

What If . . . ? The Popularity Of Strategy Games

COMPUTER'S GAZZETTE

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

Also In This Issue:

Simple Answers
To Common Questions

Programming
Commodore's
Magic Voice

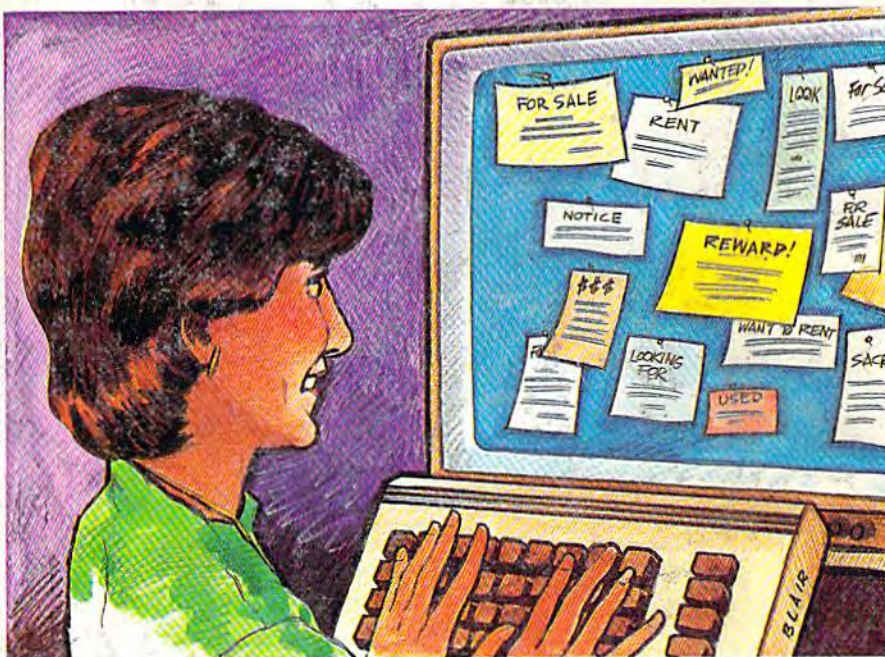
Power BASIC:
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Don't hasten through this maze—you could get hopelessly lost. For the VIC and 64.



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Turn your 64 into an electronic bulletin board. The Color/Graphics BBS makes it easy to upload/download, post messages, and send electronic mail.

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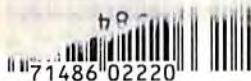
Save programming time with this versatile line numbering utility for the VIC and 64. Also instantly deletes unwanted lines.

Electronic Trivia

A look at the variety of new trivia games available for the 64.

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57087



A Nice Christmas Story

Christmas Day was approaching in the Nice household. But Mr. and Mrs. Nice (Bill and Janet) didn't know what to get for their Nice children, Tom and Marybeth. They thought and thought, but nothing seemed to hit them just right. "Hula hoops?" said Bill.

"No," said Janet. ● Tom and Marybeth, on the other hand, knew exactly what they wanted. In fact, they dreamed of it almost every night: *DawnTreader*, the latest in the *Adventures In Narnia* computer game series based on the stories by C.S. Lewis. Tom and Marybeth already

had the first game, *Narnia*, but now they dreamed about how they would captain the good ship Dawn Treader through the ocean to World's End. They dreamed about finding dufflepuds and sea serpents. And they knew that, just like *Narnia*, *DawnTreader* would be exciting, action-packed, and even educational, teaching them sound principles their Mom and Dad agreed with, too. But they wondered: would *DawnTreader* be under the tree come Christmas Morn? ● One day very close to Christmas, Bill and Janet Nice reached into the cupboard for *Narnia* (after all, it's a game *everyone* in the family can enjoy) and came across a note. It said, "We're dreaming of *DawnTreader*. Love, Tom and Marybeth."



● Finally, Bill and Janet had their answer. "It's perfect!" exclaimed Bill. "Let's get them the next Narnian adventure, *DawnTreader*!" "Oh Bill," sighed Janet, "What a nice idea!" ● It was. Wouldn't it be nice for your children, too?

**Merry Christmas from
the Nice household to yours!**

DawnTreader is available at all Waldenbooks stores and computer specialty stores. All *Adventures In Narnia* games are compatible with Apple II series® and Commodore 64™ home computers.



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Quick.

How many plates can the Juggler juggle?



Chinese Juggler

That depends on you. You are the Juggler and your act is the delicate art of plate spinning. Yours will be a tough act to follow if you succeed in matching colors and spinning plates on all 8 poles at the same time.

As your skill increases, so does the pace and the challenge of the game. You must act with speed and precision or the curtain will come down and your act will be all washed up!

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How do you moonwalk, snake and tut?



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Individual play guides you through the footwork of moonwalk, backspin, windmill, tut, and the rest of those sidewalk moves. Slow motion and lively musical accompaniment help you perform each move step by step. String together a whole series of moves and record them for future replay.

Catch the beat of the street with Break Street. For individual or team play. New from Creative Software.

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The answers are at your finger tips.

What's the capital of Alaska?



Roll Call USA

Do you know? Get ready to outwit your family and friends with Roll Call USA's fun facts on states, capitals and major industries.

Roll Call USA combines history and geography facts into a colorful question and answer game that challenges your knowledge of the 50 states, their capitals, major industries and statehood dates.

Feel confident? Drill yourself with a Flash Test. The game is speeded up, so think fast. Your answers are tallied up at the end for a final score.

Roll Call USA, a game of USA trivia for team or individual play. For Commodore 64. New from Creative Software.

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

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THE EDITOR'S

notes

GAZETTE Editor Lance Elko summarizes recent events at Commodore and looks forward to a new year here at the GAZETTE in this guest editorial.

Robert Lock, Editor In Chief

In early October, Commodore held a press conference to officially announce the kickoff of the Plus/4 and 16. Unofficially, however, not everyone at Commodore is excited about the prospects of the new machines. One source reported that there is a significant number of key employees who "just aren't behind the new computers."

Another staff member noted that some Commodore people are looking past the Plus/4 and 16 to the new Amiga (see last month's Editor's Notes), which could be on the market by early Spring. Although the Plus/4 and 16 have some advantages over the 64 and VIC, they're not technological breakthroughs. Good programming and utility machines, maybe, but not significantly different from the immensely successful VIC and 64.

Still, Commodore is proceeding with a major marketing campaign for the Plus/4 with ads in national magazines and major prime-time TV spots. It's doubtful that Commodore can repeat fiscal 1984's whopping sales figures with just the addition of the Plus/4 and the 16. Commodore's 1984 Annual Re-

port shows net sales of \$1.267 billion, almost double 1983's \$681 million.

Apparently, Commodore isn't relying completely on these two new machines to carry them through the year. Aside from the Amiga, there may be other entries in the wings. Sig Hartmann, President of Commodore's Software Division, noted at the press conference that Commodore is planning to show the C-128 (128K) computer for the home market at January's CES. He also stated that, in addition to the Amiga, an "80-column machine is coming out very, very shortly," and this, too, will be demonstrated at CES. No other details were offered, but Hartmann added that Commodore is now aiming to compete at every level in the microcomputer marketplace.

It will be interesting to see if the Plus/4 and 16 outsell the 64 this Christmas. Hartmann sees this as a possibility, but adds "the 64 is our mainstay machine. The Plus/4 is a productivity machine. It's the next level of the marketplace...for different groups of people." Commodore plans full software support for the Plus/4 and 16, and indicates a growing interest from third-party software developers. At its introduction, 26 packages were immediately available for both machines, and many more should be on the shelves as you read this.

Hartmann also noted that

Commodore has plenty of spare parts for VIC owners who don't wish to upgrade—"If people have a problem, we will fix it."

On another note, Commodore said that the previously announced Plus/4-compatible SFS 481 parallel disk drive will be released in January as the Commodore 1551, with a price tag that's \$60 to \$70 higher than the 1541. The 1551 is not compatible with the 64.

New Horizons

This issue marks the final appearance of our VICreations column by Dan Carmichael. Next month, Charles Brannon's Horizons:64 column will take on a new dimension. With a new title, simply *Horizons*, Charles will cover not only the 64, but also the VIC, the Plus/4, and the 16.

Thanks to you, the GAZETTE has continued as the leading magazine for Commodore users. Our paid circulation of 200,000 in January 1984 has grown to well over 300,000 with this, our final issue of the year.

In the next 12 months, we plan to continue offering the best articles, reviews, and programs for Commodore users, and we promise to stay innovative. We appreciate your support in 1984 and look forward to an even better year in '85. Happy Holidays.

Lance Elko
Editor

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Office Hours: 8:30 AM to 4:30 PM Monday-Friday

Chief Executive Officer Robert C. Lock

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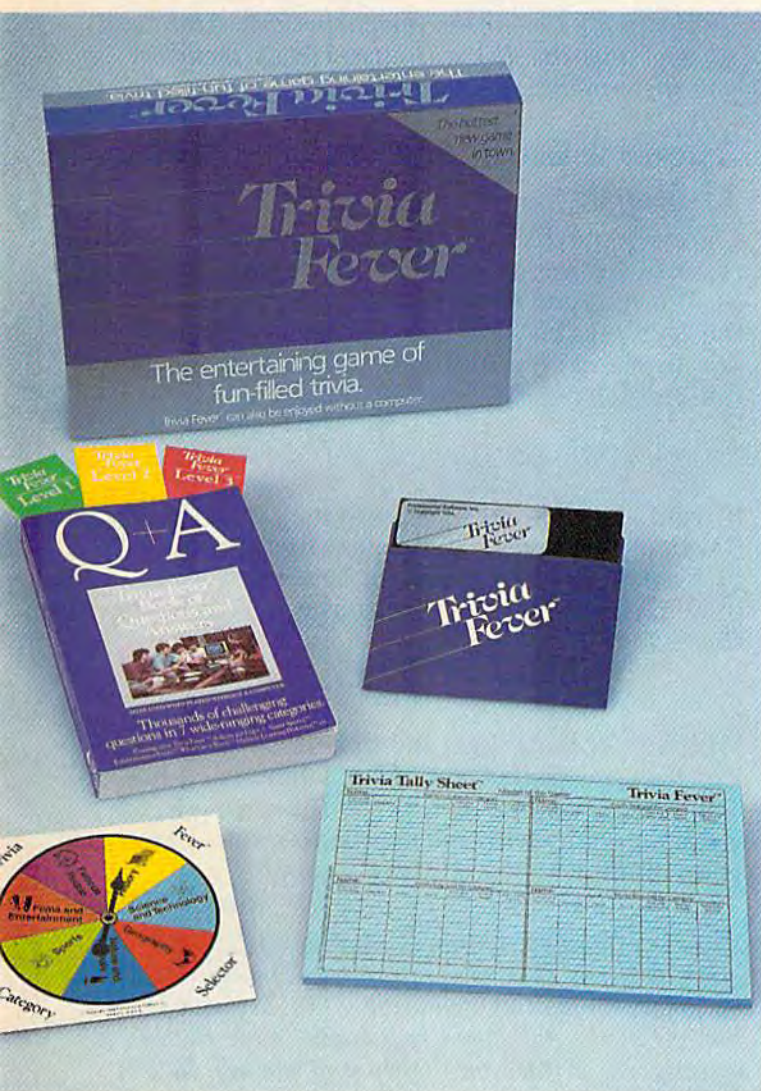
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GAZETTE FEEDBACK

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.

Note To Readers

In the October issue, page 132, we incorrectly listed the phone number of the Modem Times. The correct number is (303) 578-5405.

An End To Disk Drive Chatter

When loading commercial software, the disk drive often makes a loud chattering noise while reading the program. This is usually caused by a copy protection technique used by software distributors, whereby the disk drive is forced to read a bad track or sector on the disk.

Over a period of time, this repeated vibration of the drive's read/write head could damage the drive, or cause the stepper motor assembly which positions the read/write head to slip out of adjustment.

Here is a short program that, in most cases, will prevent this chatter when loading commercial programs. It will prevent the head from bumping when going to track one.

Type the following one line program in the immediate mode (without a BASIC line number) and press RETURN. It will reprogram the disk controller, and should be entered just before loading the commercial software. After it is entered, load the software according to the directions. This program is about 90% effective, but in cases where it does not stop the chattering, it shouldn't interfere with the proper execution of the commercial program. Try it, and your 1541 will thank you.

```
OPEN 15,8,15:PRINT#15,"M-W";  
CHR$(106)CHR$(0)CHR$(1)CHR$(133):CLOSE15
```

Gilbert D. Helland

Thanks for the very useful tip. Many readers have written and inquired about the possibility of damage to their disk drives when this "chattering" is encountered. We tested this program on software from five different software manufacturers, and it worked well with all. One other game, however, returned a message that the disk was a copy (even though it was the original).

Special Brackets And GAZETTE Listings

I recently purchased a VIC-20 and am in the process of teaching myself how to program. In doing so, I have typed in some of the programs from the GAZETTE, but have encountered a problem.

In many of your programs you use the special brackets:

{ 8 }

⌈ 8 ⌋

⌈ 8 ⌋

With any of these I get the uppercase as though I had used the SHIFT key. Also, when using the "Automatic Proofreader," I get the wrong REM values on lines with the special brackets. Can you tell me what I am doing wrong?

Russell Willis

You aren't doing anything wrong. A VIC-20 has eight different character colors. You change character colors by holding down the CTRL key and pressing one of the numbered keys from 1 to 8; the color you'll get is printed on the front of the key. BLK is black, WHT is white, and so on.

If you're in quote mode, however, pressing

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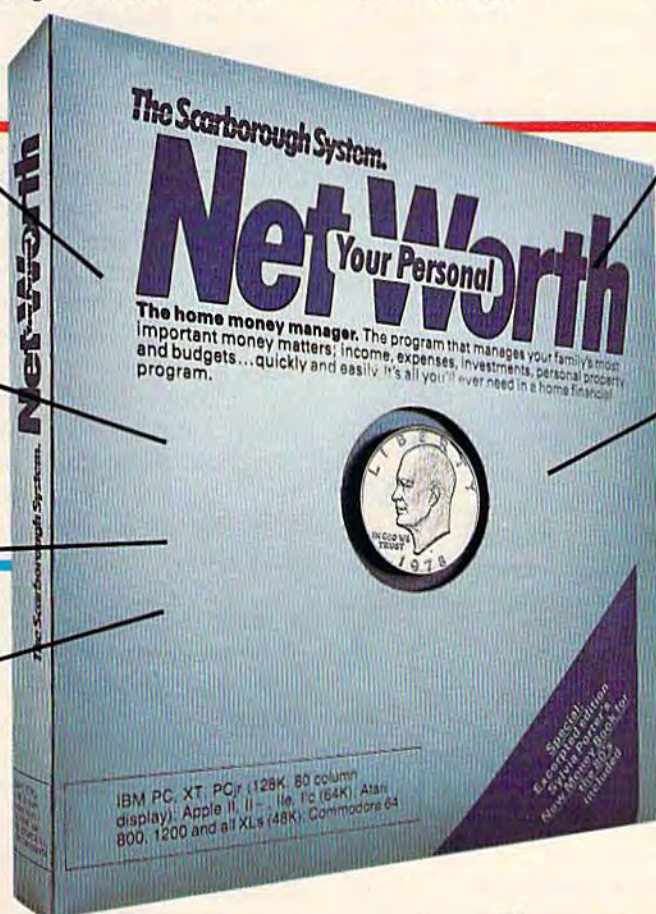
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CTRL and a color key will result in a graphics character. This is useful when you want to change colors in the middle of a string.

When Commodore developed the 64, the designers decided to add eight more character colors, for a total of 16. Among the new colors are a brown, a light blue, and three shades of gray. The new colors are accessed by holding down the Commodore logo key and typing one of the numbers between 1 and 8. The eight colors which use the Commodore key on the 64 are not available on the VIC, which treats a Commodore-8 the same as a SHIFT-8 and prints a left parenthesis.

In one case, "3-D Tic-Tac-Toe" (June), a GAZETTE program originally written for the 64 was translated for the VIC and some of the inaccessible color codes were left in the listing. The solution is to omit the character altogether, or use the CTRL alternative. Either way, the Proofreader checksum will not match up.

PEEKless SID Registers

I'd like to examine the SID (Sound Interface Device) registers in my 64 while my music program is playing. However, the SID registers are *write only* registers, and a PEEK at one of them always returns a zero. Is there any way to examine these registers to see if the voice gate is on or off, or what any of the SID parameters currently are? My program is interrupt driven, so I can check these registers while the program is running.

Mark Wardenburg

Unfortunately, there is no way to PEEK these registers and get an accurate value. The chip that runs your 64 treats the SID registers as if they occupy memory locations, but a POKE to the SID chip actually sends a one-way electrical signal to certain pins. Trying to PEEK the SID chip registers is like trying to get water to run uphill through a hydroelectric dam. On some 64s a value other than zero might be returned with a PEEK, but they may be random values, and should not be trusted.

However, there is a useful programming technique that will allow you to monitor the values you have POKEd into the SID registers. The 25 SID registers most frequently used to produce sound are the memory locations between 54272 and 54296.

First, set aside 25 bytes in an unused area of memory. Two possibilities are the cassette buffer (828-1019), or the unused area of memory between 679 and 767. These 25 bytes will correspond to the 25 SID registers between 54272 and 54296. For example, when using the area between 679 and 767, byte 679 would correspond to SID register 54272, and 703 to 54296. There is also 4K of available RAM starting at 49152.

In your program, first POKE the values you wish to place in the SID registers into the

corresponding memory location in the reserved area. Then move the value from this memory location into the SID chip. Use a loop (in BASIC or ML) to PEEK the value in memory and POKE the value to the SID chip. You still can't PEEK the SID chip, but you can PEEK its mirror image.

All of the SID registers except two are write-only—you can POKE but not PEEK. Your POKes provide the input which triggers the chip to output sounds to a television or monitor speaker. The two unusual locations are at 54299 and 54300, and like ROM, are read-only. The first of these, 54299, reads the upper eight bits of the waveform output of oscillator three. This is very handy for machine language programmers who need random numbers. At the beginning of an ML program, set voice three to a white noise waveform with the highest possible frequency and an envelope of zero attack, zero decay, maximum sustain. Any time you need a random number, Load the Accumulator (LDA) from location 54299 (\$D41B). The result is an (almost) random number from 0 to 255.

Cool Disk Drives

If you leave your 1540 or 1541 disk drive on for extended periods of time, causing it to heat up, here's a tip.

An inexpensive air purifier placed upside down over the vent grills on the top-rear of the disk drive will reduce the temperatures of the chips, and eliminate the hot spots felt when leaving your drive on for extended periods of time.

I use a Norelco model HBO999 because of its compact size and horizontal outlet. I have removed the scented crystals leaving the wire mesh to act as a coarse filter, thus increasing air flow.

I chose to blow air into the drive rather than draw it out for two reasons. First, it forces air directly onto the chips and out past the read/write head assembly. Second, it provides the option of filtering the air before it is introduced into the disk drive.

Sealing the fan unit to the drive can be enhanced by cutting out a foam gasket and placing it between the air purifier and the drive. Appearance can be enhanced by removing the purifier's legs.

Gerry Bamon

Thanks for the tip. Most of the cooling fans advertised for the 1540 or 1541 work on this principle. That is, they are flat fans laid on top of the ventilation grills. You might also place a piece of lintless cloth over one end of the air purifier.

Be sure to remove the filters made of citrus, charcoal, or any other filtering agent of this type. Any particles falling into the disk drive could cause damage.

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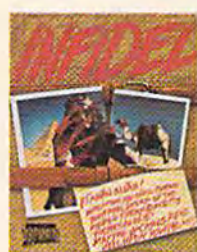
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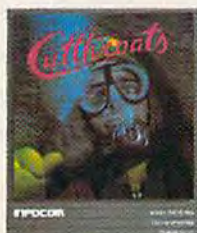
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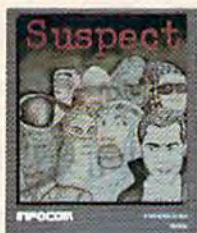
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Oversized Variables

In many of your programs for the VIC and 64, I have seen statements such as:

```
FOR ADRES = 123
```

What is ADRES? I thought variables in a program were limited to two characters.

Tim Cronsberry

When programming in BASIC, you are limited to two significant characters. You can give your variable names more than two characters, but anything after the first two will be ignored by the operating system.

Using names with more than the allowable number of characters can be beneficial because it makes the program more readable. The variables used can be understood more easily.

But you must remember that only the first two characters have any significance. For example, when writing a payroll program, a variable name of HOURLYWAGE would make the listing easier to follow. However, if you have another variable in the same program with the same first two letters (HOURSTOTAL, for example), the computer would treat them as if they were the same variable, HO, and you would not get the desired results. In addition, you must watch for embedded BASIC keywords. For example, the keyword TO (as in FORJ=1TO10), if used in a variable such as TOTALHRS, is embedded and will cause a syntax error.

If you do use variable or string names with more than two characters, make sure the first two characters are unique.

Spinning The Disk Drive

In the June 1984 issue, Jerry A. Coy had a question about spinning the disk while cleaning the disk drive. Here's a short program I wrote to help me clean my disk drive. It will move the read/write head back and forth from track 1 to track 35. This will maximize the potential of your cleaning disk, and provide a back and forth cleaning motion as well as that of the motor spinning.

If you have a drive with an address other than 8, change line 5 to U (= your drive number). To change how long the program runs, vary the loop in line 20 (each pass through takes about 10 seconds).

To use it, load the program, prepare the cleaning disk per the manufacturer's instructions, insert the cleaning disk into the drive, and enter RUN.

```
5 U=8
10 OPEN 15,U,15
15 OPEN2,U,2,"#"
20 FOR J=1TO4
30 PRINT#15,"U1:2 0 1 1"
```

```
40 PRINT#15,"U1:2 0 35 1"
50 NEXT J
60 INPUT#15,A$,A$,A$,A$
70 CLOSE2:CLOSE15
```

Random Number Ranges

I have a question about generating random numbers on my 64. How can I make my computer generate random numbers between 100 and 200 by steps of 5?

David Tan

There are a number of different ways to generate a range of random numbers in steps. Here are the two most straightforward.

The range of numbers you need (100-200) contains 21 different unique numbers. If you generate a random number between 0 and 20 (this covers the range of 21), multiply it by 5 (producing the steps by 5) and add it to 100 (which gives you the low base of 100), you will get the desired results. Here's a sample program to show how it's done.

```
10 A=INT(RND(1)*21)+0
20 A=A*5+100
30 PRINTA:GOTO10
```

Another method is to generate a random number between 100 and 200 then check to see if it is one of the desired numbers. This can be done with a FOR-NEXT loop that is incremented by steps of five. Here's how it works. Generate a random number within your range of 100-200, then via the FOR-NEXT loop check to see if it is equal to 100. If not, increment your loop by five and check to see if the number is equal to 105 and so forth up to 200. If no equal condition is found, generate another random number and start the process again. This method is much slower than the first example. Here's a sample program.

```
10 A=INT(RND(1)*101)+100
20 FORB=100TO200STEP5:IFA=BTHENPRINTA:GOTO10
30 NEXT
50 GOTO10
```

Bad Vibrations

When I purchased my 1541 disk drive, it came with a card inserted into the drive that said Head Vibration Protector. The instructions on the card stated that it should be inserted into the disk drive and the door closed each time the disk drive is moved.

Well, I have my computer and disk drive on a table that rolls so I can pull it out when in use, and push it back when I'm done. Even though I frequently move the table back and forth, should I keep the card inserted into the drive as instructed? Will it harm the read/write head if I don't?

Steve Trigili

The cardboard head protector that came inserted



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with your disk drive serves a dual purpose. Not only does it protect the head during shipment by providing it with a semi-soft surface to rest on, but it also stops the stepper motor assembly from moving back and forth. It can't hurt to insert the card into the drive whenever it is moved, no matter how far.

Sound Interference

I own a VIC-20 and have discovered that without using expansion memory, there isn't much [memory] to work with. Is there a way to find out how many bytes I have used, or how much memory is left?

In another area, I've noticed that a few of the games I've typed in from the GAZETTE cause buzzing sounds on my TV. In fact, the buzzing is so loud at times that I can't hear the beep of the characters. One such game is "React." It doesn't buzz until the white border is added to the black screen. Is it my TV or my all-thumbs programming?

Thomas Putt

To determine how many bytes are free, enter `PRINT FRE(0)`. This command returns the number of bytes of unused BASIC memory. One way to determine how many bytes a program is using is to jot down the amount of memory free when you first turn on your VIC (3581 in the unexpanded VIC, for example). After loading or writing your program, enter `PRINT FRE(0)` and subtract the resulting number from the original bytes free. This will tell you the number of bytes used by your BASIC program.

In addition to BASIC programs, variables use memory. If you ask for the amount of free memory before and after running a program, you will probably find you have less when the program has finished. This is why it's possible to run out of memory halfway through a program. There are numerous techniques for saving memory. Deleting all REMARK statements is probably the most common. Since each BASIC line takes up a minimum of five bytes, putting more than one statement on each line can open up some memory. And if you're using numeric arrays which hold whole numbers, use integer arrays (`P%(5)`) rather than `P(5)`, for example. Integer arrays use only two bytes per item compared to five bytes for floating point arrays. Unfortunately, this does not hold true for non-array variables; both integer variables and regular floating point variables take up five bytes (plus two for the variable name).

One solution to your buzzing problem is to adjust the fine tuning on your television (most TVs have a ring around the channel selector). Or try flipping the switch on the RF modulator which selects between channel three and channel four.

Some TVs will produce a buzzing sound when

certain color combinations are used. This is largely due to the video signal from the computer bleeding into the audio channel. To stop this, you could take your TV to a technician, and have him add a filter which might remove the video interference.

Another way to solve this problem is to purchase a Commodore 1701 or 1702 monitor. With this monitor, you can feed the audio and video signals separately. This helps eliminate that annoying buzz.

Jumping Screens Update

In the July issue, you dealt with a problem that many of us VIC users face. That is the apparent incompatibility of the VIC-20 and the Zenith System III TVs. You mentioned a minor hardware modification for the TV that would solve the jumping screen problem.

I initially experienced the same problem, but found a simple software solution. The jumping screen is apparently caused by a problem with the vertical sync, but it is not necessary, as you mentioned, to unplug the 2H vertical jumper, as suggested by the Zenith dealer.

If you turn on the interlace mode by either:

`POKE 36864,PEEK(36864)OR 128`

or

`POKE 36864,133`

the video signal is sent only 15 times per second, rather than the normal 30. This slower video refresh enables the vertical sync to function properly.

Dr. Philip C. Withers


Thanks for the helpful tip, Dr. Withers. Readers should note that it is bit 7 (value of 128) which controls the interlace switch. Bits 0-6 control the horizontal location of the screen. By POKEing different values to 36864, you can make the whole screen move back and forth. The next memory location, 36865, controls the vertical location. POKEing 36865 makes the screen move up and down. These two locations can be helpful in centering the screen. Also, if you're writing a game, a series of quick POKES to these two locations can make the screen appear to "tremble," as if shaken by an explosion.

1520 Printer/Plotter Replacement Pens

As a recent purchaser of a Commodore 1520 Printer/Plotter, I have found that replacement pens are hard to find.

For interested readers, I suggest using the replacement pens for the Radio Shack PC-2 Printer/Plotter, catalog number 26-1480 (3 black pens), and catalog number 26-1481 (one each of red, blue, and green). The pens are identical to the Commodore pens.

Herbert H. Starkey

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Colorful Sprites

How do you give a sprite more than one color?

Scott Senkeresty

Sprites are a powerful programming tool, but with power comes complexity. You have to work out the shape, convert it to DATA statements, POKE them into a safe area of memory, set a pointer to the sprite shape, set X and Y coordinates, set the color, and turn on the sprite. There are a number of books and magazine articles which explain how to use sprites.

Multicolor sprites give you more flexibility, more interesting shapes to work with. If you've arrived at the point where you can define sprites and move them around the screen, you can begin to experiment with color. There are two ways to make multicolor sprites.

The first is fairly easy. Define two sprites, using different colors, and put one on top of the other. Sprites are displayed in a certain order of priority, from lowest number to highest. This means that sprite zero will always appear on top of (or in front of) all other sprites. Sprite one has priority over sprites two through seven, and so on.

Normally, if a bit is turned on, it will appear on the screen in the color of the sprite. An off bit

will let the background color show through. But if you have one sprite on top of another, the off bits will let the second sprite's color show through (the second sprite is the one with the lower priority). As long as they have the same X and Y location, it will appear that you have a single two-color sprite.

There are two drawbacks to this method, however. The first is that instead of eight one-color sprites, you are limited to four two-color sprites (or two four-color sprites). Second, if your program needs to check sprite collisions, you have to be careful that the bits of the overlapping sprites do not intersect. You may get spurious collisions if the program is written in BASIC.

A better way to make colorful sprites is to use multicolor mode, controlled by a register at 53276. The eight individual bits correspond to the eight different sprites. To make all sprites one color, POKE 53276,0. POKEing a 1 makes sprite 0 multicolor (and the rest one color); POKEing a 2 makes sprite 1 multicolor, up to 128 which affects sprite seven. POKE 53276,255 (255 is $128+64+32+16+8+4+2+1$) to make all of them multicolor.

Multicolor mode gives you up to 4 different colors in each sprite. The four colors are: screen color (actually a transparent part of the sprite allowing the background screen color to show through), individual sprite color, sprite multicolor 0, and sprite multicolor 1. The individual sprite color can vary from sprite to sprite, but screen color, and the two multicolors are the same for all eight sprites. The registers to POKE are as follows:

00 Screen color : 53281
10 Sprite color : 53287-53294 (sprites 0 through 7)
01 Multicolor 0 : 53285
11 Multicolor 1 : 53286

To turn on the multicolor mode for a single sprite, POKE 53276,PEEK(53276) OR (2^N) where N = sprite number (0 to 7). To turn off the multicolor mode: POKE 53276,PEEK(53276) AND ($255 - 2^N$).

Unlike the first method of adding color, multicolor mode lets you have eight different sprites moving around. But there is one drawback: Resolution is halved. Instead of coloring individual pixels, pairs of pixels are turned on or off. Let's say one of the DATA statements is 50, which translates to a bit pattern of 00110010. With one-color sprites, the 1's would represent pixels which are turned on. But in multicolor mode, you have to look at bit pairs: 00, 11, 00, and 10. The first two pixels (00) would be transparent, the same color as the screen. The next two (11) would be multicolor 1, followed by the screen color again. The last two (10) would both be the sprite color. Even though the two bits are different, 1 and 0, the corresponding pixels would be the same color. Instead of each byte controlling eight different pixels, each byte controls four different pairs of pixels. ☺

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and you find that it's busy. Mitey Mo has "auto redial" — it hangs up and redials immediately until it gets through. With the other modem you have to redial each time — and somebody with auto redialing can slip in ahead of you.

Mitey Mo is menu-driven. It lists the things you can do on the screen. Select a number and you're on your way. Since Automodem isn't menu-driven, you'll be hunting through the manual a lot.

Mitey Mo has only one switch, the customized software does the rest. Every family member will find it

easy to use. With the other modem you'll have to remember to check three switches, otherwise you may be answering when you mean to be originating.

Mitey Mo gives you access to twelve pages of memory (24,000 bytes), so you can store data and review or print it later. The other modem doesn't let you store or print anything.

Mitey Mo is half the size of the other modem. The very latest technology allows miniaturization and increased reliability, as well. Mitey Mo is so reliable, we gave it a three-year warranty. The other modem gives 90 days, then you're on your own.

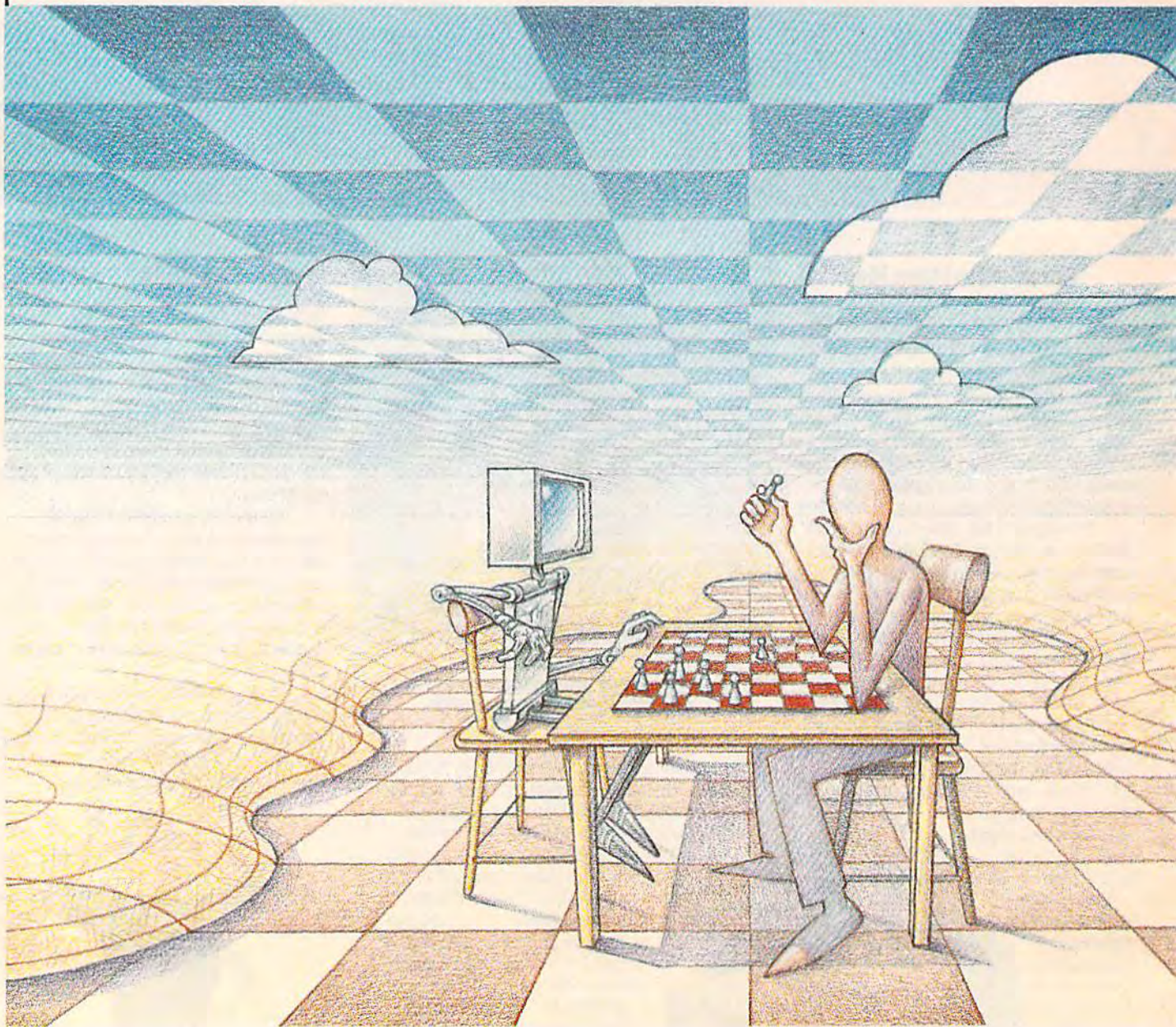
Not only will you find Mitey Mo mighty useful, you'll find it mighty reasonably priced — \$99.95. When you consider how much more you get, there's really no other choice.



TAROCO

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What If...?





The Popularity Of Strategy Games

Selby Bateman, Features Editor

From the ancient games of Chess and Go to modern simulations of business, sports, and warfare, strategy games enthrall us with their complexity and depth. Computer-based strategy games, many of which are available for the Commodore 64, are now coming into their own as sophisticated interactive simulations—the next best thing to being there.

Shall...we...play...a...game?

With that simple question, a supercomputer challenged a teenage computer hacker in the motion picture, *WarGames*. Audiences across the nation were fascinated as the game, *Global Thermonuclear War*, turned from simulation to movie-reality.

Similar computer strategy games are available in quantity for Commodore owners, and many more are in the works. Their complexity may not rival the one played by the main-frame supercomputer in *WarGames*, but they are remarkably advanced.

Game manufacturers have discovered that computers can bring to the traditional board strategy game three important components: flawless manipulation of hundreds of details, real-time action, and almost limitless variations of game play. The computer also helps to solve

two of the traditional complaints about (non-computer) strategy games: They're too slow and they lend themselves to careless human errors in game book-keeping. Some board war games involve dozens of individual units, with factors for troop movement, terrain, zones of control, morale, reinforcements, weather, and the list goes on. In some of these games, it may take an hour (or more) just to make one move.

"You're going to see even more detail and a lot faster speed in the games," says Joel Billings, president of Strategic Simulations, Inc. (SSI), a company which makes more than twenty computer-based strategy games for the Commodore 64.

"One of the problems we've been working on for five years—and it's getting solved—is that the games started out too slow. People didn't want to get into the [strategy] games on the computer because they saw



RAID ON BUNGELING BAY™

When you shopped for a computer, you wanted one with a lot of intelligence. This game may lead you to regret that choice, as your friendly little computer becomes the brains behind the most fantastic enemy you will ever face: The War Machine.

A monstrous artificial intelligence directs an endless army of self-replicating robot weapons and a complex of factories hidden on six heavily defended islands. Even as you strike at one island, robots beyond your field of vision continue to multiply...to repair the damage you've done...to attack and destroy.

Before all of Humankind is crushed beneath the Bungeling Empire's iron heel, one faint hope remains: you in your helicopter.



THE CASTLES OF DOCTOR CREEP™

Ever dream that you were locked in a haunted castle, wandering blindly through darkened corridors, never knowing what ghastly demons await you? Then you'll feel right at home in *The Castles of Doctor Creep*.

It's a maddening maze of 13 separate castles, more than 200 rooms in all. Sinister surprises await you behind every door: mummies and monsters, forcefields and death rays, trap doors and dead—very dead—ends. Remember where you've been and watch where you're going...there's got to be a way out *somewhere*!

Better hurry, or you'll wind up playing a rather unpleasant role in one of Doctor Creep's experiments.



SPELUNKER™

Who knows what fabulous treasures—and unspeakable dangers—await you in the world's deepest cave? This is one game you can really get into...and into...and into.

Wander through miles of uncharted passageways, swinging on ropes and ladders, tumbling over subterranean falls and plunging to the very depths of the earth on an abandoned mine railroad. Deadly steam vents and boiling lava pits threaten you at every turn. Chattering bats and the Spirits of dead Spelunkers beg you to join them, permanently.

Let's face it: you're in deep, deep trouble.



WHISTLER'S BROTHER™

You're the star of a full-fledged arcade adventure—and the big question is whether it'll turn out to be a comedy or a tragedy. That's because your co-star and beloved brother, Archaeologist Fenton Q. Fogbank, is rather absent-minded and extremely accident-prone.

As you search for priceless treasures in steaming tropical jungles, ancient cliff villages, musty old tombs and glittering crystal caverns, you control both your character and your brother. The only way to keep him on track and out of trouble is to whistle and pray that he follows you to safety.

Poison arrows, runaway boulders, fearsome frogs and mysterious mummies are only a few of the hazards that'll make you wish you weren't your brother's keeper.

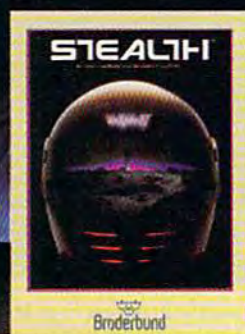
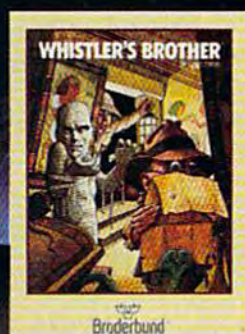


STEALTH™

You're all alone on a strange and forbidding planet. On the distant horizon, looming thousands of meters above the blasted landscape, lies your destination: The Dark Tower, home of the mysterious Council of Nine, cruel overlords of a conquered world.

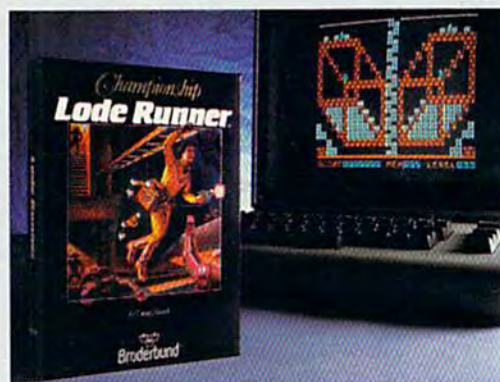
You must maneuver your Stealth Starfighter through an unending assault by the Council's automated arsenal—jets and heat-seeking missiles, photon tanks and anti-aircraft batteries, vaporizing volcanoes and deadly energy fields. Outgunned and outmanned, you must press ever onward, with only your stealth to rely on.

You must reach the Tower. You must destroy it. There's no turning back.



NO MERCY

FOR COMMODORE.™



CHAMPIONSHIP LODE RUNNER™

It has come to our attention that some of you out there think you're pretty good at *Lode Runner*, 1983's best computer game. For those foolhardy few, we offer a challenge of a higher order: *Championship Lode Runner*.

With fifty fiendish Treasury Chambers: more intricate, more elaborate, more insidious than anything you've seen before. You'll need lots of skill, lots of smarts, and every ounce of your lode-running experience to have any hope at all of survival.

And if you haven't yet paid your dues on the original *Lode Runner*, don't even think of attempting this championship round.


Broderbund™

them as very slow compared to hand-eye coordination games.

"That division between hand-eye coordination and strategy games is going to meld together; it's going to disappear," he adds.

SSI and Avalon Hill's Microcomputer Games Division offer more computer-based strategy games than any other companies, with scores of sophisticated simulations on a variety of topics.

A strategy game can be produced to simulate almost any activity. Naturally, the games that sell the best are those which intrigue the most people. Sports games such as baseball, football, boxing, bowling, and golf are all popular subjects of strategy games. Business strategy games also are popular: Manage your own multinational company, wheel and deal on Wall Street, or acquire and merge hotel chains. Avalon Hill even offers a game for the Commodore 64 which recreates a typical week in the lives of the "working class," *TGIF (Thank Goodness It's Friday!)*.

Have you ever wanted to stage a 12-round fight between two of the great heavyweights, matching their individual strengths, weaknesses, and approaches as you manage the round-by-round strategy? What would a bobbing and weaving Larry Holmes have done against a heavy hitting Rocky Marciano?

One way of designing a boxing game would be to concentrate on the fight, pitting one player against the other. It would be an action game where the two players control how much punching goes on. Each player takes on the role of a boxer. But suppose the players stepped back and took on the persona of a boxer's manager? It would no longer be a straight

arcade-style game, because strategy and tactics would become more important than reflexes and reactions. You could give orders to the boxers, plan to start fast or slow, train your fighter in different ways, concentrate on offense or defense, and much more. The game would not involve twisting a joystick back and forth; you'd have to plan ahead.

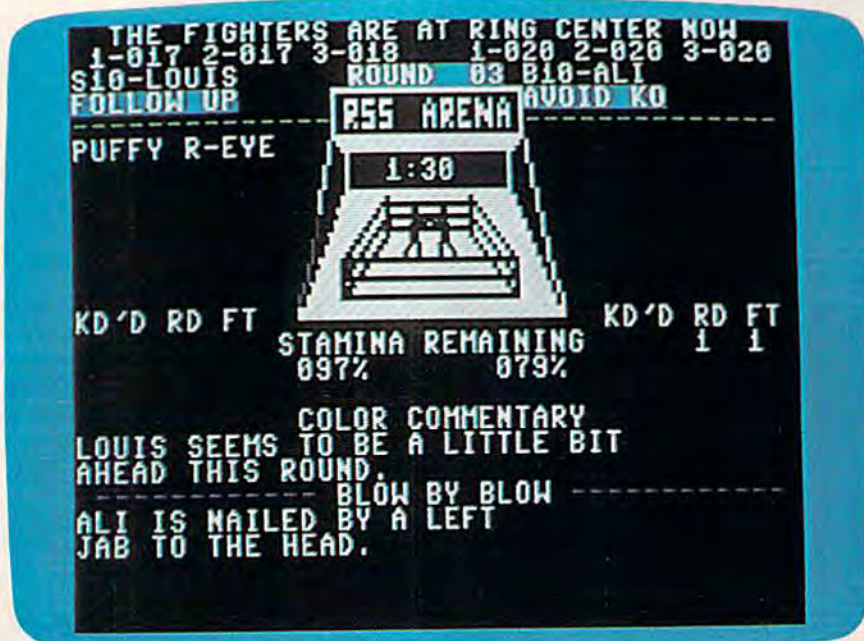
SSI offers you the chance to do just that with its computer game of championship boxing, *Ringside Seat*. Choose your fighters and mix your own set of variables. If your fighter is a slugger, then he can probably charge in more effectively than a classic boxer who may be better at such techniques as sticking and moving. The options under your control are numerous. The computer, of course, does what it does best: keeps track of all those variables. That amount of detail would be almost impossible to monitor without the computer, and probably too boring for anyone other than the most tenacious game players.

This attention to detail

brings not only more depth of play, but can offer months of continuing interest, notes Jack Dodd, director of marketing for Avalon Hill's Microcomputer Games. Game players seem more willing to pay a bit more for this extended play than for the kinds of arcade-style action games which may grow stale very quickly, he says.

Avalon Hill, which began producing board strategy games in 1958 with one title, now has more than 200 board, computer, and video games. Virtually all of the people now producing computer strategy games got their start playing Avalon Hill board games and the play-by-mail games that the company also helped pioneer.

While sports and business are topics for numerous games, the strategy of warfare remains as popular a game subject today as it was when chess was invented. Far more computer strategy games are devoted to studies of historical conflict than any other subject. Just as in *WarGames*, questions



SSI's *Ringside Seat* offers more than 45 of the world's greatest fighters. The player plans round-by-round strategy and can alter each fighter's style, ability, speed, aggressiveness, strength, and many other characteristics.

To teach your child to spell, we had to design software that talks.

Cave of the Word Wizard.™ A unique way to develop spelling skills using human speech and arcade action.

Software that tries to teach spelling by jumbled letters isn't a very good teacher. The software has to talk. Now it does. Only on *Cave of the Word Wizard* from Timeworks.

The Wizard talks like a human being, not like a robot. This fascinating character thrusts you into an intriguing adventure as he teaches spelling in the most effective way possible on a computer.

You have wandered into a mysterious cave, and the entrance has been sealed behind you. Suddenly the Word Wizard appears and informs you that in order to leave his cave you must find four magic crystals which have the power needed to open the cave entrance. You have only a flashlight to help you find your way through the cave, and your batteries are running low.

The Wizard is a funny old fellow who causes lots of mischief for anyone who enters his cave. He will appear often and ask you to spell a word—you will actually hear the old Wizard's voice!—and you cannot continue your search until you spell the word correctly.

The Wizard will use his magic powers to replenish the energy in your flashlight if you spell the

word correctly, but each time you are wrong he will draw energy from your light. When your flashlight runs out of energy you will be doomed to roam through the cave in darkness forever.

During your search you will be confronted with spiders, rocks, snakes, and other dangerous obstacles that will make your quest for freedom even more challenging.



This state-of-the-art educational program includes 500 spoken words in 10 spelling skill levels and

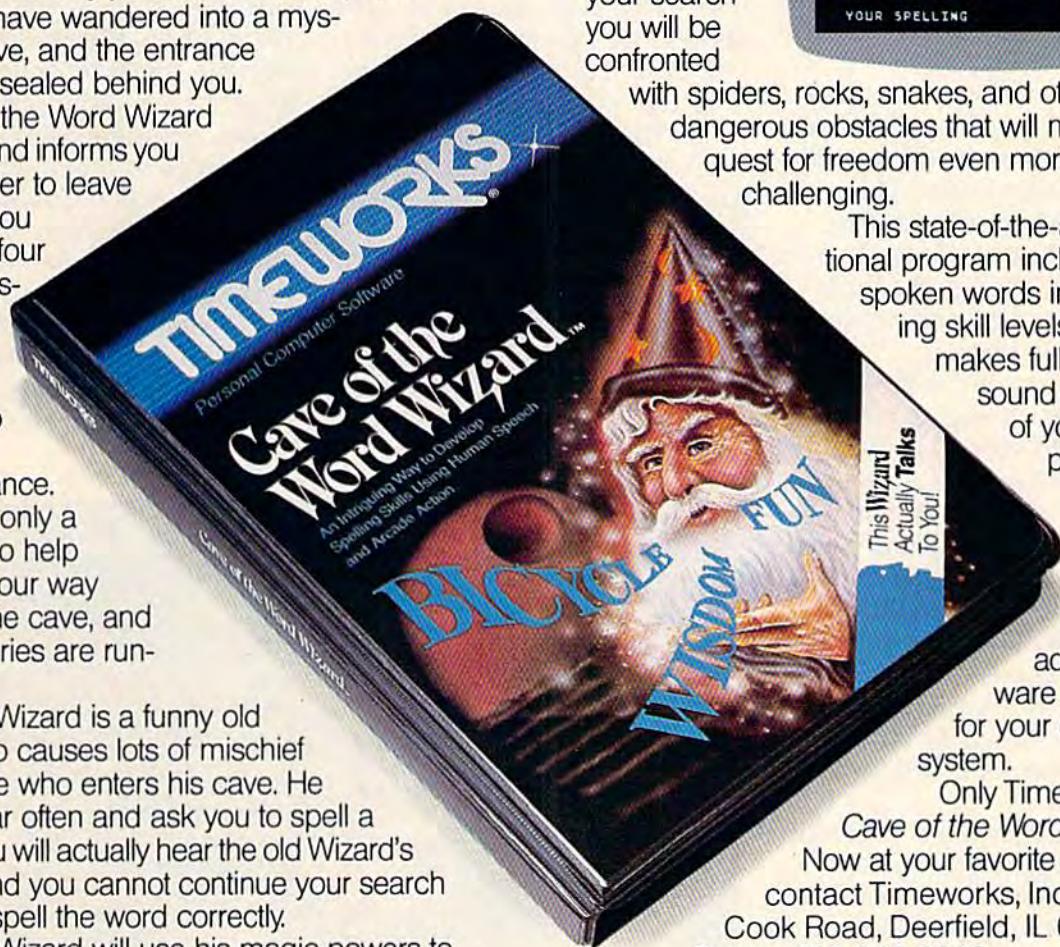
makes full use of the sound capabilities of your computer. The

Wizard will talk to you in clear human speech. No additional hardware is needed for your computer system.

Only Timeworks offers *Cave of the Word Wizard*.

Now at your favorite dealer. Or contact Timeworks, Inc., 405 Lake Cook Road, Deerfield, IL 60015. Phone: 312-948-9200.

Available for Commodore 64*



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Timeworks Programs:

■ Evelyn Wood Dynamic Reader ■ Dungeons of Algebra
■ Dragons ■ Spellbound ■ Computer Education Kits
■ Robbers of the Lost Tomb ■ Wall Street ■ Star Battle
■ Presidential Campaign ■ Money Manager ■ Electronic
Checkbook ■ Data Manager ■ Word Writer

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of "what if....?" are providing fascinating games for thousands of Commodore owners.

What if you commanded Caesar's legions against Helvetii barbarian infantry and Belgae cavalry during the Gallic Wars?

What if the Huns, who actually swept through Europe 400 years after Caesar's time, had been met by Caesar himself? Avalon Hill's *Legionnaire* for the 64 offers you the chance to find out.

What if you commanded the German troops invading Russia during World War II? Let your computer move the Russian troops in this campaign which was so crucial to the outcome of the war. Ba'rac Limited allows you to do just that in its new *Road To Moscow: The Eastern Front, 1941-45*, available for the Commodore 64. That's also the scenario in Avalon Hill's *Panzers East!*, for the 64. (See reviews of Ba'rac's *Road to Moscow* and Microprose Software's *NATO Commander* elsewhere in this issue.)

The Battle of the Bulge, another important engagement during World War II, is the subject of SSI's *Tigers in the Snow*. As in most war games, you make your strategic plans based on such factors as troop strength, weather, supplies, airpower, reinforcements, and similar categories.

Critics of these games deplore the attention given to the subject of war. SSI's Billings disagrees.

"War games make you a little more sensitive to the fact that war is not great. Seen from the eyes of the general, it may seem like a lot of fun. But you quickly realize it's very easy to say, 'I'm going to sacrifice this guy over here. It represents 15,000 men, but it's for the greater good.' Then you realize you wouldn't want to be one of those men out there being sacrificed," he says.

Those people who play strategy war games, adds Billings, generally are college educated, interested in history, and have fairly high IQs. "It's an awareness level. People who play war games are more aware of the issues. There's a better understanding of what's going on," he says.

"I don't think you have any more of the jingoistic type of feeling. You probably have less of what you might think would be associated with war games," says Billings. "Studies of the war gamer crowd ten years ago showed that you're dealing with college educated people, and that's why it fits in real well with computers, of course. [The games] are very complicated; you don't play them unless you're pretty smart."

Whatever the pros and cons, it's clear that war strategy games have found a natural habitat in the computer.

Billings says the audiences for computer war games and other strategy games, such as sports or business, are different. From customer response cards, SSI knows that 95 percent of

the people who buy their computer war games have played board war games by Avalon Hill or others. Of the customers who purchase SSI's *Computer Baseball*, Billings says that 62 percent have played a board war game before. "So, you're getting 40 percent of those people who are not wargamers, but happen to be interested in baseball. They don't know what a strategy war game is," he says.

SSI is trying to reach that percentage with several of its new games, which feature real-time action. With games like *Combat Leader*, which includes arcade-style graphics and action as well as strategy, and *Broad-sides*, which puts you in command of an 18th-century warship, realtime action is used to make the game more interactive. Realtime action allows both sides to move virtually simultaneously. Changes even occur off the screen while the game is in progress, adding a more realistic feel.

"In most war games, you sit down and make your move. Then the other player makes his move, and so on. In *Combat*



Among the most popular computer strategy games are simulations of important battles and wars, such as Avalon Hill's Dnieper River Line.

["Hi, we're from Europe. Where's the gold?"]

A SECOND CHANCE to GET the NEW WORLD RIGHT.

IF COLUMBUS HAD LANDED IN NEW JERSEY; if Cortez had been nicer to Montezuma; if Pizarro had been a more generous soul, would the world today be any different?

If you've ever wondered about things like that, you'll like *Seven Cities of Gold* very much indeed.

It's a kind of adventure. An unusually rich and technically impressive one with new continents to explore, natives to encounter, resources to manage and trade routes to establish. But beyond all the neat stuff *Seven Cities* throws up on the screen, there's something else happening here.

It feels quite odd to look at the map and see nothing. Of course you have to explore the more than 2800 screen new world in order to map it. But the way the natives act, the way you get older,



This is Europe, in scrolling 3-D graphics. You outfit, visit the Crown, launch your ships, and if you're cut out for this, you return later to tell all sorts of wild stories about what it's like over there.



There are over 2800 screens to explore in the new world. As you scroll through them, seasons change



Animated natives surround you. They have no reason to trust you. The drum beat quickens.



Trading with the Aztecs is tricky. You could wind up with enough gold to build an empire. Or as soup.



Home again you view your maps, pat yourself on the back, and consider your place in history.

the way seasons change and your men behave, and the way your reputation precedes you gives you a sort of feeling that's unexpected in computer games. It's deeper. Maybe a little disquieting. It plays as much in your head as it does inside your computer.

Seven Cities does all this with the real world or, better still (since the "new" world really isn't any more), it will construct any number of completely detailed hemispheres for you to try your hand with.

Designed by Ozark Softscape (the people who made *M.U.L.E.*, *Infoworld's* "Strategy Game of 1983"), *Seven Cities* is about as near a recreation of history as has ever been accomplished, with or without a computer.

Find it. Stomp around in it. See if you can't do a better job than all the celebrated figures who got us into the mess we have to deal with today.

SEVEN CITIES of GOLD™

from ELECTRONIC ARTS™



MACHINE REQUIREMENTS: *Seven Cities of Gold* is available for the Apple II, II+, IIe & IIfx, Commodore 64 and Atari home computers. *Seven Cities of Gold* and *M.U.L.E.* are registered trademarks of Electronic Arts. Apple is a trademark of Apple Computer Corp. Commodore is a trademark of Commodore Business Machines, Inc. Atari is a trademark of Atari Computer Corp. For a free product catalogue, send a stamped, self-addressed #10 envelope to Electronic Arts, 2755 Campus Drive, Redwood City, CA 94063.

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Leader and *Broadsides*, it's all realtime, so it has the feeling of an arcade game. But it has a lot more strategy built in than an arcade game would have," he says.

Computer strategy games, while already complex, will become even more interactive and sophisticated in the future, says Roger Damon, who designed Brøderbund Software's popular *Operation Whirlwind*, available for the Commodore 64.

"There are just so many possibilities. It's amazing to me that people haven't explored them," says Damon. "When you get into the next generation of computers, some really incredible simulations are going to start coming along."

A battle action set during World War II, *Operation Whirlwind* depends more on strategy than on force as you attempt to move your infantry battalion forward against an enemy-held city. The game was Damon's first computer-based strategy simulation. He's now completed a second game, *Field of Fire*, for the 64, which is being marketed by SSI.

"I dropped down in scale, so that it's no longer companies you're moving around. It's actually fire teams—just small groups of men," says the 34-year-old programmer. "And then it went on from there. The graphics improved. I could make houses look more like houses, and actual blocky looking figures on the pieces instead of military symbols."

In the game, your goal is to take your company of men through a sequence of World War II scenarios that starts in North Africa, goes through Sicily, takes you to the beaches of Normandy, and then into Germany.

"You try to survive with these guys. There's actually a role-playing element where you

can name your own characters. And as they survive the scenarios, they improve," adds Damon.

Avalon Hill's *T.A.C. (Tactical Armor Command)* also brings war strategy games down to the unit level. You have control over individual tanks, anti-tank guns, and infantry squads in this World War II scenario. You build your own combat team from among 40 different armored vehicles representing four of the major powers of World War II. Because of your computer's ability to handle the minutiae of detail, many variables can be included: range, armor thickness, respective speeds and maneuvering capability, visibility, and much more. Even the placement of the

fuel tank on a given tank can be a crucial factor easily accounted for by the computer.

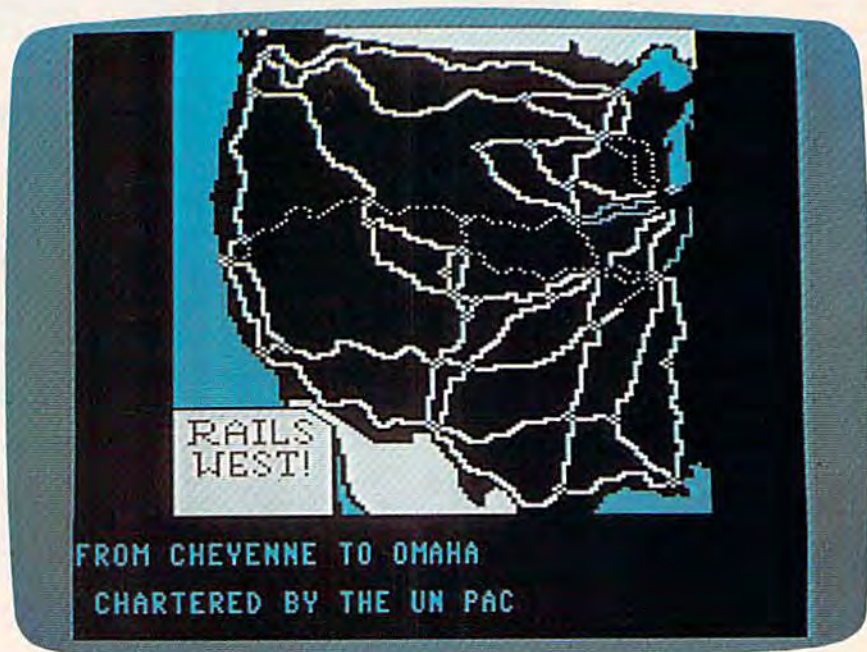
Computer strategy games are already beginning to use more of the memory becoming available on high end computers. Avalon Hill's *Computer Diplomacy*, for example, is a strategy game full of high-level diplomatic intrigues set among the superpowers prior to the First World War. The game requires a 256K IBM PC to run. That's clearly the direction in which future strategy simulations will head as computers become more powerful.

But for now, Commodore owners are strategically placed to take advantage of some of the best such simulation games in the field.

While a number of software developers offer computer strategy games, these two companies produce such a variety that you may wish to send for their catalogs:

Avalon Hill Game Company
Microcomputer Games Division
4517 Harford Road
Baltimore, MD 21214
(301) 254-9200

Strategic Simulations, Inc.
883 Stierlin Road
Building A-200
Mountain View, CA 94042-1983
(415) 964-1353



SSI's *Rails West!*, in which the player assumes the role of a railroad baron of the 1870s in an effort to build the transcontinental railroad system.

[OH NO, NOT AGAIN.]

SON of ARCHON.

If you took all the hours spent by all the people who've played *Archon* and put them together, there's a good chance it'd amount to more human effort than it took to put a man on the moon.



The Archon Dragon.

What does this mean? Is it a good thing? And why, in light of this, did the people pictured here decide to issue a scorching sequel named *Archon II: ADEPT*?

For starters, we don't really know what it means. Except that a lot of people who had a pretty good time with *Archon* are about to get more of what they like. And people who've yet to experience the best-selling, award-winning, knuckle-whitening original have two good things coming their way.



The Archon Basilisk.

Point two: If there's a moral issue here, we see it this way: A wise man once said, "I ain't never had too much fun." We agree. And we think that once you get your hands on *Archon II: ADEPT*, you'll see his point.



Jon Freeman, Paul Reiche III and Anne Westfall created *Archon*, the 1983 "Game of the Year" according to *Softline* and *Creative Computing*. Recent evidence, however, indicates they were not satisfied with this.

Now for the third question. Why a sequel? Well, there are sequels and there are sequels. The good ones happen because people just haven't had enough of a good thing. Obviously we're here to tell you that *Archon II: ADEPT* falls into the right category.

Where *Archon* took inspiration from chess, fantasy role-playing characters and arcade combat, *ADEPT* comes more from a world of its own making. Like *Archon*, it pits the forces of good against those of evil. But in place of the chessboard motif there is a map of elements—Earth, Air, Fire



The ADEPT Chimera.



The ADEPT Thunderbird.

and Water. The role of magic is greater. The strategies are deeper. Things move faster. And the hidden algorithms that control the computer's play are considerably smarter.

Having already spent the better part of a month playing *ADEPT* (in order to write this ad, of course), we're quite confident it will seduce you too.

And if, by some strange chance, there is a parallel universe in which computer simulations come to life, we are confident that a large part of its population has Jon Freeman, Paul Reiche III and Anne Westfall to thank for their brief and miserable existence.



ARCHON™ & ADEPT™

from ELECTRONIC ARTS™



MACHINE REQUIREMENTS: *Archon* is available on the Apple II, II+, IIe & IIfx, IBM-PC, PCXT & PCjr, Commodore 64 and Atari. *Archon II: ADEPT* is available on the Commodore 64 and Atari.

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CHESS:

A

"Combinatorial Explosion"

The ancient game of chess provides a good example of the way in which computer strategy games work. It also reveals the allure that such strategy games have had for computer scientists and programmers from the beginnings of the computer era.

When mathematicians first began to think of ways to test the abilities of computers, chess seemed ideal for several reasons. First, the rules are explicitly defined and limited; second, a computer's chess play can be easily compared and measured against that of a person's; and third, there is no one correct answer, only a constantly changing series of positions which the computer must continually analyze and reanalyze.

The 19th century inventor Charles Babbage theorized that games like chess and tic-tac-toe would be excellent indicators of how successfully an "analytical engine"—that is, a computer—could mimic human thought. Today, computer chess programs have been written which rival the strength of very good players; although even the strongest computer chess game is not yet superior to the world's best chess grandmasters.

Microcomputer chess games like *Sargon II* from Hayden Software (600 Suffolk St., Lowell, MA 01853) and *Chess* from Odesta (3186 Doolittle Drive, Northbrook, IL 60062)—both available for the Commodore 64—offer varying levels of play, demonstrations of moves and strategies, and other options that the first mainframe computers could never have included.

Translating Strategy To Numbers

In order to function, chess programs must assign numerical values to each chess piece. The lowly pawn might be assigned a one, for example; the queen, a nine; and the indispensable king, a number high enough to discourage the computer from ever risking its capture. Advanced computer chess games also consider values assigned to certain positions on the board as well—the center, with

its variety of possible moves, being generally better than a corner position or one along the side of the board.

Using a trial-and-error method, computer chess programs search every possible move and countermove, calculating numerical totals based on pieces captured or lost in subsequent combinations of moves.

If a computer, even a supercomputer, were asked to consider without limit each combination from the first move in a game of average length (say forty moves), what would occur would be a geometric progression of possible games—a virtual combinatorial explosion—which has been calculated at something like one million to the twentieth power, or a one followed by 120 zeros. Computer chess programmers can build in routines, however, which will limit the number of moves a computer will analyze per turn. Other techniques can be applied in chess programs which will diminish even further the total number of combinations needed to be considered by the computer to those which apply directly to a given situation.

All strategy games use some variation of this basic formula, but with additional complexities built in. There are no random elements in a game of chess. But in many of the most popular strategy games, there are such variables as weather conditions, fatigue factors, supply problems, and even troop morale fluctuations which may influence the outcome. In this way, strategy games can more accurately simulate the random elements of real life than does the game of chess.

Instead of the computer having to keep track of 16 pawns and 16 major pieces for both sides in chess, many strategy games require that the computer follow hundreds of different pieces, calculate time and strength differences, introduce random elements, and figure dozens of other variables. In the final analysis, whether the computer game is chess or the most complex simulation of business, sports, or war, the same numerical value system is at the heart of them all.



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color gives you the opportunity to print graphs, charts and pictures from popular graphics and drawing programs. OKIMATE 10's brilliant color means you'll shine, every time.



OKIMATE 10 feels right at home. Anywhere.

A special PLUG 'N PRINT™ package lets you plug your new OKIMATE 10 into your Atari or Commodore computer. And print. It's that easy. In minutes you'll be printing everything from soufflé recipes to needlepoint patterns. Party invitations to kitchen inventory. Love letters to gardening directions. At 240 remarkable words per minute. And not just in black and white, but in over 26 brilliant colors!

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If you use your personal computer to keep track of mortgage payments, tuition payments, balance your checkbook or jump ahead of the Dow Jones*, there's good news for you. You'll find that the new OKIMATE 10 gets down to business quickly. And easily.

A "Learn-to-Print" diskette and tape shows you how to set up your new personal color printer and start printing. A complete OKIMATE 10 Handbook will show you how you can take your imagination to places it's never been before.

FOR

PERSONAL COLOR PRINTER UNDER \$250.

And while your imagination is soaring, you'll be glad to know that your new printer can keep right up with it! The new OKIMATE 10 is built with the same tradition of quality and manufacturing excellence that has made Okidata the most respected name in computer printers. Okidata craftsmen specially designed and engineered the new OKIMATE 10 to be incredibly small and lightweight. And they made it quiet as a whisper. But their imagination didn't stop there. To help you

and your personal computer keep within your personal budget, they made the OKIMATE 10 available at retailers everywhere for less than \$250. Something that should make every personal budget tickled pink.



patible with a variety of software packages that will run on your Atari and Commodore with a simple disk drive. Just load and you're off and running. Plotting charts. Designing special graphs. Creating original illustrations and pictures. Drawing special graphics. And printing them all beautifully for everyone. On most kinds of paper. In over 26 beautiful colors!



Color your world.

If you've been playing games on your personal computer, now you can get serious and still have fun. The new OKIMATE 10 is completely com-



QUESTIONS & ANSWERS

Q: Why do I need a printer?

A: You might as well ask, "Why do I need crayons?" When it comes to communicating, "putting it on paper" is still the best way to get your message across. You can have lots of computer equipment, but without the OKIMATE 10, it doesn't mean very much. Unless you get your letter, report, term paper or party invitation off the screen and down on paper, nobody's going to see it.

Q: What makes the OKIMATE 10 better than any other printer?

A: Because the OKIMATE 10 is unlike any other printer. First, it prints in COLOR. Up to 26 beautiful colors. Second, it prints up to 240 words a minute, so quietly you can talk in a whisper right next to it and still hear every word! And third, it prints letter quality, every time.

Q: What about graphics and pictures?

A: The OKIMATE 10 does it all. Graphs, charts, symbols, pictures, illustrations, and special drawings! With a compatible drawing package, anything you create on your screen can be printed in full color; a disk drive is required for color screen printing.

Q: What kind of paper can I use?

A: Just about any kind of smooth paper you want. From continuous feed computer paper to single sheets. From mailing labels to plastic acetate for overhead transparencies, the OKIMATE 10 prints crisp, clean, colorful images you'll be proud to send to friends, teachers, business associates, or frame and hang right in your own living room!



Q: Is the OKIMATE 10 easy to use?

A: As easy as "PLUG 'N PRINT!" No other printer is easier to use than the OKIMATE 10. Connecting the printer to your Commodore or Atari computer is, literally, a snap. The exclusive PLUG 'N PRINT package snaps into the printer. One cable connects it directly to your computer or disk/tape drive. Turn it on and you're in business. Once your OKIMATE 10 is up and running, the "Learn-to-Print" software program (included) teaches you printer basics—the "Color Screen Print" disk (also included) automatically prints everything on the screen in a single stroke. As a matter of fact, most of your printing can be done with just one command.

Q: What's the printer like in operation?

A: In one word: easy! Incredibly easy! The ribbon comes in a "Clean Hands" cartridge. So it's as easy to change as the tape in your audio cassette player.



Q: What about reliability?

A: Okidata has built the reputation of its complete line of printers on quality, dependability and rugged construction. The OKIMATE 10 is no exception. Don't let its light weight and compact size fool you. This printer is not a toy. It's a workhorse.

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Electronic Trivia

Kathy Yakal, Feature Writer

It seemed to hit last Christmas. Thousands of holiday travelers, returning from visits with relatives, had a new way to pass the time while making the long trek home. *Trivial Pursuit* had been under a lot of Christmas trees, and it was suddenly the hottest game since *Monopoly*.

Party guests who normally would have excused themselves early to avoid icy midnight winds found themselves staying well into the early morning hours at January parties. Everybody wanted to play, and manufacturers couldn't keep up with the demand.

Waiting lists for the wildly popular game stretched for pages. Store clerks, tired of constant queries, posted signs saying, "We are out of *Trivial Pursuit*."

Sales of *Trivial Pursuit* will reportedly reach \$750 million in the United States alone this year. The entire board game industry took in less than half that amount in 1983: \$310 million.

Who was the first NHL player to earn \$100,000 per season? What does a buffalo lack which a bison has? How many states border Tennessee? Trivia questions have fascinated and frustrated people for years. More recently, trivia buffs have been able to enjoy an explosion of new trivia board games. Many new trivia games are now available for the Commodore 64.

Monopoly, the best-selling board game of all time, may soon lose that title. It took 49 years for *Monopoly* to sell 85 million sets worldwide. *Trivial Pursuit* is expected to sell more than a quarter of that total in one year's time in the U.S.

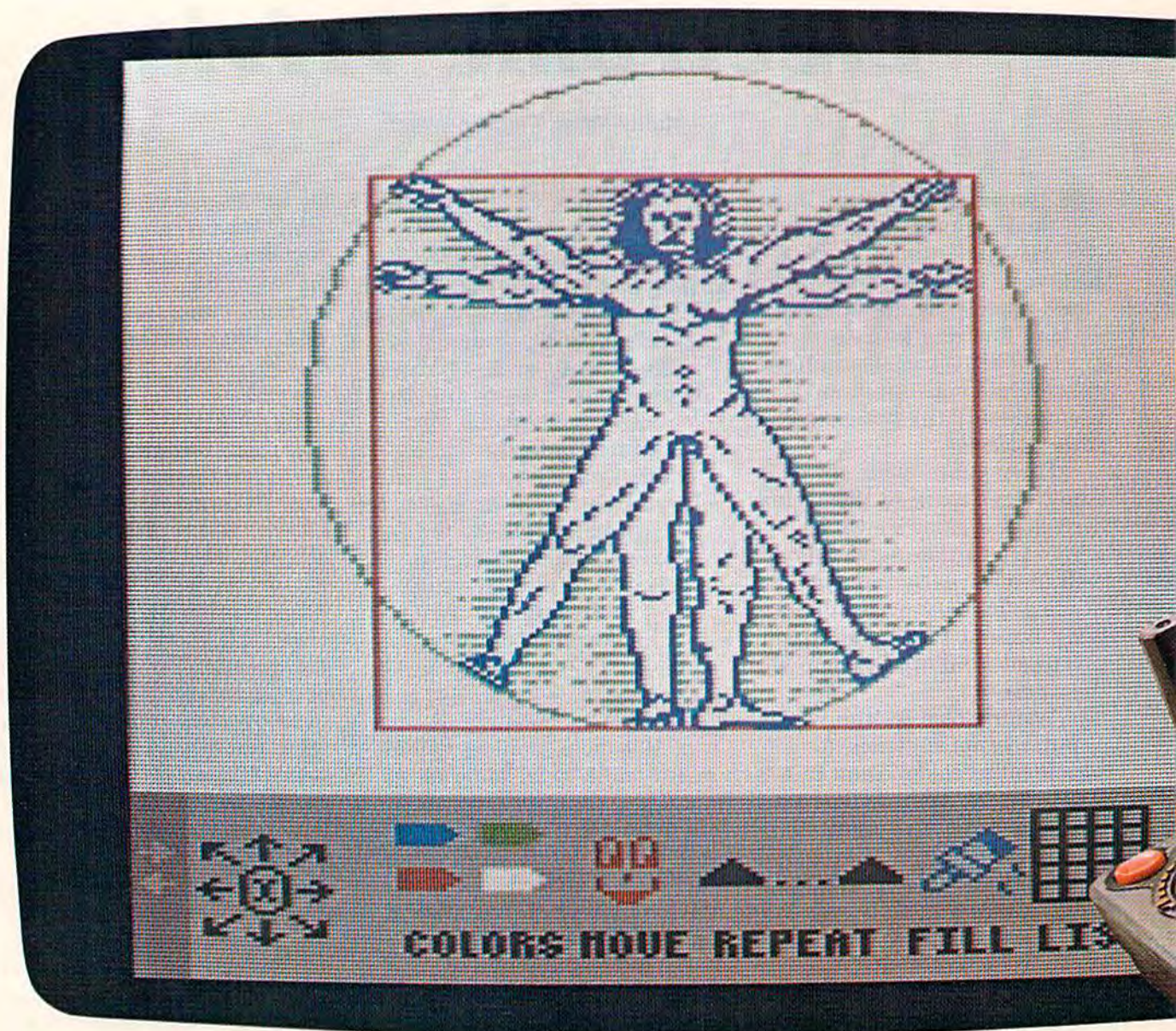
This recent surge of popularity in a trivia game has spawned many clones. (There are even trivia board games sold

by news magazines and television shows.) And at least a dozen Commodore 64 versions have sprung up in half as many months. Some are the products of familiar software publishers, but more than one company has formed for the sole purpose of supplying trivia games to home computer owners.

These games vary greatly in format. Some are multiple-choice, and require the players to enter the correct answer (via joystick or keyboard) before other players do, or before a time limit is up. Others supply the question but no hints; the correct answer is displayed after everyone has guessed. And at least one incorporates an arcade game format, giving players a chance to brush up on their hand-eye coordination as well as their memory.

Question categories vary, from such standard topics as television and movies, sports, and geography, to areas such as body language, antiques, and phobias. There's something for everyone.

Computer prog da Vinci, Shakesp Al Capp would ha



grams for kids that eare, Dickens and ve loved.

If they were starting out today, this is what they could start with. Pixelwerks.

THE OTHER WAY TO DRAW AND WRITE

Instead of a brush and canvas, a pen and paper, they'd create on a computer. Because Pixelwerks is the first medium that can keep up with their imaginations.

MR. PIXEL'S PROGRAMMING PAINT SET

With Mr. Pixel's Programming Paint Set, da Vinci (or any 8-year old) could do more than paint a picture. He could also enlarge it, repeat it, move it around, and change colors. Instantly.

And at the same time, he would be developing his programming skills. Painlessly.

SHOW DIRECTOR

On the other hand, Shakespeare would love to play around with Show Director.

He'd use it to create plots and think up one scene after another, and he'd get a big cast of characters, lots of backgrounds, props, and musical sound effects to act them out.

BANK STREET STORYBOOK

Dickens wouldn't be able to keep his hands off Bank Street StoryBook by George Brackett.

Not only could he write his own story, but he could also illustrate the scenes and characters he sees in his mind.

MR. PIXEL'S CARTOON KIT

Maybe Al Capp wouldn't be satisfied with cartoons that just sit on the page after he tried Mr. Pixel's Cartoon Kit. Because he could make his cartoons come to life by animating them. His characters could move around, and even react to each other.

Every kid has a touch of creative genius buried inside. The job of Pixelwerks is to bring it out, with more features, more options and more flexibility than other programs.

In short, we supply the tools. Kids supply the imagination.



PIXELWERKS

Why the mania? "Trivia has been around for a long time, but we just haven't noticed it as much," says Doug Monahan, co-founder of a Dallas-based software company, Trivial Compute.

Monahan's point is well taken. TV game shows, dating from the early days of *The \$64,000 Question* and *GE College Bowl*, to the recent revival of *Jeopardy*, have had people shouting answers from arm-chairs at home for years. In the pre-arcade game days, airports and other public places had coin-operated "test your knowledge" games. Monahan recalls heated verbal trivia matches in moments of boredom during his days at West Point.

"In the '60s, everyone was protesting. In the '70s, no one knew what was going on. Now, in the '80s everyone is conscious of living well," he says. "It's chic to drive a big car and know lots of stuff."

The latest in Trivial Compute's series of trivia games is the World Class Edition, focusing on the lifestyles of the rich and famous, international sports and resorts, royalty and celebrities. Questions range from "What city is Yale University in?" to "What is the name of the breed of the \$2000 dog featured in the '83 Neiman-Marcus Christmas catalog?" and "What ski resort in America offers skiing in July?"

"What we're selling is information," says Monahan. He sees his move into the trivia game business as a natural progression from his years working with data base management systems.

Other editions available from Trivial Compute include *Trivia Americana*, *West Coast Trivia*, *New York Insignifica*, and *Texas Trivia*. They're in the process of completing a talking trivia game, which uses the Covox Voice Master, a speech

synthesizer for the Commodore 64.

Also entering the trivia game arena is software publisher Screenplay. "Everyone has been asking trivia questions of each other for years, like 'What was the name of Sky King's airplane?'" says company president Sandy Schupper. "Trivial Pursuit started out the public awareness of trivia. We looked at the computer as a perfect medium, because not only

Most of the trivia games currently available emphasize getting the right answer within a pre-determined time limit. Players take turns answering questions, and the winner is usually the person who obtains the prescribed amount of points first.

Suncom's *PQ: The Party Quiz* requires quick reflexes as well as the correct answer. The game comes with four hand controllers connected to cables



Shoot down the character representing the category you want to choose (sports, music, television, science, or general knowledge), and answer correctly to win one letter in the word "TRIVIA" in Screenplay's Trivia Arcade.

does it give you the basics of a trivia game, but it gives you a little more excitement, using the computer's sound and graphics."

Screenplay's *Trivia Arcade* takes advantage of the Commodore 64's sound and graphics capabilities through its arcade game format. Before each question is displayed, players must chase down the figure representing the category they want. Each correct answer is rewarded with one of the letters in the word "trivia." Once a player spells out the entire word, he or she must answer a question correctly in each category to win.

Trivia Arcade contains 3500 questions in five categories: sports, television, science, music, and general knowledge. Additional disks, containing up to 4000 questions each, will be available this winter.

that plug into the Commodore 64's two joystick ports. Each controller has four touch-sensitive pads on it. After the question and four possible answers are displayed, the first player to hit the correct button corresponding to the right answer on the screen gets points.

The game can also be played in *social*, as opposed to *competitive*, mode. Everyone who answers the question correctly within the time limit gets points. The faster you answer, the more points you get. Other user-controlled functions are response time (3-10 seconds) and game length (5-20 rounds; 10 questions per round).

Every few rounds, each player must take on the computer in a *lightning round*, where ten questions are displayed in 20 seconds. The more questions answered correctly, the more

DRAGONRIDERS OF PERN.[™] FLY THE UNFRIENDLY SKIES.



Shooting down the menacing and constantly multiplying Threads isn't easy, but it's only one of the challenges in this official computer game version of Anne McCaffrey's famous book series.

Your strategy will be put to the test as you try to negotiate alliances with Pern's Lord Holders in an attempt to form the most powerful Weyr on the planet. Should you take a firm stance or compromise? Will asking a Craftmaster for assistance increase your chances for success? Maybe you should invite prospective allies to a Wedding or even a Dragon Hatching. Remember to check the Lord Holders personality traits

first. It may be critical to your success.

Numerous screens combine to create truly unique and challenging game play. There's even a practice screen to sharpen your Thread Fighting skills.

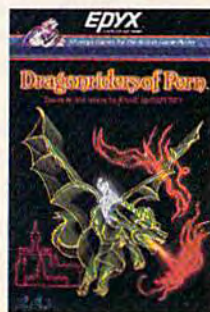
If you liked the books, you'll love the game. After all, how often do you get the chance to actually fly a dragon?

One to four players, joystick and keyboard controlled.



EPYX
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Strategy Games for the Action Game Player



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bonus points awarded.

It's rather ironic that trivia is so wildly popular. School children despise tests. Even college students, interested as they may be in their chosen subject matter, tend to groan when finals come around.

Though labeling trivia games as "educational" might mean death to them in the entertainment market, the fact is that they *are* educational. We don't always retain the answers

that crop up in *Trivial Pursuit*, says Paradiso. One of those irritations is the guy who jumps up and down and yells "I know! I know!" at every question.

To combat this, *Trivia Fever* allows handicapping. Players who are more knowledgeable in a particular area, or in all areas, can be required to answer more questions, more difficult questions, or be given less time to answer.

"Handicapping is very important," says Paradiso. "You can make the game dynamically different for every person that's playing. It also allows families to play together more easily. By handicapping the parents, the kids have a better chance to win."

Trivia Fever can be played with or without a computer (a book of questions and answers and score sheets are included). Suggested retail price is \$39.95, but purchasers who don't own computers can mail back their disk for a \$5 rebate.

To supplement the thousands of questions contained in *Trivia Fever*, Professional Software plans to release editions specializing in sports, entertainment, word trivia, and an educational series, targeted to junior high and high school students.

Other trivia games currently available for the Commodore 64 include:

- *Master Trivia*, from Cymbal Software. Up to six players; game lengths of 50, 100, or 150 points, and time limits varying from 10-20 seconds. Cymbal has released additional disks that can be integrated into play with the master disk. Categories include sports, world facts, "Entertainment Tonight," and children's trivia.

- *Factactics*, from Daystar Learning Corporation. Players move around a game board on the computer screen, typing in answers to questions on sports,



In Professional Software's *Trivia Fever*, you can opt to select your own category or let the computer choose one randomly. Once the player has given an answer, the gamemaster tells the computer whether or not it was correct, and points are awarded.



to all the questions we miss (although we certainly do if we miss them a second time), but we're often reminded of all the things we've forgotten since school days.

One trivia game that could easily be used in a classroom setting is *Trivia Trek*, by MMG Micro Software. The game contains 500 multiple-choice questions in ten different categories, ranging from antiques to inventors to U.S. statistics. There's even a section on Commodore facts: (PRINT CHR\$(147)) will cause: 1. Clear screen 2. Clear memory 3. Snow 4. Carriage return.)

What makes this game a potential educational tool is its *Editor* section. Subject matter is not limited to the questions written by the software designer: Using a separate disk for storage, players can make up

"We wanted to enter the entertainment area, but needed to find out first what was entertaining to people," says Ken Paradiso, marketing manager for Professional Software. Their research pointed to trivia. Trivia game sales had jumped from \$600,000 in 1981 to \$70,000,000 in 1983. Sales for 1984 are projected to exceed one billion dollars.

Further research revealed why Americans planned to spend that non-trivial amount of money on trivia. "One reason is obviously the maximization of social interaction," says Paradiso. "Another is the ego hit you get from the game. It's an all-win situation because even if you miss a question, it's not important. It's only trivia. People don't come down on you."

Trivia Fever was designed to minimize some of the annoy-

THE WORLD'S GREATEST BASEBALL GAME. THERE'S MUCH MORE TO WINNING THAN JUST PITCHING, HITTING & FIELDING.



Real baseball is more than just hitting, pitching and fielding. It's also your favorite major league teams, the great stars of today and the All-stars of yesteryear. It's statistics and coaching, and it's managing your own game strategy. With the World's Greatest Baseball Game, you have it all. Pick your major league line-up using the actual player and team stats. Then watch the action unfold against an opponent or the computer.

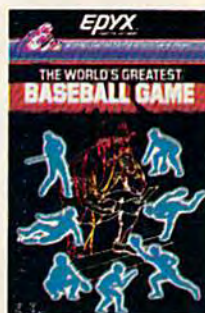
Two modes let you choose between managing and controlling your team or managing only. The World's Greatest Baseball Game—everything you could ever want except the hot dogs and peanuts.

One or two players; joystick controlled.



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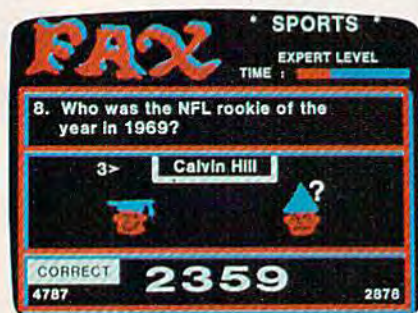
music, rock & roll, TV, movies, and Americana.

- *Fax*, by Epyx. This is the home computer version of the Exidy arcade game.

- *Computrivia*, by Extek. Over 1300 non-repeating questions on the arts, business and

politics, geography, science and nature, history, entertainment, and odds and ends. Once the

initial game parameters are set, only the space bar need be used for input.



Answer a question correctly in Epyx's FAX and you get to wear a mortarboard. Get it wrong and you're stuck with the dunce cap. FAX includes over 3,700 questions in the areas of entertainment, history, sports, or potpourri.

For more information, contact:

Computrivia (\$34.95)
EXTEK Computer Aided
Products
P.O. Box 305
Oakville, Ontario,
Canada L6J 1N0

Factactics (\$29.95)
Daystar Learning Corporation
525 University Ave.
Palo Alto, CA 94301

Fax (\$27.00)
Epyx, Inc.
1043 Kiel Ct.
Sunnyvale, CA 94089

Master Trivia (\$29.95; \$19.95
for additional disks)
Cymbal Software
1200 Rt. 23
Butler, NJ 07405

PQ: The Party Quiz Game
(\$69.95; \$24.95 for additional
disks)

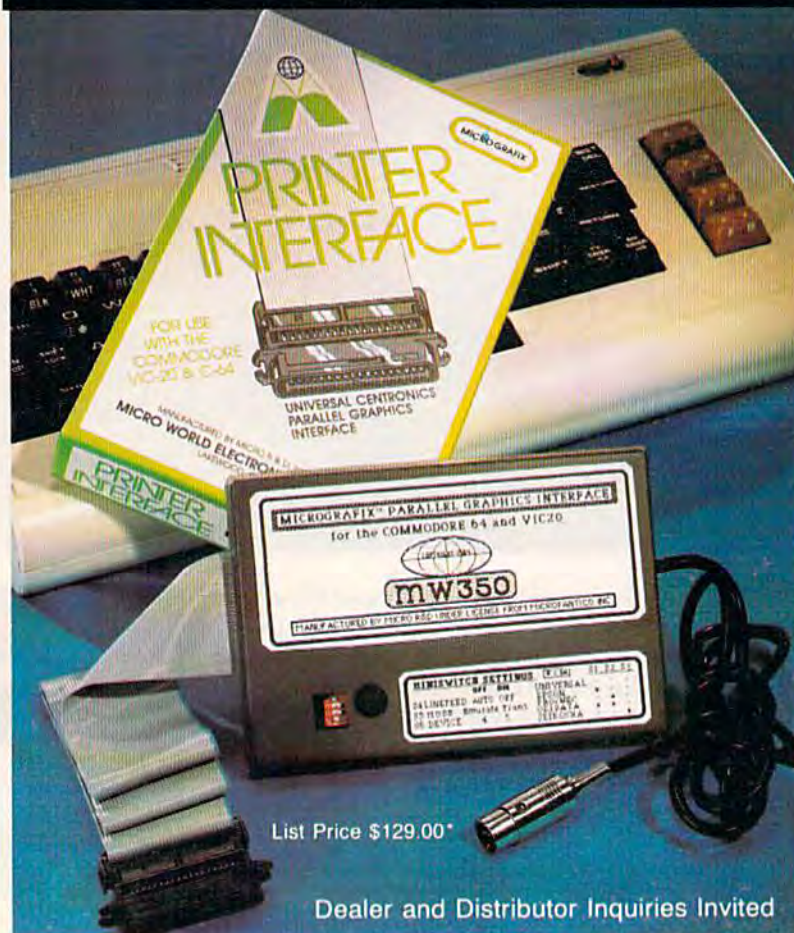
Suncom
260 Holbrook Dr.
Wheeling, IL 60090

Trivia Arcade (\$34.95)
Screenplay
500 Eastowne Dr., Suite 212
Chapel Hill, NC 27514

Trivia Fever (\$34.95)
Professional Software
51 Fremont St.
Needham, MA 02194

Trivia Trek \$29.95)
MMG Micro Software
P.O. Box 131
Marlboro, NJ 07746

Trivial Compute (\$34.95)
The Trivial Compute Company
3527 Oak Lawn Ave., Suite 179
Dallas, TX 75219



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- 7) Complete with emulate mode, transparent mode, total text mode, ASCII conversion modes that will insure virtually total compatibility with popular Software.

No more ROM changes or extra shelf space taken up. The Micrografix Interface is easier to stock since one interface will support virtually all printers.

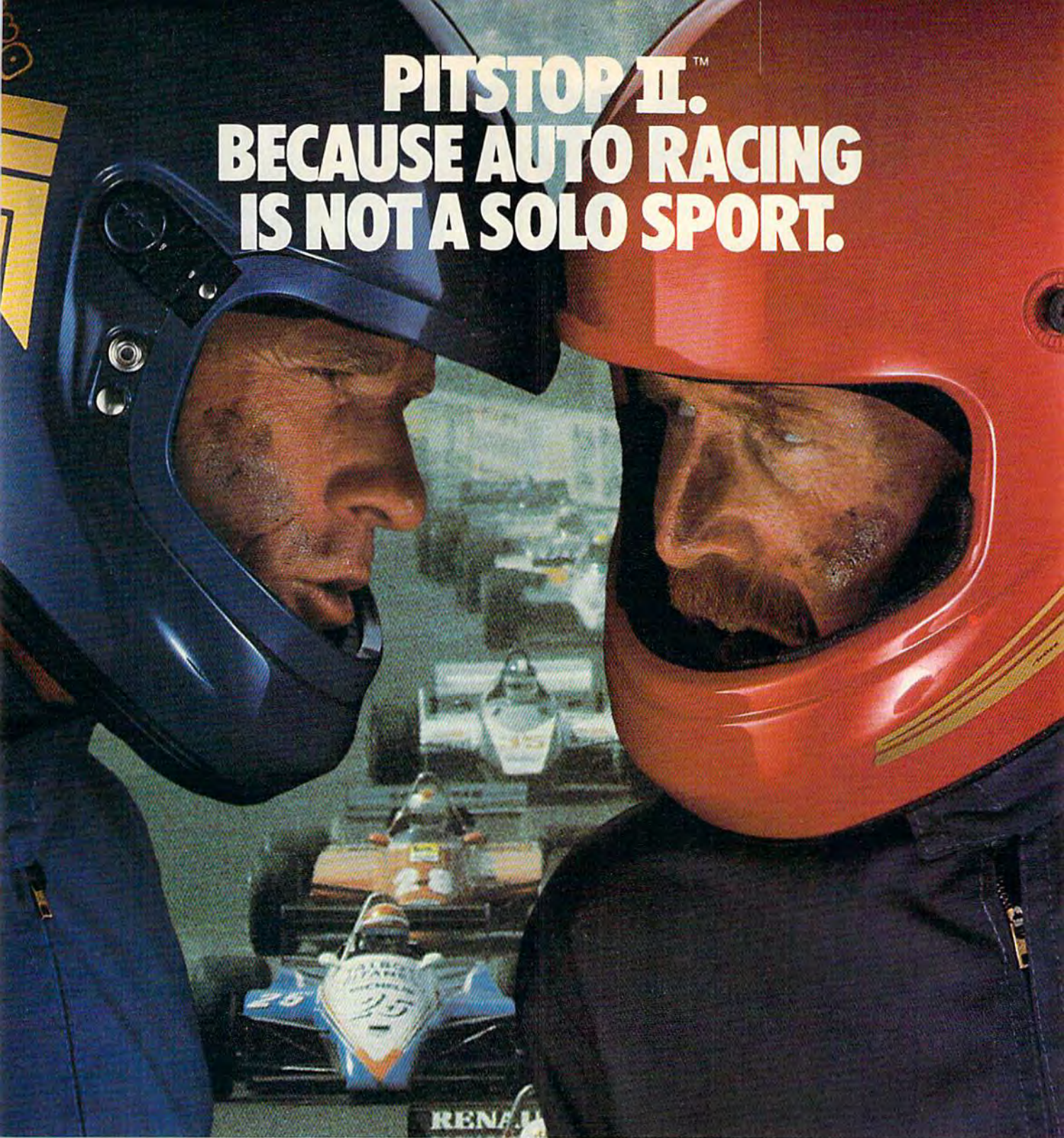
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of speed and competition as you battle your opponent in a race against the clock. Now, more than ever, the strategy of when you make a pit stop and your pit crew's speed and performance, combined with your skill on the track, will determine the winner.

A split screen shows you your position and that of your

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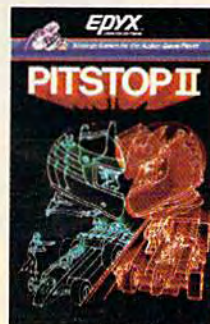
of speed and competition as you battle your opponent in a race against the clock. Now, more than ever, the strategy of when you make a pit stop and your pit crew's speed and performance, combined with your skill on the track, will determine the winner.

One or two players: joystick controlled; disk or cassette.



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OUR ARCADE GAMES WE BROUGHT



Bally Midway's *Spy Hunter* puts you in the driver's seat of the hottest machine on four wheels. You're after enemy spies. The situation is life and death. You'll need every weapon you've got—machine guns, and guided missiles, oil slicks and smoke screens. But the enemy is everywhere. On the road, in the water, even in the air. So you'll have to be more than fast to stay alive in *Spy Hunter*. You'll need brains and guts, too.

Do you have what it takes?



Bally Midway's *Tapper* would like to welcome you to the fastest game in the universe.

You're serving up drinks in some of the craziest places you've ever seen. And the service better be good, or else. You'll work your way through the wild Western Saloon to the Sports Bar. From there to the slam dancing Punk Bar and on into the Space Bar full of customers who are, literally, out of this world!

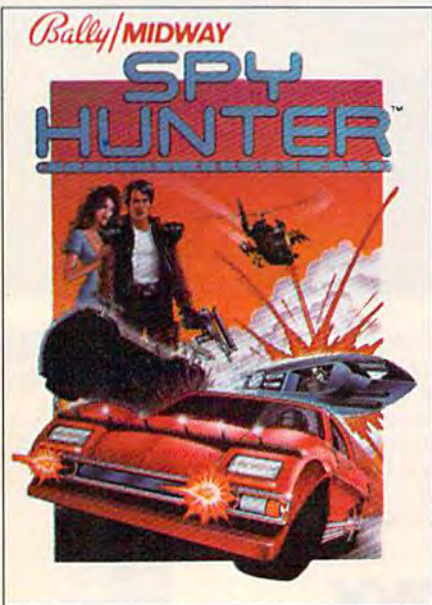
Are you fast enough to play *Tapper*? If you have to ask, you probably already know the answer.



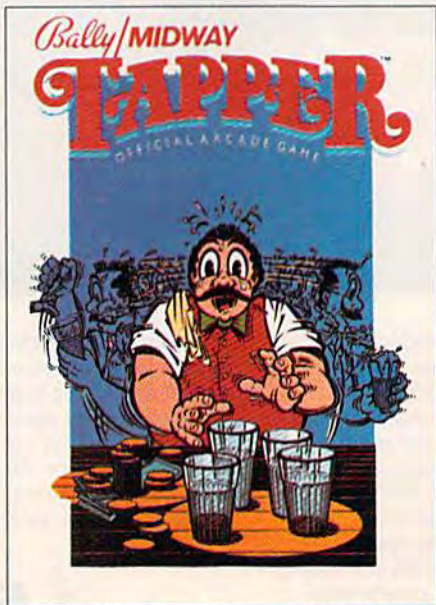
Bally Midway's *Up 'N Down* by Sega. In this game, a crash is no accident.

In fact, it's the whole object of the game. You'll race your baja bug over some of the worst roads south of any border. Leap dead ends, gaping canyons and oncoming traffic in a single bound. And if anyone gets in your way, crush 'em.

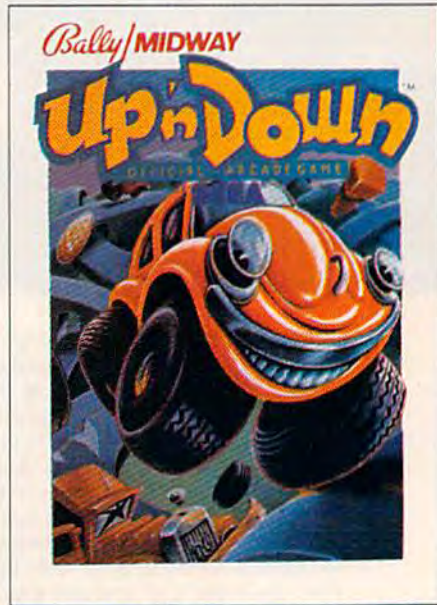
Crashing, bashing *Up 'N Down*. It's one smash hit that really is a smash.



The #1 Arcade Game of 1984.



Nominated as Most Innovative Coin-Op Game of 1984 by *Electronic Games* magazine.



#1 Arcade Hit, *Play Meter* Conversions Poll, 8/1/84.

WERE SUCH BIG HITS, THEM HOME.



Sega's Congo Bongo rocked the home game world when it shot up to Number 3 on the Billboard chart this spring.

And now it's available for even more home systems. So check the chart and get ready for jungle action. You'll pursue the mighty ape Congo up Monkey Mountain and across the Mighty River. Do battle with dangerous jungle creatures. Ride hippos, dodge charging rhinos and try to avoid becoming a snack for a man-eating fish.

Congo Bongo. It's fast and it's fun. But be careful. It's a jungle in there.



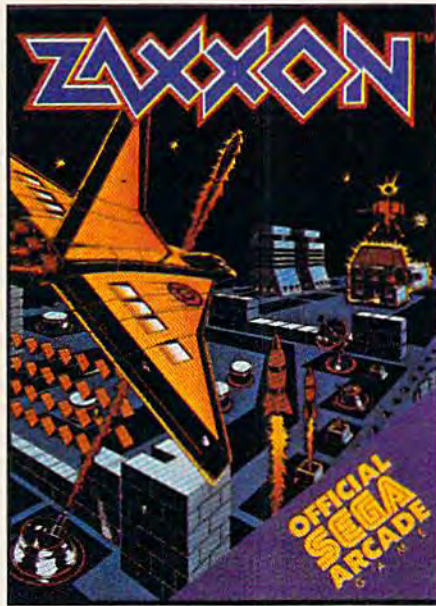
Sega's Zaxxon. If you haven't played Zaxxon, you must have been living on another planet for the past few years.

And now the ultimate space combat game is available for even more home systems. You'll pilot a space fighter through force fields and enemy fire on your way to do battle with the mighty Zaxxon robot. Countless others have gone before you in this Hall of Fame game. But this time your life is in your own hands.

Zaxxon killed them in the arcades. But compared to what it will do to you at home, that was child's play.



Arcade and Home Smash. Hit #3 on Billboard magazine's Top Video Games survey.



One of only ten games ever to make Electronic Games' Hall of Fame.

	SPY HUNTER	TAPPER	UP 'N DOWN	CONGO BONGO	ZAXXON
Atari 2600 cartridge	NEW	NEW	NEW		
Atari 5200 cartridge					NEW
Atari Computers* cartridge	NEW	NEW	NEW		NEW
Atari Computers† diskette	NEW	NEW	NEW		
ColecoVision & ADAM cartridge	NEW	NEW	NEW	NEW	
Commodore 64 cartridge	NEW	NEW	NEW		NEW
Commodore 64 diskette	NEW	NEW	NEW	NEW	
Apple II, IIe, IIfx diskette	NEW	NEW	NEW	NEW	
IBM PC diskette	NEW	**	NEW	**	**

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*Atari 400, 800, 600XL, 800XL and 1200XL.
(Congo Bongo cartridge: 400, 800 and 800XL.)

†Atari 800, 600XL, 800XL and 1200XL.

**Also available for IBM PCjr.

All new games are scheduled to be in your stores for Christmas. Check your local dealer.

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SIMPLE ANSWERS TO COMMON QUESTIONS

Tom R. Halfhill
Staff Editor

QA

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

Q. *I own a Commodore 64, and I have a few friends who own Atari 800XLs. I'd like to know if it's possible to convert programs written in Atari BASIC to Commodore BASIC. If this is feasible, are there any publications that can guide me in converting programs? Also, is there any program that would allow me to use disks formatted for the Atari on my Commodore 64? I have a Commodore 1541 disk drive.*

A. It's quite possible to convert programs written for Atari computers to work on Commodore computers, and vice versa. In fact, our staff programmers do this all the time for our companion magazine, COMPUTE!. Fortunately, the Commodore 64 and Atari computers have similar features, making conversions easier. Both machines have sprites (called *player-missile graphics* on the Atari), comparable high-resolution graphics, programmable character sets, and versatile sound capabilities.

However, unless you're a pretty good programmer, translations will not be a snap. While the Atari and Commodore both have built-in BASIC languages, the BASICs are two different dialects. Commodore BASIC is Microsoft BASIC, the most common version found on microcomputers. Regular Atari BASIC closely resembles Microsoft BASIC, but differs in several ways. Sometimes these differences matter, and sometimes they don't—it depends on the program.

For example, programs which use lots of string manipulations may be hard to translate back and forth. Atari BASIC lacks the string arrays and substring statements found in Microsoft BASIC. The statement:

```
DIM A$(10,10)
```

sets up a two-dimensional string array with 100 elements on the Commodore 64, but would trigger a syntax error on the Atari. The Atari recognizes only one-dimensional strings. This statement:

```
DIM A$(20000)
```

would be interpreted quite differently on an Atari

and a Commodore. The Atari would reserve a single string variable 20000 bytes long; the Commodore would reserve a one-dimensional string array with 20000 elements. That's because Microsoft BASIC limits strings to 255 characters, while Atari BASIC allows strings of any length, up to the limit of available memory. These statements:

```
X$=LEFT$(A$,10)
```

```
X$=MID$(A$,11,10)
```

```
X$=RIGHT$(A$,10)
```

would fill the Atari's screen with syntax error messages, because Atari BASIC lacks such substring manipulators. Instead, the Atari uses a different method of subdividing strings. Assuming that A\$ is 30 characters long, the equivalent statements would be:

```
X$=A$(1,10)
```

```
X$=A$(11,20)
```

```
X$=A$(21,30)
```

while on the Commodore, these same lines would refer to certain elements of two-dimensional string arrays. Looks hopeless, doesn't it?

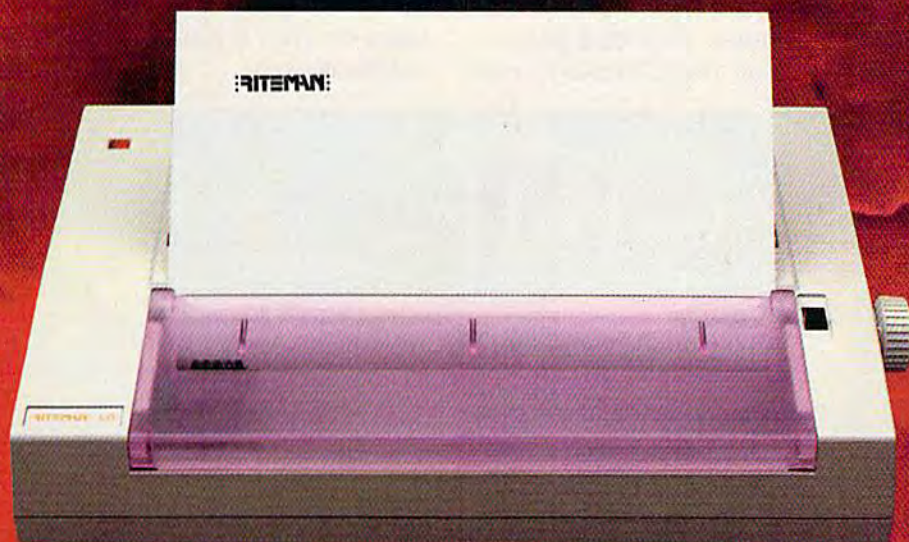
There are other differences between Commodore BASIC and Atari BASIC as well. Usually you can program around them, though. The differences that might give you the most trouble include anything involving memory manipulations, such as sprites and redefined characters, and the built-in graphics commands in Atari BASIC, some of which must be written in machine language on the Commodore 64. Conversely, to simulate the music of the 64's SID chip you'd need machine language on the Atari.

Translating programs from one computer to another requires lots of experimentation and patience. It also helps immensely to have both machines handy. We can't recommend any books specifically written for Atari-to-Commodore BASIC translations because we don't know of any. Our staff programmers are guided by programming reference manuals and memory maps for the various computers they work on.

You won't be able to read Atari disks with your Commodore 1541 disk drive, either; the formats are completely different. To save time typing in long programs to be translated, our programmers sometimes transfer the code from one computer to another via modems. Often, however, they don't even attempt a line-by-line

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translation—too many changes are required. Instead, they start almost from scratch and write a version that is similar but not identical. That way, the programs can take advantage of each computer's best features.

Q. *I have an IBM PC and a Commodore 64. My IBM has a serial (RS-232C) port. Is it possible to get an RS-232C port for my Commodore 64 and transfer data?*

A. It's possible to transfer data between almost any two computers, but usually some experimentation is required. You might also have to make your own cables or have them made for you.

First of all, the serial port on the rear of a Commodore 64 is *almost* a standard RS-232C port—the only difference is the voltage level. You can convert it by plugging in an RS-232C adapter, available from Commodore and various other companies for less than \$50 (scout the ads in this magazine).

Next, you'll need something called a *null modem cable*. This is just a simple cable that fools a pair of computers into thinking they're linked up over the phone lines with modems. A few wires are crossed so that what's an input line on one side is output at the other. One end plugs into the RS-232C adapter on the Commodore 64,

and the other end plugs into the IBM PC serial port. Null modem cables are available from several manufacturers, although you might have trouble finding one with exactly the plug connectors you need.

Finally, each computer will have to be running its own *terminal software*, a program designed for telecommunications with a modem. The terminal software must be set up to recognize a modem plugged into the serial port. Of course, there won't really be any modems attached—only the null modem cable. When everything is hooked up, you use the terminal software (which must have upload/download capability) to transfer the file from one computer to the other.

The whole process can get much more complicated than it sounds. Besides acquiring the proper cables and plugs, you have to make sure the computers are sending and receiving at the same rate, that the telecommunications parameters are properly adjusted, and other things. We've successfully used null modem cables to transfer files between an Atari, IBM PC, TI-99/4A, and TRS-80 Color Computer, but it took some work. If you already have a modem and terminal program for each computer, it might be easier to simply transfer the files over the phone lines or even a phone cord connecting the two modems.

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Byron Preiss And Ronald Martinez

Trillium Software Designers

Sharon Darling, Research Assistant

How do you go about translating science fiction and fantasy novels into computer games? Here's how two of the designers behind Spinnaker's new Trillium series did just that.

Computer games were originally little more than fast-moving action shoot-'em-up's or text adventures with severely limited vocabularies. But programmers have begun to advance the sophistication and the interaction of all types of computer games. The next generation of games has arrived—science fiction and fantasy novels turned into graphics text adventures.

Among the leaders in this new genre is Spinnaker Software, which this fall released the first entries in its Trillium series for the Commodore 64 and Apple II computers. Trillium includes adaptations of such novels as the classic *Fahrenheit 451* by Ray Bradbury, *Rendezvous with Rama* by science fiction master Arthur C. Clarke, and *Dragonworld*, a fantasy by Byron Preiss, Michael Reaves, and Joseph Zucker.

Also available are *Amazon*, an adventure tale developed by author Michael Crichton, a video version of Robert A. Heinlein's *Starman Jones*, and *Shadowkeep* from Alan Dean Foster. The Commodore versions sell for \$32.95 each, while the Apple versions cost \$39.95.



Software designer Ronald Martinez, who wrote the script for the adventure *Rendezvous with Rama*.

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Science fiction writer Arthur C. Clarke, left, studies the software version of his novel *Rendezvous with Rama*, while Byron Preiss and David M. Harris, who worked on the adaptation, look on.

Between them, the authors involved with the series have 100 million books in print, according to Seth Godin, Trillium project manager. Other authors whose works are scheduled to be adapted include Harry Harrison and Roger Zelazny.

How do you go about turning a novel into a computer game? "The key point is having a dialogue with the author," says Byron Preiss, whose company, Byron Preiss Video Productions, developed four of the releases in the Trillium series. "For example, in *Fahrenheit 451*, it meant sitting down with Ray Bradbury and saying, 'All right, this is a medium that's totally different from a film, and it's totally different from a book.'

"It doesn't have some of the advantages of a film, but it

does have flexibility. In other words, a character is able to take different actions, whereas in a book you can only do one thing."

In addition to *Fahrenheit*, Preiss's company did the adaptations for *Rendezvous with Rama*, *Dragonworld*, and *Starman Jones*. Preiss is also working on another software line for Spinnaker, the Windham Classics, turning such literary favorites as *Wind in the Willows*, *Treasure Island*, and *20,000 Leagues Under the Sea* into interactive fiction.

From *Fahrenheit 451*: The time is not too long from now. The place is New York City.... This is a world where simply owning a book is dangerously illegal.... You, Guy Montag, are a rebel fireman with a passion for books—the most wanted fugitive in the country.... Your mission: To restore to the world the freedom it once had.

"The adventure game market has been pretty much the same since 1976, when the first adventure game came out," says Godin. "That is, they've been puzzle-based games, be they text or graphics—they've always been based on a series of logic puzzles.

"We're trying to make a game that is based on plot and characterization, not puzzles—the way a book is. If you read *Fahrenheit 451*, you don't get stuck on page 50. And if you play the game, you don't get stuck on frame 50, because the whole idea is that you're interested in the game because of the characters and the plot and what's happening. You care about what's going on."

But what are these new adventures—games, interactive fiction, or books? To Ronald Martinez, who wrote the script for *Rendezvous with Rama*, "That's the dilemma with this medium—it's very difficult to put a name to it because it's like the classic instance of describing a color that no one's ever seen before."

Preiss and Martinez both like the term *electronic book*. That phrase "is the best at the moment, because you read it," Preiss says. "It's a reading medium."

Both authors are now doing something that ten years ago was beyond their imagination: working with personal computers. Neither one majored in computer science in college—"there was no such major" at the time, the 31-year-old Preiss recalls.

The New York native went to the University of Pennsylvania, where he earned degrees in communications and urban studies. He then did graduate work in film at Stanford.

"I guess from the time I was a kid in school, I was interested in science fiction and electronic media. I think almost everyone from our generation

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was," he says. "We grew up with television sitting in our laps, so that was a natural interest."

In addition to college, Preiss also spent time at Xerox's PARC (Palo Alto Research Center), where his interest in computers was fueled. After working for Sesame Street and the American Broadcasting Company as a designer of children's programming, Preiss started Byron Preiss Visual Publications in 1979 to develop television material and publish books, "but we quickly saw software as the best way to teach."

From *Rendezvous with Rama*: The year is 2130, and a huge new asteroid has just been discovered and named: Rama.... But this is no asteroid—Rama is actually a mammoth spaceship.

As fate has it, only one of Earth's ships is close enough to Rama to meet it—and it is the ship you command.... Your orders: *Rendezvous with the ship, explore it, find its creators, and return home—if you can.*

Ronald Martinez is also a New York native, and he, like Preiss, is 31. His interest in science fiction dates from the second grade, when he read his first science fiction book, *Great Stories of Space Travel*.

Science fiction "was really like something I had never imagined to exist, and I had the same feeling when I started to work with the computer, which was through Byron," he adds.

Martinez went to college at Stony Brook University on Long Island, where he earned a degree in English. He later wrote interactive children's fiction for Visual Publications. Preiss then approached him about doing the



The fantasy adventure *Dragonworld*, was adopted for Spinnaker's Trillium series from the book of the same name.

adaptation for *Rendezvous with Rama*.

Nearly all of their waking hours are now spent working with computers—IBMs, Apples, Commodores, and Ataris for Preiss, IBMs and Ataris for Martinez.

Preiss's interest in computers and books led him to approach Spinnaker about creating interactive fiction. His firm had already published works by both Bradbury and Clarke, and "partly out of that relationship with them, we were able to take the first steps toward doing this project."

Turning novels into computer adventures means keeping the quality of the story intact. "I think the challenge which we met in all the games was to come up with things that amplify the book, and are faithful to it," says Preiss. "For example, what Ron conceived for exploring the inside of the *Rendezvous*' alien ship is faithful to all of Clarke's ideas, yet it's more than the book."

Martinez says, "The means of moving about in the ship, for example, have been enhanced

so that you can get into places in the Rama structure which you wouldn't be able to get into in the book version. So if you had read the book, you could find new places to explore, and new things to discover in the adventure."

The "frustration factor" was something else the authors had to deal with—they wanted to make the games challenging, and yet not so difficult that the player would feel like giving up.

"The difference in a lot of these games is that you can talk to people," Preiss says.

"In *Dragonworld*, for example, Hawkwind is your companion, and you can have a dialogue with him to get help. In *Rendezvous*, you can communicate back to your crew, and Ron set it up so you've got three different crew members, any of which, at any given time, might give you a different piece of information."

While the puzzles are there, Martinez says, "they're not the whole point. The point is, you're in this world, and it's a story that unfolds. We never sacrifice dramatic progress for the sake of a kind of deep puzzle that you might spend two weeks on."

In the Trillium series, graphics play an integral part in the game, says Martinez. "I think a lot of adventures have used graphics which tended to be kind of superfluous because the text really covers what's there, and it's kind of nice to see the picture, but not necessary."

"In this case, a lot of the graphics are really your only kind of clue or direct link to a part of the story. So what you see there really affects what you do."

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Comparisons between Trillium and such interactive fiction heavyweights as those from Infocom are perhaps inevitable. But to Preiss and Martinez, Trillium stacks up favorably with all-text adventures.

"I think Infocom has set the standard for text input, and most of the time that you buy a graphics adventure, or any kind of unusual adventure, you see those standards going by the wayside," Preiss says. "I think what Trillium has tried to do is keep the standards of the high quality text adventure consistent and at the same time, put in the things that really make use of the computer."

For those who prefer their own imagination to an artist's conceptions, however, Preiss has added the option of playing the games without the graphics.

Sophisticated language is another extra for Trillium, Martinez feels. "It's more sophisticated than any other graphics adventure that I've seen. And the sentences that are understood by the computer, by the program, are full natural language sentences."

Martinez and Preiss were not alone in coming up with their adaptations—Clarke, Bradbury, and Heinlein worked directly with them in converting their works into electronic books. In addition, up to 12 people were involved in the process of developing each game. And in the case of *Rendezvous with Rama*, architects were hired to design the interior of the alien ship.

From Amazon: You've just been hired by NSRT, a top-secret, high-tech research firm. You knew your work wouldn't be easy—but you weren't expecting your first assignment to be a solo expedition to one of the most dangerous, most unexplored areas on Earth.

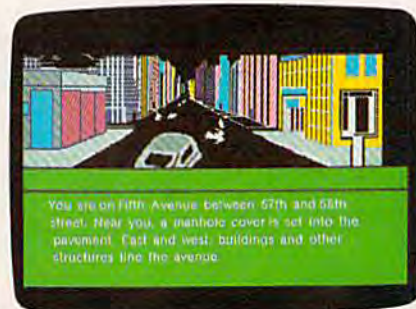


In Rendezvous with Rama you and your crew must explore a giant spaceship.

Nevertheless, you're on your way to the Amazon, on a mission whose purpose is secret and whose dangers are deadly.

The collaboration with Arthur C. Clarke "was a unique case because almost all the work, except for two meetings, was done via mail and the phone," with Clarke responding from his home in Sri Lanka, Preiss says.

Some responses came in a rather unorthodox way, however—via space satellite. "He has been working with the director of 2010 (sequel to the movie based on Clarke's 2001: A Space Odyssey), and they're online via space satellite," Preiss says.



Ray Bradbury's Fahrenheit 451 is another entry in Spinnaker's Trillium series.

But communicating via satellite is nothing new for Clarke, who was the first to propose the idea of geosynchronous satellites, in a story published decades ago. He has also delivered book manuscripts electronically from Sri Lanka to New York.

"In the course of working on the game, he would often send us messages on the computer that someone would call up and dictate. Ron came up with a very clever way to do some things differently from the book, and any time that would happen, we would want to get approval from Arthur. It would often come in the way of 'tell them it's OK,' via satellite."

Working with Bradbury was a pleasure, Preiss says. "He brings the enthusiasm of a young boy—unbelievable, unbounded enthusiasm for something new."

For the adaptation of *Dragonworld*, Preiss, who co-wrote the book, worked with fellow author Michael Reaves to come up with the game of the same name.

Neither Martinez nor Preiss take much stock in the argument that good authors don't necessarily know what makes a good computer game.

"That's why they're not working alone. I think the idea here was to take talented writers and put them together," says Preiss.

In Martinez's view, "I think a great writer would definitely have created the elements for a good game, in that a well-written book has within it a plausible universe, and that's what we're engaged in here, constructing plausible universes."

For the future of electronic books, the two authors see no limits. Says Martinez, "Marrying the technology with the artistic impulse is a good way to create something that hasn't been seen before—there are no limitations." ■

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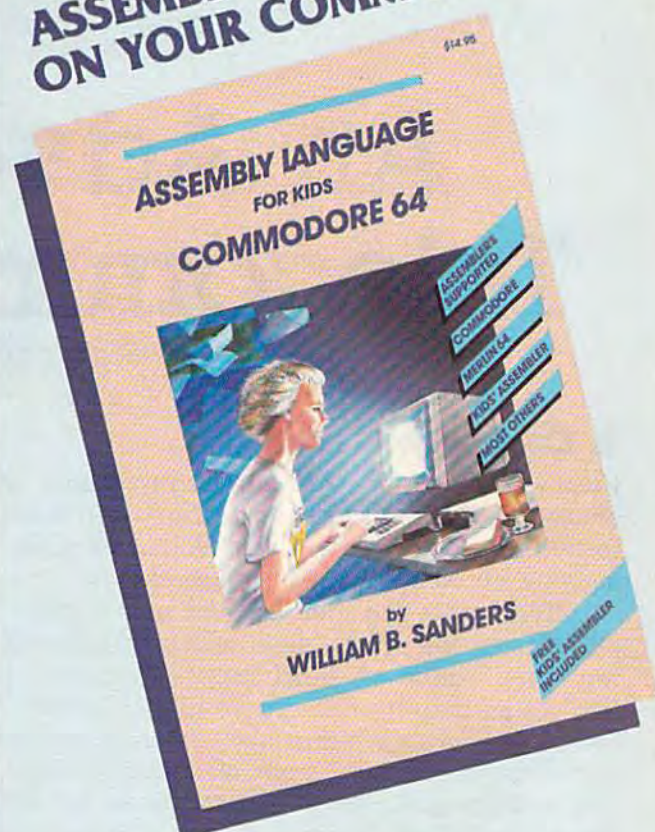
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COMPUTING for families

An Adventure In Telecommunications

Fred D'Ignazio, Associate Editor

A Computer Ostrich

I use computers for word processing, games, and education, but until recently I never used them for telecommunications. I was like an ostrich—keeping my head firmly in the sand.

Every now and then I would read a computer magazine article about telecommunications. But when I lifted my head out of the ground, I felt like an infantryman caught in a cross-fire. Telecommunication terms like *baud rate*, *parity*, *asynchronous communication*, *word length*, *stop bits*, and *xmodem protocol* whizzed over my head like angry bullets. Needless to say, I immediately stuck my head back into the hole in the ground. I figured it was safer there.

Then one day last summer I attended the CES (Consumer Electronics Show) in Chicago. I was walking by the Prentice-Hall Software booth and ran into Ken Skier. I remembered Ken as the author of *SkiWriter*, a word processing package for the Epson HX-20, the tiny lap-sized computer with only a few thousand bytes of total memory. Now Ken was all fired up about a new word processing program he had written for the Commodore 64 called *SkiWriter II*.

This new word processor comes on a 16K memory cartridge that plugs into the back of the 64, and costs \$69.95. You can learn more about *SkiWriter II* by contacting:

Prentice-Hall Home Software
P.O. Box 819
Englewood Cliffs, NJ 07632
(201) 592-2611

To Ken, 16K is a lot of memory, and he had no trouble at all fitting a powerful word processing program into the cartridge.

But that's not all he put into the cartridge. He had so much space left after he wrote the word processor that he decided to add a telecommunications program, too. So *SkiWriter II* for

the 64 is not just a word processor, it's a *communicating* word processor.

There is a precedent for this idea on the little, notebook-sized computers like the Model 100 from Radio Shack and the NEC 8201. These little computers have a telecommunications program and a word processor built into the circuits when you bring them home from the store. The programs are separate (unlike the *SkiWriter II*), but they are so easy to use, it's like they're really the same program.

When Ken showed me *SkiWriter II* at CES, he asked me to sit down and try it out. I hate trying new programs out in front of other people, because I always end up doing foolish things. Despite my reservations, I sat down at the computer and began typing.

One-Touch Functions

The first thing I noticed was the plastic overlay that fit around the 64 keyboard. There were 21 functions assigned to special keys on the keyboard, but the functions were all simple like FIND, REPLACE, TOP, BOTTOM, CANCEL, and EXECUTE, and they were written in big, bold letters. This didn't look too hard. Maybe I wouldn't look like a fool after all.

Next we plugged in the cartridge and turned on the computer. On the screen a menu appeared with an arrow pointing to the top item:

```
+ Edit
  Preview
  Print
  Use Cassette
  Use Disk
  Use Modem
  Select Colors
  Delete the Document
```

I pressed the arrow keys on the 64 and made the menu (not the arrow) move up and

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down, slowly at first, then fast like a bouncing ball. I could have sat there another couple minutes just watching the menu bounce up and down, but I could tell that, behind me, Ken was getting a little bored.

I stopped the bouncing menu at Edit and pressed the EXECUTE button. The screen emptied, and I was ready to begin creating a document.

I created a document easily by letting my fingers go wild. I filled the screen with gobbledygook characters.

"This is neat," I told Ken, "but I can't read the white characters on the blue background very well."

"No problem," Ken said. He showed me how to bail out of Edit (by pressing the CANCEL button) and how to select new text and background colors. I chose black letters on a white background, because it gave me the pleasant illusion that I was using paper and a typewriter rather than a computer and a video screen.

Next, we backed our way into Edit again. I noticed that the computer had remembered the trail we had followed out of Edit, so all I had to do was hit the CANCEL key a couple times. I felt like Hansel or Gretel following bread crumbs through the forest. The computer had remembered my pathway so I couldn't wander off into the forest of unexplored commands.

When we returned to Edit, Ken showed me how to press the different function buttons (all clearly marked with the plastic overlay). We moved blocks of text around, we copied blocks of text, we underlined words—yes, *underlined words right on the screen!*—and we replaced typos with some genuine English, and deleted huge clumps of especially hopeless gobbledygook.

After only about ten minutes of fiddling around with the text, I was zipping around, correcting errors, inserting new sentences and words, and making corrections. After only 15 minutes the whole document was completely spruced up and (to my eyes) error free.

I did have some problems, though. First, as I typed, the overlay tended to move around a little underneath the palms of my hands. This was distracting at first, but I soon got used to it. It didn't slow my typing.

Second, I missed having any commands that would allow me to jump from one end of the line to another, or jump from the beginning of one word to the next, so I could move the cursor even faster along a particular line.

Third, it took me awhile to remember to use the EXECUTE key (f3) instead of the RETURN key to choose items in the *SkiWriter II* menu. (You use the RETURN key, however, when you

are typing your document.)

Fourth, it was hard getting used to using the backspace key as the DELETE LEFT key on the upper lefthand corner of the keyboard instead of its normal place on the upper righthand corner.

However, there were numerous appealing things I found while using the word processor, too. First, the DELETE LEFT key on the left allowed Ken to use the DEL key on the right to let me delete text to the RIGHT (beginning with the cursor). This way, when I wanted to correct a word, I could move in either direction, no matter where I ended up on the word.

This is a great feature for those of us who are somewhat klutzy with their fingers. In my haste to zip around a document in my tiny cursor "airplane," sometimes I come in for a landing on a word and almost miss it. It's great to begin deleting to the right or the left depending on where I have haphazardly landed.

Also, the RETURN character has special status in the word processor and can be edited, so you can use the FIND command and find the RETURN character and replace it or add extra spaces, or whatever. This can be a great help when you need to reformat a document.

And there are lots of nice touches. When you insert text, even at the beginning of a large document, *the whole document* instantly moves down to make room. The paragraph and the whole document automatically and swiftly reformat. There is no wait whatsoever.

Also, the word-wrap happens instantaneously, so you can go typing along and never worry about fitting things on the screen.

And when you want to print your document, you don't have to remember all sorts of esoteric commands to double or triple space the lines, or add headers, or increase the size of your margins. Instead, you just press the EDIT key and the DOT LINE key and step through a menu. As you make your choices, the computer automatically inserts dot formatting commands into the text of your document.

Later on, when you become a more seasoned user, you can bypass this phase by typing the dot commands into your document yourself *in English*. For example, you can type:

.SPACES = 1

to single-space the document. And when this gets to be too tedious, you can abbreviate the command to **.S=1**.

Once you are done editing your document, you simply press the CANCEL key to get out of Edit and bounce the menu around until you get to PRINT. And, if you have a printer connected, you just press the PRINT key a second time and your document prints out.

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Saving The Best For Last

SkiWriter II is a fine word processor, but its best feature is how easy it makes using the telephone with your computer.

After I finished typing my document and saving it on disk (with just a couple extra key-strokes—*SkiWriter II* even enables you to format the disk within the program), Ken and I plugged a Commodore Automodem into the 64's user port.

According to Ken, almost any modem that plugs directly into the user port will work, including the Automodem and VICmodem from Commodore and the HesModem from HesWare. Also, acoustic couplers (such as the Lex-11 and Lex-11B from Lexicon) can be plugged into the back of the 64 if they have an RS-232C interface (such as the MFJ-1228 from MFJ in Alabama).

We set the AutoModem's switches to Data (instead of Talk), Originate (to "originate" a phone call), and Full Duplex (the standard setting for micros to talk to each other or to big computers).

Then I pressed the CANCEL key and got the main menu. I bounced the menu to USE MODEM. I selected AutoModem and DIAL, and the computer asked me which number to dial. I typed in a number Ken gave me, and the computer dialed an IBM PCjr right next to me in the booth. The PCjr was running its own version of *SkiWriter*. The PCjr answered the telephone, and waited for me to begin typing.

Ken had me enter the *conversation* mode in *SkiWriter*. This is the mode you use when two computers running *SkiWriter* are talking to each other.

Ken sat down at the PCjr and typed me a message. As he typed it, I saw it appear, letter by letter, and word by word, on my 64. I could hardly believe it. A PCjr was talking to a 64 as easily and casually as if this sort of thing happened every day. And we were talking over the phone line. We were only a couple of feet apart, but we could have been a couple thousand miles apart.

After we sent messages for a few minutes, Ken pressed the f7 key and the words CAPTURE ON appeared on the screen of his PCjr. He had me press the CANCEL key and bounce the menu to upload (transmit) a document. As soon as I did this, my document began zipping across the phone line and appeared on Ken's screen. At the same time it was being stored in the memory of Ken's computer. We watched the numbers whiz by on the screen, showing the memory being used up by the document as it rushed into the computer.

When the document was completely transmitted to Ken's computer, he loaded a document

from his disk and we reversed the process. He selected UPLOAD, and this time I typed DOWNLOAD on my 64, and a moment later the cursor raced across the screen indicating that the document was being transmitted and stored in my computer.

After we were done sending each other documents, I pressed CANCEL, pressed USE AUTOMODEM, and chose HANG UP. My computer hung up the telephone. Ken issued the same commands, and his computer hung up at the other end.

Then I chose Edit on the menu and there was my old document. Underneath, neatly appended to it, was the document I had just received from Ken's computer. Now I could edit the document, change it, delete it, copy it, save it to disk, print it, or send it along the phone wire to some new computer and to another person.

An Ingenious Marriage

After visiting Ken's booth at CES, I was bitten by the telecommunications bug. I returned home to Virginia, and immediately started teaching my 23 computers how to talk on the telephone.

This was no easy task. The truth is, many computers would rather remain isolationist and *never* talk to another computer—or to another person.

But I persisted, and today most of them can talk over the phone. We even have two phone lines so they can talk to each other.

I have tried out many different communications programs since playing with *SkiWriter II*, but I haven't found another communicating word processor. It is convenient to be able to create a document, and in the same breath, send it via electronic mail across the country to a friend, a member of the family, or to a publisher.

Simplicity, convenience, and ease of use are important features for any program that lets you create and send information electronically. Most electronic mail services (like the Source, CompuServe, or MCI Mail) are somewhat picky.

They like documents to be in pure text, or ASCII, format. This is the type of format *SkiWriterII* documents appear in. You don't have to fiddle around with a document after you type it up, you just send it.

And receiving documents is just as simple. You just point to DOWNLOAD or set CAPTURE ON and wait while the document is loaded into your computer. Then you can display the document you're receiving on the screen, and you can go into EDIT, spruce it up, and make it pretty. Then you can print it out or save it to disk. You don't have to fool around with complicated commands or telecommunications jargon.

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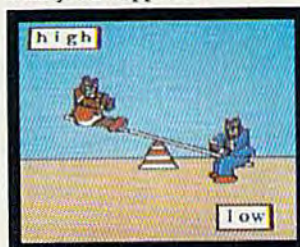
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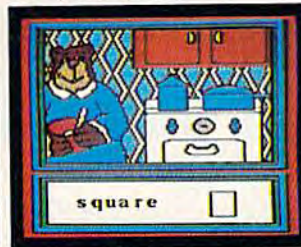


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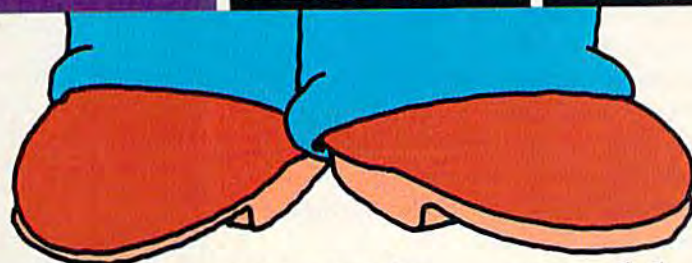
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Word Guess

David W. Rose

You'll have to make quick, educated guesses in this word game, which can easily be modified for any age group or learning level. Written for the 64, we've added a version for the expanded (8K or more) VIC.

Based on the Hangman game idea, "Word Guess" offers more of a challenge, and it's a lot more peaceful (nobody gets hung). The object of the game is to guess the letters that comprise a word which is randomly selected from the program's dictionary (found in DATA statements at the end of the program).

A Limited Number Of Guesses

It sounds easy, but there are a few conditions which make it a bit more difficult. You have only five more letter guesses than the length of the word selected. For example, if a ten-letter word (the maximum length of a word in the program dictionary) is chosen, you have a total of 15 guesses. The number of guesses remaining is displayed throughout each game.

Also, to speed the game along, a maximum of 30 seconds is allowed for choosing a letter. A countdown clock shows how many seconds remain to make a choice.

A correct choice is instantly displayed in its appropriate position (or positions), and all letters guessed are displayed for quick reference. A correct answer is rewarded with a congratulatory message and musical fanfare. If you run out of chances, the answer is displayed. In either case, the total elapsed time in minutes and seconds is displayed after each round. You are also prompted to press f3 to quit or f5 to continue on to another word.

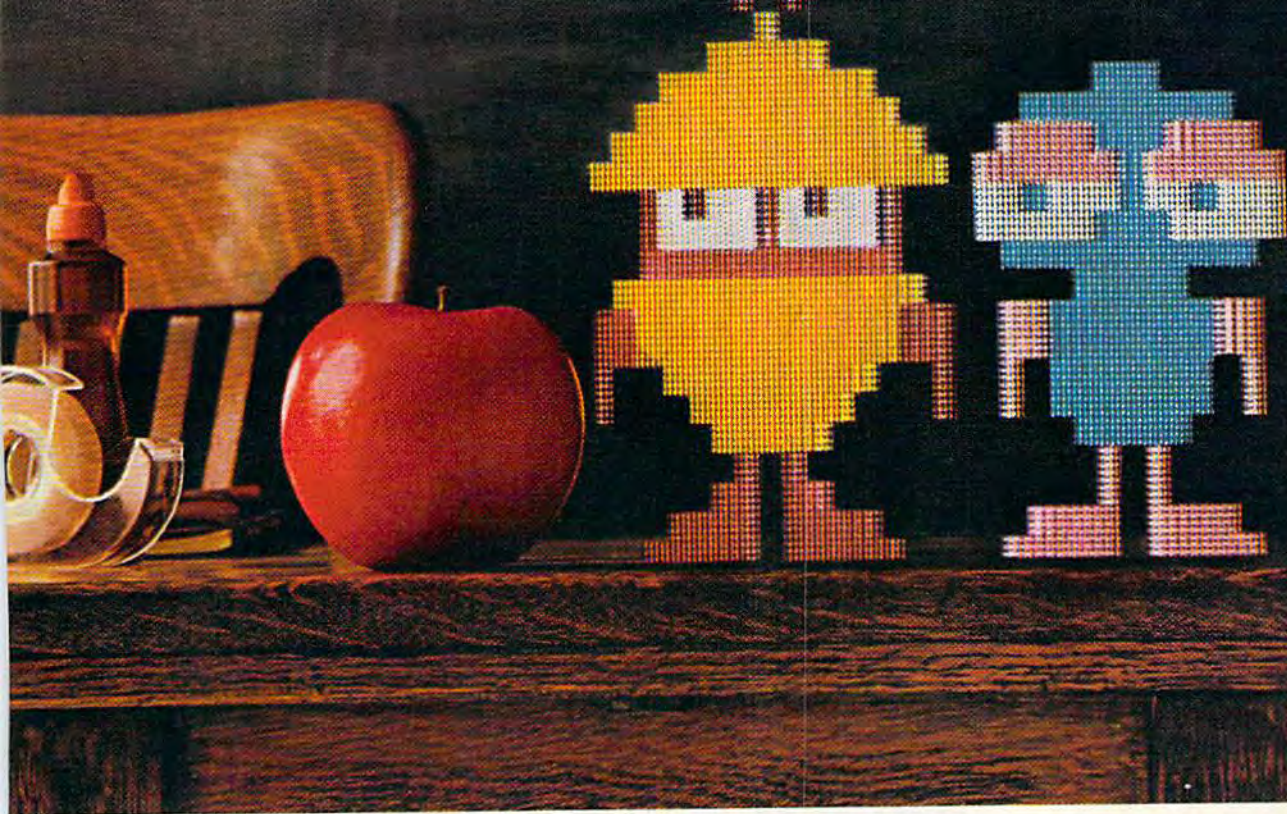
Modifying The Program

Word Guess has 100 words in the program dictionary. None is used more than once in a single game. If you wish to change this number, first change the value of N in line 9. Then change the words in the DATA statements (lines 1000-1100). Be sure the value of N corresponds to the number of words contained in the DATA statements. New words must be from one to ten

VIC And 64 Program Description

Line Number	
9	defines number of words in dictionary (N); time limit (GT)
10	branches to print introduction and instructions
17	defines music POKEs
20	DIMensions the following arrays: LE\$ each letter of word to be guessed MI\$ letters used so far DI\$ correct letters guessed in the word WU marker if word was already used WD\$ all words from dictionary AL\$ alphabet
25	reads words in dictionary to WD\$, sets WU array to 0
26	reads alphabet into AL\$
28	subroutine to clear out arrays for new word
30	picks a random number between 1 and N
35	checks to make sure a word is not repeated in the game
40	marks the word to be used so it is not repeated later
50	finds word length
55	separates letters of the word to be guessed, places letters into LE\$
80	PRINTs message to screen
85-90	define beginning screen locations for word display and underlines
102-104	PRINT messages
106	initial time for guessing word
107	gets initial time in seconds for guessing letter
108	obtains guess
109	if no guess entered yet, activates countdown (if no time left, put '-' for guess)
112	checks if length of answer is equal to one
113	checks if guess is a letter from A to Z
115	increments number of guesses
120	places guess in array of guessed letters (MI\$)
130	checks if letter in the displayed word has already been guessed
140-145	if guess is in word, place it in the appropriate spot, redisplay the word
170-173	determine POKE assignment for letter guessed
177	determines screen location for guessed letter
180	POKEs the guessed letter onto screen
190	PRINTs number of guesses left
215	if there are no guesses left, and the word is not determined, perform routine for missed words
220	if the answer was guessed, perform routine for correct word
225-230	PRINT function key options
235	waits for a response
240	if f5 was pressed, get a new word
245	if f3 was pressed, clear screen and end game

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Subroutines

300-390	countdown clock for guessed letters
500-540	clear arrays for new word
600-655	display current letter being guessed
620	determines POKE for letter
625	determines screen location for display
630	POKEs the letter onto screen
635-645	sound beep for letter guessed
650	time delay for multiple occurrences of the same letter in the word
700-730	PRINT message for missed word
705-710	print message and the word missed
715-725	sound buzz
800-850	PRINT congratulations for guessed word
810	PRINT message
815-835	sound fanfare for correct guess
875-975	PRINT introduction and instructions
875-897	print introduction
900-956	print instructions
1000-1999	dictionary of words
2000-2010	alphabet

characters in length, and no special characters or numbers may be used. By following these simple rules, it's easy to modify the game for children or even serious word buffs.

You may also change the 30-second time limit by assigning a new value to the variable GT, also in line 9.

To make the game more difficult, add GOTO160 at the end of line 140. This forces the player to guess each letter even if the selected word has more than one occurrence of that letter. For example, if the selected word is "gallon," the player must guess "l" twice to get the correct answer.

See program listings on page 201. 

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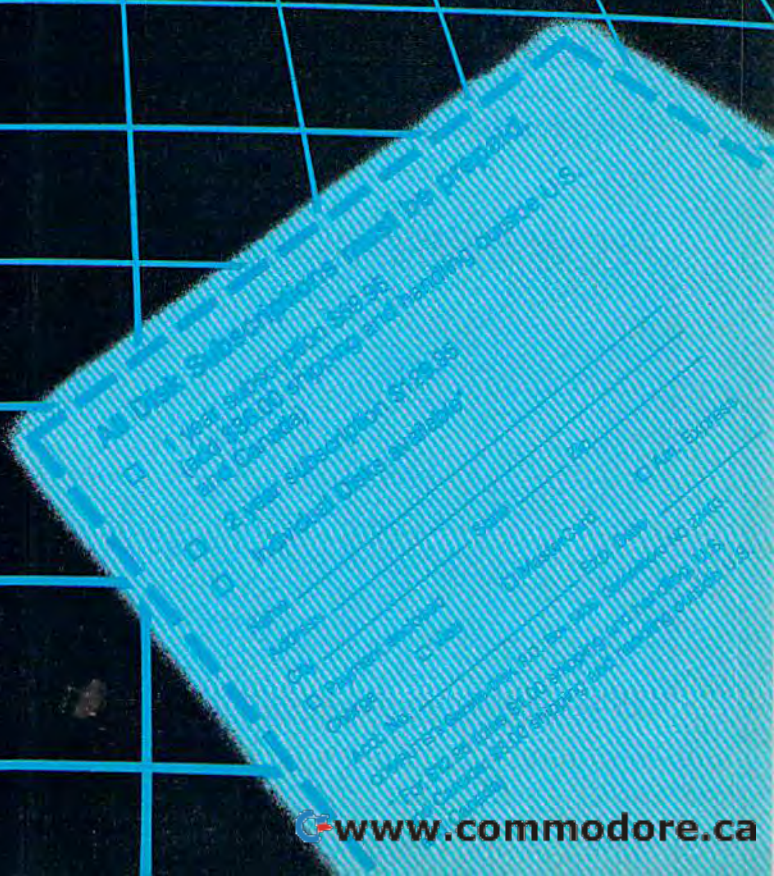
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Letter Attack

Craig Howarth

Keep your typing skills from going down the "chute" with "Letter Attack." Originally written for the VIC, we've added a version for the 64.

This program puts your typing skills to the test. It measures response time and accuracy and provides entertainment as well.

The rules of play are quite simple. A letter falls down the chute from the top of the screen at varying speeds (depending on the skill level chosen). You must press that letter on the keyboard before it reaches the bottom of the screen. If you enter the wrong letter, you can keep trying until the letter vanishes from the screen.

The Play Screen

The skill level, letters remaining, current score, and high score are displayed during play. In

addition to these, a green pointer appears on the right side of the chute every time a letter is properly entered. This shows how quickly you are responding during the course of play. The higher the pointer the faster your response time.

On the left side of the chute, starting with the second round of play, a purple pointer indicates your best response time so far.

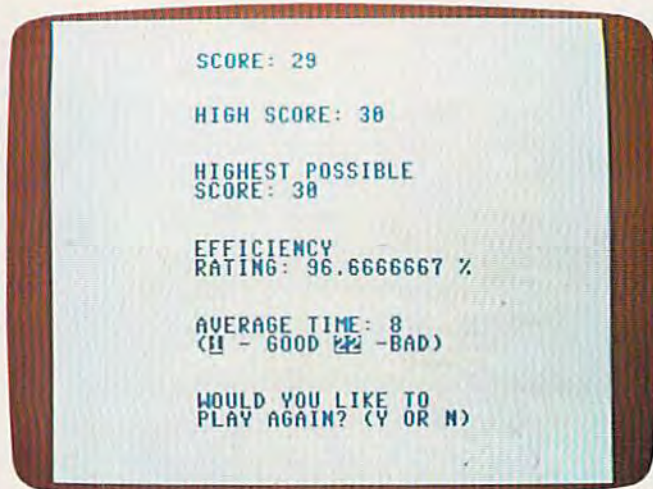
The Score Screen

Once all of the letters are eliminated (the number of letters is chosen at the beginning of play, 10-90 in increments of 10), a new screen is displayed showing the results of the most recent game. Along with the score, the highest possible score (number of letters), and the high score, is an efficiency rating which is the percentage of the score against the highest possible score.

There is also an average time displayed, determined by dividing the total of all times for



A letter is caught and marked by an arrow in the VIC version.



Each performance is rated at game's end (64 version).

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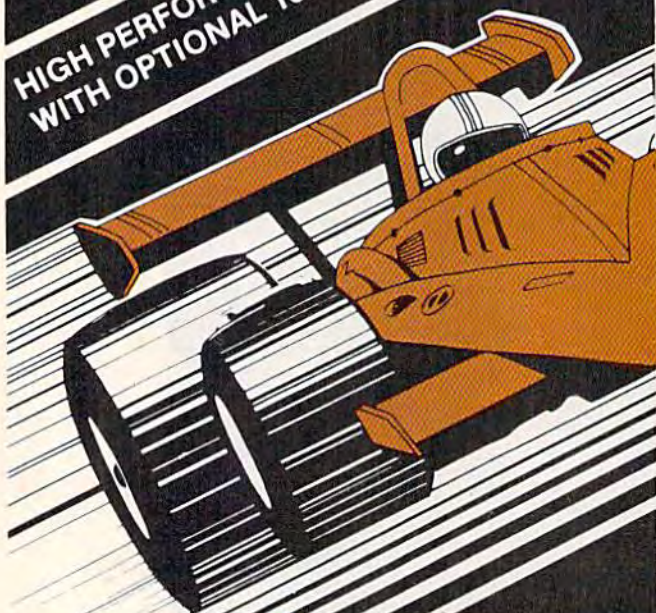
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- BT - Best time
- V - Volume
- S - Sound (tones)
- N - Noise
- DL - Difficulty level
- NL - Number of letters
- SC - Score
- LR - Number of letters counter
- TM - Time (total)
- A - Screen color code offset (30720 for the VIC)
- B - Screen character code location (7682 for the VIC)
- LE - Letter (POKE code)
- LC - Letter (ASCII code)
- CN - Sound counter
- ER - Efficiency rating
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See program listings on page 192. 

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REVIEWS

MicroFiler: A Data Base For The 64

Charles Brannon, Program Editor

If you've been looking for a fast, flexible, and easy-to-use data base program, *MicroFiler* may be well worth your attention. The term *data base* has come to have two meanings. It can refer to a large base of data, or the program that manages the data. A data base program can be a fully programmable data language like *dBASE II*, or a computerized index card file. *MicroFiler* falls into the latter category, but does far more than a glorified file card box.

Unlike disk-based data bases, which dynamically retrieve all records from disk, *MicroFiler* is memory-oriented. The performance of disk-based data bases depends on the speed of the disk drive, whereas a memory-oriented data base is much faster, but limited by available memory to a certain number of records. However, this permits 64 owners who use Datassettes to take full advantage of *MicroFiler*. You initially load all your records from tape or disk, do your entering, editing, searching, and printing, then save the data back out to tape or disk.

Since *MicroFiler* is on cartridge, there's no frustrating delay while the program loads.

The cartridge becomes part of the 64's memory, turning your machine into a filing system.

Creative Data Entry

When you turn on your computer, the *MicroFiler* title screen comes up, where you select Create File. A blank screen with a menu bar at the top appears. Here's the fun part. Using full screen editing, you "draw" a form you'll use to enter your data. Reverse-field spaces mark the blanks which will be filled in when you enter data. The number of spaces you type out determines how much memory is reserved for that field in the record. You can type names for the blanks, even embellish the form with graphics characters and color.

This is one of the most flexible ways I've ever seen to create a data entry form. When entering data, you're not required to place these entries into all fields. If you want to enforce entry, place a reverse-field C in the first spot in the field. Numeric fields, which can be summed and averaged, are specified with a reverse-field N. *MicroFiler* won't let you enter an illegal number in a numeric field.

Entering your data is just as easy. The cursor up/down keys move directly from field to field. You can only type into the reverse-fields you earlier prepared. Full cursor editing is supported within each field. After you've entered a record, press f1 to store it. Since there are only 1000 characters in a 40 × 25 screen, this is the limit of how big a record can be. With labels and prompts, you have even less room. However, if you use short records, you can, of course, have many more in memory.

After you've entered some data, you can scan through the records. If you're using *MicroFiler* as a recipe filer, you may want to find the lasagna recipe. Instead of scanning through all the records, you can search for the name of a recipe. Or perhaps you're keeping a mailing list, and would like a display of all clients located in your home state. You just enter certain search characters within the field(s) you want to search or combine searching and sorting as you view your records. You can also generate a sum or average of all numeric fields.

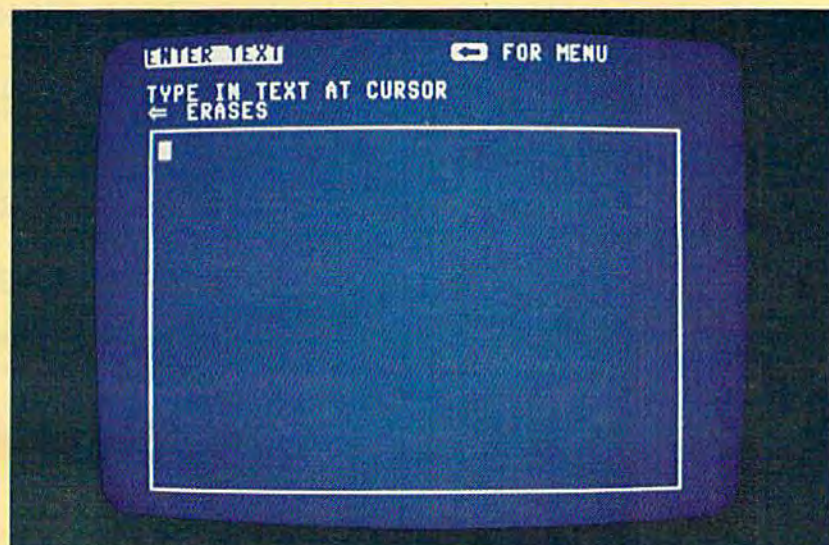
Designing A Printout

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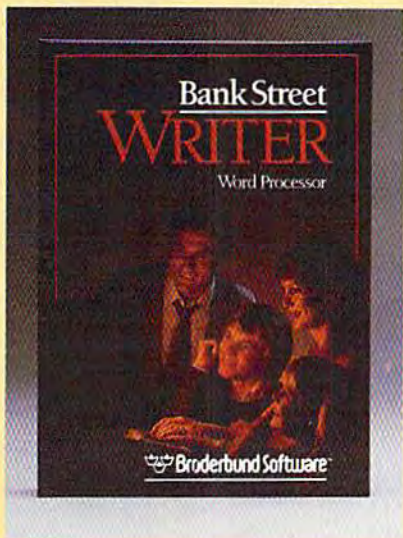
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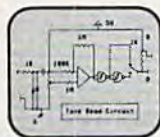
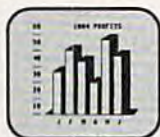
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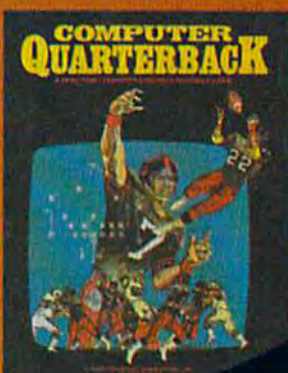
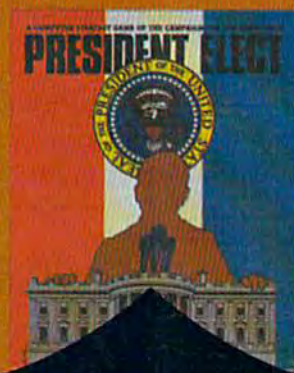
MicroFiler does have some limitations. Since the number of records is limited by memory, you may need to keep several separate data bases with the same entry form. You cannot add an extra field or change any part of the entry form without losing all your data. (Many data bases have this limitation.)

There is no way to print column heading or field names with the data, or to print headers, footers, or page numbers. Other than summing and averaging, no math operations are supported on numeric fields.

Nonetheless, MicroFiler has rare power for such an easy-to-use program. The ease with which you define and enter records and the flexibility of sorts, searches, and printouts all make MicroFiler stand out against the glut of inferior data bases. You might not want to use MicroFiler for complex business record keeping, but it will do an outstanding job for casual or home applications.

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NATO Commander Art Hunkins

NATO Commander, from MicroProse Software, is an accessible, single-player war-game simulation that quickly gets you deeply involved. And it's fun to play. The basic commands are easy to learn (one-and-a-half to two hours should do it), and its main challenge is strategy. An "accelerated real-time combat simulation" (action is updated in 5-minute chunks), it pits NATO vs. Warsaw Pact forces, with you as NATO chief.

Scenarios are based on actual and anticipated European theater strategy, including what is known of Warsaw Pact strengths and weaknesses, NATO reinforcement readiness, and France's intentions (should war break out).

A Pause To Reflect

The game's chief attraction is its ability to let you *freeze* action—a kind of "time out" to survey the situation, plan strategy, and make any moves you desire. Since *freeze* can be activated at any time, action can best be described as unstructured and free-flowing; you as commander can interrupt, interact, and change strategy whenever you want. This tactical immediacy is both captivating and realistic. So is the political dimension: Scoring includes both combat and political elements (use of nuclear weapons scores negative political points).

Strategy is of necessity defensive (although one of five scenarios involves a pre-emptive

first strike); tactical nuclear weapons are strictly a last resort, for use only when conventional remedies have failed or when the enemy has first gone nuclear—and then only after authorization from the commander-in-chief. To win, you must both keep up your guard (defend your cities), and employ your forces appropriately (each force type specializes in a particular role).

The game offers numerous options and many types of armed forces (there are multiple kinds and functions of units). In addition to the five scenarios, the game comes up in "demo mode," a feature purporting to make it more accessible to first-time players. Other noteworthy features include daily status reports, interspersed with announcements of political events which affect game action (based on historical probability).

Each military unit is "intelligent"; it does its own reconnaissance, choosing its own most favorable course of movement (this particularly applies to Warsaw Pact forces). Radio and teletype messages link you with your various units, and your access to the field is immediate.

The graphics are good, though basic. A joystick moves you around the display map, which shows water, rivers, terrain features and towns, as well as the various forces. A particularly nice, though occasionally disturbing, feature is the shift from day to night—from light to



dark background. Action is slow and difficult following the dramatic shift to black. On the whole, color is particularly effective in helping identify both forces and terrain features.

A Few Drawbacks

The documentation is sketchy to average. The vital information is all there, but not all the screen action and graphics are explained. Nor (in sufficient depth) are the roles of morale and terrain.

The map graphic is surprisingly difficult to follow and figure out, even when used with the map included in the documentation. Then there are the all-too-frequent misspellings and syntax errors, coupled with poorly formatted text that splits words between lines. The documentation still shows traces of conversion from the Atari original.

Nevertheless, as a one-player simulation, *NATO Commander* is both exciting and realistic. It is relevant to today's political climate, since it plays according to

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the "rules" of the European theater of the '80s. Although it offers multiple levels of difficulty, it can be approached by first-time war gamers, and gives some notion both of contemporary command strategy and the challenges, intricacy, and immediacy of modern warfare in the West. *NATO Commander* has interactive excitement, the realism

of today, and considerable staying power. Recommended for those who want a different kind of contemporary war game, and for the adventurous novice war gamer.

NATO Commander
MicroProse Software
10616 Beaver Dam Road
Hunt Valley, MD 21030
\$34.95 (Commodore 64 disk) 

change color to indicate who last occupied them.

All in all, the graphics are very attractive. Because everything happens on only one screen, though, the units are a bit small to be comfortably focused on for more than a couple of hours at a time. The game is playable on a black-and-white TV or monochrome monitor, with little trouble distinguishing shades.

Road To Moscow

Neil Randall

On June 22, 1941, Hitler invaded the Soviet Union. The next four years saw the largest land campaign ever fought, as the Germans pushed the Soviets to the brink of surrender and then began the long, slow retreat to Berlin. To the Allies, it was known as the War in the East; to the Soviets, the Great Patriotic War. To the Germans, it was simply the Russian Front.

Road to Moscow for the 64 is a re-creation of the entire Russo-German war. The screen displays a map of the Soviet Union from Poland to the Ural Mountains (west to east) and from Finland to the Black Sea (north to south). You're given command of the German forces, which you must maneuver using either the keyboard or a joystick. To win the game, you must capture as many Russian cities as possible, then hold on to them. The Soviets (your 64) will do everything possible to stop you. Each turn represents two weeks of real time.

Graphic Realism

On the map of the Soviet Union, you see five types of terrain: forest, swamp, mountains, seas, and clear. Each has a distinct graphics symbol, and each is appropriately colored. The map changes color with the seasons: light gray during clear weather (summer and fall), yellow during spring, and a very stark white throughout the long Russian winter. This last change has an interesting psychological effect, as you soon come to dread winter as much as the Soviet army.

The armies themselves consist of small square "units." You can choose standard designations (for example, infantry is a square containing an X), or icons, which show a picture of the type of unit (infantry is a little man, armour is a tank). German units are black, changing to light blue when less than half-strength. Russian units are red, changing to pink when depleted. The cities on the map

A Choice Of Scenarios

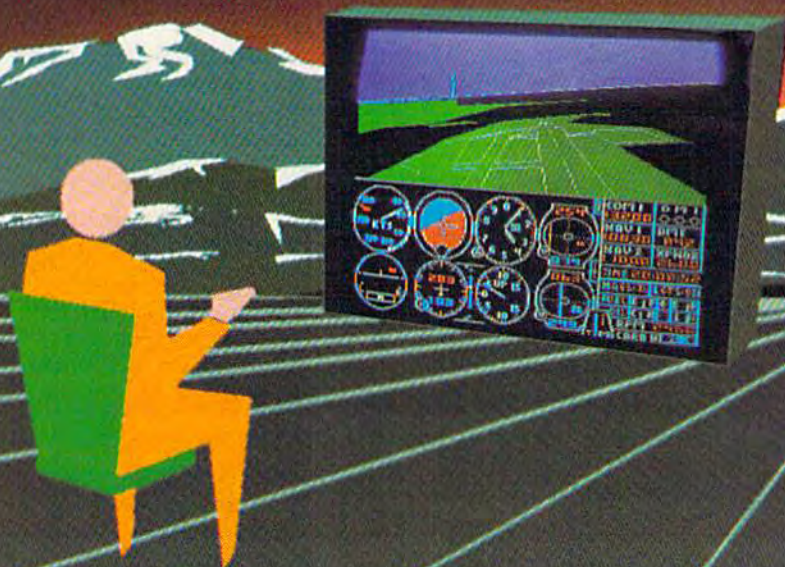
Road to Moscow has five scenarios. Four of them cover individual years of the war, and one the entire campaign. The 1941-42 scenario takes the war from the German jump-off point to the battles near Stalingrad. At the other extreme, the 1944-45 scenario shows the last, desperate German defense of Poland. The campaign game covers the war from start to end, and is the one you'll want to get to as soon as possible.

The small scenarios take about five hours to play, once you have a few hours experience. The campaign game is an undertaking of 20 to 30 hours. The program disk allows one game to be saved on it, however there is no provision for saving a game on a separate disk.

Game play is unusual in that both sides move simultaneously. First, using the joystick or keyboard, you plot movement for each German unit. While you're doing this, the computer is plotting movement for the Soviet units. When you

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finish plotting, type G and the computer performs the actual movement of both sides' units. Whenever enemy units are plotted to enter the same square, they fight.

When you "pick up" a unit, a one-line display at the bottom of the map shows the unit's current strength, potential strength, and current supply status. Units which are depleted can be taken out of the line and into a city to receive reinforcements. The supply status is a number from 0 to 9, with 9 meaning full supply and 0 indicating that the unit has been out of supply for two months. A unit with low supply takes heavier casualties, cannot move at full speed, and cannot receive replacements. In other words, it's in trouble.

A unit is moved with either a joystick or the function keys. You simply pick up a unit, plot where you want to go, then drop it. You may change its move at any time. Even if you use a joystick, the function keys are available for such purposes as identifying cities and changing-movement plots. Strangely, I find keyboard control easier than joystick control.

Simulating History

Road to Moscow handles all the major aspects of the Russo-German war. The Germans are immensely superior to the Soviets in effectiveness for the first part of the war, but the Soviets keep getting better. The player watches as Soviet reinforcements and replacements keep coming and coming, always seeming to fill the gaps at the

last moment. Russian artillery appears in mid- to late-1943 and smashes anything that stands in its way. You must use your armored units to sweep around and trap the Soviets; if you try to go right through them, you'll suffer too many losses.

There is even a series of Strategic Events, happenings beyond the player's control. As an example, the game may begin six weeks early (May 1941) to reflect what might have happened had Hitler not conducted a Balkans campaign before invading Russia. Historical events include the invasions of Italy and France, both of which siphon off troops from the Russian front. These events are introduced by the computer, and they interact with each other.

What is most impressive about *Road to Moscow* is its sense of focus. Wars are complex affairs, and a game cannot simulate every aspect of even a small war. The players must be cast in a historical role, be it tank commander, brigade commander, or commander of the entire war.

Road to Moscow places the player in the role of German strategic commander (historically assumed by Hitler). He is free to do with his troops as he will, but he is under the historical constraints of time, weather, and manpower. Unlike many war games, though, *Road to Moscow* makes the player's role very clear. He is not concerned with small-unit tactics, not even with small battles. He must deal with overall troop movement,

and that's it. The game reminds me of military maps, with troop movements shown by arrows. The arrows show where the commander hopes the units will end up, which is what this game's plotting system does for the player.

Nothing's Perfect

Despite its overall success, however, there are a couple negative points. Allowing only one game to be saved is inconvenient, and writing it to the game disk seems a little dangerous, should anything go wrong. If you forget to turn on the drive before saving the game, you lose it and must start over from your last save. Surely a warning message could show up instead. It would have been nice to allow units to move diagonally, since doing so would permit a more gradual (and safer) retreat. (Since units are joystick-controlled, I think this would have been both logical and effective.)

Finally, I would like to have seen a more explicit way of showing when units are destroyed. As it stands now, the computer flashes the unit's name on the status line, but it is almost impossible to tell which unit has just been eliminated. A better handling of this would help the player learn how to fight battles more efficiently.

More importantly, the documentation is a little vague on how the game actually works. I suspect this is intentional, the idea being to learn as you play. But war gamers tend to be an analytical lot, and want to know how the computer conducts

A STEP BEYOND.



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combat and where it gets its numbers. The game uses a system different from other computer war games, and should therefore be explained in greater detail. Since Ba'rac plans other games using this system, perhaps we'll see more explanation.

Road to Moscow is one of

the best computer war games available, for two main reasons. First, it uses a system which plays quickly and yet allows the player to feel like a theater commander. Second, it simulates one of the most interesting wars of all time. For these reasons, and because it does its job dif-

ferently than other computer war games, I recommend it to both beginner and veteran.

Road to Moscow
Ba'rac Limited
P.O. Box 37206
Shreveport, LA 71133-7206
\$29.95 (disk)

The Castles Of Dr. Creep

Thirteen castles, over 200 rooms, countless passageways, and legions of creatures make this arcade game for the Commodore 64 one that plays for days, not just hours.

After selecting the castle you want to explore (there's a tutorial game that quickly shows you how to play and illustrates the different elements of a castle), your character appears in a room. Sometimes you have but one possible exit, because the other doors are locked or simply cannot be opened from this side. Other times you have a choice. Running through a doorway and up the passageway (graphically entertaining in itself), you find yourself in another room.

But there are electrostatic generators (remember the huge silvered balls, with lightning sparking off them, from the old horror movies?), matter transmitters, force fields, trap doors, moving sidewalks, automated death rays, ladders, fireman's poles, and walkways filling each room. To make things even more complicated, Frankenstein monsters and stumbling mum-

mies leave their coffins and tombs and follow you almost everywhere. The combination and number of these devices and creatures sets the difficulty of the room.

Each room is a puzzle in itself. How can you get to the generator switch when a Frankenstein bars the way? How can you close that trapdoor without electrocuting yourself?

And the rooms comprise a greater puzzle—the castle itself. You somehow must escape. To do that, you have to find and pocket the numerous keys scattered throughout the building. Only then can you find your way back into the light.

The Castles of Dr. Creep is an entertaining, engrossing game that manages to combine arcade action, superior graphics and sound, and strategic puzzle solving. You need quick thinking, and even quicker reflexes to find your way out. And with

Also Worth Noting

two players, one at each joystick, it becomes a medley of competition and cooperation. Transylvania was never so hard to leave.

Brøderbund Software
17 Paul Drive
San Rafael, CA 94903
\$29.95 (disk)

Dragon's Keep And Troll's Tale

These two new children's adventure games for the 64 from Sierra are teachers as well as entertainers. Both are graphics/text adventures in which the player travels from scene to scene, following clues, to locate missing objects. In *Dragon's Keep*, the object is to rescue animals, in *Troll's Tale* to find hidden treasures. Each game has good graphics, and the constant disk access, common to most adventure games, doesn't cause too long a wait. Each package includes maps and stickers to help the child visualize and track his or her movements.

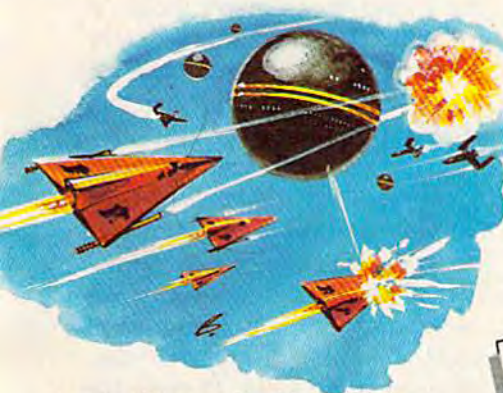
The skill focus of these adventures is on identifying details, understanding inferences, and drawing conclusions. *Dragon's Keep* is designed for ages

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seven and up and teaches compass directions. *Troll's Tale* is a bit more complex and is designed for ages eight and up.

Both games are well designed and fun to play. Just as importantly, they don't get in the way of the interactive process. No matter what choices a youngster enters, the programs provide guidance to those who may get frustrated, and they teach important skills.

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Rug Rider

You'll need to develop a deft touch with the joystick to take full advantage of this new action game from International Tri Micro. Very much in the tradition of *Joust*, *Rug Rider* puts you in command of a free-floating magic carpet piloted by a red-robed, turbaned character, Ahmed. You fly among clouds, caves, forests, mountains, and castles collecting power and experience for the final confrontation with the Evil Genie.

Rug Rider lets you scroll and choose any of 32 screens, each with different terrain and challenges. Colorful graphics, sprightly music, and a variety of obstacles help keep the game lively. As with almost any good action game, mastering the joystick movements takes a bit of practice. It is particularly important that you not let Ahmed come in contact with objects on the screen, such as the bottom of a cloud or any of the lethal instruments of destruction.

In each round, you gather

all of the keys on the screen, freeing the treasure for you to take. By using the space bar, your character can fire bolts of magic at the Evil Genie and lesser threats. This is an awkward component of the game, however, and in practice is difficult to use effectively.

Rug Rider includes a good mix of activities on the different screens. Sometimes you'll need to drill for the magic keys. On other occasions, you'll have to pick up and drop heavy irons, or brandish magic shields. Destroying the Evil Genie is the toughest part of a very challenging game. You'll have to hit him with your magic bolts more than once to achieve the desired results.

International Tri Micro

1010 N. Batavia Unit G

Orange, CA 92667

(714) 771-4038

\$29.95 (disk)

Impossible Mission

From the moment you hear the sinister voice of Dr. Elvin Atombender welcome you to his underground stronghold, you know this new action-puzzle game from Epyx is something refreshingly different. Fast action, superb graphics and sound effects (including speech synthesis), a somersaulting central character, and a difficult code for you to crack make *Impossible Mission* a game you can come back to and still enjoy.

As a special agent attempting to stop Atombender from destroying the world, you run through the tunnels and ride the elevators of his headquarters seeking pieces of code, which

are the keys to preventing annihilation. More than 30 rooms must be searched, and 90 robots have to be circumvented while you gather parts of the puzzle. As you pick up the code, the pieces are automatically transferred to your Agency's computer, which will help you unscramble the meaning. But it's by no means easy. Look at the pieces, flip them vertically or horizontally, match their colors. Call the computer for help. Hurry, time is running out.

There are numerous subtle touches which make *Impossible Mission* unique. The sound effects are extremely well done, including Atombender's taunting comments, a chilling cry if your character plunges to his demise, the robots' electrifying zaps, even the footfalls as you run through the tunnels and the rooms. Two code rooms permit you to pick up "snooze" passwords (which temporarily stop the robots) and "lift inits" (which reset the elevators in a room) if you can correctly remember a sequence of musical tones.

If time runs out before you've solved the code, Atombender's mocking laughter will haunt you as the screen breaks up in destruction. Each time you play the game, it generates a different pattern of rooms and a variety of codes for you to break. This game presents an excellent combination of features which takes full advantage of the Commodore 64's capabilities.

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Programming Commodore's Magic Voice

Betsy And Danny Byrne

Commodore's new Magic Voice Speech Module gives your 64 the power to talk. Here's a short program that acts as a "speech processor." You type the words and your computer speaks them.

Making your 64 talk to you is a simple matter now. Commodore's Magic Voice Speech Module is easy to use, and it can greatly enhance your programs with educational and entertainment value.

For starters, just plug the Magic Voice cartridge into your 64, hook a wire to your TV or monitor, and turn on the computer. Type SAY and one of the 234 available words, and your 64 is in business.

You can insert any cartridge software into the top-loading slot. Certain games, like Commodore's *Gorf* and *Wizard of Wor*, have some speech routines built in. *Gorf* guffaws (or is it a chortle?) as the game begins, "Ha Ha Ha, Space Cadet." It adds a new dimension to game playing.

Writing Your Own Voice Programs

If you're able to understand and manipulate the PRINT statement, you should have little trouble using SAY.

You can SAY a word directly, as long as you spell it correctly and put it inside quotation marks. Or you can use the word number (the number which represents a word from the available list), which saves some memory if you plan to speak a lot of words in your program. For example, SAY "MILLION" is equivalent to SAY18, because word number 18 is "million."

Besides SAY, the Magic Voice module adds two other new BASIC statements and a new reserved variable. RATE sets the speed of the words spoken. It doesn't make the pitch higher (like a cartoon character) or lower; it makes the words come out faster. VOC is a specialized

statement for use with extended vocabularies (which are not yet available as this issue goes to press). And RDY is a variable which keeps track of when the computer has finished one word and is ready to say another.

The manual includes a short program to allow the computer to speak every number from 0 to 999,999,999 when typed from the keyboard. But what if you want a program to speak the other words when they're typed in?

There are several problems that must be solved before a "speech processor" is possible.

Probably the most serious problem is the 234-word limit of the Magic Voice. It's not that it's a strange or useless vocabulary. It does contain most of the most common words. The difficult part is that, unless you've memorized the list of words, it's easy to type a word which the Magic Voice doesn't know. What happens then is the program stops and prints an ?ILLEGAL QUANTITY ERROR message.

In addition, the Magic Voice does not recognize sentences. You have to SAY words one by one. As you type sentences, the program has to watch for individual words. That's simple enough, just GET letters from the keyboard, building up the word until you reach a space (marking the end of a word). Then SAY the word and go back to get the next one.

Finally, there are some homonyms not on the list. We'd want the program to swap between homonyms if one is on the list but its counterpart isn't. For example, if you tried to SAY the words DOWN BY THE SEA, you'd hear the first three. But SEA would result in an illegal quantity error, even though the Magic Voice can say the letter C and the word SEE. Another problem is with alternate spellings, for example GREY (acceptable) versus GRAY (not).

Using Finger Talk

"Finger Talk," the program accompanying this article, addresses some of these quirks.

Our original solution to the first problem

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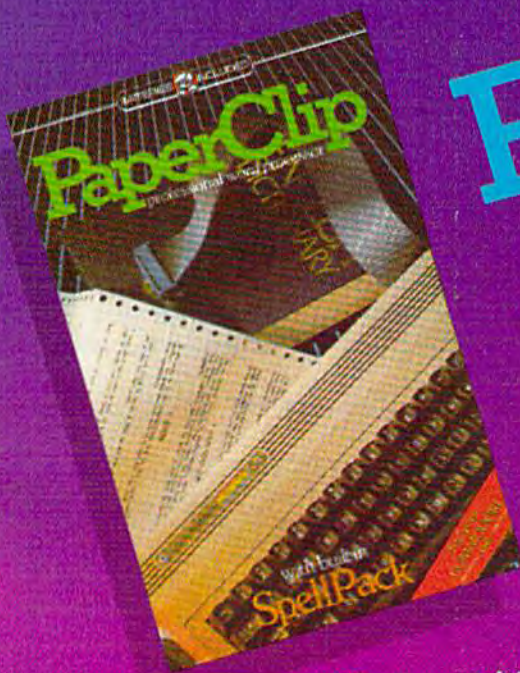
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was to include lots of DATA statements to cover 230+ words and various homonyms. The numerous DATA statements contributed to the length of the original program.

Finger Talk was shortened considerably by a slight modification to the error routine. If you look at line 80, you'll see three POKES. They divert the Magic Voice module's error routine to a harmless section of memory. If you try to say an illegal word, the Magic Voice just ignores it. The program continues, instead of stopping and printing ?ILLEGAL QUANTITY ERROR.

If you own a Magic Voice and plan to write programs for it, you might want to make note of the three POKES, especially if you plan to SAY words which are INPUT by users.

The second problem, speaking words instead of sentences, is solved with the GET statement, as described above.

Several homonyms have been added. You can see them in the DATA statements toward the end of the program. They are stored in an array. When you type an illegal word which sounds like a legal one, the program trades the two and the equivalent vocabulary word is spoken.

Typing In The Program

Type in Finger Talk and save it. Before you run it, make sure you have the Magic Voice module plugged into your 64. As the program begins, the homonyms are read into memory and the title screen appears.

You are asked two questions. If you want each letter spoken as you type, answer YES to SAY EACH LETTER? For example, if this option is active, you will hear T, H, R, E, E when you press those letters. Press the space bar and you'll hear the word THREE. If you answer no, you'll hear only the word, not the individual letters.

You also choose what RATE the Magic Voice will use, from 1 for the fastest to 10 for the slowest.

After you answer the questions, the main speaking routine begins. If you type a word that's part of the Magic Voice's vocabulary, you'll hear it spoken. If the word isn't available, you don't hear anything. Press RETURN and the whole sentence is spoken.

Finger Talk limits sentences to 80 characters (two screen lines). If you reach the 80th character without pressing RETURN, the computer automatically says the sentence as if RETURN had been pressed.


The f1 key controls the RATE (1-10) from within the program. Each time you press f1, the rate is increased by 1. A single number in the upper left corner tells you the current rate (a zero means rate ten). If you make a typing mistake,

you can use the DEL key to correct it. And SHIFT-CLR/HOME clears the screen. It doesn't matter whether you use upper- or lowercase letters; they're converted to lowercase by the program.

One thing to watch for is typing a space while the SHIFT LOCK key is down. Spaces are used to mark the boundaries between words, and the SHIFTed space character is different from a regular space. They look the same on the screen, but have different ASCII values. A SHIFTed space is like a capital space, if you can imagine that. It's best to avoid using SHIFT LOCK when entering words to be spoken.

One other quirk comes from the way words are kept in an array until you press RETURN. If you type a few words and clear the screen (without pressing RETURN), the previous words will be spoken when you finally do press RETURN. The array is active until RETURN is pressed.

Finger Talk demonstrates what the Magic Voice module can do (and gives you something for your friends to "ooh" and "aah" over at parties). It could be useful to teach touch typing to blind people; they'll hear which key they just pressed. And kids who are learning to read could use it to practice.

See program listing on page 197. 

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Tommy Graham

Wave after wave of enemy Zirconians attempt to descend on your home planet in hope of the ultimate conquest. Your only defense is your particle beam pulsar cannon, which will destroy them. But don't even let them get close—they'll self-destruct and take you along with them. An action game for the VIC and 64. Joystick required.

Alien visitors from a faraway galaxy have left their dying planet in search of a new base for their civilization. Their target: Earth. As they descend in waves, your mission is to carefully maneuver your nuclear-powered space cruiser, which is armed with a particle beam pulsar cannon.

Although you're greatly outnumbered, effective use of your powerful cannon can offset this disadvantage. A direct hit disintegrates an enemy ship. Unfortunately, the Zirconians know of your weapon and are artful dodgers. So much so, in fact, that they'll sometimes collide with each other in an effort to avoid your pulsars.

The Zirconian ships have no weapons to return your fire, but each has a self-destruct mechanism on board. When a ship reaches a certain depth, this device activates and explodes. If you're in the vicinity, your ship, too, is a victim. Fortunately, you have two extra space cruisers in reserve. If these are destroyed, it's all over.

Straightforward Operation

You must first choose one of five skill levels. Use the joystick to move your ship left and right, and

press the fire button to shoot your pulsar cannon. You receive 100 points for each Zirconian ship destroyed, but 20 points are deducted for each ship that reaches the ground.

There are innumerable waves of attack forces. When you clear one, the program displays

Programmer's Notes: 64 Version

Gary Black, Editorial Programmer

Program 3, the 64 version of "Cosmic Combat," is written entirely in machine language, so the action is very fast. As in the VIC version, you move your ship with the joystick (port 2) and blast away at the descending Zirconians. Because the game is fast at the start, there is only one skill level.

As in the VIC version, you receive 100 points for each destroyed Zirconian. However, you lose only ten points for each ship that touches down.

Typing in this version requires the use of MLX, elsewhere in this issue. Be sure to read and understand the MLX article before entering Cosmic Combat. When MLX prompts you for a starting and ending address, respond with 49152 and 51479, respectively. Load the program with LOAD "filename",8,1 (for disk) or LOAD "filename",1,1 for tape. To begin play, type SYS49152.

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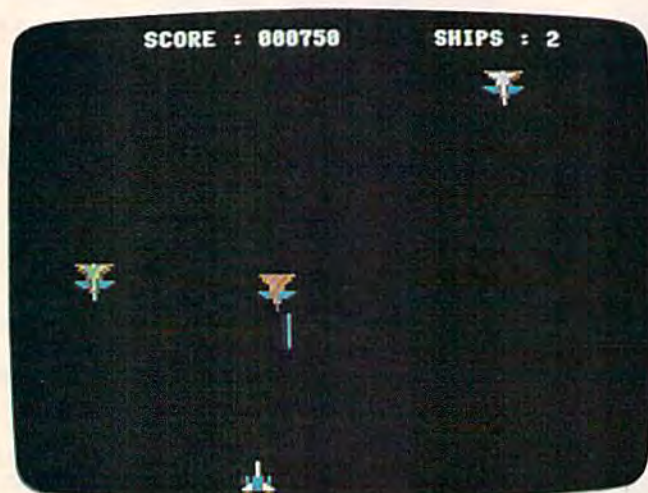
the number of waves you've eliminated. The longer you play, the more difficult the game. My highest score is 62,840. As a challenge, see if you can top this.

Typing In The VIC Version

The VIC version of "Cosmic Combat" is in two parts. Program 1 POKEs custom characters into

memory and automatically loads and runs Program 2. If you're using tape, change the 8 to a 1 in line 19 of Program 1. Save Program 2 directly after the first program. Both disk and tape users should be sure to save Program 2 with the filename CC.

See program listings on page 188.



Defend your planet against the kamikaze Zirconian ships (64 version).



An invader dodges the pulsar cannon in the VIC version.

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3-D Labyrinth

This game is a classic example of how a challenging game with good graphics can be written without a lot of code. It runs on the VIC (with or without expansion) and the 64.

Your goal in "3-D Labyrinth" is simply to make it through the maze. Sound easy? It isn't. You start in the northwest corner and must make your way to the exit in the southeast corner. The maze is different each time you play, so tracing your path in one game won't help when you play the next one.

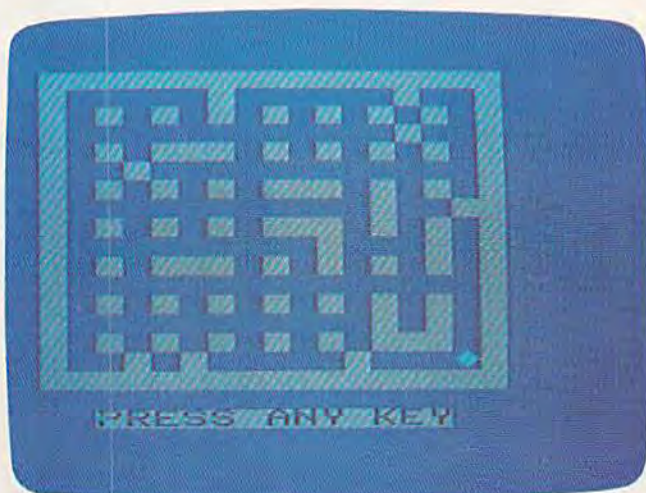
A Leisurely Stroll?

If you choose to just explore the maze, you can take a leisurely stroll, carefully plotting your course, and all in your own good time. Or you can play competitively by timing your trip through the maze and then seeing if you or a friend can beat that time in another game.

After typing in and saving the program, simply load and run. The screen blanks while the program constructs the maze, so you'll have a brief wait before the game starts. You begin in the northwest corner, where the wall is marked START. (The southeast exit is marked FINISH.) To face any direction, press S, N, E, or W. Throughout the game, the current direction is displayed lest you forget which way you're looking. To move in the direction you've chosen, press the space bar. You might want to use graph paper to map your moves.

If you start feeling hopelessly lost, help is at your fingertips. Press H to get a brief top view of the maze with your current position marked. If you're still unable to find your way out, press Q (Quit) to start again in a new maze.

When you make it to the FINISH marker, you must take a step south (S) out of the maze to win the game. You'll then be given the time used to complete the tour and a map of the maze.



If you're feeling lost, press H (for Help) to get a brief top view of your position in the labyrinth (VIC screen).

Programming Techniques

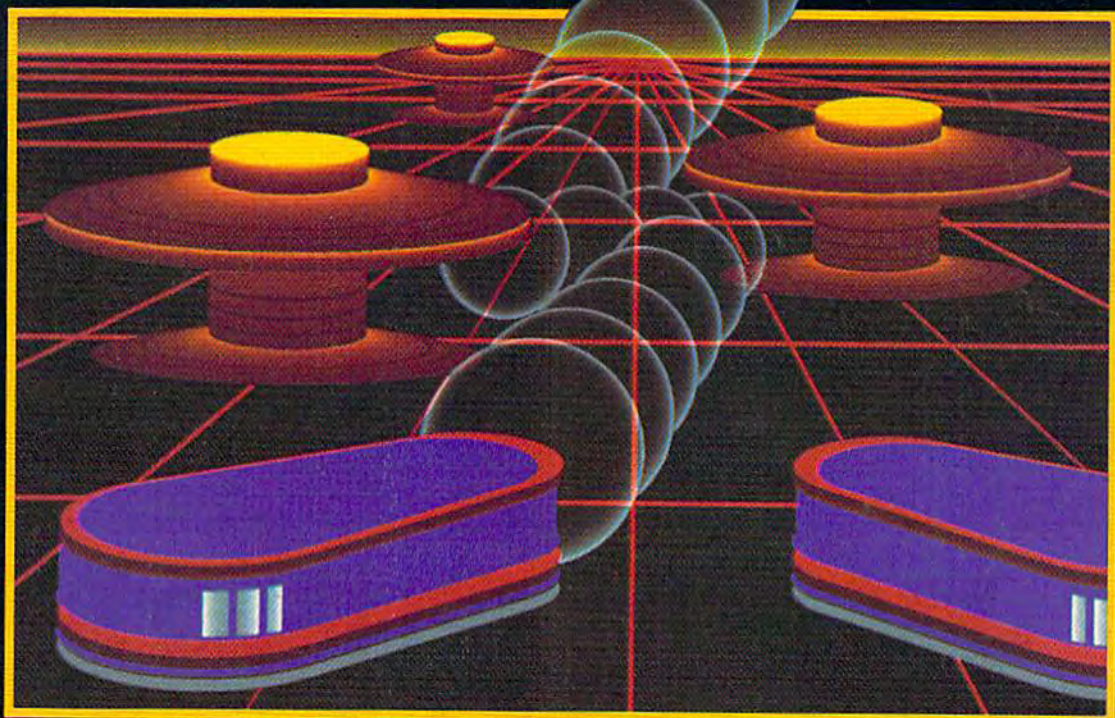
When I first wrote the program, I used POKes to the screen. But after changing the POKes to PRINTs, the game became faster and more memory efficient.

First, the background is PRINTed—in this case, a giant X with smaller pictures laid on top. This X represents the main corridor without any connecting (side) corridors. The computer then looks at the maze (created by an array) in the direction you are facing, and adds pictures of the appropriate side corridors. It first looks to the right and left to see if there are any side corridors. If so, the appropriate picture is PRINTed on either or both sides of the X.

Next, it checks to see if there is a wall in front of you. If so, it PRINTs the proper-sized square centered on the X. The size is determined by how far away the wall is from your present position. If there is no wall, the computer then

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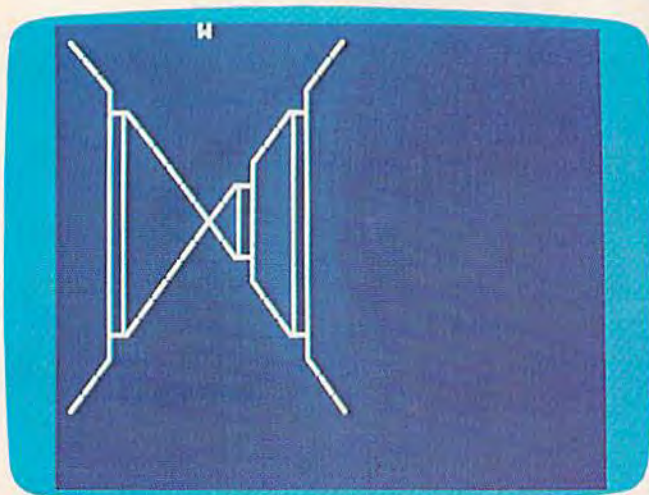
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The player faces west with corridors ahead to the left and right (64 screen).

looks ahead two squares for two more side corridors. The program continues until the computer has looked five squares away from your current position.


After this process is completed, all of the in-

dividual pictures have overlapped in such a way as to simulate a 3-D effect.

As written, the goal is to simply finish the maze in the shortest time. Ambitious BASIC programmers might want to add some twists, perhaps a series of mazes with monsters, treasures, or puzzles to solve along the way.

Note To VIC Users

If you're typing the program into an unexpanded VIC, be very careful not to add any extra spaces as you enter the lines. The program just barely fits as is, with only a few bytes to spare. Any extra spaces could cause an OUT OF MEMORY ERROR.

See program listing on page 196. 

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BASIC Magic

A Christmas Assortment

This month, we'll build a Christmas program with techniques learned in the previous two columns, and introduce some new programming tricks.

Most experienced programmers have a secret collection of programming tricks—simple techniques picked up over many years of trial and error, or learned from more advanced programmers. In the spirit of the holiday season, let's look at a Christmas assortment of simple tricks which are easy to code and can add a lot to your programs.

These examples work for the VIC, 64, and the new Plus/4 and 16.

Our "tricks" include a brief explanation of how CHR\$ codes are used, followed by some simple sound effects you can add to your BASIC programs, and, finally, a way to freeze your program until the user presses any key, or a specific key.

Let's start with one short program and build it up using some "Christmas magic."

Using CHR\$ Codes

First, look up the CHR\$ codes in the back of your owner's manual. They're listed in the ASCII and CHR\$ Codes chart in the appendices of your manual or *Programmer's Reference Guide*. As you can see, every key and symbol on your computer keyboard has its own CHR\$ value. For example, the CHR\$ number for the club symbol (like on a playing card) is 120. To see how it works, type these lines and press RETURN after each line:

```
PRINTCHR$(120)
FOR X=1TO22:PRINT CHR$(163);:NEXT
PRINT CHR$(28)"THIS IS THE COLOR RED."
```

The first line prints one "club" symbol on the screen. CHR\$(120) is exactly the same as the club symbol.

The next line uses a FOR-NEXT loop to PRINT the CHR\$(163) symbol 22 times. As you may recall from our previous lesson on FOR-NEXT, everything between FOR X=1 TO 22 and NEXT will be repeated 22 times. In this case, CHR\$(163) is the CHR\$ code for a horizontal line, so the horizontal line is printed 22 times. The semicolon causes all the symbols to appear right next to each other. Without it, each symbol would be printed on a separate line.

You can also use CHR\$ commands to change colors, as we did in the third line above, or to switch between upper- and lowercase.

Now, let's see how we can use a CHR\$ to clear the screen:

```
100 PRINT CHR$(147)
200 PRINT"PLEASE TYPE YOUR NAME AND PRESS
RETURN.":INPUT N$
300 PRINT CHR$(147)
400 PRINT"MERRY CHRISTMAS, "N$
```

Type RUN and press RETURN, then follow the instructions on the screen. Let's see how this program works:

Line 100 clears the screen. Printing the CHR\$(147) is the same as printing the "clear screen" character (SHIFT-CLR/HOME).

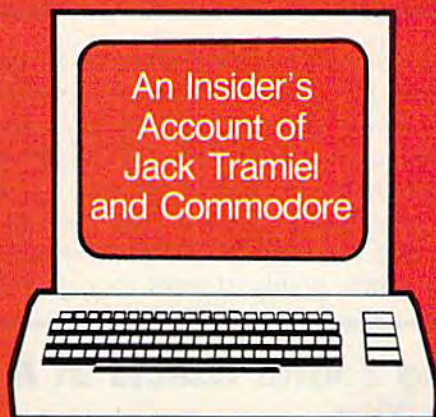
Line 200 prints a message on the screen. The INPUT command tells the computer to put a question mark on the screen, wait until something has been typed, and then assign the variable N\$ to stand for whatever was typed. For example, if you typed your name, the variable N\$ is the same as your name.

Line 300 clears the screen again so the second message in line 400 appears all by itself.

Line 400 prints the MERRY CHRISTMAS message, followed by your name. Notice that N\$

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is *outside* the quotation marks. Variables are always used outside quotation marks. The comma, however, is *inside* quotation marks, so it will be printed as the comma character. Try putting the comma outside of the quotation marks, just before N\$.

REM: In our first program example, we numbered the lines 100, 200, 300 because numbering the lines by 100 lets us insert more lines later on. Most programs are numbered by tens—10, 20, 30 and so on—but if you think you might add a lot of lines later, it's a good idea to number your lines by 20, 50, or even 100. The highest line number allowed is 63999, so you have plenty of room to work with.

Creating Sound Effects In A Line Or Two

Did you ever write a program and wish you could include just a simple "bleep" or other short sound effect? Let's see how easily this can be done. Below are simple one and two line statements you can use in your own programs. Find the one appropriate for your computer, type it in, and press RETURN.

For the VIC:

```
150 POKE 36878,15:POKE 36876,160:FOR T=1T
    0200:NEXT:POKE 36876,0
```

For the 64:

```
150 POKE 54296,15:POKE 54276,33:POKE 5427
    7,9:POKE 54278,0
151 POKE 54273,51:POKE 54272,97:FOR D=1TO
    200:NEXT:POKE 54276,0
```

For the Plus/4 and 16:

```
150 VOL 7:SOUND 1,460,60
```

After typing the sound effect line for your computer, type LIST and press RETURN to make sure the sound effect line has been added to your program. For example, if you have a 64, your new program should look like this:

```
100 PRINT CHR$(147)
150 POKE 54296,15:POKE 54276,33:POKE 5427
    7,9:POKE 54278,0
151 POKE 54273,51:POKE 54272,97:FOR D=1TO
    200:NEXT:POKE 54276,0
200 PRINT"PLEASE TYPE YOUR NAME AND PRESS
    RETURN.":INPUT N$
300 PRINT CHR$(147)
400 PRINT"MERRY CHRISTMAS,"N$
```

Now, type RUN and press RETURN to see how the program works. (Make sure the volume control on your TV or monitor is turned up.) Presto—you've just added sound to your program.

Using GOSUBs To Repeat A Sound Effect

You can repeat a sound effect as many times as you like, but if you use it more than once, you'll probably want to use a GOSUB command with a RETURN.

The GOSUB command tells the computer to GO to a SUBroutine, execute that routine, and then when it's done, RETURN to its original position and continue on with the program. Using the GOSUB command means you can jump down to a program line and use it over and over again. The obvious advantage to using this command is that you don't have to retype the line every time you want to use it. Here's how it would work with the 64:

```
50 GOSUB 990
100 PRINT CHR$(147)
200 PRINT"PLEASE TYPE YOUR NAME AND PRESS
    RETURN.":INPUT N$
250 GOSUB 990
300 PRINT CHR$(147)
400 PRINT"MERRY CHRISTMAS,"N$
450 GOSUB 990
900 END
990 POKE 54296,15:POKE 54276,33:POKE 5427
    7,9:POKE 54278,0
991 POKE 54273,51:POKE 54272,97:FOR D=1TO
    200:NEXT:POKE 54276,0
992 RETURN
```

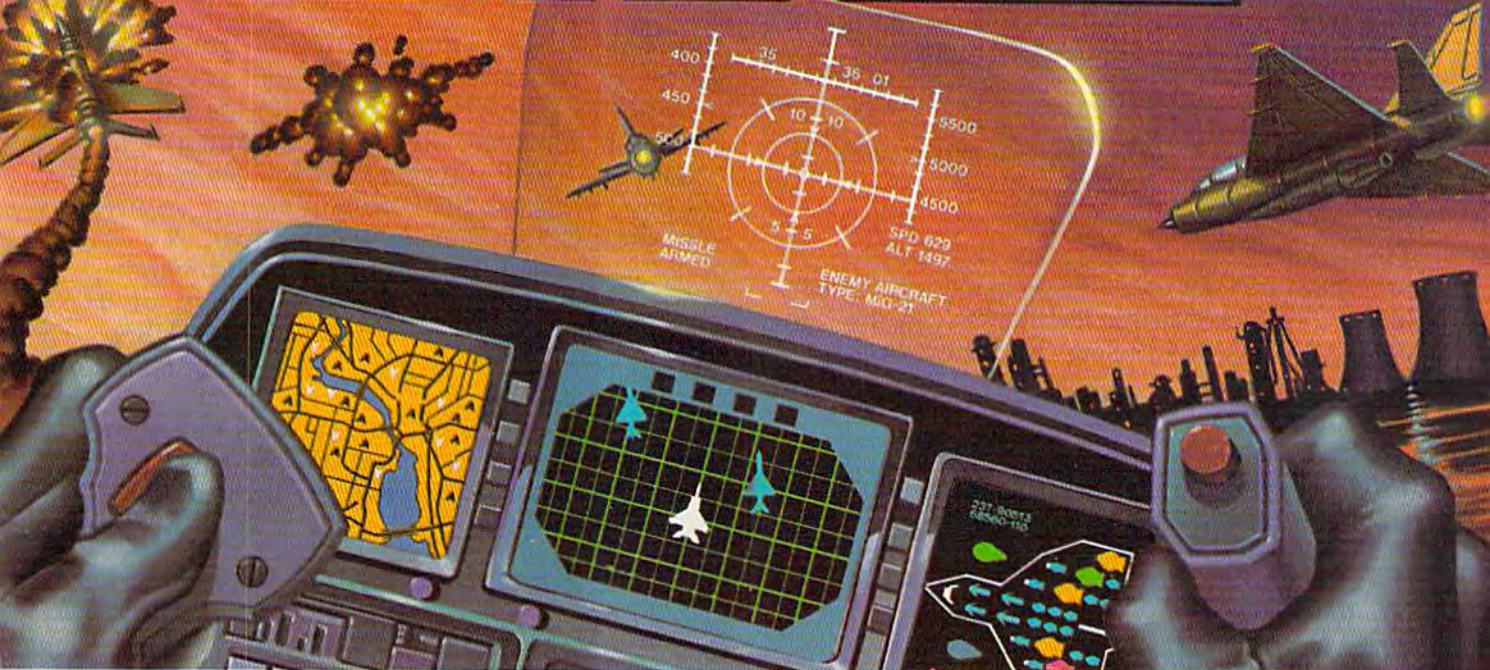
If you have a Commodore 64, change lines 150 and 151 to lines 990 and 991 as shown. To do this, LIST the previous program, cursor up to the beginning of line 150 and type 990, then press RETURN. Then position your cursor at the beginning of line 151, type 991, and press RETURN. Now LIST again, and you'll see the two lines 990-991 at the end of the program. To get rid of line 150, type a 150 all by itself. Entering a blank program line erases that line from memory. Do the same for line 151.

If you have another Commodore computer, change line 150 to line 990 using the same technique (of course, you won't have a line 991 because the 64 has a two-line sound effect and yours only requires one line).

So how does this program work?

The GOSUB command in lines 50, 250, and 450 tells the computer to jump down to line 990 and execute whatever follows (which is your sound effect). When the computer reaches the RETURN command in line 992, it jumps back up to where it left the program, and continues from that point. In this program, the computer plays the sound effect, clears the screen, PRINTs a message and accepts an INPUT, plays the sound effect, then clears the screen again, PRINTs the MERRY CHRISTMAS message, and plays the sound effect one more time before coming to the

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end of the program. Notice that the GOSUB and RETURN lines come *after* the END command. Try removing line 900 (type a 900 with nothing after it) and running the program again; you'll get an error message. By putting END after the main program, but before the subroutines, we have created a "safe place" for subroutines. The program will execute the subroutine only when you want it to.

You can do fancier sound effects, of course. Any sound effect, long or short—even songs—can be inserted using the techniques we just discussed. You can also use GOSUB-RETURN to repeat other actions as well, such as screen titles, graphics displays, "rewards," or random numbers.

"Press Any Key To Continue"

Did you ever see a BASIC program that instructed you to PRESS ANY KEY TO CONTINUE? This technique freezes your BASIC program until the user presses a key on the keyboard. Let's look at this technique with the same program we've been using. Add these lines:

```
280 PRINT "PRESS ANY KEY"
285 GET K$:IF K$="" THEN 285
```

Type LIST and press RETURN. If you have a 64, your new program should look like this (if you have another computer your program should look pretty much the same, only 990 will be different and there's no 991).

```
50 GOSUB 990
100 PRINT CHR$(147)
200 PRINT "PLEASE TYPE YOUR NAME AND PRESS
    RETURN.":INPUT N$
250 GOSUB 990
280 PRINT "PRESS ANY KEY"
285 GET K$:IF K$="" THEN 285
300 PRINT CHR$(147)
400 PRINT "MERRY CHRISTMAS, "N$
450 GOSUB 990
900 END
990 POKE 54296,15:POKE 54276,33:POKE 5427
    7,9:POKE 54278,0
991 POKE 54273,51:POKE 54272,97:FOR D=1 TO
    200:NEXT:POKE 54276,0
992 RETURN
```

Line 280 prints a prompt message telling the user to press any key on the keyboard. Line 285 contains a GET statement which works like this. First it tells the computer to GET K\$, which means "check the keyboard and see if a key is being pressed—the next key that is pressed will be called K\$." The second part of the line tells the computer, "If no key is being pressed, then keep going back to line 285 and checking to see if a key is pressed." The GET statement, together with the IF-THEN test, makes the computer check the keyboard over and over again and

"freezes" the program there until a key—any key—is pressed.

"Press A Specific Key To Continue"

Here's another variation which requires the user to press a *specific key*. Change lines 280 and 285 by retyping them as follows (whenever you retype the same program line, it automatically changes):

```
280 PRINT "PRESS THE LETTER C TO CONTINUE"
285 GET K$:IF K$<>"C" THEN 285
```

Now type RUN and press RETURN. This time, instead of freezing the program until *any* key is pressed, the program is frozen until the letter C is pressed. The less than and greater than signs together (<>) tell the computer to keep going back and checking the keyboard as long as any key which is higher or lower than the C is pressed, so when the C is pressed the program drops down to the next line and continues on its merry way. The statement IF K\$<>"C" THEN 285 is equivalent to saying, "If K\$ is not equal to C, then repeat line 285."

You can require the user to press one of the function keys, too. Let's use function key 1 (f1) to get our response this time. We'll change lines 280 and 285:

```
280 PRINT "PRESS FUNCTION KEY 1 TO CONTINUE"
285 GET K$:IF K$<>CHR$(133) THEN 285
```

See how we used the CHR\$ number in line 285? In this case, we use the CHR\$ number to tell the computer to check to see if the function key is being pressed. This is one of the most important applications of CHR\$—to define a key in conjunction with the GET statement.

Reading the function keys is a little more complicated on a Plus/4 and 16, so the two lines above will not work properly.

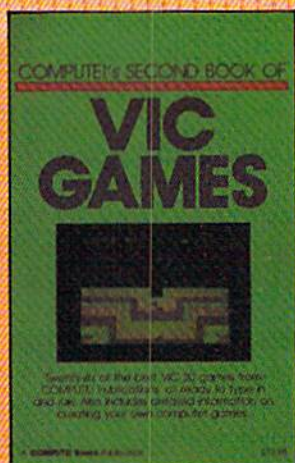
A Look Ahead At Random Numbers

In an upcoming column we'll explore how random numbers work, but just to take a glimpse ahead, here's a program to try in the meantime:

```
10 X$="{BLK}{WHT}{RED}{CYN}{PUR}{GRN}
    {BLU}{YEL}"
20 X=INT(8*RND(1))+1
30 PRINT MID$(X$,X,1)"{RVS} ";
40 GOTO 20
```

{BLK} means hold down the CTRL key and press the color key marked BLK (the 1 key) at the same time. The other characters in line 10 are obtained with CTRL and one of the other color

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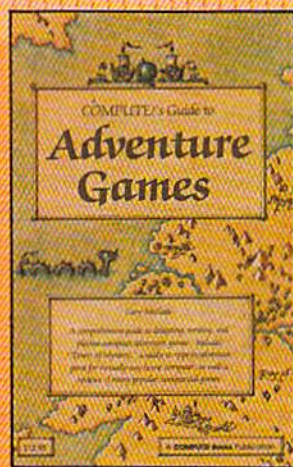
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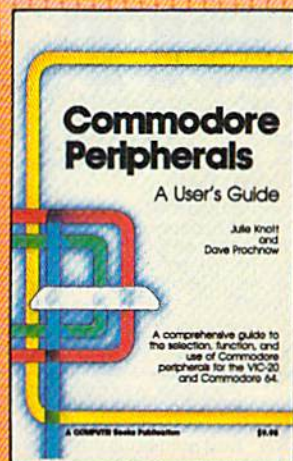
Dan Heeb

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keys. See the article "How To Type In COMPUTE!'s GAZETTE Programs" for more details. Here's a brief explanation of how this program works:

Line 10 defines X\$ as the group of colors inside the quotation marks. Remember, in most cases a string variable is a letter followed by a dollar sign. String variables can be used to define a color as well as letters, graphics symbols, keyboard commands, and numbers not used as values.

Line 20 defines the numeric variable X as a random number. The random number formula is given to the right of the equal sign. INT makes the random number a whole number. The number 8 is the *upper limit* from which the random numbers are chosen, and the number 1 at the end of the line is the *lower limit*.

Line 30 tells the computer to print a character from the middle of the X\$ grouping of colors in line 10. The X in parentheses designates how many characters over from the left of X\$ the computer should go to choose the color in the group. But since this number is *random*, it could be the first, second, third, fourth, fifth, sixth, seventh, or eighth number. Whichever number it is, that's the color that will be used when the computer goes on in the same line to print a *reverse space* ({RVS} means hold down the CTRL key

and press the RVS ON key at the same time). A reverse space is always printed on the screen as a solid block. The semicolon at the end of line 30 makes the reverse spaces (the blocks) print one after the other.

Incidentally, printing reverse spaces is one way to draw solid bars across the screen, or to make solid squares in different colors.

Line 40 tells the computer to go back to line 20 and choose another random number, after which the computer continues with line 30 and prints another solid square, again in a color chosen at random.

The result of all this is a multicolored pattern.

Here's a challenge for you to work on until next month. See if you can write a program, like the one above, that prints a color at random, then a reverse block. Next, using a different string variable, print a cursor movement (up, down, left, or right) at random and go back to pick a new color. Instead of printing characters one after another, the cursor will seem to wander randomly around the screen.

This month, we jumped ahead a little. We'll flesh out many of these programming concepts and techniques in upcoming columns, but until then, experiment with these programs. You might be surprised at what can be accomplished with so little programming. Happy Holidays! ☺

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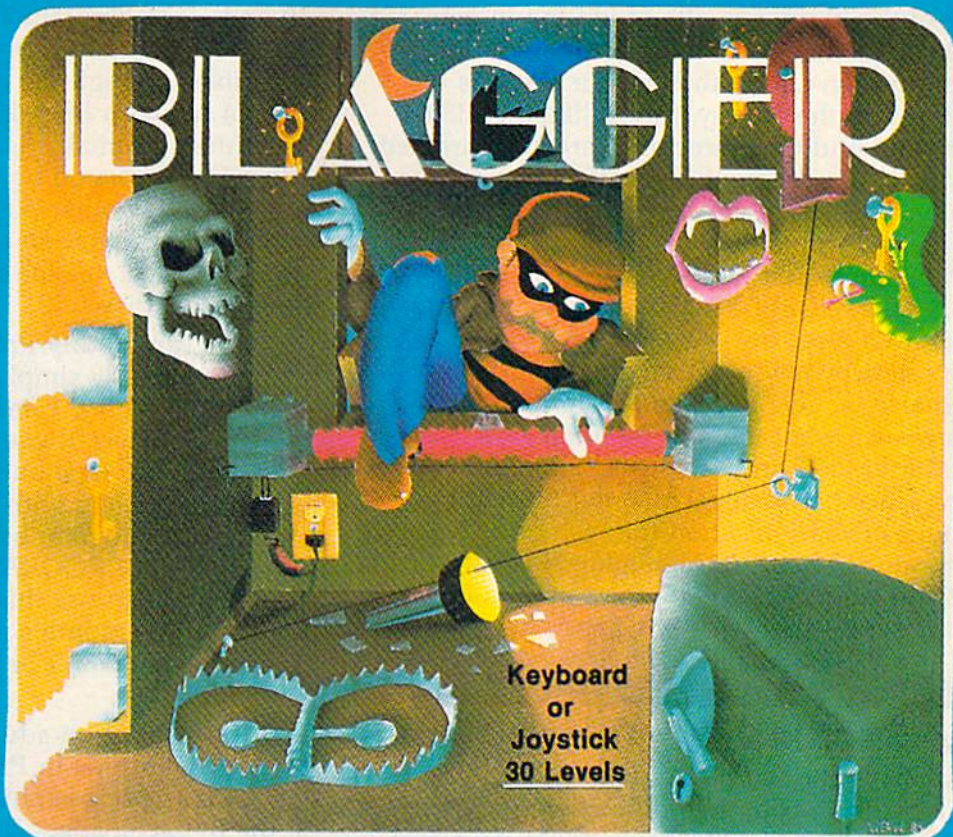
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MACHINE LANGUAGE FOR BEGINNERS

Richard Mansfield, Senior Editor

Customizing

One of the many benefits of writing in machine language is that you can get inside your computer and have it do things your way. As it comes from the factory, things like the LIST command and disk directories are standardized. If you want a different kind of listing or directory, you've got to make your own.

Let's create a disk directory that we can manipulate to suit ourselves. Instead of LOAD "\$",8 we can just SYS 830 and see a complete, condensed directory—even on the VIC screen. It won't destroy any program already in RAM. We'll also be able to make any formatting changes we want. Should the filenames be divided into PRG and SEQ lists? Should there be more space between each name? Should the amount of space used on the disk be eliminated from our directory, or highlighted? Whatever format you want, whatever information you need, can be set up the way you want it.

Adding Automatic Disk Save To The Simple Assembler

If you have the Simple Assembler, published in the November column, you can type in Program 2 and it will be directly entered into your computer. Then, to save it to disk for future use, type NEW (to get rid of the Assembler) and enter Program 4. Program 4, from an idea by Charles Brannon, can be used to save any machine language program to disk, provided you know the starting and ending addresses. The ML program can then later be loaded with the usual LOAD "filename",8,1.

If you are using the Simple Assembler, you might want to add Program 4 to it as a subroutine. You can use the Simple Assembler variables TA (starting address) and SA (ending address) instead of the INPUT statements in lines

30 and 40 of Program 4. This would make saving your ML routines automatic from within the assembler. It might be convenient to insert Program 4 between lines 250 and 260 of the Simple Assembler. To make SAVEs optional, you could add a SAVE pseudo-op, similar to the END pseudo-op. Another possibility is using save-with-replace if you do a great deal of testing and want the latest version of your routine to always be saved to disk.

You can modify Program 4 to save ML programs to tape by simply changing line 20. Replace the 8 with a 1 and omit the 0; before the filename. As usual, you must avoid putting programs into the tape buffer. A minor quirk of using this method with tape is that when you load an ML program back into memory, you will see FOUND "PROGRAMNAME" twice on the screen. You can use this method for tape saves, but since this month's main program reads a disk directory, you won't be able to use it without a disk drive.

If you have an advanced, label-based assembler, you can type in Program 1 and assemble it. If you have no assembler at all, type in Program 3, the BASIC loader.

When learning machine language, it's often helpful to go through someone else's program step-by-step to see how loops and branches and variables are handled. Let's look at Program 1 and see how machine language is written for an advanced assembler. Program 1 is *source code* (what you write) which the assembler will then translate into *object code* (a runnable program). This source code is written for the LADS assembler in my new book, *The Second Book of Machine Language* (COMPUTE! Books), but would work on most assemblers with few changes. For example, some assemblers use a pseudo-op EQU

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Program 1: Full Source Program For Commodore 64 Easydir

```
10 *= 830
20 ;-----
30 ;           EQUATES AND DEFINITIONS FOR COMMODORE 64
40 ;-----
50 FNAMELEN = $B7;    LENGTH OF FILENAME FOR OPEN A FILE
60 FNAMEPTR = $BB;    POINTER TO FILENAME LOCATION IN RAM.
70 FNUM = $B8;        CURRENT FILE NUMBER FOR OPEN, GET & PUT CHARS TO DEVICE
80 FSECOND = $B9;     CURRENT SECONDARY ADDRESS FOR OPEN
90 FDEV = $BA;        DEVICE NUMBER (8 FOR COMMODORE DISK)
110 OUTNUM = $BDCD;    PRINTS OUT A NUMBER--A HOLDS (MSB), X (LSB)
120 OPEN = $E1C1;     OPENS A FILE
130 CHKIN = $FFC6;     OPENS A CHANNEL FOR READ (HAVE FILE# IN X)
140 CHARIN = $FFE4;    PULLS IN ONE BYTE
150 PRINT = $FFD2;     SENDS OUT ONE BYTE
160 CLRCHN = $FFCC;    RESTORES DEFAULT I/O
170 CLOSE = $FFC3;     CLOSE FILE (FILE# IN A)
180 ;-----
190 ;           INITIALIZATION -- OPEN DIRECTORY. PRINT DISK NAME & ID
200 ;-----
210 JSR OPEN1
220 JSR CLRCHN:LDX #1:JSR CHKIN; OPEN FILE CHANNEL FOR READING
230 JSR CHARIN:JSR CHARIN; THROW AWAY START ADDR BYTES
240 LDY #29:LOOP JSR CHARIN:JSR PRINT:DEY:BNE LOOP:LDA #13:JSR PRINT
250 JMP CLOSEQUOTE
260 ;-----
270 ;           MAIN LOOP -- PULL IN ALL FILENAMES & PRINT THEM
280 ;-----
290 QUOTE JSR PRINTIT
300 OPENQUOTE JSR CHARIN:CMP #13:BEQ CLOSENOW:CMP #34:BNE OPENQUOTE
310 LOOP1 JSR CHARIN:CMP #34:BEQ CLOSEQUOTE
320 JSR PRINT:JMP LOOP1
330 CLOSEQUOTE JSR CHARIN:BEQ ENDTEST:CMP #42:BNE CLOSEQUOTE
340 JSR PRINT:JSR PRINT:JMP CLOSEQUOTE
350 ENDTEST JSR CHARIN:JSR CHARIN:JSR CHARIN:STA SIZE+1:JSR CHARIN:STA SIZE
360 JMP QUOTE
370 CLOSENOW LDA #"F:JSR PRINT:LDA #"R:JSR PRINT:LDA #"E:JSR PRINT
380 LDA #1:JSR CLOSE:JSR CLRCHN; RETURN TO BASIC
390 RTS
400 ;-----
410 ;           SUBROUTINE -- PRINT OUT THE BLOCKS-USED NUMBER
420 ;-----
430 PRINTIT LDA #32:JSR PRINT
440 LDA SIZE:LDX SIZE+1:JSR OUTNUM:LDA #45:JSR PRINT:RTS
450 ;-----
460 ;           SUBROUTINE -- TO OPEN 1,8,0,"$0" FOR READING DIRECTORY
470 ;-----
480 OPEN1 JSR CLRCHN
490 LDA #1
500 STA FNUM;          FILE#
510 LDA #8
520 STA FDEV;          DEVICE NUMBER
530 LDA #0
540 STA FSECOND;       SECONDARY ADDR
550 LDA #2:STA FNAMELEN
560 LDA #<FNAME:STA FNAMEPTR:LDA #>FNAME:STA FNAMEPTR+1
570 JSR OPEN; ROUTINE WITHIN BASIC THAT OPENS UP A NEW FILE
580 RTS
590 ;-----
600 FNAME .BYTE "$0"
610 SIZE .BYTE 0 0;    SPACE TO HOLD "SIZE" VARIABLE
```

Program 1a: Changes To Create A VIC Version

```
20 ;-----
30 ;           EQUATES AND DEFINITIONS FOR VIC
40 ;-----
110 OUTNUM = $DDCD;    PRINTS OUT A (MSB), X (LSB) NUMBER
120 OPEN = $E1BE;     OPENS A FILE (3 BYTES PAST NORMAL OPEN IN ROM)
```


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instead of the equals sign (=). If you have such an assembler, make the appropriate substitutions.

Line 10 establishes the start address. This is where the assembler will put the ML program. Then there are a series of variable definitions (called *label equates*) where a name is given to various important addresses within the computer. Between lines 50-170, we label all the memory locations which are used to open and close a disk file; read bytes off the disk; and print characters or numbers to the screen. Once we've defined these variables, we can then use just the label name instead of the number throughout the rest of the program. We can say JSR PRINT instead of JSR \$FFD2.

In line 210 we jump to a subroutine (situated between lines 480 and 580) which will open a disk file for reading. This particular file is a special one which is named "\$0" and holds the directory of the disk. As you can see, we store 1-8-0 into the appropriate locations, store a 2 into the location which holds the length of our filename, and then set up a *pointer* to the filename. A pointer just holds (in two bytes) the address of some other thing in the computer. A pointer could, for example, point to the start of screen RAM. In this case, we want it to point to the \$0 in line 600. We don't yet know, however, at which address this \$0 will be when the program is finally assembled. So, we give line 600 a label of its own, FNAME, and point to it using #< for the low byte and #> for the high byte. (These #< symbols are special assembler directives to fetch low and high bytes of labels.) After loading and storing (LDA/STA) these bytes into the pointer, we then, in line 570, JSR to the routine in BASIC ROM that opens a disk file. The RTS in 580 ends the OPEN1 subroutine, sending the program back to the main routine.

Opening A Channel

Next (line 220), we clear all channels and, loading X with a 1, we open a channel to file #1. (This is distinct from opening a file. We've already done that. This is closer to the action of INPUT#1.) We are now ready to use CHARIN to pull in bytes from our opened file. However, the first two bytes are pointers the disk drive uses, so we throw them away (line 230).

Now we want to pull in the next 29 characters and print them. This will be our disk name and disk ID number. We set up a loop (line 240) which will get a character, print it to the screen, lower our Y counter by 1 (DEY) and branch back if Y is not yet equal to zero (BNE). Then we LDA #13 and print that, causing a carriage return on screen. And finally, we jump into the main part of the program at a location called

CLOSEQUOTE.

The way it's set up, this routine will look for quotation marks and print whatever is between them, but not what's outside of them. The information streaming in to us from the directory file will look something like this:

```
GAMES DISK IC UF 0 18 "BOMBER" PRG 0 24
"CHESS" PRG 0 55 "ADDRESS FILE"
```

We've already printed the disk name and ID and now we are ready to read in all the filenames and file sizes. The size appears first (preceded by a zero and two spaces), then a quote, the filename, another quote, the type of file, and the size of the next file. We only want to print the file size and the name. So, we'll use the quotes to tell us when to turn our printing on or off. And we'll use that zero to tell us when we've found a file size number.

The Main Loop

Let's take it from the top. In line 290 we jump to a subroutine which prints the size number. Then line 300 is a loop which looks for the first quotation mark. If it finds a carriage return (#13), it jumps down to end the whole machine language program. That's because directory files end with a series of #13s. So, when we find a 13, we know we're finished.

Assuming we're not finished, we keep pulling in bytes until we find a quote. That gets us past the BNE at the end of line 300, and we fall down to line 310. This next loop is quite similar to the one in line 300 except it contains a JSR PRINT. Every byte coming in now will be printed on the screen and will allow us to see the filename. We exit this loop when we find another quote symbol (#34).

Now, in line 330, there's another loop which looks for a zero (signifying that a file size number is coming in). That forces us to BEQ and go to the ENDTST which pulls in the two-byte number. The loop in line 330 also looks for a #42 which is the * symbol. Finding a * would mean that a bad file was on the disk—and we want to be alerted to that. Line 340 will print two ** symbols and then jump back into the loop on line 330 to continue looking for the zero.

Line 350 pulls off the two spaces after the zero, positioning us to get the file size number. We put these two bytes into a variable we've set aside called SIZE (see line 610). SIZE will hold these bytes until we need to print them. Then we start the whole thing over again by jumping back up to the start (line 360 jumps to line 290).

Shutting Things Down

We only get to line 370, the close-down routine, if we came upon a #13 up in line 300. That, you


recall, meant that we'd arrived at the end of the directory file. Anyway, to close down we print the letters FRE (the last thing printed on screen will have been the number of blocks left free on the disk). Then we CLOSE file #1.

We clear the channels, which means that normal I/O conditions are restored: Input comes from the keyboard, output goes to the screen. That last RTS sends us back into BASIC since we got to this ML program with a SYS. SYS acts just like a JSR except that it goes from BASIC to ML and then an unmatched RTS will send you back to BASIC.

How did I know enough about the format of directory files to be able to construct this ML program? Often the easiest thing is to first construct a BASIC program to see how things work. I set up a simple BASIC sketch:

```
10 OPEN 1,8,0,"$0"
20 GET #1, A$:PRINT A$;GOTO 20
```

and then just watched what came in on the screen, counted spaces, and figured that the quotes, the zeros, and the carriage returns (#13) would be my triggers. They would be the IF/THEN signals that something different was happening. They could be tested for in loops and force exits from those loops.

See program listings on page 194. 

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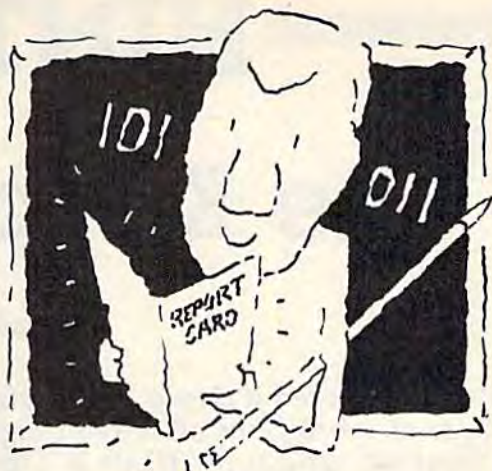
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You may not have thought about it before, but the keyboard on your computer is just another peripheral. The chip that controls the computer is not directly connected to the keyboard; it has to talk to the keyboard through an interface chip, much like it talks to a disk drive or printer.

Keystrokes don't enter the computer directly. They are funneled into the *keyboard buffer*, an area of memory which can be directly accessed by the chip which controls the computer.

Sixty times a second your VIC or 64 interrupts whatever it is doing for some housekeeping. The jiffy clock (which registers every sixtieth of a second) ticks once, the screen is refreshed, and the keyboard wiring is checked for a signal that a key was pressed. But before the character is printed on the screen, its ASCII value is put into the keyboard buffer at memory locations 631-640. At the same time, the value in location 198, which keeps track of how many characters are in the buffer, is increased by one, unless it has reached its maximum of ten. When you're typing, the letters aren't printed directly from the keyboard to the screen; they make a short stop in memory.

In immediate mode (when a program is not running), the characters are pulled out of the keyboard buffer immediately and put on the screen.

But when a program is running, the characters are saved up until the program either ends or tries to INPUT or GET. You can see how this works if you enter `FORJ=1TO5000:NEXT`, a simple delay loop. After pressing RETURN, hit a key twenty times. When the loop ends, you should see ten (not twenty) of the letters on the screen.

That's because the keyboard buffer comprises only ten bytes. Once it is full, nothing more is added until the buffer is accessed with an INPUT or GET.

Think of the keystrokes as raindrops falling through a funnel (the interface chip) into a tiny bucket (the keyboard buffer) which can hold only ten drops at a time. When the bucket is full, no more raindrops will fit until the bucket is emptied.

With a few POKES, we can control the keyboard buffer and its contents.

Emptying The Buffer

Manipulating the buffer at 631-640 and the byte at 198 (number of characters currently in the buffer) can solve some common programming problems.

For example, you're playing a game and it asks `PLAY AGAIN (Y/N)?` and you type Y. Nothing seems to happen for whatever reason; maybe the computer is setting up variables. So you press Y again. A second later you see `INSTRUCTIONS (Y/N)?` flash briefly on the screen, followed by the first of 20 pages of instructions. You didn't want the instructions, but you got them anyway.

The problem is that the second time you typed Y, it was stored in the keyboard buffer. When your computer got to the instructions prompt, it went to GET a character and found a Y right there.

A variation on this can happen in data entry (say, a checkbook balancing program). Perhaps you mean to enter a check for \$36 but you miss the top row of keys, hitting E and Y by mistake. You see `ERASE EVERYTHING` for a moment, followed by `ARE YOU SURE (Y/N)?` The Y in the buffer answers the question for you and three hours of work are destroyed.

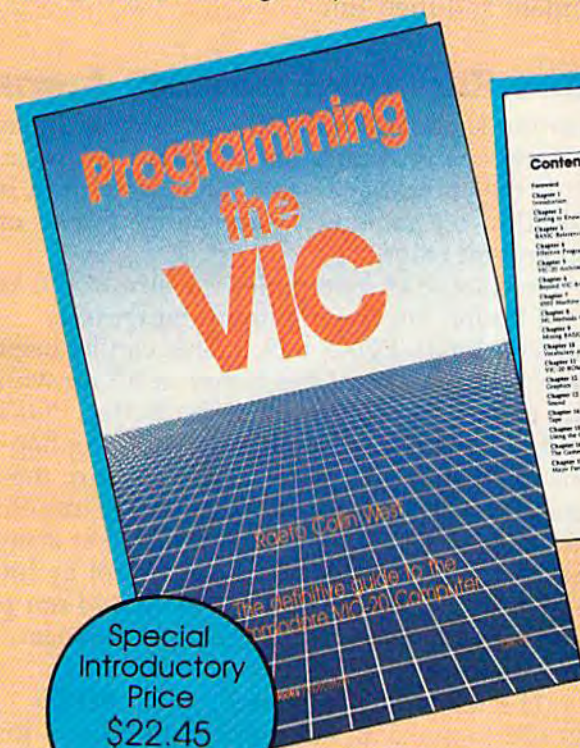
The solution is simple. Since location 198 holds the number of characters in the buffer, `POKE 198,0` tells the computer nothing is there at the moment. Use this POKE before INPUT or GET statements to eliminate extra characters in the buffer.

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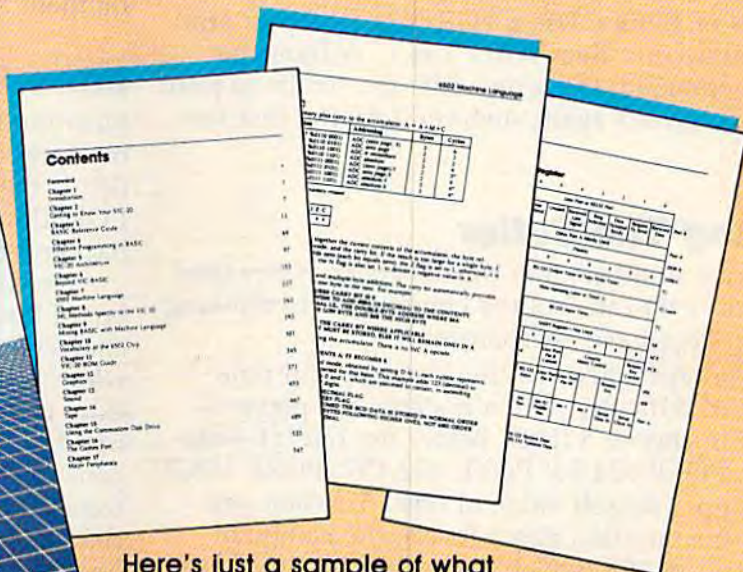
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Press Any Key To Continue

Since location 198 holds the number of keys pressed, we can use it for a user-defined delay.

A title screen or page of instructions often includes a line like PRESS ANY KEY TO CONTINUE, since some people read faster than others. The usual way of checking for a key press is to use a GET statement. To save a little memory, use WAIT instead. To be safe, clear the keyboard buffer first. POKE 198,0: WAIT 198,1 is a substitute for 50 GET A\$:IF A\$ = "" THEN 50, uses less memory, and doesn't need a whole line of its own.

The same technique can be useful in immediate mode. For example, you might want to use all 25 lines (23 on a VIC) to print variable values or PEEKs. Use a FOR-NEXT loop to print the values and then WAIT 198,1. Without the wait command, the screen fills up, scrolls to print READY, scrolls again, and you lose the first few lines.

Filling The Buffer

POKEing numbers into the keyboard buffer (and location 198) can fool the computer into thinking certain keys have been pressed.

Perhaps you're writing a game with nine levels of difficulty. When it starts, the player is asked to choose a level. Before the INPUT statement, POKE 631,53: POKE 632,157: POKE 198,2 to set up a default value of level 5. When you reach the question about levels, the computer finds a 2 in 198 (which makes it think two keys have been pressed), gets a character "5" (ASCII value 53) and prints it. Next, it finds an ASCII 157 (cursor left). The user just presses RETURN for difficulty level 5 (because the 5 is already on the screen). Any other value can be entered by pressing the appropriate key.

The buffer holds up to ten characters, which provides a lot of flexibility for setting default values in programs which use INPUT (for obvious reasons, you can't do this with GET). Just remember to use ASCII values, starting at 631, and POKE the total number of characters into 198. You can even change the character color or turn reverse on.

The dynamic keyboard technique (more on this in an upcoming issue) uses a variation on this idea. You fill up the keyboard buffer with carriage returns (ASCII 13), print BASIC commands or program lines on the screen, position the cursor, and end the program. The computer sees END and goes into immediate mode. Because there are 13's in the buffer, the commands on the screen execute. You might, for example, add DATA statements by printing an

open line number, the word DATA, and some information you want to build into the program. Underneath the new DATA line, print RUN. Position the cursor, POKE 13's into 631 and 632, and a 2 into 198. When the program ends, the DATA statement is added to the program and the program runs.

You could also list-proof a game which uses joysticks but not the keyboard. At the beginning of the program, POKE the numbers 78, 69, 87, and 13 into locations 631-634. POKE a 4 into 198. If the game player presses the STOP key, the letters N, E, W appear and the program is gone. Or POKE the values for R, SHIFT-U (the abbreviation for RUN), and carriage return. Any time you press STOP, the program will stop for a moment and then run.

More Keyboard Memory Areas

Near the keyboard buffer are some other memory locations related to the keyboard. Location 646 is the current character color, which can be POKEd in the same way you change border or background color.

Location 649 determines the size of the keyboard buffer. For the minimum buffer (one character long), POKE 649,1. This can be useful when you don't want the buffer to fill up with extra characters. To get rid of the buffer, POKE 649,0 and try typing something. Nothing happens. By setting the buffer length to zero, the computer has nowhere to temporarily store the characters. It's as if we pulled the bucket away from the funnel. You can regain control by hitting RUN/STOP-RESTORE. You should not put a value higher than ten in this byte because some important vectors can be overwritten.

The repeat flag is stored in 650. POKE 650,128 to make all keys repeat. POKE a 0 to go back to normal (space bar and cursor keys repeat). A 64 in 650 disables all repeating.

Thus, if you're writing a rapid-fire action game, you might want to make all the keys repeat. You would put a 128 into 650 and leave the buffer size at 10. But for a game where movement has to be precise, you could lower the buffer size to 1 or 2 and eliminate all repeating keys.

In an educational program for children, you might want to get rid of repeating keys with a POKE 650,64. For a spreadsheet, you'd leave the default values, so the cursor keys would repeat and allow quick movement from cell to cell. For word processing, though, you might as well allow all keys to repeat. Controlling the behavior of the keyboard buffer and related memory locations can help you create programs which are both efficient and convenient to use. ■

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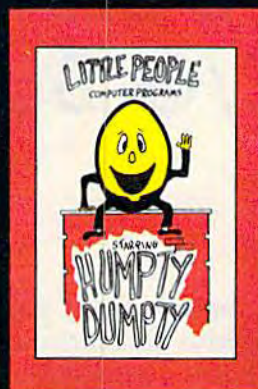
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GAZETTE

Telecommunications

Software, Part 2:

The C/G Bulletin Board System

Robert Sims

This month we continue our presentation of the color/graphics telecommunications package. "C/G Term," published last month, allows two people to use a modem to connect their computers directly over the phone lines, and to communicate using the full color and keyboard graphics capabilities of the VIC or 64.

The "Color/Graphics Bulletin Board System" (C/G BBS) makes it possible for many people to trade information and programs without being in direct one-to-one contact.

The BBS is written entirely in machine language (ML), but no knowledge of ML is required to use it. Because the listing is so long, we're publishing the first half of the code this month. The remainder will appear next month. A 64 with one or two disk drives, a 1650 Autodem, and a printer are required.

An electronic bulletin board functions in much the same way as its conventional namesake: Messages can be put up about most anything, whether it's free kittens, meeting announcements, or a lost sweater.

With "C/G BBS," anyone with a basic knowledge of the Commodore 64 can put up an electronic bulletin board almost as easily as hanging an ordinary bulletin board. Instead of a cork board and some wall space, you need a computer system, a modem, and a phone line. Other than that, it's similar to a bulletin board in any school or office hallway.

But there are some important differences in the ways these two kinds of message boards are used. You can read an electronic board without

leaving home. You can leave or receive private messages. And electronic boards can contain long documents or program listings that won't fit on a conventional bulletin board.

There are several kinds of electronic bulletin boards, with various capacities. Large information services like CompuServe, The Source, and Delphi contain bulletin boards that hold a thousand messages and allow many callers to use the board simultaneously. And they're on-line 24 hours a day.

At the other extreme are small boards which have a capacity of 50 messages or less, allow only one person to access the system at one time, and may be on-line only a few hours a day.

The C/G BBS is a small system, but it has some features not usually found on small bulletin boards. It is simple to operate, it automates as many of the technical aspects of telecommunications as possible, and callers are presented with menus or simple prompts rather than a long list of commands.

Also, the BBS may contain from 120 to 1000 public messages (depending on length) and as many private messages. Messages are stored in "endless" files. When the records are full, the program calculates how much room it needs for a new message and adjusts its tables accordingly. The oldest messages are automatically erased as new ones come in, so the board operator doesn't have to worry about running out of storage space.

Calling The BBS

To call a C/G BBS, you need a VIC or 64, a modem, and a copy of C/G Term (published last month). Because the C/G BBS and C/G Term communicate using unique codes, other terminal programs will not work with this bulletin board.