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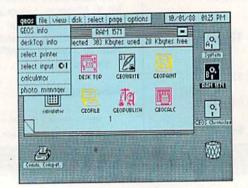
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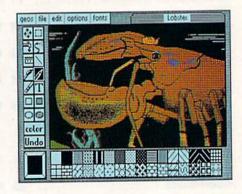
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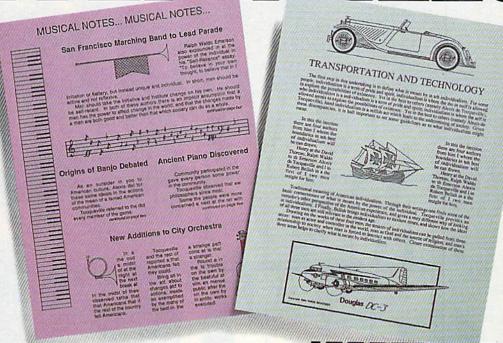


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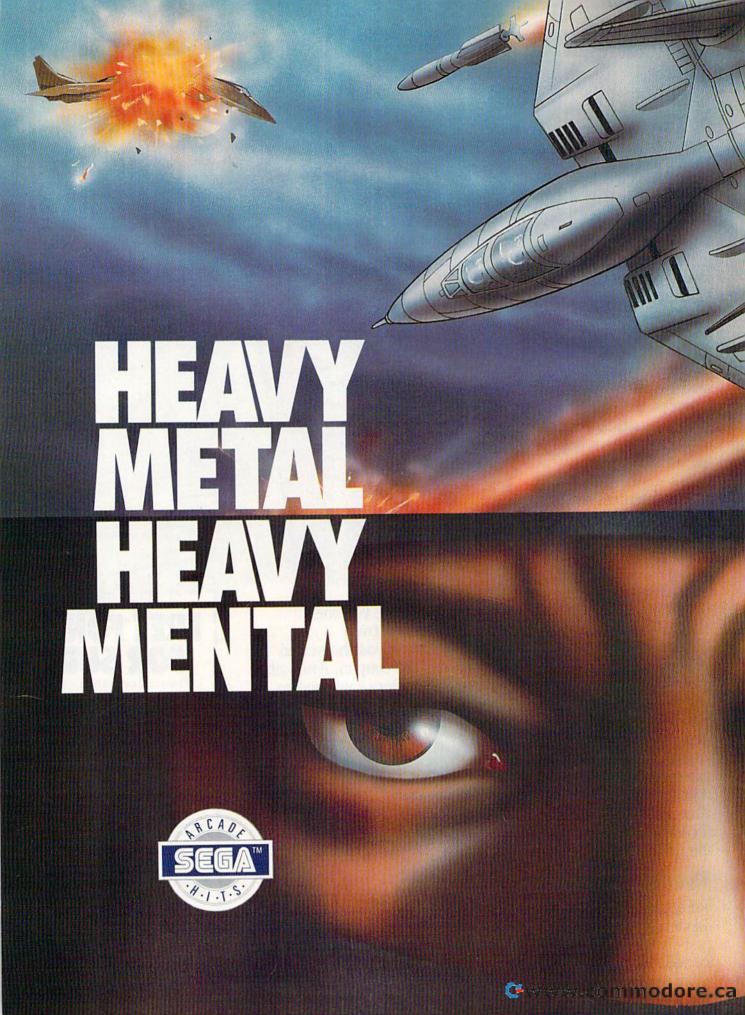
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EUITOR'S

ack in the spring of 1983, COMPUTE!, our flagship magazine, was growing as fast as the personal computer boom. Its circulation was on a steady upswing, advertisers were calling every day, and we were hiring a lot of new writers, editors, and programmers. In those days, COMPUTE!—at nearly 300 pages per issue offered coverage of Atari, Apple, Commodore (VIC-20, PET, and 64), Texas Instruments, Radio Shack, and Timex/Sinclair computers. Of these machines, the hottest seller was the new kid on the block, the 64. Computer enthusiasts oohed and aahed at the 64's 16 colors, eight sprites, SID chip, and wonderfully generous 64K of RAM. When we saw this computer's charge out of the starting gate, we decided then to serve this emerging market in a new way: COMPUTEI's Gazette was born.

When first planning this magazine, we were aware that more than half of COM-PUTE!'s readers were VIC-20 and 64 owners. We knew we would publish program listings in Gazette—after all, COMPUTE! readers thrived on the type-ins. But we decided to handle the listings in a different manner. We grouped all the listings together and put them in the back of the magazine. After the first couple of issues were out, we got the news. Reader response cards told us that Gazette was a great success—but the majority of those responding to questions about the format complained about the listings in the back. They wanted the listings next to the companion articles. Well, it took us nearly 61/2 years to make the change, but you'll find it here, at last, in this issue. A quick flip through these pages shows you the results.

Before I write another word, however, I must make a confession. What prompted this change was not a collection of 1983 reader requests. This issue is bound differently for the first time since its debut 78 issues ago-it's saddlestitched. This form of binding—the same used for our other three publications dictates where your color pages can go. And with a saddle-stitched magazine, the back pages are where some of the color goes, like it or not. We saw that we'd be wasting precious color on listings in the back, so we decided to look at all options. The result: listings with articles (and, maybe, a few happier original subscribers). Confession over.

If you haven't yet seen Commodore's Christmas-season ads, you will soon. Word has it that Commodore has committed millions of dollars (we've heard estimates from \$15-\$30 million) to a fall and winter media campaign hyping the Amiga. We hear that ads will appear in Time and Newsweek and that TV spots will be shown during prime time and major sports events. Also, if you have a Sears' Christmas Wish Book, you'll see the Amiga 500 in there. We wish Commodore luck—this appears to be the most aggressive stance the company has taken in six years.

Gazette has several good, new disk products available. In the past few issues, we've run ads for Best Gazette Games, Gazette Power Tools, and The GEOS Collection disks. Judging by the orders coming in, we've apparently struck a chord with our readers.

In this issue, you'll see our ad for the 128 Classics disk, a collection of our finest 128 programs. The disk includes applications, utilities, and games. For more details, see page 15. We also have an updated version of our Gazette Index disk. This update includes all items from our first issue (July 1983) through the issue you're reading now. If you bought the five-year-index disk last year, you can add the data from your 1989 Gazette copies—it will fit. If you want a complete index but don't want to spend your time typing in entries, see page 78 for ordering details.

Have a happy holiday season, and thanks to all of you for your support of COMPUTE!'s Gazette. We look forward to seeing you in 1990.

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teedback

Do you have a question or a problem? Have you discovered something that could help other Commodore users? We want to hear from you. Write to Gazette Feedback, COMPUTEI's Gazette, P.O. Box 5406, Greensboro, North Carolina 27403. We regret that, due to the volume of mail received, we cannot respond individually to programming questions.

Double Trouble

The "Disk Doubler" article in the August 1989 Gazette is very interesting, but I have some questions. When I first load the program and reformat a disk, I can look at the disk's directory and see that it has 1328 blocks free (as it should). However, if I turn my computer and disk drive off and back on and then load the directory of this disk, I find that it has 664 blocks free. Is it true that if I now try to store more than 664 blocks, the additional blocks won't go onto the second side? It appears that my disk has returned to the 1541 state. Is this correct? It seems to me that if I want to use both sides of a disk, I'd need to have a copy of your program on the disk. Am I right?

> Dr. Chas F. DeVoe Corning, NY

The situation you've described indeed confuses many users. To understand what's going on, you need to know a little about how your 1571 operates.

The 1571 assumes different personalities based on which computer it's connected to. If you insert a CP/M boot disk into the 1571 and turn on your computer, the 1571 becomes a disk drive that reads and writes MFM-format disks. If the 1571 is attached to a 128 and you boot the computer in its native mode, the 1571 becomes a double-sided disk drive that reads and writes disks in Commodore's GCR format. (This is the 1571's native mode, and it's generally called 1571 mode.) If the 1571 is attached to a 64, Plus/4, or 16, or to a 128 that's booted in 64 mode, the 1571 becomes a 1541.

In your letter, you don't mention which computer you're using. Based on your problem, we'll assume that the computer isn't a 128 and that your 1571 normally operates in 1541 mode.

When you use "Disk Doubler" to format the second side of a disk, the program switches the disk drive into 1571 mode before it formats. After you exit the program, the drive is still in 1571 mode. If you examine the directory of the disk at this point, you'll find that it has 1328 blocks free (unless, of course, the front side of the disk already contained data).

At this point, you turn your computer off and back on. When the computer powers up, it sends a reset signal to all the devices on the serial bus. When the 1571 receives this signal, it does the equivalent of a warm boot. Now, when you examine the disk's directory, it has only 664 blocks free; it appears that the disk has lost 664 blocks of storage.

The problem isn't that the disk has reverted to 1541 mode, but that the disk drive has. During the warm boot, the 1571 realizes that it's not connected to a 128 and goes into 1541 mode. Since the 1541 doesn't know about the second side of the disk, it builds the directory listing based on what's on the first side of the disk.

Your assumption about saving more than 664 blocks of data to the disk is correct. As far as the disk drive is concerned, the second side of the disk doesn't exist. If you try to save or retrieve data on the second side of the disk while the drive is in 1541 mode, you'll get an ILLEGAL TRACK AND SECTOR ERROR message.

However, you don't need Disk Doubler every time you access data on the second side of the disk. You can use the following commands in direct or program mode to set the 1571 back to its native mode:

OPEN15,8,15,"U0>M1":CLOSE15

If you want to set the drive to 1541 mode, enter the following commands:

OPEN15,8,15,"U0>M0":CLOSE15

If you own a 64 and want to format both sides of a disk to take advantage of the extra storage, you can simply execute the command to put the drive in 1571 mode before you format the disk.

GEOS Letterhead

I run a small mail-order business out of my basement and use geo-Write for most of my correspondence. I'd like to know if there is any way to get geoWrite to print letterhead. I've used geoPaint to design a graphic that I really like, but when I import it into geoWrite, I can't get it to print close enough to the top of the page. Do you have any ideas?

> John J. Scione Frankfort, KY

We'll let reader J. A. McKnight answer your question.

To create letterhead in geoWrite, paste a photo scrap in the header along with your name, address, and phone number. Since the header is always closed while you're working on your document, the photo scrap doesn't get in the way or have to be redrawn. Once you've created a document with your letterhead, save it with the name Letterhead. Now, when you need to print something on letterhead, simply duplicate Letterhead with the duplicate option under the file menu. You can fill in the body of your letter and then print it. I usually type the date and salutation in the font and style I want to use and save that in the template with the header. That way I don't have to select them each time I write a letter.

> J. A. McKnight Addison, TX

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- Compactor: Efficient compacting techniques -3 programs per disk -6 if you use both sides. Single File: All programs saved as a single file for maximum compatibility.
- Utility Commands: Many additional commands: Autonum, Append, Old, Delete, Linesaver, etc. Screen Dump: Print out any screen in 16 Gray Scales, Double size print options.
- Unstoppable Reset: Reset button to Retrieve System and Reset even so called Unstoppable Programs.
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LETTERS to the editor

Mall Mates

The article "Who Ya Gonna Call?" (September) performed a service in telling your readers about user groups. Commodore users who live in areas served by such groups should seriously consider joining. "Meeting 64/128 Users Through the Mail" is a user group for those who cannot attend a local group or who would like to make more Commodore friends. We've been around for over three years. We have 79 members from the U.S., Canada, Mexico, France, and West Germany. Members include absolute beginners and experienced programmers. We exchange information, advice, encouragement, and public domain programs, including those we write ourselves. Members receive a group name-andaddress list and a short description of each member's interests and the equipment they own. We also have a bimonthly newsletter. Dues are \$9 per year (to cover newsletter postage and photocopy costs). For more information, write me at Route 1 Box 151, St. Joseph, Illinois 61873.

Jean Nance President

Meeting 64/128 Users Through the Mail

C = Cosmetic

What's the difference between the 64 and 64C? Which do you recommend?

Jim McKinney Rawlett, TX

We'd recommend either because they're functionally identical. The 64C is the newer machine—all differences between it and the 64 are cosmetic. If you're planning to buy a brand-new machine, the 64C is all you'll find. If you buy a used machine, either will do just fine.

User Group Directory

Is a list of user groups available? I'm looking for one in my area.

Jan F. A. Veen Holland, MI

We publish a complete list of user groups every year in our May and June issues. This year's list has 453 names. Every issue between July and April, we publish "User Group Update," which lists new groups, disbanded groups, group mergers, and address changes. Our current file shows the closest group to Holland as the West Michigan Commodore Users Group, P.O. Box 88191, Kentwood, Michigan 49508.

SXtinct

I've seen the name SX-64 several times while reading your magazine over the past year. All I've been able to gather is that it's some sort of portable 64. Please explain what an SX-64 is.

Andy Orthmann La Center, WA

What you've gathered is correct: It's a portable 64. The SX-64 was introduced at the January 1984 Consumer Electronics Show. It had actually debuted earlier as the SX-100 and then as the Executive 64, but it didn't really sell until it was launched as the SX-64. It features a builtin 5-inch color monitor and a 170K builtin 5¼-inch disk drive, and it had an initial retail price of \$995. The SX-64 has been out of production for about four years.

Already There

In your August column, Philip Bishop recommends the 64K video upgrade module to all 128 owners. I'd like to know what that module is. I have a 128D. Does that make a difference?

Arif Mohamed Salem Abu Dhabi United Arab Emirates

You bet. You already have the 64K upgrade. The 128D, which replaced the 128 in late 1987, includes the 64K 8563 video chip. The original 128 contains a 16K chip. By offering 64K of dedicated video RAM, the newer chip allows for impressive 640 × 200 hi-res graphics displays.

Reader Advice, Please

Can you recommend a 64 accounting program that prints checks for a small business and a company from which I can purchase blank checks?

Kristine Cipra Brandon, MN

Here's another challenge to our readers. Do you use a 64 accounting program with check-printing capabilities? If you like what you're using (preferably a program that's still available so Kristine can find it), write and tell us. We'll publish the names of the most highly recommended packages in an upcoming issue.

Rhett Anderson

If you were reading Gazette last year, you may remember that Randy Thompson's "Programmer's Page" column beat out my own "Horizons" by a hair in the annual Readership Survey. I happened to notice that this year's survey is in this issue, so I'd like to take advantage of this opportunity to stuff the ballot box. Will the readers of my column please take the time to fill out the survey?

Seriously folks, we use the results of the survey to plan for the next year. The more forms we get, the better we can plan. Plus, it's nice to get a pat on the back for the work we do; maybe that's why associate publisher Lance Elko put his columns, "Editor's Notes" and "Letters to the Editor," on the ballot this year. (Just kidding, boss.)

While you're at it, feel free to write us a note and drop it into the mail along with the survey. Tell us whatever's on your mind. Do you like a game we hated? Do you think the home computer market is due for a resurgence? Do you think that the shampoo instructions "Wet hair. Lather. Rinse. Repeat." form an infinite loop? Let us know.

Actually, Î brought up the voting subject because I've been thinking about computer voting. Wouldn't democracy be better served if we could vote with our home computers?

Maybe someday it will happen. But there are obvious problems. Not everyone has a home computer with a modem. Could we just let the people with home computers vote from their homes and the rest vote normally? No, that would lead to a greater percentage of affluent people voting, and that wouldn't be fair. (Home computers, unfortunately, find their way into few low-income homes.)

Plus, a clever hacker might be

able to cast millions of votes. There are problems, but I hope we can work them out.

I have cousins who live in Columbus, Ohio. In the late 1970s they had Qube, an experimental interactive cable system that was run by Warner Amex. With Qube, you could vote for things. I'm not sure if Qube dabbled in local government, but I do remember that there were talent shows. Three people would sing, then everyone watching could push a button to vote for their favorite singer. Pure democracy.

Would you rather wait in line at the polling place or vote by modem? Let me know.

Euler vs. Newton vs. Gauss

It's time for three mathematical geniuses to face off. (Warning: You won't understand this unless you read the October "Horizons.")

First up, Isaac Newton, represented by Randy Herner of Norwalk, Ohio:

"After reading Horizons, I couldn't resist dropping you a note. I believe Sir Isaac Newton usually gets credit, or blame, as the case might be, for the trick.

"Computers have always been smart. It's the programmers that need help. Did you ever wonder why, when they program a computer to think like a human, they call it artificial intelligence?"

Next, Leonhard Euler, represented by Charley Musselman of Somerville, Massachusetts:

"I agree with your comment regarding Christopherson's method for solving the problem. I have a story to add.

"Leonhard Euler was a wise guy in a Swiss grade school. To punish him for cutting up in class, his teacher ordered him to sum the integers from 1 to 100. Rather than quiet down, Euler promptly answered '5050,' no doubt annoying his teacher. Euler had invented the

method discussed in your column.

"A couple of years later, Euler was introduced to the imaginary number i defined by the square root of -1. When his teacher wrote $x = EXP(PI \times i)$, Euler, still a smarty pants, said, 'Obviously equals -1!' Somehow he saw that raising e, the base of natural logarithms, to imaginary powers yields the trigonometric functions, sine and cosine.

"Euler (1707–1783) worked in Germany and Russia and has been called the most prolific mathematician who ever lived. I had to use Euler Equations to analyze the motion of a spinning top—a very hairy problem."

Finally, representing Karl Friedrich Gauss is Charles M. Shapin from Massapequa, New York:

"In response to your recent column regarding the method of computing, for example, the sum of all the integers from 1 to 1000 by using the method of pairs, involves the formula for the sum of an arithmetic progression using S=n/2*(a+1) where n is the number of terms, a is the first term, and l is the last.

"The formula is said to be the discovery of the great German mathematician, Karl Friedrich Gauss (1777–1855). As the story goes, when he was in elementary school, his teacher, to keep the boys busy, would give them problems like 'add up all the numbers from 1 to 1000.' It seems all the boys were busy except for Gauss, who came up with the answer in a few seconds. Incidentally, compare this formula with the formula for the area of a trapezoid, A=h/2*(B1+B2). But that's another story."

Well, I'm glad we cleared that up. (Late-breaking news: Readers Douglas Hudson and John Doane vote for Gauss, and they even back their votes with documentation, the books Oh! Pascal! and Men of Mathematics, respectively.)

THE programmer's page

Tips from Readers

Randy Thompson

"The Programmer's Page" is interested in your programming tips and tricks. Send all submissions to The Programmer's Page, COMPUTE!'s Gazette, P.O. Box 5406, Greensboro, North Carolina 27403. We'll pay \$25-\$50 for each tip we publish.

My mailbox is about to explode, so it must be time to dedicate another column to reader hints and tips. Sifting through stacks of letters, I've found a good selection of hints that promise to increase your programming productivity. This should also keep my mailbox from reaching critical mass for at least another week.

Who's Out There?

Here's a short program that tells you how many and what types of disk drives are connected to a 64 or 128 computer. In order for it to work, all of the disk drives must be turned on and they must have consecutive device numbers (8, 9, 10, and so on).

```
10 DV=8
20 OPEN 15,DV,15:CLOSE 15
30 IF ST THEN DV=DV-1:GOTO 50
40 DV=DV+1
50 FOR T=8 TO DV
60 OPEN 15,T,15
70 PRINT#15,"M-R"CHR$(198)CHR$
(229)CHR$(1)
80 GET#15,A$:A$=A$+CHR$(0)
90 PRINT "DRIVE";T;"IS A ";
100 IF ASC(A$)=52 THEN PRINT "
1541"
110 IF ASC(A$)=55 THEN PRINT "
1571"
120 IF ASC(A$)=255 THEN PRINT "
{SPACE}"1581"
130 CLOSE 15:NEXT
```

You could convert this program into a subroutine and save the results in an array instead of printing them to the screen. This way, your program could prompt the user with such intelligent lines as SAVE DATA TO YOUR 1541 OR WOULD YOU PREFER USING

YOUR 1581? when it comes time to save data to disk.

If you have a third-party disk drive that this program does not recognize, run the following program:

```
10 INPUT "DRIVE NUMBER"; DV
20 OPEN 15, DV, 15
```

30 PRINT#15, "M-R"CHR\$(198) CHR\$
(229) CHR\$(1)

40 GET#15,A\$:A\$=A\$+CHR\$(0)

50 PRINT ASC(A\$)

60 CLOSE 15

Write down the number that prints to the screen and then add a line to the first program that reads

121 IF ASC(A\$)=xxx THEN PRINT "drive type"

where xxx is the number that you wrote down and drive type is the type of drive that you own.

Sean Ganess Hollis, NY

Missing Data

Neglecting to put numeric data between the commas in a DATA statement is the same as including the digit 0. For example, this program

```
10 FOR I=1 TO 10:READ D:PRINT 
{SPACE}D:NEXT
20 DATA ,,,,,,,,
```

produces the same results as this program

```
10 FOR I=1 TO 10:READ D:PRINT 
{SPACE}D:NEXT
20 DATA 0,0,0,0,0,0,0,0,0,0
```

If you are reading string data as in the command READ D\$—the missing data is interpreted as a null string.

> Doug Ross Merrickville, Ont. Canada

Joystick Initials

You can use this subroutine in an arcade game to allow players to enter their initials via the joystick in port 2. After the initials have been

entered, the program stores them in X\$ for later use, such as saving high scores to disk.

```
10 GOSUB 1000:PRINT:PRINT X$:E
ND
1000 PRINT CHR$(147):L$="ABCDE
```

1000 PRINT CHR\$(147):L\$="ABCDE
FGHIJKLMNOPQRSTUVWXYZ":X\$="
":L=1:P=1

1010 JS=PEEK(56320):FB=JS AND {SPACE}16:JS=15-(JS AND 15) 1020 IF FB=0 THEN X\$=X\$+MID\$(L \$,L,1):L=1:P=P+1:WAIT 56320 ,16:IF P=4 THEN RETURN

1030 PRINT "{HOME}{6 DOWN}YOUR
 INITIALS:"; SPC(P); MID\$(L\$,
 L,1)

1040 IF JS=1 THEN L=L+1:GOSUB1 070:IF L=27 THEN L=1

1050 IF JS=2 THEN L=L-1:GOSUB1 070:IF L=0 THEN L=26

1060 GOTO1010 1070 FOR K=1 TO 100:NEXT:RETUR

To operate it, push forward or back on the joystick to cycle through the alphabet. Press the fire button to accept the current letter and move on to the next one. Three letters make up the player's initials. This program works on both the 64 and 128.

Michael Pere Glendale, AZ

Built-In 64 Monitor

The 128's built-in machine language (ML) monitor can be used to edit 64 programs. For example, you can use the 128's monitor to enter an ML program at location 49152 (\$0C000) in bank 0. Then, while depressing the CMD key, reset the computer using the reset button on the right side of the computer. You will now find your ML program at 49152 exactly as it was entered in 128 mode. What's more, you can return to 128 mode (by using the reset button, not by turning the computer off and on), enter bank 0, alter the program, and return once again to 64 mode to try out your changes.

Richard R. Harvel Fort Worth, TX

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Fame, Nintendo, and Robots

Fred D'Ignazio

I used to be a little-known columnist tucked away in the back pages of Gazette. Maybe I got one or two letters a year from my readers. I was

obscure but happy.

Suddenly all that changed. I wrote a column about Nintendo and then, the following month, published Dennis Joslin's rebuttal of my first column. A flood of letters began arriving. I'd touched a nerve; there was high drama, love, hate, and passion. Some people loved 64s and hated Nintendos. Others felt differently. I began reprinting their letters. Gazette dubbed this "The Great Nintendo vs. 64 Debate" and published a headline on each month's magazine cover. The flood increased.

Now I'm getting hundreds and hundreds of letters. I'm feeling less obscure, still happy, but a little nervous about the tornado of feelings, emotions, and opinions swirling around this great debate.

The Winner!

The winner for the 64 "Maniac of the Year" award goes to Mike Franz of Idaho Falls, Idaho. Mike colorfully decorated the outside of his envelope with cartoons, diagrams, and signs. A taste of Mike's envelope graffiti: "Down with Nintendo! Too many people like Nintendo better than Commodore! Bogus, dude! Most untriumphant!"

I carefully opened Mike's envelope (so as not to spoil the artwork) and found an articulate, wordprocessed letter on the inside.

Among Mike's comments:

"Nintendo fans say they like the machine because it has cartridges and you don't have to load disks. Well, if you can't insert a disk and type LOAD "*",8,1, then you're in bad shape!"

Mike goes on to say:

"Mark Hall [a fan of Nintendo] says 'our cartridges have a megabyte!' Well, I say, 'Big Deal! Your megabyte only adds cost, not quality!"

Mike bills himself as the world's leading Commodore fan and concludes his letter with this

parting shot:

"Nintendo is only for children who are too young to play anything complex. Commodore is for mature, intelligent individuals who are tired of Pac-Man and want a game machine that's also a computer."

%S#&!

While rummaging through my mailbag, I came across these choice remarks in a letter from John D. Larkin of Milford, Connecticut:

"I'd like to see whoever designed those %\$#&! Nintendo control pads sentenced to use them for 24 hours straight. I prefer the old Intellivision disks to those things, and you know how universally despised those controllers were!"

John adds:

"There are some really good 64 arcade games, but they get lost in the flood of bad ones. These bad games are invariably given a good review by someone who has never set foot inside an arcade in their life, much less played the arcade game they're reviewing. Among the good games, my personal favorites are Arkanoid, Delta Patrol, Boulderdash Construction Kit, Speed Buggy, Ghosts 'N' Goblins, and Technocop."

Who Killed the Robots?

David Lee of Waverly, Tennessee, has a theory that explains the disappearance of personal robots. He writes:

'You asked your readers where have all the robots gone? They went to the back shelves of the flea markets. They went there because the public got bored with them.

"You see, the public wants a robot that doesn't do tricks, but one that understands what you say, can do housework, and plays games. It may be possible to make such a robot, but the cost would make it affordable only for eccentric millionaires.

"Another thing that killed all the robots is price. The public wanted a robot like the one in the movie Short Circuit, but they wanted it for under \$200. People get bored with robots that just run around and

bump into things.

"I used to have a great robot. I bought him for about \$20. He had a little keyboard on top of his head. You could program him to spin, stop, speed up, slow down, beep, and do about 20 other things. He was great until a fatal miscalculation sent him tumbling off the side of the kitchen table. I couldn't bear throwing him out, so now he rests on top of the TV I use as a monitor, with another old, useless robot used for a Nintendo videogame, as a bookend for my old paperbacks.

"If it were possible for a robot to be human, do all the things humans can do, obey every command, and still be priced under \$1,000, then robots would come back at full blast."

Keep Those Letters Coming

I, too, wish I had the kind of robot that David is describing. I wrote about such a robot in my sciencefiction book Robot Odyssey (Tor Books, 1988).

Until David's and my fantasy robot arrives, please keep writing. Let me know how you feel about robots, Nintendo, and other matters technological.

Fred D'Ignazio c/o COMPUTE!'s Gazette 324 W. Wendover Ave. Suite 200 Greensboro, NC 27408

machine language programming

Sneaky Stack

Jim Butterfield

The stack is straightforward and normally takes care of itself. A JSR (Jump to SubRoutine) is balanced by the corresponding RTS (ReTurn from Subroutine); an interrupt, by an RTI (ReTurn from Interrupt).

Programmers use PHA to push (or store) data onto the stack and PLA to pull (or load) it back. The pushes and pulls must match exactly so as to keep the stack clean. For example, the stack might be marked by pushing a binary 0, followed by other information such as ASCII characters. When it's time to recall this information, the program pulls until it sees the binary 0.

One programming trick is to push an address on the stack with two PHA (PusH A register) commands and then to execute an RTS. Even though a subroutine has not been called with a JSR, the RTS does the job; it obediently collects the address from the stack and "returns" to that location.

Passing Data

Computer science texts often note that the stack is a convenient place in which to pass data to a subroutine. This is not generally true on a 6502-based chip. It's possible, but it's not convenient.

Here's the problem: Suppose we were to put several data items on the stack and then call a subroutine using JSR. The subroutine's return address is the last thing to go on the stack. The data could not easily be pulled from the stack without somehow getting past that return address.

But it can be done. We could pull the return address, followed by the data, and then restore the return address. Alternatively, we could "peek" at the stack in memory. On Commodore 8-bit machines, the stack occupies page 1 and is filled from top to bottom—from address \$01FF downward to \$0100; the current stack pointer can be established with a TSX command. In this last case, we would ask the calling program to clean up the stack after we had returned. Either method is awkward but can be made to work.

There's one more way of passing data to a subroutine using the stack: Leave the data directly behind the JSR instruction. Again, it's not always the best way. But it can be made to work well, and it's interesting to trace the logic.

Inside the 128

The Kernal ROM of the Commodore 128 contains an example of this kind of code at \$B3C4. Similar code could be written on any 6502-based machine. If you have a 128, you can follow the description by disassembling the code. Press F8 to enter the machine language monitor and then type D FB3C4. (The F is used since ROM is in bank 15.)

At \$B3C4, a call to the Kernal routine PRIMM (PRint IMMediate) is made with JSR \$FF7D followed by a string ("error") to be output. The string consists of ASCII characters followed by a binary 0. After the 0, the program continues.

B3C4: JSR \$FF7D

B3C7: .BYTE 20 45 52 52 4F 52 00

B3CE: JMP \$B08B

When the jump at \$B3C4 is executed, the return address is placed on the stack. This is not, as you might think, \$B3C7; instead, it's 1 less, \$B3C6. No special reason—that's just how JSR and RTS work.

Let's look at location \$FF7D to see how the string at \$B3C7 is printed. The jump to \$FF7D (in the Kernal jump table) takes us immediately to \$FA17. In this routine we find more registers being pushed onto the stack.

FA17: PHA:TXA:PHA:TYA: PHA:LDY #\$00

All three data registers—A, X, and Y—are pushed on the stack. The stack now contains five bytes: the return address plus the contents of the three registers. The stack pointer points at the next empty space, below the five bytes. This instruction copies the stack pointer into the X register.

FA1E: TSX

The subroutine then adds 1 to its own return address. The base address of \$0104 is necessary to put us beyond the three data-register bytes.

FA1F: INC \$0104,X:BNE \$FA27 FA24: INC \$0105,X

Next, the subroutine checks the location where this return address points. To do this, it copies the address from the stack to zero page, where it may be used as an indirect pointer.

FA27: LDA \$0104,X:STA \$CE:LDA \$0105,X

FA2F: STA \$CF:LDA (\$CE),Y:BEQ \$FA3A

If the indirect address now points at the 0 following the string, the subroutine is finished. Otherwise, it prints the ASCII character in the accumulator.

FF35: JSR \$FFD2:BCC \$FA1E

On the 128, a jump to \$FFD2 (Kernal routine BSOUT) will always return (under normal conditions) with the carry flag clear. Thus, the BCC may be viewed as an "always" branch.

FA3A: PLA:TAY:PLA:TAX:PLA:RTS

So, after restoring the data registers, the subroutine returns to an address that was changed since the call was made.



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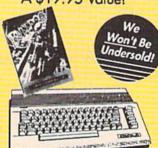
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BASIC for beginners

Playing It

Larry Cotton

Merry Christmas! I hope you typed in last month's program, which draws a musical keyboard on the Commodore 64 screen. This month we're going to play a Christmas song on it. All you have to do is continue the program where we left off.

First, we'll create four, 62element arrays which contain the
appropriate "POKEable" note values. These values should generate
pitches that match the notes on the
musical—let's call it a synthesizer—keyboard. Recall that each note
requires two numbers for the two
memory registers that control its
frequency or pitch. Using one oscillator frequency for each note, from
the "Music Note Values" table in
the appendix of either the User's or
the Programmer's Reference Guide,
we can calculate these numbers.

For instance, the oscillator frequency for C-3 (one octave below middle C on the piano) is 2145. Because the largest POKEable number one memory register can contain is 255, we must split 2145 into two parts, called high and low bytes. To do this, we first divide by 256. We need only the whole-number value for the number of times that 256 divides into 2145, so we use the INT function:

K=256 N=2145 F1=INT(N/K)

The variable F1 (with a value of 8) is the high byte, which is POKEd into the higher of the two memory registers. If we divided 2145 by 256 in elementary school, the math teacher would insist that we show a remainder. The remainder here is the low byte, which is POKEd into the lower memory register. To determine the remainder, multiply F1 by 256 and subtract the result from N (recall that multiplica-

tion is executed before subtraction):

F2=N-F1*K

Thus F1 and F2 are 8 and 97, respectively. These two values are also shown in the HI/LOW columns in the "Music Note Values" table.

Voice 2 Detuned

OK, voice 1 uses F1 and F2 to create its pitch. Let's simultaneously play voice 2, slightly detuned with respect to voice 1, to create a rich, full tone. To calculate the slightly detuned frequency, multiply the basic frequency by, say, 1.005 (see below for other multiples). Call it MU. Our detuned frequency will be N1:

MU=1.005 N1=INT(N*MU)

Now we can calculate F3 and F4 as above, except we use N1 instead of N:

F3=INT(N1/K) F4=N1-F3*K

The variable N1 is 2155, and F3 is 8 (as was F1). But F4 (our remainder) is 107, thus yielding a slightly higher pitch when POKEd into voice 2's frequency-control registers. So, by using only one basic oscillator frequency, we have created four POKEable values, F1–F4.

Keyboard Part II: The Sound

Now we're ready to resurrect last month's program. Load it from disk or tape and then list it. You'll see lines 5–300 and the subroutines at lines 1000 and 2000. Now change line 300 to

300 PRINT "{DN}{DN}"TAB (13)"PLEASE WAIT."

Then enter this line:

400 DIM F1(62),F2(62),F3(62),F4(62)

Here's where the arrays come in. You'll recognize the familiar DIM statement which dimensions four arrays of 62 elements each. You'll also recognize our divisor and multiplier in the next line:

410 K=256:MU=1.005

Now we use a FOR-NEXT loop to read in the basic oscillator frequencies for 41 notes:

420 FOR J=1 TO 41 430 READ T,N 440 N1=INT(N*MU)

450 F1(T) = INT(N/K):F2(T) = N - F1(T)*K

460 F3(T)=INT(N1/K):F4(T)=N1-F3(T)*K 470 NEXT

I'll explain the variable T later. Note that J is only a counter for the 41 pairs of data; it doesn't become part of an array. Lines 440–460 essentially repeat the calculations introduced above. Although we've DIMensioned all four arrays with 62 slots, some will be left empty: F(1) through F(8), for instance, contain values of 0 and are not used.

Here are the 41 pairs of DATA presented in the order of notes on the keyboard:

630 DATA62,2145,9,2408,14,2703,17, 2864,22,3215,25,3608,30,4050,33, 4291,38,4817

640 DATA41,5407,46,5728,49,6430,54, 7217,12,8101,23,8583,20,9634,31, 10814,28

650 DATA11457,39,12860,36,14435,47, 16203,44,17167,55,19269,59,2273, 8,2551,16

660 DATA3034,19,3406,24,3823,32, 4547,35,5103,43,6069,48,6812,51, 7647,18,9094,21

670 DATA10207,29,12139,34,13625,37, 15294,45,18188,50,20415,53,21629

The Keyboard Matrix

Have you figured out what T is used for yet? It corresponds to a particular key on the 64's keyboard. Enter this line, which we'll erase later:

3000 PRINT PEEK(197):GOTO 3000

continued on page 22

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Now type RUN 3000 and press RETURN. You should see a stream of 64s on your TV or monitor screen. As you'll recall, PEEK returns the contents of a particular memory register. Memory register 197 always contains a unique number which corresponds to the key that's currently being pressed. When no key is being pressed, that number is 64. Try pressing some keys while this one-line program is running. The space bar should yield 60; the Q key, 62; and so on.

What we want to do is associate one of the screen synthesizer keys (and its corresponding pitch) with one of the computer keys. Look at the first two data items-62 and 2145. The number 62 is the keyboard matrix value for Q, and 2145 is the basic frequency that should sound when the Q key is pressed. Therefore, as calculated in line 450, F1(62) equals 8 and F2(62) equals 97. When Q is pressed, 2145 is POKEd into voice 1's two frequency-control registers as 8 and 97; Q's detuned frequency, 2145*1.005, is POKEd into voice 2's frequency registers as 8 and 107. (We precalculate all the array values to speed up keyboard response.)

Here's another way of looking at the frequency arrays. Erase line 3000 and run the program as is; the keyboard will be drawn and the arrays will be loaded. The chart below shows the first eight array items, which you can confirm by typing, say, PRINT F1(62) and pressing RETURN.

Array Item	POKEable Value
F1(62)	8
F2(62)	97
F3(62)	8
F4(62)	107
F1(9)	9
F2(9)	104
F3(9)	9
F4(9)	116

Let me reiterate: There are 41 keys on the synthesizer keyboard we've drawn. Their corresponding computer-key matrix values range from 9 to 62 but skip around with no apparent order. The keys we'll press don't use matrix values 1–8 or 13 other values. But because the highest matrix value we do use is 62 (corresponding to Q), our arrays must be dimensioned to that size; 21 positions will go unused in each array.

Looking at the Keyboard

All that's left in the program is to look at the keyboard, POKE the array values into the frequency-control registers, and turn the voices on and off. The next few lines will be presented with minimal discussion because we've covered these concepts recently. First clear the sound chip:

480 V=54272:FOR J=V TO V+23: POKE J,0:NEXT

Then set up a simple envelope for voices 1 and 2:

490 E=136:POKE V+5,E:POKE V+6,E:POKE V+12,E:POKE V+13,E

The frequency-control registers are at locations 54272 and 54273 for voice 1 and at locations 54279 and 54280 for voice 2:

To turn the voices on and off with a sawtooth waveform, we define two constants VN (for on) and VF (for off):

520 VN=33:VF=32

Next, we turn up the volume:

530 POKE V+24,15

and define two more constants. The first is the memory register for the keyboard matrix, and the second is the value returned when no key is pressed:

540 KB=197:NK=64

That's it; everything has been done. We can print a new message to cover up the one we printed in line 300:

550 PRINT"{UP}"TAB(13)"OK, HIT IT!"

We're now ready to look at the keyboard. This is the start of a loop which will end in a few more lines:

560 T=PEEK(KB):IF T=NK THEN 560

If no key is pressed (T is 64), the program just goes into a holding pattern at line 560. If a key is pressed, T becomes something else—hopefully corresponding to one of the synthesizer keys on the screen. Whatever the case, control passes to the next two lines, which POKE our precalculated values into

the respective frequency-control registers:

570 POKE V1,F1(T):POKE V2,F2(T) 580 POKE V3,F3(T):POKE V4,F4(T)

Finally, we turn on voices 1 and 2:

590 POKE V+4, VN: POKE V+11, VN

Invalid Keypresses

If by chance an invalid key is pressed, an empty array value will be called and 0s will be POKEd into the frequency-control registers; no sound will be generated.

While a key is being pressed and T is in memory register 197, we want the note to continue sounding. Therefore, we must check the keyboard again:

600 IF PEEK(KB)=T THEN 600

And another holding pattern results. As soon as the key is released, control continues to the next line, which turns off both voices:

610 POKE V+4, VF: POKE V+11, VF

This ends our loop; we must return to its beginning:

620 GOTO 560

Ordinarily an unconditional GOTO is strictly *verboten*. But in this case it's short, so we can get away with it.

If you've been following this column for a few years, you should now be prepared to change various things in the program and observe the results. Other multipliers you can try in line 410 are 1.5, for a musical interval of a fifth, and 2, which should produce an octave. You can also change the envelope (line 490), the voices (line 520), or even the pitches in the DATA lines for a really weird effect.

Here are the notes for our Christmas song; try to guess its title before playing it. The numbers above the letters denote the relative time given each keypress.

	0		1000		1					
2	2	1	1	1	1	2	2	2	2	
X	В	В	N	В	V	C	C	C	N	
			1							
N	M	N	В	V	X	X	M	M	K	
1	1	2	2	1	1	2	2	2	4	
M	N	В	C	X	X	C	N	V	В	

Have a safe and happy holiday!

CONFS MARGING CONFS MARGING MARGING MARGING MARGING MARGINE MARGINE

The battle of Midway isn't
history. It's now, And the fate
of the free world rides on the
of the free world rides on the
wings of your p. 38X Lightning
perform daring dives and loops
perform daring dives and loops
perform daring dives and loops
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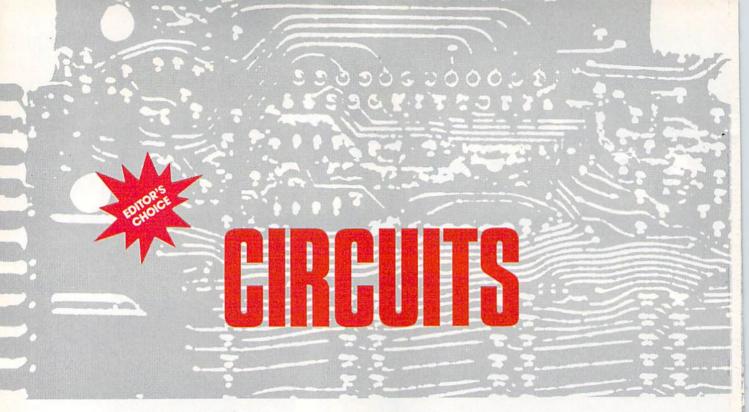
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But this won't be easy. You can't just turn the computer off—it's too well protected for that. Instead, you must manually switch a series of circuits so that pulses of electricity are directed to critical power points.

Getting Started

Since Circuits is written entirely in machine language, you'll need to enter it using "MLX," the machine language entry program found elsewhere in this issue. When MLX prompts you, respond with the values given below.

Starting address: 0801 Ending address: 19D8

Follow the MLX instructions carefully, and be sure to save a copy of the data for Circuits before you exit MLX. To start Circuits, simply load it as you would any BASIC program; then plug a joystick into port 2 and type RUN.

A title screen with several play options will appear. To select the number of electric pulses you want to guide, move the joystick left and right. The pulses are represented by small yellow balls below the word CIRCUITS and can be any number

Eric Haines

HOW DOES IT FEEL TO
KNOW THAT THE
SECURITY OF ALL
MANKIND RESTS IN
YOUR HANDS? FIND
OUT IN THIS
OUTSTANDING
STRATEGY GAME FOR
THE 64. JOYSTICK
REQUIRED.

from 2 through 8. The default is 3, but you may want to start with 2 until you get used to the game. The balls above CIRCUITS represent the number of players. Push the joystick up for a cooperative, two-player game; push it down for a one-player game. Normally the game is set for one player. When you have finished choosing your options, press the fire button to begin the game.

Circuit Power

When you start the game, you'll see an overhead view of the first circuit board. Across the top of the screen is the score, the number of lives remaining, a small diagram showing the joystick functions, the high score for the session, and the number of "safeties" left (safeties are described below). The small squares which fluctuate between yellow and red are the electric pulses. After a short pause, they'll begin flowing through the circuit.

Your goal is to use the electric pulses to short out the power sources, which appear on the circuit board as small pyramids. In order to succeed, you must reroute the pulse paths by using three controls: switches, rotators, and transporters.

Switches are found at all threeway junctions on the circuit board and are used to shunt the pulses in different directions. Some switches face right, while others face left, but they all act the same. When a pulse encounters a switch barrier, it assumes the direction allowed by the barrier. However, if a pulse approaches a barrier from behind (no directional change is possible), it passes directly through the barrier.

Use the joystick to change the direction of the switch barriers. Push the joystick to the right, and the barriers in all the right-facing switches will change position. Push right again, and the barriers return to their original positions. Pushing the joystick to the left has a similar effect on the left-facing switches.

Some parts of the circuits have a bridge across them; these are the rotators. Rotators are usually found wherever the circuits cross—that is, at four-way intersections. In order

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L.E.D. Storm Screen Shot.

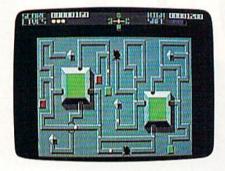


Side Arms Screen Shot.

Cavilland of the car

Circle Reader Service Number 141

for a pulse to safely pass through a rotator, the rotator bridge itself must be aligned with the direction of the pulse movement. Pushing the joystick up causes all rotators to turn 90 degrees. In the process, a rotator that is horizontal will become vertical, and vice versa.



Face electronic chaos in "Circuits."

Transporters are the colored squares on the circuit board. Some boards have more transporters than others, but there are always two transporters of each color. When a pulse hits a transporter, the screen flashes green and the pulse instantly moves to the other transporter of the same color. By pushing the joystick down, you can cause one transporter of each color to cycle to the next hue. Because of this, you can use transporters to move pulses to different places on the board. The transporter colors cycle in this order: red to green, green to blue, blue to yellow, and yellow to red. Most screens have less than four transporter colors, so you usually only have to keep track of the first two or three.

Another way that pulses can change paths is through logic gates. These look somewhat like flat, square buildings with green roofs. When a pulse passes into a gate, you can't see it until it comes out another pathway. Only by experience will you be able to tell where a pulse will emerge.

Powering Down

The pulses aren't very strong, so each power pyramid must be hit three times in order to eliminate it. Destroying a pyramid leaves a jagged gap in the circuit. Because the computer is malfunctioning, there are already some gaps in the circuitry. Be careful of these gaps—if a pulse touches one, it's vaporized and you lose a life. The game ends

once you've lost all three of your lives. Also, be sure a pulse doesn't hit a rotator that isn't lined up with the path along which the pulse is traveling, and be careful not to activate a rotator while a pulse is passing through it.

If you're not alert, you may find a pulse heading toward a gap, with no way to prevent it. Fortunately, by pressing the fire button, you can activate the safety function. This gives the pulse an extra burst of energy, signified by the screen turning blue for three seconds. During this time, the pulse will bounce harmlessly off any of the hazards. Use this capability sparingly because you're only allowed three safeties per circuit board.

When you've destroyed all of the power pyramids on the circuit board, you advance to the next board and the number of safeties is reset to 3. The boards have different layouts, and they become progressively more difficult. If you manage to shut down the fifth board, you go back to the first, but with another pulse to contend with. However, there will never be more than eight pulses on the board at once.

Scoring and Strategies

Scoring in Circuits depends on the number of pulses you have on the board. The base value for hitting a power pyramid is 10 points; for destroying a pyramid, 100 points; for clearing a board, 1000 points; and for shutting down all five boards, 10,000 points. Each point value is multiplied by the number of pulses in play. Thus, hitting a pyramid with two pulses on the board, for example, would give you 20 points. Clearing all the boards with eight pulses, on the other hand, is worth 80,000 points.

There are several strategies that will increase your chances of success. One is to align the switches so that all but one of the pulses are in an endless loop; then use the remaining pulse to destroy a power pyramid. Another strategy is to get all the pulses moving in the same direction. This way, you can send more current into a pyramid at one time.

Lastly, when there are a lot of pulses on the board at once, you may find it difficult to keep track of them all. If so, recruit a friend to help you. For two players, plug the second joystick into port 1. After selecting the two-player option on the title screen, start the game as usual. Now, however, the player with the joystick in port 2 only has to concentrate on left switches and rotators. The other player controls the right switches and transporters. Either player can activate a safety, but you still only get three per board. Scoring is not affected, though you'll probably get more points by shutting down more circuit boards.

Circuits

Ø801:0B Ø8 ØA ØØ 9E 32 3Ø 36 2E 0809:31 00 00 00 A9 08 20 D2 Ø811:FF A9 ØØ 8D 20 D0 20 Ø819:ØE 20 B2 ØE A9 1F 8D 18 0821:DØ A9 D8 8D 16 DØ A9 1B 5A 7F 8D ØD Ø829:8D 11 DØ A9 Ø831:A9 A2 8D 14 Ø3 A9 0839:15 03 A9 81 8D 1A DØ AØ Ø841:00 A9 60 99 aa a4 99 aa 0849:05 99 00 06 99 E8 06 A9 D9 99 0851:00 99 99 DB 99 00 0859:00 DA 99 E8 DA C8 D0 E1 0861:A9 C9 A0 15 A2 00 20 F3 0869:10 A9 3D 8D 64 04 A9 Ø871:8D 64 D8 AØ ØØ 98 99 ØØ 1E 99 00 Ø879:37 C8 DØ FA A9 CØ ØC DØ F6 0881:37 CB CS CB 0889:20 47 ØF AØ Ø7 A9 ØØ 99 DF 99 88 0891:02 A9 FF 00 3B 1B DØ 2Ø 0899:10 F3 8D ØE AØ Ø7 B9 Ø8A1:AØ 01 20 9F 18 Ø8A9:02 00 69 30 99 20 04 Ø8B1:A9 99 FØ D9 99 AØ D9 EA Ø8 DØ 88 10 99 Ø8B9:99 gg Dg 20 Ø8C1:E6 A9 5F AØ 12 A2 01 12 A2 Ø2 Ø8C9:F3 A9 69 AØ Ø8D1:20 F3 10 A9 12 A2 8D AØ @8D9:@3 2@ F3 10 A9 2F AØ Ø3 84 ED 88 99 FØ FA Ø8E1:05 Ø8E9:05 88 10 FA C8 8C 47 ØA 7E 35 C9 Ø8F1:AD ØØ FØ Ø8F9:7D FØ 3D C9 7B FØ C9 19 C9 6F FØ 37 2Ø 0901:77 FØ 93 0909:2E 11 FØ E4 A6 ED EØ 02 Ø911:FØ CA 86 ED A9 20 9D 0919:F0 05 D0 EB A6 ED E0 E8 86 ED A9 2F 9D 0921:FØ CE 2F 0929:EF 05 DØ DB A2 Ø1 A9 ØA 8D A7 Ø5 DØ B8 Ø931:8E 47 0939:A2 00 A9 20 D0 AØ Ø941:A9 ØØ 85 B2 99 C3 19 0949:10 FA A9 03 85 F0 20 DC 70 A9 2F AØ Ø2 DE Ø951:ØE 20 11 04 88 10 FA A9 00 0959:99 2E 99 ØØ D4 88 0961:A0 18 18 D4 A9 80 8D Ø969:A9 1 F 80 0971:06 D4 8D 0D D4 8D 14 D4 1.8 04 D4 A0 03 84 Ø979:A9 41 Ø981:EF A9 2F 99 48 04 88 10 Ø989:FA 2Ø 67 ØF A9 Ø1 20 E5 Ø991:ØE A9 FF 8D 15 DØ A2 ØØ 0999:8E 17 D4 E8 86 B6 86 E1 DF 09A1:86 E4 86 E9 86 B1 09A9:01 D4 A2 F6 8E 00 D4 20 Ø9B1: Ø8 ØE A9 19 85 DD C6 E1 75 ØB C6 E4 DØ Ø9B9:DØ Ø3 4C 09C1:03 4C 50 0B AE 00 DC E4 37 09C9:EA F0 7A A9 05 8D 14 D8 D6 Ø9D1:8D 3A D8 85 EA EØ 6F DØ 37 09D9:03 4C E9 0A E0 7E D0 36 37 Ø9E1:86 EA A9 Ø1 8D 14 D8 A2 48 Ø9E9:63 AØ 35 A9 5Ø 2Ø 25 ØF 73

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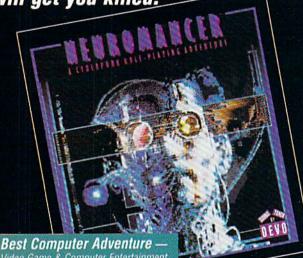


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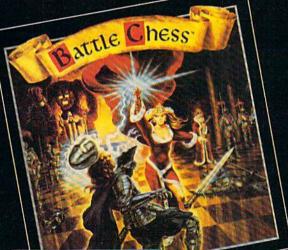


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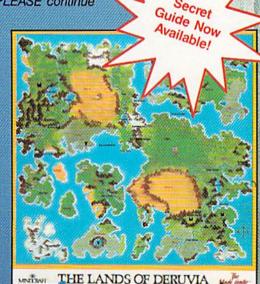
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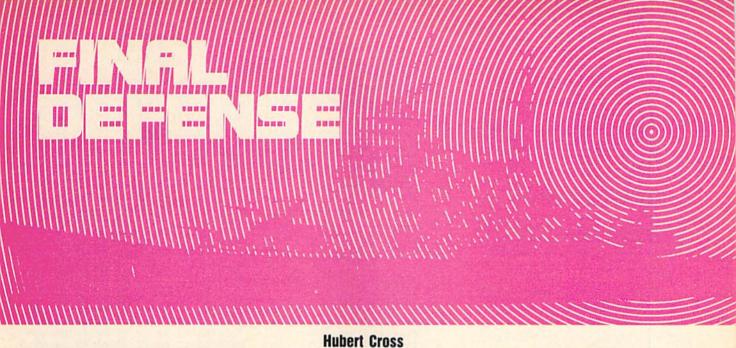






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P2200



They've finally broken through. In "Final Defense," hundreds of enemy ships are approaching by sea, and an equal number of tanks are converging on you by land. You're the last defender. And before they take you, you must wipe out as many of them as possible. If only you could hold on long enough for reinforcements to arrive.

Getting Started

Final Defense consists of two programs. Program 1, "Boot," is a short BASIC program that loads and runs Program 2. To avoid typing errors, enter it using "The Automatic Proofreader," found elsewhere in this issue. When you've finished, be sure to save a copy of the program to disk. Since it tries to load Program 2 (which hasn't been created), don't run the program yet.

Program 2 is written in machine language. To enter it, you'll need to use "MLX," the machine language entry program, also found in this issue. The MLX prompts, and the values you should enter, are as follows:

Starting address: 2000 Ending address: 339F

Before you exit MLX, be sure to save a copy of Program 2 to disk with the filename FINAL.ML.

To start the game, plug a joystick into port 2; then load and run Program 1. After the play fields have been set up, you'll be prompted for the level of play (0–9). Level 0 allows you to practice takeoffs and landings without enemy conFIGHT BY SEA AND BY LAND

IN THIS ARCADE-STYLE

GAME FOR THE

COMMODORE 64.

JOYSTICK REQUIRED.

frontation. Levels 1–9 range from relatively easy (where ships and tanks fire at you infrequently) to very difficult (where they fire constantly and quickly).

Playing the Game

The first time you play Final Defense, select level 0 to practice flying the plane. As the game begins, the airport scrolls onto the screen and your plane appears on the runway. To take off, push the joystick to the left and hold it there as your plane picks up speed. Since the plane has a full load of ammunition, you must be very close to full speed before you can take off. If you hesitate while accelerating, you'll probably run out of runway and crash into the fence before becoming airborne (so gun it!). When you've gained sufficient speed, push the joystick up to take off.

You may abort a takeoff by braking before you reach the end of the runway. Push the joystick to the right to apply the brakes. If you wait too long to start braking, you'll reach the end of the runway before you can stop. If you do stop on the

tarmac, tap the RESTORE key to get back to the start of the runway. (Don't press RESTORE during the game or you'll reset your score to 0.)

Once you're in the air, you'll find that the plane is more responsive at higher speeds and less responsive at lower speeds. If you try to fly too slowly, the plane stalls. Also, be careful not to fly too low or you'll crash.

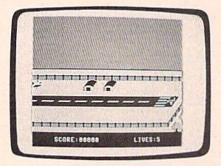
In practice mode—that is, at level 0—there are no enemy ships or tanks. Push the joystick to the left until you're going full speed, then wait until you're out of the combat zone and the PREPARE TO LAND message appears on the screen. As soon as you see the message, slow down to the minimum speed and dive to treetop level. When the airport appears on the screen, set your plane down on the runway as soon as possible. If you see that you're going to run out of runway before you can stop, gun your engines and take off again. There are two more airports at which you can attempt to land. If you fail to land at any of them, you'll have to fly over the combat zone again.

Fighting the War

After you've learned to take off and land, you're ready to go into battle. Select a level between 1 and 9 and prepare to face the enemy. Leave the airport and fly along at cruising speed until you reach the combat zone. Once there, you see the message GET READY on your screen, and your plane automatically slows

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to combat speed. Push the joystick left and right to move back and forth over the combat zone. Press the fire button to fire your weapons.



Prepare for takeoff in "Final Defense."

Your weapons-system officer automatically selects air-to-ground missiles or cluster bombs, depending on whether you're attacking ships or tanks. Each ship you destroy is worth 100 points; each tank, 500 points. Tanks are much harder to destroy, because you must deliver a direct hit. Both ships and tanks fire back at you, so be careful. Your plane can take only five hits before it's destroyed. If you crash into the ocean or the ground, it's all over.

When you exit the combat zone, your plane regains speed and you may choose to land for repairs (your plane can take only five hits without repairs) or face another attack wave. If you do land, the program also advances you to the next level. Here, the enemy shoots more rapidly and bullets travel faster.

Program 1: Boot

```
GK 100 IFA=0THENA=1:LOAD"FINAL
        .ML",8,1
QC 110 SYS9094:W=250:POKEW, 40:
       R=9091
       PRINT" {CLR } {2 DOWN }
ME 120
        {WHT}PLEASE WAIT A MINU
       TE"
DB 130 Q=-16:GOSUB410:FORQ=80T
       O4ØSTEP-4Ø
QF 140 GOSUB290:GOSUB270:NEXT:
        GOSUB290
       O=32:GOSUB410:GOSUB270:
        FORY=1ØTO21
       SYSR, 17, 21-Y, Y: FORX=22T
RG 160
        048
        K=9*RND(Ø):IFK>3THENK=Ø
FP
   170
       SYSR, 18+K, X-Y, Y: NEXT: SY
BQ
   180
        SR, 21, X-Y, Y
        NEXT: GOSUB270: FORY=10TO
   190
        21
   200
        FORX=21TO49:SYSR,8+RND(
        0) * 4, X-Y, Y
   210 NEXTX, Y: GOSUB270: FORY=1
        ØT021
SJ 220 POKEW, 27: FORY=10TO21: SY
        SR, 13, 34-Y, Y
       FORX=36TO47:SYSR, 12, X-Y
   230
KE
         ,Y:NEXT
GQ 240 SYSR, 13, X-Y, Y: NEXT: GOSU
```

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BQ	250	POKEW, 25:Q=0:GOSUB410:G
нЈ	260	OSUB270 SYS9696
	270	SYS9088
SH	280	The state of the s
SR	290	PRINT"{CLR}":RETURN
5K	290	FORX=ØTO1Ø8STEP2:SYSR,Ø
GM	300	,X-Q,20
GH	300	SYSR, Ø, X+9-Q, 11:NEXT:FO RX=ØTO8
FA	310	SYSR, 1, X-Q, 19-X: SYSR, 1,
LA	216	X+110-Q,19-X
RP	320	NEXT:SYSR,2,-Q,20:SYSR,
KE	320	3,118-0,11
XF	330	SYSR, 4,7-Q, 15:SYSR, 5,9-
	330	0,15
BD	340	FORX=14TO1@2STEP4:SYSR,
טט	340	6, X-0, 15
HC	350	NEXT:SYSR,5,X-Q,15:SYSR
	330	,7,X+5-0,15
BR	360	SYSR, 15, Q-72, 12: SYSR, 15
		,Q-67,12
XB	370	SYSR, 16, Q-30, 12: SYSR, 16
		,0-26,12
RP	380	SYSR, 15, Q-20, 12: SYSR, 14
		,Q-16,12
XS	390	SYSR, 16, Q-5, 12: SYSR, 14,
		Q+20,12
GK	400	SYSR, 14, Q+24, 12: RETURN
BC	410	FORY=10TO21STEP2:FORX=3
		5TO47STEP3
MX	420	SYSR, 14, X-Q-Y, Y: NEXTX, Y
		: RETURN

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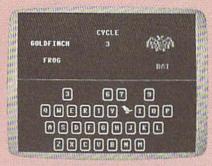


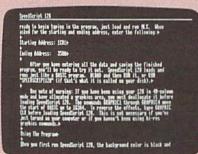
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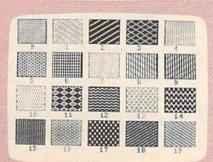
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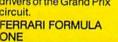
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9D 2CD8:34 ØØ 29 2F70:50 9D 97 50 3208:50 57 55 55 FD FD FD FD 4C Ø3 A9 03 C9 03 2D F8 BD 50 5B 2CEØ:DØ 20 AD 79 50 ØD 78 50 F1 2F78:60 50 BD 48 50 90 58 50 51 3210:FD 30 15 55 57 57 57 D8 2F80:60 85 3218:57 98 50 29 91 CF CF 3F 76 2CE8:DØ 24 A5 A3 CS A4 90 1E Al F7 AD **A3** 03 FF 33 3F 2CFØ:4E 50 FØ ØC 2F88:18 65 F7 60 10 2C AØ BF 3220:33 00 00 03 93 ac aF 3C FØ 8F 50 CE 8E EE AØ CC 2CF8:A9 05 8D 70 99 8D 2F90:1D 4A B9 aa DØ 3D 30 18 3228:33 FØ CC FØ CØ FØ CØ 71 50 A9 E8 2F98:90 03 ac 30 99 aa Da 3230:C0 28 2DØØ:34 03 na ØA A9 02 8D 3B 9B 10 10 Ca FE F3 CC F3 CC F3 2FAØ:60 15 3D 14 30 8D 72 3238:CC 33 36 2DØ8:03 A9 08 20 FB 2F AD 8B D4 AD DØ 00 FF 33 CC 33 CC A9 2D10:50 FO 90 50 DØ 3E B7 2FA8:15 DØ aa 90 68 50 90 C7 3240:CC A8 80 aa aa aa aa D2 43 AD AA 2D18:A9 06 20 D2 2F 18 69 06 AC 2FBØ:70 50 90 78 50 20 SF 2F F.7 3248:00 ØC 8C SC 30 FA Fa Ca 7.A 9B 2D20:8D 90 50 AD 98 50 29 40 E 2 2FB8:AØ 17 DØ D5 8A ØA A8 BD 30 3250:00 FA EA AA 03 02 00 aa DØ BF 2FCØ:10 50 B5 99 aa 00 85 2D28:FØ 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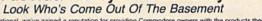
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The bad news is that Commodore's own 1750 512K RAM Expansion Unit (REU) is expensive and almost impossible to

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We found him.

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We bought brand new Commodore 1764 REU's, which come with only 256K of RAM. Next, we installed a 256K upgrade which was custom engineered to our demanding specifications. Once modified, we tested each and every unit and warranted them to be free from defects. The final product is called the 1750 Clone, and it's all the room you'll ever need on a simple plug in cartridge.

Once on board, you'll have a whopping 512K of RAM - the SAME amount of memory found on the Amiga 500. Your Commodore will operate at advanced levels of performance that the original designers never even demed of! You'll be amazed at the enhanced capabilities of software that takes advantage of the 1750 Clone, programs like GEOS, PaperClip III, and our own Maverick, to name a few.

The 1750 Clone works EXACTLY like the original 1750. It will open the door on years of extended use from your Commodore as even newer, more powerful software appears on the horizon, software that requires the room the 1750 Clone can pro-

Twin Cities 128 magazine says they "can completely recom-mend the 1750 Clone." Once you see it work, you'll feel the same way. So don't buy a whole new computer just to get more memory. Get the 1750 Clone instead -and get another decade of satisfaction from your Commodore.

Decade of satisfaction from your Commodore.

IMPORTANT NOTES - READ CAREFULLY

C-64/64c (but NOT C128/128D) owners MUST buy a heavyduty power supply to use these units. The power supply is
NOT included - it is available from us separately. If you ALREADY own a 1764 RAM cartridge, we can upgrade it for you.
Your unit MUST be in perfect working order for us to upgrade
it. The turnaround time on upgrades is approx. 2 weeks. It will
NOT be necessary for you to purchase a new power supply
- the one that came with your 1764 will still work fine.

THE 1750 CLONE \$199.95 ONLY 1764 UPGRADE

\$124.95

C-128 VIDEO RAM

For 128 Owners Who Refuse To Be Left Behind

When Commodore first released the new 128D, we got one, opened it up, and took a good look, it didn't take long to discover one MAJOR difference. The standard C-128 has just 16K of video RAM, while the newer 128D has 54K: 400% more! We knew that there were tremendous advantages to the extra RAM. Like being able to scroll through video memory or the potential for greatly enhanced color resolution. And, since Commodore had seen fit to make it a standard feature on all new 128D's, we knew it was only a matter of time before new software started taking advantage of the full 64K.

That time has arrived, Programs like BASIC 8, the

the full 64K
That time has arrived. Programs like BASIC 8, the
BASIC 8 Toolkit, Spectrum 128, Sketchpad 128,
and News Maker 128 have all been coded to utilize
the full 64K of video RAM found on the 1280's.
So if you've got a regular 6-128 with only 16K of
video RAM, you've got a problem. And we've got
the solution.

the solution.

You could upgrade on your own - but if thoughts of splattered solder and heat-damaged mother-boards bother you, relax; we've developed a module that just plugs right in to your C 128. No soldering, no hassles. Now your computer can have the same 64K video RAM as the new machines. And you'll be ready for whatever the

PLUG-IN 64K VIDEO RAM UPGRADE FOR C-128's

ONLY \$49.95

KRACKER JAX VOLUMES 1-7 We Just Made A Good Thing Better - Without Lifting A Fire

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Each Volume of Kracker Jax allows you to make Unprotected versions of around 100 specific popular titles. No special knowledge or tools are required. Each Volume originally sold for \$19.95. So if you wanted all 7 Volumes, it would have cost you \$139.65. But now, you can buy each Volume for only \$9.95 or, for you bargain hunters, you can buy ALL 7 VOL-UMES FOR ONLY \$29.95! That works out to a cost of only

We've also cut the price on The Shotgun II, one of the most powerful nibblers ever produced. Originally \$14.95, you can now own it for only \$9.95!

And just because there's a remote chance that it might be your birthday, we'll go one step further: Buy the Kracker Jax Volume 1 -7 package for \$29.95, and we'll throw in The Shotgun II nibbler FREE! Quite a deal, huh? But if you want it, better hurry - supplies are limited. After all, nothing good lasts



ONLY

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DIICOVER

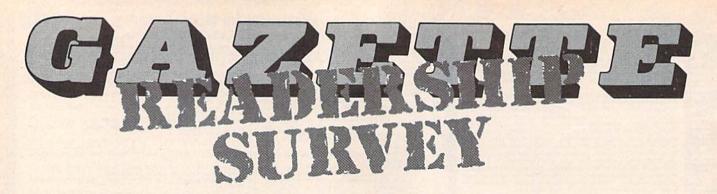
VISA

MasterCan

MARIE

DEALERS — WE HAVE THE SUPPORT YOU'RE LOOKING FOR!





What do you like most about COMPUTE!'s Gazette? And what don't you like? We want this magazine to be as useful and interesting as possible and to provide you with the coverage you want most.

to provide you with the coverage you want most.

Please take a moment to fill out and mail us this questionnaire (photocopies are fine if you'd prefer not to mark up or deface your personal issue).

Note that some questions may require more than one answer.

44 COMPUTE!'s Gazette December 1989

	Readership Survey, P.O. Box 5406,	Technical information
Greensboro, North Carolina 27403.		Graphic presentation
		Quality of programs
1. What computer(s) do you own	6. Which language do you prefer	Quality of writing and editing
or use?	for programming?	Overall grade
□ 128	□BASIC	
□ 64	☐ Machine language	11. Do you use programs
☐ Other (please specify)	Other (specify)	published in Gazette?
d Other (please specify)		☐ Yes
PART IN THE CONTRACTOR OF THE PARTY OF THE P	☐ I don't program	□No
	7. Which part of the magazine	If so how do you obtain them?
	do you like most? (Check no	If so, how do you obtain them?
2. Do you plan to purchase	more than two.)	☐ Type them in
another computer within the	☐ Features	☐ Gazette Disk
next year?	☐ Reviews	☐ Other (please specify)
□ Yes	□ Games	
□ No	☐ Programming	12. What types of programs
□ Undecided	☐ Departments	would you like to see in
□ Olidecided	☐ Program Listings	upcoming issues?
If	☐ Advertisements	
If you answered Yes to the above		
question, which computer do	8. Which columns do you read	
you plan to buy?	regularly?	
	☐ Editor's Notes	
	Letters to the Editor	13. What other computer
3. Do you use GEOS?		magazines do you read
☐ Yes	□ Commodore Clips	regularly?
□ No	☐ Feedback	regularly.
	☐ BASIC for Beginners	A THE RESIDENCE OF THE PARTY OF
4. Are you a member of a	☐ Machine Language	
Commodore user group?	Programming	
☐ Yes	□ D'Iversions	
□No	☐ The GEOS Column	
	☐ Horizons	14. How did you get this copy of
5. What types of software have	☐ The Programmer's Page	Gazette?
you purchased in the past year?	0 D	☐ Newsstand
	9. Do you use SpeedScript?	☐ Subscription
☐ Word processor	☐ Yes	☐ Pass-along
☐ Programming language	□No	☐ Library
☐ Graphics design		
☐ Telecommunications		Additional comments:
☐ Education		
☐ Games		
☐ Business applications		
Other		
□ None		

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10. Please rate Gazette on a scale

of 1-10 in the following areas (10

for highest grade, 1 for lowest):

General news and product



A R C A D E

The Amazing Spider-Man and Captain America in Dr. Doom's Revenge



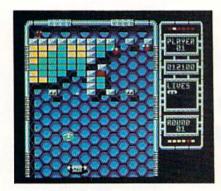
Paragon Software

Distributed by Medalist International A Division of MicroProse Software 180 Lakefront Dr. Hunt Valley, MD 21030 \$34.95

Doom looms over New York City, and only Spider-Man and Captain America can save the day in *Dr. Doom's Revenge*. The evil doctor possesses a nuclear missile, and it's up to the superheroes to stop him in this ground-breaking arcade game. Instead of progressing through various levels of arcade action, you follow a story line that takes the form of an onscreen comic book.

Since the game takes on the characteristics of a comic book, you should expect superior graphics and animation. You won't be disappointed. Spidey and the Captain react and move realistically through their battles with Doom's henchmen, and the full-screen comic-book pages are richly detailed. These and many other exceptional features make *Dr. Doom's Revenge* the top arcade game for 1989.

Honorable Mentions



Arkanoid II: The Revenge of Doh

Taito Software

267 W. Esplanade North Vancouver, B.C. Canada V7M 1A5 \$29.95

This was the year of the sequel, and not just in the movie industry. Taito's *Arkanoid II* picks up from the original and features outstanding graphics, showing just how much can be done on a 64. You'll find it hard to stop playing this game.



Gauntlet II

Mindscape

3444 Dundee Rd. Northbrook, IL 60062 \$29.95

Another sequel, Gauntlet II was also a strong contender for best arcade game. This coin-op translation features most of the action, sound, and animation found in arcades around the country. One or two players can choose from four characters and explore treacherous mazes while battling the enemy.

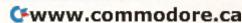


Chomp!

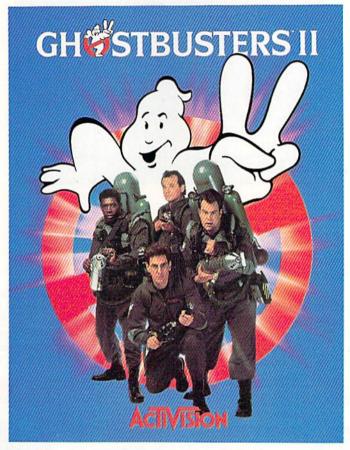
Cosmi

431 N. Figueroa St. Wilmington, CA 90744 \$24.95

Ever wish you were a fish? With *Chomp!*, you can live the aquatic life while learning that only the fittest survive. You must eat enough in order to jump to the next tank, all the while staving off predators. The ultimate goal is to reach ultimate freedom, the river. Sound, graphics, and animation are excellent.



Bustin' Makes You Feel Good!



Who ya gonna call? The Ghostbusters—again. Clear the courtroom of ghouls and get back in business. Bust your pals out of the insane asylum. Trap ghosts around New York City, then turn the slime to your side and march the Statue of Liberty across town to the Museum. If you've got the slimeblower, wasting the evil Vigo should be easy.



Get Ready to Believe Them.



Launch Miss Liberty on a rescue mission.



Keith Van Eron's Pro Soccer



MicroPlay Software

Marketed by Medalist International A Division of MicroProse Software 180 Lakefront Dr. Hunt Valley, MD 21030 \$34.95

Whether you're a fan of the indoor or the outdoor game, you'll enjoy *Pro Soccer*. Realistic player and ball movements and detailed graphics make this the top sports game of 1989. An overhead view of the action provides an excellent perspective of the game. In the outdoor version, weather can even become a factor with thunderstorms

making the footing treacherous.

You can play out a World Cup tournament with the outdoor game or play out an MISL season with the indoor portion of the game. The extensive documentation will have you performing everything from banana shots to Pelé-style backward overhead kicks in no time.

Honorable Mentions



Kings of the Beach Professional Beach Volleyball

Electronic Arts

1820 Gateway Dr. San Mateo, CA 94404 \$29.95

Set the ball for your partner and go for the spike! Kings of the Beach brings the fun and excitement of beach volleyball to your 64. Practice courts help your skills as you prepare for the Tournament of Kings. The realistic movements and reactions of the players have made this game a favorite with the COMPUTE! volleyball crowd.



International Team Sports

Mindscape

3444 Dundee Rd. Northbrook, IL 60062 \$29.95

Choose your country, select the best athletes, and take on the world in *International Team Sports*. Compete in soccer, swimming, track, volleyball, and water polo. You not only play, you must also coach. Graphics and animation are what can be expected from another award-winning sports game designed by SportTime for Mindscape.



Omni-Play Basketball

SportTime Computer Software

3187-G Airway Ave. Costa Mesa, CA 92626 \$34.95

SportTime wins again, but this time with its own release, *Omni-Play Bas-ketball*. The game takes on a television perspective with commentators providing pregame and halftime shows. In addition to full five-on-five action on the court, you can build your team into SBA champions. Additional game modules are available to add to the

Will they call you "Tinkerbell" or "Deadeye"?





Take on the best pilots in oneon-one dogfights at the Naval Fighter Weapons School to find out who is the real top gun.



You don't know what a good chewing out is until you've ticked off Admiral Hawk. Wipe that smirk off your face, Lieutenant.

Find out, on the toughest fighter training ground in the world. In F-14 TOMCAT. Master the fine points of aerial combat. Move up the ranks in your tours of duty aboard the carrier U.S.S. Nimitz. And test your dogfighting skills against the most elite pilots in the world.

F-14 TOMCAT features 80 randomly assigned missions in five theaters. 1st-person in-the-cockpit realism. And feel-it-in-your-gut aerial maneuvers. It's the best-selling combat flight simulator on the Commodore today.

Think you're a "Top Gun"? Then prove it, hot-shot, in F-14 TOMCAT.

"F-14 TOMCAT is one of the best combat flight simulators for the 64. Graphics, sound, and action are excellent, and the framework of a career scenario adds a sense of realism and purpose. Compute's Gazette

"F-14 gives you a shot at being one of America's most elite fighter pilots." Computer Gaming World

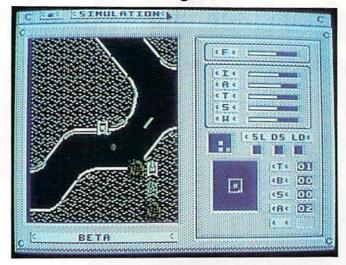
ACTIVISION.

See your local retailer, or call 1-800-227-6900 to order.

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STRATEGY AND WAR GAMES

Omega



Origin

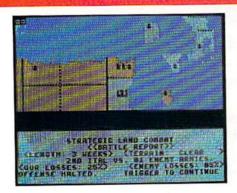
136-B Harvey Rd. Londonderry, NH 03053 \$49.95

A game that teaches programming skills while providing superb interactive combat, *Omega* was the year's most original war game.

Join an elite team of cybernetic-tank engineers, designers of sophisticated war machines. Specify the chassis, the weapon system, and the electronic countermeasures of your own futuristic battle chariot, but don't stop there. Give your tank a brain, too.

An English-based Cybertank Command Language gives your creation the artificial intelligence it needs to seek out and destroy enemy cybertanks. Test your design on a battlefield of your own creation—then challenge the world. Upload and download cybertanks via modem from bulletin boards or from other computer makes. Compete in team or individual free-for-alls where the best and smartest machine wins.

Honorable Mentions



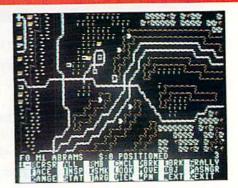
Storm Across Europe Strategic Simulations

Distributed by Electronic Arts 1820 Gateway Dr. San Mateo, CA 94404

\$49.95

This strategy game covers every aspect of the 1939–1945 war in Europe. One to three players command armies from northern Europe to North Africa, from England to the Urals. Paratroops, infantry, armor and air support are all under your command.

Mount amphibious landings, send U-boats against Allied shipping, order pinpoint bombings of Axis industrial targets, but don't neglect your side's war production and research and development. Storm Across Europe is a thorough game that can nonetheless be played quickly.



Overrun!

Strategic Simulations

Distributed by Electronic Arts 1820 Gateway Dr. San Mateo, CA 94404 \$39.95

Set in 1992, this tactical war game features eight preprogrammed scenarios. Pit Arab against Israeli forces or NATO against Warsaw Pact nations, or create your own battles with the included construction set.

Larger maps, increased weapon accuracy, new armored units, and the ability to direct counterfire against enemy artillery are new SSI features. Call for helicopters and other modern weapons as you engage the enemy in a single skirmish or an entire campaign. Our reviewer called it the most complex war game ever produced for the 64.

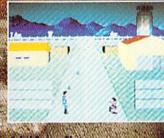
ANOTHER ONE BITES THE DUST

Eliminating terrorists.

Easier said than done. You must destroy these soldiers of fortune who strike you with machine guns, tanks, grenades and worse. Only then can you celebrate your victories.

Go beyond traditional war games and see why CABAL is #1 in the arcades. The fast action of every covert operation keeps you at the edge of survival.

See your favorite software retailer to enlist in the excitement. Or for more details, call Capcom U.S.A. at 408-727-1665 Act fast so that "another one" is one of them.



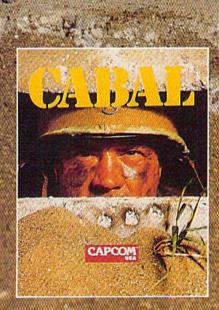
Cabal Screen Shots.



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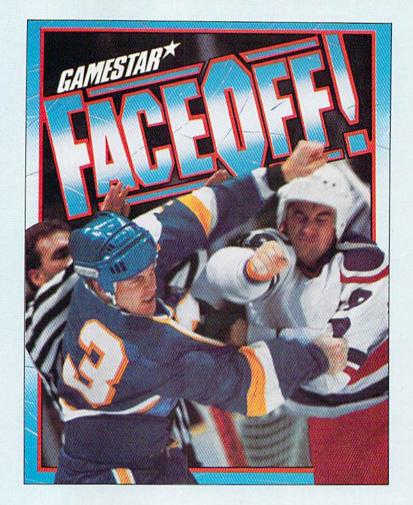
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"I Went to the Fights and a Hockey Game Broke Out."

Hockey is war on ice. Players travel over 30 miles an hour, the puck over 100. FaceOff: captures the beauty and brutality of hockey. When you see it, you'll understand why Gamestar—the leading sports software publisher—waited to do it right.

FACEOFF! features the largest animated players, a hands-on full-screen fight mode, and a close-up Shot Cam. With complete league and general manager features. It's hockey the way it was meant to be—fast, furious, and violent.





Take No Prisoners
When the goon squad hits
the ice, yank your hotshots
before they're ice-spots.



Don't Get Mad, Get Even! Slug it out as the Fight Cam zooms in. Better fight coverage than TV.

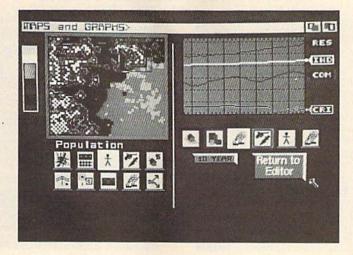


See your local retailer, or call 1-800-227-6900 to order.

 \odot 1989 GAMESTAR. IBM screens shown; screens may vary depending on computer system. IBM is a trademark of International Business Machines Corp. Circle Reader Service Number 106

S I M U L A T I O N S

SimCity



Maxis

Distributed by Brøderbund 17 Paul Dr. San Rafael, CA 94903 \$29.95

A simulation that breaks new ground, SimCity gives you a piece of land and the tools to transform it into a thriving metropolis—or an overpopulated, polluted nightmare.

SimCity is truly innovative, a serious simulation that's still entertaining. Build residential communities, establish commercial and industrial sectors to provide employment, lay roads and construct bridges—you get a real sense of the many and complex aspects of city management that

must be juggled in order to give your metropolis a fighting chance. (And when you get tired, you can unleash earth-quakes, fires, or even Godzilla on your unsuspecting masses.) Graphs and other information provide a behind-the-scenes view of how you're doing. The manual includes an essay on city planning and a suggested reading list.

A one-of-a-kind product, SimCity is unquestionably the simulation of the year.

Honorable Mentions



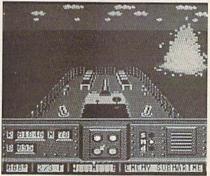
F-14 Tomcat

Activision

3885 Bohannon Dr. Menlo Park, CA 94025 \$39.95

A solid, supersonic combat simulator, *F-14* is notable for its graphics, its realistic feel, and its sheer variety of scenarios.

Flight simulation is convincing, and combat is lightning-fast, calling for reflexes as well as control of your weapons systems. You can rise through the ranks, and there are various difficulty levels. *F-14* could herald a new golden age of 64 aviation.



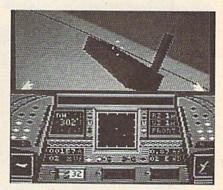
Destroyer Escort

Medalist International

A Division of MicroProse Software 180 Lakefront Dr. Hunt Valley, MD 21030 \$39.95

An outstanding, if not wholly realistic, simulation of convoy escort duty during World War II, Destroyer Escort shows in its design both careful accuracy and judicious compromise (in the interest of gameplay).

Choose from a number of missions, as well as various levels of enemy resistance, as you oversee several battle stations.



Snow Strike

Ерух

600 Galveston Dr. Redwood City, CA 94063 \$29.95

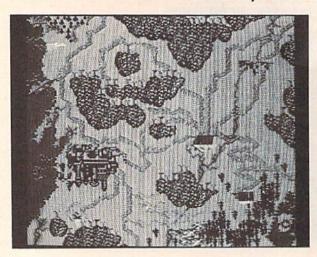
A good jet-fighter simulator, *Snow Strike* is made more effective because of its underlying scenario—war against Central American drug lords in the near future.

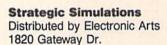
Among its nice touches is the selection of your copilot from a group with widely differing personalities. Flight simulation is good—although the craft's controls are a bit too sensitive—and combat is believable.

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ROLE-PLAYING GAMES

Hillsfar/Curse of the Azure Bonds





San Mateo, CA 94404 \$39.95 each

In adapting Advanced Dungeons & Dragons to the computer, SSI takes a conservative approach that may play a large part in the success of these games. The conservatism is offset, though, by a thoroughness that makes the products stand out. The essence of AD & D is captured in these two products, which, along with other SSI add-ons and modules, are bringing AD & D role-players to the computer and exposing computer role-players to AD & D.

Of the two programs, Hillsfar is simpler—a one-player search game enhanced with arcadelike sequences.

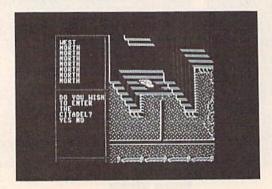


Azure Bonds is a more complex, combat-oriented package, with increased emphasis on character development, spells, and character classes.

The icing on the 64 AD & D cake is the series of game-management modules SSI has produced to make "real-world" AD & D games more efficient.

SSI's Advanced Dungeons & Dragons series has captured a large following and, despite the conservatism of the approach, is helping to define the nature of role-playing games for the 1990s.

Honorable Mentions



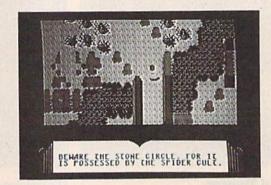
Battletech: The Crescent Hawk's Inception

Infocom

Distributed by Mediagenic 3885 Bohannon Dr. Menlo Park, CA 94025 \$39.95

A new venue for role-playing games, a new direction for Infocom, and a new source (Japan)—plus its sheer playability—make *Battletech* stand out.

It's the future, and you're in training to become a mechanized warrior, master of a battlefield titan. Training is actually part of the game, another touch that makes this one a winner. Judicious use of text—Infocom's forte—further enhances the game's reality.



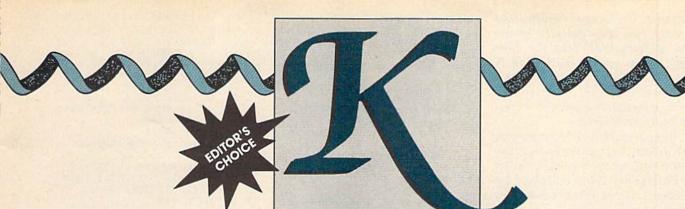
Fire King

Micro Forte/SSG

Distributed by Electronic Arts 1820 Gateway Dr. San Mateo, CA 94404 \$29.95

A classic fantasy role-playing game with an innovative interface, *Fire King* mingles joystick with keyboard commands to good effect. The game gives you a well-realized world filled with artifacts and characters and offers an interesting two-player mode.

Fire King is not particularly innovative, nor is its ambition anything out of the ordinary. What makes this game special is the attention paid to both playability and detail.



Telecommunications is an increasingly popular hobby of many home computer users. A modem and a terminal program open up a whole new world of information. They allow you to access public domain software libraries, current stockmarket information, and graphics files and to communicate with other computer users.

Unfortunately, due to noisy phone lines, data can become lost or garbled during transmission. In the last decade, several file-transfer protocols have been designed to detect and correct these errors. One of these, XMODEM, is now widely used. However, it has some annoying deficiencies. For one, every block XMODEM transmits must be a full 128 bytes long. As a result, it often adds zero bytes to the end of a file. Some programs, especially file archive programs, won't work correctly when these extra bytes are added. Another problem with XMODEM is that it can only transfer one file at a time.

Kermit, an advanced filetransfer protocol developed at Columbia University, corrects many of the shortcomings of XMO-DEM. Like XMODEM, Kermit guarantees that data will be transferred correctly, but unlike XMODEM, it doesn't add extra bytes to the end of a file. The Kermit protocol also supports a batch mode so that multiple files can be transferred without the operator intervening. "KTerm" is a terminal program for the 64 and 128 that utilizes the Kermit file-transfer protocol.

Getting Started

KTerm is written entirely in BASIC. Enter the program using "The Automatic Proofreader," found elsewhere in this issue. Be sure to save a copy to disk when you've

TERM

Transfer your files
more reliably with this
simple Kermit server
for the 64 and 128.

Disk drive and
modem required.

Bert Kerkhof

finished typing. If you own a Commodore 128, add or change the following lines:

20 BANK 15:COLOR 6,7:POKE 169,1 25 KEY 1,CHR\$(133):KEY 3,CHR\$(134)

26 KEY 5,CHR\$(135):KEY 7,CHR\$(136)

30 PRINT CHR\$(144); CHR\$(147); CHR\$(5); CHR\$(14); CHR\$(11); SPC(30);

260 PRINT CHR\$(144);CHR\$(27);"F"; 370 PRINT CHR\$(R(G));:RETURN 1500 GET#2,G\$:IF PEEK(2580) AND 247 THEN POKE 2580,0:GOTO

1700 GET#2,G\$:Y=PEEK(2580):IF Y THEN POKE 2580,0:GOTO 1720

If you own a Commodore 1660 modem, add the following line (it

lets the modem receive calls when it's in answer mode):

165 POKE 56579,PEEK(56579) OR 32:POKE 56577,PEEK(56577) AND 223

Using KTerm

KTerm operates at 300 baud. When you first run it, you're asked to specify a word size, or the number of data bits that you'll send for each character. Enter either 7 or 8; most bulletin boards use eight data bits. KTerm then displays a help line and enters terminal mode. (Press f7 to recall the help line at any time.) While in terminal mode, everything you type is sent to the modem, and every character received is shown on the screen. You can send commands to your modem, or if you're connected to another computer, you can communicate with it.

By default, KTerm turns off local echo and relies on the host computer to echo what you're typing. If you're communicating with a computer that doesn't echo your typing, press f1 to turn on local echo. If each character you type appears twice, turn off local echo. (This situation occurs when both KTerm and the host computer echo what you type on the screen.)

To download (receive) one or more files, ask the host to send the file(s) and then press f3. KTerm responds with the following prompt:

Receive: File Type?

Enter the type of the file(s) you wish to download: Type *S* for sequential files, *P* for program files, or *U* for user files. You don't have to enter the filenames; they are provided by the host computer.

KTerm constantly tells you what is happening during the transfer. A period (.) indicates that nothing is being received from the host

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computer. The letter O signifies that an error has been detected in the data. (KTerm then asks the host computer to resend that data.) A plus sign (+) is printed when data is received correctly. It displays the message Complete when all the data has been transferred.

Irrecoverable error conditions, such as very bad phone lines, cause KTerm to give up. If it has to abort the file transfer, KTerm displays the message Timeout. When a disk error occurs on your end of the connection, Kermit refers to it as a local error. For example, when your disk is full, KTerm prints the message Local disk full.

An error that occurs at the host computer is called a remote error. An example message is Remote disk read error. Both local and remote errors can cause the transfer to end, returning you to terminal mode.

Kermit doesn't convert file data in any way. If you receive a text file from another type of computer, you must convert it from true ASCII to Commodore ASCII, and vice versa. When you receive a BASIC text file, you must use a tokenizing program to convert it to a BASIC program.

Uploading Files

To upload a file, press f5. Kermit responds with the prompt:

Send: Which File(s)?

You can type in a single filename or indicate several files by using standard Commodore wildcards. A few examples are as follows:

Sends all files on the disk $R^*=S$ Sends all sequential files that begin with R

?.DAT Sends A.DAT, B.DAT, C.DAT, and so on

When you send files to a computer other than a 64 or a 128, use filenames that are valid for that computer. For example, filenames on IBM and compatible computers are up to eight characters long, optionally ending with a period and an extension of up to three characters.

When you're ready to exit KTerm, press the RUN/STOP key.

KTerm

FH 10 REM COPYRIGHT 1989 COMPU TE! PUBLICATIONS, INC. ALL RIGHTS RESERVED AX 20 POKE53280,14:POKE53281,1

4: POKE169,1 XX 30 PRINT" {CLR} {WHT}"; CHR\$ (1 4); CHR\$ (8); SPC (10); CP 40 PRINT" (CLR)": PRINTTAB (6) "COPYRIGHT 1989 COMPUTE! BX 50 PRINTTAB(8) "PUBLICATIONS , {2 SPACES}INC."
SF 60 PRINT:PRINTTAB(8)"ALL RI GHTS RESERVED" FP 70 FOR JF=1T03000:NEXT:PRIN T:PRINT SJ 130 PRINT"KERMIT FILE TRANS FER": PRINT FE 140 INPUT"NUMBER OF DATA BI TS ? 8[3 LEFT]"; B GF 150 IF B<>7 THEN OPEN 2,2,0 ,CHR\$ (6) +CHR\$ (0) :B=0 AF 160 IF B=7 THEN OPEN 2,2,0, CHR\$ (38) +CHR\$ (96) :B=128 QA 170 OPEN 15,8,15:Z\$=CHR\$(0)

CG 180 GOSUB420:DIM R(255),S(2

FQ 190 H(1)=32:H(2)=192:H(3)=6

QG 200 FOR I=0 TO 31:S(I)=I:NE

BG 210 R(8) = 20:R(13) = 13:S(20) =

QS 220 FOR J=1 TO 3:G=H(J):FOR

JH 230 S(I) = S:R(S) = I:S=S+1:NEX

KK 240 DEF FNC(I)=32+(I+(I AND

GC 250 DEF FNT (I) = (I OR 64) - (I

GB 260 B\$=CHR\$(20):C\$="{P}":PR

INT" {BLK}";C\$;

{SPACE}290

270

330

\$="":E=0

60,420

XQ 350 PRINT: GOTO260

RETURN

FB 400 H=3-H: RETURN

RB 430 RETURN

70

KG 270 GET#2,G\$:IF G\$="" THEN

AM 280 G=ASC(G\$):GOSUB370:GOTO

AP 290 GET G\$:G=ASC(G\$+Z\$):IF

HB 300 IF G>132 AND G<137 THEN

XD 310 G=S(G): IF H THEN GOSUB3

HB 320 PRINT#2, CHR\$ (G);:GOTO27

KK 330 PRINTB\$; "{WHT}": N\$="":T

QJ 340 ON G-132 GOSUB390,450,7

PC 370 PRINTBS; CHRS (R(G)); CS;:

CJ 380 REM ++ F1, ECHO ++ HP 390 PRINT"ECHO: ";MID\$("ON (SPACE)OFF",H+1,3)

RF 410 REM ++ F7, HELP ++ SQ 420 PRINT" (RVS) F1 (OFF) = ECHO

{2 SPACES}{RVS}F3{OFF}=

RECEIVE [2 SPACES] [RVS]F

5{OFF}=SEND{2 SPACES}

{RVS}F7[OFF] =HELP"

450 INPUT"RECEIVE: FILE TYP

500 E=0:GOSUB1320:P=0:P\$=""

QX 510 GOSUB670: IF WS="B" THEN

XR 440 REM ++ F3, RECEIVE ++

E ? S(3 LEFT)";TS
HE 460 IF TS="" THEN RETURN

:GOSUB670

MC 490 IF E>1 THEN 630

E = 2EG 520 IF E THEN 630

CH 470 GOSUB1890:GOSUB1670:P=4

XX 480 IF E=0 THEN GOSUB1920

SE 360 REM ++ PRINT BYTE ++

{SPACE}G=Ø THEN 270

192)/64 AND 63)

I=G TO G+31

: PRINT

4: PRINT

8:S=32

T:NEXT

AND 64)

55),N\$(143)

FA 530 GOSUB2050: I\$=I\$+","+T\$ 540 OPEN 8,8,8,15+",W":GOSU PJ B2020 QJ 550 IF E THEN 620 RK 560 GOSUB1320:GOSUB670 ES 570 IF W\$="Z" THEN E=1 AM 580 IF E THEN 620 MP 590 PRINT#8, 1\$; AK 600 IF ST THEN E=5:IS="WRIT E ERROR" JP 610 GOTO550 KS 620 CLOSE 8:GOSUB2020:GOTO4 90 DH 630 IF E>4 THEN U\$="E"+I\$ FB 640 P=0:P\$="":IF E<>4 THEN {SPACE } GOSUB1320 EX 650 GOTO1150 EA 660 REM ++ RECEIVE PACKET + KE 670 FOR J=1 TO 5:X=P:GOSUB1 490 HB 680 PRINTMID\$ ("+0.0", Y, 1); CD 690 U\$=MID\$("YYNN",Y,1):U=K KB 700 ON Y GOTO730,710,720,72 EB 710 U=K-1 AND 63:US=US+AS:X =A JA 720 GOSUB1320:NEXT:E=4:RETU FG 730 K=K+1 AND 63:U\$=U\$+P\$ XF 740 AS=PS:A=P:RETURN 750 REM ++ F5, SEND ++ CD 760 INPUT"SEND: WHICH FILE (S) "; N\$ XM 770 IF NS="" THEN RETURN KA 780 OPEN 8,8,0,"\$:"+N\$ QX 790 GOSUB2020: IF E THEN 910 MA 800 GET#8, G\$, G\$: FOR N=0 TO {SPACE}143 XK 810 GET#8,G\$,G\$,G\$,I\$ DA 820 IF ST THEN 910 JH 830 N\$=STR\$ (ASC (G\$+Z\$) +ASC (I\$+Z\$) *256) MX 840 FOR I=1 TO 40:GET#8,G\$, IS BF 850 N\$=N\$+G\$+I\$:IF I\$>"" TH EN NEXT RF 860 T\$=MID\$(N\$,25,1) BX 870 IF T\$<>"P" AND T\$<"S" T HEN 810 DP 880 FOR I=7 TO 23 RH 890 IF MID\$ (NS, I, 1) <> CHR\$ (3 4) THEN NEXT BB 900 N\$(N)=MID\$(N\$,7,1-7):NE XT N RA 910 CLOSE 8:GOSUB2020:IF E {SPACE}THEN 1150 CK 920 PRINT"NUMBER OF FILES:" ; N MX 930 IF N=0 THEN RETURN SX 940 GOSUB1890:U\$="S"+P\$:X=4 :GOSUB1250 XC 950 X=0:IF E THEN 1120

AJ 960 GOSUB1920:F=0 BR 970 E=0:IF F=N THEN E=2:GOT 01110 BS 980 I\$=N\$(F):GOSUB2050

CR 990 US="F"+IS:GOSUB1200:IF (SPACE)E THEN 1110 JB 1000 OPEN 8,8,8,NS(F):GOSUB

2020 JJ 1010 IF E THEN 1090 PR 1020 U\$="":V=0:FOR I=1 TO 9

BD 1030 GET#8, G\$: G=ASC (G\$+Z\$): U\$=U\$+CHR\$(G) EK 1040 IF G AND B THEN V=V+1:

G=G-B SP 1050 IF G<32 OR G=35 OR G=Q OR G=127 THEN V=V+1 AH 1060 IF ST THEN E=1:GOTO108

KF 1070 IF I+V<P(1) THEN NEXT

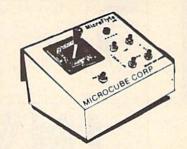
RC

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co	1000	U\$="D"+U\$:GOSUB1250:GO			
CQ	1000		100000	-	50
ov	1000	TO1010 IF E<3 THEN US="Z":GOS	FJ	1590	ON W GOSUB1750,1800,18
QX	1030	UB1200:F=F+1			30,1860,1780
JD	1100	CLOSE 8:GOSUB2020:IF E		1600	
JU	1100	<2 THEN 970	QB	1610	C=-FNC(C):GOSUB1700:IF
DD	1110		22		Y THEN 1650
טט	1110	IF E<3 THEN U\$="B":GOS UB1200	GS	1620	IF C THEN Y=2:W\$="":GO
DD	1120	IF E<5 THEN 1150	-		T01650
PE	1130	U\$="E"+1\$:GOSUB1200:1\$	CB	1630	GOSUB1700: IF Y THEN 16
PE	1130		Section:		50
pe	11/0	=MID\$(U\$,2)	FG	1640	C=U<>K: IF WS="E" THEN
	1140	REM ++ END MESSAGE ++			{SPACE}E=3
SF	1150	U\$="COMPLETEREMOTE	XP		Y=Y+1: IF C THEN Y=Y+1
	1100	{LEFT}TIMEOUT LOCAL"	BG	1660	REM ++ CLEAR INPUT BUF
PK	1100	PRINT: PRINTMIDS (US, E*8			FER ++
1000		-15,8);	PC	1670	GET#2,G\$:IF G\$="" THEN
EA	1170	IF (E AND 1) = 0 THEN PR			RETURN
		INT: RETURN			GOTO1670
HC	1180	GOSUB2050:PRINT" ";1\$:	DS	1690	REM ++ GET BYTE ++
		RETURN			GET#2,G\$:Y=ST:IF Y THE
		REM ++ SEND STRING ++			N 1720
PQ	1200	V=0:FOR I=1 TO LEN(U\$)	EP	1710	G=ASC (G\$):C=C+G:RETURN
GC	1210	G=ASC (MID\$ (U\$, I, 1) +Z\$)	CQ	1720	IF Y=8 AND TI <t 1<="" td="" then=""></t>
CX	1220	IF G<32 OR G=35 OR G=Q			700
		THEN V=V+1	QP	1730	Y=2:W\$="":RETURN
	1230				REM ++ DECODE BYTE ++
EM	1240	REM ++ SEND PACKET ++			IF G=P(6) THEN W=2:RET
BJ	1250	FOR J=1 TO 5:U=K:GOSUB			URN
		1320	KF	1760	IF G=Q THEN W=3:RETURN
PP	1260	GOSUB1490			REM ++ ADD BYTE ++
JF	1270	IF W\$="N" AND (Y=1 OR			IS=IS+CHRS(G):RETURN
		(SPACE)P) THEN Y=4	FD	1790	REM ++ CONTROL BYTE ++
QB	1280	PRINTMID\$ ("++.0", Y, 1);			IF G<>P(6) AND G<>O TH
		IF Y<3 THEN K=K+1 AND	*	1000	EN G=FNT(G)
		{SPACE}63:RETURN	QE	1810	I\$=I\$+CHR\$(G):W=1:RETU
ES	1300	NEXT: E=4: RETURN	***		RN
KA	1310	REM ++ PUT PACKET ++	ox	1820	REM ++ QUOTED BYTE ++
MG	1320	I=1:C=66+LEN(U\$)+V+U:G	SD	1830	IF G=P(6) THEN W=4:RET
		OSUB1670	-	1000	URN
CH	1330	IF I>P(3) THEN 1350	EE	1840	I\$=I\$+CHR\$(G OR 128):W
CJ	1340	PRINT#2, CHR\$ (P(4));: I=	-	2010	=1:RETURN
		I+1:GOTO1330	KE	1850	REM ++ QUOTED CONTROL
CH	1350	PRINT#2, CHR\$ (1); CHR\$ (L	****	1030	{SPACE}BYTE ++
		EN (U\$) +V+34); CHR\$ (U+32	НВ	1860	IF G<>P(6) AND G<>Q TH
);	1113	1000	EN G=FNT (G)
GG	1360	FOR I=1 TO LEN(U\$)	RG	1870	I\$=I\$+CHR\$(G OR 128):W
		G=ASC (MID\$ (U\$, I, 1)):IF	110	1010	=1:RETURN
		X THEN 1410	KM	1888	REM ++ INITIALIZE PARA
FD	1380	IF G AND B THEN S=Q:GO			METERS ++
		SUB1470:G=G-B	JR	1890	K=0:V=0:O=0:IS=""
AM	1390	IF G<32 OR G=127 THEN			D\$=CHR\$(112)+"% @-#N"
		{SPACE}GOSUB1450:G=FNT	EO	1910	REM ++ SET PARAMETERS
		(G):GOTO1410	24	1710	(SPACE)++
МО	1400	IF G=35 OR G=Q THEN GO	BP	1920	FOR I=1 TO 7:GS=MID\$(I
1/100		SUB1450	DE	1320	\$,1,1)
OJ	1410	S=G:GOSUB1470:NEXT	ΔΔ	1930	IF GS<"!" THEN GS=MIDS
		PRINT#2, CHR\$ (FNC(C));C		1000	(D\$, I, 1)
		HR\$(P(5));	PP	1940	P(I) = ASC (G\$): NEXT: P(1)
HP	1430	RETURN	-	2310	=P(1)-36
		REM ++ PUT BYTE '#' ++	SA	1950	P(2)=60*(P(2)-32):P(3)
	1450		Un	1550	=P(3)-32
		REM ++ PUT BYTE S ++	PA	1960	P(4) = P(4) - 32 : P(5) = P(5)
		C=C+S:PRINT#2,CHR\$(S);		1300	-32
		: RETURN	A.T	1970	G=((P(7) AND 63)+1 AND
DR	1480	REM ++ GET PACKET ++	AU	19/0	63)>32
		I\$="":Y=2:W\$="":T=TI+P	RF	1984	GS="Y": IF G THEN Q=P(7
-		(2)	WE	1300):GOTO2000
XC	1500	GET#2,GS:IF ST AND 247	HC	1990	IF B THEN GS="&":IF P(
animal.	3 3 3 5	THEN 1500		1000	7)=89 THEN Q=38
MJ	1510	IF G\$<>CHR\$(1) AND TI<	MK	2000	
	A Line	T THEN 1500	111	2000	P\$=CHR\$(126)+", @-#"+G \$:RETURN
QB	1520	C=0:IF G\$<>CHR\$(1) THE	ВС	2010	REM ++ CHECK DRIVE ++
-		N 1650		2020	INPUT#15,G,G\$:IF G THE
KJ	1530	GOSUB1700:IF Y THEN 16		2020	N E=5:1\$=G\$
		50	ES	2030	RETURN
SJ	1540	D=G-32:GOSUB1700:IF Y			REM ++ CONVERT IS ++
	1	{SPACE}THEN 1650	FJ	2050	G\$="":FOR I=1 TO LEN(I
AS	1550	U=G-32:GOSUB1700:IF Y	-		\$)
		{SPACE}THEN 1650	FF	2060	G=ASC (MID\$(I\$,I,1)+Z\$)
GK	1560	W\$=G\$:W=X+1:IF D<4 THE		2070	IF G>95 THEN G=G AND 9
		N 1610			5
XQ	1570	FOR I=4 TO D	GR	2080	G\$=G\$+CHR\$(G):NEXT:I\$=
		GOSUB1700:IF Y THEN 16			G\$:RETURN G

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VENTOF

Having trouble locating important disk files? "Disk Inventory" can help. This utility program catalogs disk files and has two unique features. First, it can catalog several disks at once, allowing you to compile one complete list of filenames. Second, Disk Inventory automatically senses when you remove and insert a new disk, thus eliminating keyboard interaction and making the inventory process quick and easy.

Getting Started

Since Disk Inventory is written entirely in BASIC, use "The Automatic Proofreader," found elsewhere in this issue, to type it in. When you've finished typing, make sure you save a copy of the program to tape or disk before attempting to run it.

When you're ready to inventory a disk, load the program and type RUN. The main menu will appear, offering three options. Select option 1 to inventory all files, option 2 for PRG files only, or option 3 for SEO files only. Insert your first disk and make a selection to begin the inventory process.

As the program reads the disk files, it will display the filename, file type (P for program files, S for sequential files, and so on), and the disk name for each file. When it finishes with a disk, insert another disk or press any key to end the inventory process. The program will detect when another disk has been inserted and will automatically start reading the directory on the new

After all the disks you want to inventory have been read, press any key for the final menu. From

HERE'S A WAY TO CATALOG YOUR DISKS INTO A SINGLE REFERENCE LIST. FOR THE 64. PRINTER RECOMMENDED.

this menu, you can sort the files by name, save your inventory list to disk as an ASCII file, display the list on the screen, print the list, or exit the program. To make a selection, press the corresponding number.

If you display the list, you can slow the scrolling process by holding down the CTRL key. The sorting is done alphabetically by filename and may take several minutes, depending on the number of files. The print option works with a Commodore or Commodore-compatible printer. Make sure your printer is online before selecting the print option. If you decide to save your list to disk, you'll be prompted for a filename. Remember that filenames can be no more than 16 characters in length.

The Sort Routine

Disk Inventory uses a shell sort to order the filenames. This type of sort is adequate when cataloging a few disks, but it may bog down if you have a large number of filenames to sort. For this reason, you may want to replace the sort routine, located in lines 650-740, with one of your own. In this routine, the

information for each filename is stored in the array R\$(). Each element of R\$ contains the filename (positions 1-16), the first letter of the file type (position 18), and the disk name (positions 20-35).

By default, Disk Inventory holds as many as 501 filenames (numbered 0-500). You can increase this number by changing the DIM statement in line 150. For example, to allow for 1000 filenames, you'd change this statement to DIM R\$(999).

Disk Inventory

- FH 10 REM COPYRIGHT 1989 COMPU TE! PUBLICATIONS, INC. -ALL RIGHTS RESERVED
- OH 20 POKE53280,0:POKE53281,0: PRINT" (CLR) (YEL)"
- XJ 30 PRINTTAB (10) " [RVS] {20 SPACES}"
- FQ 40 PRINTTAB (10) " (RVS) [3 SPACES]DISK INVENTORY {3 SPACES}"
- AG 50 PRINTTAB (10) " [RVS] {20 SPACES}"
- RJ 60 PRINT" [3 DOWN] [2 SPACES] 1) {2 SPACES} INVENTORY AL L FILES"
- GE 70 PRINT" [DOWN] [2 SPACES] 2) {2 SPACES} INVENTORY 'PRG ' FILES ONLY"
- AC 80 PRINT" (DOWN) (2 SPACES) 3) [2 SPACES] INVENTORY 'SEQ ' FILES ONLY"
- MD 90 PRINT" (5 DOWN) (WHT) {RVS}INSERT FIRST DISK A ND MAKE SELECTION"
- OF 100 GETAS: IFAS=""THEN100
- DB 110 IFA\$<"1"ORA\$>"3"THEN100
- XA 120 B\$="\$"
- FP 130 IFAS="2"THENBS="\$: *=P"
- JA 140 IFAS="3"THENBS="5:*=S"
- HR 150 DIMR\$ (500) : CURRENT = 0
- JE 160 OPEN15,8,15:OPEN1,8,0,B
- MG 170 PRINT" (CLR) {WHT}":PRINT "{2 SPACES}FILENAME {4 SPACES}TYPE
- {3 SPACES}DISK NAME"
- QA 190 GET#1,D\$,D\$,D\$,D\$,D\$,D\$

,D\$,D\$ GC 630 GETD\$: IFD\$=""THEN630 QE 200 DNS="" DH 430 GET#15, ZS: IFZS=""THENZS BS 640 GOTO480 CD 210 FORI=1T016:GET#1,X\$:DN\$ EP 650 REM *** SORT ROUTINE ** =CHR\$ (Ø) =DN\$+X\$:NEXTI PG 440 IFASC(Z\$)=QTHEN410 PB 220 GET#1,D\$,D\$,D\$,D\$,D\$,D\$ FC 450 RETURN EQ 660 PRINT" (CLR) (DOWN) ,D\$,D\$ BS 460 PRINT"{CLR} {DOWN} DISK {RIGHT} {CYN} SORTING ... " BK 230 GET#1,D\$,D\$,L\$,D\$,E\$ {SPACE}ERROR: "ENS;" "E XK 670 M=CURRENT-1 HH 240 IFE\$="B"THEN350 MS;" "ETS;" "ES\$ JF 680 M=INT(M/2):IFM=0THEN480 FP 250 GET#1, X\$: IFX\$<>CHR\$ (34) HB 470 CLOSE15:END GC 690 J=0:K=CURRENT-1-M THEN250 SJ 480 PRINT" (CLR) (DOWN) DX 700 I=J RJ 260 NS="" {RIGHT} {WHT} {RVS} SELEC AK 710 L=I+M GC 270 GET#1, X\$: IFX\$<>CHR\$ (34) T: {YEL}":PRINT:PRINT:P AP 720 IF R\$(I)>R\$(L)THENT\$=R\$ THENN\$=N\$+X\$:GOTO270 RINT (I):R\$(I)=R\$(L):R\$(L)=T MS 490 PRINT" 1) SORT BY FILEN GH 280 GET#1,D\$:IFD\$=" "THEN28 \$:I=I-M:IFI>ØTHEN71Ø AME": PRINT DA 730 J=J+1:IFJ>KTHEN680 BD 290 T\$=D\$:GET#1,D\$,D\$ EJ 500 PRINT" 2) SAVE AS AN AS DD 740 GOTO700 CQ 300 FORI=LEN(N\$) TO16:N\$=N\$+ CII FILE": PRINT INPUT" {CLR } {DOWN } KH 750 DS 510 PRINT" 3) DISPLAY TO SC CHR\$(32):NEXTI {RIGHT} {WHT} FILENAME "; XG 310 R\$ (CURRENT) = N\$+T\$+CHR\$ (REEN" N\$:N\$=LEFT\$(N\$,16) 32) +DN\$ SA 520 PRINT" [4 SPACES] (USE <C HK 760 OPEN2,8,8,"0:"+N\$+",S,W RR 320 PRINTR\$ (CURRENT) : CURREN TRL> TO SLOW LISTING) ": T=CURRENT+1 PRINT CD 770 PRINT#2,"{2 SPACES}FILE HP 330 GET#1,D\$:IFD\$=" "THEN33 QK 530 PRINT" 4) PRINT LIST":P NAME [4 SPACES] TYPE RINT {3 SPACES}DISK NAME" GK 540 PRINT" 5) EXIT": PRINT QJ 340 GOTO230 CB 780 PRINT#2,"-----AK 350 PRINT: PRINT" {WHT} {RVS}I QG 550 GETD\$:IFD\$=""THEN550 {SPACE}----NSERT NEXT DISK OR PRES PD 560 IFD\$<"1"ORD\$>"5"THEN550 S A KEY TO STOP" DM 570 D=VAL (D\$): ON D GOTO 660, CX 790 FOR I=1TOCURRENT: PRINT# FA 360 Q=16:GOSUB410:REM BEING 750,590,810,580 2,R\$(I):NEXTI GG 580 CLOSE15:END REMOVED? BP 800 PRINT#2:CLOSE2:GOTO480 RX 370 Q=0:GOSUB410:REM FULLY AP 590 PRINT" (CLR) {WHT}": PRINT DE 810 OPEN4,4:CMD4 {SPACE } REMOVED? "{2 SPACES}FILENAME GX 820 PRINT#4,"{2 SPACES}FILE EG 380 Q=16:GOSUB410:REM BEING {6 SPACES}TYPE NAME {4 SPACES} TYPE [3 SPACES]DISK NAME" INSERTED? {3 SPACES}DISK NAME" BQ 600 PRINT"CCCCCCCCCCC CCC C CCCCCCCCCCCC(YEL)" CS 390 Q=0:GOSUB410:REM FULLY FF 830 PRINT#4,"-----{SPACE} INSERTED? {SPACE}----DF 400 CLOSE1:CLOSE15:GOTO160: HG 610 FOR I=ITOCURRENT: PRINTR REM READ NEXT DISK \$(I):NEXTI FF 840 FOR I=lTOCURRENT:PRINT# MK 410 GETWS: IFWS<>""THEN480 HC 620 PRINT: PRINT" (WHT) {RVS} 4,R\$(I):NEXTI

END (PRESS ANY KEY)"



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Circle Reader Service Number 135

GUUMN SEREM FLIPPER

James K. Walker

Create 80-column help and menu screens with this short, easy-to-use machine language program for the 128. A demo is included. Disk drive and RGB monitor are required.

With the introduction of the 128, Commodore finally had a computer that could display 80 columns of text in color. This was achieved using the 8563 Video Display Chip (VDC). This chip has its own 16K bank for storing a text screen, character attributes (such as color, reverse video, blink, and underline), and character definitions. Within this 16K bank, there's also 4K of unused memory (see the accompanying memory map). This area is ideal for locating another 80-column text screen, including character attributes. (Because it has 64K of VDC memory, the newer 128D can store up to 14 different text screens.)

Unfortunately, you cannot read or write directly to this memory. Instead, you must communicate with the VDC's 37 registers through two memory locations, \$D600 and \$D601 (a tricky task for both beginners and experts). "80-Column Screen Flipper" is a program that makes it easy to manage two or more 80-column text screens.

Getting Started

80-Column Screen Flipper consists of two BASIC programs. Program 1, "Screen Flip Creator," creates a machine language file on disk called VDC.SCREEN.FLIP. This file contains the routines necessary to initialize and flip the text screens. Program 2, "Demo," shows you how to use 80-Column Screen Flipper in your own programs.

To ensure accurate typing, enter Programs 1 and 2 using "The Automatic Proofreader," found elsewhere in this issue. Be sure to save a copy of both programs to disk when you've finished typing. Once you've entered the two programs, run Program 1. After it creates VDC.SCREEN.FLIP, run Program 2 to see how easy it is to flip between screens.

Screen-Flipping Routines

The machine language file VDC .SCREEN.FLIP contains three routines. The first of these routines is for older 128s that have been upgraded to 64K of VDC memory. The VDCs in these machines must be initialized to use the extra memory. This is done with the command SYS 2816.

The second routine changes where the 80-column text screen or the character attributes for this screen are located. The syntax of this command is

SYS 2831, hb, lb, rn

where *hb* is the high byte of the address, *lb* is the low byte of the address, and *rn* is a VDC register number (12 or 20).

When you change the address for the 80-column text screen and character attributes, you need two SYS commands. To change the screen address, assign *rn* a value of 12. To change the address of the screen's character attributes, use an *rn* value of 20.

As an example, you might want to change screen memory from the default to the unused 4K at address \$1000. The high byte of this address is \$10 (decimal 16); the low byte is 0. Therefore, to relocate the 80-column screen to location \$1000, you'd execute a SYS 2831,16,0,12. The command SYS 2831,24,0,20 changes the address of character-attribute memory to \$1800.

The final routine changes the location where characters are printed in VDC memory. This means you can display one 80-column text screen while writing to another simultaneously. The format of this command is

SYS 2861, hbc, hba

where *hbc* is the high-byte character location and *hba* is the high-byte attribute location. To output characters to the unused 4K block, use the command SYS 2861,16,24. Note that only the high bytes of the addresses are used.

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VDC Memory Map

Location Description

\$0000-\$07FF Text display
(80 × 25)

\$0800-\$0FFF Character attributes
\$1000-\$1FFF Unused

\$2000-\$3FFF Character-set
definitions

Program 1: Screen Flip Creator

BH 10 REM COPYRIGHT 1989 COMPU TE! PUBLICATIONS, INC. -- ALL RIGHTS RESERVED

GC 20 FOR I=DEC("0B00") TO DEC ("0B42")

BF 30 READ X\$: X=DEC(X\$): POKE I,X: Y=Y+X

BG 40 NEXT I

XF 50 PRINT Y

GQ 60 IF Y=5362 THEN BSAVE "VD C.SCREEN.FLIP", B0, P(DEC("0B00")) TO P(DEC("0B43")): END

EA 70 PRINT "ERROR IN DATA STA TEMENTS": END

KQ 80 DATA A2,1C,20,DA,CD,09,1 0,20,CC,CD,20,0C,CE,60,0 0,8D,2A,0B,8E,2B,0B,8C

MF 90 DATA 2C,0B,AE,2C,0B,AD,2
A,0B,20,CC,CD,E8,AD,2B,0
B,20,CC,CD,60,00,00

KG 100 DATA 00,00,8D,41,0B,8E, 42,0B,AD,41,0B,AE,42,0B ,8D,2E,0A,8E,2F

AX 110 DATA 0A,60,00,00,00,60

Program 2: Demo

BH 10 REM COPYRIGHT 1989 COMPU TE! PUBLICATIONS, INC. -- ALL RIGHTS RESERVED

RF 30 SC = DEC("0B0F"):
{2 SPACES}REM SC - CHANG
E BEGINNING OF VDC SCREE
N AND ATTRIBUTES

PE 40 SP = DEC("0B2D"):
{2 SPACES}REM SP - SET P
OINTERS FOR PRINTING TO
{SPACE}SCREENS

EF 50 REM ****** LOAD SCREEN H ANDLING ROUTINES *****

XH 60 BLOAD "VDC.SCREEN.FLIP", B0,P(DEC("0B00"))

JQ 70 REM ***** DEMO THE ROUT

INES ******
DG 80 REM{2 SPACES}SYS I6: REM

DG 80 REM[2 SPACES]SYS 16: REM

*** ELIMINATE THE FIRST

REM IF YOU HAVE 64K OF

{SPACE}VDC RAM

RX 90 FAST: SCNCLR: GRAPHIC 5: COLOR 6,1

HA 100 PRINTTAB(20)"{CYN}COPYR
IGHT 1989 COMPUTE! PUBL
ICATONS, INC."

KK 110 PRINTTAB (30) "ALL RIGHTS RESERVED" FB 120 PRINT: PRINT: PRINT TAB (3 5) "SCREEN 1"
XA 140 PRINT: PRINT: PRINTTAB (15
) " {RED} PRESS ANY KEY TO
FLIP TO SCREEN 2, OR '
Q' TO QUIT {CYN}"

HK 150 GETKEY AS: IF AS = "Q"

{SPACE}THEN SCNCLR: END
JA 160 SYS SP,DEC("10"),DEC("1
8"): REM *** SET PRT PO
INTERS TO \$1000/1800 **

SK 170 SCNCLR:PRINT:PRINT:PRIN T:PRINT:PRINTTAB(35)"SC REEN 2"

RR 180 CHAR 1,25,16," (RED) PRES S ANY KEY TO SEE SCREEN 1"

GF 190 SYS SC,DEC("10"),DEC("0
0"),DEC("0C"): REM ***
{SPACE}SET SCRN TO \$100
0 IN VDC ***

SR 210 GETKEY AS

RG 260 GOTO 190

QC 220 SYS SC,DEC("00"),DEC("0
0"),DEC("0C"): REM ***
{SPACE}SET SCRN TO \$000
0 IN VDC ***

QK 230 SYS SC,DEC("08"),DEC("0
0"),DEC("14"): REM ***
{SPACE}SET ATTR TO \$080
0 IN VDC ***

EE 240 SYS SP,DEC("00"),DEC("0 8"): REM SET PRT POINTE RS TO \$0000/\$0800

CX 250 GETKEY A\$: IF A\$="Q" THE EN SCNCLR: END

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80×50 Display

Joseph Heaverin

Computer users are on a continuing quest for higher text resolution. One of the first affordable home computers, the VIC-20, had a 22×25 text screen. The 64 soon followed with a 40×25 screen. The 128, with its 80×25 screen, offered even greater text resolution. Now comes "80 \times 50 Display," a program that lets you display 50 rows of 80-column text on your 128.

And 80 × 50 Display isn't limited to the PRINT statement—any program that uses the Kernal BSOUT routine will work without modification. This includes BASIC programs, the built-in machine language (ML) monitor, and many ML programs. With the addition of a short wedge, 80 × 50 Display is even compatible with *SpeedScript* 128.

Getting Started

Four programs comprise 80×50 Display: Program 1, 80×50 Display; Program 2, "Speed Routines"; Program 3, "Patch"; and Program 4, "Speed Boot." Program 1 is a general 80×50 display routine, while the others give SpeedScript 128 this higher text resolution.

RESOLUTION OF YOUR
80-COLUMN SCREEN
WITH THIS POWERFUL
UTILITY FOR THE 128.
INCLUDED IS A
ROUTINE THAT ADDS
THIS CAPABILITY TO
SPEEDSCRIPT 128. AN
RGB MONITOR IS
REQUIRED.

Programs 1 and 2 are written entirely in machine language. Type them in using the 128 version of "MLX," the machine language entry program, found elsewhere in this issue. When MLX prompts you, respond with the values given below.

Program 1:

Starting address: 1300 Ending address: 158F

Program 2:

Starting address: 0800 Ending address: 08D7 Before you exit MLX, be sure to save a copy of each program to disk. Save Program 1 as 80X50 DIS-PLAY and Program 2 as SPEED ROUTINES. It's important that you use these names because Program 4 expects to load these files.

Programs 3 and 4 are BASIC programs. To prevent typing errors while entering these programs, use "The Automatic Proofreader," also found elsewhere in this issue. When you've finished typing, be sure to save a copy of each program to disk. Save Program 3 as PATCH and Program 4 as SPEED BOOT.

Next, copy *SpeedScript 128* to your program disk and run Patch. This program loads *SpeedScript 128*, modifies it to display text in 80 × 50 mode, and then saves the modified version as SPEED80X50.

Using 80×50 Display

To load the program and activate the 80×50 display mode, type

BLOAD"80X50 DISPLAY":SYS 4864

Your programs will run as before, only now they'll display twice as much text. To return to the 80 × 25 screen, press ESC ↑. To switch back

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to 80 × 50 mode, press ESC + or press RUN/STOP-RESTORE.

Note that if you use BASIC's WINDOW command, you can't create a window that extends beyond the 25th row even though there are 50 lines of text; attempting to do so will trigger an ILLEGAL QUANTI-TY ERROR. Instead, you must directly POKE the row and column parameters into the registers at 228-231. For example, to establish a 10 × 10 window in the lower left corner of the screen (at row 40), you'd type POKE 228,49: POKE 229, 40:POKE 230,0:POKE 231,9.

To use the 80×50 version of SpeedScript 128, load and run Program 4, Speed Boot. (To avoid disk swapping, the files SPEED BOOT, 80X50 DISPLAY, SPEED ROU-TINES, and SPEED80X50 should be on the same disk.) All of Speed-Script's commands work normally, but now you'll notice twice as much text appears on the screen as before. (Note that you can't toggle between 80×25 and 80×50 mode while in the modified version of Speed-Script.)

How It Works

80 × 50 Display first copies the ROM routines at \$C000-\$FFFF to bank 0 RAM, and then it modifies these routines. The Kernal routine BSOUT at \$FFD2 is diverted to the modified routines in bank 0. After a character has been printed, the program returns to bank 15.

To speed printing to the screen, the 128 is operated at 2 MHz while in 80-column mode and is switched to 1 MHz when the 40column screen is used. The top-of-BASIC text storage is moved to \$C000, screen memory is stored at \$0000-\$0FFF in 80-column RAM, and attribute memory is moved to \$1000-\$1FFF in 80-column RAM (which, for owners of a 128, means all 80-column memory is used; 128D users have 48K of free memory).

Several changes were made to SpeedScript 128 that greatly increase its response time. Instead of using a loop, the VDC's fill routine pads the end of each text line with spaces. Also, the bottom of RAM to \$1000 is made common and the text read and write routines are moved to \$0800; this eliminates the need to switch banks when accessing each character.

BEFORE TYPING ...

Before typing in programs, please refer to "How to Type In COMPUTE!'s Gazette Programs," elsewhere in this issue.

Program 1: 80 \times 50 Display

```
1300:AD 27 03 C9
                 14 DØ Ø6 A9 5D
 1308:30 8D 00 FF 60 A0 00 8C BB
 1310:12 12 84 16 A9 CØ 8D 13 34
 1318:12 85 17 A9 Ø1 8D ØØ FF
1320:B1 16 91 16 C8 DØ F9 E6
 1328:17 A5 17 FØ Ø9 C9 FF DØ
 1330:EF AØ Ø5 4C 20 13 A9
                           30
1338:8D 00 FF A2 08 A9 03 20
1340:CC CD A2 04 A9 40 20 CC
1348:CD A2 Ø6 A9 32 20 CC
1350:E8 A9 3A 20 CC CD A2 00 81
1358:A9 80 20 CC CD A2 14 A9 0F
1360:10 8D 2F 0A 8D 3A CA
1368:CC CD E8 A9 00 20 CC CD 08
1370:AD 24 03 8D 16 15 AD 25 35
1378:03 8D 17 15 A9 5B 8D 24 B1
1380:03 A9 14 8D 25 03 AD 26 A4
1388:03 8D 14 15 AD 27 03 8D 05
1390:15 15 A9 E6 8D 26 03 A9
1398:14 8D 27 Ø3 AD 39 Ø3 C9 63
13AØ:14 FØ
           29 8D
                 19
                    15 AD 38
13A8:03 8D 18 15 A9 6C 8D 38
13BØ: Ø3 A9 14 8D 39 Ø3 AD 18 67
13B8:03 8D 12 15 AD
                    19 Ø3 8D
13C0:13 15 A9 41 8D 18 03 A9 7B
13C8:14 8D 19 03 A9 31 85 E4 B1
13DØ:85 ED A9 ØF 8D 6C C1 8D
13D8:56 C4 8D 87 C1
                     8D 89 C4 A1
13EØ:8D 22 C5 A9 Ø7
                     8D 35 CA
13E8:A9 1C 8D 5F C1
                     8D 4D C4
13F0:A9 4E 8D 69 C1
                     8D 53 C4 77
13F8:A9 Ø2 85
              F1 A9
                    15
                        8D 60
                              61
1400:C1 8D 4E C4 A9 15 8D 6A
1408:C1 8D 54 C4 A9 80 8D 7A
1410:CB 8D 8B CB 8D 8E CB 8D
1418:9B CB A9 80 8D 37 CA A9 C6
1420:15 8D 7B CB 8D 8C CB 8D 26
1428:8F CB 8D 9C
                 CB A9 15 8D
1430:38 CA A9 4C 8D 59 FA A9 92
1438:01 8D
           1B 15 A9 93 4C D2 FF
1440:FF 20 E1 FF D0 12 A9
                          30 FE
1448:8D 00 FF 20 40 FA 24 D7 47
1450:30 03
           20
              5F
                 FF
                    20
                       00
                          13 DE
1458:6C 00 0A 08 24 D7 10 08 21
1460:A9 30 8D 00 FF 20 04 15 B8
1468:28 6C
           16
              15 C9
                    5F FØ
1470:C9 5E FØ 35 C9 58 DØ 2E Ø6
1478:20 A6
           14 20 04 15 24 D7 73
1480:30 10 A9 00 8D 30 D0 AD
1488:11 DØ Ø9 10 8D 11 DØ 4C 2E
1490:97 14
           AD
              18
                 15 DØ
                       Ø3 A9
                             8C
1498:18 2C
           A9 31 85 E4 85 ED D8
14AØ: A9 3Ø 8D ØØ FF 6Ø 6C
                          18 CD
14A8:15 A9
           ØØ 8D 1B
                    15
                       78
                              DC
14BØ:81 FF 20 84 FF 20 8A FF
                              7B
14B8:A9 6C
           8D 38 Ø3 A9
                       14 8D
                             7A
14C0:39 03 A9
              41 8D 18
                       Ø3 A9
                              ØC
14C8:14 8D 19 Ø3 58
                    60 24 D7 16
14DØ:30
        03
           20
              5F
                 FF
                    8D
                       18
                          15 4D
14D8:20 00
                 93 20 D2 FF
           13 A9
                             DØ
14E0:A9 30 8D 00 FF 60 24 D7 3D
14E8:10 17
           8D
              1A
                 15
                    A9
                       30
                          8D
                             6F
14F0:00 FF AD
              1A 15
                    20
                       Ø1 15 BØ
14F8:A9 00 8D 00 FF AD 1A 15 A7
1500:60 6C
           14
              15
                 AD
                    11 DØ 29 C5
1508:6F 8D 11 DØ A9 Ø1 8D 3Ø 19
1510:DØ 60 00 00 00 00 00 00 BA
1518:00 00 00 00 00 28 50 78 FB
```

1520:A0	C8	FØ	18	40	68	90	B8	E9	
1528:EØ	08	30	58	80	A8	DØ	F8	91	
1530:20	48	70	98	CØ	E8	10	38	16	
1538:60	88	BØ	D8	00	28	50	78	12	
1540:A0	C8	FØ	18	40	68	90	B8	ØA	
1548:EØ	08	30	58	80	A8	00	00	17	
1550:00	00	00	00	00	01	01	01	81	
1558:01	01	01	02	02	02	02	02	A1	
1560:02	02	03	03	03	03	03	03	C9	
1568:04	04	04	04	04	04	05	05	95	
1570:05	05	05	05	05	06	06	06	A1	
1578:06	06	06	07	07	07	07	07	Cl	
1580:00	00	00	00	00	00	00	00	AA	
1588:00	00	00	00	00	00	00	00	B2	
	1528:E0 1530:20 1538:60 1540:A0 1548:E0 1550:00 1558:01 1560:02 1568:04 1570:05 1578:06 1580:00	1528:EØ Ø8 1530:20 48 1538:6Ø 88 1540:AØ C8 1548:EØ Ø8 1550:0Ø ØØ 1558:Ø1 Ø1 1560:Ø2 Ø2 1568:Ø4 Ø4 1570:Ø5 Ø5 1578:Ø6 Ø6 1580:ØØ ØØ	1528:E0 08 30 1530:20 48 70 1538:60 88 B0 1540:A0 C8 F0 1548:E0 08 30 1550:00 00 00 1558:01 01 01 1560:02 02 03 1568:04 04 04 1570:05 05 05 1578:06 06 06 1580:00 00 00	1528:E0 08 30 58 1530:20 48 70 98 1538:60 88 B0 D8 1540:A0 C8 F0 18 1548:E0 08 30 58 1550:00 00 00 00 1558:01 01 01 02 1560:02 02 03 03 1568:04 04 04 04 1570:05 05 05 05 1578:06 06 06 07 1580:00 00 00 00	1528:E0 08 30 58 80 1530:20 48 70 98 C0 1538:60 88 B0 D8 00 1540:A0 C8 F0 18 40 1548:E0 08 30 58 80 1550:00 00 00 00 00 1558:01 01 01 02 02 1560:02 02 03 03 03 1568:04 04 04 04 04 1570:05 05 05 05 05 1578:06 06 06 07 07 1580:00 00 00 00 00 00 00 00 00 00 00 00 00	1528:E0 08 30 58 80 A8 1530:20 48 70 98 C0 E8 1538:60 88 B0 D8 00 28 1540:A0 C8 F0 18 40 68 1548:E0 08 30 58 80 A8 1550:00 00 00 00 00 01 1558:01 01 01 02 02 02 1560:02 02 03 03 03 03 1568:04 04 04 04 04 1570:05 05 05 05 05 06 1578:06 06 06 07 07 07 1580:00 00 00 00 00 00	1528:E0 08 30 58 80 A8 D0 1530:20 48 70 98 C0 E8 10 1538:60 88 B0 D8 00 28 50 1540:A0 C8 F0 18 40 68 90 1548:E0 08 30 58 80 A8 00 1550:00 00 00 00 00 01 01 1558:01 01 01 02 02 02 02 1560:02 02 03 03 03 03 03 1568:04 04 04 04 04 05 1570:05 05 05 05 06 06 1578:06 06 06 07 07 07 07 1580:00 00 00 00 00 00 00	1528:E0 08 30 58 80 A8 D0 F8 1530:20 48 70 98 C0 E8 10 38 1538:60 88 B0 D8 00 28 50 78 1540:A0 C8 F0 18 40 68 90 B8 1548:E0 08 30 58 80 A8 00 00 1550:00 00 00 00 00 01 01 01 1558:01 01 01 02 02 02 02 02 1560:02 02 03 03 03 03 03 03 1568:04 04 04 04 04 04 05 05 1570:05 05 05 05 06 06 06 1578:06 06 06 07 07 07 07 07 1580:00 00 00 00 00 00 00 00	1528:E0 08 30 58 80 A8 D0 F8 91 1530:20 48 70 98 C0 E8 10 38 16 1538:60 88 B0 D8 00 28 50 78 12 1540:A0 C8 F0 18 40 68 90 B8 0A 1548:E0 08 30 58 80 A8 00 00 17 1550:00 00 00 00 00 01 01 01 81 1558:01 01 01 02 02 02 02 02 A1 1560:02 02 03 03 03 03 03 03 C9 1568:04 04 04 04 04 05 05 95 1570:05 05 05 05 06 06 06 A1 1578:06 06 06 07 07 07 07 07 C1 1580:00 00 00 00 00 00 00 00 00 00 AA

Program 2: Speed Routines

Ø800:A9	9F	85	ØC	A9	00	A2	12	E2	
Ø8Ø8:8E	00	D6	2C	00	D6	10	FB	74	
Ø810:8D	01	D6	E8	A9	AØ	8E	00	7D	
Ø818:D6	8D	01	D6	AD	13	35	85	2E	
Ø820:FB	AD	14	35	85	FC	A2	30	05	
Ø828:AD	7D	27	8D	37	08	8D	48	69	
0830:08	A9	7E	8D	00	FF	AØ	4F	E7	
Ø838:B1	FB	29	7F	C9	1F	FØ	09	F2	
Ø84Ø:C9	20	FØ	05	88	DØ	F1	AØ	B7	
Ø848:4F	C8	84	3B	AØ	00	A9	1F	ED	
Ø85Ø:8D	00	D6	Bl	FB	2C	00	D6	84	
0858:10	FB	8D	01	D6	C8	29	7F	DC	
Ø860:C9	1F	FØ	04	C4	3B	DØ	EB	1C	
Ø868:18	98	65	FB	85	FB	A5	FC	7B	
0870:69	00	85	FC	EØ	00	DØ	02	60	
0878:84	03	CØ	50	FØ	36	84	02	14	
Ø88Ø:A9	00	AØ	18	8C	00	D6	2C	39	
0888:00	D6	10	FB	8D	01	D6	A9	D7	
0890:20	AØ	1F	8C	00	D6	2C	00	39	
Ø898:D6	10	FB	8D	Øl	D6	18	A9	AD	
Ø8AØ:5Ø	E5	02	C9	Ø1	90	ØD	AØ	34	
Ø8A8:1E	8C	00	D6	2C	00	D6	10	77	
Ø8BØ:FB	8D	01	D6	CA	FØ	03	4C	1C	
Ø8B8:36	08	8E	00	FF	A5	FB	8D	D3	
Ø8CØ:1B	35	A5	FC	8D	1C	35	A5	1D	
Ø8C8:03	8D	12	35	60	A9	05	8D	94	
Ø8DØ:06	D5	4C	00	13	50	85	00	C7	

081	B8:3	36 Ø	8 8E	00	FF	A5	FB	8D	D3	
Ø80	CØ:1	B 3	5 A5	FC	8D	1C	35	A5	1D	
Ø80	28:0	13 8	D 12	35	60	A9	05	8D	94	
081	00:0	16 D	5 4C	00	13	50	85	ØØ	C7	
Pr	ogra	am :	3: Pa	tch						
МВ	10		K1:B				DSC	RIE	т	
вв	20	FOR	ACE }	07:	REA		: PO	KEL	DEC	
JS	30),16			ADA	\$:P	OKE	DE	
ED	40		\$),7				8:P	OKE	DE	
QK	50	C("	1D53 EDEC	"),	Ø					
нх	60	DEC	("1C	10"),8	3/ 8/				
	70	EC ("21A	F")	,9					
		268	A1C3 5,27	93,	2B6	3				
QH	80		A1D5							
XC	90	BSA	VE"S		080	X50	",В	1,P	71	
DB	100	3.75	NK15	204						

Program 4: Speed Boot

```
MG 5 TRAP 100
GH 10 JF$="80X50 DISPLAY":BLOA
      D(JF$)
XP 20 JFS="SPEED ROUTINES":BLO
      AD (JF$)
BG 30 JFS="SPEED80X50":RUN(JFS
GX 100 PRINT"INSERT A DISK CON
       TAINING "JF$
KR 110 PRINTTAB (7) "PRESS A KEY
        TO CONTINUE"
```

CH 120 GETKEY AS: RESUME

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power BASIC

Color Magic

Shao-Tien Pan

Impress your friends with the scintillating displays you create on your 64 using this set of rasterinterrupt routines.

Looking for a way to add some pizazz to your programs? Nothing is quite as effective as color in gaining and holding the user's attention. "Color Magic" offers four machine language routines that produce interesting color-cycling effects for text. Each routine is short—under 100 bytes—and can easily be added to your BASIC programs.

Getting Started

Color Magic consists of five short BASIC loaders. The first four programs create various patterns of text color cycling; the fifth turns off each effect. Program 1, "Mix," causes each character to change colors randomly. Program 2, "Scroll," produces the same effect, but on a lineby-line basis. Program 3, "Flash," makes all text the same color and then rapidly changes the color. Program 4, "Sparkle," cycles the text colors randomly in a columnar fashion. And Program 5, "Set," interrupts the color-cycling process.

To avoid typing errors, enter each program using the "The Automatic Proofreader," found elsewhere in this issue. Since the routines have different line numbers, you can type them in separately or combine them into a single program. Before you run any of the programs, be sure to save a copy of each to tape or disk.

To install and activate one of the color-cycling effects, load and run one of the first four programs. To turn off the effect, load and run Set or press RUN/STOP-RESTORE.

The last line of each program contains a POKE statement and a SYS command. The POKE sets the

speed of the color-cycling pattern, while the SYS initiates the effect. The table below lists the speed registers and SYS addresses for each routine.

Routine	Speed Register	SYS Address
Mix	49209	49152
Scroll	49288	49244
Flash	49388	49344
Sparkle	49469	49425
Set	none	49509

The higher the value POKEd into the speed register (0-255), the slower the color-cycling effect. The exception to this rule is 0; it produces the slowest speed.

After you've installed each routine, the POKEs and SYSs can be used from either direct or program mode. And in fact, all five routines can be in memory at once. As long as you leave the IRQ interrupt vector and memory locations in the range 49152-49554 intact, you'll have four special effects at your disposal. To set this up, just include all five loaders in one program. Then, to switch quickly from one effect to another, execute the appropriate SYS. For example, you could activate Scroll with SYS 49244, turn it off with SYS 49509, and then activate Mix with SYS 49152.

BEFORE TYPING ...

Before typing in programs, please refer to "How to Type In COMPUTE!'s Gazette Programs," elsewhere in this issue.

Program 1: Mix

- CC 1000 REM COPYRIGHT 1989 COM PUTE! PUBLICATIONS, IN C.{2 SPACES}ALL RIGHTS RESERVED.
- QM 1010 POKE53280,0:POKE53281,
- CP 1020 PRINT"{CLR}{CYN}COPYRI GHT 1989":PRINT"COMPUT E! PUBLICATIONS"

- RH 1030 PRINT"ALL RIGHTS RESER VED"
- MM 1040 REM MIX
- JK 1050 CK=0:FORA=49152TO49243
- JS 1060 READAA:CK=CK+AA:POKE A
 ,AA:NEXT
- FG 1070 IF CK<>12247 THEN PRIN T"ERROR IN MIX DATA":S TOP
- EX 1080 DATA120,169,49,141,20, 3,169,192,141,21,3,173 ,17,208
- CM 1090 DATA41,127,141,17,208, 169,255,141,18,208,169 ,1,141
- MC 1100 DATA26,208,169,127,141 ,13,220,88,169,255,141
- RR 1110 DATA212,141,15,212,169
- KG 1120 DATA206,53,192,169,3,2 08,27,169
- GB 1130 DATA3: REM SPEED
- EQ 1140 DATA141,53,192,162,0,1 73,27,212,157,0,216,15 7,250
- MX 1150 DATA216,157,244,217,15 7,238,218,232,224,250
- RS 1160 DATA208,236,169,1,141,
- 25,208,76,49,234,0 BK 1170 POKE 49209,3:SYS 49152

Program 2: Scroll

- HE 2000 REM COPYRIGHT 1989 COM PUTE! PUBLICATIONS, IN C.{2 SPACES}ALL RIGHTS RESERVED.
- XP 2010 POKE53280,0:POKE53281,
- EF 2020 PRINT"(CLR)(CYN)COPYRI GHT 1989":PRINT"COMPUT E! PUBLICATIONS"
- CG 2030 PRINT"ALL RIGHTS RESER
- DB 2040 REM SCROLL
- MM 2050 CK=0:FORA=49244T049343
- HQ 2060 READAA:CK=CK+AA:POKEA, AA:NEXT
- RD 2070 IF CK<>12665 THEN PRIN T"ERROR IN SCROLL DATA ":STOP
- FA 2080 DATA120,169,128,141,20 ,3,169,192,141,21,3,17 3,17
- QR 2090 DATA208,41,127,141,17, 208,169,255,141,18,208
- ,169 BC 2100 DATA1,141,26,208,169,1 27,141,13,220,88,96,20 6,132,192,169,4,208,48
- PQ 2110 DATA4: REM SPEED

.169

PC 2120 DATA141,132,192,162,24 ,189,240,236,141,163,1 92,181

SE 2130 DATA217,41,15,24,105,2 6,57 BX 3110 DATA1: REM SPEED PX 4110 DATA193,169,2,208,32,1 12,141,164,192,160,39, 169,0 CJ 3120 DATA141,232,192,162,0, 69 AR 2140 DATA153,0,216,136,16,2 EX 4120 DATA2: REM SPEED 169,0,157,0,216,157,25 KA 4130 DATA141,57,193,162,0,1 50,206,161,192,202,16, 0,216 69,0,24,105,1,157,0,21 224 ED 3130 DATA157, 244, 217, 157, 23 6,157,250 MM 2150 DATA173,161,192,24,105 8,218,232,224,250,208, ,8,141,161,192,169,1,1 239,238 AD 4140 DATA216,157,244,217,15 41,25,208,76,49,234,0 CB 3140 DATA243, 192, 169, 1, 141, 7,238,218,232,224,250, HA 2160 POKE 49288,4:SYS 49244 25,208,76,49,234,0 208 PE 3150 POKE 49388,1:SYS 49344 GF 4150 DATA236, 206, 68, 193, 169 ,1,141,25,208,76,49,23 Program 3: Flash 4,0 Program 4: Sparkle DP 3000 REM COPYRIGHT 1989 COM ME 4160 POKE 49469,2:SYS 49425 PUTE! PUBLICATIONS, IN SK 4000 REM COPYRIGHT 1989 COM C. {2 SPACES}ALL RIGHTS PUTE! PUBLICATIONS, IN Program 5: Set RESERVED. C. {2 SPACES}ALL RIGHTS CK 3010 POKE53280,0:POKE53281, KJ 5000 REM COPYRIGHT 1989 COM RESERVED. FR 4010 POKE53280,0:POKE53281, PUTE! PUBLICATIONS, IN KG 3020 PRINT" [CLR] [CYN] COPYRI C. {2 SPACES}ALL RIGHTS GHT 1989": PRINT"COMPUT CA 4020 PRINT" (CLR) (CYN) COPYRI RESERVED. E! PUBLICATIONS" KD 5010 REM SET GHT 1989": PRINT"COMPUT HE 3030 PRINT"ALL RIGHTS RESER E! PUBLICATIONS" CF 5020 CK=0:FORA=49509TO49554 VED" ED 4030 PRINT"ALL RIGHTS RESER GE 5030 READAA: CK=CK+AA: POKE A 3040 REM FLASH VED" , AA: NEXT 3050 CK=0:FORA=49344T049424 AP EJ 4040 REM SPARKLE IF CK<>6321 THEN PRINT 3060 READAA: CK=CK+AA: POKEA, GE 4050 CK=0:FORA=49425TO49508 "ERROR IN SET DATA":ST AA: NEXT 4060 READAA: CK=CK+AA: POKEA, 3070 IF CK<>11388 THEN PRIN AE 5050 DATA120,169,49,141,20, GO AA: NEXT T"ERROR IN FLASH DATA" KC 4070 IF CK<>10792 THEN PRIN 3,169,234,141,21,3,169 :STOP T"ERROR IN SPARKLE DAT HA 3080 DATA120,169,228,141,20 A":STOP QQ 5060 DATA141,26,208,169,129 ,3,169,192,141,21,3,17 PX 4080 DATA120,169,53,141,20, ,141,13,220,88,162,0,1 3,17 3,169,193,141,21,3,173 3090 DATA208, 41, 127, 141, 17, PF 5070 DATA134,2,157,0,216,15 208,169,255,141,18,208 CJ 4090 DATA208,41,127,141,17, 208,169,255,141,18,208 7,250,216,157,244,217, ,169 157 PA 3100 DATA1, 141, 26, 208, 169, 1 QM 5080 DATA238,218,232,224,25 ,169

RD 4100 DATA1, 141, 26, 208, 169, 1

27,141,13,220,88,96,20

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27,141,13,220,88,96,20

6,232,192,169,1,208,29

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THE geos column

Mini DeskTop

Stephen Van Egmond

Reclaim almost 30K of workspace on your GEOS disks with this desk-Top replacement for the 64.

Computer-industry watchers have been predicting the death of the 8-bit computer—including the Commodore 64—for years now. According to them, the easy-to-use graphics user interfaces (GUIs) available on most 16-bit computers would steal the hearts of would-be 64 buyers.

Berkeley Softworks extended the life of the 64 and 128 with its GUI, GEOS, but at a price. GEOS and GEOS applications are notorious memory hogs. If you've ever written a program using geoProgrammer or designed a newsletter using geoPublish, you know that it's nearly impossible to get all the files you need onto one or two disks.

With "Mini DeskTop," you can squeeze an extra 29.5K out of your work disks. This 0.5K program replaces the considerably larger 30K deskTop and retains its most frequently used function—moving from application to application. (If you need to do more than just move from one program to another, you can still exit to the normal deskTop.)

Typing It In

Program 1, Mini DeskTop, is written in machine language, so you'll need to use "MLX," the machine language entry program found elsewhere in this issue, to type it in. The MLX prompts, and the values you should type in, are as follows:

Starting address: 1503 Ending address: 16EA

When you've entered all the data for Program 1, save two copies to a GEOS work disk that doesn't contain the standard GEOS deskTop. Save the first file with the filename DESK TOP and the second with the name DESK TOP.BKUP. One copy will be converted by Program 2 into a GEOS system file. The other is a backup copy in case you have a problem with the conversion.

Now, type in Program 2, "Geo-Converter." If you've used Geo-Converter before, you'll want to enter this new, enhanced version. This version works with any Commodore-compatible drive (1541, 1571, or 1581) numbered 8-11. The new GeoConverter also runs on the 64 and the 128. Be sure to use "The Automatic Proofreader," found elsewhere in this issue, to prevent typing mistakes when you enter the program. Save a copy of GeoConverter to the disk that contains Program 1. Be very careful when typing in GeoConverter. It writes directly to your disk, so a typing error could cause it to scramble your disk.

To prepare Mini DeskTop for use with GEOS, load Program 2 and type RUN. When prompted for a filename, enter DESK TOP. Geo-Converter then converts the file into a GEOS system file.

Using the Program

Mini DeskTop isn't an application or a desk accessory, so you can't run it from the deskTop. As a matter of fact, it replaces the deskTop. To test Mini DeskTop, run a GEOS application such as geoWrite or geo-Paint. Once the program is loaded, insert your work disk that contains Mini DeskTop in the drive and select Quit to DeskTop from the application's dialog box or file menu. Instead of the standard deskTop screen coming up, Mini DeskTop takes over. If a dialog box comes up with the message System Error near \$0400, you need to go back to MLX and recheck your typing. If the dialog box contains the message Please insert a disk with deskTop V1.5 or higher, make sure that your file is named DESK TOP.

When Mini DeskTop comes up,

it displays a dialog box with the names of the applications on the disk in the current drive. To run one of the applications, simply select it by clicking on its name and then click OPEN. To run an application from another disk, insert the new disk and select DISK. In either case, after the application finishes running, you'll return to Mini Desk-Top. If you need to return to the standard GEOS deskTop, insert a disk containing the deskTop file into the drive and select CANCEL.

Mini DeskTop displays only applications files. If you need a desk accessory, enter an application and run the desk accessory from the GEOS menu. Also, don't put Mini DeskTop on a ramdisk. Since the only way to switch to the standard deskTop is to swap disks, you wouldn't be able to copy files from the ramdisk to a floppy disk, effectively destroying the files.

Program 1: Mini DeskTop

160B: 36 C1 20 AE C1 32 00 A8 31 Ø:POKE53281,0:GOTO40 FH 190 GET#2,B\$:I=I+1:IF B\$="" 1613:4D 69 6E 69 20 44 65 73 F4 FK 32 LISTØ,1:LIST4,1:LIST6,1 THEN B\$=CHR\$ (Ø) 161B:6B 54 70 20 77 72 69 34 PS 40 FORI=1TO10: PRINT" [DOWN]" 6F IF ASC (B\$) = 160 THEN 220 1623:74 74 65 6E 20 62 3A F1 : NEXT GD 210 D\$=D\$+B\$:GOTO190 162B:20 ØE 74 70 53 65 68 65 BF ER 50 PRINTTAB (5) "{4}UDI COPYR RK 220 FOR I=I TO 31:GET#2,B\$: 1633:6E 20 56 61 6E 2Ø 45 67 65 IGHT 1989" NEXT 163B:6D 6F 6E 64 18 00 20 AE D5 SP 60 PRINTTAB (5) "GCH COMPUTE! AX 230 IF DS=GFS THEN260 6F 1643:C1 32 ØØ B8 18 43 70 85 PUBLICATIONS INC." EC 240 NEXT E: IF NT\$=NL\$ THEN2 164B:79 20 72 69 67 68 74 31 FA SP 70 PRINTTAB (5) "JFK ALL RIGH 60 1653:39 38 39 20 43 6F 6D 70 76 TS RESERVED [HOME]" FX 250 T\$=NT\$:S\$=NS\$:GOTO140 165B:75 74 65 21 20 50 75 62 BK 80 PRINT" [DOWN] [RVS] (8) GEOC CR 260 IF DS=NLS THENPRINT" 1663:6C 69 63 61 74 69 6F 6E 39 ONVERTER 1.2{OFF} {DOWN} {DOWN} {RVS} FILE NOT FOU 98 1B ØØ A9 04 03 A9 166B:73 85 {GRN}" ND {OFF} ": GOTO360 1673:C7 85 Ø2 A9 04 85 ØD A9 B9 CP 270 PRINT" (DOWN) CONVERTING QA 81 N=8: PRINT"DRIVE NUMBER " 10 167B:E9 85 ØC A9 06 85 A9 2A N"{4 LEFT}";:INPUTN {SPACE} "GF\$ 1683:00 85 17 A9 00 85 16 20 AC 82 IFN<80RN>11THEN81 XC 280 DTS=TS:SSS=SS:TS=HTS:SS 168B:56 C2 A5 02 C9 06 DØ 03 73 SA 83 PRINT"IS DRIVE"N"A 1581? =HS\$:GOSUB370 1693:4C 00 04 C9 02 DØ 03 4C A8 ";:T\$=CHR\$(18):S\$=CHR\$(MB 290 GET#2, MT\$, MS\$: IF MS\$="" 169B: 2C C2 A9 04 A9 E9 85 ØF 1) THEN MS\$=CHR\$(0) 16A3:85 ØE A9 00 85 02 20 08 C7 PJ 84 GETK\$: IFK\$<>"Y"ANDK\$<>"N BM 300 FOR I=0 TO 65:GET #2,B\$ 16AB:C2 00 05 02 01 aa aa aa 02 "THEN84 : NEXT 01 16B3:03 3F 01 C7 05 00 ØF 07 MR 85 PRINTK\$: IFK\$="Y"THENT\$=C XB 310 GET#2,CT\$,GT\$:GOSUB370: 16BB: 01 BE 03 30 00 9A 07 ØF HR\$ (40): S\$=CHR\$ (3) PRINT#2, HD\$;:GOSUB380:T 16C3:01 BE 00 81 10 05 03 ØB DD AP 90 INPUT"FILE TO CONVERT";G \$=DT\$:S\$=SS\$:GOSUB370 16CB:84 ØA DA Ø4 Ø5 10 06 EA 11 FP 320 FOR I=0 TO 32*E+2:GET#2 FS 16D3:11 23 02 11 4C 00 18 53 88 CX 100 PRINT" [DOWN] SEARCHING F 74 ,B\$:NEXT 16DB:65 6C 65 63 66 OR "GF\$ FQ 330 PRINT#2,MTS;MSS;:FORI=0 16E3:6C 65 3A 1B 00 00 00 00 98 PA 110 HDS="":FOR I=1 TO 4:REA TO 15:GET#2,B\$:NEXT D HE: HDS=HDS+CHR\$ (HE): N GP 340 PRINT#2, HT\$; HS\$; CHR\$(0) Program 2: GeoConverter EXT ;GTS; FH 10 REM COPYRIGHT 1989 COMPU FK 120 FOR I=1TO5:READIE:ID\$=I KM 350 PRINT#2, ID\$;:GOSUB380:P TE! PUBLICATIONS, INC. -D\$+CHR\$(IE):NEXT RINT: PRINTGF\$" CONVERTE ALL RIGHTS RESERVED BE 130 NLS="": OPEN 15, N, 15, "I0 PD 20 REM THIS IS THE UPDATED :":OPEN 2,N,2,"#" ER 360 CLOSE2:CLOSE15:END

The GEOS Collection

IF ASC (B\$) <> 130 THEN 220

\$="" THEN HS\$=CHR\$(0)

JX 140 GOSUB370:GET #2,NT\$,NS\$

KQ 160 D\$=NL\$:GET#2,B\$:I=1:IFB

HM 180 GET#2, HT\$, HS\$: I=3: IF HS

\$=NL\$ THEN220

KB 150 FOR E=0 TO 7

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KA 370 U\$="U1":GOTO390

KP 390 PRINT#15, US; 2; 0; ASC (T\$+

"Ø"); ASC (S\$+"Ø")

FM 410 DATA 0,255,3,21,87,10,1

RR 380 U\$="U2"

AS 400 RETURN

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User Group Update

Edited by Mickey McLean

The following list includes updated entries to our annual "Guide to Commodore User Groups," which last appeared in the May and June 1989 issues.

Send typed additions, corrections, and deletions for this list to

Commodore 64/128 User Group Update

COMPUTE!'s Gazette

P.O. Box 5406

Greensboro, NC 27403

When writing to a user group for information, please remember to enclose a self-addressed envelope with postage that is appropriate for the country to which you're writing.

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User Group Notes

The Barton County Commodore Users Group (B.C.C.U.G.) has been renamed the Barton County Computer Users Group. It has also changed its address to 506 West 10th #1, Lamar, Missouri 64759.

The Mililani User Group in Wahianwa, Hawaii is now an Amiga-specific group. The group no longer supports the Commodore 64 and 128.

The new mailing address for the Washington Area Commodore User Group (WAC) is P.O. Box 3602, Fairfax, Virginia 22038-3602.

New Listings

ALABAMA

Birmingham Commodore Computer Club (BCCC), P.O. Box 59564, Birmingham, AL 35259-9564

DELAWARE

Wicomico Commodore Users Group, 913 Grove St., Delmar, DE 19940

IOWA

Commo-Hawk Commodore Users Group, P.O. Box 2724, Cedar Rapids, IA 52406-2724 (BBS# 319-377-4095)

MICHIGAN

Downriver Commodore Group, P.O. Box 1277, Southgate, MI 48195

MINNESOTA

Minnesota Commodore Users Association, P.O. Box 22638, Robbinsdale, MN 55422

MISSOURI

Heartland Users Group, P.O. Box 281, Cape Girardeau, MO 63702-0281

Commodore Users Group of Kansas City, P.O. Box 36034, Kansas City, MO 64111 (BBS# 816-792-0326)

VERMONT

Green Mountain Commodore Users Group (G.M.C.U.G.), P.O. Box 6087, Rutland, VT 05702

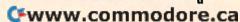
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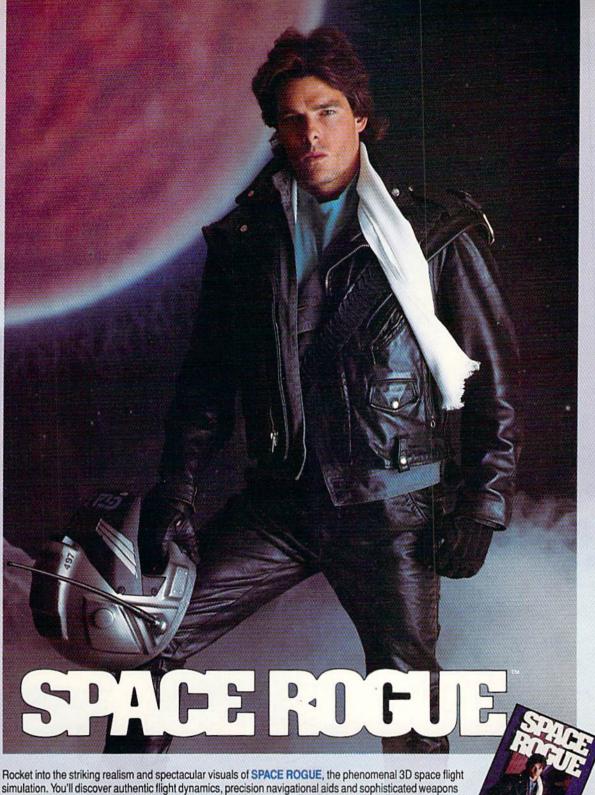
COSTA RICA

Club Fast Software de Costa Rica, Arturo Arana G., Maquinas Roxamaro, Calle 2, Aves 12-14, San Jose, Costa Rica, America Central

NEW ZEALAND

Christchurch Commodore Users' Group, P.O. Box 4665, Christchurch, New Zealand





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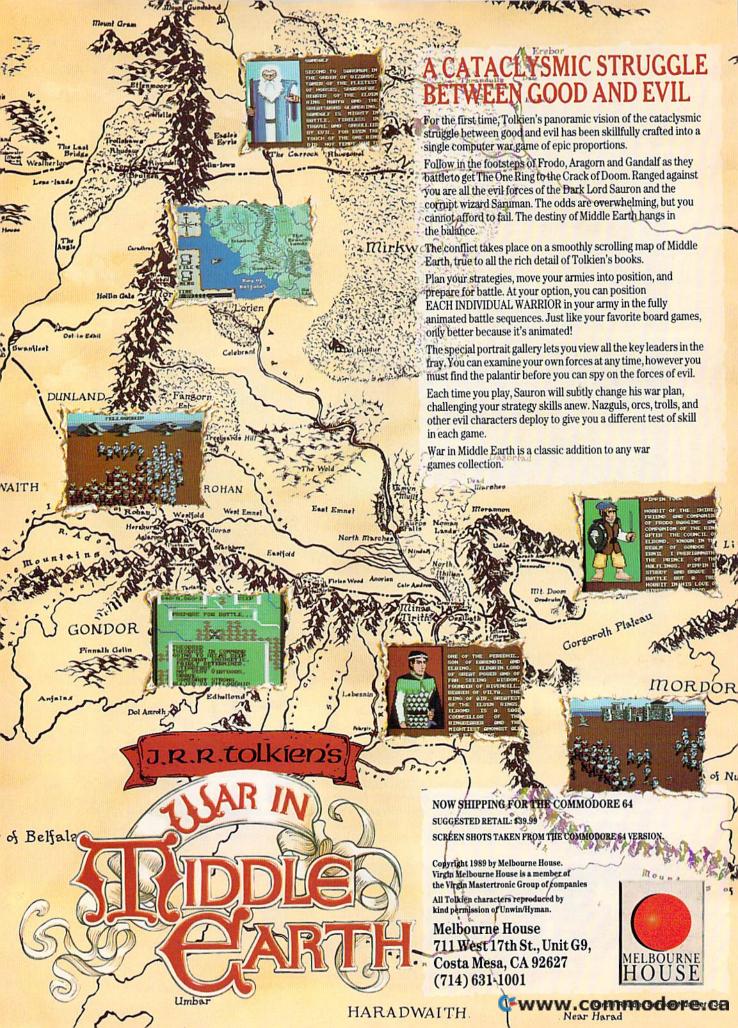
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REVIEWS

Dr. Doom's Revenge

OK, Marvel Comics fans, it's time to soup up those superpowers, jump into those mystical costumes, and sprint into action. In Paragon Software's *Dr. Doom's Revenge*, you assume the roles of the web-spinning Spider-Man and America's number 1 supersoldier, Captain America.

If you've never seen an interactive action comic book, you're in for a real treat. Unique in both concept and idea, this computer comic book lets you read simulated comic-book pages and then jump inside them, assuming a character's role. Before your quest begins, choose your supercharacter's fighting abilities: beginner, hero, or full-fledged superhero.

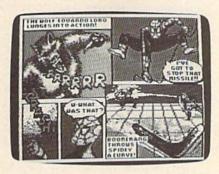
As you read through each comic strip, a hand (or bookmark) follows. Whenever you reach the end of a page, the next one appears, just as if you had turned the page. Anytime you wish to quit, you can save your place to disk so you can resume reading (or playing) later.

Doctor Doom is back in town with sinister plans for New York City. The genius supervillain has stolen a nuclear missile and plans to detonate it in the city unless his outrageous demands are met. Only two things stand in his way: Spider-Man and Captain America.

Enter the dark and evil castle that Doom has built and try to guide our heroes to victory. This won't be easy, though. Doctor Doom suspected the city might recruit superheroes to spoil his plans, so he has called to his castle the most sinister villains the world has to offer.

As you read the comic, you switch roles between Spider-Man and Captain America at the end of each page. You encounter different villains depending on which role you assume. For example, Spider-Man faces Eduardo Lobo, Gray Gargoyle, Machete, and Boomerang, while Captain America battles Oddball, Rattan, Rhino, Batroc, Hobgoblin, and Electro. Once these supervillains have been defeated, our heroes must team up to take on Doctor Doom.

If you're a Marvel Comics fan, you might wonder about the quality of translation from comic book to arcadestyle action. Put your fears aside: All combat aspects are faithful to the heroes' abilities. For example, whenever you assume the role of Captain America, you have all of his fighting powers and tools, including his famous starspangled shield. The same holds true for Spider-Man. His powers allow him to stick to walls and shoot webs.



As you go into battle, notice two bar graphs at the bottom of the screen. One shows your character's strength, while the other displays your enemy's. Whenever your character takes a hit from a supervillain, the graph shows how much you've been injured.

During battle, you can perform different kicks and punches that affect your enemy. Also, running flips (over your enemy) are available. Don't forget, since you're a superhero, you must use your superpowers. As Captain America, use your shield for both defense and offense: Protect yourself and throw it at your foe. The same is also true for Spider-Man. If things get too sticky, stick to a wall and shoot webs to sap a villain's strength. But it's not all that easy—supervillains own the same fighting abilities they have in the comics.

If you manage to defeat an enemy, you'll be taken back to the point where you stopped reading (and started fighting) in the comic. Continue reading from there until your next confrontation with a supervillain. The game ends when you've found and defeated the sinister Doctor Doom.

Graphics, sound, and gameplay are excellent. Not only have I, an avid comic collector, enjoyed playing the game, but I've also found that others who don't really care about comics love the game, too.

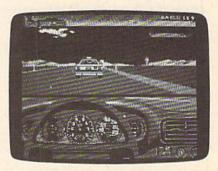
The manual explains both gameplay and origins of all the characters you'll encounter. Also included is a special collector's comic book. My complaint to Paragon: If you're going to make a collector's comic, don't roll it up and place a rubber band around it. I'd also like to see Spidey's abilities used a little more. Perhaps next time allow him to climb all over the walls, not just stick to them. And let him entangle his foes in webs and swing from place-to-place on them. These few minor complaints aside, let me say that this is one terrific product. Wow, what a concept! I can hardly wait for the next one.

-Jeffery Scott Hall

Dr. Doom's Revenge Paragon Software Distributed by MicroProse 120 Lakefront Dr. Hunt Valley, MD 21030 \$34.95

The Duel: Test Drive II

Never play *Test Drive* just before you go on vacation with the family. What you can do blithely with a Ferrari on your computer may be frowned upon by the authorities (or at least by your mate) when tried with the family van. The realism of Accolade's *The Duel: Test Drive II* is great enough to make the danger of carryover a distinct possibility.



While Smokey stayed off our tail and we didn't use up any of our lives (hackers sometimes forget we're only issued one), one of us found it necessary to liven up our long drive by playing road games with the trucks on the interstate. The rest of the family could tell by the chuckle and the gleam in Dave's eye that he was reliving the last

encounter he'd had in The Duel. Confirmation soon came in the form of his remark: "If only I had that Ferrari!" Well, since it's easier to plunk down the money for these programs rather than a quarter-million for one Ferrari, Dave will have to be content with the stable of seven sports cars housed on these two little black disks for now. And that's not such a bad deal.

It's almost as good as driving a \$250,000 sports car. This simulation is hot!

Accolade's original Test Drive let you try out five different sports cars. The Duel pits you in one exotic car against the computer in another. The two of you race through the countryside evading traffic, police, and other road hazards. The race is broken down into segments by stops for fuel, allowing new scenery to be loaded in for the next leg of the

You choose your vehicle. The game disk includes two cars: a Ferrari F40 and a Porsche 959. You may race the F40 against the 959 or pit two F40s or two 959s against each other. You can also race a car against the clock. To get more vehicles, you must use the Supercars disk. Sold separately (\$14.95), it works only with Test Drive II. It expands your choice of cars to seven by adding a 1988 Lotus Turbo Esprit, the Ferrari Testarossa, a Porsche 911 RUF, a 1988 Lamborghini Countach 5000S, and a 1989 Corvette ZR1.

So what makes this simulation so hot? Tremendous graphics, ranging from super screen dissolves to fascinatingly accurate depictions of rearview mirror images. And there's fun stuffsuch as the digital speedometer in the Vette and the functioning radar detec-

tors in each of the cars.

Finishing touches abound-good music in the game's opening, clever jibes from the computer between runs, and distinct, realistically designed dashboards for each of the cars.

In play, Test Drive II is a challenging, tension-filled, adrenaline-pumping road run. Collectively, it's a slick package of smooth programming.

From the opening sequence you move on to pick out your car. Following onscreen directions (supported by easygoing instructions in the snappily worded manual), you make a series of choices for yourself and the computer. If you purchase a scenery disk (also available, but not reviewed here), you can select your countryside. Using the car and scenery disks is easy enough,

but it's heavy on the disk swapping, since, as Accolade warns you, it assumes you have only one drive. Accolade's solution to this problem is to provide the ability to make play disksdisks that contain two cars and a set of scenery. This cuts down on disk swapping and makes it handier to run your favorite cars over preferred terrain. Conceivably, you could make play disks for all the possible combinations of cars and scenery, but that seems like a lot of work. A two-drive option might have worked better.

Creating the play disk is not difficult, but here the onscreen prompts are actually clearer than the manual, which gets bogged down with cautions and loses you amid fragmented directions scattered on different pages. Experimentation and trusting your instincts

are your best bet here.

Levels of play range from Rookie to Pro. At the first four levels, you have an automatic shift. The remaining eight levels allow you to do your own shifting. This can be done by pressing the fire button as you increase engine speed or by toggling into Expert mode and maneuvering the joystick like a real gearshift (accelerating, steering, and shifting, all on one joystick!).

Hazards on the highway include traffic (two-way), troopers (you can take your ticket, outrun them, or run them down), and dangers such as fall-

ing rocks and oil slicks.

We like the road signs. They're just as pertinent as real ones, so you'd better pay attention. The windshield cracks on impact, and if you go off a cliff, you get a sense of falling before you hit.

You can pause but not save a race, toggle sound off and on (this feature is claimed, but we couldn't get it to work; at least it was on), and have the gear-

shift displayed or not.

The spec screens displayed at the outset tell you plenty about each car, giving you a chance to make an educated choice about which one to set up against another. The status screens between runs tell you such things as time, average speed, points scored, and who is winning.

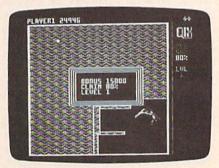
The Duel has a few flaws. It could have a two-drive option, and a couple of the features seemed to be missing or not working. Even so, what it does do is so thrilling, so entertaining, and so much fun, it almost doesn't matter that you don't have that quarter of a million to buy a real sports car. Almost.

—David & Robin Minnick

The Duel: Test Drive II Accolade 550 S. Winchester Blvd. Suite 200 San Jose, CA 95128

With the success of Tetris and Shanghai, the demand for easy-to-learn yet difficult-to-master strategy games has increased. Rather than creating something new to fill this demand, Taito has reissued QIX, its eccentric 1981 arcade hit.

Although many of the game's more superficial features have been improved, QIX (pronounced Kicks) remains essentially the same as the earlier home computer version. In both, the playing field is a large rectangle that contains a small marker (you) and an undulating spiral (the Qix).



The idea is to move your marker with your joystick and draw boxes of varying sizes without being touched by the Qix. When you complete a box, it is filled with a colored pattern and you earn points, the amount of which depend on the size of the box and the speed at which it was drawn. Larger figures constructed at a slow speed reap more bountiful harvests but at a much greater risk.

In earlier rounds, a level is completed when you've filled in 65 percent of the main rectangle. By coloring in more than the required amount, you may earn 1000 bonus points for each percentage point over the goal.

As you try to complete a box, the Qix whirls unpredictably throughout the unboxed area of the rectangle. If it touches any part of an uncompleted box, you lose one of your four lives. By the third round, the Qix has acquired a mate. Separate the two and you double the points earned during each succeeding round; dividing them in a subsequent screen triples your earnings.

As you draw, two sparklike objects (appropriately called Sparx) dog your path. Since they follow a pattern around all existing lines, they are relatively easy to avoid. If the red time-line at the side of the screen runs down before you finish, two more Sparx enter the fray. Dodging four or more of these pests is quite a chore. Equally deadly is the Fuse, which is lit when you hesitate while drawing your line. The Fuse travels up your line until it makes contact with your marker. The ensuing explosion kills you. If your line is not too short, you may eliminate the Fuse by continuing to move. This allows you to stop briefly in order to avoid other enemies. Two other life-threatening phenomena are the Spritz, a starlike figure that floats around the screen in later levels, and the Spiral Death Trap, created by crossing over your own lines.

The original QIX programmers created a masterpiece, with the hero being a simple joystick-driven painting program, the villains a quartet of abstract shapes, and the challenge—boxing in as much of the space as possible. In updating the original, Taito has chosen to beautify the game rather than make significant revisions.

QIX (1989) is more difficult because the marker moves more slowly, and the Qix is more erratic. The amount of screen-fill needed in early levels, however, has dropped from 75 percent to 65 percent. Also, boxes now are filled with a variety of colorful patterns instead of the older version's solid colors.

Other changes include the awarding of an extra life for every 50,000 points; a timely plotline (you vs. Qix, the computer virus); a practice mode; a sophisticated musical score that includes everything from rock to a Latin sound; and less grating sound effects.

The current model resides on two disk sides, one for the 64 and the other for the 128. The latter may be autobooted, and five high scores may be saved to disk. Otherwise both games are identical.

What makes QIX unique is not its plot, music, or graphics, but the skills it demands of the player. Like all superior arcade games, QIX demands planning, patience, decision making under pressure, and eye-hand coordination. To succeed at QIX, you also will need a good grasp of spatial relationships. After all, your primary purpose is not to evade but to use space to your advantage. Because you design each screen, based on your decisions and your enemy's movements, possibilities for each level are nearly endless.

As with most arcade games, you must replay earlier screens to reach higher levels. Discovering different ways of surviving, building boxes, and entrapping the Qix make repeated play of these beginning rounds a delight.

QIX's documentation adequately describes gameplay and contains general tips for survival and success. A good specific strategy is to box the Qix in as closely as possible on the first relatively easy level and enter Level 2 with 25,000–30,000 points.

Taking risks in the second screen rarely pays off. Instead, slowly and carefully move up the center of the main rectangle until you complete 50 percent; then go to the center point and build out from the side until you have boxed in approximately 75 percent of the playing area. Splitting the pair in level 3 is easy,

but I wouldn't recommend it until you have earned as many points as possible—and an extra life. Don't go over 64 percent, however, or you will lose your chance to divide the pair and thereby double your scores in subsequent screens.

Although I respect Taito's decision not to alter QIX too dramatically, I am disappointed that a few substantial revisions were not made. Would it not have been possible, for example, to allow players to draw nonrectangular shapes in certain screens or to provide them with tools (say, speed pellets, or Qix stunners) as rewards for high scores or daring actions? In the way that Arkanoid and Blockbuster are lineal descendants of Breakout, QIX could have harked back to its predecessor while breaking new ground of its own.

While two classics are better than one, one is better than none at all. If you don't own the original, or if you want a slightly different QIX experience, purchasing this package will be money well spent.

-Joe Poggiali

QIX Taito 267 W. Esplanade North Vancouver, B.C. Canada V7M 1A5 \$29.95

Risk

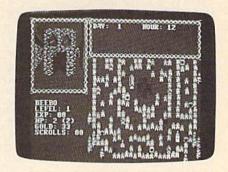
It is probably possible to computerize every board game that ever existed. But it's a less-than-useful endeavor unless the implementation improves speed and gameplay. If the execution is such that cards, tiles, currency, markers, and the like cannot be easily read or used, then stick to the board version.

The computer edition of *Risk* succeeds on both counts and more. It speeds and improves play, does away with the beans normally used to represent armies, and converts bonus cards to easily readable lines of type. To my mind, it fails only in the one area it cannot control.

Like Monopoly, *Risk* is a game for multiple players. At the end of a long evening of play, there's more satisfaction in conquering several friends than in defeating only one or two. However, it is difficult to cluster five or six people around a computer monitor. The problem is solved partially by requiring a minimum of two players and having the computer make up a third.

Once the players are named, the program divides the world by placing counters in turn until every country is occupied; the computer plays this first round with no help. After that, players continue by reinforcing their countries

until all counters are played. (In the board game, you contend with a number of beanlike counters. Here, there is only an incrementing number.)



Once all counters are played, it is time to attack somebody. The object of *Risk* is world domination, and you might as well get on with it. A player attacks neighboring countries by declaring his or her intentions and by rolling dice with the owner of that country. An attacking player may have as many as three dice, but the defender will always have one less, giving the attacker a slight edge.

As challenges are won, the loser removes counters. When the last counter is removed, the winner occupies the newly acquired territory with his or her counters. The game continues until there is one winner who has swept everyone else off the globe.

Because your "board" is a map of the world (arbitrarily accurate), the computer handles it as a smoothly scrolling screen behind a window. The window is bordered at the bottom by a message board that informs you when it is your turn, who is attacking whom, who is winning and losing a particular battle, and the number of bonus armies you amass following each play. To the right of the map, another area shows the dice being rolled. It is an uncluttered screen, and the graphics are large enough to overcome the fuzziness of the 64's display.

The countries each player occupies are displayed in a color of his or her choice. Lines of attack between countries separated by oceans are clear enough, and, if you like, you can opt for a full world view, though the disk access time required probably means you won't use this option often.

Drop-down menus give you access to the game's options: Some of the options are meant to speed or enhance play; others, to allow you to change the rules to suit your needs. A menu option allows you to check on the bonus cards you've accumulated. The alternate screen shows you what you have and gives you the option of trading matching sets for more armies.

Risk's documentation is good, outlining rules of play, special rules for

Reviews

two-player games, rule variations for playing in the United Kingdom, and a good section on strategy. (If you're new to the game, read the rules carefully. There is a demo-game option, but it moves so swiftly I doubt that a novice will find it helpful.)

In all, the sensible approaches to conversion have made the computer edition of *Risk* as much fun as the board game. The pitfalls of direct conversion were avoided in favor of making modifications that work best on a computer. These modifications have changed the look and feel of the game, but it is still a game of conquest that can be played for long hours and be thoroughly enjoyed—as long as you are winning.

-Ervin Bobo

Risk
Virgin Mastertronic
18001 Cowan Ave.
Suite A
Irvine, CA 92714
\$29.99

Hillsfar

When I started playing adventure games on computers almost ten years ago, I thought it would be neat to play a game based on the Advanced Dungeons and Dragons role-playing game. I had to wait a while, but it was worth it.

About two years ago, Strategic Simulations Incorporated (SSI) started hinting at an officially licensed AD & D game. The result was Pool of Radiancean excellent game that closely follows AD & D rules and locales. Hillsfar, the latest entry onto SSI's AD & D list, is an action adventure that takes place in and around the city of Hillsfar in the Forgotten Realms game world. Two other fantasy role-playing games in the AD & D series, Pool of Radiance and the recently released Curse of the Azure Bonds, also take place in this mysterious world. Hillsfar lets you import a character from either Radiance or Curse or create one from scratch.

You can boost characters to higher levels in *Hillsfar* by sending them on miniature quests. There are three quests assigned to each of four basic character classes (magic user, cleric, fighter, and thief), so you'll have plenty to keep you busy in this game—and plenty of fun as well.

You can also send Hillsfar characters back to Curse of the Azure Bonds because both games employ the same types of statistics. Importing characters to Hillsfar is easy. The only items lost in the transition are weapons and magic, neither of which are needed in Hillsfar. You don't need to fight (except in the arena), and any magic items you need are found in the town.

The game screen is set up with your statistics in the bottom left quadrant. A first-person view (that's very well done) of your location fills the upper left quadrant, and an overhead view of Hillsfar takes up the rest of the screen. A message bar covers part of the overhead view and is moved when necessary. Overall, the graphics are very clearly rendered. You may not know what the buildings are from the overhead view, but you can get a good indication from the first-person perspective.

Playing Hillsfar involves moving your character around the city, looking for your class's guild in order to receive a quest from the guild master. The guild master sends you to the first stop of your adventure, where messages direct you toward the next location. Your quest takes you from place to place in and around the city, usually in search of some item or information that the guild master requests.



The forte of Hillsfar is its sequence of arcade events: riding a horse, shooting arrows on an archery range, fighting in the arena, picking locks, and exploring buildings. These events fit logically into the quests. When exploring outside the city, you must ride a horse, jumping holes, puddles, and bushes, while ducking birds and arrows. Shooting on the archery range and fighting various opponents in the arena help you hone other skills needed during your quest. You must prove yourself at shooting weapons and fighting. Both challenges are more difficult than the horse-riding sequence, and they get harder as you move up levels.

Picking a lock and exploring a building are both timed sequences. Retrieve items from a building and find the exit or pick a lock before time runs out. Even if you are not a thief, you may still complete this sequence by hiring a nonplaying-character thief in the town. Picking locks is easily the most interesting event. You must quickly match geometrically shaped picks to the tumblers in a lock. Overall, the game's sequences are all well done and graphically pleasing.

Hillsfar is the first of what I hope is a long line of action adventures. It contains the right amounts of exploration and action to satisfy any adventurer or arcade-game aficionado. The graphics are great, the difficulty level is average, and you can journey in *Hillsfar* for as long as you like.

-Russ Ceccola

Hillsfar Strategic Simulations Distributed by Electronic Arts 1820 Gateway Dr. San Mateo, CA 94404 \$39.95

Raw Recruit and Skate Crazy

When the history of computer software is finally written, Virgin Mastertronic deserves a footnote for being the first software firm to introduce low prices in the marketplace. Raw Recruit and Skate Crazy are two of its latest releases.

With Mastertronic titles frequently offered for less than \$15, the competition took notice. The competitive labels that have sprung up in Mastertronic's wake—some of them rereleasing older and almost forgotten games—have made it possible for many of us to enlarge our software libraries and increase our trading stock.

Not that every Mastertronic game is a winner: I've seen some titles where I didn't know what was going on and couldn't get involved enough to want to find out. Others involved themes already explored to death by other publishers; and still others featured playing screens so cluttered as to be incomprehensible.

Only the arcade expert can meet these challenges.

Raw Recruit avoids these particular pitfalls in opting for simplicity in design and theme while giving you six basic training courses in which to qualify before you become a "real" soldier.

Begin on the rifle range, shooting at targets that pop up at various distances. You must qualify in this before going on to any of the other tests of skill. You must hit at least 26 targets—and do it before the clock runs out.

Assuming you qualify, your next tests consist of a cross-country run over rocky terrain, a timed fitness course in which you must complete a certain number of push-ups and chin-ups; an assault course in which you'll attack while leaping over obstacles; a pistol range in which targets appear in and around a house (and where killing a hostage costs time); and a tug of war.

All events are controlled by your

Reviews

joystick, and all may be played by either one or two players. You must attain a minimum score in each event before moving on to the next. Scores are posted in a hall of fame, which is renewed each time the game is booted.

If your interests run more toward civilian pursuits, Skate Crazy bucks modern trends by not even nodding at skateboards. Here your transportation consists of simple shoe skates, and your obstacles are many: oil puddles to slow you down, ramps to be jumped, pylons that require tricky maneuvers, and broken glass that will slow and tire you.

While doing all this, it is also possible to impress the judges and run up a higher score by performing stunts such as jumping from the ground, jumping over ramps, and twisting in the air. The downside of being a showoff is that it increases your fatigue-and that may make it impossible for you to complete the required maneuvers.

The first game is called the Car Park Challenge (car park is a British term for parking lot). In this game, you must follow painted arrows on the ground and negotiate obstacles in order to pass through all the gates. Keep an eye on your fatigue meter and the clock, and try not to fall down too many times.

Success here means you move to the car park and pick up trash by skating over it. If you manage this, you can advance to level 2. In these upper levels, you'll encounter hurdles, footballs, trampolines, and even more silly obstacles. During all this, you are being graded on overall skating ability, your elapsed time, and jumps.

The second half of the game, which is independent of the first, is called the Championship course. In four levels, you'll find yourself dodging and ducking objects while making your way through a building site, crossing a lake while avoiding deadly wildlife, skating through a subway inhabited by giant rats, and skating down streets occupied by pedestrians and hostile rival gangs.

While Skate Crazy is a variation on the maze game and Raw Recruit owes a great deal to various shooting-gallery games, both are presented well; they have good graphics and good animation.

The skill requirements may be too much for many of you. I consider myself an average player, but I was unable to reach the second level in either game. In Skate Crazy, the clock ran out because I was unable to master the art of jumping obstacles; and in Raw Recruit it was only by the greatest good luck that I was able to bring the sights to the targets in the first event. I tested several joysticks with this game and all had similar alignment problems. I concluded the problem was in my reflexes, so I called in the experts.

Daughter Kelly and wife Carla (who has achieved impossible scores on Solar Fox) had similar trouble. It was left to my son, Mike, to finally break the barrier and reach beyond the first levels in both games. Mike's joystick skills are above average—the height of the grass on my lawn is a fair barometer of the amount of computer time he puts in.

Were it not for the apparent difficulty of play, both games would be joyfully recommended, especially in light of the low investment required. (While I've often repeated that mindless arcade games are a staple of computer entertainment, I really hate to pay \$30 and up for them.) As it is, I think games we cannot master quickly lose their appeal. For myself, a further loss of appeal lies in the fact that I must disconnect my second disk drive and my printer before the games will load. For these reasons, I'd suggest you try one or both of these Mastertronic bargains and if they're too difficult, trade them with a friend who has better game skills.

-Ervin Bobo

Raw Recruit and Skate Crazy Virgin Mastertronic 18001 Cowan St. Irvine, CA 92714 \$9.99 each

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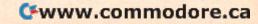
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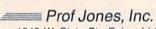
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The Automatic Proofreader

Philip I. Nelson

"The Automatic Proofreader" helps you type in program listings for the 128, 64, Plus/4, and 16 and prevents nearly every kind of typing mistake.

Type in the Proofreader exactly as listed. Since the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unfamiliar commands. After finishing, save a copy or two on disk or tape before running it. This is important because the Proofreader erases the BASIC portion of itself when you run it, leaving only the machine language portion in memory.

Next, type RUN and press RE-TURN. After announcing which computer it's running on, the Proofreader displays the message "Proofreader Active". Now you're ready to type in a

BASIC program.

Every time you finish typing a line and press RETURN, the Proofreader displays a two-letter checksum in the upper-left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, it's almost certain the line was typed correctly. If the letters don't match, check for your mistake and correct the line.

The Proofreader ignores spaces not enclosed in quotes, so you can omit or add spaces between keywords and still see a matching checksum. However, since spaces inside quotes are almost always significant, the Proofreader pays attention to them. For example, 10 PRINT"THIS IS BASIC" will generate a different checksum than 10 PRINT"THIS ISBA SIC".

A common typing error is transposition—typing two successive characters in the wrong order, like PIRNT instead of PRINT or 64378 instead of 64738. The Proofreader is sensitive to the position of each character within the line and thus catches transposition errors.

The Proofreader does not accept keyword abbreviations (for example, ? instead of PRINT). If you prefer to use abbreviations, you can still check the line by LISTing it after typing it in, moving the cursor back to the line, and pressing RETURN. LISTing the line

substitutes the full keyword for the abbreviation and allows the Proofreader to work properly. The same technique works for rechecking programs you've already typed in.

If you're using the Proofreader on the Commodore 128, Plus/4, or 16, do not perform any GRAPHIC commands while the Proofreader is active. When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the Proofreader—to another memory area, causing the Proofreader to crash. The same thing happens if you run any program with a GRAPHIC command while the Proofreader is in memory.

Though the Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. However, the Proofreader is purposely difficult to dislodge: It's not affected by tape or disk operations, or by pressing RUN/ STOP- RESTORE. The simplest way to disable it is to turn the computer off then on. A gentler method is to SYS to the computer's built-in reset routine (SYS 65341 for the 128, 64738 for the 64, and 65526 for the Plus/4 and 16). These reset routines erase any program in memory, so be sure to save the program you're typing in before entering the SYS command.

If you own a Commodore 64, you may already have wondered whether the Proofreader works with other programming utilities like "MetaBASIC." The answer is generally yes, if you're using a 64 and activate the Proofreader after installing the other utility. For example, first load and activate MetaBASIC, then load and run the Proofreader.

When using the Proofreader with another utility, you should disable both programs before running a BASIC program. While the Proofreader seems unaffected by most utilities, there's no way to promise that it will work with any and every combination of utilities you might want to use. The more utilities activated, the more fragile the system becomes.

The New Automatic Proofreader

10 VEC=PEEK(772)+256*PEEK(773) :LO=43:HI=44

- 20 PRINT "AUTOMATIC PROOFREADE R FOR ";:IF VEC=42364 THEN {SPACE}PRINT "C-64"
- 30 IF VEC=50556 THEN PRINT "VI C-20"
- 40 IF VEC=35158 THEN GRAPHIC C LR:PRINT "PLUS/4 & 16"
- 50 IF VEC=17165 THEN LO=45:HI= 46:GRAPHIC CLR:PRINT"128"
- 60 SA=(PEEK(LO)+256*PEEK(HI))+
 6:ADR=SA
- 70 FOR J=0 TO 166:READ BYT:POK E ADR,BYT:ADR=ADR+1:CHK=CHK +BYT:NEXT
- 80 IF CHK<>20570 THEN PRINT "* ERROR* CHECK TYPING IN DATA STATEMENTS": END
- 90 FOR J=1 TO 5:READ RF,LF,HF:
 RS=SA+RF:HB=INT(RS/256):LB=
 RS-(256*HB)
- 100 CHK=CHK+RF+LF+HF:POKE SA+L F,LB:POKE SA+HF,HB:NEXT
- 110 IF CHK<>22054 THEN PRINT "
 ERROR RELOAD PROGRAM AND
 {SPACE}CHECK FINAL LINE";EN
- 120 POKE SA+149,PEEK(772):POKE SA+150,PEEK(773)
- 130 IF VEC=17165 THEN POKE SA+ 14,22:POKE SA+18,23:POKESA+ 29,224:POKESA+139,224
- 140 PRINT CHR\$(147); CHR\$(17); PROOFREADER ACTIVE": SYS SA
- 150 POKE HI, PEEK(HI)+1: POKE (P EEK(LO)+256*PEEK(HI))-1,0:N EW
- 160 DATA 120,169,73,141,4,3,16 9,3,141,5,3
- 170 DATA 88,96,165,20,133,167, 165,21,133,168,169
- 180 DATA 0,141,0,255,162,31,18 1,199,157,227,3
- 190 DATA 202,16,248,169,19,32, 210,255,169,18,32
- 200 DATA 210,255,160,0,132,180
- ,132,176,136,230,180 210 DATA 200,185,0,2,240,46,20
- 1,34,208,8,72 220 DATA 165,176,73,255,133,17
- 6,104,72,201,32,208 230 DATA 7,165,176,208,3,104,2 08,226,104,166,180
- 240 DATA 24,165,167,121,0,2,13 3,167,165,168,105
- 250 DATA 0,133,168,202,208,239
- ,240,202,165,167,69 260 DATA 168,72,41,15,168,185,
- 211,3,32,210,255 270 DATA 104,74,74,74,74,168,1
- 85,211,3,32,210 280 DATA 255,162,31,189,227,3,
- 149,199,202,16,248 290 DATA 169,146,32,210,255,76 ,86,137,65,66,67
- 300 DATA 68,69,70,71,72,74,75, 77,80,81,82,83,88
- 310 DATA 13,2,7,167,31,32,151, 116,117,151,128,129,167,136

Machine Language Entry Program For Commodore 64 and 128

"MLX" is a labor-saving utility that allows almost fail-safe entry of machine language programs. Included are versions for the Commodore 64 and 128.

Type in and save some copies of whichever version of MLX is appropriate for your computer (you'll want to use it to enter future ML programs from COM-PUTEI's GAZETTE). Program 1 is for the Commodore 64, and Program 2 is for the 128 (128 MLX can also be used to enter Commodore 64 ML programs for use in 64 mode). When you're ready to enter an ML program, load and run MLX. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing.

If you're unfamiliar with machine language, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in hexadecimal-a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short-includes the numerals 0-9 and the letters A-F. But don't worryeven if you know nothing about ML or hex, you should have no trouble using MLX.

After you enter the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this

option.

A functions menu will appear. The first option in the menu is ENTER DATA. If you're just starting to type in a program, pick this. Press the E key, and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you left off typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. If you pressed E by mistake, you can return to the command menu by pressing RETURN alone when asked for the address. (You can get back to the menu from most options by pressing RETURN with no other input.)

Entering A Listing

Once you're in Enter mode, MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an MLXformat listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows MLX to check your typing. (Commodore 128 users can enter the data from an MLX listing using the built-in monitor if the rightmost column of data is omitted, but we recommend against it. It's much easier to let MLX do the proofreading and error checking for you.)

When you enter a line, MLX recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if MLX detects a typing error, you'll hear a low buzz and see an error message. The line will then be redisplayed for editing.

Invalid Characters Banned

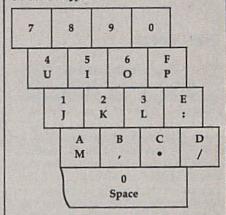
Only a few keys are active while you're entering data, so you may have to unlearn some habits. You do not type spaces between the columns; MLX automatically inserts these for you. You do not press RETURN after typing the last number in a line; MLX automatically enters and checks the line after you

type the last digit.

Only the numerals 0-9 and the letters A-F can be typed in. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, 128 MLX redefines the function keys and + and keys on the numeric keypad so that you can enter data one-handed. (The 64 version incorporates the keypad modification from the March 1986 "Bug-Swatter" column, lines 485-487.) In either case, the keypad is active only while entering data. Addresses must be entered with the normal letter and number keys. The figures above show the keypad configurations for each version.

MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, MLX will catch your mistake. There is one error that

64 MLX Keypad



128 MLX Keypad

A	B	C	D	
(F1)	(F3)	(F5)	(F7)	

7	8	9	E (+)
4	5	6	F (-)
1	2	3	E
	0		E N T E R

can slip past MLX: Because of the checksum formula used, MLX won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take reasonable care while entering data.

Editing Features

To correct typing mistakes before finishing a line, use the INST/DEL key to delete the character to the left of the cursor. (The cursor-left key also deletes.) If you mess up a line really badly, press CLR/HOME to start the line over. The RETURN key is also active, but only before any data is typed on a line. Pressing RETURN at this point returns you to the command menu. After you type a character of data, MLX disables RETURN until the cursor returns to the start of a line. Remember, you can press CLR/HOME to quickly get to a line number prompt.

More editing features are available when correcting lines in which MLX has detected an error. To make corrections in a line that MLX has redisplayed for editing, compare the line on the screen with the one printed in the listing, then move the cursor to the mistake and type the correct key. The cursor left and right keys provide the normal cursor controls. (The INST/ DEL key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, RETURN is active; pressing it tells MLX to recheck the line. You can press the CLR/HOME key to clear the entire line if you want to start from scratch, or if you want to get to a line number prompt to use RETURN to get back to the menu.

Display Data

The second menu choice, DISPLAY DATA, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, MLX asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. MLX displays program lines until it reaches the end of the program, at which point the menu is redisplayed. You can pause the display by pressing the space bar. (MLX finishes printing the current line before halting.) Press space again to restart the display. To break out of the display and get back to the menu before the ending address is reached, press RETURN.

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are SAVE FILE and LOAD FILE; their operation is quite straightforward. When you press S or L, MLX asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save (save only for the 128 version). Don't panic; this is normal behavior. MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands (128 MLX makes use of BLOAD). Disk users should also note that the drive prefix 0: is automatically added to the filename (line 750 in 64 MLX), so this should not be included when entering the name. This also precludes the use of @ for Save-with-Replace, so remember to give each version you save a different

name. The 128 version makes up for this by giving you the option of scratching the existing file if you want to reuse a filename.

Remember that MLX saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When saving a partially completed listing, make sure to note the address where you stopped typing so you'll know where to resume entry when you reload.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. (Tape users should bear in mind that Commodore computers are never able to detect errors during a save to tape.) MLX also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran MLX; LOAD ENDED AT address, which means the file you're trying to load ends before the ending address you specified when you started MLX; and TRUNCATED AT ENDING AD-DRESS, which means the file you're trying to load extends beyond the ending address you specified when you started MLX. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct starting and ending addresses.

The 128 version also has a CATA-LOG DISK option so you can view the contents of the disk directory before

saving or loading.

The QUIT menu option has the obvious effect—it stops MLX and enters BASIC. The RUN/STOP key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, RUN/STOP-RE-STORE also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the clear workspace option.

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. Some ML programs are designed to be loaded and run like BASIC programs, so all you need to type is LOAD "filename", 8 for disk (DLOAD "filename" on the 128) or LOAD "filename" for tape, and then RUN. Such

programs will usually have a starting address of 0801 for the 64 or 1C01 for the 128. Other programs must be reloaded to specific addresses with a command such as LOAD "filename", 8,1 for disk (BLOAD "filename" on the 128) or LOAD "filename",1,1 for tape, then started with a SYS to a particular memory address. On the Commodore 64, the most common starting address for such programs is 49152, which corresponds to MLX address C000. In either case, you should always refer to the article which accompanies the ML listing for information on loading and running the program.

An Ounce of Prevention

By the time you finish typing in the data for a long ML program, you may have several hours invested in the project. Don't take chances—use our "Automatic Proofreader" to type the new MLX, and then test your copy thoroughly before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses, then use the Display option to verify that the data has been entered correctly. And be sure to test the Save and Load options several times to ensure that you can recall your work from disk or tape. Don't let a simple typing error in the new MLX cost you several nights of hard

Program 1: MLX for Commodore 64

SS 10 REM VERSION 1.1: LINES 8 30,950 MODIFIED, LINES 4 85-487 ADDED

EK 100 POKE 56,50:CLR:DIM IN\$, I,J,A,B,A\$,B\$,A(7),N\$

DM 110 C4=48:C6=16:C7=7:Z2=2:Z 4=254:Z5=255:Z6=256:Z7= 127

CJ 120 FA=PEEK(45)+Z6*PEEK(46) :BS=PEEK(55)+Z6*PEEK(56):H\$="0123456789ABCDEF"

SB 130 R\$=CHR\$(13):L\$="{LEFT}" :S\$=" ":D\$=CHR\$(20):Z\$= CHR\$(0):T\$="{13 RIGHT}"

CQ 140 SD=54272:FOR I=SD TO SD +23:POKE I,0:NEXT:POKE {SPACE}SD+24,15:POKE 78 8,52

FC 150 PRINT"(CLR)"CHR\$(142)CH R\$(8):POKE 53280,15:POK

E 53281,15

EJ 160 PRINT T\$" {RED}{RVS}

{2 SPACES}{8 @}

{2 SPACES}"SPC(28)"

{2 SPACES}{OFF}{BLU} ML

X II {RED}{RVS}

{2 SPACES}"SPC(28)"

{12 SPACES}"SPC(28)"

{12 SPACES}{BLU}"

FR 170 PRINT"[3 DOWN]
[3 SPACES]COMPUTEI'S MA
CHINE LANGUAGE EDITOR
[3 DOWN]"

JB 180 PRINT"[BLK]STARTING ADD

MIL	•	
		RESS[4]";:GOSUB300:SA=A D:GOSUB1040:IF F THEN18
GF	190	PRINT"[BLK][2 SPACES]EN DING ADDRESS\$43"::GOSUB 300:EA=AD:GOSUB1030:IF
KR	200	[SPACE]F THEN19Ø INPUT"[3 DOWN] [BLK]CLEA R WORKSPACE [Y/N] [4]; A \$:IF LEFT\$ (A\$,1) <> "Y"TH
PG	210	EN22Ø PRINT"{2 DOWN}{BLU}WORK ING";:FORI=BS TO BS+ EA-SA+7:POKE I,Ø:NEXT:P
DR	220	[BLK] (RVS) MLX COMMAND [SPACE] MENU [DOWN] [4]": PRINT T\$" (RVS) E (OFF) NTE
BD	230	R DATA" PRINT T\$" (RVS)D(OFF)ISP LAY DATA":PRINT T\$" {RVS}L(OFF)OAD FILE"
JS	240	PRINT T\$"[RVS]S[OFF]AVE FILE":PRINT T\$"[RVS]Q [OFF]UIT[2 DOWN][BLK]"
	25Ø 26Ø	GET A\$:IF A\$=N\$ THEN250 A=0:FOR I=1 TO 5:IF A\$= MID\$("EDLSQ",I,1)THEN A =I:I=5
FD	27Ø	NEXT:ON A GOTO420,610,6 90,700,280:GOSUB1060:GO TO250
EJ	28Ø	
EM JX	29Ø 3ØØ	POKE SD+24,0:END IN\$=N\$:AD=0:INPUTIN\$:IF LEN(IN\$)<>4THENRETURN
KF	310	B\$=IN\$:GOSUB320:AD=A:B\$ =MID\$(IN\$,3):GOSUB320:A D=AD*256+A:RETURN
PP	320	A=0:FOR J=1 TO 2:A\$=MID \$(B\$,J,1):B=ASC(A\$)-C4+ (A\$>"0")*C7:A=A*C6+B
	330	Ø:A=-1:J=2
GX CH	34Ø 35Ø	NEXT:RETURN B=INT(A/C6):PRINT MID\$(H\$,B+1,1);:B=A-B*C6:PRI NT MID\$(H\$,B+1,1);:RETU RN
RR	360	A=INT(AD/Z6):GOSUB350:A =AD-A*Z6:GOSUB350:PRINT ":":
BE	370	CK=INT(AD/Z6):CK=AD-Z4* CK+Z5*(CK>Z7):GOTO390
PX JC QS	38Ø 39Ø 4ØØ	CK=CK*Z2+Z5*(CK>Z7)+A CK=CK+Z5*(CK>Z5):RETURN PRINT"[DOWN]STARTING AT E43";GOSUB3Ø0:IF INS<> N\$ THEN GOSUB103Ø:IF F {SPACE}THEN4Ø0
EX HD	418 428	RETURN PRINT"[RVS] ENTER DATA [SPACE]":GOSUB400:IF IN S=NS THEN220
JK SK	43Ø 44Ø	OPEN3,3:PRINT POKE198,0:GOSUB360:IF F THEN PRINT IN\$:PRINT" [UP] [5 RIGHT]";
GC	450	FOR I=0 TO 24 STEP 3:B\$ =S\$:FOR J=1 TO 2:IF F T
на	460	HEN B\$=MID\$(IN\$,I+J,1) PRINT"{RVS}"B\$L\$;:IF I< 24THEN PRINT"{OFF}";
HD FK	47Ø 48Ø	GET A\$:IF A\$=N\$ THEN470 IF(A\$>"/"ANDA\$<":")OR(A \$>"@"ANDA\$<"G")THEN540
GS	485	A=-(A\$="M")-2*(A\$=",")-

		3*(A\$=".")-4*(A\$="/")-5 *(A\$="J")-6*(A\$="K")
FX	486	A=A-7*(A\$="L")-8*(A\$=": ")-9*(A\$="U")-10*(A\$="I")-11*(A\$="I")-12*(
CM	487	A=A-13*(A\$=S\$):IF A THE N AS=MIDS("ABCD123E456F
MP	490	0",A,1):GOTO 540 IF A\$=R\$ AND((I=0)AND(J=1)OR F)THEN PRINT B\$;:
кс	500	J=2:NEXT:I=24:GOTO550 IF A\$="{HOME}" THEN PRI NT B\$:J=2:NEXT:I=24:NEX T:F=0:GOTO440
MX	510	IF(A\$="{RIGHT}")ANDF THE ENPRINT B\$L\$;:GOTO540
GK	520	IF A\$<>L\$ AND A\$<>D\$ OF ((I=0)AND(J=1))THEN GOS
HG	53Ø	:J=2-J:IF J THEN PRINT
QS	540	(SPACE)S\$;
PM	550	NEXT I:PRINT:PRINT"[UP] [5 RIGHT]";:INPUT#3,INS :IF INS=NS THEN CLOSE3:
QC	56Ø	GOTO220 FOR I=1 TO 25 STEP3:B\$= MID\$(IN\$,I):GOSUB320:II I<25 THEN GOSUB380:A(1)
PK	57Ø	B1060:PRINT"[BLK][RVS] [SPACE]ERROR: REENTER I
HJ	580	R I=Ø TO 7:POKE B+I,A()
QQ	590):NEXT AD=AD+8:IF AD>EA THEN (LOSE3:PRINT"[DOWN][BLU] ** END OF ENTRY ** [BLK]
	600 610	
RJ	620	20
KS	63Ø	BREAK \$43 (DOWN)" GOSUB360:B=BS+AD-SA:FOR I=BTO B+7:A=PEEK(I):GOS UB350:GOSUB380:PRINT SS
cc	640	; NEXT:PRINT"{RVS}";:A=CK :GOSUB350:PRINT
KH	65Ø	F=1:AD=AD+8:IF AD>EA THE ENPRINT " (DOWN) (BLU) ** H
KC	660	ND OF DATA **":GOTO22Ø GET A\$:IF A\$=R\$ THEN GO SUB1Ø8Ø:GOTO22Ø
	67Ø	IF A\$=S\$ THEN F=F+1:GOS UB1080
	690	(SPACE)DATA ":OP=1:GOTO
	700	[SPACE]FILE ":OP=Ø
RX	710	INS=NS:INPUT"[DOWN]FILE NAME&43";INS:IF INS=NS [SPACE]THEN220
PR	720	F=0:PRINT"(DOWN)(BLK) [RVS]T[OFF]APE OR (RVS] D[OFF]ISK: [4]";
PP	730	
HQ	740	IF A\$<>"D"THEN730

```
HH 750 PRINT"D[DOWN]":OPEN15,8
,15,"I0:":B=EA-SA:IN$="
       Ø:"+IN$:IF OP THEN810
SQ 76Ø OPEN 1,8,8,IN$+",P,W":G
       OSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(A
       H*256):PRINT#1,CHR$(AL)
        ; CHR$ (AH);
PE 780 FOR I=0 TO B:PRINT#1,CH
       R$(PEEK(BS+I));:IF ST T
       HENROO
FC 790 NEXT:CLOSE1:CLOSE15:GOT
       0940
GS 800 GOSUB1060:PRINT"[DOWN]
        [BLK] ERROR DURING SAVE:
        E43":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+",P,R":G
       OSUB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z
        $)+256*ASC(B$+Z$):IF AD
        <>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,A$:P
       OKE BS+I, ASC(A$+Z$):IF(
       I <> B) AND ST THEN F=2:AD
       =I:I=B
FA 840 NEXT: IF ST <> 64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F
       >Ø)+1 GOTO96Ø,97Ø
SA 860 INPUT#15, A, A$:IF A THEN
        CLOSE1:CLOSE15:GOSUB10
       60:PRINT"[RVS]ERROR: "A
GQ 87Ø RETURN
EJ 880 POKE183, PEEK (FA+2): POKE
       187, PEEK (FA+3) : POKE188,
       PEEK (FA+4): IFOP=ØTHEN92
HJ 890 SYS 63466:IF(PEEK(783)A
       ND1) THEN GOSUBIØ60: PRIN
       T"[DOWN][RVS] FILE NOT
[SPACE]FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(8
       30):IF AD<>SA THEN F=1:
       GOTO970
SC 91Ø A=PEEK(831)+256*PEEK(83
        2)-1:F=F-2*(A<EA)-3*(A>
        EA):AD=A-AD:GOTO93Ø
KM 920 A=SA:B=EA+1:GOSUB1010:P
       OKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOS
       UB1010:ON OP GOTO950:SY
        S 63591
AE 940 GOSUB1080:PRINT" [BLU] **
        SAVE COMPLETED **":GOT
       0220
XP 950 POKE147,0:SYS 63562:IF
        [SPACE]ST>Ø THEN97Ø
FR 960 GOSUB1080:PRINT"[BLU] **
        LOAD COMPLETED **":GOT
        0220
DP 970 GOSUB1060:PRINT"[BLK]
        [RVS]ERROR DURING LOAD:
        [DOWN] [4]":ON F GOSUB98
Ø,99Ø,1000:GOTO220
PP 980 PRINT"INCORRECT STARTIN
       G ADDRESS (";:GOSUB360:
       PRINT") ": RETURN
GR 990 PRINT"LOAD ENDED AT ";:
       AD=SA+AD:GOSUB360:PRINT
        D$ : RETURN
FD 1000 PRINT "TRUNCATED AT END
         ING ADDRESS": RETURN
RX 1010 AH=INT(A/256):AL=A-(AH
         *256) : POKE193, AL: POKE1
         94, AH
FF 1020 AH=INT(B/256):AL=B-(AH
         *256):POKE174,AL:POKE1
         75, AH: RETURN
FX 1030 IF AD SA OR AD EA THEN
         1050
HA 1040 IF (AD>511 AND AD<40960
```

-)OR(AD>49151 AND AD<53 248)THEN GOSUB1080:F=0 :RETURN
- HC 1050 GOSUB1060:PRINT"(RVS)

 {SPACE}INVALID ADDRESS

 {DOWN}{BLK}":F=1:RETU

 RN
- AR 1060 POKE SD+5,31:POKE SD+6
 ,208:POKE SD,240:POKE
 {SPACE}SD+1,4:POKE SD+
 4,33
- DX 1070 FOR S=1 TO 100:NEXT:GO TO1090
- PF 1080 POKE SD+5,8:POKE SD+6, 240:POKE SD,0:POKE SD+ 1,90:POKE SD+4,17
- AC 1090 FOR S=1 TO 100:NEXT:PO KE SD+4,0:POKE SD,0:PO KE SD+1,0:RETURN

Program 2: MLX for Commodore 128

- AE 100 TRAP 960: POKE 4627,128: DIM NL\$, A(7)
- XP 110 Z2=2:Z4=254:Z5=255:Z6=2 56:Z7=127:BS=256*PEEK(4 627):EA=65280
- FB 120 BE\$=CHR\$(7):RT\$=CHR\$(13):DL\$=CHR\$(20):SP\$=CHR\$ (32):LF\$=CHR\$(157)
- KE 130 DEF FNHB(A)=INT(A/256): DEF FNLB(A)=A-FNHB(A)*2 56:DEF FNAD(A)=PEEK(A)+ 256*PEEK(A+1)
- JB 140 KEY 1,"A":KEY 3,"B":KEY 5,"C":KEY 7,"D":VOL 15
 :IF RGR(0)=5 THEN FAST
- FJ 150 PRINT"{CLR}"CHR\$(142);C HR\$(8):COLOR 0,15:COLOR 4,15:COLOR 6,15
- GQ 160 PRINT TAB(12) "{RED} {RVS}{2 SPACES} {9 @} {2 SPACES} "RT\$; TAB(12) " {RVS}{2 SPACES}{OFF} {BLU} 128 MLX {RED} {RVS}{2 SPACES} "RT\$; TAB (12) "{RVS}{13 SPACES} {BLU}"
- FE 170 PRINT"[2 DOWN]

 {3 SPACES]COMPUTE!'S MA

 CHINE LANGUAGE EDITOR

 {2 DOWN]"
- DK 180 PRINT"[BLK]STARTING ADD RESS \$4 \rightarrow";:GOSUB 260:IF {SPACE}AD THEN SA=AD:EL SE 180
- FH 190 PRINT"{BLK}{2 SPACES}EN
 DING ADDRESS{4}";:GOSUB
 260:IF AD THEN EA=AD:E
 LSE 190
- MF 200 PRINT" [DOWN] {BLK}CLEAR {SPACE | WORKSPACE [Y/N]? {4}":GETKEY A\$:IF A\$<>" Y" THEN 220
- QH 210 PRINT" [DOWN] {BLU} WORKIN
 G..."; :BANK 0:FOR A=BS
 {SPACE} TO BS+(EA-SA)+7:
 POKE A,0:NEXT A:PRINT"D
 ONE"
- DC 220 PRINT TAB(10)"{DOWN}

 {BLK}{RVS} MLX COMMAND

 {SPACE}MENU {4}{DOWN}":

 PRINT TAB(13)"{RVS}E

 {OFF}NTER DATA"RT\$; TAB(
 13)"{RVS}D{OFF}ISPLAY D

 ATA"RT\$; TAB(13)"{RVS}L

 {OFF}OAD FILE"
- HB 230 PRINT TAB(13) "{RVS}S

- 3)"{RVS}C{OFF}ATALOG DI SK"RTS;TAB(13)"{RVS}Q {OFF}UIT{DOWN}{BLK}"
- AP 240 GETKEY A\$:A=INSTR("EDLS CQ",A\$):ON A GOTO 340,5 50,640,650,930,940:GOSU B 950:GOTO 240
- SX 250 PRINT"STARTING AT";:GOS UB 260:IF(AD<>0)OR(A\$=N L\$)THEN RETURN:ELSE 250
- BG 260 A\$=NL\$:INPUT A\$:IF LEN(A\$)=4 THEN AD=DEC(A\$)
- PP 270 IF AD=0 THEN BEGIN:IF A \$<>NL\$ THEN 300:ELSE RE TURN:BEND
- MA 280 IF AD<SA OR AD>EA THEN {SPACE}300
- PM 290 IF AD>511 AND AD<65280 (SPACE)THEN PRINT BES;: RETURN
- SQ 300 GOSUB 950:PRINT"{RVS} I NVALID ADDRESS {DOWN} {BLK}":AD=0:RETURN
- RD 310 CK=FNHB(AD):CK=AD-Z4*CK +Z5*(CK>Z7):GOTO 330
- DD 320 CK=CK*Z2+Z5*(CK>Z7)+A AH 330 CK=CK+Z5*(CK>Z5):RETURN
- QD 340 PRINT BES; "{RVS} ENTER {SPACE}DATA ":GOSUB 250 :IF AS=NLS THEN 220
- JA 350 BANK 0:PRINT:F=0:OPEN 3
- BR 360 GOSUB 310:PRINT HEX\$ (AD
)+":";:IF F THEN PRINT
 {SPACE}L\$:PRINT"{UP}
 {5 RIGHT}";
- QA 370 FOR I=0 TO 24 STEP 3:B\$
 =SP\$:FOR J=1 TO 2:IF F
 {SPACE}THEN B\$=MID\$(L\$,
 I+J,1)
- PS 380 PRINT"[RVS]"B\$+LF\$;:IF [SPACE]I<24 THEN PRINT" [OFF]";
- RC 390 GETKEY AS: IF (AS>"/" AN D AS<":") OR(AS>"@" AND
- A\$<"G") THEN 470

 AC 400 IF A\$="+" THEN A\$="E":G

 OTO 470
- QB 410 IF AS="-" THEN AS="F":G OTO 470
- FB 420 IF A\$=RT\$ AND ((I=0) AN D (J=1) OR F) THEN PRIN T B\$;:J=2:NEXT:I=24:GOT O 480
- RD 430 IF AS="{HOME}" THEN PRI NT B\$:J=2:NEXT:I=24:NEX T:F=0:GOTO 360
- XB 440 IF (A\$="{RIGHT}") AND F THEN PRINT B\$+LF\$;:GOT O 470
- JP 450 IF A\$<>LF\$ AND A\$<>DL\$ {SPACE}OR ((I=0) AND (J =1)) THEN GOSUB 950:GOT O 390
- PS 460 A\$=LF\$+SP\$+LF\$:PRINT B\$ +LF\$;:J=2-J:IF J THEN P RINT LF\$::I=I-3
- GB 470 PRINT AS;:NEXT J:PRINT {SPACE}SPS;
- HA 480 NEXT I:PRINT:PRINT"{UP} {5 RIGHT}";:L\$=" {27 SPACES}"
- DP 490 FOR I=1 TO 25 STEP 3:GE T#3,A\$,B\$:IF A\$=SP\$ THE N I=25:NEXT:CLOSE 3:GOT O 220
- BA 500 A\$=A\$+B\$:A=DEC(A\$):MID\$
 (L\$,I,2)=A\$:IF I<25 THE
 N GOSUB 320:A(I/3)=A:GE
 T#3,A\$
- {OFF}AVE FILE"RTS; TAB(1 | AR 510 NEXT I: IF A<>CK THEN GO

- SUB 950:PRINT:PRINT" {RVS} ERROR: REENTER LI NE ":F=1:GOTO 360
- DX 520 PRINT BES:B=BS+AD-SA:FO R I=0 TO 7:POKE B+I,A(I):NEXT I
- XB 530 F=0:AD=AD+8:IF AD<=EA T HEN 360
- CA 540 CLOSE 3:PRINT"[DOWN]

 {BLU}** END OF ENTRY **

 {BLK}{2 DOWN}":GOTO 650
- MC 550 PRINT BES; "{CLR}{DOWN}
 {RVS} DISPLAY DATA ":GO
 SUB 250:IF A\$=NL\$ THEN
 {SPACE}220
- JF 560 BANK 0:PRINT"(DOWN)
 {BLU}PRESS: {RVS}SPACE
 {OFF} TO PAUSE, {RVS}RE
 TURN{OFF} TO BREAK{4}
 {DOWN}"
- XA 570 PRINT HEX\$ (AD) + ":"; : GOS UB 310: B=BS+AD-SA
- DJ 580 FOR I=B TO B+7:A=PEEK(I
):PRINT RIGHT\$(HEX\$(A),
 2);SP\$;:GOSUB 320:NEXT
 {SPACE}I
- XB 590 PRINT"[RVS]"; RIGHT\$ (HEX \$ (CK), 2)
- GR 600 F=1:AD=AD+8:IF AD>EA TH EN PRINT"{BLU}** END OF DATA **":GOTO 220
- EB 610 GET AS: IF AS=RTS THEN P RINT BES: GOTO 220
- QK 620 IF A\$=SP\$ THEN F=F+1:PR INT BES:
- XS 630 ON F GOTO 570,610,570
- RF 640 PRINT BES"[DOWN] [RVS] L OAD DATA ":OP=1:GOTO 66
- BP 650 PRINT BE\$"{DOWN}{RVS} S AVE FILE ":OP=0
- DM 660 F=0:F\$=NL\$:INPUT"FILENA ME{4}";F\$:IF F\$=NL\$ THE N 220
- PF 665 IF LEN(F\$)>14 THEN 660 RF 670 PRINT"{DOWN}{BLK}{RVS}T {OFF}APE OR {RVS}D{OFF}
- ISK: {4}";
 SQ 680 GETKEY A\$: IF A\$="T" THE
 N 850: ELSE IF A\$<>"D" T
 HEN 680
- SP 690 PRINT"DISK{DOWN}":IF OP THEN 760
- EH 700 DOPEN#1, (F\$+",P"), W:IF {SPACE}DS THEN A\$=D\$:GO TO 740
- JH 710 BANK 0:POKE BS-2,FNLB(S A):POKE BS-1,FNHB(SA):P RINT"SAVING ";F\$:PRINT
- MC 720 FOR A=BS-2 TO BS+EA-SA: PRINT#1, CHR\$ (PEEK(A));: IF ST THEN A\$="DISK WRI TE ERROR": GOTO 750
- GC 730 NEXT A:CLOSE 1:PRINT"
 {BLU}** SAVE COMPLETED
 {SPACE}WITHOUT ERRORS *
 *":GOTO 220
- RA 740 IF DS=63 THEN BEGIN:CLO
 SE 1:INPUT"{BLK}REPLACE
 EXISTING FILE [Y/N] {4}
 ";A\$:IF A\$="Y" THEN SCR
 ATCH(F\$):PRINT:GOTO 700
 :ELSE PRINT"{BLK}":GOTO
 660:BEND
- GA 750 CLOSE 1:GOSUB 950:PRINT
 "{BLK}{RVS} ERROR DURIN
 G SAVE: {4}":PRINT AS:G
 OTO 220
- FD 760 DOPEN#1, (F\$+",P"):IF DS THEN A\$=D\$\$:F=4:CLOSE {SPACE}1:GOTO 790

PX 770 GET#1,A\$,B\$:CLOSE 1:AD= ASC (A\$) +256*ASC (B\$): IF {SPACE}AD<>SA THEN F=1: GOTO 790 KB 780 PRINT"LOADING ";F\$:PRIN T:BLOAD (F\$) ,BØ, P(BS):AD =SA+FNAD (174) -BS-1:F=-2 * (AD<EA) - 3* (AD>EA) RQ 790 IF F THEN 800:ELSE PRIN T"{BLU}** LOAD COMPLETE D WITHOUT ERRORS **":GO TO 220 ER 800 GOSUB 950: PRINT" [BLK] {RVS} ERROR DURING LOAD : {4}":ON F GOSUB 810,8 20,830,840:GOTO220 QJ 810 PRINT"INCORRECT STARTIN G ADDRESS ("; HEX\$ (AD);") ": RETURN DP 820 PRINT"LOAD ENDED AT ";H EX\$ (AD) : RETURN EB 830 PRINT"TRUNCATED AT ENDI NG ADDRESS ("HEX\$(EA)") ": RETURN FP 840 PRINT"DISK ERROR "; A\$:R ETURN KS 850 PRINT"TAPE": AD=POINTER (F\$):BANK 1:A=PEEK(AD):A L=PEEK (AD+1): AH=PEEK (AD XX 860 BANK 15:SYS DEC("FF68") ,0,1:SYS DEC("FFBA"),1, 1,0:SYS DEC("FFBD"),A,A L,AH:SYS DEC("FF90"),12 8: IF OP THEN 890 FG 870 PRINT: A=SA:B=EA+1:GOSUB 920:SYS DEC("E919"),3: PRINT"SAVING ";F\$ AB 880 A=BS:B=BS+(EA-SA)+1:GOS UB 920:SYS DEC ("EA18"): PRINT" { DOWN } {BLU } ** TAP E SAVE COMPLETED **":GO TO 220 CP 890 SYS DEC("E99A"): PRINT: I F PEEK (2816) = 5 THEN GOS UB 950: PRINT" [DOWN] {BLK}{RVS} FILE NOT FOU ND ":GOTO 220 GQ 900 PRINT"LOADING ... [DOWN] ":AD=FNAD(2817):IF AD<> SA THEN F=1:GOTO 800:EL SE AD=FNAD(2819)-1:F=-2 *(AD<EA)-3*(AD>EA) JD 910 A=BS:B=BS+(EA-SA)+1:GOS UB 920:SYS DEC("E9FB"): IF ST>0 THEN 800:ELSE 7 90 XB 920 POKE193, FNLB(A): POKE194 ,FNHB(A):POKE 174,FNLB(B) : POKE 175, FNHB (B) : RET URN CP 930 CATALOG: PRINT" [DOWN] [BLU] ** PRESS ANY KEY F OR MENU **":GETKEY AS:G ото 220 MM 940 PRINT BES" [RVS] QUIT {4}";RTS;"ARE YOU SURE {SPACE}[Y/N]?":GETKEY A \$:IF A\$<>"Y" THEN 220:E LSE PRINT" (CLR) ": BANK 1 5: END JE 950 SOUND 1,500,10:RETURN AF 960 IF ER=14 AND EL=260 THE N RESUME 300 MK 970 IF ER=14 AND EL=500 THE N RESUME NEXT KJ 980 IF ER=4 AND EL=780 THEN F=4:A\$=DS\$:RESUME 800 DQ 990 IF ER=30 THEN RESUME: EL SE PRINT ERRS (ER); " ERR OR IN LINE"; EL

bug-swatter

"GeoConverter," the conversion program listed in the GEOS column each month, has a couple of errors. The first problem prevents Geo-Converter from finding a file if the preceding filename in the disk directory is 16 characters long. The second problem causes it to set the file type for the converted file incorrectly. To correct the problems, substitute the following lines:

200 IF ASC(B\$)=160 OR I=19 THEN 220

320 FOR I=1 TO 32*E+2:GET#2, BS:NEXT

330 PRINT#2,CT\$;MT\$;MS\$;:FOR I=0 TO 15:GET#2,B\$:NEXT

• Program 3 from "Text Screen Editor" and Program 3 from "RGB Kit" (both from the October 1989 issue) have a similar problem. The starting addresses of both programs are unacceptable to "MLX." To enter these programs, you'll have to create a special version of 64 MLX which doesn't check the starting and ending addresses. To do this, change line 1040 of MLX to

1040 RETURN

Save this new version of MLX under a new name—don't erase your old version. Using this version, you'll be able to enter both programs correctly.

- Several readers have had trouble entering Program 2 from "64 Animator" (September 1988). If 64 Animator isn't activated when you type in the demo, the program isn't tokenized correctly and won't run. To enter Program 2 correctly, first enter Program 3 using MLX. Next, load Program 3 and activate it with the command SYS 16384. Load "The Automatic Proofreader," found elsewhere in this issue, and run it. Then enter Program 2.
- The MLX ending address for the patch program, SpeedScript 128 Plus (September 1989), is incorrect. The

correct values for MLX are as follows:

Starting address: 3A00 Ending address: 48EF

If you've already typed in the data for SpeedScript 128 Plus, you can correct your copy with a few simple steps. First, load and run MLX, and then enter the correct starting and ending addresses listed above. Next, load your copy of SPEEDPATCH 128. When MLX displays the error message ERROR DURING LOAD: TRUNCATED AT ENDING ADDRESS, just ignore it. Now, save a copy of the patch program with a new name and follow the directions in the SpeedScript 128 Plus article for incorporating the patch into Speed-Script 128.

• We've received dozens of calls and letters about the program "Stars II" (August 1989). It seems that many of you are having trouble typing in this program. We've checked the program thoroughly and know that it works correctly.

Stars II is very difficult to type in. It contains nearly 100 DATA statements. If these DATA statements aren't entered correctly, the program won't run. If your copy of Stars II doesn't run correctly, go back and examine the DATA statements very carefully. One of the most common mistakes our readers make is typing periods where they should have commas and vice versa.

Many of you have requested a way to print the sky plots once they're on the screen. "Print-Screen" (December 1987) and "1526 PrintScreen" (December 1988) provide excellent printouts. PrintScreen works with the Commodore 1525 and compatible printers. It also has a customizer program to allow it to work with nearly any printer. As its name implies, 1526 PrintScreen works with the Commodore 1526 printer.

G

How To Type In COMPUTE!'s Gazette Programs

Each month, COMPUTE!'s Gazette publishes programs for the Commodore 128, 64, Plus/4, and 16. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. All 64 programs run on the 128 in 64 mode. Be sure to read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

We frequently publish two programs designed to make typing easier: The Automatic Proofreader, and MLX, designed for entering machine language programs.

When entering a BASIC program, be especially careful with DATA statements as they are extremely sensitive to errors. A mistyped number in a DATA statement can cause your machine to "lock up" (you'll have no control over the computer). If this happens, the only recourse is to turn your computer off then on, erasing what was in memory. So be sure to save a program before you run it. If your computer crashes, you can always reload the program and look for the error.

Special Characters

Most of the programs listed in each issue contain special control characters. To facilitate typing in any programs from the *Gazette*, use the following listing conventions.

The most common type of control characters in our listings appear as words within braces: {DOWN} means to press the cursor down key; {5 SPACES} means to press the space bar five times.

To indicate that a key should be shifted (hold down the SHIFT key while pressing another key), the character is underlined. For example, A means hold down the SHIFT key and press A. You may see strange characters on your screen, but that's to be expected. If you find a number followed by an underlined key enclosed in braces (for example, {8 A}), type the key as many times as indicated (in our example, enter eight SHIFTed A's).

If a key is enclosed in special brackets, [3], hold down the Commodore key (at the lower left corner of the keyboard) and press the indicated character.

Rarely, you'll see a single letter of the alphabet enclosed in braces.

This can be entered on the Commodore 64 by pressing the CTRL key while typing the letter in braces. For example, {A} means to press CTRL-A.

The Quote Mode

Although you can move the cursor around the screen with the CRSR keys, often a programmer will want to move the cursor under program control. This is seen in examples such as {LEFT}, and {HOME} in the program listings. The only way the computer can tell the difference between direct and programmed cursor control is the quote mode.

Once you press the quote key, you're in quote mode. This mode can be confusing if you mistype a character and cursor left to change it. You'll see a reverse video character (a graphics symbol for cursor left). In this case, you can use the DELete key to back up and edit the line. Type another quote and you're out of quote mode. If things really get confusing, you can exit quote mode simply by pressing RETURN. Then just cursor up to the mistyped line and fix it.

When You Read:	Press:	See:	When You Read:	Press:	See:	When You Read:	Press:	See:
{CLR}	SHIFT CLR/HOME	dille	{PUR}	CTRL 5		4		
{HOME}	CLR/HOME	5	{GRN}	CTRL 6	+	1	SHIFT †	m
{UP}	SHIFT ↑ CRSR ↓	-	{BLU}	CTRL 7	#-			
(DOWN)	↑ CRSR ↓	0	{YEL}	CTRL 8	T	For Commodore 64	Only	
{LEFT}	SHIFT ← CRSR →		{ F1 }	fi				1
{RIGHT}	← CRSR →		{ F2 }	SHIFT fi		E 1 3 E 2 3	COMMODORE	2
{RVS}	CTRL 9		{ F3 }	f3		E 3 3	COMMODORE	3
{OFF}	CTRL 0		{ F4 }	SHIFT f3		£ 4 3	COMMODORE	9 0
{BLK}	CTRL 1		{ F5 }	f5		E 5 3	COMMODORE	5 1
{WHT}	CTRL 2		{ F6 }	SHIFT f5	2	E 6 3	COMMODORE	6
{RED}	CTRL 3		{ F7 }	f7		E 7 3	COMMODORE	7
{CYN}	CTRL 4		{ F8 }	SHIFT f7		E 8 3	COMMODORE	8

Classified

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COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS

continued from page 88.

Nightmares and Aliens

Medalist International (marketed by MicroProse, 180 Lakefront Drive, Hunt Valley, Maryland 21030) has released two new games that may keep you up at night. Weird Dreams (\$29.95) delves into the subconscious, while the arcade conversion Xenophobe (\$29.95) takes you on a mission of alien extermination. Both games are marketed under Medalist's MicroPlay label and require a joystick to operate.

In Weird Dreams, you assume the role of a hospital patient as he undergoes surgery. As his subconscious mind begins to wander, you'll encounter giant wasps, carnivorous rose bushes, a psychopathic lawn mower, and an evil little girl. Other ordeals include fish flying through the sky, a person trapped inside a giant cotton-candy machine, and a demonic soccer ball. Your success directly affects the patient's health on the operating table.

Xenophobe puts you in command of three squads of scientists, soldiers, and others in a battle to reclaim abandoned space stations from alien invaders. From your nine charges you must select the two best personalities to handle each mission. These fighters then face a continuous wave of creatures with names like Rollerbaby, Snotterpillar, and Tentacle, each with its own unique way of knocking human attackers out of action.

Psygnosis Invades Software World

In an aggressive move, Psygnosis (P.O. Box 483, Addison, Illinois 60101) has announced a plan to release a large volume of game titles in the coming months, including several for the Commodore 64.

The Great Britain-based company has recruited additional personnel, including software engineers, graphic artists, animators, musicians, and writers. Psygnosis also has put into place a new advertising campaign and will attend more trade shows.

New titles currently available or soon to be released include *Captain Fizz* (\$29.95), *Ballistix* (\$29.95), and *Blood Money* (\$29.95). Three others are planned for early 1990.

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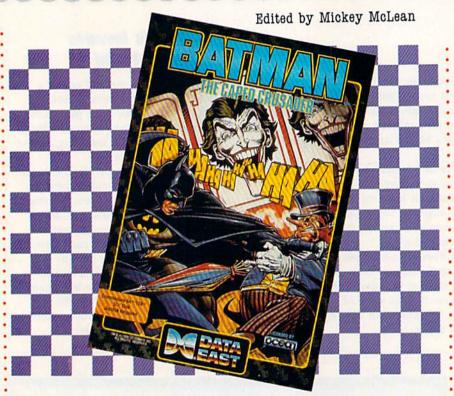
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COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS



Software Box Office Boffo

Two software titles from Data East USA (1850 Little Orchard Street, San Jose, California 95125), *Batman, The Caped Crusader* and *Robocop*, have sold over 100,000 units. The games are based on motion pictures that have also done well at the box office.

"Data East anticipated strong consumer demand for software games that bring the excitement of Hollywood movies right to the computer," said Mark Beaumont, vice president of consumer marketing at Data East USA. "Our strategy was to capture the essence and characters from the Batman and Robocop movies and create challenging and fun games around those popular themes."

In Batman, you must make your way through the streets of Gotham City to destroy The Penguin's master computer. After defeating that feathered fiend, you must rescue Robin, who has been kidnapped by The Joker.

The software version of *Robocop* features the same action story line and adventure as the movie.

Rap It Up!

Taito Software (9267 West Esplanade, Suite 206, North Vancouver, British Columbia, Canada V7M 1A5) has announced a rap-music sweepstakes game. The "Say Rap. Say Taito. Say Yo!" Sweepstakes' grand prize includes a five-day trip for two to New York with round-trip airfare and hotel accommodations, a visit to the cable TV show, "Yo! MTV Raps," and \$1,000 in spending money.

The contest began with commercials on MTV and two-page ads in computer magazines including the October issue of *Gazette's* sister publication, *COMPUTE!*. The ad contains a rap identifying Taito's game titles and an entry form. Official entry forms are also available at Taito software retailers. To enter, you must list any five Taito product titles and mail in the form. Entries must be received by February 1, 1990.

Kube Khaos

Addiction could be a problem with Kaleidokubes (\$24.95), a mind bender from Artworx (1844 Penfield Road, Penfield, New York 14526). The game's concept is similar to dominoes, but the object is to match colors.

Place your kube on the playing board, matching the sides with pieces already on the board. Game options include playing against the computer, another player, or yourself in practice mode. Kubes appear randomly and can be rotated to best fit the kubes which have already been played. The program keeps track of the time and penalizes slow play and incorrect moves. High scores and low times are saved to disk. Several different board configurations are available on disk, or you can design your own.

Character Builder

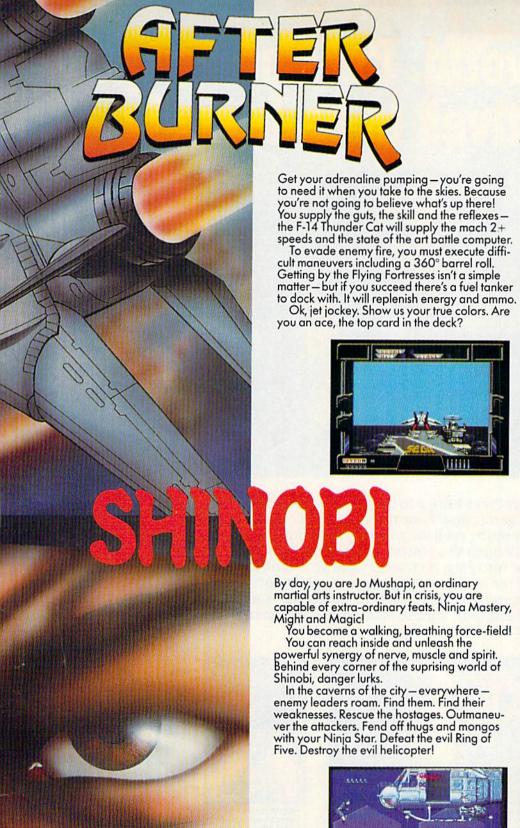
A second time-saving utility program for TSR's Advanced Dungeons & Dragons has been released by Strategic Simulations. Dungeon Masters Assistant, Volume II: Characters and Treasures (\$29.95) enables Dungeon Masters to generate detailed player or nonplayer characters and large treasure hoards while letting the computer do the number crunching.

The program accounts for every facet of character generation, from languages and spell lists to class and racial abilities. All character classes, including multiclass characters, can be displayed on ready-made character sheets with all pertinent information. Character sheets can also be printed out for convenience.

You can generate all magic items from the AD & D Dungeon Masters
Guide and Unearthed Arcana as well as all treasure types from the Monster
Manual and Monster Manual II by using this program.

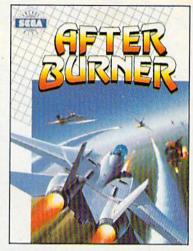
Dungeon Masters Assistant, Volume II: Characters and Treasures is distributed by Electronic Arts (1820 Gateway Drive, San Mateo, California 94404).

continued on page 87.



Get your adrenaline pumping — you're going to need it when you take to the skies. Because you're not going to believe what's up there!

Ok, jet jockey. Show us your true colors. Are you an ace, the top card in the deck?



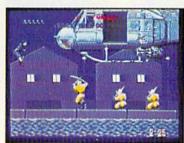


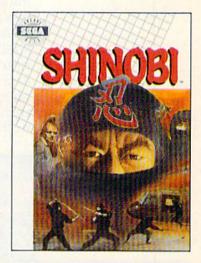
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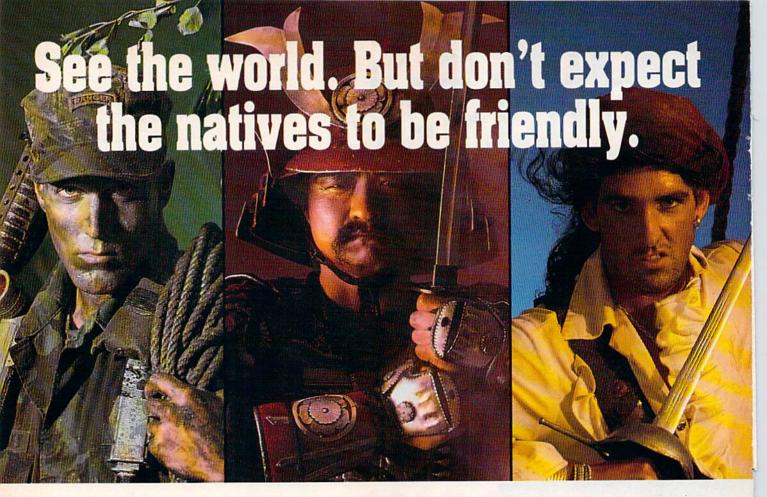






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