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*=General, 64=Commodore 64, +4=Plus/4, 16=Commodore 16, 128=Commodore 128

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editor's notes

COMPUTE!'s GAZETTE

FOR COMMODORE PERSONAL COMPUTER USERS

Everyone has to take science courses in high school. The big problem for me started with chemistry class. A barrage of elements, minerals, and chemicals, each with strange, cryptic abbreviations. Then came the bizarre chains that represent the various molecular structures: If we add H_2 here, will oxidation take place? If so, how is the carbon chain affected? Draw the new chain. You may recall the strange little diagrams that looked like many strings of pearls after several hours in a clothes dryer.

It was then that I began to suspect the Great Scheme. All of this information was too abstract, too far removed from the real world I thought I was beginning to understand through history, English, geography, even math. Well contrived, I thought, but not clever enough. People who had little or no talent for self-expression—writing, music, and art, for example—had long ago invented a secret society for the institution of bogus scientific systems and subsystems which has continued to expand and codify over the decades and centuries.

The culmination of my experience with that chemistry class was a drawing I made in answer to a final-exam question requiring one of those molecular chain contrivances. I drew a picture of bacon and eggs.

Freshman year, college. Required: Chemistry 101, with a two-hour lab every Friday. In the labs, I remember pouring combinations of oddly colored solutions together to make an even stranger-colored one with, maybe, some smoke rising. On paper, the string of pearls became even more convoluted. My Great Scheme suspicions were now zealous convictions.

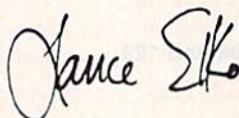
While I held these beliefs closely over the years, I never shared them until many years later. My wife is very strong in the sciences and had taken a lot of chem-

istry and related courses in college. She was, by then, a clinical dietitian. One day after work, she was discussing how a certain hospital patient required this and that, but no potassium—and an IV solution because of electrolyte imbalance. I let loose. The restraining walls that had held my pet theory for so many years erupted. I accused her of propagating the confounding conspiracy, the Great Scheme. She laughed, hard. But I knew her to be an honest woman—and this added to my confusion.

In January 1983, intrigued by a new mass-market product—the personal computer—I splurged and purchased a Commodore 64 for \$400. Computers fascinated me. After learning to program, I was hooked.

The following Thanksgiving, having been at COMPUTE! since the previous spring, I returned home with my wife for the holidays. Sitting around the table, some curious family members asked me questions about how these new computers worked. As the questions and answers became more complex, I heard myself explaining things about serial and parallel data transfer, raster interrupts, data storage, binary math, and electron guns used with RGB monitors. Electron guns? The great revelation. I had become a co-conspirator with my wife and old chemistry teachers. I was now part of the Great Scheme.

Welcome to the wonderful world of science.



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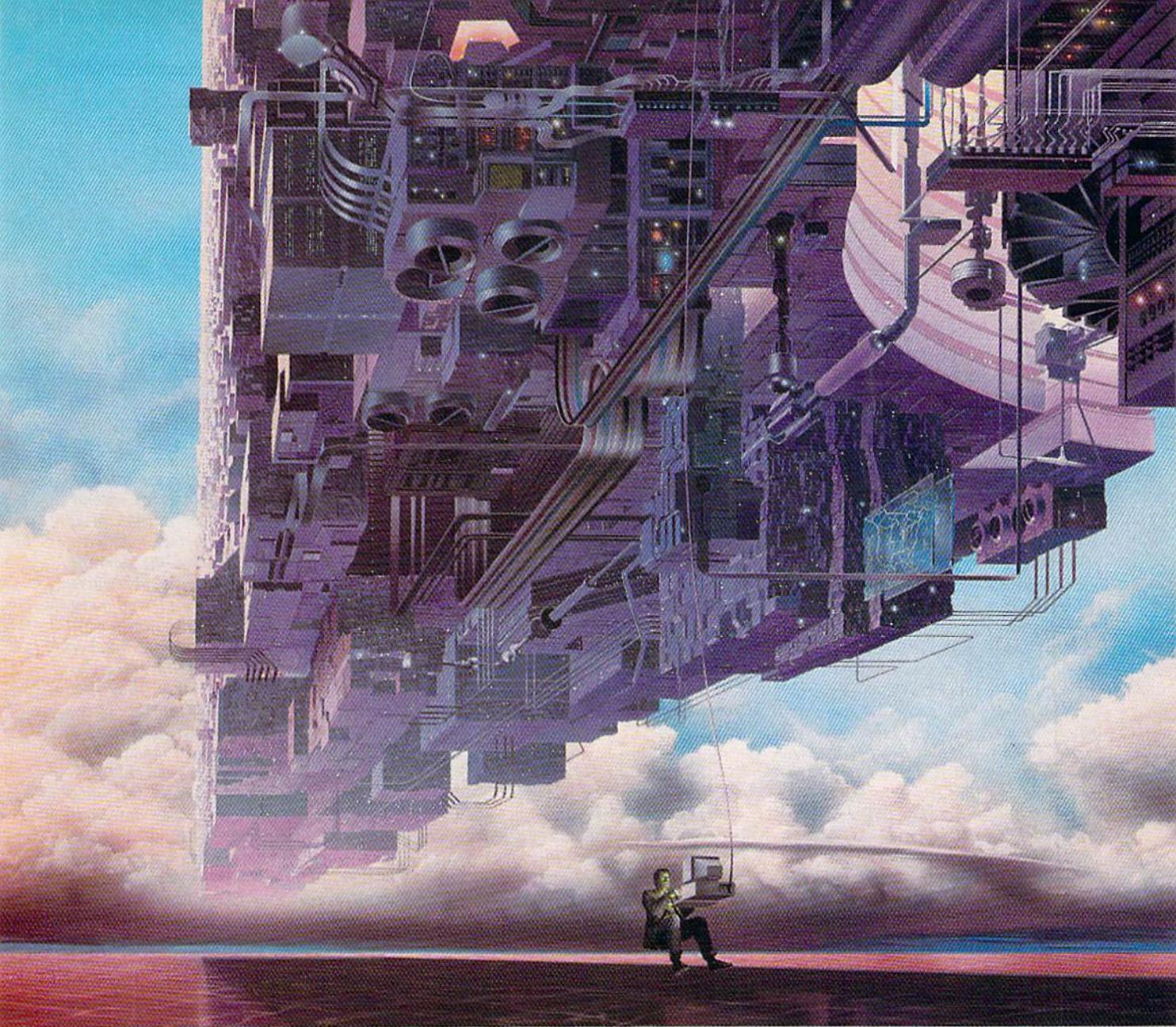
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letters to the editor

Plain Vanilla Reviews

Let's discuss your software reviews. They are much too vanilla. What is sorely needed is a rating system that will rate software in several categories, including a warning if the product's copy-protection scheme will rattle the disk drive head.

Robert Nellist
Brockport, NY

We've heard this complaint off and on over the past five years, and we addressed it way back in the July 1984 issue. We haven't stated our position on software reviews in recent years, so since it remains the same, here's how we addressed it four years ago in the July 1984 "Editor's Notes."

"A number of readers have asked why we don't 'grade' our reviews or 'de-grade' some products. Essentially, any product we review is, in our opinion, of merit. We feel that it's only worth your time and space in GAZETTE to review products that are well designed. The market is flooded with products, and we'd rather tell you about the good ones.

"While the grading of products may be helpful to some readers, it is often unfair to the product. If you've ever read reviews of records you really like, only to see a thumbs down or a poor grade, you probably wondered if the critic heard the same thing you did. The goal of quantifying a product with a letter or number grade is to be objective, yet it's often subjective and arbitrary. If we took a poll of our staff, we'd have a number of different answers."

To augment this position, it remains true that our staff and outside reviewers have varying opinions on software products. If there's a general consensus among our staff that a product is not good, we'll pass on it (regardless of who published it). Whether a good product should get a B or an A— is eternally debatable.

Our reviewers are sensitive to products that are abusive to the disk drive. And many have made notes to that effect in a number of reviews in the past year.

WordStar for CP/M

I've just read the excellent article in the March 1988 issue entitled, "Super CP/M Software for the 128, Part 1: Writer's Toolbox," by Clifton Karnes. I have always wanted to purchase WordStar, but I didn't think I could afford its hefty price tag. Your article got me to thinking. If I could purchase WordStar 2.26 from PDSC at \$39.95, I could then upgrade to WordStar 4.0 for \$89.

Then I saw an article in FOGHORN that said WordStar 4.0 was now available to all registered CP/M users for \$89. I couldn't believe that this word processor was available to 128 users for less than \$100. I thought your readers might like to know about the new version of WordStar and its new low price.

John L. Gordon
Chadds Ford, PA

When MicroPro first released the CP/M version of WordStar 4.0, it was available only as an upgrade for owners of previous versions. As you stated in your letter, it's now available to any CP/M user at a bargain-basement price of \$89. You can order WordStar 4.0 from MicroPro at (800) 227-5609, extension 761.

SpeedScript Copyright

What is the present copyright status of SpeedScript? A couple of our user group members say they have seen a notice releasing the program to public domain.

James C. Ladd
San Antonio, TX

We have not released SpeedScript to the public domain, nor do we have plans to do so. While we own the copyright to SpeedScript, we do grant permission for user groups (or any individuals or organizations) to provide disk copies of SpeedScript—or any of our programs—to individuals who own a copy of the issue in which the corresponding article was printed. Version 2.0 of SpeedScript is in the January 1984 GAZETTE; version 3.0 is in the March 1985 COMPUTE!; and version 3.2 is in the May 1987 GAZETTE. Each of these issues contains full documentation.

Copying GAZETTE Disks

I would like to know how to copy my COMPUTE!'s Gazette disks. Are they write-protected? If so, why?

Peter J. Cotton
Waukesha, WI

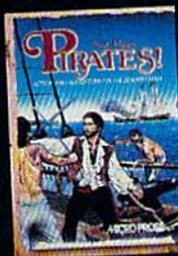
The GAZETTE Disk is write-protected as a result of a damaging incident several years ago. A program on a 1985 disk, which was not write-protected, included a feature which reformatted the current disk in the drive. A number of subscribers loaded the disk menu, then pressed a key to load the program, which itself contained a menu. After pressing a number corresponding to the menu selection which reformatted the disk, they lost everything. We had a large number of returns—and a lot of phone calls. We decided at that time to write-protect the disk as a safeguard for both ourselves and subscribers. In retrospect, we're glad we did. Since that incident, we've published dozens of programs that are designed to write to disk. When those programs are published on disk, we include a message screen to remind the user that disk is write-protected.

While the disk is write-protected, it is not copy-protected. Any GAZETTE program can be saved from memory directly to a blank, formatted disk. Over the years, we've published a number of copy programs that can help with this. The most recent is "Disk Rapid Transit" (December 1987) which is easily the fastest copier program we've published. In general, copy programs are available—with varying quality—in the public domain and in user group libraries.

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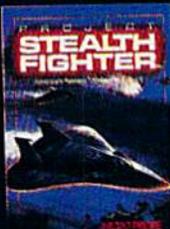


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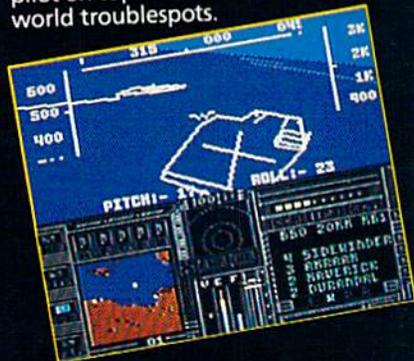


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Do you have a question or a problem? Have you discovered something that could help other Commodore users? We want to hear from you. Write to Gazette Feedback, COMPUTE!'s Gazette, P.O. Box 5406, Greensboro, NC 27403. We regret that, due to the volume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

Stop Scrolling

I adapted the algorithm for scrambling the random numbers 1-1000 in the March 1988 "Gazette Feedback" column to pick random numbers in the range 1-48 for the New York state lotto.

One minor problem presents itself. The column of numbers scrolls out of sight before the program reaches the 48th number. Could you print an addition to this program that would print the numbers in four or more columns across the screen?

Robert G. Farricy
Syracuse, NY

A variety of solutions present themselves. If you're using a 128, you can press the NO SCROLL key to freeze the screen. Press it again to unfreeze it. On the Plus/4 and 16, use CTRL-S to freeze and CTRL-Q to unfreeze.

On the 64, you can build your own print-freezing routine. If you want to check for a keypress between lines 60 and 70, add these lines:

```
65 GET A$: IF A$="" THEN 70
66 GET A$: IF A$<>"" THEN 66
```

In line 65, the program checks for a keypress. If the user didn't press a key, the program jumps forward to line 70. At line 66, it waits for another keypress and doesn't break out of the loop until the user hits a key. Note that both lines use two double quotation marks with nothing between them. This is a null string, a string that contains no characters.

A quicker way to freeze the screen is to press the RUN/STOP key. When you want the program to continue, type CONT.

If you'd prefer to see all 48 numbers on the screen at the same time, you can print them in columns. Just add a comma after the variable name in the PRINT statement. Substitute PRINT X(I), (with a comma) for PRINT I,X(I) and you'll see 12 lines of four columns.

Doctor, Doctor

I have recently purchased a 1581 disk drive. I can't get my directory organizers and disk cataloger programs to work with it. I guess this is because there are twice as many tracks, which makes programs for the 1541 incompatible with the 1581. Can you help?

Seth Meashey
Woodbridge, VA

A disk operating system (DOS) stores information in two sections: the directory and the rest of the disk. DOS designers can make disk access slightly faster if the directory is located on the middle track. A 1541 disk puts the directory on track 18 because there are a total of 35 tracks. When a program is found in the directory, the drive's read/write head will move a maximum of 17 tracks to track 1 or track 35.

A 1581 disk has 80 tracks, and the directory is located on track 40 (the middle of the disk). If you happen to have a disk doctor or directory organizer program for the 1541, it probably expects to find the directory on track 18. The programmer assumed the directory would always live on track 18.

Two suggestions come to mind: Either modify the program to look for the directory on 40 instead of 18, or write to the company that released the original program and ask them if they are working on a new version for the 1581 drive.

The Best Language?

I was wondering which language the creators of commercial games use—machine language or BASIC or some other language I don't know about? I was also wondering if a person like me could learn how to create games like the ones on the market today.

Craig Cassata
Orland Park, IL

Although some smaller software companies sell programs written in BASIC, most commercial software for the 64 and 128 is written in machine language (ML) because it doesn't use up much memory and it's very fast. On computers such as the IBM PC or Amiga, C language is popular because it's almost as fast as ML and it's fairly portable, meaning that you can write a program for the PC and then "port" it over to the Amiga or another computer. Pascal,

Modula-2, Forth, and various other languages are also used for commercial development.

Some software companies assign an entire program to one programmer, but, on complicated projects, the work is sometimes split up between people who specialize in sprites, sound, and other aspects of a project. Some companies use expensive—and very fast—minicomputers to develop Commodore software (imagine a \$20,000 computer running an emulator that makes it act like a \$200 Commodore 64). Infocom has its own language for writing adventure games, the Zork Interactive Language (ZIL). After creating a game and the generic packaging and documentation, they can quickly compile it into several dozen versions for different computers. The resulting program is machine language, but it wasn't written directly in ML.

Some companies write all of their programs in-house, but others hire freelance programmers. Still others will evaluate software and buy it if they like what they see. If you're interested in freelance programming, write to various software companies and ask for their Author's Guidelines. Another avenue is writing for GAZETTE. Many of our programs are written by readers like yourself.

Vexed by Hex

My printer has many capabilities that I have been unable to use, as I am unable to give the proper commands with the information I have available. The user's manual gives commands such as this:

```
CHR$(&HE) Set enlarged characters
CHR$(&H4E) Select pica characters
CHR$(&H51) Select condensed characters
```

Is there any cross-referencing information available for translating these codes to the 64?

Paul Offutt
Louisville, KY

Some computers, but not the 64, use the &H prefix to mark hexadecimal (base 16) numbers. You'll have to translate the hex values into decimal. Just remember that the hex numerals A-F correspond to the decimal values 10-15 and that the second number from the right is the sixteens' place (not the tens' place).

*The three CHR\$ codes you listed translate into CHR\$(14), CHR\$(4*16+14), and CHR\$(5*16+1)—or 14, 78, and 81.*

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CHR\$(78) and CHR\$(81) are the ASCII values of the letters n and q. If you send these characters to the printer, it will just print an n or a q. It's likely that you'll need to send an Escape code, a CHR\$(27), first. Try this: OPEN 4,4,7: PRINT#4, CHR\$(27);"N": CLOSE 4. If your interface automatically translates from Commodore ASCII to true ASCII, you may need to experiment with using uppercase or lowercase for the letters like n and q.

Commas Instead of Periods

I have a question concerning the keypad and the 128. When inputting a program with numerous DATA statements, I have found it easier to use the numeric keypad. Is there some way to redefine the decimal point to a comma? If so, I wouldn't have to reach across to hit the comma key.

Donald Hebert
APO, NY

The 128 uses five lookup tables to translate keyscan codes to ASCII values (for more information, see the entry at location 830 in Mapping the 128 from COMPUTE! Books). The five tables correspond to the five keyboard maps: plain (unshifted), SHIFT, Commodore, CONTROL, and ALT. The default location for normal, unshifted keys is 64128. The first thing to do is copy the table from ROM down to RAM. Line 20 does this in the program below. The period (decimal point) on the numeric keypad has a keyscan code of 82. A period is ASCII 46. We want to change it to a comma, which is ASCII 44. Line 30 modifies that character in the table. Then, in line 40, the pointer for the unshifted keys is moved to point to the brand new table at 6912. When you press the period on the numeric keypad, you'll get a comma instead. See the next letter for another idea.

```
BQ 10 RAM=6912: ROM=64128
XP 20 FORJ=0TO88: POKERAM+J, P
    EEK (ROM+J): NEXT
AG 30 POKE RAM+82,44
CR 40 HI = INT (RAM/256): POKE
    {SPACE}830, RAM-HI*256: P
    OKE 831,HI
```

DATA and Commas

Many BASIC programs have an extensive DATA section. It would be easier for 128 users if a one-handed entry feature could be incorporated into "The Automatic Proofreader." I'd suggest that one of the function keys be reassigned to a comma (F1, maybe?). I don't have a machine language assembler/disassembler, and my ML is a little rusty, but the change should only be a few lines.

Charles F. Oller
Warwick, RI

You don't need ML. You can do everything in BASIC 7.0. Look up the two commands

KEY and AUTO in your System Guide. If you want F1 to print a comma and F7 to print DATA, type these two lines:

```
KEY1,""  
KEY7,"DATA"
```

If the DATA statements are numbered by tens, use the AUTO command to put the 128 into autonumbering mode. Type a line, press RETURN or ENTER, and the next line number will appear. Press F7 for DATA and F1 to print the commas between numbers.

Using "Countdown Timer"

I am trying to write a BASIC program that will determine typing speed. I'd like to use "Countdown Timer" from the April GAZETTE, but when it's running I can't type on the keyboard. How can I use the Countdown Timer to stop all keyboard entry after one or five minutes?

Steven Schulte
Long Beach, CA

From your description, it sounds like you're attempting to build your program around the five-line demonstration program included in the article. This demo displays the current internal clock reading as it counts down from one minute. Near the end of the article is a description of how to incorporate the Countdown Timer into your own BASIC programs.

To do this, you'll need to include the lines from Program 1 (for the 64) or 2 (for the 128) in your program. These lines POKE the ML routine into memory. Start up Countdown timer with SYS 679 on the 64 or SYS 3072 on the 128. Next, set the internal clock using the reserved variable TIS (either TIS="000100" or TIS="000500").

Follow this with your typing input routine. Include a line near the end of the routine to check the timer. If it has wrapped around from "000000" to "235959" or something lower, the time is up and you can rate and display the user's typing speed. Otherwise, loop back to the beginning of the typing input routine.

Note that we didn't suggest that you look for exactly zero ("000000") on the timer each time through the loop. If you did this, chances are you'd miss it since the input routine may take longer than a second to execute.

Locating the Hi-Res Screen

I have a question regarding location 53272, which is used to select base addresses for bitmap mode on the Commodore 64. Most references I've seen will POKE 53272,29 (binary 00011101) to put the graphics screen at \$2000 (8192) and color memory at \$0400 (1024). The low nybble of this number is 13 in decimal. Shouldn't the low nybble

be 8? POKEing a 29 in 53272 would seem to put the bitmap at 13*1024 (13312). Could you explain what they're doing here?

Wayne Dooley
Winchester, VA

Locations 53248-53294 are registers in the VIC-II chip, which is responsible for the 64's video display. The VIC chip can address only 16K of memory at a time. Data for anything shown on the screen must be located within this 16K of memory. Any of the four 16K blocks (0-16383, 16384-32767, 32768-49151, 49152-65535) can be chosen for video memory. Location 56576 (bits 0-1) determines which 16K video bank the VIC chip addresses.

The VIC chip register at 53272 does several different things. In text mode, it contains the offset address within the current video bank for the character set in the low nybble and the address for the text screen in the high nybble. The character set is 2K in length, so the low nybble (in bits 1-3) must hold an even number from 0 to 14, representing a 2K offset (since the number is always even, bit 0 is unused). Similarly, the text screen is 1K in length. So, bits 4-7 hold a number from 0 to 15, representing a 1K offset.

In normal bitmap mode, bits 4-7 still point to the offset address for the text screen. But in this case, the text screen provides color data for the graphics screen. As for the low nybble (bits 0-3) in this mode, only bit 3 is significant. It provides the 8K offset for the bitmap screen from the beginning of VIC memory. If this bit contains a 0, the offset is 0K, and if it contains a 1, the offset is 8K (8192).

Now, to consider your example. POKEing a 29 (binary 00011101) into 53272 sets bit 3. Assuming the VIC-II chip is in video bank 0 (0-16381), the bitmap screen is positioned at 8192 because bit 3 is turned on. The other bits in the low nybble are ignored. You could get the same result by POKEing a 24 (binary 00011000) into 53272.

Color memory for this hi-res screen is at 1024. A value of 1 is stored in the high nybble of 53272, and $1 \times 1024 = 1024$.

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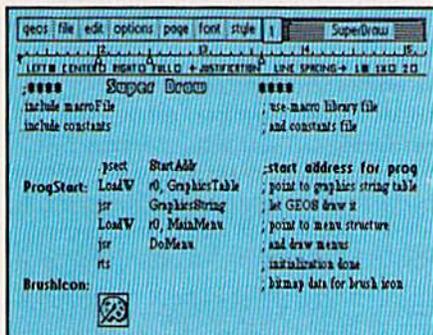
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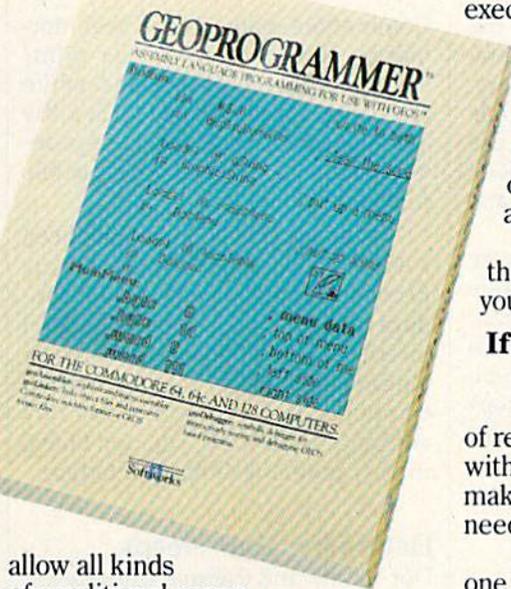
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Commodore-Ready Printers: A New Generation

Much More—For Less

Tom Netsel, Assistant Features Editor

Sales of more than seven million 64s and 128s have had a major impact on the printer market. The result: Printer manufacturers now offer 64 and 128 owners a wide choice of Commodore-ready printers that are filled with features undreamed of just a few years ago.

After a disk drive, a printer is the most popular computer peripheral bought by home computer users. About 65–70 percent of the people who buy a computer for personal use also buy a printer, according to Rick Lamb, product manager for Okidata, a major printer manufacturer.

For Commodore owners, there are more than 100 different printers on the market, made by 20 different companies, all listing for less than \$500. Virtually any of them can be connected to a 64 or 128 with a separate printer interface. But it's not always a simple matter to achieve compatibility among printer, interface, computer, and software.

Uniquely Commodore

At one time, only a Commodore printer would connect directly to Commodore's unique serial port. There wasn't much of a choice, and special features were limited. Anyone who wanted underlining, multiple pitches, subscripts and superscripts, or a choice of type styles had to buy a printer with a standard Centronics parallel port. Then a separate interface was still needed to connect the printer to the 64 or 128.

As the base of Commodore owners grew, however, more and more manufacturers began offering ready-to-use printers packed with a full range of features. Now 64 and 128 owners have a wide choice of

Commodore-ready daisywheel, dot-matrix, and thermal-transfer printers to handle their black-and-white and color printing needs. (See the accompanying buyer's guide for details about Commodore-compatible printers.)

Last year, Okidata introduced a universally compatible dot-matrix printer featuring both a Commodore serial and a Centronics parallel interface. The Okidata 180 is compatible with every major personal computer. If, for example, you buy an Amiga or IBM PC, you don't have to buy another printer or interface.

Determine Your Needs

Dot-matrix and thermal printers are the most popular choices among Commodore owners. Key ingredients to their popularity are versatility and low cost. Cost alone, however, should not be the deciding factor in choosing a printer. If a bargain printer doesn't meet your printing requirements, it isn't much of a bargain.

"Too many times the printer-purchase decision is dependent upon how much money is left over in discretionary income," Lamb says. "The buyer has \$120 left, so he buys a \$120 printer. Often there is some buyer remorse. After he lives with the print quality for a while, he realizes he needs something better."

Ask yourself what you want the printer to do. Decide how you plan to use the printer; then pick the one that has the features you need. If you primarily want to print graphics, you have different needs from those of the person who works with spreadsheets and needs a printer with 136 columns.

Daisywheels

If you write business reports, term papers, or other important correspondence requiring a professional look, a daisywheel printer offers the sharpest type. Your papers will look as though they've been typed on a quality typewriter, but you'll have to wait for them. Daisywheels are notoriously slow. Most daisywheels priced for the home market operate at speeds in the 10–20 cps (characters per second) range. That's fast for a human typist, but the daisywheel is the tortoise of the printer world.

The printing element of a daisywheel is a flat metal wheel that has approximately 90 spokes. It's about three inches in diameter, and gets its name from the fact that it looks something like a daisy. At the end of each spoke or "petal" is a bossed letter, number, or punctuation mark. As the wheel spins, the characters are pressed against a ribbon, which transfers ink onto the paper. You can buy additional printwheels if you want to change to a different style of type or a different font. Since its basic printing element is a fixed alphanumeric character, the daisywheel cannot print graphics.

If you're looking for quality type, and you don't need speed or

graphics-printing capabilities, then a daisywheel may suit your requirements. Blue Chip, Brother, and Silver Reed each sell Commodore-ready units. The Silver Reed EXP 420 and the Brother HR-10/C offer a choice of pitches in the 10-15 cpi (characters per inch) range. Their top speed is 12 cps, while the Blue Chip D 20/10 is a little faster, at 20 cps.

Paper Handling

The method used for feeding paper in and out of a printer varies between models. Friction-feed printers move paper around the platen somewhat the way a typewriter does, while tractor-feed printers engage the holes at the edge of fanfold paper. Tractor feeds are usually more reliable when it comes to handling long printouts on continuous or fanfold paper. Many printers offer both methods, but tractors are often sold as options.

Some models, such as the Seikosha SP-1000VC, have an automatic loading feature for single sheets of paper: When the paper is inserted behind the platen, the printer automatically advances it to the proper starting position. This feature can speed up long printing jobs. The NX-1000C from Star Micronics America comes in two Commodore-ready models. Each employs a unique paper-parking feature that allows users to feed single-sheet paper into the printer without removing tractor-fed paper.

Dot-Matrix Printers

If the daisywheel is the tortoise of the printer world, then the dot-matrix printer is the hare. This versatile machine offers speed plus the ability to produce complex graphic printouts. Instead of printing with preformed characters, dot-matrix printers use a row of vertical pins that strike the paper through an inked ribbon.

Dot-matrix printers generally fall into one of three printhead configurations: 9-pin, 18-pin, or 24-pin. Printers with 24 pins offer letter-quality type, as opposed to the near-letter-quality (NLQ) mode found on 9-pin printers. Their ability to print out letter-quality correspondence at 100 cps makes 24-pin printers popular in an office environment. Their relatively high cost, however, has limited consumer interest.



The Okidata 180 is compatible with every major personal computer.

Printheads with nine pins are the standard with the Commodore-ready models. A vertical column of nine pins prints across a page in both directions in draft mode, at speeds ranging from 100 to 180 cps. This process is considerably slower in NLQ mode.

An early drawback to dot-matrix printers was print quality. The printheads formed characters in a 5 x 7 or 8 x 8 matrix. There was often considerable space between the dots, making the letters look porous and ill-defined. Upgrades in printer electronics and printheads, however, have improved print quality tremendously.

Most printers now have several print modes. Draft mode is usually the fastest, but produces a rougher, fainter type. NLQ, or correspondence mode, takes longer to print, but it produces a more polished print quality.

NLQ is achieved in a variety of ways. Spaces between the horizontal dots of a letter can be filled in by printing the same column of dots twice while the printhead is traveling at half-speed across the page. This is sometimes called *emphasized type*. Spaces between vertical dots can be eliminated by making a second pass over the line after moving the printhead or paper half a dot vertically.

NLQ printing uses these multi-strike techniques and special letter shapes to improve print quality. Unfortunately, improvements in one area often force a decline else-

where. A tradeoff for improved print quality is a reduction in printing speed, by 50-300 percent. Most NLQ printing is done at speeds of 25-30 cps.

Until recently, changing from draft to NLQ mode required changing the printer's DIP switches. This often meant turning the printer around or opening an inside panel to access the switches. Then you had to check the manual for the proper sequence, since DIP switches were seldom marked. Most printers today simplify this chore by providing front panel buttons that allow instant access to frequently used print functions. You can switch from emphasized to double width to italics at the touch of a finger.

Some high-end printers allow the user to change fonts by plugging in ROM cartridges, but multiple fonts are also available on some printers in the Commodore price range. The Star NX-1000C Multi Font printer has four onboard fonts that are selected from the front control panel.

A Splash of Color

Another Commodore-compatible version of Star's Multi Font is the NX-1000C Rainbow. In addition to the multiple internal fonts, the Rainbow provides seven-color printing capabilities, and prints at 144 cps in draft mode and 36 cps in NLQ mode at 12 cpi. It prints black, red, yellow, blue, orange, green, and violet.

"We believe [the NX-1000C Rainbow] will be a significant factor in the Commodore market," says Brian Kennedy, product manager at Star Micronics. "It's going to be the lowest-priced color impact printer on the market."

The Rainbow can be used as a conventional printer for word processing and similar functions when color is not wanted or needed. "If you want to use it in the monochrome, or black-only mode, that's no problem," Kennedy says. "When you print out a hardcopy, just omit the color commands."

Barriers to Color

Printer manufacturers expect color to play an important role in the future of all printers. Several obstacles presently stand in the way. The first is the lack of color copiers. While they are available, the cost is prohibitive. A color printout may look great for a business presentation or meeting, but without the ability to make color copies, its value is greatly diminished.

Another obstacle is the lack of software support for color printers. Most printing packages simply do not support color printers. To circumvent this problem, Kennedy says the Rainbow recognizes embedded color commands. For example, if it sees ((C1)) in a letter or memo, the Rainbow recognizes that code and changes accordingly to color number 1.

"If you're typing a report and want a heading in a different color, type in ((C3)) followed by the heading," Kennedy says. "Then type in ((C2)) to change back to blue or black. You can embed these commands in any standard word processing or software package."

Kennedy notes that the average life of the color ribbons on a dot-matrix printer should be a couple of hundred pages. It can be considerably shorter on other types of color printers.

Thermal-Transfer Printers

Another Commodore-ready color printer is Okidata's Okimate 20. It uses a different print technology called the *thermal-transfer* process. Instead of using pins to strike an ink-coated ribbon, the Okimate 20 briefly heats the pins. The heat transfers to a ribbon coated with a



The Star Micronics NX-1000C Multi Font includes four onboard fonts that are selected from the front control panel.

waxlike ink that melts, forming a character on the paper.

The thermal-transfer process has several advantages over the dot-matrix and daisywheel method. One is quietness. The Okimate 20 makes a slight whirring sound, and is practically silent compared to impact printers.

A third obstacle to the expanded use of color in printers is the high price tag—but not so with thermal-transfer printers. The Okimate, with a plug-in Commodore interface, has a suggested retail price of \$268, while the dot-matrix

Rainbow (which includes the multiple fonts) lists for \$379. There are a few other color printers in the \$500-\$700 range, but then prices jump quickly to \$6,000 and \$7,000.

"There's a big gap there," says Star's Rick Lamb. "Virtually all the large players are starting to add color to their line of printers, although very few are serial thermal-transfers such as the Okimate 20."

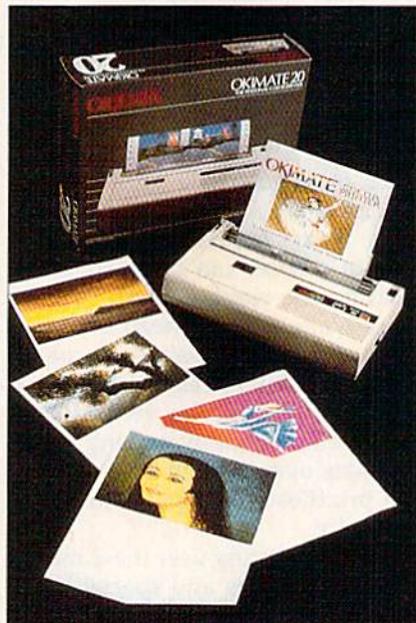
Another advantage to the color thermal-transfer process is its vibrant color. Dot-matrix printers put color to paper with ink, which lacks the high-gloss factor that wax achieves.

Unfortunately, thermal-transfer printers gobble up ribbons rather quickly, and they also require a very smooth paper for best results. A black ribbon may last for 75 pages of text, but expect only 10-15 pages when printing color graphics.

More Features in the Future

A few years ago, a basic dot-matrix printer cost about \$500 and offered little in the way of extras. Now you can find models for half that price that are loaded with advanced printing features. There have been modest price increases recently on Japanese-made printers because of the dollar/yen exchange rate, but there are still many exceptional printers available at attractive prices for Commodore users.

"The number-1 thing to remain competitive," says Star's Brian Kennedy, "is to introduce



The Okimate 20 offers vibrant color and graphics capabilities.

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new price/performance machines."

As manufacturers battle for a greater share of the printer market, printer buyers are reaping the advantages. And most manufacturers say this trend will continue.

As the prices of 24-pin machines come down, Kennedy believes they are going to force 9-pin machines out of the marketplace. "I think that over the next two or three years, 24-wire printers are going to come down so much in price that only the real down and dirty printers—in terms of price—are going to be 9-wires," he says.

Epson and NEC already have introduced 24-pin printers selling for \$499. Breaking the \$500 price barrier was a major step, and Kennedy expects to see them selling for \$399 in a couple of years. In order to compete, 9-pin printers will have to sell for \$299 and less. The 24-pin printers will be the standard for home users, and 9-pins will be bargain-basement items.

Looking to Lasers

On the other side of the coin, laser printers have come down in price so

quickly that they are overtaking the high-end 24-pin market. Lasers print spectacular graphics and produce text at near-typeset quality. They are quiet and fast. Instead of being rated at characters per second, lasers are rated at pages per minute. Most of today's models crank out eight to ten pages per minute.

The street price for a Hewlett-Packard LaserJet Plus is around \$1,500. That's only a couple of hundred dollars more than a 300-400 cps 24-pin printer. When people consider what an extra \$200 can buy, most will lean toward the laser.

It may be a few years before the average 64 owner buys a laser printer, but the marketing battles in the high-end business environment ultimately filter down to benefit the home-computer user. Most industry representatives say these advances in technology and reductions in price will be passed on to the Commodore market.

"We have plans to support the Commodore for years because of its installed base," says Okidata's Rick Lamb. "There's still one heck of a lot of them out there." ■



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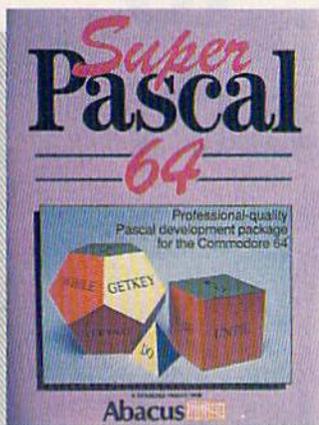
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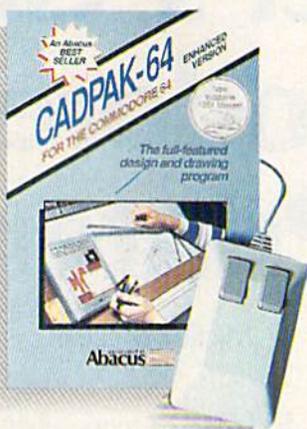
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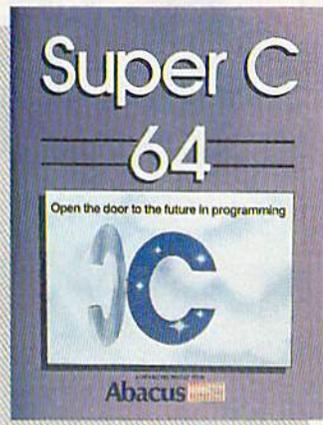
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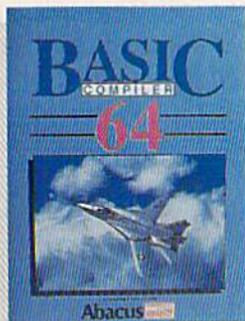
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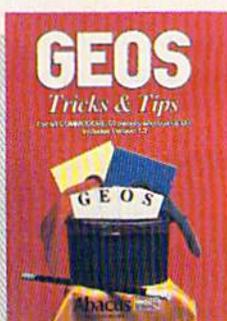
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A Buyer's Guide to Commodore-Ready Printers

Mickey McLean

There is a good selection of printers designed to work specifically with the Commodore 64 and 128—with no separate interface required. This buyer's guide represents a comprehensive list and description of all those available. Included are categories describing speed, pitch, buffer, paper feed, graphics capability, warranty, and price. Be sure to see the previous article, "Commodore-Ready Printers: A New Generation," for more details.

Explanations of Terms

The following list contains definitions of terms used in the buyer's guide.

Compatibility. Because of Commodore's unique serial-data communications format, printers with standard serial or parallel connections will not work with a 64 or 128 without first being connected to a separate interface. All printers in this buyer's guide work directly with Commodore computers and do not require a separate interface. As noted in the buyer's guide, some of these printers are compatible with other formats as well.

Printer type. There are three types of print technology available for Commodore computers: daisy-wheel, dot matrix, and thermal transfer. Daisywheel printers form characters by striking the paper through an inked ribbon with a small wheel whose spokes have letters and numbers at their tips. Dot-matrix printers also use impact, but employ a printhead that contains either tiny wires or pins that form characters or graphics. A printer with thermal-transfer capabilities uses heat to melt a waxlike ink onto

the paper.

Speed. In this category, users can determine how fast a printer prints. Most printers offer users a range of speeds measured in characters per second (cps). The slower modes can provide near-letter-quality printing (like a typewriter), whereas the faster modes produce rougher or fainter type in what is usually referred to as draft mode. Some printer speeds vary depending on the type of font used such as pica or elite.

Pitch. The pitch determines how many characters can fit on a line and is measured in either characters per inch (cpi) or characters per line (cpl). If larger- or smaller-than-normal characters are being printed, the pitch can vary.

Buffer. This is amount of text the printer can store while it is operating, allowing the computer to perform other work. Add-on buffers can be purchased to increase the printer's memory capacity.

Paper feed. The two basic feed types are friction and tractor. Friction-feed printers grip the paper and move it around the platen like a typewriter,

while tractor-feed printers grab the holes at the edge of the paper with teeth at either side of the platen. Many printer manufacturers offer single-sheet feeders and additional tractors as optional equipment.

Graphics capability. Because of the limited number of characters on a daisywheel, printers with daisywheel technology cannot usually produce Commodore graphics characters. Dot-matrix and thermal-transfer printers do not have these limitations and therefore have the capability to print graphics.

Manufacturer Names and Addresses

Blue Chip Electronics
7505 W. Boston Ave.
Chandler, AZ 85226

Brother International
8 Corporate Pl.
Piscataway, NJ 08854

Commodore Business Machines
1200 Wilson Dr.
West Chester, PA 19380

Okidata
532 Fellowship Rd.
Mt. Laurel, NJ 08054

Seikosha America
1111 Macarthur Blvd.
Mahwah, NJ 07430

Silver Reed America
19600 S. Vermont Ave.
Torrance, CA 90502

Star Micronics
200 Park Ave., Suite 2310
Pan Am Bldg.
New York, NY 10166

Name	Manufacturer	Compatibility	Printer type	Speed (cps)	Pitch (cpi)	Buffer	Paper feed	Graphics Capability	Warranty	Price	Comments
D12/10	Blue Chip Electronics	Commodore interface included	Daisywheel	12	10	2K	Friction, tractor optional	No	6 months	\$269	Comes with <i>Fleetwriter III</i> word processor
D 20/10	Blue Chip Electronics	Built-in Commodore and Centronics interfaces	Daisywheel	20	10	2K	Friction, tractor optional	No	6 months	\$279	Comes with <i>Fleetwriter III</i> word processor
M 120 NLO	Blue Chip Electronics	Commodore interface included, optional IBM/compatible cable	Dot matrix	25-120	10	2K	Friction and tractor	Yes	6 months	\$299	Comes with <i>Fleetwriter III</i> word processor
HR-10/C	Brother International	Commodore serial, parallel	Daisywheel	12	10-15	2K	Friction and tractor	No	1 year for parts, 90 days for labor	\$349	Optional keyboard converts printer into electric typewriter
MPS 1250	Commodore Business Machines	Commodore serial, Centronics parallel	Dot matrix	24-120	5-12	available	Friction and tractor	Yes	90 days	\$299.95	
Okidata 180	Okidata	Commodore serial, Centronics parallel	Dot matrix	30-180	17	2K	Friction and pin, tractor optional	Yes	1 year	\$329	
Okimate 20	Okidata	Serial, parallel (Commodore interface with Plug 'N Print Kit)	Thermal transfer	40-80	17	8K	Friction and tractor	Yes	90 days	\$268	Color printing capabilities
1200 VC	Seikosha America	Commodore standard	Dot matrix	25-120	10-15	2.3K	Friction and tractor	Yes	2 years	\$299	Fonts chosen from front panel
SP-1000 VC	Seikosha America	Commodore standard	Dot matrix	20-100	10-15	1.5K	Friction and tractor	Yes	2 years	\$270	Includes linefeed and margin setting
SP-180 VC	Seikosha America	Commodore standard	Dot matrix	20-100	10-15	1.5K	Friction and tractor	Yes	2 years	\$249	
EXP 420	Silver Reed America	Built-in Commodore interface	Daisywheel	12	10-15	1 line	Friction; tractor and sheet feed optional	No	90 days	\$299	
NX-10C	Star Micronics	Commodore serial	Dot matrix	30-120	5-17	1 line	Friction and tractor	Yes	1 year	\$349	
NX-1000C Multi-Font	Star Micronics	Commodore serial	Dot matrix	36-144	12	1 line	Friction, tractor, and single-sheet feed; optional automatic sheet feeder	Yes	1 year	\$299	
NX-1000C Rainbow	Star Micronics	Commodore serial	Dot matrix	36-144	12	1 line	Friction, tractor, and single sheet feed; optional automatic sheet feeder	Yes	1 year	\$379	Color printing capabilities

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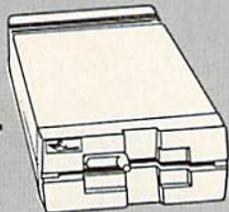


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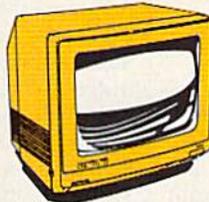
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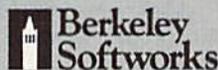


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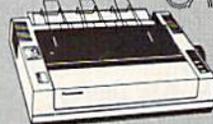
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Super Snapshot 3.0 and Slideshow Creator

The 64 utility-cartridge war has intensified markedly in the past year. I recently counted at least ten "fast load plus" cartridges on the market. Several, including Super Snapshot, are in their third incarnations. Though one of the most technologically advanced, even a quality product like Super Snapshot needs something special going for it in a crowded market. And this "something special" is a gem of a companion: Slideshow Creator.

Dependent entirely on the cartridge for slide preparation, Slideshow's Projector program does not require Super Snapshot to run. Essentially, Slideshow Creator enables you to turn *DOODLE!* and/or *Koala Paint* images into a series of "slides," either in a stand-alone show, or as part of your own BASIC or machine language program. (Demos are included illustrating all possibilities.) All applications should be easily understood by intermediate programmers.

One of Super Snapshot's many fine features is its screen copy (dump) capability, which permits any screen (minus sprites—we are promised these in version 4.0) to be captured on disk as a *DOODLE!* or *Koala* file, among other formats. Screen dumps can also be sent in three sizes, and in normal or reverse format to a variety of printers.

Once saved, screens can be modified by their respective programs. Slideshow allows for sequencing any set of *DOODLE!* or *Koala* images, specifying their timing, and entry/exit mode (wipes). It also offers a scrolling text overlay option.

Scrolling text (which can be quite long) is either of two sizes, in any of ten fonts, and may be placed anywhere on the screen. (It can appear either in front of or behind the graphic, in a variety of user-specifiable colors.) The show itself can be set either to run once and stop or to repeat infinitely. To display a large number of slides, up to four disk drives of any type may be chained together.

Slideshow Creator is a versatile program. It's highly appropriate for window displays and for both business

and educational presentations. This ability alone is nearly reason enough to purchase a Super Snapshot cartridge (the combination costs less than \$70).

Super Snapshot has many other features going for it as well. With a 32K ROM and an 8K RAM, it—uniquely among utility cartridges—permits plug-in ROM upgrades. Company policy is to upgrade cartridge ROM for \$20 plus \$3 shipping and handling; all you do is send in your old cartridge. (The original Snapshot 64 is not upgradable). It replaces the ROM (you can do it yourself as easily), and includes the current "parameters" disk and documentation, which is quite good.

Super Snapshot is one of the most technologically advanced cartridges for the 64—and it has a gem of a companion: Slideshow Creator.

Users familiar with version 2.0 should be aware that 3.0 is a significant upgrade. Among the many new features are turbo save and a faster turbo load. (Now, 60 blocks load in 6 seconds instead of 8.5, and we are promised further improvement in version 4.0.) Version 3.0 includes turbo routines unique to the 1571 drive. (The manual shows how to use these even on the 64). Also, there is sprite collision disabling (several varieties), and an Extended Life function that locks in your attained level in a game. Should a game "death" occur, upon restart, the game resumes at the previously attained level. This is one of several reasons for the on-board 8K RAM. Indeed, dedicated hacker/gamers can freeze a program at any point, enter the machine language monitor, modify code, and return to the running program with memory otherwise uncorrupted. This is a capability

unique to Super Snapshot.

One of the features I particularly like is the easily programmable function keys. Cartridges typically offer preprogrammed keys, but this is the only one I've seen that allows you to modify them. And who doesn't want to change one or two? Particularly well-designed is function key loading from an on-screen disk directory, accessible via another function key. (I only wish that a DSAVE command made saving from a directory as simple.)

The cartridge contains so many useful features, I cannot begin to name them all. Two, however, merit special mention: the accessible—through the ML monitor—and user-friendly track-and-sector editor, and the turbo file and disk copy utility. The file copier permits fast copying of selected files from any model disk drive to any other, including the 1581. (Turbo and copy utilities for the 1581 are rare.) The disk copier purportedly copies disks between like drives only. I could not test this copier; my review ROM lacked this feature.

A parameters disk—the latest one from Kracker Jax—is included with Super Snapshot for those relatively few programs the cartridge cannot back up by itself. (According to the publisher, Software Support International, no cartridge can back up all programs.) The disk includes both a nibbler for programs that require one (Kracker Jax identifies them) and a set of disk-based Turbo*25 utilities that permit you to reformat your backups—on the 1541 only—and to load very fast, with or without Super Snapshot.

Every reviewer has a wish-list of desirable features, and I am no exception. I miss a set of BASIC aid utilities, a reset button available during system crash, and an OLD command to recover a lost BASIC program. On the other hand, a complete disk wedge is always available, even at snapshot time. This wedge, turbo load and/or save, and the programmed function keys may be turned on or off at any time. I would also appreciate a turbo Scratch and Validate to go with the fast Format, Load, and Save (maybe in 4.0?).

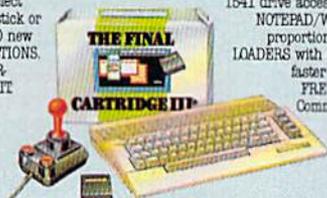
There's a lot of power in these two packages. Both are well-designed and packed with useful features. Software Support International (formerly Com-

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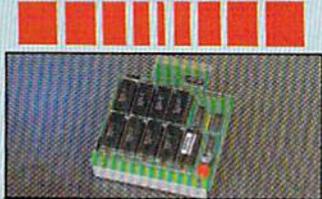


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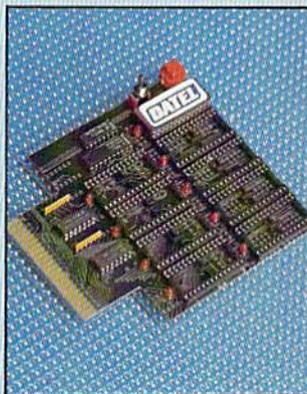
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Kung-Fu Master

Data East is becoming a major source of games centering on Eastern martial arts. After my initial disappointment with the action and graphics found in two other Data East products—*Karate Champ* and *Kid Niki*—I was beginning to think that there was nothing of interest to be found in this genre.

It was with pleasant surprise that I discovered *Kung-Fu Master*.

In this newest offering from Data East, you'll find realistic action, cunningly designed enemies that include stylized dragons and snakes, dwarfs, henchmen, guardians, killer bees, and jars and exploding globes raining from the sky. You would be well advised to

buy a high-quality joystick. You'll need it because the action is so frantic you'll find yourself trying to wrench the joystick in four directions at once. (You can also play with keyboard joystick emulation.)

When the game begins, you'll see a demonstration game. Press any key to see the options screen. You have the option of playing against an opponent (actually you'll just trade off control of the central character) or of playing alone.

Next, select your level of play. There are five floors in the wizard's temple, where you have come to rescue a maiden, and the five levels of difficulty correspond to these floors. The level of difficulty represents the number of enemies coming after you.

The third option is whether to play the game with the selected options or to return to change the options already mentioned. Once again, press RETURN to continue. When you are on the level you want, you can begin play after a

*Buy a high-quality joystick.
You'll need it because the
action is so frantic.*

loss by pressing RETURN four times. You'll probably lose often at first, so this procedure will quickly become a part of the game's rhythm.

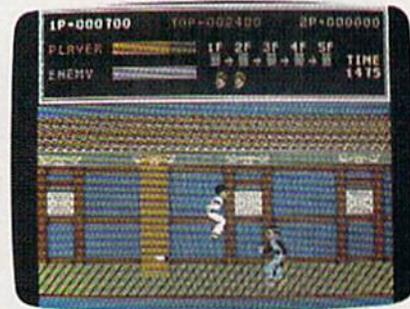
In the first frame of the first level, jars and globes fall from the sky. They can be destroyed in midair. If they reach the ground, they burst to reveal dragons and snakes. Some globes float a moment and then explode into clouds of deadly shards.

You cannot kill the snakes, but they can kill you, so you should leap over them. Attacking a dragon is very dangerous. They breathe flames, which you must avoid. Squat and kick for best results. Move quickly, because the dragons disappear after the flames go out.

Henchmen approach you individually and in groups. They appear to be unarmed, but they can destroy you if they get their hands on you. Shrug off their life-draining grip by rapidly turning from side to side. It will save your life, but you'll earn no points for such a maneuver. You can keep tabs on your strength, and the enemy's strength as well, by watching the bar displays at the top of the screen.

To earn points, you must kick or punch the enemy. This concept is deceptively simple. The fact is that, just as in real martial arts, you must develop a sense of space around yourself. When a henchman (or any one of the dozen or

so other threatening obstacles) enters that space, you must react instantly. If the enemy is too close or too far away, your aggression will have no effect.



You can select kicking or punching by pressing the space bar. You can kick or punch on any of three levels: standing, squatting, or leaping. For example, you can leap over or squat-kick dwarfs. If one grabs your legs, switch the joystick rapidly from side to side until the dwarf falls off the surface of the earth.

Generally, you'll earn more points for defeating someone with a punch or a jumping kick than with a standing or squatting kick. Points, however, will be a secondary consideration to survival until you become very good at this game.

Guardians are the most resilient characters in this game, and they are armed. Somehow you have to avoid being stabbed by flying knives or destroyed by bats as you kick or punch the guardian repeatedly.

You must battle your way to the stairs at the end of the corridor before the timer counts from 2000 to 0. The stairs lead you to the next floor, where you will be given additional time and energy. You begin with three lives, but you can earn extra ones for each 40,000 points scored. To earn points rapidly, concentrate on killing dragons, floating globes, and bats.

The pause feature is most welcome—especially in a game so frenzied as this one. Another impressive feature is the ability to move in both directions. Many action games allow you to move right to left or left to right, but steadfastly refuse to move in the opposite direction (*Kid Niki* and *Bazooka Bill* are two examples). *Kung-Fu Master* can move away from or toward the objective, which makes the game just a little more realistic.

If you want fast, unrelenting action (and particularly if you have been disappointed by other oriental combat offerings), *Kung-Fu Master* is the martial arts game you've been waiting for.

—Robert Bixby

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Tetris

It arrived during the first week of the Olympics. It was a simple-looking game in a red-and-yellow box. I looked it over excitedly thinking, "Aha! Here's a chance for at least someone to get even with the Soviets!"

So I thought.

Courtesy of Spectrum Holobyte, *Tetris* is the first game to arrive in the United States from the U.S.S.R. This intriguing and deceptive game was invented by a young Soviet researcher currently working at the Computer Centre (Academy Soft) of the U.S.S.R. Academy of Scientists in Moscow. The original programmer was an 18-year-old student of Computer Informatics at Moscow University. It was developed through the joint efforts of Academy Soft (Moscow), Andromeda Software (London), and Spectrum HoloByte (U.S.A.).

The concept is relatively straightforward. You're presented with an attractive picture overlaid by a tall black window in the center of the screen. This window is a "pit" into which descend six shapes composed of four tiny squares. The six shapes include a bar, a T-shape, an L-shape, a rectangle, and two zigzags. Your objective is to maneuver these shapes, rotating and aligning them, to create a solid row of multicolored blocks across the bottom of the pit. When such a row is created, it disappears from the screen and you accumulate points. Misaligned pieces, however, stack up until they reach the top of the pit, and then the game is over.

As rows disappear, the rate at which pieces fall increases. At faster speeds, you score more points per row. Being quick at *Tetris* means faster scoring, boosting your point value per row, and keeping the pit clear for room to maneuver.

Tetris is played solely with a joystick. The instructions are short, consisting of only two pages of large print. In just a few minutes, you'll get the idea of how to play. Developing strategy takes a few more sessions. Mastering *Tetris* is another story altogether.

Choose your level of play at the outset from nine available levels. I've found that, in terms of effective scoring, starting at a medium level is actually more advantageous than starting at the lowest. While one shape is falling, the next shape to descend is previewed in a corner of the screen. Seeing this next shape is extremely helpful in planning where to put the piece currently tumbling down the pit.

Musical accompaniment while you play is optional, and the program will automatically rank your score for up to 15 games. Unfortunately, the game will not save scores from session to session.

Is *Tetris* fun? I found it addictive on the order of *Pac Man*. There's a strong pull to try to stay in the game longer, a competitive desire to build up your score. Yet *Tetris* is mentally more challenging than *Pac Man*. You're trying to beat time, but that's not all. Fitting those puzzle pieces together takes as much mental dexterity as physical. The game is both fascinating and unpredictable. I've played over 15 games in a row and have never noticed the shapes falling in a discernible pattern.

There's less tension in *Tetris* than in arcade-style games and less mental exertion than in adventure games. That makes it all the easier to while away a couple hours juggling the little tiles of color.

Is Tetris fun? Yes, addictive on the order of Pac Man—yet mentally more challenging.

I have only one real criticism of *Tetris*: Why weren't the details of the onscreen presentation done better? This is the second game from Spectrum I've seen that has not used the 64 to its potential. The outside package is misleading. It features four screen shots taken from IBM PCs. (*Tetris* is also available for the IBM PC, Amiga, and Atari ST.) The 64 version has only one background scene—and it isn't of the variety shown on the box. And while the drawing is quite beautiful and well-executed, it uses none of the 64's vibrant colors. Also, the musical background could be more sophisticated. Here again, the 64 is not used to its potential.

Other features listed on the package aren't available on the 64 version. Different starting heights and different statistic and help screens appear in versions for other machines, but it's not clear why they're excluded from the 64 version. It may be due to lack of memory, why couldn't disk space be used to store different screens which could be retrieved at random intervals, perhaps linked to the level of play?

This, of course, is the fine detailing which would simply make a good program more complete and impressive. The game itself is well-designed, challenging, and fun. That, more than anything, is what matters.

That and my next score.

—David and Robin Minnick

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Skyfox II: The Cygnus Conflict

Legends and apocryphal stories abound in computer lore. One very popular story is that the Apple II became a success because of *VisiCalc*, the first computer spreadsheet. Maybe, but I've often felt great numbers were sold because of a game called *Skyfox*.

Whatever the truth may be, *Skyfox* was eventually released for other computers, and now Electronic Arts has chosen the 64 for the debut of *Skyfox II*. A product of Dynamix—the wonderful folks who brought you *Arctic Fox*—*Skyfox II* is worthy of the name, owing only a little to its predecessor.



You may remember that the original game took place in the air above a far planet and that your targets in the various missions were aircraft, tanks, or both. Convincing explosions, good sound effects, and the impression of rapid flight were features that made the original a standout. These features have been carried into the new release—in spades.

Your mission now encompasses the preservation of an entire galaxy against the invading Xenomorphs, but all action will occur in the blackness of space. After selecting one of ten missions and the skill level at which you wish to fight, you'll find yourself sitting in the cockpit of a highly advanced—well, for lack of a better name—space plane.

On your windscreen, a digital countdown begins. At 0, a metal door slides open, and you are rocketed into space, powered by nuclear batteries. Your armament includes neutron disruptors (lasers), photon pulse bombs, and antimatter mines.

The control console, reading from left to right, displays the number of photons, a target identifier, number of mines, a scan monitor, shield and damage indicators, and the energy level. Just below this, a long bar indicates the range of radar scanning. It will also alert you as to enemy craft in your neighborhood.

On the windscreen, a circle and an arrow form a Heads Up Display. The

arrow points the direction to the nearest target and changes color depending on the target's range. When using the neutron disruptors, the circle functions as a gunsight and must be centered on the target.

The scan monitor shows your ship and its relative attitude. Enemy craft are white dots, and the nearest space station is a flashing red dot. You'll need to know this when it's time for repairs or reloading of weapons, because there is little future in trying to dock with an enemy ship.

*The name of the game is
speed*

Once you've docked with a Federation space station, you'll want to use the Repair command to fix damaged systems. A schematic of your space plane appears on the screen with damaged sections indicated by a yellow or red color. Repair is as simple as moving the cursor (now a screwdriver) to the damaged section and pressing the fire button. This process takes time, and attacks are still taking place. You'll want to be ready to go as soon as you can,

perhaps with only partial repairs.

As with the original, the name of the game is speed. This time, instead of soft and friendly clouds rushing by, you'll find yourself in a field of meteors. No matter what direction you choose, the meteors are always rushing toward you (perhaps because you're going faster than they are). I think the field must be a couple of million miles across.

At any rate, they must be avoided or blasted out of the way, for too many hits will eventually destroy your shields. Subsequent hits will lead to a fiery death. Personally, I think the meteors are overdone, a case of too much of a good thing. By avoiding them, however, you'll become very aware of the smoothness of screen scrolling as you whip your craft around in what really feels like 3-D space.

When your mission ends, you'll see a graphic depicting your ship as either crashed or returned home to cheering crowds. If you wish, you can see the evaluation of your mission. You are presented with a list of accomplished objectives, enemy craft and bases destroyed, and a final point score for the entire mission. Then it's on to the next mission.

In selecting a mission, you highlight the one you wish to try. You have the option of seeing a description of the mission. Take it, or go back and try another.

You also have the option, at this point, of checking out the specifications of the *Skyfox II*. There is little point to this, since you can't do anything about them, but leafing through the specs does give you three beautiful views of your space plane. They are worth looking at more than once.

The graphics of *Skyfox II* are excellent, the sound good, and the documentation average. Fortunately, there is not a great deal of the latter. Because some missions require navigation, a star map of the Cygnus system is included, but for reasons not made clear, it's printed in dark blue on darker blue. Luckily, the same map can be called up on the Heads Up Display, where it is much easier to read.

It is also worth noting that *Skyfox II* requires so much memory that it will probably not run until you've disconnected your printer, second disk drive, and any other peripherals except your monitor.

Summing up, I think the original *Skyfox* is difficult to beat, but *Skyfox II* certainly matches it in speed and slam-bang action.

—Ervin Bobo

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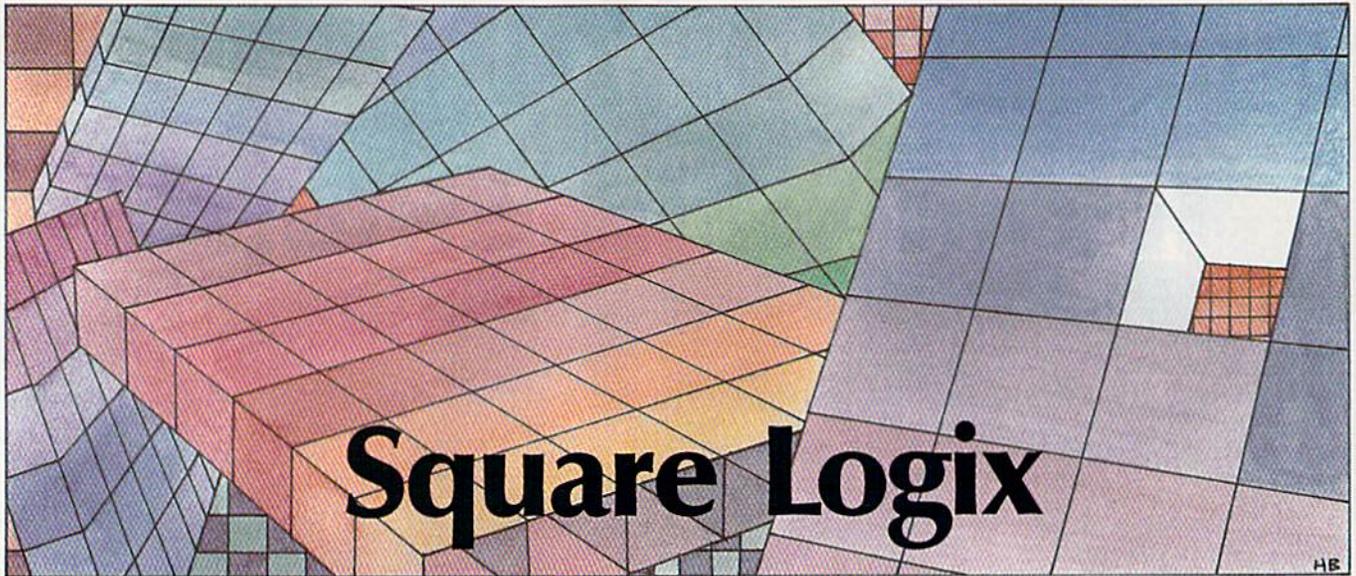
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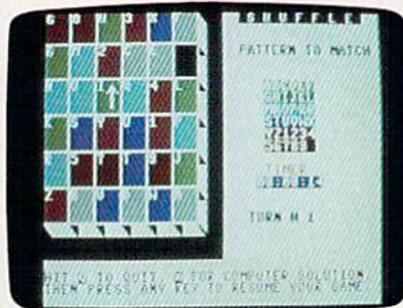
Puzzle lovers of all ages will find this Commodore 128 game both challenging and entertaining. There are four game variations and nine skill levels so every member of the family can enjoy playing. A joystick is required.

"Square Logix," is a quartet of logic games that will exercise your problem-solving ability and amuse you. Each of the four games offers its own special logic test and, since each one has nine difficulty levels, players from the beginner to the advanced puzzler can share in the fun. You may start playing Square Logix just for the challenge, but Square Logix quickly can become addicting.

Each of the games in Square Logix involves shifting blocks in a 6×6 grid until they form a specified predetermined pattern. The number of blocks you'll need to move to solve a puzzle is three times the level number selected. At level 1, for example, three blocks need to be moved; at level 2, six blocks; and so on. It's a good idea to start at level 1 to get a feel for each of the four games and then advance to the more difficult levels.

Getting Started

Square Logix consists of three programs: Two are written in machine language and one in BASIC. To enter Program 1 (SQRS.OP), you'll need to use "128 MLX," the machine language entry program found elsewhere in this issue. When you run 128 MLX, you'll be asked for the starting and ending



"Square Logix," a four-in-one game, offers a challenge for every member of the family.

addresses of the data you'll be entering. Here are the values to use for SQRS.OP:

Starting address: 0B00
Ending address: 0BE7

Follow the 128 MLX instructions carefully and be sure to save a copy of the data with the filename SQRS.OP before you leave 128 MLX.

Program 2 (SQRS.SPR), is also written in machine language, so you'll need to enter it with 128 MLX, too. Again, when you run 128 MLX, you'll be asked for the starting and ending addresses of the data you'll be entering. Here are the values to use for SQRS.SPR:

Starting address: 0E00
Ending address: 0F7F

As with Program 1, follow the 128 MLX instructions carefully and be sure to save a copy of the data with the filename SQRS.SPR before leaving 128 MLX.

Since Program 3 (SQUARE) is written entirely in BASIC, simply type it in and save a copy on the same disk as SQRS.OP and SQRS.SPR. Now, make sure your 128 is set up for 40 columns and your joystick is plugged into port 1. Type RUN to get started.

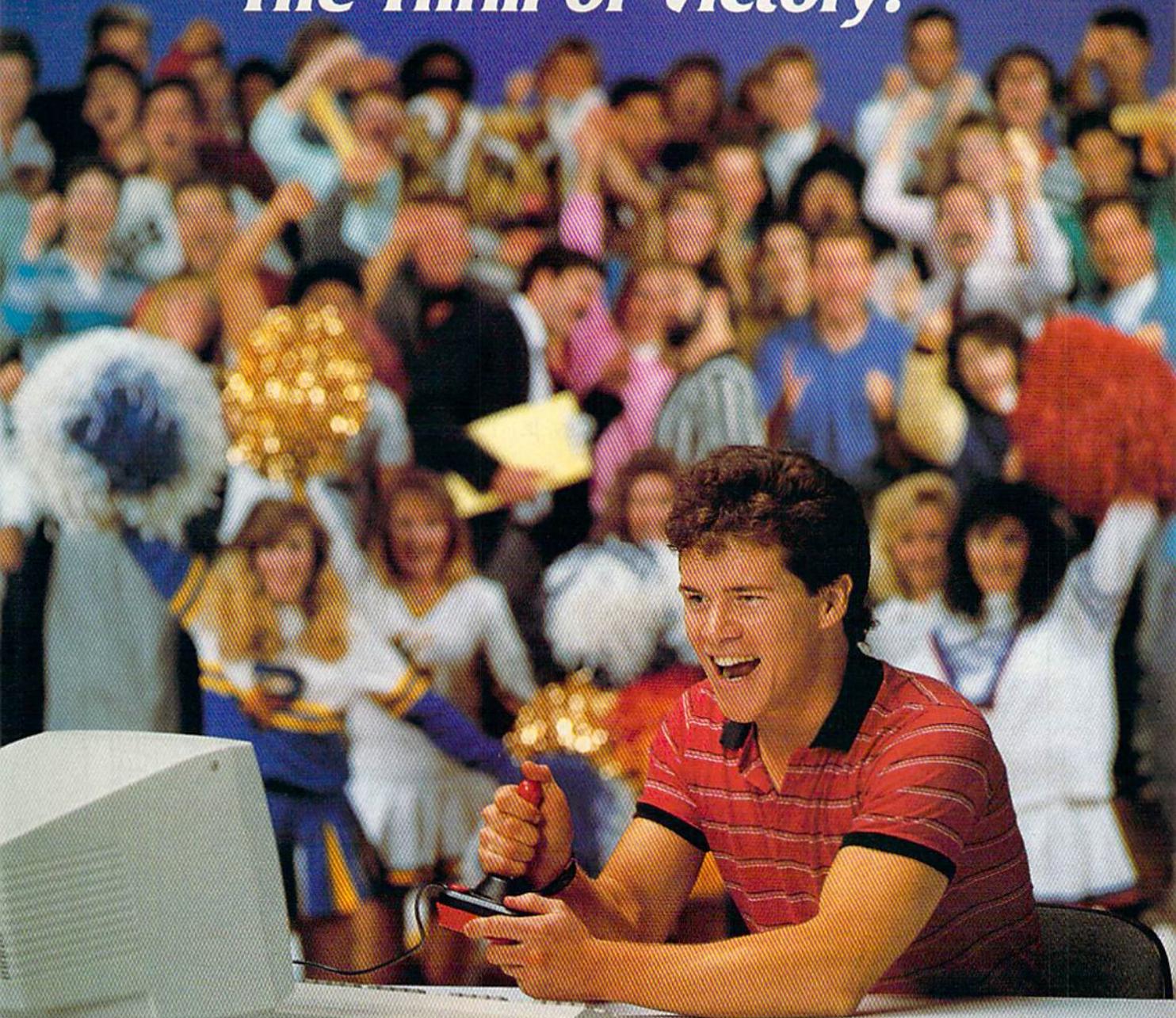
Four Games

When you first run Square Logix, you'll see the main screen with the four game variations displayed. After choosing which of the games you want to play, you'll be given the chance to select a difficulty level of 1-9.

After choosing the difficulty level, you'll see the game screen, with the puzzle block in the upper left corner, a timer on the right side of the display, and a running total of the number of turns you've taken just below the timer. From the game screen, you can press Q to quit or * to see a solution to the puzzle (we'll discuss the solution option a little later).

When you successfully complete a game, the difficulty level and the game's number will be displayed at the bottom of the screen, and a colorful display will highlight the entire display. You'll then be prompted to press the fire button to start another game.

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Let's take a look at each of Square Logix's four games.

Game 1: Shifts. This is the easiest of the four games and the best one with which to start. As the name suggests, you use the joystick to shift columns and rows of blocks until you produce the winning pattern. An arrow inside the array indicates the direction in which the row or column will be shifted. Any block that's shifted off the array will wrap around to its opposite end.

To shift blocks, press the fire button. The arrow can be moved horizontally or vertically by moving the joystick in the corresponding direction. Don't forget that the whole row or column moves, not just one block.

Game 2: Shuffle. This is played in much the same way as Shifts, except that the pattern you must match has a definite order, identified by letters and numbers on the blocks. This makes Shuffle somewhat more difficult than Shifts.

Game 3: Rotate 1. This game is more challenging. You must generate the desired pattern by rotating a group of four blocks—indicated on the screen by a large outlined square—either clockwise or counterclockwise. The direction of rotation is controlled by holding the fire button down and moving the joystick right for clockwise or left for counterclockwise.

To move the outlined group either horizontally or vertically, move the joystick in that direction. It may take several games of play to unlock the secret of Rotate 1, but when you do, you'll be ready for Rotate 2.

Game 4: Rotate 2. This is the most difficult game of the four. This variation uses the same logic as Rotate 1, but a group of nine blocks, instead of four, is rotated.

The Solution

If you decide you need a little help to solve the game you're playing, you'll need to use the asterisk (*) key. Pressing this allows you to see the solution to the game. The computer displays only the solution, however; it doesn't actually solve the game for you. After the computer shows you the solution, you can continue your game by pressing any key.

See program listings on page 69. ●

Arcade Volleyball

Rhett Anderson
& David Hensley, Jr.

"Arcade Volleyball" is a two-player arcade-style game with colorful graphics and realistic sound effects. You control two high-jumping, if short, expert volleyball players. It won't be long before you're executing top-notch serves, sets, and spikes.

Arcade Volleyball is written entirely in machine language, so you'll need to use "MLX," the machine language entry program found elsewhere in this issue, to enter it. Arcade Volleyball is compact, requiring less than 4K of memory. When MLX asks for a starting address and ending address, respond with the values indicated:

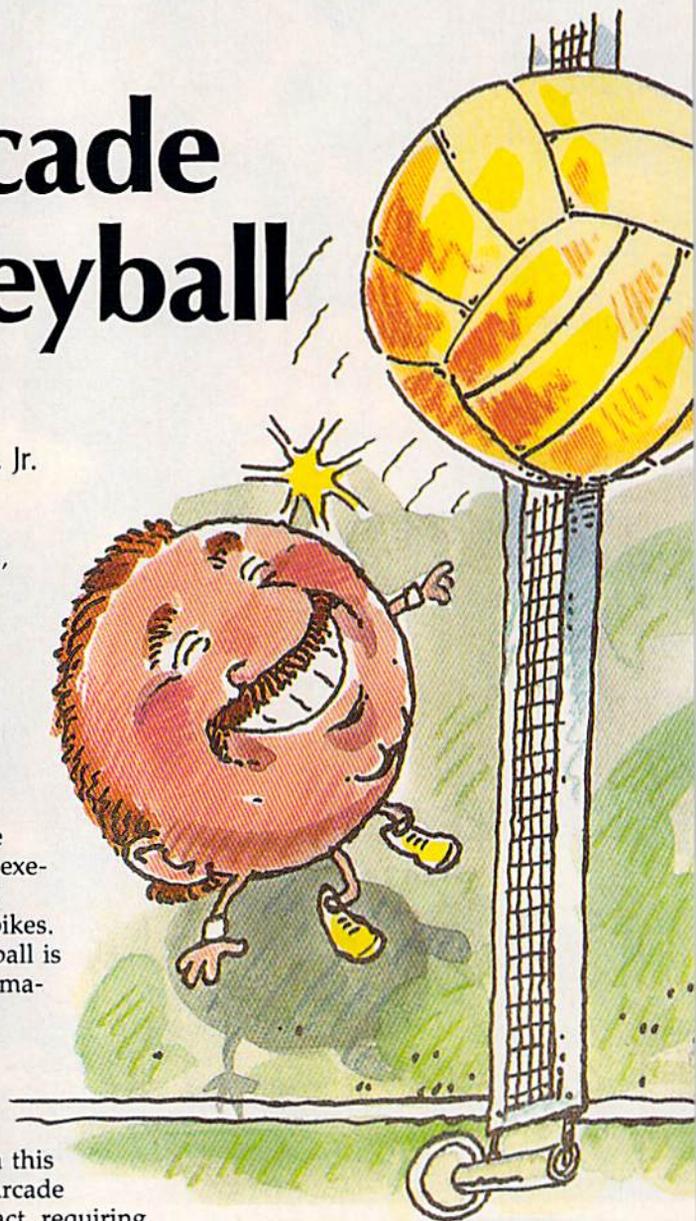
Starting address: 0801
Ending address: 1688

Be sure to save a copy to disk or tape after you've finished typing.

The Big Serve

When you're ready to play, plug in two joysticks. Although Arcade Volleyball is a machine language program, it can be loaded, saved, and run just like a BASIC program. To start the game, load the program and type RUN.

In the center of the court, you'll



see the volleyball net. One player controls the side to the left of the net; the other player controls the side to the right. Above the court, you'll see the status line. Here you'll find a two-digit score for each player. The player with joystick 1 controls the yellow and green jumping heads on the left side of the screen; the player with joystick 2 controls the purple and red heads on the right.

For the first point, it's a red-head's serve. Position him under the floating volleyball and press the fire button to serve. You have three chances to get the ball over the net. If you fail, you'll lose the serve.

How do you play volleyball without hands? Use your head, of course. You and an opponent each control two mutant heads in this fast-paced and rather unusual version of America's favorite beach sport. An optional practice mode is included. For the Commodore 64. Joystick(s) required.



The joystick controls are easy to learn. You can run either left or right by moving the joystick in the appropriate direction. To jump, press the fire button. The players in Arcade Volleyball are gifted; they can move left and right while in the air. You control both of your players at the same time—there's no need to switch back and forth. In time, you'll grow accustomed to the synchronized movement.

Use Your Head

You can hit the ball while you're on the ground or in the air. If you hit the ball while you're standing on the ground, the ball will neither

lose nor gain speed. If you jump to hit the ball, the ball will speed up. You are free to bounce the ball off the ceiling and the wall behind you. If you hit the ball with the left side of your head, the ball will tend to go to the left. If you hit the ball with the right side of your head, it will go right. If you hit the ball with the top of your head, the ball will continue on with the same horizontal velocity.

As in real volleyball, you can receive points only during your serve. However, Arcade Volleyball differs from real volleyball in several ways. First, the court is entirely surrounded by walls; there is no need to worry about hitting the ball out of bounds. Also, the same head

can legally hit the ball several times in a row, as long as the three-hit-per-team limit is not exceeded. Remember, the serve does not need to travel over the net on the first hit. Finally, the first player with 15 points wins the game—there is no need to win by 2 points as in real volleyball. When a player reaches 15 points, the game pauses. Press a key to start another game.

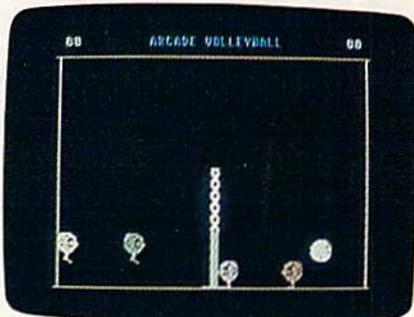
Over, Into, and Under the Net

When you play Arcade Volleyball, your prime concern is to get the ball over the net. If the ball hits the top of the net, it may either continue over the net or bounce back to your

side. Either way, the ball's velocity decreases. If the ball goes over the net, hits the opponent's wall, and bounces back to your side, you'll have three more chances to get the ball over the net.

If the ball hits the side of the net, it rebounds at full velocity. Don't lose your composure, though. You may still have a chance to score.

If the ball hits the floor on your side of the court, you'll lose your serve—or a point, if your opponent was serving. You must also be sure to keep the ball from going under the net. This is considered to be the same as hitting the floor.



It's heads up in this fast-moving volleyball game for one or two players.

Warm-Up

If you'd like to warm up with a computer opponent, you can make a special one-player version of Arcade Volleyball. To do so, follow these steps:

- Load the program
- Type **POKE 2065,1**
- Save the program with a new name
- Type **RUN**

You won't find the computer opponent especially challenging, but the one-player mode is a good way to learn how to serve and return the ball.

Playing Tips

The key to the game is learning the angles. Watch the ball carefully as you play. If you jump to hit the ball, it will speed up and the angles will change. The players' horizontal movement is limited—try to anticipate which head the ball will come to. Be sure to use the walls and nets to your advantage. Careful use of these obstacles is the best way to confuse your opponent.

See program listing on page 75. 

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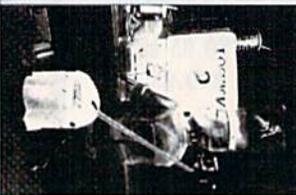
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Fred D'Ignazio
Contributing Editor

A reader wrote me recently to confess that he once remarked "8K of RAM was all the memory anyone would ever need."

Don't laugh! Many of us old-timers are guilty of making the same statement.

I remember when I was getting my first computer . . . I told the dealer that I needed 64K of memory because I was a writer and would be writing long chapters for books. The dealer finally gave me what I wanted, but he warned me that I was being extravagant. "You know, 16K would work just fine for your documents now,—and 32K would last you forever."

Attack of the Terabytes

Last week a friend of mine, Dr. Gerri Sinclair, sent me some E-mail. "I am so frustrated," she wrote. "Now that computers are starting to plug into CD-ROM 'libraries' and are processing digital sounds, photographs, and full-motion video, a million bytes of memory just doesn't cut the mustard!"

I wrote back to Gerri asking what she thought *would* cut the mustard. Her reply: "Sixteen million bytes, minimum, for main storage, and another 80-160 megabytes on hard disk. And this is just the start. Soon we'll need gigabytes and terabytes, and even that might not be enough."

Terabytes? It sounds like an invasion of Japanese snapping turtles.

Have Mercy!

Computers make us lazy. Didn't you know? After all, they're supposed to be labor-saving devices. And the labor they're supposed to save is *mental* labor. So when we use computers, we think less, and we get lazy.

Simple, eh? Except it's not true.

Anyone who uses computers intensively will stare blearily at you and swear that computers aren't making them work less. In fact, they're working harder—much harder.

It's true. Think about it. Human bosses are just that—human. They work a full day; then they quit and go home. Even when they're at the office, they're not hanging over you every minute, tapping their fingers, waiting for you to keep working. But computers—oh my! Once you turn them on, their little crystal clocks rev up to a million beats a second, and they're ready for you to work. You can put in a solid eight-hour day, and the computer won't even be winded. It's ready for more work. So you take the computer home and try to appease it by working another four hours.

Does this satisfy the beast? Not by a long shot. It sits there with its little cursor blinking, like a perky puppy waiting for more play.

Every day we push ourselves a little harder, trying to keep up with our computers. But it's a losing battle. So, computer manufacturers, hear my cry: Please make a computer that, after a lengthy session, flashes "Good work! I can see you'd like to keep going, but I'm pooped! How about a break? After all, tomorrow's another day."

Desktop Foods

By now, we've all heard of desktop publishing. It's so popular that it has spawned a lot of other terms, all beginning with the word *desktop*. There are desktop presentations, desktop communications, and even desktop videos.

Have you wondered where this desktop mania will end? Can you imagine the computer designers who spend all their waking moments "on the desktop," who see the world as a giant desktop, and who are forever dreaming up new desktop applications?

We're already doing our work at the desktop. Maybe in the near future the desktop can go with us and become a part of all our daily activities. For example, imagine what "desktop eating" would be like. When we get hungry, we'll just click on a little icon of a refrigerator. The refrigerator door will open, and we'll click on pictures of soda pop, candy bars, and sandwiches, to "select" our snack. Then the pictures will pop open and display the number of calories consumed, and the vitamins (if any) we're getting. Productivity consultants will recommend desktop eating to corporate management because it will replace costly coffee breaks and lunch hours, since workers will be able to do their eating at the desktop.

Beware of Computer Mouth!

During a busy day at the desktop, we have all experienced that awful sensation known as "computer mouth"—a sour taste that arises from trying to find a pesky program bug or from struggling to make our printer ignore the formatting glitches. When computer mouth strikes, you should hightail it to the restroom and whip out a toothbrush. But, if you have "desktop toothbrushing" installed as a DA (Desk Accessory), you just click on the little icon of the toothbrush. Instantly you see a picture of a little person (that's you) actively brushing, and smiling a great big smile with gleaming, pearly whites.

And at the end of a long, grueling day on the desktop, what could be nicer than taking your computer home, resting it on your lap in the living room, and taking in some desktop movies? Demi Moore may not look the same, but it sure beats renting a video or going to the theater. After all, when you're hungry, you just press RESTORE and order up a round of desktop Cokes and a tub of desktop popcorn. ☐

Todd Heimarck
Contributing Editor

On the subject of software piracy in this column ("The Software Police," March 1988), many GAZETTE readers responded very passionately on both sides of the issue. Herewith, their comments.

To Pirate . . .

When I read your article on piracy, I almost died of laughter. I have over 300 games and around 100 more other programs. Five of them I bought; the rest are pirated. The pirated programs include *GEOS*, *Print Shop*, *Newsroom*, *Project Stealth Fighter*, *Elite*, and *Fast Hack'em*. I'm just a high school student, and I cannot afford to buy a \$40 program. I have to dig deep in my pocket just to pitch out \$3 for your magazine. I have over \$2,000 in software; it's crazy to spend that much on software. You say I could always get public domain software. What a joke; PD programs are not worth a dime. They're the programs kids write and put up on a BBS. If they were any good, they would write to a software company or a magazine.

Because of copy-protection, I have wanted to learn how to crack. I have become a much better programmer. I've mastered BASIC, ML, and Pascal. If I had decided to follow the "law," I never would have been interested in programming.

—DL, Nebraska

I have a complete 128 system and about \$2,500 worth of software. I have purchased four or five titles. For us hourly workers, there's just no other way to be able to enjoy computing at all.

—Anonymous, Alabama

Being a software pirate myself, I felt compelled to write. You're absolutely right, of course; piracy is thievery. Since most pirates are like

me, honest enough to return a lost wallet, why do we do it? I have a few theories. First, I think a lot of us use it as a means to exercise the larcenous part of our nature, a chance to do something wrong, to thumb one's nose at a faceless authority. Second, it's a challenge. It's a game with few rules, fewer reliable guidelines, and only one way of winning: obtaining a working copy. There's a definite kick to seeing a copy fire up for the first time. Third, it's an ego trip. Witness the bragging opening graphics on many of the cracked games going around. Finally, having a huge software library is usually regarded as quite a status symbol. Note that I didn't mention that it's an easy way to obtain programs. Most avid pirates have hundreds of disks, more than they can ever use.

Maybe the only answer is to forbid copying for any reason. I believe the typical pirate uses one of the many nibblers and parameter copiers to make his copies. Banning nibblers would certainly cut down on your ad revenue. One of the better nibblers was advertised on the same page as your article.

—Anonymous, Ohio

To think that people will pay money when they can get something for nothing is way off. Face it, it's easy and it's free. If software companies can't come up with good copy-protection, that's their problem. Morals are a thing of convenience and are best abandoned altogether.

—CE, Texas

. . . Or Not to Pirate?

It is unfortunate that most home computer users are not aware of the bargains in excellent commercial software available to them. Programs that cost tens of thousands of dollars to produce are available for a few dollars, because of the large market for them. If piracy could be eliminated, the increased market

would reduce the cost even more.

—BW, Michigan

I am writing to say that the article is the most sensible statement I've read on the subject. I salute you for calling piracy exactly what it is—stealing—and, more importantly, for saying in print that it is immoral, not just illegal. This is an ethical issue, and it is right in front of many youngsters. How can we expect them to understand piracy is wrong when we don't tell them so, or (worse) when our example doesn't show them so? How many of us adults use pirated software (myself included)? To say nobody is hurt is foolish. There is no such thing as a free lunch. Somebody has to pay, sometime, somehow. Thanks for saying what you did.

—JDJ, Pennsylvania

I have the ability to copy virtually any type of software, including some of the most highly protected. I back up my own programs, which I believe we all have a right to do. I don't believe copiers and protection strippers should be used to furnish everyone in town with a copy, however. Piracy not only grates against my moral attitude but, as you pointed out, it is illegal.

—RF, Kansas

I would like to clarify one point you made. Making a copy is not *per se* an infringement of copyright. The copyright law of 1976, which went into effect in 1978, unintentionally made it illegal to load a program into a computer, because the definition of *copying* included the copying of software from disk to memory. The law was amended in 1980. In addition to making it legal to load (copy) a legally obtained program into your computer, the amendment allows the making of an archival copy (as you noted). It also allows the revising of software, if it is necessary to do so to use it on

your computer.

I agree with all you say. If someone has the intelligence and ability to write a worthwhile program, he or she is entitled to make a profit from it. The better the program, the more the profit should be.

—EPV, Illinois

About five or six years ago, I bought my first computer, a VIC-20. I soon realized that I could make copies of cassette games with a dual cassette stereo. So I did, and gave all my best games to friends and sold them to kids from school, charging \$3 and a blank tape. Then I went even further. I actually ran an ad in the local newspaper that offered two or three VIC games on one cassette for \$5-\$10. I made over \$900 in three days! To a 15-year-old, that's a lot of money. Now the tables are turned. I am a programmer, developing real estate applications for a small company. I get paid each week for the programs I write. I can imagine what it would be like to have a percentage of my pay taken away because of pirates. Now I realize what harm I was doing.

—MX, Florida

Software Companies: The Real Pirates?

I do *not* agree with piracy. However, I *do* have a copy program for protected software and I am planning to update (Electronic Arts is driving me crazy). Why do I want to copy software if I'm against piracy? You mentioned it in your article: archival purposes. I've got three kids who are real sticky-fingered threats to software, but I'm not about to ban them from the computer. They range from 4 to 13 years old. What I want are backup copies.

—DC, Texas

You seemed to miss an important point about copying—why it's done. Clearly, software is copied illegally so that one can avoid paying for it. And you forgot to mention that the term "piracy" can also apply to software pricing. If every program were \$9.95, then almost nobody would be copying programs illegally (except really poor people, who probably don't have computers in the first place).

—JBM, North Carolina

I purchased my 64 several years ago, along with a few games my children requested. This introduced me to the use of disk errors as protection. My disk drive was unmercifully beaten to a premature death by this form of protection. This forced me to learn how to crack games, to remove the errors and lengthen my drive's life. I wrote letters to all the major software companies, explaining that their protection schemes were beating my drive to death. I got one response. They said they couldn't help my problem and that their foremost concern was to protect their programs. I got fed up with the fact that software companies don't care about users and started to learn more and more. I put up a BBS that turned out to be one of the biggest and best in the country. I am now a *major* pirate and will continue to be one with the same conscience that the software companies have about knocking equipment out of alignment and costing us money in repairs. I would not be a pirate today if it were not for the software companies and their irresponsible attitude toward the users. I can honestly say there are no programs reviewed in GAZETTE I don't already have.

—RAF, New Jersey

Recently, I downloaded a 128 database. It seemed like a very good program. The drawback was that it would only handle 20 records. I was able to run it, test it, and judge if I wanted it. If I decided to buy the database, there was an address. For \$49.95, I could purchase the full-scale program with no limits on records, plus manuals, plus updates, plus support. Software publishers should consider selling a test disk at cost and then waiting for orders.

—RH, Illinois

Your holier-than-thou attitude concerning piracy irritates me more than pirating does you. I have not pirated in the past because it might be illegal and I once thought it was immoral. However, now I have my doubts as to whether pirating from a pirate is immoral. The pirates I'm talking about are the software companies who sell software with bugs or the ones who misrepresent their products in advertising and packag-

ing. And those reviews in your magazine—if you told the truth about some of these products, you would not have the advertisers; therefore, you couldn't bring us those "hard-hitting" reviews.

—JTT, West Virginia

What about the poor user who wastes hundreds of dollars on software that doesn't live up to the hype of the ads? Software that crashes with one keypress, word processors with fewer features than a typewriter, and databases that make you long for 3 × 5 index cards—that's what makes people copy software. I know several people who have pirated software. They always bought the program if they enjoyed it. If not, the disk was promptly formatted.

—JS, Maryland

On the Chin

What kind of hypocrites are you? Why do you criticize the pirates when you sell them the tools to ply their trade?

—CES, Vermont

If you want to stop piracy, the only way to do it is to stop selling nibblers. To stop selling nibblers, you have to stop advertising them like the greedy, money-sucking scum you are! Sure, there's always a need for backup copies, but can't the rich software companies afford to pack two of the same disk in a software package? I'm sick and tired of hearing only one side of this controversy—the side spoken by the huge monopolies. If you have any guts, you'll print this letter.

—AE, New Jersey

Reprint Piracy?

I thought the March "Horizons" column was very well written and made some good points about the illegality and immorality of copying software. I liked it so much, I was going to make some photocopies and pass them along; maybe even copy it onto a local BBS. Then the irony hit me. If I copied your article, even though my motives were pure, wouldn't that also be piracy?

—KL, Alabama

Written permission for reprinting is required. We may charge a reprint fee, although we often do not.

simple answers to common questions

Tom R. Halfhill

Each month, *COMPUTE!'s Gazette* tackles some questions commonly asked by Commodore users. If you have a question you'd like to see answered here, send it to this column, c/o *COMPUTE!'s Gazette*, P.O. Box 5406, Greensboro, NC 27403.

Q. I have a Commodore 128 and have recently begun using its CP/M capabilities. In the documentation for various programs, I have repeatedly come across the term *overlay*. I am baffled by this term. What is an overlay, and how do you find them within programs? For example, my terminal program says to use the phone library overlay to change the numbers. There is no file that comes up when the DIR command is used that says anything about being an overlay file. I am stumped.

A. Neglecting to define a term which may be unfamiliar to the reader is a common pitfall in explanatory writing; we know, because it happens to us all the time. In this case, the author of your terminal program's manual assumed you were familiar with a term that was quite common a few years ago but is seen less often now.

Until very recently, programmers were severely cramped by the amounts of random access memory (RAM) available in personal computers. RAM is the part of the computer where a program is temporarily stored when loaded from disk or tape. As long as the computer remains powered up, RAM retains the information loaded into it. The more RAM available in a computer, the larger the programs it can run. In addition, most programs that let you create or process information—such as word processors, spreadsheets, database managers, and so on—also use RAM as a temporary workspace to

hold your information until you save it on disk or tape.

Because RAM is so useful, the power of a computer is often defined in terms of how much RAM it has. The more RAM, the more power.

CP/M (Control Program/Microcomputers) is an operating system that's been around since the late 1970s. (An *operating system* is a master control program that's always active while the computer is switched on; it takes care of numerous housekeeping tasks that allow the computer to run other programs for you.) Because CP/M was designed in the 1970s, its power is limited by the hardware that was available then. To be specific, it was designed to run on the Z80 microprocessor chip, which can't directly access more than 64K of RAM at a time (1K = 1024 bytes, roughly equivalent to 1024 characters).

The Commodore 128, in addition to having a microprocessor chip that's compatible with the Commodore 64, also has a Z80 chip. That's why this multipurpose computer can run CP/M and programs written for CP/M. But even though the Commodore 128 contains 128K of RAM, its Z80 chip is still limited to directly addressing only 64K of that memory, just like any other Z80.

Although 64K was considered a lot of memory in the late 1970s, it just isn't enough to run some large programs. For instance, your terminal program evidently needs more than 64K. To get around this limitation, the programmer resorted to a technique that was common in the days when computers had only 64K or less memory: *overlays*. Overlays allow a program to be much larger than the amount of memory available in the computer.

An overlay is a section of a program that normally isn't loaded into memory along with the main

part of the program. Instead, it's loaded into memory only when needed. The main program is written to fit in memory with a little room to spare. Whenever necessary, it then loads the overlay into this spare memory to perform a certain function. A program may have several overlays waiting on disk. As each overlay loads, it replaces the previous one in memory.

Overlays usually perform some auxiliary function that isn't central to the main program. That way, you don't have to wait for them to load from disk any more often than necessary. In some cases, though, a large overlay may also replace the main program in memory, requiring you to rerun the main program after using the overlay.

Overlays are less common now that personal computers routinely come with anywhere from 512K of RAM to four megabytes (one megabyte equals 1024K). Still, overlays will probably be around as long as programmers keep writing memory-hungry programs.

Generally, a program automatically loads the appropriate overlay when you select the function it performs. Some programs, however, require you to load the overlay yourself. It sounds like your terminal program expects this. There should be an overlay file on the disk, and it should be a program file, most likely shorter than the terminal program.

Check your manual again for any instructions on loading overlays or any explanation of the files on the disk. If you draw another blank, it's possible the overlay was inadvertently left off the disk or the instructions were omitted from the manual. Your best bet would be to contact the software publisher. ☺

E. William Huffman

To get the most from geoPaint, you need a chart showing the maximum possible sizes for a document, a normal-edit window, a pixel-edit window, and an album page. This month's column shows you how to construct just such a chart.

GeoPaint is undoubtedly one of the most-used GEOS applications, but it's sometimes difficult to get your bearings when creating a document. What size, for example, is the pixel-edit window when compared with an entire document page? When you fill the normal-edit window with a pattern, how much of a page will be used? The *geoPaint* reference chart described in this column will help solve all these problems. Making a chart like this is also an excellent way to get acquainted with some of *geoPaint*'s editing features.

Making the Chart

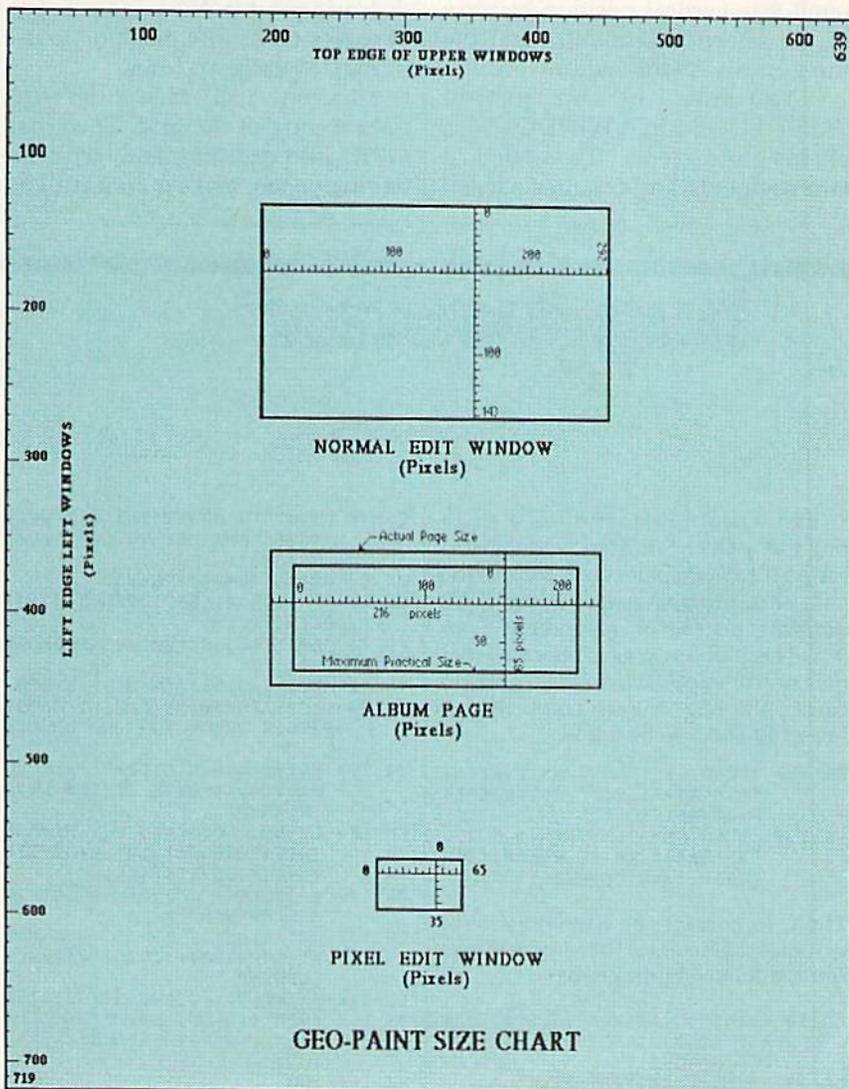
First, boot GEOS and load *geoPaint*, telling the program you're going to create a new file with the name SCALES. Now, take just a moment to look at the accompanying reference chart. The chart has an outline with pixel scales along its top border and down the left side. Inside this area are scaled representations of a normal editing window, an album page, and a pixel editing window.

Start things off by outlining the document. You may want to experiment with both normal- and pixel-edit modes for drawing the outline. Be sure your pencil is drawing at the extreme edge of the normal-edit window to get a true size for the page. Because single pixel-width lines are very thin, you might try using a double pixel line, but for accuracy, measure to the outer one. The *GEOS Manual* explains moving windows around to make all outside edges available.

Next, draw a short line of three pixels at ten pixel intervals along the left and the top edges. You'll need to do this in pixel-edit mode. Use the ruler or tape measure to check the scale markings or count. Make slightly longer marks every 50 pixels and still longer ones every 100. Examine the accompanying chart for guidelines. If you're ambitious, you might want to place

scales along the right and bottom edges of the document, too.

With the text-edit feature, place the appropriate numbers along the top and left sides of the chart. When you've finished this step, save this file (you may find a chart with just these measurements on it useful). Now, bring SCALES back to the screen and rename it CHART. Next, we'll add the normal-



This chart makes it easy to navigate geoPaint.

edit window, the album page, and the pixel-edit window to the chart.

Adding the Windows

Discovering the largest possible album can be time consuming. You need to make long horizontal and vertical scales and to experiment by placing them on an album page. Experimentation determined that the maximum size of the page is 250 × 85 pixels, but it's impossible to place a graphic of this size in the album because of limitations in the selection process. The practical limit for album pictures is about 216 × 65 pixels.

Now draw the normal-edit window using a rectangle of 262 × 143 pixels. Please note that, although you can fill this window with a graphic, if you do, you won't be able to rotate it. Text or any graphic larger than 125-pixels long horizontally probably can't be rotated to a vertical position because of the selection limitation and the more narrow window dimension.

You may find the caption "LEFT EDGE LEFT WINDOWS" a challenge to create. It's rotated in two segments and requires several

moves before everything is aligned correctly. Each move is in eight-pixel jumps, so this can be a time-consuming process.

After you've created the document, including all captions, print a hard copy and save the file to disk. Now you can visualize exactly what portion of your picture is displayed in the editing windows, an album page, or the entire document. Larger drawings are no problem, except for album pages. Segments drawn in pixel- or normal-edit modes can be rearranged to make larger pictures.

The Grid

Bring the SCALES file into *geoPaint* and rename it GRID (leave SCALES on the files disk for future use, however). Now extend all the ten-pixel marks across the document both horizontally and vertically. Save the completed document to the files disk and print it. Next, make several copies on a copy machine to use in making large pictures.

Layout and trace a drawing onto a copy of the grid. Then load GRID into *geoPaint*, and, with the editing pencil, make marks at all in-

tersections in pixel-edit mode. You'll need to make identification marks near key intersections so they can be seen in the pixel-edit window. With enough intersections marked, proceed to outlining the small portion of your drawing in the pixel window and watch your creation come to life in the small window to the left of the status box. When you're satisfied, erase all the unwanted grid pixels and move to an adjacent area to continue your artwork. When you've finished, you'll have mastered an important new technique.

A complicated graphic can be laid out on a hard copy of your GRID or, if you don't relish erasing all those grid lines, on a hard copy of SCALES. When the master layout is finished, simply load the appropriate *geoPaint* file and use corresponding reference points on the master to position graphics and text on the screen. Be sure to rename the new document and to erase all the unwanted grid or reference lines, numbers, and so on, before saving and printing. ●

bug-swatter

Modifications and Corrections

• "Easy Load" (February) has a slight bug that prevents it from working correctly. It adds graphics characters to the end of the program names in the disk's directory instead of appending ,8; or ,8,1. This problem makes the converted files nearly impossible to load. First, to correct the bug in Easy Load, change lines 180 and 190 as follows:

```
KB 180 IFCHOICE=1THENOPEN15,8,15,
      "R:"+AS+"{SHIFT-SPACE}{D}8
      @:"+AS:CLOSE15
RG 190 IFCHOICE=2THENOPEN15,8,15,
      "R:"+AS+"{SHIFT-SPACE}{D}8
      {D}1:"+AS:CLOSE15
```

Then, to correct the filenames with graphics characters in them, type in and run the following program:

```
QQ 10 PRINT{CLR}{RVS}{5 SPACES}E
      ASY LOAD DIRECTORY CORRECTO
      R{6 SPACES}"
DE 20 PRINT:PRINT:PRINT"
      {3 SPACES}PLACE THE DISK TO
      BE CORRECTED IN"
MM 30 PRINT:PRINTTAB(11)"DRIVE 0
      {SPACE}OF UNIT 8."
```

```
QR 40 PRINT"{3 DOWN}"TAB(6)"{RVS}
      PRESS ANY KEY TO CONTINUE
      {SPACE}"
RX 50 GETKS:IFKS="THEN50
FE 60 OPEN1,8,0,"$0":OPEN15,8,15:
      PRINT{CLR}"
FP 70 GET#1,AS,AS:REM LOCATION BY
      TES
RQ 80 GET#1,AS,AS:REM LINK BYTES
KG 90 S=ST:IFS<>0THENCLOSE1:GOTO1
      50:REM CHECK FOR END OF FIL
      E
KE 100 GET#1,LOS,HIS:CS=":REM LO
      W BYTE,HI BYTE OF THE LINE
      NUMBER
FH 110 LO=ASC(LO+CHR$(0)):HI=ASC
      (HI+CHR$(0)):LN=LO+HI*256
      :LNS=MID$(STR$(LN),2)
DR 120 PRINTLNS+" ";:REM PRINT TH
      E LINE NUMBER
BB 130 GET#1,B$:IF B$="" THEN PRI
      NT CHR$(13);:GOTO170:REM F
      ILENAME
ED 140 PRINT B$;:CS=CS+B$:GOTO130
BM 150 INPUT#15,EN,EM$,ET,ES:CLOS
      E15:IFEN<>0THENPRINTEN;EM$
      ;ET;ES
MX 160 END
PE 170 I=1:J=LEN(CS)
EA 180 IF(MID$(CS,I,1)<>CHR$(34))
      AND(I<>J)THENI=I+1:GOTO180
JA 190 IF(MID$(CS,J,1)<>CHR$(34))
```

```
AND(I<>J)THENJ=J-1:GOTO190
DS 200 IF I=J THEN80
XS 210 J=J-4:IFMID$(CS,J,4)=" {D}
      8@"THEN240
DC 220 J=J-1:IFMID$(CS,J,5)=" {D}
      8{D}1"THEN250
ME 230 GOTO80
GR 240 I=I+1:D$=MID$(CS,I,J-I):PR
      INT#15,"R0:"+D$+"
      {SHIFT-SPACE}{D}8@:"+D$+"
      {SPACE}{D}8@":GOTO80
AK 250 I=I+1:D$=MID$(CS,I,J-I):PR
      INT#15,"R0:"+D$+"
      {SHIFT-SPACE}{D}8{D}1:"+D$
      +" {D}8{D}1":GOTO80
```

You will be prompted to place the disk containing the corrupted filenames into drive 0 of unit 8 (a 1541 as it comes from the factory is drive 0 of unit 8). Place the disk to be corrected into the drive and press any key. All the filenames that were corrupted by Easy Load will be corrected. Filenames that weren't corrupted by Easy Load are not affected by the correction program, so don't worry if you place the wrong disk in the drive. ●

So you can code circles around the pros, eh? Well, here's your chance to prove it. It's the GEOS Programming Contest. And all it takes to win is a Commodore and your skill at programming under GEOS to win in any four categories and walk away with all kinds of prizes.

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- applications from Berkeley Softworks
- Commodore peripherals: 1670 1200 Baud Modem, 1351 Mouse and 1764 or 1750 RAM Expansion Module
- Six month subscription to Q-Link, the telecommunications service and Q-Link's Public Domain Software Library from Quantum Computer Services
- Twelve month subscription to Compute!'s

6. Judging will be performed by the staff of Compute!'s Gazette Magazine. The decisions of the judges are final in all respects. This includes decisions regarding creativity, similarity among entries and general suitability.

7. Entries become the property of Berkeley Softworks, which reserves the right to adapt, use or publish all entries received. Entries may become part of a "shareware" library to be distributed by Berkeley Softworks, Compute!'s Gazette and Quantum Computer Services. As part of each

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1. Applications are identified by the GEOS Application File Type, are entered from and exit to the deskTop and conform to the GEOS user interface.
2. Desk Accessories are defined as programs which are less complex than applications, are identified by the GEOS Desk Accessory File Type, may be entered and pop-up within any application and upon exiting return the application to its prior state.

Categories

ENTERTAINMENT—Includes entertainment and games. For example, a Chess game (Applications Division) or a trivia game (Desk Accessories Division).

EDUCATION—Primarily educational and instructional. For example, a world geography program (Applications Division) or a flash card program (Desk Accessories Division).

PRODUCTIVITY—Designs that improve personal productivity. Examples include an "outline processor" (Applications Division) or a scientific or financial calculator (Desk Accessories Division).

OPEN PROGRAMMING—Open design category that includes programs not covered in other categories. Examples include disk utilities, printer and input drivers and telecommunications programs.

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- Complete library of C64 or C128 GEOS

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- Complete library of C64 or C128 GEOS applications from Berkeley Softworks
- Commodore peripherals: 1670 1200 Baud Modem and your choice of a 1764 or 1750 RAM Expansion Module or 1351 Mouse
- Three month subscription to Q-Link, the telecommunications service and Q-Link's Public Domain Software Library from Quantum Computer Services

• Twelve month subscription to Compute!'s Gazette magazine
Eight Third Prizes!

- Announcement in Compute!'s Gazette Magazine
- Your choice of any five C64 or C128 GEOS applications from Berkeley Softworks
- Commodore peripherals: 1670 1200 Baud Modem and your choice of a 1764 or 1750 RAM Expansion Module or 1351 Mouse
- Three month subscription to Q-Link, the telecommunications service and Q-Link's Public Domain Software Library from Quantum Computer Services
- Twelve month subscription to Compute!'s Gazette magazine

Official Rules

1. Employees of Berkeley Softworks, Quantum Computer Services, Laser Direct, Compute!'s Gazette Magazine, their advertising and promotional agencies and their immediate families are not eligible to enter the contest.

2. Each entry must be your original work, previously unpublished in any form. All those programs accepted will be required to affirm this in writing.

3. Contestants may enter multiple categories, but may only submit one entry per category per division (e.g. one entry in the Entertainment category Applications Division, and one entry in the Entertainment Desk Accessories Division). Regardless of the number of categories you enter, you will only be eligible to win one prize.

4. Deadline for entries is August 31, 1988. Mail entries to Compute!'s Gazette, P.O. Box 5406, Greensboro, NC, 27403
Attn: GEOS Programming Contest.

5. Acceptance of an entry shall not create any implication that the entry has been received and reviewed by Berkeley Softworks or has been used in any way in product development.

submission, contestants should include in the program their name, address and a "user fee" amount for satisfied users to send a discretionary payment.

8. Entries may be written in any programming language but must be a GEOS based program supporting the GEOS file structure and be executable from the GEOS deskTop or a GEOS application. Whichever language is chosen, the code must be a self-standing program that can be run by someone who does not own the language. We must be able to legally distribute the program without incurring licensing fees or any other obligations to the maker of the language.

9. Entries must be submitted on 5.25" floppy disks in 1541/1571 format. The following should be clearly marked on both the printout and the disk:

- A. Contestant's name, address and phone number.
- B. Category and division for the entry.
- C. Intended use for the program.

10. Entries must be accompanied by a description which explains how to use the program and what it does.

11. This contest is void where prohibited by law. All federal, state and local taxes are the sole responsibility of the winners.

General Conditions

- Entries will be judged on creativity, originality, interface consistency with other GEOS programs and error-free quality of the code.
- Make sure your mailer will protect your disk from damage. Affix sufficient first class postage. Mail your printout, disk and official entry blank to the above address in time to reach Compute!'s Gazette Magazine before the August 31, 1988, deadline.
- Winners will be announced by October, 1988.

Sponsored by Berkeley Softworks and Compute!'s Gazette.

PLEASE PRINT

Name _____

Phone _____

Address _____

City _____

State _____ Zip _____

Age _____

EVERY CONTEST ENTRY MUST INCLUDE THIS SIGNED FORM.

I warrant that the program presently entitled is my own original work and that the work has not been submitted for consideration elsewhere, nor has it been previously published in any form. If my work is accepted by you, I understand that your decision as to the selection of winners and awarding of prizes is final and without recourse on my part. I understand that by entering this contest, my entry becomes the property of Berkeley Softworks and in the event my program is included in a shareware library, I will be required to sign a standard release agreement. (If you are under 18, your parent or legal guardian must sign for you.)

Signature _____

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Ramdisk 64

Bruce Thompson

This short machine language utility creates a ramdisk in the 64's "hidden" memory, allowing you to load and save programs instantaneously—and it provides over 20K of storage.

BASIC programmers rarely tap the great expanses of memory in the Commodore 64. For instance, both BASIC and Kernal ROM (Read Only Memory) have an 8K chunk of RAM (Random Access Memory) beneath them. "Ramdisk 64" lets you use this RAM (along with the 4K block of free memory at location 49152) for temporary storage of BASIC programs. No longer will loads and saves depend on the speed of your tape or disk drive. With Ramdisk 64, you'll have instant access to as many programs as you can fit in 20K of RAM.

Installing the Ramdisk

Since Ramdisk 64 is written in machine language, you'll need to enter it with "MLX," the machine language entry program printed elsewhere in this issue. When you load and run MLX, respond to the address prompts with the following values:

Starting address: 0801
Ending address: 0A50

After you've typed in the program, save a copy to disk or tape before leaving MLX. Even though it's written in machine language, Ramdisk 64 loads and runs like a normal BASIC program. Thus, to install the ramdisk, simply load the program, type RUN, and press RETURN. When the cursor reappears, type NEW and press RETURN. The ramdisk is now active and ready for use.

RAM Power

The ramdisk you've installed operates much like a disk or tape drive. It assumes a device number of 2 (a disk drive is normally device 8; a

tape drive is device 1). So, to save a BASIC program to the ramdisk, use the command SAVE"filename",2 where filename is any string of 16 or fewer characters.

Once you've stored a number of programs in the ramdisk, enter LOAD"\$",2 to produce a two-column directory of all the files currently in the ramdisk. This directory does not destroy the program that's in memory. At the end of the directory, you'll see a BYTES FREE message telling you how much memory is left in the ramdisk for additional programs. If you attempt to save a program that is longer than the space that remains, the save aborts with an OUT OF MEMORY error, and your BASIC program remains intact.

When you wish to reload a file from the ramdisk into the BASIC work area, type LOAD"filename",2 and press RETURN. If there is an appropriately named file in the ramdisk, it loads into memory (much as it would from tape or disk). To conserve memory, the program is erased from the ramdisk. For this reason, when you're finished working on a program you've taken from the ramdisk, be sure to resave it (either to the ramdisk, or to tape or disk) before loading another program. If you wish to delete a file from the ramdisk, just load it into memory.

Ramdisk 64 shares traits of both the disk and tape drive. For instance, if you're using tape for program storage, entering LOAD"C" will load the first program on the tape whose filename starts with the letter C. This technique works just fine with Ramdisk 64 (for example, LOAD"C",2 loads the first program

in the ramdisk that begins with the letter C.)

With disk, this process is known as *pattern matching* and requires an asterisk (*). The ramdisk also recognizes this convention when loading files. For example, just as with disk, LOAD"file*",2 loads the first file that begins with the letters file. In contrast, LOAD"*",2 always loads the first entry in the ramdisk directory. With disk, this is true only when no other program has been loaded yet. If a program has been loaded, LOAD"*",8 fetches the most recently accessed program.

As a convenience, Ramdisk 64 allows you to save multiple versions of a program using the same filename. This prevents you from accidentally overwriting a program in the ramdisk. To recall a version of a program, simply load the program repeatedly until your most recent copy is in memory. Be sure to save other versions to disk or to the ramdisk if you wish to keep them.

How It Works

The Ramdisk 64 driver routine resides at the bottom of the BASIC text area. This allows utilities like "MetaBASIC" to operate undisturbed.

When it is run, Ramdisk 64 immediately protects itself from BASIC by adjusting the start-of-BASIC pointers upwards. Next, it stores the current ERROR handler vector at 768, redirects the vector to its own error handler, and exits to BASIC.

Henceforth, whenever a BASIC error occurs, the program checks for an ILLEGAL DEVICE NUMBER error. If this error took place, it assumes the user is attempting to access the ramdisk. The program then looks for a correct filename and loads or saves the specified program to the ramdisk workspace. Ramdisk storage extents from location \$A000 to \$FFFF, excluding the area from \$D000 to \$DFFF.

On the 64, certain device numbers other than 2 will trigger the ILLEGAL DEVICE NUMBER error (0, 3, and so on). These can also be used for ramdisk access. For example, both LOAD"\$",0 and LOAD"\$",3 produce a ramdisk directory listing.

See program listing on page 77.

Big Screen Converter

Robert Bixby

This companion program to "Big Screen," (a powerful 640 × 400-pixel drawing program for the 64, published in the March 1988 issue) makes ordinary DOODLE! files—and BASIC 7.0 graphics screens—compatible with Big Screen.

"Big Screen," published in the March 1988 issue of *COMPUTE!'s Gazette*, lets you create hi-res drawings on a virtual graphics screen that is 640 × 400 pixels—four times the usual screen size. With "Big Screen Converter," you can load graphics created with *DOODLE!* into Big Screen and handle them as you would other Big Screen files. Thus you'll be able to perform the kind of detail work allowed by Big Screen on your *DOODLE!* files.

Big Screen Converter is written in machine language for maximum speed. To enter it, you must use "MLX," the machine language entry program found elsewhere in this issue. When you run MLX, you are asked for the starting and ending addresses of the data you'll be entering. Here are the values to use with Big Screen Converter:

Starting address: 0801
Ending address: 0B70

Follow the MLX instructions carefully, and be sure to save a copy of the Big Screen Converter data before exiting MLX. Although written in machine language, Big Screen Converter can be loaded and run just like a BASIC program.

Converting DOODLE! Files

To convert a file, first load and run Big Screen Converter. The program asks you for a filename. Place a disk

containing a *DOODLE!* file in your disk drive. Type the name of the *DOODLE!* file and press RETURN. Remember to add the DD prefix which precedes all *DOODLE!* filenames. (For example, if you save a hi-res picture as LANDSCAPE with *DOODLE!*, the file will appear in the directory as DDLANDSCAPE.) Be sure that you type a valid filename—if the program is unable to find your file, you'll have to load the program and run it again to ensure an accurate conversion.

Once you've entered the *DOODLE!* filename, Big Screen Converter switches to the hi-res screen and begins the conversion process. You'll actually see the first part of the picture load and expand until the limits of the normal hi-res screen have been reached (320 × 200 pixels). The screen border color flashes red and white during the conversion. When the process ends, the text screen reappears.

At this point, follow the instructions in the March *GAZETTE* to load and run Big Screen. Your *DOODLE!* file will be displayed on the graphics screen in an enlarged form—four times bigger than before. Using Big Screen's various modes and commands, you can now work on this expanded image. When you've finished, be sure to save a copy of it to disk.

Converting 128 Graphics

Big Screen Converter handles not only *DOODLE!* files; it also converts graphics screens saved from BASIC 7.0. Hi-res screens on the 128 are generally saved with the command BSAVE. For instance, the following statement saves the contents of the hi-res screen at 7168 to disk as the file "HR PICTURE":

```
BSAVE "HR PICTURE",B0,P7168 TO  
P16384
```

Once it is saved, you can convert HR PICTURE to Big Screen format by first switching to 64 mode. Next, load and run Big Screen Converter. At the filename prompt, enter "HR PICTURE". When the conversion is complete, load and run Big Screen and save a copy of the enlarged image to disk.

How It Works

After you've specified a filename (*DOODLE!* or BASIC 7.0 graphics screen), Big Screen Converter reads a byte of graphics data from the file and expands it to encompass four bytes. These four bytes are displayed on the 64's graphics screen beginning at 8192 before another byte is read from the disk. The normal graphics screen represents the first quadrant of Big Screen's 640 × 400-pixel canvas. The rest of the converted graphics data (the three remaining quadrants) is stored in 8000-byte areas beginning at 16384, 24576, and 32768. Big Screen Converter itself occupies a little more than 800 bytes of memory in the BASIC text area.

See program listing on page 75. ☐

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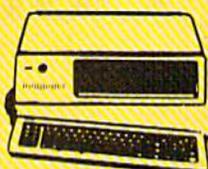
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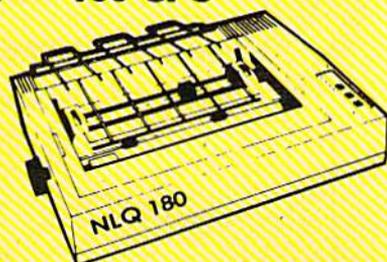
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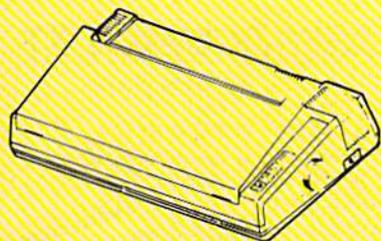
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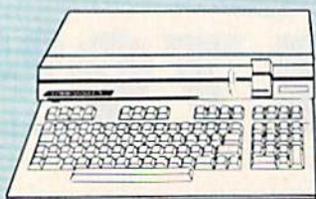
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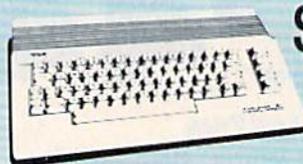


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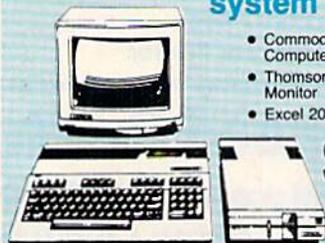
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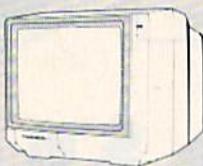
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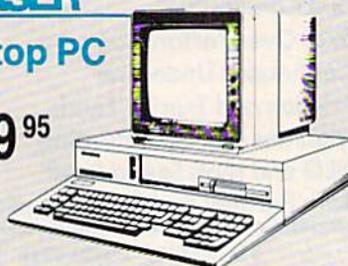
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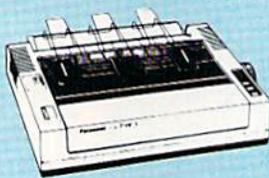
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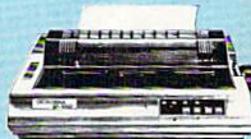
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Pointer

Charles Prince

This clever utility allows you to use a joystick-controlled, mouse-like pointer in your own BASIC programs. A demo is included to help you get the most from this program. For the 64 with joystick.

"Pointer" is a short machine language utility that displays an on-screen arrow you can maneuver around your 64's display with a joystick. With Pointer installed, you can program your joystick to create "point-and-shoot" applications like those used in the popular GEOS operating system. "Finder," Program 2, demonstrates how to locate the arrow's position on the screen so you can use Pointer to its best advantage.

Pointer is written in machine language, so you'll need to enter it with "MLX," the machine language entry program found elsewhere in this issue. When you run MLX, you'll be asked for the starting and ending addresses of the data you'll be entering. Here are the values to use for Pointer:

Starting address: CF00
Ending address: CFF7

Follow the MLX instructions carefully and be sure to save a copy of the Pointer data before you leave MLX.

Using Pointer in Your Own Programs

There are two ways to use Pointer in a program. First, you can wait for the fire button to be pushed. This can be done in two ways:

```
100 WAIT 56320,16,16
```

or

```
100 IF (PEEK(56320)AND16)=16 THEN  
100
```

Both options will freeze execution of the BASIC program until the fire button is pressed. The program

then continues normally.

The second method involves reading the location of the pointer. This is accomplished with three simple formulas:

```
X=INT(((PEEK(53262)-255*(PEEK(53264)  
-128))-24)/8)  
Y=INT((PEEK(53263)-49)/8)  
SL=40*Y+X
```

In these formulas, X is the column where the pointer is currently located (in the range 0-39), Y is its row (in the range 0-24), and SL is the specific cell of the screen that the pointer occupies (between 0 at the top left corner and 999 at the lower right).

Once these steps have been taken, your BASIC program can do whatever is required when the user has pointed at something and pressed the fire button. For example, the joystick could be used to pick options from a menu on the screen. In this case, one space on the screen should be designated as the *activating space* for each option. When the user points to this space, the BASIC program transfers control to the appropriate subroutine to execute the chosen option.

(A Macintosh-style interface can be created by combining Pointer with "Looking Glass," a program published in *COMPUTE!*'s June 1986 issue that adds windowing capabilities to the Commodore 64. When the two programs are used in concert, your BASIC programs take on a whole new look, with windows and pull-down menus. Pointer was written to be completely compatible with Looking Glass.)

Customizing Pointer

There are several ways to customize Pointer for your preferences. You can change the color of the pointer simply by typing

```
POKE 53294,n
```

where *n* is the number of the desired color. Values for colors are the following:

0 = Black	8 = Orange
1 = White	9 = Brown
2 = Red	10 = Light Red
3 = Cyan	11 = Dark Gray
4 = Purple	12 = Medium Gray
5 = Green	13 = Light Green
6 = Blue	14 = Light Blue
7 = Yellow	15 = Light Gray

To change what the pointer looks like, you can use any sprite. (Please note, however, that sprites that are eight pixels by eight pixels or smaller work best. If you use anything larger, you won't be able to select anything in the bottom-most row or the rightmost column.) Either you can place the data for the new sprite in locations 704-766—erasing the data for the original sprite—or you can store the data for the new sprite somewhere else (such as the cassette buffer) and change the data pointer by entering `POKE 2047,b`, where *b* is the number of the block in which you stored the data.

If the picture for the new sprite has a size other than four pixels by four pixels, you'll need to change two registers in the routine with the following POKES:

```
POKE 53101,251-YW  
POKE 53146,88-XW
```

YW is the height of the sprite, and XW is its width (both measured in pixels). For example, for a sprite with a width of six pixels and a height of eight pixels, you'd enter:

```
POKE 53101,243  
POKE 53146,82
```

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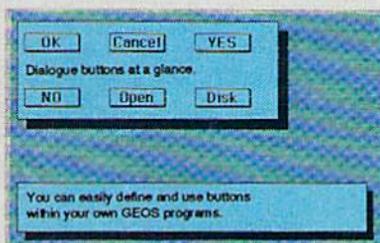
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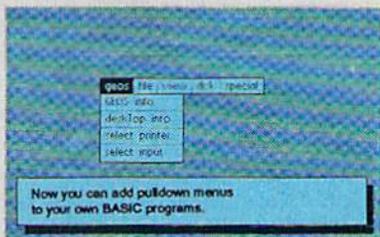
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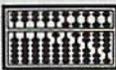
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Finder

Finder, Program 2, is designed to demonstrate how to use Pointer and to help you determine where things are on the screen. Since Finder is written entirely in BASIC, simply type it in, save a copy to disk, and type RUN.

You'll see the pointer on the screen and, in the upper left corner, the *x* and *y* coordinates followed by the screen position. To find the position of a point on the screen, use the joystick to move to any location, press the space bar to erase the position information, and press the fire button on the joystick. Pressing Q at any time will return you to BASIC.

Program Notes

When using Pointer, there are a few restrictions to note:

- Your BASIC program cannot use sprite number 7, since that is the one used by the machine language routine for the pointer.
- The BASIC program cannot store anything in locations 704-766, except to change the appearance of the pointer.
- Anything that is stored in locations 52992-53232 will affect the machine language routine already there and probably result in a crash.
- If your BASIC program uses WAIT 56320,16,16 to test for the fire button, you won't be able to use the RUN/STOP key during that wait.

Pointer works by wedging itself into the computer's hardware interrupt. The hardware interrupt is that part of the operating system that performs various house-keeping functions 60 times per second. By changing the interrupt vector (locations 788-789) to point at the new routine, the computer reads the joystick and moves the pointer accordingly every 1/60 second, regardless of what else is going on. This gives BASIC programmers more memory to work with, since they no longer need to include routines in their programs to read the joystick, check to see if the sprite has gone off the screen, and so on. Pointer, running in the background, takes care of all these details.

See program listings on page 74. ☐

Graphics Wedge

Phillip A. Gilley

View any hi-res picture on your screen with this powerful machine language graphics utility for the Commodore 64. Six different formats are supported.

One of the most impressive features of the Commodore 64 is its bit-mapped graphics. Beautiful pictures can be created with a variety of graphics programs, including *DOODLE!*, *KoalaPainter*, and *Cadpak*.

Unfortunately, it can be difficult to display the pictures you've made. To display a picture file created with *KoalaPainter*, for instance, you must load and run the *KoalaPainter* program and then load the picture. From within *KoalaPainter*, you can load only *KoalaPainter* pictures. To load a picture of another format, you must leave *KoalaPainter* and run the appropriate program. "Graphics Wedge" is the solution to this problem.

Graphics Wedge is a short machine language program that allows you to view picture files quickly and easily—even pictures created by different graphics programs. Graphics Wedge can display files created with *Blazing Paddles*, *Cadpak*, *DOODLE!*, *KoalaPainter*, *Micro Illustrator*, and the Screen Magik area of *The Print Shop*—the only time you'll need to load a graphics program is when you draw your pictures.

Graphics Wedge is especially handy for those who have many public domain pictures, but don't have the graphics programs needed to display them.

Getting Started

Since Graphics Wedge is written in machine language, you'll need to enter it with the "MLX" machine language entry program found elsewhere in this issue. When you run MLX, you'll be asked for the starting and ending addresses of the

data you'll be entering. For Graphics Wedge, use the following values:

Starting address: 0801
Ending address: 0B28

Follow the MLX instructions carefully, and be sure to save a copy of the Graphics Wedge data before you leave MLX.

Easy Display

To use Graphics Wedge, load and run it just like a BASIC program. Graphics Wedge places itself in a safe area of memory and returns you to the READY prompt.

Viewing picture files is easy. First, type LOAD "filename",8,1 (tape users should type LOAD "filename",1,1). The picture loads into memory. Now type a period and press RETURN. You'll see a list of the file formats that Graphics Wedge supports. Press the letter that corresponds to the format of the picture. The picture will appear on the screen.

While the picture is being displayed, you can change the border and background color. The f1 and f2 keys cycle through the border colors (f1 cycles forward; f2 cycles backward). The f3 and f4 keys cycle through the background colors. (Note: Changing the background color while in multicolor mode can produce strange results.) When you are finished viewing the picture, press a key.

You can now load and display another file. If you're not sure what format a picture is in, try one. If it fails, load the picture again and try another format.

See program listing on page 77. ☐

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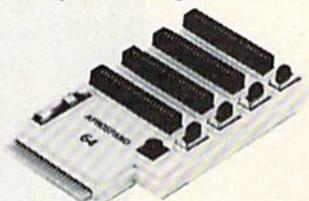
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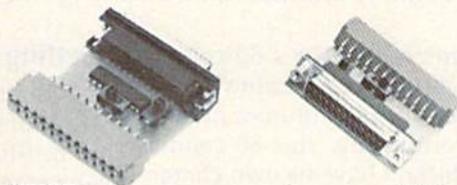
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Excelfont 80

Super Character Editor for the 128

Daihung Do

With this well-designed and powerful utility, you can easily create your own custom 80-column character sets for the 128, using an amazing maximum of 15 pixel rows for each character. An 80-column monitor and disk drive are required.

The Commodore 128's 80-column video is a remarkable improvement over the 64's 40-column display, but unfortunately, the 80-column screen doesn't have its own character set—it borrows the 64's. The 64's characters, though fine in 40 columns, don't do justice to the 128's 80-column resolution. "Excelfont 80" solves this problem by allowing you to creatively design any number of attractive character sets to suit your preferences.

One special feature of Excelfont 80 is that it allows you to edit the full 15 rows of the 80-column set. Imagine a large 15-row character set for titling and a smaller one for normal text. With Excelfont 80, you can create just the right look for any program on which you're working. Although Excelfont 80 is partially written in machine language, you don't need to know machine language in order to use it.

Getting Started

Excelfont consists of six programs. Three of these programs are written in BASIC, and three in machine language. Program 1, EXCEL.LDR, loads the other programs into memory and sets up the screen. Since Program 1 is written in BASIC, simply type it in and save a copy to disk with the name EXCEL.LDR.

Program 2 does most of the work, scanning the keyboard and calling the correct machine language routines. Program 2 is written in BASIC, so type it in and save a copy to disk with the filename EXCEL.BAS.

Program 3 is the main machine language program, the one that actually manipulates characters and accesses the 80-column video chip. Enter this program with "128 MLX," the machine language entry program found elsewhere in this issue. When

you run 128 MLX, you'll be asked for the starting and ending addresses of the data you're entering. For Program 3, use the following:

Starting address: 0C00
Ending address: 0FCF

When you've finished entering the Program 3 data, save it with the filename EXCEL.OBJ. Be sure to use this name, because Program 1 looks for a file with this name on disk.

Program 4 is also a machine language program, so again, use 128 MLX to enter it. Respond to the prompts with the values indicated:

Starting address: 1300
Ending address: 135F

When you've finished entering the Program 4 data, save it with the filename EXCEL.OBJ1. It's important that you use the name EXCEL.OBJ1, because this is the filename that Program 1 uses to load this file.

Program 5 is a BASIC program that merges the two character sets into one. Simply type it in and save a copy to disk with the filename EXCEL.UTL.

Program 6 is a machine language program that enables you to

load and install a character set for use in your own programs. Use 128 MLX to type in this program. When you run 128 MLX, you'll be asked for the beginning and ending addresses of the data you're entering. The values for Program 6 are as follows:

Starting address: 0C00
Ending address: 0C2F

When you've finished entering the data, be sure to save a copy with the filename EXCEL.OBJ2. Be sure to save the data with this filename because this is the name Program 5 will expect.

Up and Running

In order for Excelfont 80 to work, all six files must be on the same disk in the disk drive, and your 128 must be in 80-column mode. When everything is set, type

RUN"EXCEL.LDR"

followed by RETURN, to run the program.

This program loads the other three programs into memory and executes Program 2, EXCEL.BAS. (The last two programs, Programs 5 and 6, are used separately.) On the main screen you'll see a character-editing window with an enlarged version of the character currently being edited, a window that displays the entire character set, a help window, a status window, and a prompt window.

When you first start the program, you'll be asked whether you want to edit the uppercase/graphics (character set 0) or the lower-/uppercase character set (character set 1). Excelfont 80 allows you to edit one character set at a time. Later, the two separate character sets can be merged into one. The second prompt asks for the number of character rows you'll be using for the character. This question affects the number of rows that are reversed, mirrored, or flipped when the appropriate options—to be discussed later—are selected.

You'll notice that there are two cursors on the screen: One is in the character-editing window, and the other one is in the character-selecting window. To move the cursor in the character-editing window, use a joystick in port 2. To move the cursor in the character-selecting window, use the cursor keys. When you press the fire button, the corre-

sponding pixel under the cursor is set or cleared, depending on its previous state: If it was set, then it will be cleared, and vice versa. To continuously set or clear pixels, hold down the fire button and move the cursor around. You'll notice that the corresponding character in the character-selecting window is altered with each change you make to the expanded character in the character-editing window. When you move the character-selecting cursor, the pattern in the character-editing window changes to the character that is under the cursor in the selecting window.

Editing Characters

Excelfont has several features that allow you to edit and manipulate the character in the editing window or even the whole character set. Here's a brief description of each one.

HELP. Pressing this key displays a Help menu in the Help window. Press HELP again to see the next Help menu. There are a total of three of them, so pressing HELP three times returns you to the first menu.

R. Rotates your character clockwise. This feature only rotates the upper 8×8 grid. It will operate regardless of the number of character rows. This feature is handy if, for example, you want to make a ship point in a different direction, or if you want to create a sideways character set. If you want to rotate the bottom 8×8 grid, just scroll the character eight times vertically to move the bottom eight rows to the top, rotate the character, and then scroll it back so that the character is back where it started, except for the rotated bottom rows.

SHIFT-R. This command is like R, but it rotates your character counterclockwise instead of clockwise.

CONTROL-9. Reverses the character. All pixels that have been set are cleared and all cleared pixels are set. If you press this twice, you'll have the same character you started with.

F. Flips the character vertically. This is the same as pressing R twice, but it saves a keystroke.

M. This command mirrors your character horizontally. This feature allows you to make mirrored character sets. Pressing this

key twice returns to the character with which you started.

SHIFT-CLEAR/HOME. Clears the character so you can begin afresh. Be careful with this option, however; you may have to edit the whole character over if you press this accidentally.

N. Restores the ROM character image. If you've made a mistake trying to enhance a ROM character, press this to get it back. Please note that this restores the ROM character, not your previous character.

E. Pressing this key enlarges (or expands) the character vertically. This feature is particularly useful if you're making a 15-row character set. It makes two rows for every one row that was in the original pattern. Be careful not to press this twice, because it will ruin your character, leaving you no way to get it back. This feature destroys the last eight rows of the original character.

C. This command is the opposite of E, above. It shrinks the character. If you press E and then this key, you'll have your original character pattern.

Commodore-9. Copies the first two rows, reverses them, and then writes them to the bottom two rows, effectively making a reverse character set for your new character set. This feature can be quite a timesaver.

T. Use this command to try your new character set. If you specified any number of character rows except 8 or 16, you'll be prompted to enter the number of displayed character rows, 8 or 16. You're asked this because Excelfont can only display either an 8- or a 16-row character set. After you've answered the prompt, the main screen is replaced by a nearly blank one. You can type and try out your font as much as you wish. Press the ALT key to return to the main screen.

O. Stashes your character in a buffer so you can recall it later. If you're about to make a big change in your character, stash it here first in case you make a mistake.

SHIFT-O. Recalls the character from the buffer. If you press this key before you've saved something to the buffer with the above feature, you'll get a random pattern.

SHIFT-N. Restores the ROM character set. Please note that this will erase your whole character set, replacing it with the one in ROM.

You'll be asked if you really want to do this before the ROM character set is restored.

Q. Allows you to quit the character set and edit another one.

HOME. Homes the editing cursor to the top of the character-editing window.

Cursor keys. Allow you to move the character-selecting cursor.

Joystick (in port 2). Allows you to move the editing cursor.

Joystick fire button. Sets or clears pixels in the editing window.

Y. Scrolls up in the cursor's column.

G. Scrolls left in the cursor's column.

H. Scrolls right in the cursor's column.

B. Scrolls down in the cursor's column.

8. Scrolls the whole character up.

4. Scrolls the whole character left.

6. Scrolls the whole character right.

2. Scrolls the whole character down. Scrolling affects the entire column or row. The number of rows it affects will always be either 8 or 16.

D. Displays the disk directory.

S. Saves the character set. Note that the character set is saved with a starting address of 8192 and an ending address of 12288. You can merge character sets after they have been saved by using EXCEL.UTL, Program 5.

L. Loads a saved character set. The loaded character set must have been created and saved from Excelfont in order for it to load correctly. When you load a character set, the one that was in memory will be replaced by the new one, so save the old one if you'll need it later. If you attempt to load a character set created with another character editor, the results are unpredictable.

@. Allows you to enter a DOS command through the command channel. See your disk drive manual for more information. It's possible to scratch and rename files, and format, initialize, and validate disks with this option.

W. This command toggles wrapping on the scrolling features.

P. Toggles between whole and part rows. If you're in whole mode, mirroring, reversing, or flipping af-

fects the character up to the row that you entered as the maximum number of displayed character rows (specified when you first ran the program). If you're in part mode, the mirroring, reversing, and flipping only affect the rows from the top of the character to the row that the cursor is on.

Program Notes

Excelfont's machine language routines do most of the program's work, such as manipulating characters, accessing the 80-column video chip, and moving memory. The BASIC program is essentially a shell. It reads the keyboard, calls the appropriate routines, prints the screen, loads and saves files, and performs screen tricks with the help of the ML program.

You may be interested in the way the program manages to make the screen fade in and fade out. This effect is created by decrementing (to fade out) or incrementing (to fade in) VDC registers 22 and 23. To change a register, use the following command in bank 15:

```
SYS 52684,value,registernumber
```

Register 22 controls a character's horizontal size. Bits 0-3 control how many horizontal pixels of a character are displayed. This affects all the characters on the screen, so by decrementing this value slowly, you can make the screen fade out. By incrementing the register after you've changed the screen, you create a fade-in effect.

Register 23 controls the character's vertical size. The fading effect that you want determines which register to change. If you want characters to slowly disappear by losing columns, use register 22. If you want them to fade in or out vertically, use register 23.

The curtain effects are created by incrementing or decrementing register 34 or 35. Register 34 controls the left-most blanked column; register 35, the right-most blanked column. The left-most visible column on many monitors is 0, and the right-most column is 96. You may have noticed that there are three different curtain effects you can create. A curtain can move from the left side of the screen to the right, or vice versa; or a curtain can come in from both sides to meet in

the center. You don't have to use a curtain effect; you can blank out the screen while you're setting up another one so that it will pop into view. Note that when you blank a screen or column, it turns black because the electron gun in your monitor is turned off.

Installing a Character Set

To use a character set in your program, you need Programs 5 and 6, EXCEL.UTL and EXCEL.OBJ2, respectively.

If you plan to use just one character set, decide which one—that is, either uppercase/graphics or lowercase/uppercase. If you want the leftover character set to be the default ROM character set, boot up Excelfont and select which ROM character set you want to use and save it to disk. Then follow the instructions below as if you were using two character sets. If you want to use only one, saving disk space and loading time, have your program allocate graphics memory, because that's where the character set will be temporarily stored. Then BLOAD the character set into memory at address 8192. After this, BLOAD Program 6 into memory and SYS 3072. Your character set is installed. You can automate this process by adding the following line to the beginning of your program:

```
10 BLOAD"EXCEL.OBJ2":GRAPHICS
1,1:BLOAD "YOUR CHARACTER
SET FILENAME":SYS 3072:
GRAPHICS CLR
```

If you plan to use two character sets, merge them with Program 5; then use the BASIC line above at the beginning of your program to install the character set. Please note, if you reset the computer, or press RUN/STOP-RESTORE, the character set will be erased. If you want the default ROM character set back, just SYS 65378, but be sure that you're in BANK 15.

Excelfont allows you to utilize as many as 15 rows for each character set. To use these large characters in your program, incorporate the following line in your program:

```
100 WR=52684:BANK 15:FAST:SYS
WR,15,4:SYS WR,6,5:SYS WR,12,6:
SYS WR,15,7:SYS WR,15,9:SYS
WR,16,23:WINDOW 0,0,79,12
```

See program listings on page 72. @

Eight Thousand Dragons

Paul Carlson

Fractal graphics invade your home with this short but stunning graphics program. "Eight Thousand Dragons" is the fastest fractal program you can find for your Commodore 64.

In the last few years, the word *fractal* has nearly become a household word with personal computer users. A fractal is a curve or surface which has a fractional dimension. While fractals are very important to mathematicians, most people appreciate fractals because of the spectacular graphic effects they make possible. For instance, the *Star Trek II* "Genesis" sequence was fractal-generated.

"Eight Thousand Dragons" lets you view fractal "dragons," one by one, on your 64's hi-res screen. More than eight thousand dragons are possible.

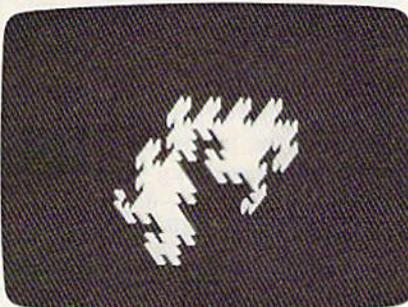
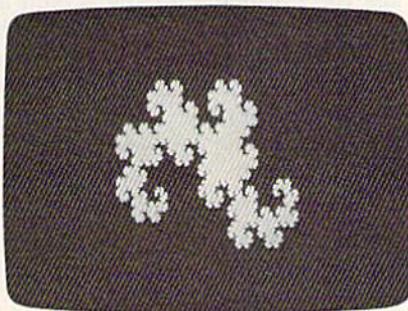
Typing It In

Eight Thousand Dragons is a very short program—just over 400 bytes, in fact. Since it's written in machine language, type it in with "MLX," the machine language entry program found elsewhere in this issue. When MLX asks you for a starting and ending address, respond with the values indicated:

Starting address: 0801
Ending address: 0998

Enter the data for Eight Thousand Dragons. When you've finished, be sure to save a copy to tape or disk.

Although Eight Thousand Dragons is written entirely in machine language for speed (each dragon is drawn in less than 10 seconds), the program loads and runs



Three examples of the beautiful fractals that are automatically created by "Eight Thousand Dragons."

just like a BASIC program. To start the program, type LOAD "DRAGONS",8 (for disk) or LOAD "DRAGONS",1 (for tape). Use the filename you specified when you saved the program from within MLX. After the program has loaded, type RUN.

The first fractal you'll see is the classic fractal dragon. Press a key to see the next dragon. After the first, the parameters for the dragons are generated randomly, and more than eight thousand different screens are possible. Press Q at any time to quit.

The Fire-Breathing Engine

To achieve the speed of Eight Thousand Dragons, I used a technique I call *incremental bitmap addressing*. The complete calculation for the bitmap address is done only for the first point plotted. For successive plots, only the change in bitmap address is computed. This is a fast and easy calculation with dragon curves because each point is immediately adjacent to the previous one.

The program is also self-modifying, which means that it changes itself as it runs.

As listed, the program plots orange dragons on a black background. If you'd like different colors, load the program, then type the following lines:

```
POKE 2442,background color number  
POKE 2443,foreground color number  
RUN
```

The color numbers correspond to those listed in the user's guide that came with your 64.

See program listing on page 72. ■

Larry Cotton

Over the last couple of months we've written a four-function math program to see how RND works. In the process, I hope you've also discovered more about the BASIC language itself.

In order to concentrate on RND, I deliberately glossed over the math programming. This month, we'll take a closer look at computer math.

The Old Days

In the mid-seventies, I bought an exciting machine—a calculator the size of two videocassettes which could instantly do calculations that machines a year earlier had taken several noisy minutes to do. It was made by APF (who, incidentally, later made an early personal computer called The Imagination Machine). This \$80 wonder could do only four things—add, subtract, multiply, and divide.

For several years, calculators that did more than that cost as much as a Commodore 64 does now. Things have changed; we now have wonderful computing machines which can do complex mathematical equations in less time than in takes to press and release a key.

All BASIC math operations, simple or complex, can be accomplished in both BASIC modes—immediate and program. In the immediate mode, the computer works just a like a calculator except that we must type the word *PRINT* (or use a question mark) before the expression and press the RETURN key after it. Here's an example:

```
? 4 + 5
```

If you type this and press RETURN, you'll see the number 9 displayed. This also works with the other three simple math functions:

```
PRINT 18 - 9  
PRINT 3 * 3  
PRINT 18 / 2
```

The asterisk means multiply and the slash means divide. The answer to all these problems, is, of course, 9. Here are the same problems in program mode:

```
10 PRINT 4+5  
20 PRINT 18-9  
30 PRINT 3*3  
40 PRINT 18/2
```

If you enter this and run it, you'll see four 9's. The computer performs its calculations and prints only the answers—not the problems.

But suppose you did want to see the problems on the screen as well as the answers. The way to do this is simple: Put the problems (along with the equals sign) inside quotation marks. The computer prints whatever's inside quotation marks.

```
10 PRINT "4 + 5 =" 4+5  
20 PRINT "18 - 9 =" 18-9  
30 PRINT "3 * 3 =" 3*3  
40 PRINT "18 / 2 =" 18/2
```

All of this has been presented before in various ways, so it should look familiar. Another (and probably the most common) way to perform math functions is to use letters (variables) to represent numbers. Again, in the immediate mode:

```
A=4: B=5: PRINT A+B  
A=18: B=9: PRINT A-B  
A=3: B=3: PRINT A*B  
A=18: B=2: PRINT A/B
```

Using variables is a powerful way to do math, but before looking closely at variables, let's try a few more examples which use only numbers.

Adding and Subtracting

Math performed with computers is the same math done with calculators, or, for that matter, with pencil and paper. Certain conventions have been adopted which are universal. For instance, in most problems, the math operations are performed from left to right. What would you expect the answer to this problem to be?

```
PRINT 10-5+4
```

The answer is 9. And 9 also would be the answer if the numbers were rearranged:

```
PRINT 4-5+10
```

Adding and subtracting are *commutative*, that is, they can be done in any order. Just be sure that the signs stay with the numbers. To illustrate further:

```
PRINT -5+4+10
```

Again, the answer is 9. The negative sign stays with the 5.

Multiplying and Dividing

Multiplication and division are trickier. In problems which contain only these two operations, the computer will again do the math from left to right. Since this is so, these two lines will *not* produce the same answer:

```
PRINT 12/6*3  
PRINT 6/12*3
```

In the first line, the computer first divides the 12 by 6 to get 2, and then it multiplies the 2 by 3 to get 6. In the second line the computer first divides the 6 by 12 (.5) and then multiplies that by 3 to yield 1.5. Division is *not* commutative.

My Dear Aunt Sally

When math problems include combinations of adding, subtracting, multiplying, and division, we mustn't forget *My Dear Aunt Sally*—a memory aid which uses the first letters of the words in the phrase—*MDAS*—to help you remember to Multiply, Divide, Add, Subtract—in that order.

Since the internals of the computer are already preprogrammed to think that way, it's up to the programmer to remember that. Here's a problem which demonstrates how *My Dear Aunt Sally* goes about her work:

```
PRINT 5+3*6-2
```

Before you type this, try to guess what the answer would be. Now

type the line in and press RETURN. The answer is 21. Why? My Dear Aunt Sally says that the computer will do multiplication and division (there's no division here) to get $5 + 18 - 2$ and then addition and subtraction to get $23 - 2$ (and finally 21).

Don't take My Dear Aunt Sally too literally—multiplication does not take precedence over division, nor does addition take precedence over subtraction. But both multiplication and division do take precedence over either addition or subtraction. Consider this example:

```
PRINT 10/5*3-1+2
```

In this case, the division is performed first, followed by the multiplication, the subtraction, and finally the addition.

Most computers and calculators do math in this order without your having to worry about it. Notable exceptions are the Hewlett Packard calculators which use the *postfix* method of computation. Postfix or RPN (Reverse Polish Notation) calculators perform the operations in the order that they are entered. Calculators that use the *infix* method of computation need a set of rules, such as My Dear Aunt Sally, to determine the order in which to perform the calculations. Calculators that use the My Dear Aunt Sally rules are called *algebraic* calculators.

Gaining Control

To cause the computer to preempt My Dear Aunt Sally requires extra effort:

```
PRINT (5+3)*6-2
```

When parentheses appear in a problem, My Dear Aunt Sally quietly takes a back seat. Parentheses say "Do this first!" In other words, if 5 and 3 *must* be added together before being multiplied by 6, we must enclose these numbers in parentheses. The answer to the above problem is 46.

The Laws of Averages

Now let's look at a practical use for combining math operations—averaging. The average of two or more numbers is calculated by adding the numbers together and then dividing the total by the number of numbers. Let's say we want the average of 4 and 6. Suppose we typed:

```
PRINT 4+6/2
```

My Dear Aunt Sally will step in and try to multiply and divide first. Finding nothing to multiply, she'll divide the 6 by the 2 to get 3. Then she'll add the 3 to the 4 to get 7. This is definitely *not* the average of 4 and 6. To get the correct answer you must use parentheses:

```
PRINT (4+6)/2
```

Since parentheses take precedence, the numbers 4 and 6 will be added and their sum divided by 2 (the number of numbers to average) to get a correct average of 5.

To carry this further, let's write a simple program that averages a series of numbers which are typed into the computer. Let's write this program in a logical order and then add the frills.

To gather user data requires the use of INPUT. Let's start with line 100 and write the lower line numbers later:

```
100 INPUT "FIRST NUMBER";A
```

Here's where the variables which represent numbers come into play again. Variables consist of one or two letters such as *AB* or *HY*, or a combination of one letter and one digit, such as *A4* or *T6*. In the line above, *A* is the variable.

When the user types a number at the INPUT prompt and presses RETURN, that number immediately goes into the computer's memory and will from then on (at least in this program) be identified as *A*. We've seen this concept many times before. OK, let's get the next number:

```
110 INPUT "SECOND NUMBER";B
```

Experienced BASIC programmers will immediately recognize that this is not the most efficient way to write an averaging program, but since the thrust here is to learn math concepts, we'll continue. The second memory space we've set aside is called *B*. Let's add a couple more lines:

```
120 INPUT "THIRD NUMBER";C  
130 INPUT "FOURTH NUMBER";D
```

These four user-input numbers which are now identified as *A*, *B*, *C*, and *D*, must be added together and their sum divided by 4. As in our previous example, the letters which now represent numbers must be enclosed in parentheses so they will be added *before* they're divided by 4:

```
140 PRINT "AVERAGE IS" (A+B+C+D)/4
```

That's the core of the program; it's runnable. But let's neaten it up a bit by adding a lower line number to clear the screen and move the cursor down a little:

```
90 PRINT "{CLR}{3 DOWN}"
```

When the program is listed, line 90 will automatically place itself in front of the previously written lines, and the program will, of course, run in line-number order.

You may want the lines as printed on the screen to be separated and spaced away from the left border. If so, go back to each line (except the first) and add a cursor down and a space just inside each first quotation mark, such as:

```
100 INPUT "{DOWN}{SPACE}FIRST  
NUMBER";A
```

There is a distinction between your doing math on computers and having computers do the math for you. The latter sounds much more interesting, so let's all begin to think of it this way. Next month, we'll investigate more ways computers can do math for you. ■

COMPUTE!'s Gazette is looking for utilities, games, applications educational programs, and tutorial articles. If you've created a program that you think other readers might enjoy or find useful, send it, on tape or disk to:

Submissions Reviewer
COMPUTE! Publications
P.O. Box 5406
Greensboro, NC 27403

Please enclose an SASE if you wish to have the materials returned. Articles are reviewed within four weeks of submission.

machine language programming

Where To Locate

Jim Butterfield
Contributing Editor

Unlike BASIC programmers, machine language programmers have to worry about where their programs are placed in memory.

In this column, I often put machine language demonstration programs at decimal 8192 (\$2000). This is an excellent place for programs, but since it is so universally used, other items (programs, variables, arrays, or strings) might write over this part of memory.

The Cassette Buffer

For quick test programs, the cassette buffer is ideal. A machine language program is unlikely to be disturbed in this area. Memory area \$33C-\$3E8 (decimal 828-1000) is quite safe. The 128 is an exception—the cassette buffer is at \$B00-\$BFF (decimal 2816-3071).

If you assemble (or POKE) a program here, it needs no special handling. If you load a program into this area, you must be careful about pointers. I'll discuss this in more depth later.

Free Space on the 128

The Commodore 64 has a block of memory not used by the system at \$C000-\$CFFF (decimal 49152-53247). This whopping 4K area is a favorite place to put machine language programs. Feel free to use it, but watch out for other utility programs which like to nest in the same space.

The Commodore 128 has a lot of free space at low addresses. The \$1300-\$17FF block can also be considered spare. Other chunks can be claimed if you know your system. For example, the RS-232 code uses the \$C00-\$DFF area. If you know that you won't be communicating with an RS-232 device, help yourself. Other areas become available if you don't use sprites, if you

have few programmed keys, or if you never use DOS commands such as SCRATCH or DLOAD. If you plan to load a machine language program to any of these areas, check the "Pointers" section of this article.

Asking for Memory

One way to get memory is to ask BASIC to give up some of its working space. This workspace holds BASIC code and variables, arrays, and strings. On the 128, it holds code only.

It's best to do this before BASIC starts creating variables; otherwise, you may be asking for space that's already in use. After such an allocation, a CLR (clear) command allows the BASIC program to adjust to its new space.

Usurping memory space from the top of BASIC is the least complicated method. Most machines have a "top of BASIC" pointer. On the 64, this pointer is located at \$37. Move this pointer down (then type CLR) and BASIC will give up the space.

The 128 has a special situation. Since variables, arrays, and strings are kept in Bank 1, you may help yourself to the space above BASIC without worrying about changing pointers. To simplify programming, you'll want your program to stay below \$4000.

Memory space taken from the top of BASIC gives you a fairly permanent area for a program. Even if you load other BASIC programs, you'll keep the space you have taken unless you give it back. Only a complete reset changes everything back to its original state.

Space can be taken from the bottom of the BASIC area, but this is more complex. There are sometimes valid reasons for doing this on the 128, but it's best to avoid if possible.

If you plan to load a machine language program into an allocated area, check "Pointers," below.

A nearly ideal way to site a machine language program is to tack it onto the end of a BASIC program. The two parts—BASIC and machine language—can be loaded and saved as a unit—there's no need to worry about pointers.

Here's how to do it: After the ML program is placed somewhere above the end of the BASIC program, move up the pointer that marks the end of BASIC. On most machines, that's the Start-of-Variables pointer (\$2D and \$2E on the 64). On the 128, there's a special End-of-BASIC pointer at \$1210. Once everything is in place and the pointer has been moved, type CLR and then save the program. From this point on, a single load brings in the two parts, BASIC and ML. Once the programs have been united, you *must not* change the BASIC program.

This system becomes difficult if the start-of-BASIC pointer has been changed. The program will be relocated as it loads (into the wrong place).

Pointers

If you load a machine language program using a BASIC direct command, you'll create a minor problem that may crash your system.

The LOAD command changes BASIC pointers around. That's OK when you load a BASIC program; the pointers do the right thing. But it's wrong when you load ML. To correct the problem, type NEW immediately following the LOAD command. If you have a 128, you can type BLOAD instead of LOAD and the pointers will be undisturbed.

If you arrange for a program to load the machine language segment, the pointers will *not* be disturbed. Unless your computer has a BLOAD command, you'll have to learn some new coding tricks to make it all work, but at least you won't need to worry about pointers.

A Guide to Commodore User Groups

Part 2

Mickey McLean

This annual GAZETTE feature provides an up-to-date list of user groups across the U.S., throughout Canada, and around the world. Last month, Part 1 listed user groups in states A through M (Alabama-Montana). This month, our list includes user groups in the remaining states (Nebraska-Wyoming) and from outside the U.S. (including APO addresses). Groups are listed in order according to zip code.

If your group does not appear in this list and you wish to be included, send your club name, address, and, if appropriate, your bulletin board service telephone number to:

User Group Update
COMPUTE! Publications
P.O. Box 5406
Greensboro, NC 27403

Your group will then be listed in our monthly "User Group Update" column.

When writing to a user group for information, please remember to include with your request a stamped, self-addressed envelope.

NEBRASKA

Pathfinder Commodore User Group, P.O. Box 683, Fremont, NE 68025
Greater Omaha Commodore Users Group, P.O. Box 241155, Omaha, NE 68124
Mid-Nebraska Users of Commodore (MUC), 1920 N. Huston Ave., Grand Island, NE 68803
Platte Valley Computer Users Group (PVCUG), 1625 North St., Gering, NE 69341

NEVADA

SOG Commodore User Group, c/o Video Tonite, 1111 N. Nellis, Las Vegas, NV 89110
Silver State Computer Users Group, P.O. Box 81075, Las Vegas, NV 89180

NEW HAMPSHIRE

Manchester Commodore Users Group, P.O. Box 402, Merrimack, NH 03054
Commodore Help And Information Network (CHAIN Gang), P.O. Box 1155, Laconia, NH 03247
Commodore Users Group, 53 Page Rd., Bow, NH 03301
Monadnock Users Group (MUG) for Commodore Owners, 135 Liberty Ln., Keene, NH 03431

NEW JERSEY

Data Exchange—Beneficial Users Group 64/128 (DE-BUG 64/128), 213 Burns Way, Fanwood, NJ 07023

Info-64, P.O. Box BC, Paterson, NJ 07509
Hillsdale Commodore 64 Users Club, 32 Esplanade Lake Dr., Hillsdale, NJ 07642
Gold Crown Commodore Club, 517 Center Pl., Teaneck, NJ 07666
Commodore 64 Beginners Group, 680 Leigh Terrace, Westwood, NJ 07675
Garden State Commodore User's Group Inc., 89 Stratford Rd., Tinton Falls, NJ 07724
L & L Commodore 64 User Group, 1 Longstreet Rd., Manalapan, NJ 07726
Commodore User Group of Central New Jersey, 112 Old Bridge Rd., Matawan, NJ 07747
South Jersey C-64 Users Group, 507 N. Dudley Ave., Ventnor, NJ 08406
Bordertown Area Commodore Users Group, P.O. Box 381, Bordertown, NJ 08505
Commodore Computer Collection Club, 72 Pine Dr., Roosevelt, NJ 08555
Commodore Users Group of Ocean County, 981 Cedar Grove Rd., Toms River, NJ 08753
Commodore E. Brunswick Users Group (CE-BUG), 9 Kings Rd., E. Brunswick, NJ 08816
Somerset Users Group, 49 Marcy St., Somerset, NJ 08873

NEW MEXICO

New Mexico Commodore User's Group, P.O. Box 37127, Albuquerque, NM 87176
64-X, 501 Camino Sin Nombre, Santa Fe, NM 87501

Los Alamos Commodore Users Group, 4125-D Sycamore Dr., Los Alamos, NM 87544
Taos Area Commodore User's Group, P.O. Box 5089, Taos, NM 87571
The Southern New Mexico Commodore User's Group, P.O. Box 4437, Uni. Park Brch., Las Cruces, NM 88003

NEW YORK

Kids Computer News, 2714 University Ave., #1B, Kingsbridge Heights, NY 10468-3424
Bronx Users Group (BUG-64), P.O. Box 523, Bronx, NY 10475
Folklife Terminal Club, Box 555-R, Co-op City Station, Bronx, NY 10475
For Your Computer Only, 35 Bellevue Ave., Ossining, NY 10562
St. Francis College Microcomputer Users' Group, Microcomputer Center, 180 Remsen St., Brooklyn, NY 11201
The Computer Freaks, 84 Sterling Pl., Brooklyn, NY 11217
Brooklyn Commodore User's Group, 1735 E. 13th St., Apt.7N, Brooklyn, NY 11229-1950
Commodore Users Group of Greater New York, 190-25 Woodhull Ave., Hollis, NY 11423
Commodore Long Island Club, Inc., 2949 Roxbury Rd., Oceanside, NY 11572
Elite Commodore Users Group, 151 DuBois Ave., Sea Cliff, NY 11579
Brentwood 64/128 Computer Club, Pub. Lib., 2nd Ave. & 4th St., Brentwood, NY 11717
MI-Comm User Group, 26 Azalea Rd., Levittown, NY 11756
Amiga-64 User Group, P.O. Box 280, Lindenhurst, NY 11757
Club 64, 174 Maple Ave., Patchogue, NY 11772
LIVICS Commodore Users Group, 15 Hastings Dr., Stony Brook, NY 11790
Ridge C-64 Users Group, 94 Ridge Rd., Ridge, NY 11961
Mohawk Valley Computer User Group, R.D. #2, Box 177, Johnstown, NY 12095
Tri City Commodore User's Group (TCCUG), P.O. Box 12742, Albany, NY 12212-2742
Hudson Valley Commodore Club, P.O. Box 2190, Kingston, NY 12401
Orange County Commodore Users Group (OC-CUG), 7 Cottage Ave., Newburgh, NY 12550
Commodore 64 User Group of Orange County, 74 Cardinal Dr., Poughkeepsie, NY 12601
Frontier Computer Users, R.F.D. #1, Box 352A, Chazy, NY 12921 (BBS# 518-846-8803)
Malone Commodore User Group (MALCUG), 27 Bentley Ave., Malone, NY 12953 (BBS# 518-483-1035)

Morrisonville Commodore Users Group, 61 E. Main St., Morrisonville, NY 12962

Oswego Commodore User Group, 424 Mahar Hall, State University College, Oswego, NY 13126

Central New York Commodore Users Group (CNYCUG), 6887 Peck Rd., Syracuse, NY 13209

The Commodore Computer Club of Syracuse, P.O. Box 2232, Syracuse, NY 13220

Utica Commodore User Group, 1801 Storrs Ave., Utica, NY 13501

Commodore Users Group of Massena (COMA), 7 Water St., Massena, NY 13662

Leatherstocking Computer User's Club, P.O. Box 1284, Oneonta, NY 13820

Triple Cities Commodore Society, 1713 Castle Gardens Rd., Vestal, NY 13850

Commodore Buffalo User Group (COMBUG), P.O. Box 1005, Tonawanda, NY 14151-1005

The Rainbow International C-64 Users' Group, 3 Expressway Village, Niagara Falls, NY 14304

The Niagara Falls Commodore Club, 2405 Willow Ave., Niagara Falls, NY 14305

The Lost Boys (TLB), 20 Mountain Rise, Fairport, NY 14450

Geneva Commodore Users Group, 84 Pleasant St., Geneva, NY 14456

Commodore Users Group of Rochester (CUGOR), P.O. Box 23463, Rochester, NY 14692

Finger Lakes Area Komputer Experts (FLAKES), 86 West Lake Rd., Hammondsport, NY 14840

NORTH CAROLINA

Foothills User Group, 1012 Jesse Tr., Mount Airy, NC 27030

Sanlee Commodore Club, 5822 Blue Jay Dr., Sanford, NC 27330

Triad Commodore Users Group, P.O. Box 10833, Greensboro, NC 27404 (BBS# 919-288-0372)

Carolina Commodore Computer Club, P.O. Box 2664, Raleigh, NC 27602-2664

Lincolnton Commodore Users Group, Rt. 3, Box 351, Lincolnton, NC 28092

Salisbury Compute, Rt. 1, Box 349B, Salisbury, NC 28144

Cleveland/Gaston Commodore User's Group (CGCUG), 2048 McBrayer Springs Rd., Shelby, NC 28150

Wilmington Commodore Users Group, 2104 Wisteria Dr., Wilmington, NC 28401

Down East Commodore Users Group, P.O. Box 1255, Havelock, NC 28532

Greater Onslow Commodore User Group, P.O. Box 7171, 910 Winchester Rd., Jacksonville, NC 28540

Unifour Commodore Users Group, P.O. Box 9324, Hickory, NC 28603-9324

Asheville-Buncombe User Group (A-BUG), P.O. Box 15578, Asheville, NC 28813

NORTH DAKOTA

Central Dakota Commodore Club, P.O. Box 1584, Bismarck, ND 58502-1584

OHIO

The Commodore User Group, Inc. (TCUG), P.O. Box 63, Brice, OH 43109

Central Ohio Commodore Users Group, P.O. Box 28229, Columbus, OH 43228-0229

Marion Ohio Commodore User Group (MO-CUG), 775 Wolfinger Rd., Marion, OH 43302

South Toledo Commodore Computer Club, P.O. Box 6086, Toledo, OH 43614

Commodore Computer Club of Toledo (CCCT), P.O. Box 8909, Toledo, OH 43623

Basic Bits Commodore Group, P.O. Box 447, N. Ridgeville, OH 44039

Northeast Ohio Commodore User Group, P.O. Box 718, Mentor, OH 44061-0015

C128 Network, 321 Kensington, Vermilion, OH 44089

Commodore Preference Users Connection (CPU Connection), P.O. Box 42032, Brook Park, OH 44142

Cuyahoga Falls Commodore Club, P.O. Box 3025, Cuyahoga Falls, OH 44223

Akron Area Commodore User Group (AACUG), P.O. Box 685, Akron, OH 44309

TRUMCUG, P.O. Box 8632, Warren, OH 44484

C-128/64 Amateur Computer Club, P.O. Box 1180, Youngstown, OH 44501

Commodore Users Group, 29425 Bettler Rd., Box 175, Dennison, OH 44621

Canton/Akron/Massillon Users Group (CAMUG), P.O. Box 2423, North Canton, OH 44720

Mid-Ohio Commodore User's Club, R.D. #2, Box 10A, Cassell Rd., Butler, OH 44822

Commodore Erie Bay Users Group (CEBUG), P.O. Box 1461, Sandusky, OH 44870

Cincinnati Commodore Computer Club, Box 450, Owensville, OH 45160

Southwestern Ohio Commodore Users Group (SWOCUG), P.O. Box 46644, Cincinnati, OH 45246

Dayton Area Commodore Users Group (DACUG), 2040 Turnbull Rd., Dayton, OH 45431

PMUG, P.O. Box 31744, Dayton, OH 45431

Hancock User's Group (HUG), P.O. Box 1651, Findlay OH 45839-1651

OKLAHOMA

Commodore User's Group of Lawton, P.O. Box 3392, Lawton, OK 73502

Commodore Users of Bartlesville, 1704 S. Osage, Bartlesville, OK 74003

Stillwater Computer Society, 3124 N. Lincoln, Stillwater, OK 74075

Tulsa Area Commodore Users Group (TACUG), P.O. Box 691842, Tulsa, OK 74169-1842

Muskogee Commodore Users Group (MCUG), 2429 Georgia, Muskogee, OK 74403

OREGON

Commodore East County (CEC), 2424 S.E. Evans Ave., Troutdale, OR 97060-2328

United States Commodore Users Group, P.O. Box 2310, Roseburg, OR 97470

Caveman Commodore Computer Club (CCCC), 5863 Lower River Rd., Grants Pass, OR 97526

PENNSYLVANIA

Beaver County Area Commodore User's Group (BCACUG), P.O. Box 412, New Brighton, PA 15066

A-K 64 User Group, 1762 Fairmont St., New Kensington, PA 15068

Bettis Commodore Users Group, 592 Arbor Lane, Pittsburgh, PA 15236

Pittsburgh Commodore Group (PCG), P.O. Box 16126, Green Tree, PA 15242

Westmoreland Computer Users Club (Commodore Section), P.O. Box 3051, Greensburg, PA 15601

Butler Commodore 64 User Group, P.O. Box 2408, Butler, PA 16001

Castle Commodore Computer Club, P.O. Box 961, New Castle, PA 16103

North Coast Commodore Users Group Erie, P.O. Box 6117, Erie, PA 16512-6117

PCUC, C. Rhoads, Milton Hershey School—Ridgeway, P.O. Box 830, Hershey, PA 17033-0830

Blue Juniata Commodore Users Group, 18 Ridge Rd., Lewistown, PA 17044

Huntingdon County Hackers, P.O. Box 132, Mill Creek, PA 17060

Southern York County Commodore Users Group, 5E Lark Circle, York, PA 17404

White Rose Commodore Users Group, 760 Fireside Rd., York, PA 17404

West Branch Commodore Users Group, P.O. Box 995, Williamsport, PA 17703

CenPUG for Commodore, R.D. #4, Box 99A, Jersey Shore, PA 17740

Susquehanna Valley User Group, P.O. Box 90, Hummels Wharf, PA 17831

Lehigh Valley Commodore User Group, 2228 Baker Drive, Allentown, PA 18102

Ingersol Rand Computer Users Group (IRCUG), R.D. #1, Box 173, Sayre, PA 18840

Lower Bucks Users Group, P.O. Box 397, Croydon, PA 19020-0959

Environmental Protection Agency (EPA) Commodore Users Group, Edward H. Cohen, 1712 Aidenn Lair Rd., Dresher, PA 19025 (Note: Open to all federal government employees and their families.)

Horsham Amiga/64, 20-A Lumber Jack Circle, Horsham, PA 19044

Commodore Users Group, Philadelphia Area Computer Society, P.O. Box 57096, Philadelphia, PA 19111-7096

Main Line Commodore Users Group (MLCUG), 1046 General Allen Lane, West Chester, PA 19382

Worldwide Commodore Users Group (International Headquarters), P.O. Box 337, Blue Bell, PA 19422

Upper Buxmont CBM Users Group, 1206 Cowpath Rd., Hatfield, PA 19440

Plymouth-Whitemarsh Commodore Users Group, 4029 Woodruff Rd., Lafayette Hill, PA 19444

Commodore Colony, 303 Old Airport Rd., Douglassville, PA 19518

Commodore Users of Berks (CUB), 810 Sledge Ave., West Lawn, PA 19609

RHODE ISLAND

No listings.

SOUTH CAROLINA

Commodore Computer Club of Columbia, P.O. Box 5691, Columbia, SC 29250

BIBS, S.P.O. 589, Charleston, SC 29424

SOUTH DAKOTA

Aberdeen Commodore Club, 115 Church Dr., Aberdeen, SD 57401

Port 64, P.O. Box 1191, Rapid City, SD 57709 (BBS# 605-348-9443)

TENNESSEE

CHIP, 4952, Shihmen Dr., Antioch, TN 37013

Commodore Association of the Southeast (CASE), P.O. Box 2745, Clarksville, TN 37042-2745

Nashville Commodore User Group, P.O. Box 121282, Nashville, TN 37212 (BBS# 615-833-8642)

Commodore Computer Club, P.O. Box 96, Estill Springs, TN 37330

Howard S. Bacon, KC4CIQ, 213 Holly Ave., South Pittsburg, TN 37380-1313

Memphis-East Commodore Organization (MECO), 6870 Sauterne Cove, Memphis, TN 38115

Commodore PC-10/MS-DOS Users Group, 3318 Keystone Ave., Memphis, TN 38128

Raleigh-Bartlett Hackers CUG, James Patrick, 3457 Gatewood Dr., Memphis, TN 38134

Memphis Commodore Users Club, P.O. Box 34095, Bartlett, TN 38134-0095

Old Hickory Commodore Users Group, 542 Lambuth Blvd., Jackson, TN 38301

TEXAS

PD Users of Texas, 135 Maytrail, McKinney, TX 75069

Society of Computer Owners and PET Enthusiasts (SCOPE), P.O. Box 3095, Richardson, TX 75083

128 Users of Dallas/Ft. Worth, P.O. Box 28277, Dallas, TX 75228-0277 (BBS# 214-328-7261)

Longview Computer Users Group, P.O. Box 9284, Longview, TX 75608

Mid-Cities Commodore Club, P.O. Box 1578, Bedford, TX 76095

Commodore Languages and Operations Group (C/LOG), Rt. 1, Box 158, Groesbeck, TX 76642

East Texas Commodore User Group, 2200 Montgomery Park Blvd., No. 616, Conroe, TX 77304

Commodore Houston User Group (CHUG), P.O. Box 612, Tomball, TX 77375 (BBS# 713-470-2484)

The Willis Commodore Users Group, 8 Forest Trails, Willis, TX 77378

Tri-County Commodore Users Association (T-CCUA), 557 Lakeview Circle, New Braunfels, TX 78130

Commodore Users of San Antonio, P.O. Box 380732, San Antonio, TX 78280

Commodore User Group of Austin, P.O. Box 49138, Austin, TX 78765

Top of Texas Commodore (TOTCOM), Box 2851, Pampa, TX 79066-2851

Commodore Users of Texas (CUT), 7007 Memphis Ave., Lubbock, TX 79413

UTAH

Cache Valley Commodore Users Group, 315 W. 400 S., Smithfield, UT 84335

Moab Commodore User's Group, 860 S. Antiquity Ln., Moab, UT 84532

Payson Area Commodore Users Group (PAC), P.O. Box 525, Salem, UT 84653

Southern Utah Commodore Hobbyists, 528 N. Blue Sky Dr., Cedar City, UT 84720

VERMONT

Champlain Valley Commodore Users Group, 6 Mayfair St., South Burlington, VT 05403

VIRGINIA

Arlington Victims Commodore Computer Club, 9206 Annhurst St., Fairfax, VA 22031

Capitol Area Commodore Enthusiasts (CACE), 607 Abbotts Lane, Falls Church, VA 22046

Washington Area Commodore User Group, P.O. Box 684, Springfield, VA 22150-0684

Dale City Commodore Users Group, Inc., P.O. Box 2265, Dale City, VA 22193-0265

Fredericksburg Commodore Club, P.O. Box 8438, Fredericksburg, VA 22404-8438

Shenandoah Valley Commodore Users Group, Mountain Falls Rte., Box 77FF, Winchester, VA 22601

The Richmond Area Commodore Enthusiasts (TRACE), 2920 Pinehurst Rd., Richmond, VA 23228

South Richmond Commodore User Group, 11101 Cranbeck Ct., Richmond, VA 23235

Peninsula Commodore Users Group, P.O. Box L, Hampton, VA 23666

Portsmouth Commodore Users Group (PCUG), P.O. Box 6561, Portsmouth, VA 23703

Southside Virginia Commodore Users Group, 315 Lakeview Ave., Colonial Heights, VA 23834

Commodore Users of Franklin, 1201 N. High St., Franklin, VA 23851

Henry County Commodore Computer Club, Rt. 9, Box 61, Martinsville, VA 24112

Lynchburg User Group, Rt. 2, Box 180, Lynchburg, VA 24501

WASHINGTON

64 E/T, 127-182 Pl. SW, Bothell, WA 98012

The Covington Commodore Connection, 26243 172 SE, Kent, WA 98042

NW Commodore User Group, 2565 Dexter N., #203, Seattle, WA 98109

PSACE, 1313 5th Ave. W, Seattle, WA 98119-3410

UW Commodore User Group, P.O. Box 75029, Seattle, WA 98125

Arlington Commodore Users' Group, 4416-126th Place NE, Marysville, WA 98270

Club 64, 6735 Tracyton Blvd. NW, Bremerton, WA 98310

World Wide User Group, P.O. Box 98682, Tacoma, WA 98498

Commodore Users of Grays Harbor, 1111 Fordney, Aberdeen, WA 98520

Lewis County Commodore Users Group, 803 Euclid Way, Centralia, WA 98531

Longview Commodore Users Group, 626 26th Ave., Longview, WA 98632

North Forty Commodore User Group, 2903 Florida St., Longview, WA 98632

Tri-City Commodore Computer Club (TC CUBED), P.O. Box 224, Richland, WA 99352

Blue Mountain Commodore Users, 550 S. 2nd Ave., Walla Walla, WA 99362-3149

WEST VIRGINIA

Bluefield User Group 20/64 (BUG), P.O. Box 1190, Bluefield, WV 24701

Kanawha Valley Commodore Computer Club, P.O. Box 252, Dunbar, WV 25064

Commodore Home User's Group (CHUG), 81 Lynwood Ave., Wheeling, WV 26003

Mid-Ohio Valley Commodore Club, Inc. (MOVCC), P.O. Box 2222, Parkersburg, WV 26101-2222

Northern West Virginia C-64 Club, 228 Grand St., Morgantown, WV 26505

WISCONSIN

Wisconsin Association of Vic/Commodore Enthusiasts (WAVE), 840 Park Manor Ct., Cedarburg, WI 53012

Lakeshore Commodore Computer Club, 1738 N. 27th Pl., Sheboygan, WI 53081

Commodore Hobbyists Involved In Personal Systems (CHIPS), P.O. Box 1006, West Bend, WI 53095

715 Commodore Users Group, 1052 S. Fork Dr., River Falls, WI 54022

Kewaunee & Brown County Computer Club (KB Triple C), E4125 Krok, Kewaunee, WI 54216

COMM-BAY64, P.O. Box 1152, Green Bay, WI 54305

Price County Computer User Group, Rt. 2, Box 532, Phillips, WI 54555

Western Wisconsin La Crosse Area Commodore Users Group, 1545 Loomis St., La Crosse, WI 54603

Menomonee Area Commodore Users Group, 510 12th St., Menomonee, WI 54701

Eau Claire Area CBM 64 User Group, 1527 W. Mead St., Eau Claire, WI 54703

Fond du Lac Area Commodore Users Club, P.O. Box 1432, Fond du Lac, WI 54936-1432

WYOMING

Cheyenne Association of Computer Enthusiasts (CACE), P.O. Box 1733, Cheyenne, WY 82003

Outside the U.S.**APO**

Commodore Computer Users Group Heidelberg, Robert H. Jaquot, P.O. Box 232, Gen. Del., APO NY 09102, Tel. 06223-5614 (West Germany)

Stuttgart Local Users Group, c/o Don Rimestad, HHC VII Corps, Box 228, APO NY 09107-0007 (West Germany)

Commodore Base User's Group (C-BUG), Attn: Computer Club Recreation Center/SSRR, RAF Chicksands, APO NY 09193 (Shefford Beds., England SG17 5PZ)

U.S. Naval Station Guantanamo Bay Cuba Computer Users Group, OSC Mark Merklung, FTG Box 605, FPO New York, NY 09593

AUSTRALIA

Commodore Computer Users Group (QLD) Inc., P.O. Box 274, Springwood Qld. 4127, Brisbane, Australia

Commodore Computer Users Group (Townsville), 9 Bryant St., Cranbrook, Townsville 4814, Qld., Australia

Commodore User Group (ACT), P.O. Box 599, Belconnen, ACT, Australia 2616

Hedland Commodore Computer Group, David Warren, P.O. Box 2551, South Hedland 6722, Western Australia

Melbourne Commodore Computer Club Inc., P.O. Box 177, Box Hill, Victoria 3128, Australia

South Australian Commodore Computer Users Group, P.O. Box 427, North Adelaide, SA 5006, Australia

BELGIUM

L'Amiral Club C=64 & Amiga, c/o Alain Trinteler, P.O. Box 41, B-1090, Brussels, Belgium

BRAZIL

Brasilian General Computers by Piagesoft, Flavio Joao Piagentini, Rua Heitor de Moraes 856-Pacaembu, Sao Paulo-SP-Cep01237-Brasil

Commodore Grupos de Usuarios, Carlos A. Silva, Rua Gen. Roca 176, Apt. 501, 20521 Rio de Janeiro RJ, Brasil

Commodore Users Group Porto Alegre, Ferreira de Abru 91/3, 90040 Porto Alegre RS, Brasil

Curitiba Commodore Club, R. Ver. Garcia R. Velho 33, Apto. 41—Barro Cabral, 80030 Curitiba-PR-Brasil

CANADA**British Columbia**

Castlegar Commodore Computer Club, R.R. 1, Site 37, Comp. 7, Castlegar, British Columbia, Canada V1N 3H7

Chilliwack Commodore Computer Club, P.O. Box 413, Sardis, British Columbia, Canada V2R 1A7

Commodore 64 Soft Swap, 4635 210 St., Langley, British Columbia, Canada V3A-2L3

C64 International Users Group, 1544 West 59th Ave., Vancouver, British Columbia, Canada V6P 1Z2

Juan de Fuca C64/128 Users' Group, P.O. Box 7188, Depot 4, Victoria, British Columbia, Canada V9B 4Z3

Port Coquitlam Computer Club, 1752 Renton Way, Port Coquitlam, British Columbia, Canada V3B 2R7

Powell River Commodore User Group (PRUG), 4858 Fernwood Ave., Powell River, British Columbia, Canada V8A 3L8

Prince George Commodore User's Association (PGCUA), 1491-17th Ave., Prince George, B.C. Canada V2L 3Z2

Universal Commodore Users Group, 1518 Myrtle, Victoria, British Columbia, Canada V8R 2Z8

Manitoba

Commodore Concepts Users Group (CCUG), Box 783, Steinbach, Manitoba, Canada R0A 2A0

New Brunswick

The FORCE, P.O. Box 2203 MPO, Saint John, New Brunswick, Canada E2L 3V1

Moncton Users Group, Box 2984, STN A, Moncton, New Brunswick, Canada E1C 8T8

Ontario

Barrie User Group, P.O. Box 22224, Barrie, Ontario, Canada L4M 5R3

Brampton User's Group (BUG), P.O. Box 384, Brampton, Ontario, Canada L6V 2L3

Hamilton Commodore Users' Group, 201 Millen Rd., Stoney Creek, Ontario, Canada L8E 2G6

Midland Commodore Users Group, c/o W. E. McKibbon, R.R. #3, Penetang, Ontario, Canada L0K 1P0

Ottawa Home Computing Club, P.O. Box 4164, Station C, Ottawa, Ontario, Canada K1Y 4P3

Sarnia Commodore User Group, 1276 Giffel Rd., Sarnia, Ontario, Canada N7S 3K7

The Sault Commodore Computer Club, 7 Chaurmier Pl., Sault Ste. Marie, Ontario, Canada P6A 6P3

3-D Commodore 64 User Group, c/o Jonathan St. Clair, 10 Queen St., Branchton, Ontario, Canada N0B 1L0

Ultima 64 Computer Club, c/o Centre des Jeunes, 20 Ste.-Anne St., Sudbury, Ontario, Canada P3C 5N4

Quebec

CICN Commodore Group, P.O. Box 564, Sept-Îles, P. Quebec, Canada G4R 4X7

Club Commodore Champlain, P.O. Box 522, Boucherville, Quebec, Canada J4B 6Y2

C-64 Users Group of Canada, Snowdon, P.O. Box 1205, Montreal, Quebec, Canada H3X 3Y3 (BBS# 514-739-3446)

L'Association de Micro Informatique de l'Estrie (L'AMIE), P.O. Box 1627, Sherbrooke, Quebec, Canada J1H 5M4

Yukon

64s North of 60, P.O. Box 5438, Whitehorse, Yukon, Canada Y1A 5H4

COLOMBIA

Club Commodore Colombia, c/o Jorge Bonilla, Avenida Caracas No. 52-79 Of. 401, P.O. Box 36621, Bogota, Colombia, South America

ComSoft Commodore User Group, D.F. Cardenas, Apartado Aereo 9872, Cali, Colombia, South America

COSTA RICA

Club Commodore de Tibas, Marvin Vega, P.O. Box 516, Tibas, San Jose, Costa Rica

DENMARK

MIDTJYDSK Computer Klub (M.C.K.), Jægstrupvej 86, 8800 Viborg, Denmark

DOMINICAN REPUBLIC

RD-C-64 Users Group, David Braverman, Centro Ed. de Bona, Ave. Jose Marti, Bona, Dominican Republic

ENGLAND

Rolls Royce International Computer Users Group, Tom Lomax, 17 Greystoke Drive, Bilborough, Nottingham, Nottinghamshire, England NG8 4HW

FINLAND

Commodore Micro Amateurs, P.O. Box 852, SF-00101 Helsinki, Finland

User's Club of PTT, c/o Matti Pohtola, Teletutkimuslaitoksen, Mikrotietokonekerho, Kiviaindankatu 2 F, 00210 Helsinki 21, Finland

INDIA

Commodore Users Group, c/o S. Ram Gopal, 1 B, 19th D Main Rd., Rajajinagar First Block, Bangalore 560 010, India

ITALY

Commodore 64 Computer Users Group of Rome, c/o Pluchinotta Via di S. Agnese 22, 00198 Rome, Italy

Software Computer Club, Box N-39, 13060 Val-dengo (VC) Italy

JAPAN

Commodore Fan Club, Koji Sugimura, 2-1-10-1107 Higashi-Taishi Yao Osaka, Japan 581

MALAYSIA

Commodore Users Exchange (CUE), No. 1 Jalan SS 18/2B, 47500 Subang Jaya, Selangor, Malaysia

MEXICO

Bose Commodore Users Group, Lic. Oscar E. Saenz Salinas, Av. Francisco I. Madero con, Oriente 3 #1001, Cd. Rio Bravo, Tam., Mexico

Club Commodore de Juarez, Calle del Manantial #1448, Ciudad Juarez, Chihuahua, Mexico 32500

Club Commodore del Sureste, Carlos M. Diaz Escoffie, Col. G. Gineres 25 X 14 192 A, 97070 Merida Yucatan, Mexico

Club Herra*Tec C64, Alain Bojmal, Vicente Suarez 25, 06100 Mexico, D.F.

Commodore Users of Puerto Vallarta, APDO 86 CP 48300, Puerto Vallarta, Jalisco, Mexico

Golden Chips Users Group, Ibsen 67 #2, Mexico D.F., Mexico 11560

Grupo Commodore del Sureste, Barcasas #115, Fracc. Jose Colomo, 86100 Villahermosa, Tabasco, Mexico

THE NETHERLANDS

Comiac-Software User Group, Jarrod Bernadina, Kortenaerstraat 12, 2712 KJ Ziermeer, The Netherlands

NETHERLANDS ANTILLES

Commodore 64 User Group, Ludwin Statie, Caracasbaaiweg #94, Curacao, Netherlands Antilles

NEW ZEALAND

Hokitika Commodore Computer Users Group, 185 Sewell St., Hokitika, New Zealand

N.Z. Commodore User's Group (Wellington) Inc., P.O. Box 2828, Wellington, New Zealand

PAKISTAN

Computer Users of Pakistan, 882/14, Federal B' Area, Karachi-38, Pakistan

PUERTO RICO

East Commodore User's Club, c/o Nelson Jimenez Marquez, Jardines Judely Edif. 4, Apt. 36, Las Piedras, Puerto Rico

SAUDI ARABIA

Commodore League of Riyadh (CLR), P.O. Box 16216, Riyadh 11464, Saudi Arabia

REPUBLIC OF SINGAPORE

The Commodore User Club, Bedok Central P.O. Box 693, Singapore 9146, Republic of Singapore

SPAIN

Costa Blanca Computer Club, c/o Ed Kelly, Montebello 25, La Nucia-Alicante, Spain 03530

SWEDEN

Commodore-Klubben, Lars Persson, Box 18158, 200 32 Malmo, Sweden

Computer Club Sweden, Hans Engstrom, P.O. Box 7040, S-103 86 Stockholm, Sweden

SWITZERLAND

Computer Anwender Club, Postfach 29, 8042 Zurich, Switzerland

WEST GERMANY

International Commodore Owners Network (ICON), 55 Westfallen Strasse, Apt. 2, 6200 Wiesbaden, West Germany

WEST INDIES

Commodore Computer Club, Jim Lynch, P.O. Box 318, St. Johns, Antigua, West Indies

Jericho

Robert Bixby

"Jericho" adds a new twist to the venerable line of breakout games. There are no walls here—you have to keep the ball on the screen no matter which way it bounces. For the 64. Joystick required.

Bad news! Jericho, the super moth, has broken into your competitor's kilt factory. You've got to pitch in and help. But you know there's only one thing to do—keep that moth in the warehouse until he's eaten every scrap of cloth.

"Jericho" is a variation of the popular breakout-style game, where you try to keep a ball bouncing in-bounds until all the bricks on the screen are gone. In Jericho, the ball is a moth, and the bricks are colorful pieces of cloth.

Getting Started

Jericho is written in machine language. Type it in with "MLX," the machine language entry program found elsewhere in this issue. When MLX prompts you for starting and ending addresses, respond with the following values:

Starting address: 0801

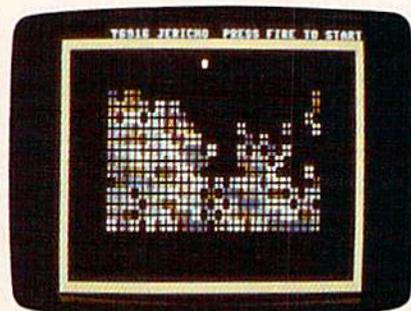
Ending address: 0E78

Enter the data for Jericho. Be sure to save a copy to tape or disk before exiting MLX.

When you're ready to play Jericho, load and run the program. Although Jericho is written in machine language, it can be loaded, saved, and run like a BASIC program.

First Game

Plug a joystick into port 2. When you type RUN, you'll see the game's demo mode, which is very much like the game itself. In the center of the screen is the cloth that is used to make the kilts. Jericho the moth flaps around, soaring from place to place, until he bumps into cloth. He then eats a section and moves on.



Try to make the moth eat as much of the colorful kilt as possible in this clever takeoff on the classic Breakout game.

Since moths are so flighty, Jericho is as likely to fly right out the window as he is to stay in the building. In the demo mode, all four edges of the screen are walled off. This keeps Jericho in.

Press the fire button to begin the game. The walls disappear. You now have control of two large paddles. These paddles can be moved around all sides of the screen. Use them to bounce Jericho back into the kilt factory whenever he strays.

Joystick control is easy. Press the stick forward to move the paddles clockwise and pull back to move them counterclockwise.

Sooner or later, no matter how careful you are, Jericho will slip away. Press the fire button to bring him back. This can be done ten times. When Jericho escapes for the final time, press RETURN to begin a new game.

Your current score and number of lives are displayed in the upper left corner of the screen.

See program listing on page 78.

3-D Bar Grapher for the 128

Jon Atkinson

Transform ordinary numbers into bold, multicolored three-dimensional graphs with this useful application for the 128. You can keep track of your expenses, earnings, or just about anything else you might imagine. A color monitor is suggested.

Before the computer age, plotting graphs was a time-consuming chore that had to be done by hand. With "3-D Bar Grapher," however, graphing spreadsheets is fun and easy. Using multicolor and 3-dimensional charts, 3-D Grapher enables you to see where your money is going, to gauge how your investments are doing, to plot as many as 20 years of statistics incorporating as many as 20 different items, and much more. You can save graphs to disk, or by using a printer and a screen dump program (such as *The Print Shop* by Brøderbund), you can make a printout.

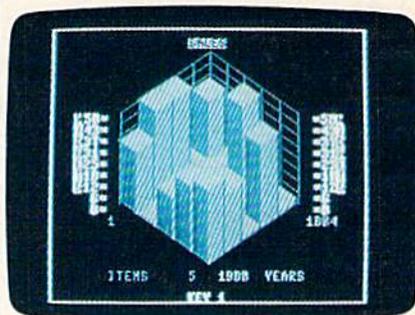
Getting Started

Since 3-D Bar Grapher is written entirely in BASIC, simply set your 128 for 40 columns, type the program in, save a copy to disk, and type RUN. 3-D Bar Grapher begins by asking you the first of several questions. Pressing RETURN at a prompt enters the default response. This is useful if you're trying the program for the first time, or if you're not sure what to enter. The first two prompts involve looking at previously saved graphs. For now, choose N for these prompts. (We'll discuss saving graphs later on.)

Now you begin to input the actual values for your 3-D graph.

First, enter the title of the graph. This can be as long as 40 characters and is displayed at the top of your graph. The next prompt asks what you want displayed at the sides of your graph. This is called the *value representation* and is a label for the graph's height or the z dimension. Common values are dollars, millions, or number of units sold.

Next, 3-D Bar Grapher asks for the beginning and ending year. The year span must be in the range 0-20. For example, for a graph for this decade, enter 80 for the beginning year and 88 for the ending year. These values are displayed on the x length of the graph. If the same year is chosen for starting and ending values, the computer asks for the beginning and ending month, a number in the range 1-12. The ending month is normally calculated 12 months ahead, but can be changed by entering the number of the ending month (for example, 8 for August). Next you're asked for the number, within the range 1-20, of items to graph. In graphing a home budget, for example, you might have monthly payments on a house or a car, travel expenses, medical bills, entertainment expenses, and miscellaneous, for a total of five items. These values are represented on the y length of the graph.



Just one example of the colorful 3-D graphs you can create with this versatile program.

The next two prompts ask for the graphing range. The minimum and maximum values are 0 and 99,999, respectively. If one million or any other number greater than 99,999 is needed, all you have to do is enter the value as millions or billions and use 0-100 for the graphing range.

Impact Colors

Now the three multicolors have to be entered using values in the range 1-15. The defaults are 15—light blue, 4—cyan, and 7—dark blue. To make your graph more pleasing to the eye and to strengthen the 3-D illusion, three shades of a single color are recommended.

Recommended Color Combinations

shade	color 1	color 2	color 3
blue	15	4	7
red	9	11	10
gray	13	16	12
green	14	6	2

After the colors have been chosen, each value must be entered at a prompt. The total number of values can be calculated by multiplying the number of years or months by the number of items. There are no default values for this part of the program. If you press RETURN without entering any data, the program assumes you've entered a 0. When you've finished with the values, item keys may be entered. These are optional, but they make a more readable and attractive chart. For an expense graph, for example, you might have the following keys' values: ITEM 1 = HOUSE, ITEM 2 = CAR, ITEM 3 = TRAVEL, and ITEM 4 = MEDICAL. You can also place a comment in the key area.

You can have a border drawn around the screen after the graph has been completed by answering *yes* to the next prompt. The border can give a printout a more polished look. Finally, you're asked if fast mode is to be turned on. Fast mode cuts the drawing time of the graph in half, but the screen will be

blanked during the process. It's important to run the program in slow mode until you're sure you've eliminated any typing errors, because you can't see error messages while in fast mode.

Finished Product

Now the graph will be drawn on a 3-D chart, starting with the ending year or month in the top corner. The starting year or month is located near the bottom of the screen and the ending year or month further up, near mid-screen. The bar's length, width, and height depend on the number of items, the number of years or months, and the value of that particular cell.

After the graph has been completely plotted, press any key to return to text mode. Here you have three options: Save the graph, plot another graph, or exit to BASIC. If you choose Y to save the graph, you're prompted for the filename of the graph. Note that each graph takes a space of 33 blocks on the disk, so be sure to have enough

room on a disk before attempting to save anything. After you've saved the graph, you return to the beginning of the program to construct another graph.

Loading Graphs

The first prompt in 3-D Bar Grapher loads graphs from disk. After selecting this option, you can display a directory before entering a filename and your color choices. The graph is then displayed until any key is pressed. Unfortunately, you can't add to the data from an old graph. If you have a graph with expenses from January to May, for example, when June comes along, you won't be able to add the June data. The only solution is to reenter all your old data and then the new information.

Each graph resides in memory locations 8192-16383, so hi-res dumps can be made with *The Print Shop*. Load your graph using *get screen* from the Screen Magic section of *The Print Shop*.

See program listing on page 70. 

Make music

With Your 64 or 128!

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Sidplayer, the feature-packed, popular music player and editor program, is now more versatile and more impressive than before. *Enhanced Sidplayer* for the Commodore 128 and 64 includes two new versions—one for the Commodore 128 running in 128 mode and another for the Commodore 64. Take advantage of every feature the SID chip (the sound chip in the 128 and 64) has to offer. Just like the original, *Enhanced Sidplayer* is easy to learn and use, with many powerful new features. The accompanying disk contains the editor, player programs (including a Singalong program), utilities, and sample music that you can enjoy immediately or change. The new *Sidplayer* plays any songs created by the original *Sidplayer* for the Commodore 64.



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Square Logix

See instructions in article on page 30 before typing in.

Program 1: SQRS.OP

```
0B00:A0 A0 E6 E6 E6 A0 A0 E8 BD
0B08:A0 A0 E8 A0 E8 A0 A0 E8 B1
0B10:A0 A0 E8 E8 A0 A0 A0 E8 FB
0B18:A0 A0 A0 E8 A0 A0 E8 A0 43
0B20:A0 E8 E8 A0 E8 E8 A0 45
0B28:A0 A0 DC A0 A0 A0 E6 A0 52
0B30:E6 A0 DC A0 E6 A0 E6 A0 AF
0B38:E6 A0 E6 A0 E6 A0 E6 A0 F8
0B40:E6 A0 E6 A0 E6 A0 E6 A0 01
0B48:E6 A0 A0 A0 DC A0 A0 A0 63
0B50:A0 A0 E6 E6 E6 A0 DC A0 3E
0B58:E6 A0 E6 A0 E6 A0 E6 E6 5F
0B60:E6 A0 E8 E6 DC A0 DC A0 61
0B68:E6 A0 DC A0 A0 A0 DC A0 A1
0B70:DC A0 A0 A0 E6 E6 E6 A0 7C
0B78:A0 A0 A0 E6 A0 E6 A0 4D
0B80:E6 A0 E6 A0 E6 A0 DC A0 2D
0B88:E6 A0 E6 A0 E6 A0 E6 A0 49
0B90:E6 A0 E6 A0 E6 A0 E6 A0 51
0B98:E6 A0 A0 A0 A0 A0 E6 A0 5E
0BA0:A0 A0 E6 E8 E6 A0 A0 E6 7C
0BA8:E8 A0 E6 E8 E6 A0 E6 A0 EE
0BB0:E6 A0 DC A0 E6 A0 E6 E8 78
0BB8:E6 A0 E6 E8 DC A0 E6 A0 AD
0BC0:E6 E8 E6 A0 E6 E8 E6 A0 B4
0BC8:20 20 20 20 20 20 20 DE
0BD0:20 20 20 20 20 02 19 20 60
0BD8:0C 05 0F 0E 01 12 04 20 71
0BE0:0D 0F 12 12 09 13 20 20 99
```

Program 2: SQRS.SPR

```
0E00:00 00 00 00 00 00 00 1C
0E08:00 00 02 00 00 07 00 80
0E10:0F 80 00 1F C0 00 37 60 9A
0E18:00 67 30 00 07 00 00 53
0E20:00 00 07 00 00 07 00 39
0E28:07 00 00 07 00 00 07 46
0E30:00 07 00 00 07 00 00 4D
0E38:00 00 00 00 00 00 00 54
0E40:00 00 00 00 00 00 00 5C
0E48:00 00 00 00 00 00 00 64
0E50:06 00 00 03 00 00 01 80 22
0E58:00 00 C0 00 00 60 0F FF 2C
0E60:E0 0F FF F8 0F FF F0 00 A2
0E68:00 60 00 00 C0 00 01 80 25
0E70:00 03 00 00 06 00 00 7D
0E78:00 00 00 00 00 00 00 94
0E80:00 00 00 00 00 00 00 9C
0E88:00 00 07 00 00 07 00 00 A1
0E90:07 00 00 07 00 00 07 00 AE
0E98:00 07 00 00 07 00 00 07 B5
0EA0:00 00 47 10 00 67 30 00 A4
0EA8:37 60 00 1F C0 00 0F 80 0F
0EB0:00 07 00 00 02 00 00 00 9E
0EB8:00 00 00 00 00 00 00 00 D4
0EC0:00 00 00 00 00 00 00 00 DC
0EC8:00 00 00 00 00 00 00 00 E4
0ED0:00 00 00 C0 00 01 80 00 FD
0ED8:03 00 00 06 00 00 0F FF F4
0EE0:F8 1F FF F8 0F FF F8 06 41
0EE8:00 00 03 00 00 01 80 00 6A
0EF0:00 C0 00 00 40 00 00 00 3F
0EF8:00 00 00 00 00 00 00 00 15
0F00:FF FF FE 80 00 02 80 00 0F
0F08:02 80 00 02 80 00 02 80 EF
0F10:00 02 80 00 02 80 00 02 D2
0F18:00 00 02 80 00 02 80 00 C7
0F20:02 80 00 02 80 00 02 80 08
0F28:00 02 80 00 02 80 00 02 EA
0F30:80 00 02 80 00 02 80 00 DF
0F38:02 80 00 02 FF FF FE 00 95
0F40:F0 10 1E C0 38 06 A0 54 1A
0F48:0A 90 92 12 08 10 20 00 C3
0F50:10 00 00 00 00 00 00 00 76
0F58:20 00 04 40 00 02 FC 00 0D
0F60:3F 40 00 02 20 00 04 00 57
0F68:00 00 00 10 00 00 10 00 A7
```

0F70:08 10 20 90 92 12 A0 54 16
0F78:0A C0 38 06 F0 10 1E 00 37

Program 3: Square

```
QD 1 REM COPYRIGHT 1988 COMPUTE! PUBLICATIONS, INC. - ALL RIGHTS RESERVED
BA 2 PRINT"{CLR}{3 SPACES}COPYRIGHT 1988 COMPUTE! PUB., INC.":PRINTTAB(11)"ALL RIGHTS RESERVED"
QG 3 BLOAD"SQRS.SPR",B0,P3584
BH 4 REM *** ESTABLISH VARIABLE S ***
QF 5 A=0:AA=0:AX=0:B=0:D1=-1:G=0:G1=0:H=0:J=0:J1=0:J2=0:J3=0:JV=0:K=0:L=0:L1=-1:LV=0:M=0:M1=0:N=0:O=0:OX=0:OY=0:P=0:R1=-1:SD=0:T=0:U1=-1:UU=0:V=0:W=0:WW=0
XK 6 WZ=0:X=0:XU=0:XX=0:YX=0:Y=0:YY=0:Z=0:ZZ=0:CO$="{8}{GRN}{CYN}{BLU}{RED}{2}":FORT=1TO6:CS(T)=MID$(CO$,T,1):NEXT:Y$=""
SM 7 P$="{RVS}@@@@@{OFF}":FORT=0TO5:READC(T):NEXT:II=49176:DIMAS(6,6),X(999),J(999),K(999)
AP 8 FORT=0TO3:POKE53287+T,1:POKE53291+T,0:SPRITET+1,0:SPRITET+5,0:NEXT
QA 9 WZ=0:V=0:YX=0:J1=1:J2=1:J3=4:AX=17:COLOR0,2:COLOR4,1:COLOR6,2
RS 10 ?WINDOW0,0,39,24,1:PRINTTAB(9)"{RVS}{BLU}{4 SPACES}SQUARE LOGIX{5 SPACES}{DOWN}"
EH 11 PRINT"{RVS}{1}SHIFTS{OFF}{3 SPACES}{RVS}SHUFFLE{OFF}{2 SPACES}{RVS}ROTATE 1{OFF}{2 SPACES}{RVS}ROTATE 2{DOWN}"
AX 12 PRINT"{2 SPACES}{BLK}"P$"{3 SPACES}{RVS}{8}ABCDE{OFF}{4 SPACES}{RVS}{BLK}@@@@@{OFF}{3 SPACES}{RVS}{BLK}@@@{8}@@@"
AK 13 PRINT"{2 SPACES}{GRN}"P$"{3 SPACES}{RVS}GHIJKL{OFF}{4 SPACES}{RVS}{BLK}@@@{GRN}@@@@@{OFF}{3 SPACES}{RVS}{BLK}@@@{GRN}@@@"
EG 14 PRINT"{2 SPACES}{CYN}"P$"{3 SPACES}{RVS}MNOPQR{OFF}{4 SPACES}"P$"{3 SPACES}{RVS}{BLK}@@@{CYN}@@@"
BH 15 PRINT"{2 SPACES}{BLU}"P$"{3 SPACES}{RVS}STUVWX{OFF}{4 SPACES}"P$"{3 SPACES}"P$"
FS 16 PRINT"{2 SPACES}{RED}"P$"{3 SPACES}{RVS}YZ1234{OFF}{4 SPACES}"P$"{3 SPACES}"P$"
ER 17 PRINT"{2 SPACES}{2}"P$"{3 SPACES}{RVS}56789{BLK}{OFF}{4 SPACES}{2}"P$"{3 SPACES}"P$"
QJ 18 PRINT"{DOWN}{BLK}{2 SPACES}{RVS}GAME 1{OFF}{3 SPACES}{RVS}GAME 2{OFF}{4 SPACES}{RVS}GAME 3{OFF}{3 SPACES}{RVS}GAME 4":J1=1:UU=15:SLOW:GOSUB26
KK 19 REM ***{2 SPACES}MAKE SELECTION{2 SPACES}***
```

BEFORE TYPING . . .

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

```
GP 20 WINDOW5,14,39,14,1:PRINT"{BLU}PICK GAME.... 1 2{SPACE}3 4":GOSUB23:WZ=0:G1=J1:GOSUB35
XS 21 B=G1-2:AX=15:J1=1:J3=9:Z=7-G1:ZZ=Z+1:UU=17:GOSUB26:SLOW
JX 22 WINDOW0,16,39,16,1:PRINT"{BLU}LEVEL OF PLAY{BLK}... 1 2 3 4 5 6 7 8 9":GOSUB26:GOSUB23:LV=J1:F:AST:GOTO27
CF 23 JV=JOY(1):IFJV=0THEN23:ELSEIFJV=7THENJ1=J1-1-(J1=J2):GOSUB26:GOTO23
RJ 24 IFJV=3THENJ1=J1+1+(J1=J3):GOSUB26:GOTO23:ELSEIFJV>127THENSOUND1,400,1:RE:TURN
DD 25 GOTO23
DG 26 XU=AX+2*J1:SOUND1,J1*1000,10:WINDOW0,UU,39,UU,1:PRINTTAB(XU)"{RED}↑":RE:TURN
DS 27 J=RND(-TI):M1=0:IFG1<3TH:ENZZ=6
SD 28 REM ***{2 SPACES}RANDOMLY MIX BLOCKS{2 SPACES}***
DX 29 DO:M1=M1+1:J=INT(RND(1)*Z7Z):K=INT(RND(1)*ZZ):GOSUB33:SOUND2,8000,1:ONG1GOSUB30,30,31,31:LOOPUNTILM1=LV*3:J=2:K=2:WZ=1:GOSUB35:TI$="000000":GOTO50
CG 30 X=INT(RND(1)*4+1):GOSUB32:GOSUB71:RETURN
KX 31 X=INT(RND(1)*2):X(M1)=-X:GOSUB33:GOSUB82:RE:TURN
MK 32 X(M1)=X+2+(X>2)*4:RETURN
EE 33 J(M1)=J:K(M1)=K:RETURN
PM 34 REM ***{2 SPACES}PRINT BLOCKS TO SCREEN{2 SPACES}***
HH 35 FAST:WINDOW0,0,39,24,WZ:AA=0:FORY=0TO5:FORX=0TO5:IFWZ=1THEN42
BE 36 AA=AA+1:IFG1<>2THENAAS="":GOTO39
CQ 37 IFAA<27THENAAS=CHR$(64+AA):GOTO39:ELSEIFAA<36THENAAS=CHR$(22+AA)
SE 38 IFAA=36THENAAS(X,Y)="{RVS}{BLK}{2 SPACES}{M}{DOWN}{3 LEFT}{2 SPACES}{M}{DOWN}{3 LEFT}{2 P}$@":GOTO41
HM 39 ZZ$="{M}{DOWN}{3 LEFT}{2 SPACES}{M}{DOWN}{3 LEFT}{2 P}$@{OFF}"
SX 40 AS(X,Y)="{RVS}"CS(INT((AA-1)/6)+1)+AAS+ZZS
GX 41 BS(X,Y)=AS(X,Y):NEXTX,Y:SLOW:RETURN
EQ 42 SYSII,0,Y*3,X*3:PRINTAS(X,Y):SOUND1,10000,1:NEXTX,Y
DJ 43 WINDOW18,0,20,24:PRINT"{OFF}{BLK}{*}{RVS}{2 SPACES}{RIGHT}{2 SPACES}{RIGHT}{2 SPACES}":FORT=1TO5:P
```

```

RINT"[*]{2 SPACES}
{RIGHT}{2 SPACES}{RIGHT}
{2 SPACES}";:NEXT
GQ 44 WINDOW0,18,21,22:PRINT"
{RVS}{*}{2 RIGHT}{OFF}
[*]{2 RIGHT}{*}{2 RIGHT}
[*]{2 RIGHT}{*}{2 RIGHT}
[*]{2 RIGHT}M{RVS}
{2 SPACES}":FORT=1TO2:PR
INT"{RVS}{21 SPACES}":NE
XT:WINDOW0,0,39,24
GK 45 IFGL=3THENOX=24:OY=52:SD
=5:ELSEIFGL=4THENOX=36:O
Y=64:SD=6
HQ 46 SLOW:RETURN
GG 47 REM *** MARKERS ***
BQ 48 MOVSPRX,J*24+24,K*24+50:
POKES3269,2[(X-1):SOUND1
,4000,1:RETURN
GR 49 SPRITESD,1,1,0,1,1:MOVSP
RSD,J*24+OX,K*24+OY:SOUN
D1,(J+K*5+1)*1000,1:RETU
RN
BE 50 SLOW:GOSUB101:IFGL<3THEN
X=1:GOSUB47:GOTO52:ELSEG
OSUB49:GOTO52
BJ 51 M1=M1+1:J(M1)=J:K(M1)=K:
IFGL<3THENX(M1)=X+2+(X>2
)*4:ELSEX(M1)--(X=0)
AS 52 GOSUB116:IFV=1THEN96
QH 53 GETK$:IFK$="Q"THENFORI=1
TO8:SPRITEI,0:NEXT:PRINT
"{CLR}":COLOR0,1:COLOR5,
14:COLOR4,14:END:ELSEIFK
$=""THENGOSUB118
JD 54 REM *** JOYSTICK CONTROL
S ***
JF 55 JV=JOY(1):IFJV=0THEN52:E
LSEIFGL>2THEN58
BC 56 IFJV=1THENX=1:GOTO62:ELS
EIFJV=3THENX=2:GOTO64:EL
SEIFJV=5THENX=3:GOTO66:E
LSEIFJV=7THENX=4:GOTO68:
ELSEIFJV=128THENGOSUB71:
GOSUB80:GOTO51
HG 57 GOTO52
FG 58 IFJV=1THENK=K-1-(K=0):GO
TO61:ELSEIFJV=3THENJ=J+1
+(J=Z):GOTO61:ELSEIFJV=5
THENK=K+1+(K=Z):GOTO61:E
LSEIFJV=7THENJ=J-1-(J=0)
:GOTO61
HK 59 IFGL>2AND(JV=131ORJV=135
)THENYX=YX+1:GOSUB81:GOS
UB80:GOTO51
RG 60 GOTO52
PS 61 GOSUB49:GOTO52
EA 62 U1=U1+1:R1=-1:D1=-1:L1=-
1:IFU1>0THENK=K-1-(K=0)
FM 63 GOTO69
GE 64 R1=R1+1:U1=-1:L1=-1:D1=-
1:IFR1>0THENJ=J+1+(J=5)
GOTO69
PP 65 GOTO69
CD 66 D1=D1+1:L1=-1:U1=-1:R1=-
1:IFD1>0THENK=K+1+(K=5)
BP 67 GOTO69
BJ 68 L1=L1+1:U1=-1:R1=-1:D1=-
1:IFL1>0THENJ=J-1-(J=0)
DC 69 GOSUB48:GOTO55
XH 70 REM *** SHIFT AND ROTATE
ROUTINES ***
CD 71 ONXGOTO72,74,76,78
KJ 72 AS=AS(J,0):FORT=0TO4:AS(
J,T)=AS(J,T+1):NEXT:AS(
J,5)=AS:IFWZ=0THENRETURN
QC 73 FORT=5TO0STEP-1:SYSII,0,
T*3,J*3:PRINTAS(J,T):NEX
T:RETURN
JS 74 AS=AS(5,K):FORT=5TO1STEP
-1:AS(T,K)=AS(T-1,K):NEX
T:AS(0,K)=AS:IFWZ=0THENR
ETURN
GB 75 FORT=0TO5:SYSII,0,K*3,T*

```

```

3:PRINTAS(T,K):NEXT:RETU
RN
RB 76 AS=AS(J,5):FORT=5TO1STEP
-1:AS(J,T)=AS(J,T-1):NEX
T:AS(J,0)=AS:IFWZ=0THENR
ETURN
AE 77 FORT=0TO5:SYSII,0,T*3,J*
3:PRINTAS(J,T):NEXT:RETU
RN
KJ 78 AS=AS(0,K):FORT=0TO4:AS(
T,K)=AS(T+1,K):NEXT:AS(5
,K)=AS:IFWZ=0THENRETURN
BK 79 FORT=5TO0STEP-1:SYSII,0,
K*3,T*3:PRINTAS(T,K):NEX
T:RETURN
CR 80 SOUND1,(X+1)*2000,1:GOSU
B92:GOSUB115:RETURN
JR 81 IFJV=135THENX=1:ELSEX=0
SD 82 L=J+1:O=K+1:IFGL=4THEN86
:ELSEIFX=1THEN84
JP 83 AS=AS(J,K):AS(J,K)=AS(J,
O):AS(J,O)=AS(L,O):AS(L,
O)=AS(L,K):AS(L,K)=AS:GO
TO85
EA 84 AS=AS(J,K):AS(J,K)=AS(L,
K):AS(L,K)=AS(L,O):AS(L,
O)=AS(J,O):AS(J,O)=AS
EJ 85 IFWZ=0THENRETURN:ELSEFOR
H=KTOK+B:FORG=JTOJ+B:SYS
II,0,H*3,G*3:PRINTAS(G,H
):NEXTG,H:RETURN
CB 86 M=J+2:P=K+2:IFX=1THEN89
RC 87 AS=AS(J,K):AS(J,K)=AS(J,
O):AS(J,O)=AS(J,P):AS(J,
P)=AS(L,P):AS(L,P)=AS(M,
P)
SH 88 AS(M,P)=AS(M,O):AS(M,O)=
AS(M,K):AS(M,K)=AS(L,K):
AS(L,K)=AS:GOTO85
MH 89 AS=AS(J,K):AS(J,K)=AS(L,
K):AS(L,K)=AS(M,K):AS(M,
K)=AS(M,O):AS(M,O)=AS(M,
P)
EB 90 AS(M,P)=AS(L,P):AS(L,P)=
AS(J,P):AS(J,P)=AS(J,O):
AS(J,O)=AS:GOTO85
KK 91 REM *** CHECK FOR WIN **
*
CD 92 V=1:FORXX=0TO5:FORYY=0TO
5
QQ 93 IFAS(XX,YY)<>B$(XX,YY)TH
ENV=0:YY=5:XX=5:GOTO94
SE 94 NEXTYY,XX:RETURN
BQ 95 REM *** YES, COMPLETED.
{SPACE}NEW GAME ***
RK 96 WINDOW0,22,39,24,1:PRINT
"{WHT}YOU HAVE COMPLETE
{SPACE}GAME"G1"AT LEVEL"
LV"
AE 97 PRINT"{4 SPACES}{RVS}
{2 SPACES}PRESS
{2 SPACES}FIRE{2 SPACES}
BUTTON{2 SPACES}TO
{2 SPACES}START {OFF}";:
A=0:
EF 98 JV=JOY(1):IFJV>127THENGO
TO8
XJ 99 A=A+1+(A=5)*6:COLOR0,C(A
):W=W+1+(W>200)*200:SOUN
D1,W*300+300,2:GOTO98
FD 100 REM *** PRINT TITLE AND
PATTERN ***
EQ 101 WINDOW23,0,39,24,1:IFGL
=1THENPRINT"{RVS}{BLK}
{SPACE}S H I F T S
{2 DOWN}"
RP 102 IFGL=2THENPRINT"{RVS}
{BLK}S H U F F L E
{2 DOWN}"
CR 103 IFGL=3THENPRINT"{RVS}
{BLK}R O T A T E 1
{2 DOWN}":SD=5

```

```

GP 104 IFGL=4THENPRINT"{RVS}
{BLK}R O T A T E 2
{2 DOWN}":SD=6
AP 105 PRINT"PATTERN TO MATCH"
:WINDOW26,5,39,24:IFGL=
2THEN107
QA 106 FORR=1TO6:PRINTCS(R)"
{RVS}"PS:NEXT:GOTO111
FE 107 AK=0:FORAA=1TO6:PRINT:F
ORBB=0TO5:AK=AK+1
FS 108 IFAK<27THENPRINT"{RVS}"
CS(AA)CHRS(64+AK);:GOTO
110:ELSEIFAK=36THENPRIN
T"{RVS}{BLK}";:GOTO110
SF 109 PRINT"{RVS}"CS(AA)CHRS(
22+AK);
KH 110 NEXTBB,AA:GOTO111
FK 111 WINDOW0,0,39,24
AA 112 REM *** COMPUTER SOLVES
***
KP 113 SYSII,0,22,0:PRINT"
{OFF}{RED}HIT {RVS}Q
{OFF} TO QUIT. {RVS}*
{OFF} FOR COMPUTER SOLU
TION, {PUR}THEN PRESS A
NY KEY TO RESUME YOUR G
AME."
KK 114 WINDOW0,0,39,24
KJ 115 SYSII,0,17,24:PRINT"
{OFF}{BLK}TURN #"YX+1"
{2 SPACES}":RETURN
RB 116 SYSII,0,13,26:PRINT"{3}
TIMER"
HQ 117 PRINTTAB(25)"{RVS}{BLU}
"LEFT$(TI$,2)":MID$(TI
$,3,2)":RIGHT$(TI$,2):
RETURN
FE 118 IFGL>2THEN125
XH 119 WW=1:W=M1:DO:X=X(W):GOS
UB121:W=W-1:LOOPUNTILW<
1:GETKEY$:FAST
RB 120 WW=-1:W=1:DO:X=X(W)+2+(
X(W)>2)*4:GOSUB121:W=W+
1:LOOPUNTILW>M1:SLOW:RE
TURN
GP 121 J=J(W):K=K(W):SD=X-1
BS 122 GOSUB48:IFWW>0THENGOSUB
124
MB 123 GOSUB71:RETURN
SA 124 SLEEP1:SOUND2,4000,1:RE
TURN
BS 125 WW=1:FORW=1TO1STEP-1:X
=X(W):GOSUB127:NEXT:GET
KEY$:FAST
BK 126 WW=-1:FORW=1TOM1:X=-X(
W)=0:GOSUB127:NEXT:SLO
W:RETURN
BJ 127 J=J(W):K=K(W):SD=G1+2:G
OSUB49:IFWW>0THENGOSUB1
24
BH 128 GOSUB82:RETURN
MG 129 DATA6,6,4,7,3,10

```

3-D Bar Grapher for the 128

Article on page 67.

```

HE 10 REM COPYRIGHT 1988 COMPU
TE! PUBLICATIONS, INC. -
ALL RIGHTS RESERVED
MQ 20 PRINT"{CLR}{3 SPACES}COP
YRIGHT 1988 COMPUTE! PUB
., INC.":PRINTTAB(11)"AL
L RIGHTS RESERVED":SLEEP
3
XB 30 DIMV1(441),V(21,21):GRAP
HIC3,1
FX 40 GRAPHIC0,1:COLOR0,16:COL
OR4,7:PRINT"{BLK}

```

```

(12 SPACES)3-D BAR GRAPH
ER"
HE 50 PRINT"{2 DOWN}{BLK}{RVS}
LOAD A GRAPH FROM DISK?
{SPACE}(Y/N)"
DQ 60 INPUT"{2 SPACES}N
(3 LEFT)";LGS=IFLGS="Y"THE
HEN670
GG 70 PRINT"{RVS}VIEW PREVIOUS
GRAPH IN MEMORY? (Y/N)"
ED 80 INPUT"{2 SPACES}N
(3 LEFT)";V$:IFV$="Y"THE
NGOSUB710
QA 90 PRINT"{RVS}ENTER TITLE O
F GRAPH (0-40 CHARACTERS
)"
MR 100 INPUT$:IFLEN(T$)>39THE
NPRINT:T$="":GOTO100
SP 110 PRINT"{RVS}ENTER VALUE
{SPACE}REPRESENTATION (
0-15 CHARS.)"
EB 120 INPUT$:IFLEN(R$)>15THE
NPRINT"{2 UP}":R$="":GO
TO120
CS 130 PRINT"{RVS}ENTER STARTI
NG YEAR{21 SPACES}2 DIG
IT REPRESENTATION)"
GF 140 INPUT$:IFSY=0THENPRINT
"{2 UP}":GOTO140
JF 150 PRINT"{RVS}ENTER ENDING
YEAR (0-20 YEAR SPAN)"
FH 160 INPUT"{5 SPACES}
{5 LEFT}";EY:IFEY<SYTHE
NEY=EY+100
DA 170 IFEY>SY+20THENPRINT"
{2 UP}":GOTO160
BQ 180 IFEY=SYTHENGOSUB720
KP 190 PRINT"{RVS}ENTER NUMBER
OF ITEMS TO GRAPH (1-2
0)"
CS 200 INPUT"{5 SPACES}
{5 LEFT}{2 SPACES}5
{3 LEFT}";IT:IFIT<LORIT
>20THENPRINT"{2 UP}":GO
TO200
PP 210 PRINT"{RVS}GRAPH FROM (
0-99999)"
RH 220 INPUT"{5 SPACES}
{5 LEFT}{2 SPACES}0
{5 SPACES}{8 LEFT}";S:I
FS>99999THENPRINT"
{2 UP}":GOTO220
DX 230 PRINT"{RVS}TO{9 SPACES}
(0-99999)"
DD 240 INPUT$:IFE<=SORE>99999T
HENPRINT"{2 UP}":GOTO24
0
XA 250 GOSUB820
RD 260 PRINT"{RVS}ENTER VALUES
":TM$="YEAR":IFFL=1THEN
TM$="MONTH"
MP 270 FORA=1TOEY-SY+1-FL:FORB
=1TOIT
MQ 280 PRINTTM$;A", ITEM"B;:INP
UTV(A,B):IFV(A,B)<SORV(
A,B)>ETHENPRINT"{2 UP}":
GOTO280
GG 290 NEXTB,A
HJ 300 PRINT"{RVS}ENTER KEY (0
-40 CHARACTERS)"
KC 310 INPUTK$:IFLEN(K$)>40THE
NPRINT:K$="":GOTO300
CC 320 BD$="":INPUT"{RVS}BORDE
R? (Y/N){OFF}{2 SPACES}
N{3 LEFT}";BD$
QX 330 INPUT"{RVS}FAST? (Y/N)
{OFF}{2 SPACES}N
{3 LEFT}";F$:IFF$="Y"TH
ENFAST
DQ 340 T1=12:GOSUB870:SL=INT(4
9/(EY-SY+1-FL)):SI=INT(
49/IT)
RK 350 DRAW3,79,18TO79,82TO79-

```

```

(EY-SY+1-FL)*SL,82+(EY-
SY+1-FL)*SLTO79-(EY-SY+
1-FL)*SL,18+(EY-SY+1-FL
)*SLTO79,18TO79+IT*SI,1
8+IT*SI*TO79+IT*SI,82+IT
*SI*TO79,82:B=0
HJ 360 FORA=18+(EY-SY+1-FL)*SL
TOB2+(EY-SY+1-FL)*SLSTE
P8:DRAW3,79-(EY-SY+1-FL
)*SL,ATO79,18+8*BT079+I
T*SI,18+8*B+IT*SI:B=B+1
:NEXT
JG 370 SP=INT(49/(EY-SY+1-FL))
:Y=19+(EY-SY+1-FL)*SL:D
=79-(EY-SY+1-FL)*SL:FOR
A=DT079STEPSP:DRAW3,A,Y
TOA,Y+63:Y=Y-SP:NEXT
RD 380 SK=INT(49/IT):Y=18:D=79
:L=Y:M=D:FORA=DT079+IT*
SKSTEPSP:DRAW3,A,YTOA,Y
+64:Y=Y+SK:NEXT
AD 390 SE=E/8:Y=16:O=50:Q=-1:C
OLOR3,2:FORA=0TOESTEPSE
:N1$=STR$(INT(A))+ "=" :N
M$=STR$(INT(A)):N2$="":
+RIGHT$(NM$,LEN(NM$)-1)
:X=8-LEN(N1$)-1:CHAR3,X
,Y,N1$
FF 400 CHAR3,33,Y,N2$:Y=Y-1:IF
X<0THENP=X:O=X
HA 410 IFQ<LEN(N2$)THENR=LEN(N
2$):Q=R
AP 420 NEXT
GG 430 SC=(40-LEN(T$))/2:COLOR
3,5:CHAR3,SC,1,T$,1
DC 440 COLOR3,8:Y=8:FORA=1TOLE
N(R$):R2$=MID$(R$,A,1):
CHAR3,P,Y,R2$,1:CHAR3,R
+33,Y,R2$,1:Y=Y+1:NEXT
PS 450 COLOR3,9:IFFL=1THENCHAR
3,21,22,Y1$:CHAR3,31,17
,Y2$:CHAR3,27,22,"MONTH
S":GOTO480
AF 460 Y1$=STR$(SY):Y2$=STR$(E
Y):IFEY>99THENY2$=STR$(
EY-100)
KQ 470 CHAR3,20,22,Y1$:CHAR3,3
1,17,Y2$:CHAR3,27,22,"Y
EARS"
CK 480 COLOR3,10:I2$=STR$(IT):
CHAR3,7,17,"1":CHAR3,16
,22,I2$:CHAR3,7,22,"ITE
MS"
PJ 490 SC=(40-LEN(K$))/2:COLOR
3,11:CHAR3,SC,24,K$:COL
OR3,C3
GE 500 IFBD$="Y"THENCOLOR3,8:B
OX3,0,0,159,199:COLOR3,
C3
MC 510 X2=80:Y2=81+SP:X3=X2:Y3
=Y2:Y4=81+SK:Y5=Y4:FORA
=EY-SY+1-FLTO1STEP-1:FO
RC=1TOIT:V1(C)=V(A,C):N
EXTC:FORB=1TOIT:X=X2-SP
:Y=Y2:F=(E-S)/64:G=0:H=
X+SK-1:I=Y+SK-1
RQ 520 DRAW3,X,YTOX+SK-1,Y+SK-
1:Y=Y-1:G=G+F:IFG>=V1(B
)THEN530:ELSE520
KR 530 J=X:K=Y:DRAW1,H,ITOH,Y+
SK:X=X2+SK-2:Y=Y4:G=0:H
=X:I=Y
DQ 540 DRAW1,X,YTOX-SP+2,Y+SP-
2:Y=Y-1:G=G+F:IFG>=V1(B
)THEN550:ELSE540
CP 550 DRAW3,H,ITOH,Y+1:X=J:Y=
K:G=0:L=X+SP-1:M=Y-SP+1
BA 560 DRAW2,X,YTOX+SP-1,Y-SP+
1:TOX+SP-1,Y-SP+2:TOX,Y+1
:X=X+1:Y=Y+1:G=G+1:IFG>
=SK-1THEN570:ELSE560
GP 570 DRAW2,X,YTOX+SP-1,Y-SP+
1:DRAW1,J,KTOL,MTOX+SP-

```

```

1,Y-SP+1:X2=X2+SK:Y2=Y2
+SK:Y4=Y4+SK:NEXTB:X2=X
3-SP:Y2=Y3+SP:Y4=Y5+SP:
X3=X2:Y3=Y2:Y5=Y4:NEXTA
SLOW:COLOR4,1:POKE208,0
:GETKEYA$:GRAPHIC0,1:CO
LOR0,16:COLOR4,7
DJ 590 PRINT"{2 DOWN}{BLK}
{RVS}SAVE GRAPH TO DISK
(Y/N/Q)?{OFF}{RVS}
{OFF}{LEFT}";
CH 600 GETKEYB$
MS 610 IFB$="Y"THENPRINT"YES
{RVS}{OFF}":SLEEP1:GOT
0650
BS 620 IFB$="N"THENPRINT"NO
{RVS}{OFF}":SLEEP1:GOT
040
CP 630 IFB$="Q"THENEND
KP 640 GOTO600
QX 650 GOSUB880
DD 660 FAST:BSAVE(SG$),B0,P819
2TOP16383:SLOW:GOTO900
HK 670 GOSUB880:GOSUB820
HF 680 DOPEN#1,(SG$):IFDS<>0TH
ENGOSUB810:CLOSE1:GOTO6
70:ELSECLOSE1
KA 690 T1=1:GOSUB870:FAST:BLOA
D(SG$),B0,P8192:SLOW
JC 700 GRAPHIC3:POKE208,0:GETK
EYB$:GOTO40
PG 710 GRAPHIC3:COLOR0,1:COLOR
4,1:POKE208,0:GETKEYB$:
GRAPHIC0:COLOR0,16:COLO
R4,7:RETURN
AE 720 INPUT"{RVS}STARTING MON
TH? (1-12){OFF}
{2 SPACES}1{3 LEFT}";M1
:IFM1<LORM1>12THENPRINT
"{2 UP}":GOTO720
XH 730 M2=(M1+12)-13:IFM2=0THE
NM2=12
BP 740 PRINT"{RVS}ENDING MONTH
? (1-12){OFF}{2 SPACES}
"M2;:INPUT"{5 LEFT}";M3
:IFM3<LORM3>12THENPRINT
"{2 UP}":GOTO740
QB 750 M$="JANFEBMARAPRMAJUNJ
ULAUGSEPCTNOVDEC":Y1$=
MID$(M$,M1*3-2,3):Y2$=M
ID$(M$,M3*3-2,3):SY=0:E
Y=(12-M1)-(12-M3)+1:IFE
Y<=0THENEY=EY+12
SQ 760 FL=1:RETURN
SJ 770 PRINT"{DOWN}{RVS}NEED T
O SEE THE DIRECTORY FIR
ST? (Y/N)"
QQ 780 INPUT"{2 SPACES}Y
{3 LEFT}";D$:IFD$="N"TH
ENRETURN:ELSEIFD$<>"Y"TH
EN770:ELSEPRINT"{CLR}"
FH 790 DIRECTORY:IFDS<>0THENGO
SUB810:GOTO790
BM 800 GETKEYA$:PRINT"{CLR}":R
ETURN
DR 810 PRINT"{DOWN}"D$:GETKEY
A$:PRINT"{CLR}":RETURN
XH 820 PRINT"{RVS}ENTER THREE
{SPACE}COLORS"
PB 830 INPUT"COLOR 1{2 SPACES}
15{4 LEFT}";C1:IFC1<LOR
C1>16THENPRINT"{2 UP}":
GOTO830
MJ 840 INPUT"COLOR 2{2 SPACES}
4{3 LEFT}";C2:IFC2<LORC
2>16THENPRINT"{2 UP}":G
OTO840
QK 850 INPUT"COLOR 3{2 SPACES}
7{3 LEFT}";C3:IFC3<LORC
3>16THENPRINT"{2 UP}":G
OTO850
MR 860 RETURN
SQ 870 COLOR0,1:COLOR4,T1:COLO

```

```

R1,C1:COLOR2,C2:COLOR3,
C3:GRAPHIC3,1:RETURN
EP 880 GOSUB770:PRINT"[RVS]ENTER
NAME OF GRAPH (1-16
{SPACE}CHRS)"
GM 890 INPUTSG$:IFLEN(SG$)<10R
LEN(SG$)>16THENPRINT"
{2 UP}":GOTO890:ELSERET
URN
KG 900 IFDS<>0THENGOSUB810:GOT
0650:ELSE40

```

Eight Thousand Dragons

See instructions in article on page 59 before typing in.

```

0801:0B 08 01 00 9E 32 30 36 0D
0809:31 00 00 00 AD 8A 09 8D E8
0811:20 D0 A9 01 A2 08 9D B1 CC
0819:09 0A CA D0 F9 A9 FF 8D 9A
0821:0F D4 A9 80 8D 12 D4 8D 17
0829:18 D4 A0 00 AD 8B 09 0A 46
0831:0A 0A 0A 0D 8A 09 99 00 86
0839:04 99 00 05 99 00 06 99 74
0841:00 07 C8 D0 F1 A9 00 A2 12
0849:0F 9D 93 09 CA D0 FA A9 84
0851:18 8D 18 D0 AD 11 D0 09 3D
0859:20 8D 11 D0 A9 00 85 FB 60
0861:A2 20 86 FC A0 00 91 FB 8F
0869:C8 D0 FB E6 FC CA D0 F4 A9
0871:A9 00 A0 0E 99 A3 09 88 41
0879:C0 FF D0 F8 A9 60 85 FD 6B
0881:A9 84 85 FE A9 64 85 FB 0E
0889:A9 34 85 FC A0 00 A9 80 D4
0891:91 FB A0 00 A2 00 18 BD 80
0899:95 09 7D A3 09 7D A4 09 31
08A1:29 01 D0 04 88 4C AA 08 B3
08A9:C8 E8 0E 0E D0 E8 98 29 D9
08B1:07 A8 B9 8C 09 8D C0 08 77
08B9:B9 8D 09 8D C1 08 4C FF CA
08C1:FF E6 FD A5 FD 29 07 AA F2
08C9:D0 0D A5 FB 18 69 08 85 F5
08D1:FB A5 FC 69 00 85 FC 4C DB
08D9:42 09 E6 FE A5 FD 29 07 98
08E1:AA A5 FE 29 07 D0 10 E6 A5
08E9:FC A5 FB 18 69 39 85 FB 1A
08F1:90 02 E6 FC 4C 42 09 E6 DB
08F9:FB F0 F7 4C 42 09 C6 FD C9
0901:A5 FD 29 07 AA C9 07 D0 56
0909:38 A5 FB 38 E9 08 85 FB 1A
0911:A5 FC E9 00 85 FC 4C 42 6D
0919:09 C6 FE A5 FD 29 07 AA E8
0921:A5 FE 29 07 C9 07 D0 10 77
0929:C6 FC A5 FB 38 E9 39 85 B3
0931:FB B0 0E C6 FC 4C 42 09 42
0939:A5 FB 38 E9 01 85 FB 90 69
0941:F2 A0 00 B1 FB 1D B2 09 D2
0949:91 FB EE B1 09 A2 0E BD C8
0951:A3 09 C9 02 D0 0B A9 00 D6
0959:9D A3 09 FE A2 09 CA D0 D3
0961:EE AD A3 09 D0 03 4C 93 1A
0969:08 20 E4 FF C9 00 F0 F9 4E
0971:C9 51 F0 12 A0 02 AD 1B 7F
0979:D4 29 01 99 94 09 C8 C0 15
0981:0F D0 F3 4C 5D 08 4C 18 4E
0989:E5 00 08 C2 08 DB 08 FF 7B
0991:08 1A 09 00 00 00 00 00 4F

```

Excelfont 80

See instructions in article on page 56 before typing in.

Program 1: EXCELLDR

```

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PD 20 GRAPHIC1,1:GRAPHIC0,1:FA

```

```

ST:POKE2606,8:POKE2607,2
4:GRAPHIC5,1:SYS52684,8,
12:SYS52684,24,20:SYS526
84,96,34:COLOR6,15
XF 30 PRINT"[WHT]{5 DOWN}"TAB(
10)"{A}CCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCC{S}"
FQ 40 FORI=.TO2:PRINTTAB(10)"B
TAB(69)"B":NEXT
CQ 50 PRINTTAB(10)"B"TAB(34)"E
XCELLFONT 80"TAB(69)"B"
QS 60 PRINTTAB(10)"B"TAB(69)"B
"
DD 70 PRINTTAB(10)"B"TAB(26)"(
C) 1988 COMPUTE! PUB., I
NC."TAB(69)"B"
XG 80 PRINTTAB(10)"B"TAB(30)"A
LL RIGHTS RESERVED"TAB(6
9)"B"
RQ 90 PRINTTAB(10)"B"TAB(69)"B
"
KR 100 FORI=.TO2:PRINTTAB(10)"B
TAB(69)"B":NEXT
MQ 110 PRINTTAB(10)"{Z}CCCCCCC
CCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCC
CCCC{X}":SYS52684,,34
KA 120 CHAR1,33,16,"LOADING
{2 SPACES}ML...":BLOAD"
EXCEL.OBJ":BLOAD"EXCEL.
OBJ1"
JR 130 CHAR1,33,16,"SETTING
{2 SPACES}UP...":GOSUB1
50
JA 140 CHAR1,28,16,"{WHT}LOADI
NG MAIN PROGRAM...":CLR
:RUN"EXCEL.BAS"
FH 150 POKE2606,..:POKE2607,16:
PRINT"[CLR]"
MR 160 PRINTTAB(34)"{B}{WHT}EX
CELLFONT 80"
QS 170 PRINT"[CYN]{3 SPACES}
{B}12345678"CHR$(130)"
{2 SPACES}{YEL}{A}CCCC
CCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCC
CCCCCCCC{S}"
EB 180 FORI=1TO4:PRINT"[CYN]"S
TR$(I)"{M}"SPC(8)"{G}
{YEL}B"SPC(64)"B":NEXT
BC 190 PRINT"[CYN] 5{M}"SPC(8)
"{G}{YEL}{Z}CCCCCCCC
CCCCCCCCCCCCCCCCCCCC
CCCCCCCC{X}"
AJ 200 PRINT"[CYN] 6{M}"SPC(8)
"{G}{WHT}{A}CCCCCCCC
CCCCCCCCCCCCCCCCHELP ME
NUCCCCCCCCCCCCCCCCCCCC
CCCCCCCC{S}"
MC 210 FORI=7TO9:PRINT"[CYN]"S
TR$(I)"{M}"SPC(8)"{G}
{WHT}B"SPC(64)"B":NEXT
DM 220 FORI=10TO16:PRINT"[CYN]"
{LEFT}"STR$(I)"{M}"SPC(
8)"{G}{WHT}B"SPC(64)"B
":NEXT
JR 230 PRINT"[CYN]{3 SPACES}
{8 T}{2 SPACES}{WHT}{Z}
CCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCC
CCCCCCCC{X}"
JR 240 PRINT"[6]{A}CCCCCCCC
{S}{PUR}{A}CCCCCCCC
CCCCCCCCCCCCCCCCCCCC
CCCCCCCC{S}"
KG 250 PRINT"[6]B WRAP
{2 SPACES}ON B {PUR}B"SP
C(64)"B"
SB 260 PRINT"[6]B{3 SPACES}WHO

```

```

LE{2 SPACES}B {PUR}B"SP
C(64)"B"
MH 270 PRINT"[6]B SIZE
{5 SPACES}B {PUR}B"SPC(
64)"B"
JJ 280 PRINT"[6]B CHRSET
{3 SPACES}B {PUR}B"SPC(
64)"B"{53 SPACES}"
AF 290 PRINT"[6]{Z}CCCCCCCC
{X}{PUR}{Z}CCCCCCCC
CCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCC
CCCC{X}";
SP 300 POKE2606,8:POKE2607,24:
SYS4864:RETURN

```

Program 2: EXCELBAS.

```

BS 10 TRAP1020:BANK15:MA$="
{UP}{RIGHT}{DOWN}{LEFT}D
SLYGH8462WPRR{RVS}EM
{CLR}N)OON{HOME}QTEC{A}"
:SYS24812,,9,,CHR$(1)
RJ 20 FORI=.TO48:SYS3072,34,I:
SYS3072,35,96-I:NEXT
JR 30 SYS3072,12,0:SYS3072,13,
0:SYS3072,20,16:POKE2606
,0:POKE2607,16:COLOR6,1:
SLEEP1
QP 40 FORI=.TO48:SYS3072,34,48
-I:SYS3072,35,48+I:NEXT
RJ 50 FORI=1TO8:READX(I),Y(I):
NEXT
KR 60 IFPA<>.THENSYS3114,PA/25
6,PAAND255,7:SYS3114,CA/
256,CAAND255,141
JC 70 WINDOW14,20,77,23,1:PRIN
TCHR$(142)"{WHT}(U)PERC
ASE OR (L)OWERCASE?":GET
KEYA$:IFA$="U"THENCC=. :I
=208:ELSEIFA$="L"THENCC=
1:I=216:ELSE70
GB 80 INPUT"# OF EDITING ROWS(
1-16)";R:R=R-1:IFR<.ORR>
15THEN80
CJ 90 WINDOW1,20,10,23:CHAR1,7
,3,CHR$(153)+STR$(CC)
ER 100 IFR<10THENA$="":ELSEA$
=""
SB 110 A$=A$+STR$(R):CHAR1,5,2
,A$
PA 120 BANK14:SYS3890,I:BANK15
:SYS3784
BR 130 CX=-. :CY=. :SYS3254,48,0:
SYS3289:X=. :Y=. :PA=4259
:SYS3114,16,174,181:CA=
4270:SYS3114,16,163,59:
AH=48:AL=. :W=1
BK 140 SYS3158,AH,AL:SYS3289
RF 150 WINDOW14,20,77,23,1
DC 160 J=JOY(2):IFJ=. :THENB=. :G
OTO260
RG 170 IF>127THEN230
HD 180 B=.
BK 190 SYS3114,PA/256,PAAND255
,15:X=X+X(J):Y=Y+Y(J)
ED 200 IF(X<. )OR(X>7)THENX=X-X
(J)
HC 210 IF(Y<. )OR(Y>15)THENY=Y-
Y(J)
MP 220 PA=Y*80+X+4259:SYS3114,
PA/256,PAAND255,59:GOTO
260
CX 230 J=JAND15:IFB=1THEN250
PA 240 B=1:SYS3125,(PA-4096)/2
56,(PA-4096)AND255:RREG
,,S:IFS>32THENS=. :ELSES
=1
JD 250 SYS3220,8-X,Y,S:SYS3158
,AH,AL:SYS3254,AH,AL:SY
S3289:IFJ=. :THEN260:ELSE
GOTO190
KK 260 GETA$:A=INSTR(MA$,A$):I

```

```

FA=.THEN160
BS 270 IFA<5THEN300
JR 280 A=A-4:ONAGOTO350,380,400,420,430,440,450,460,470,480,490,500,520,540,550,560,570,580,600,610,630,640,650,660,670,680,690,780
SQ 290 A=A-28:ONAGOTO790,800
DE 300 A=A*2-1:CX=CX+X(A):CY=CY+Y(A):SYS3114,CA/256,CAAND255,141
PG 310 IF(CX<.)OR(CX>63)THENCX=CX-X(A)
QB 320 IF(CY<.)OR(CY>3)THENCY=CX-Y(A)
JM 330 CA=CX*80+CX+4270:SYS3125,(CA-4096)/256,(CA-4096)AND255:RREG,,C:AD=12288+C*16:AL=ADAND255:AH=AD/256
AQ 340 SYS3254,AH,AL:SYS3289:SYS3114,CA/256,CAAND255,181:GOTO160
RJ 350 POKE2606,8:POKE2607,24:PRINT"{WHT}{2 HOME}{CLR}":FORI=8TO.STEP-1:SYS3072,23,I:FORD=.TO99:NEXT:NEXT:SYS3072,12,8:SYS3072,13,0:SYS3072,2,0,24:SYS3072,23,8:DIRECTORY
PD 360 PRINT{RVS}PRESS ANY KEY TO CONTINUE":GETKEYA$:FORI=8TO.STEP-1:SYS3072,23,I:FORD=.TO99:NEXT:NEXT:SYS3072,34,96:FORD=.TO99:NEXT
JP 370 SYS3072,12,0:SYS3072,13,0:SYS3072,20,16:POKE2606,0:POKE2607,16:SYS3072,34,.,.FORI=.TO8:FORD=.TO99:NEXT:SYS3072,23,I:NEXT:GOTO160
KS 380 SYS3744:WINDOW14,20,77,23,1:INPUT{WHT}SAVE FILENAME":F$:IFF$=""THEN150
SQ 390 BSAVE(F$,P8192TOP12288:GOTO150
PG 400 WINDOW14,20,77,23,1:INPUT{WHT}LOAD FILENAME":F$:IFF$=""THEN150
JJ 410 BLOAD(F$,P8192:SYS3784:SYS3254,AH,AL:SYS3289:GOTO150
BE 420 SYS3568,W,X:GOTO140
SJ 430 SYS3443,W,Y:GOTO140
PP 440 SYS3419,W,Y:GOTO140
XM 450 SYS3590,W,X:GOTO140
RR 460 SYS3670,W,R:GOTO140
MJ 470 SYS3612,W:GOTO140
KS 480 SYS3641,W:GOTO140
RR 490 SYS3711,W,R:GOTO140
CB 500 W=XOR(W,1):WINDOW1,20,10,23:IFW=1THENW$="{6}ON":ELSEW$="{6}OFF"
PP 510 CHAR1,6,.,W$:GOTO160
PB 520 P=XOR(P,1):WINDOW1,20,10,23:IFP=1THENP$="{6}PART":ELSEP$="{6}WHOLE"
HX 530 CHAR1,3,1,P$:GOTO160
DG 540 SYS3486:GOTO140
PB 550 SYS3527:GOTO140
QP 560 GOSUB590:SYS3406,T:GOTO140
GQ 570 GOSUB590:SYS3196:SYS3389,T:GOTO140
DJ 580 GOSUB590:SYS3196:SYS3467,T:GOTO140
QB 590 IFP=1THENT=Y:RETURN:ELSET=R:RETURN

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DB 600 SYS3136:GOTO140
SQ 610 WINDOW14,20,77,23,1:PRINT"ARE YOU SURE?":GETKEYA$:IFAS=""N"ORAS<>"Y"THEN150
AC 620 BANK14:SYS3890,208+CC*8:BANK15:SYS3784:SYS3254,AH,AL:GOTO140
RX 630 GOSUB590:SYS3196:SYS3820,T:SYS3208:GOTO140
ER 640 SYS3949:GOTO160
JJ 650 SYS3961:GOTO140
BP 660 RA=(208+CC*8)*256+(C*8):BANK14:FORI=.TO7:POKE2816+I,PEEK(RA+I):NEXT:FORD=8TO15:POKE2816+I,.:NEXT:BANK15:GOTO140
EG 670 SYS3114,PA/256,PAAND255,15:X=.:Y=.:PA=4259:SYS3114,PA/256,PAAND255,59:GOTO160
SQ 680 WINDOW14,20,77,23,1:PRINT"{WHT}QUIT CHARACTER{SPACE}SET":PRINT"ARE YOU SURE?":GETKEYA$:IFAS=""N"ORAS<>"Y"THEN150:ELSEGOTO600
GA 690 IFR=7ORR=15THENV=R:GOTO710
AF 700 WINDOW14,20,77,23,1:INPUT{WHT}# CHARACTER ROWS USED FOR ACTUAL DISPLAY(8/16)":V:V=V-1:IFV<>7ANDV<>15THEN700
QS 710 FORI=8TO.STEP-1:SYS3072,23,I:FORD=.TO99:NEXT:NEXT:SYS3072,34,96
EP 720 IFV=15THENSYS3072,4,15:SYS3072,5,6:SYS3072,6,12:SYS3072,7,15:SYS3072,9,15:WINDOW0,0,79,11:SYS3072,11,15:ELSEPRINT"{2 HOME}"
AQ 730 POKE2606,8:POKE2607,24:PRINTCHR$(11){WHT}{CLR}":SYS3072,12,8:SYS3072,13,0:SYS3072,20,24
AC 740 PRINTCHR$(142)TAB(34)"SAMPLE FONT":PRINTTAB(18){DOWN}{CYN}PRESS ALT{SPACE}TO RETURN TO MAIN SCREEN{WHT}CHR$(14)
AF 750 SYS3072,34,.:FORI=.TOV:FORD=.TO99:NEXT:SYS3072,23,I:NEXT:SYS3973:FORI=120TO113STEP-1:SYS3072,22,I:FORD=.TO99:NEXT:NEXT:EXT:FORD=.TO99:NEXT
MH 760 IFV=15THENSYS3072,4,32:SYS3072,5,224:SYS3072,6,25:SYS3072,7,29:SYS3072,9,231:SYS3072,23,232:SYS3072,11,7
PR 770 SYS3072,12,0:SYS3072,13,0:SYS3072,20,16:POKE2606,0:POKE2607,16:PRINTCHR$(142):WINDOW14,20,77,23,1:FORI=113TO120:FORD=.TO99:NEXT:SYS3072,22,I:NEXT:GOTO160
KM 780 SYS3997:GOTO140
GD 790 SYS4019:GOTO140
XE 800 WINDOW14,8,77,17,1:H=H+1:IFH=4THENH=1
CQ 810 ONHGOTO820,910,970
PF 820 PRINT{WHT}{B}CHARACTER EDIT FEATURES"SPC(11)"{B}MISC. FEATURES"
CQ 830 PRINT{3 SPACES}R{3 SPACES}- ROTATE CLOCKWISE"SPC(12)"T

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```

{3 SPACES}- TYPE/TRY FONT"
MK 840 PRINT"SHFT-R - ROTATE COUNTERCLOCKWISE{2 SPACES}CMMD-9 - REV{SPACE}1ST TO 2ND HALF"
XG 850 PRINT"CTRL-R - REVERSE"SPC(21)"O{3 SPACES}- RESTORE CHAR"
SJ 860 PRINT"{3 SPACES}F{3 SPACES}- FLIP"SPC(21)"SHFT-O - STASH CHAR"
QA 870 PRINT"{3 SPACES}M{3 SPACES}- MIRROR"SPC(19)"SHFT-N - RESTORE ROM CHAR SET"
XE 880 PRINT"{3 SPACES}E{3 SPACES}- EXPAND CHAR"SPC(17)"Q{3 SPACES}- QUIT CHAR SET"
DS 890 PRINT"{3 SPACES}C{3 SPACES}- COMPACT CHARACTER":PRINT"SH-CLR - CLEAR CHARACTER"
XG 900 PRINT"{3 SPACES}N{3 SPACES}- RESTORE ROM CHAR":GOTO160
FS 910 PRINTSPC(23)"{WHT}{B}SCROLLING FEATURES"
FP 920 PRINTSPC(7)"SCRL UP"SPC(32)"SCRL COL UP"
BS 930 PRINTSPC(10)"{6}8"SPC(40)"Y":PRINT{DOWN}{WHT}SCRL"SPC(11)"SCRL"SPC(22)"SCRL"SPC(11)"SCRL"
RA 940 PRINT"LEFT {6}4"SPC(7)"6 {WHT}RIGHT"SPC(21)"ROW{2 SPACES}{6}G"SPC(7)"H {WHT}ROW"
CM 950 PRINTSPC(42)"LEFT"SPC(11)"RIGHT":PRINTSPC(10)"{6}{DOWN}2"SPC(40)"B"
XC 960 PRINTSPC(6)"{WHT}SCRL DOWN"SPC(30)"SCRL COL DOWN":GOTO160
QF 970 PRINT{WHT}{B}DISK COMMANDS"SPC(21)"{B}TOGGLES"
EK 980 PRINT{3 SPACES}D{3 SPACES}- DIRECTORY"SPC(16)"W{3 SPACES}- WRAPP ON/OFF"
HA 990 PRINT{3 SPACES}S{3 SPACES}- SAVE CHAR SET"SPC(12)"P{3 SPACES}- PART/WHOLE CHAR EDIT"
CH 1000 PRINT{3 SPACES}L{3 SPACES}- LOAD CHARACTER{SPACE}SET":PRINT{3 SPACES}@{3 SPACES}- DOS COMMAND":PRINT{B}{DOWN}CURSOR FEATURES"
RA 1010 PRINT"HOME{2 SPACES}- HOME CHAR EDIT CURSOR":PRINT"CURSOR":PRINT"KEYS{2 SPACES}- MOVE{SPACE}CHAR SELECT CURSOR":GOTO160
RJ 1020 IFA$="{STOP}"THENSTOP
XG 1030 IFDS<>.THENPRINTDS$RESUME160
XH 1040 DATA,-1,1,-1,1,.,1,1,.,1,-1,1,-1,.,1,-1

```

Program 3: EXCELOBJ.

```

0C00:8D 00 D6 2C 00 D6 10 FB E3
0C08:8E 01 D6 60 8D 00 D6 2C CE
0C10:00 D6 10 FB AE 01 D6 60 27
0C18:8E 30 0B AA A9 12 20 00 65

```

```
0C20:0C A9 13 AE 30 0B 20 00 E3
0C28:0C 60 20 18 0C 98 AA A9 A5
0C30:1F 20 00 0C 60 20 18 0C 60
0C38:A9 1F 20 0C 0C 8A A8 60 ED
0C40:A2 0F A9 00 9D 00 0B CA 70
0C48:10 FA 60 A2 0F A9 00 9D 1A
0C50:10 0B CA 10 FA 60 20 18 3F
0C58:0C A0 00 A9 1F BE 00 0B 38
0C60:20 00 0C C8 C0 10 D0 F5 74
0C68:60 20 18 0C A0 00 A9 1F F3
0C70:BE 10 0B 20 00 0C C8 C0 D1
0C78:10 D0 F5 60 A2 0F BD 00 5E
0C80:0B 9D 10 0B CA 10 F7 60 1F
0C88:A2 0F BD 10 0B 9D 00 0B 48
0C90:CA 10 F7 60 8E 31 0B AA 11
0C98:3A A9 00 2A CA D0 FC AE 1C
0CA0:31 0B C0 00 D0 09 49 FF 69
0CA8:3D 00 0B 9D 00 0B 60 1D A4
0CB0:00 0B 9D 00 0B 60 20 18 71
0CB8:0C A9 1F A0 00 20 0C 0C D3
0CC0:8A 99 00 0B A9 1F C8 C0 51
0CC8:10 D0 F2 60 48 8A 48 20 9E
0CD0:40 0C 68 AA 68 20 56 0C 40
0CD8:60 A9 A3 8D 39 0B A9 00 22
0CE0:8D 3A 0B 8D 3B 0B 8D 3D E6
0CE8:0B AC 3B 0B B9 00 0B 8D 3B
0CF0:3C 0B 0E 3C 0B 90 05 A0 B4
0CF8:A0 4C FE 0C A0 20 AD 3A 30
0D00:0B AE 39 0B 20 2A 0C AC 91
0D08:3D 0B C0 07 F0 0E EE 3D E6
0D10:0B EE 39 0B D0 03 EE 3A ED
0D18:0B 4C F2 0C 18 AD 39 0B DE
0D20:69 49 8D 39 0B AD 3A 0B 15
0D28:69 00 8D 3A 0B EE 3B 0B E1
0D30:A0 00 8C 3D 0B AC 3B 0B 8C
0D38:C0 10 D0 AD 60 A8 A2 00 96
0D40:B9 00 0B 9D 10 0B E8 88 79
0D48:10 F6 20 88 0C 60 A8 B9 A1
0D50:00 0B 49 FF 99 00 0B 88 C1
0D58:10 F5 60 C9 00 D0 04 5E 4A
0D60:00 0B 60 18 7E 00 0B B0 85
0D68:01 60 A9 80 1D 00 0B 9D F4
0D70:00 0B 60 C9 00 D0 04 1E 5F
0D78:00 0B 60 18 3E 00 0B B0 9B
0D80:01 60 A9 01 1D 00 0B 9D 15
0D88:00 0B 60 AA A0 08 7E 00 3E
0D90:0B 3E 10 0B 88 D0 F7 CA B4
0D98:10 F2 20 88 0C 60 20 4B 71
0DA0:0C A9 01 8D 38 0B A2 00 57
0DA8:A0 07 AD 38 0B 5E 00 0B EA
0DB0:90 06 19 10 0B 99 10 0B A2
0DB8:88 10 EF 0E 38 0B E8 E0 9A
0DC0:08 D0 E5 20 88 0C 60 20 27
0DC8:4B 0C A9 8D 8D 38 0B A2 CE
0DD0:00 A0 07 AD 38 0B 1E 00 F8
0DD8:0B 90 06 19 10 0B 99 10 DE
0DE0:0B 88 10 EF 4E 38 0B E8 F5
0DE8:0D 10 D0 E5 20 88 0C 60 8B
0DF0:8D 30 0B 8E 31 0B 20 9E BC
0DF8:0D AD 30 0B AE 31 0B 20 2C
0E00:5B D0 20 C7 0D 60 8D 30 C2
0E08:0B 8E 31 0B 20 9E 0D AD 67
0E10:30 0B AE 31 0B 20 73 0D BC
0E18:20 C7 0D 60 A8 A2 0F 1E E9
0E20:00 0B 08 C0 00 F0 0D 28 12
0E28:90 0B BD 00 0B 09 01 9D 23
0E30:00 0B D0 01 28 CA 10 E7 AD
0E38:60 A8 A2 0F 5E 00 0B 08 05
0E40:C0 00 F0 0D 28 90 0B BD 03
0E48:00 0B 09 80 9D 00 0B D0 24
0E50:01 28 CA 10 E7 60 A8 AD 11
0E58:00 0B 8D 3C 0B E8 8E 31 F6
0E60:0B A2 01 BD 00 0B 9D FF 0E
0E68:0A E8 EC 31 0B D0 F4 C0 BA
0E70:00 F0 07 AD 3C 0B 9D FF CD
0E78:0A 60 A9 00 4C 76 0E A8 E7
0E80:BD 00 0B 8D 3C 0B CA BD 17
0E88:00 0B 9D 01 0B CA 10 F7 C6
0E90:C0 00 F0 07 AD 3C 0B 8D 9D
0E98:00 0B 60 A9 00 4C 97 0E 8C
0EA0:FA 10 8D 39 0B A9 20 85 9F
0EA8:A9 00 0A 85 FA A9 30 73
0EB0:20 18 0C A0 00 A9 1F 20 73
0EB8:0C 0C 8A 91 FA C8 D0 F5 DA
0EC0:E6 FB CE 39 0B D0 EE 60 96
```

```
0EC8:A9 20 85 FB A9 00 AA 85 5A
0ED0:FA A9 30 20 18 0C A0 00 0F
0ED8:B1 FA AA A9 1F 20 00 0C 02
0EE0:C8 D0 F5 E6 FB A5 FB C9 FA
0EE8:30 D0 ED 60 8D 36 0B A9 1A
0EF0:30 8D 3A 0B A9 38 8D 3B 05
0EF8:0B A9 00 8D 39 0B AD 3A 69
0F00:0B AE 39 0B 20 B6 0C AD C8
0F08:36 0B 20 4E 0D AD 3B 0B 8D
0F10:AE 39 0B 20 56 0C 18 AD F7
0F18:39 0B 69 10 8D 39 0B 90 BB
0F20:0E EE 3B 0B EE 3A 0B AD 3D
0F28:3B 0B C9 40 D0 01 60 4C 7B
0F30:FE 0E 85 FB A9 20 85 FD 98
0F38:A9 00 85 FA 85 FC A0 00 EC
0F40:B1 FA 91 FC C8 C0 08 D0 22
0F48:F7 18 98 65 FA 85 FA 90 46
0F50:02 E6 FB A9 00 91 FC C8 4C
0F58:C0 10 D0 F9 18 98 65 FC 7F
0F60:85 FC 90 02 E6 FD A5 FD 2B
0F68:C9 30 D0 D2 60 A2 0F BD 28
0F70:00 0B 9D 20 0B CA 10 F7 A2
0F78:60 A2 0F BD 20 0B 9D 00 95
0F80:0B CA 10 F7 60 20 6F CD 88
0F88:20 E4 FF D0 A5 D3 29 B4
0F90:08 F0 F5 20 9F CD 60 20 C4
0F98:D2 FF 4C 85 0F A2 07 A0 B3
0FA0:0F BD 00 0B 99 10 0B 88 12
0FA8:99 10 0B 88 CA 10 F2 20 1E
0FB0:88 0C 60 20 4B 0C A2 07 FA
0FB8:A0 0E B9 00 0B 9D 10 0B DB
0FC0:88 88 CA 10 F5 20 88 0C EC
0FC8:60 00 00 01 01 00 00 00 17
```

Program 4: EXCELOBJ1.

```
1300:A9 00 8D 36 0B 8D 38 0B 1A
1308:8D 3C 0B AE 36 0B BD 54 FD
1310:13 8D 39 0B BD 58 13 8D FD
1318:3A 0B A2 3F 8E 38 0B AD 7F
1320:3A 0B AE 39 0B AC 3C 0B 1E
1328:20 2A 0C 18 AD 3A 0B 69 C1
1330:10 AE 39 0B A0 8D 20 2A 87
1338:0C EE 3C 0B EE 39 0B D0 9B
1340:03 EE 3A 0B CE 38 0B 10 19
1348:D6 EE 36 0B AE 36 0B E0 52
1350:04 90 B8 60 AE FE 4E 9E 66
1358:00 00 01 01 00 00 00 00 AE
```

Program 5: EXCELUTL.

```
XC 10 GRAPHIC5,1:COLOR6,1:PRIN
TCHR$(142)CHR$(5);:IFT=.
THENT=1:BLOAD"EXCEL.OBJ2
"
HA 20 PRINTSPC(32)"{B}EXCELFON
T UTILITY":PRINTSPC(27)"
{DOWN}{YEL}1) COMBINE CH
ARACTER SETS":PRINTSPC(2
7)"2) DIRECTORY"
CG 30 GETA$:A=VAL(A$):IFA<>1AN
DA<>2THEN30
FS 40 ONAGOTO50,70
QE 50 INPUT"DOWN}{PUR}EXCELFON
T CHARACTER SET {WHT}1
{PUR} FILENAME";F1$:INPU
T"{PUR}EXCELFONT CHARACT
ER SET {WHT}2{PUR} FILEN
AME";F2$:INPUT"{DOWN}{6}
MERGED CHARACTER SET FIL
ENAME";F3$
XD 60 BLOAD(F1$),P8192:BLOAD(F
2$),P12288:BSAVE(F3$),P8
192TOP16383:GOTO10
SC 70 DIRECTORY:PRINT"{DOWN}
{RVS}{WHT}PRESS ANY KEY
{SPACE} TO CONTINUE":GETK
EYA$:GOTO10
```

Program 6: EXCELOBJ2.

```
0C00:A0 00 8D 00 FF A2 12 A9 72
0C08:20 85 FB 20 CC CD E8 A9 2C
0C10:00 85 FA 20 CC CD A0 00 C9
```

```
0C18:B1 FA 20 CA CD C8 D0 F8 A4
0C20:E6 FB A5 FB C9 40 D0 F0 01
0C28:60 00 00 00 00 00 00 00 70
```

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

Pointer

See instructions in article on page 52 before typing in.

Program 1: Pointer

```
CF00:78 A9 40 8D 14 03 A9 CF F6
CF08:8D 15 03 58 A2 3F BD B2 D9
CF10:CF 9D C0 02 CA 10 F7 A9 67
CF18:64 8D 0E D0 8D 0F D0 A9 10
CF20:01 8D 2E D0 A9 80 8D 15 F5
CF28:D0 AD 18 D0 29 F0 4A 4A 97
CF30:18 69 03 85 FC A9 FF 85 03
CF38:FB A0 00 A9 0B 91 FB 60 8F
CF40:AD 00 DC A0 00 A2 00 4A 31
CF48:B0 03 CE 0F D0 4A B0 03 DF
CF50:EE 0F D0 4A B0 03 CE 0E 27
CF58:D0 4A B0 03 EE 0E D0 AD 38
CF60:0F D0 C9 31 D0 03 EE 0F 87
CF68:D0 AD 0F D0 C9 F7 D0 03 9D
CF70:CE 0F D0 AD 10 D0 20 80 C6
CF78:D0 1C AD 0E D0 C9 17 D0 CA
CF80:03 EE 0E D0 AD 0E D0 C9 3D
CF88:00 D0 24 AD 10 D0 09 80 12
CF90:8D 10 D0 4C AF CF AD 0E FF
CF98:D0 C9 54 D0 03 CE 0E D0 EA
CFA0:AD 0E D0 C9 FF D0 08 AD 52
CFA8:10 D0 29 7F 8D 10 D0 4C 3C
CFB0:31 EA F0 00 00 E0 00 00 45
CFB8:90 00 00 08 00 00 00 00 21
CFC0:00 00 00 00 00 00 00 00 60
CFC8:00 00 00 00 00 00 00 00 68
CFD0:00 00 00 00 00 00 00 00 70
CFD8:00 00 00 00 00 00 00 00 78
CFE0:00 00 00 00 00 00 00 00 80
CFE8:00 00 00 00 00 00 00 00 88
CFF0:00 00 00 00 00 00 00 00 90
```

Program 2: Finder

```
GF 10 REM COPYRIGHT 1988 COMPU
TE! PUBLICATIONS, INC. -
ALL RIGHTS RESERVED.
HR 20 IFA<>1THENA=1:LOAD"POINT
ER",8,1
PA 30 SYS52992
GA 40 DIMC(39)
PD 50 PRINT"{CLR}";:GOSUB160
QR 60 FORI=0TO39:C(I)=PEEK(102
4+I):NEXT
HS 70 WAIT56320,16,16
JM 80 X%=((PEEK(53262)-255*(PE
EK(53264)=128))-24)/8
CR 90 Y%=(PEEK(53263)-49)/8:SL
=40*Y%+X%
FA 100 PRINT"{HOME}{RVS}X=";X%
;"Y=";Y%;"SL=";SL
MP 110 GETA$:IFAS=""THEN110
XK 120 IFA$="Q"THENPRINT"{CLR}
":END
DE 130 IFA$<>" THEN110
KX 140 FORI=0TO39:POKE1024+I,C
(I):NEXT
MX 150 GOTO70
HH 160 PRINT"{CLR}{9 DOWN}"TAB
(13)"COPYRIGHT 1988"
BB 170 PRINTTAB(7)"{DOWN}COMPU
TE! PUBLICATIONS, INC."
```

RH 180 PRINTTAB(10)"{DOWN}ALL
{SPACE}RIGHTS RESERVED.

FC 190 RETURN

Big Screen Converter

See instructions in article on page 45 before typing in.

0801:0B 08 FF FF 9E 32 30 39 EF
0809:39 00 31 08 FF FF 8F 14 8F
0811:14 14 14 14 14 14 14 21
0819:31 39 38 38 20 43 4F 4D 94
0821:50 55 54 45 21 20 50 55 0D
0829:42 2E 2C 20 49 4E 43 00 77
0831:00 00 A9 00 85 C6 8D F5 CE
0839:08 8D F6 08 20 3E 0A 20 3E
0841:5C 0A 20 F4 0A A2 17 A0 FE
0849:00 18 20 F0 FF A9 00 AA C3
0851:A8 BD C6 0A F0 09 20 D2 5D
0859:FF EF 4C 52 08 A0 00 20 35
0861:CF FF 99 9E 07 C8 C0 0D 72
0869:D0 F5 C0 02 D0 01 60 A9 8C
0871:14 20 D2 FF 88 98 A2 9E 78
0879:A0 07 20 BD FF A9 08 A2 D4
0881:08 A0 00 20 BA FF 20 C0 96
0889:FF A2 A0 A0 00 86 FC 84 F8
0891:FB A2 08 20 C6 FF 20 DB 9D
0899:08 20 A9 0A 20 80 0A 20 C2
08A1:CF FF 20 F7 08 EE 6E 0B 01
08A9:D0 03 EE 6F 0B AD 6F 0B B0
08B1:C9 1F 90 EB AD 6E 0B C9 46
08B9:40 B0 12 20 B7 FF 29 40 AA
08C1:F0 DD A9 08 20 C3 FF 20 A7
08C9:CC FF 4C 5C 0A 20 CF FF FF
08D1:20 B7 FF 29 40 F0 F6 4C 72
08D9:C3 08 20 CF FF EE F5 08 7E
08E1:D0 03 EE F6 08 AD F6 08 55
08E9:C9 04 90 EE AD F5 08 C9 FF
08F1:02 90 E7 60 00 00 A2 00 6F
08F9:A0 00 8C D7 0A 8C D8 0A A7
0901:8D CE 0A AD CE 0A 3D CF 92
0909:0A F0 09 BD D9 0A 0D D7 42
0911:0A 8D D7 0A E8 E0 04 90 8A
0919:EA AD CE 0A 3D CF 0A F0 B4
0921:09 BD D9 0A 0D D8 0A 8D 70
0929:D8 0A E8 E0 08 90 EA A2 50
0931:00 A0 00 AD D7 0A 91 19 69
0939:20 E1 0A 91 19 AD D8 0A 69
0941:91 1B 20 E8 0A 91 1B 20 62
0949:E1 0A 20 E8 0A EE EF 0A 57
0951:AD EF 0A C9 04 B0 01 60 59
0959:A9 00 8D EF 0A EE F0 0A E8
0961:AD F0 0A 8D 20 D0 C9 02 7A
0969:F0 25 AD F2 0A C9 0C 80 82
0971:03 4C 24 0B A5 19 18 69 78
0979:38 85 19 90 02 E6 1A E6 FB
0981:1A A5 1B 18 69 38 85 1B 41
0989:90 02 E6 1C E6 1C 60 A9 15
0991:00 8D F0 0A AD F2 0A C9 DC
0999:0C D0 06 20 49 0B 4C BC 74
09A1:09 A5 19 38 E9 38 85 19 9C
09A9:B0 02 C6 1A C6 1A A5 1B 14
09B1:38 E9 38 85 1B B0 02 C6 20
09B9:1C C6 1C EE F1 0A AD F1 03
09C1:0A C9 14 B0 01 60 A9 00 B5
09C9:8D F1 0A EE F3 0A AD F3 66
09D1:0A C9 02 F0 25 A5 19 18 B4
09D9:69 C0 85 19 90 02 E6 1A 87
09E1:A5 1A 18 69 1E 85 1A A5 C7
09E9:1B 18 69 C0 85 1B 90 02 84
09F1:E6 1C A5 1C 18 69 1E 85 1D
09F9:1C 60 A9 00 8D F3 0A A5 5D
0A01:19 38 E9 C0 85 19 B0 02 EC
0A09:C6 1A 38 A5 1A E9 1E 85 A2
0A11:A5 1A 1B 38 E9 C0 85 1B FA
0A19:B0 02 C6 1C A5 1C 38 E9 98
0A21:1E 85 1C EE F2 0A AD F2 26
0A29:0A C9 0D F0 01 60 A9 61 A3
0A31:85 1A 85 1C A9 40 85 19 73

0A39:A9 48 85 1B 60 A9 20 85 06
0A41:1C 85 1A A9 00 85 19 8D 78
0A49:EF 0A 8D F0 0A 8D F1 0A 0D
0A51:8D F3 0A 8D F2 0A A9 08 5E
0A59:85 1B 60 AD 02 DD 09 03 7A
0A61:8D 02 DD AD 00 DD 29 FC 1A
0A69:09 03 8D 00 DD A9 15 8D C1
0A71:18 D0 A9 1B 8D 11 D0 A9 A8
0A79:00 85 C6 8D 15 D0 60 A5 F2
0A81:01 29 FE 85 01 AD 02 DD 39
0A89:09 03 8D 02 DD AD 00 DD 38
0A91:29 FC 09 03 8D 00 DD AD A0
0A99:18 D0 09 08 8D 18 D0 AD AB
0AA1:11 D0 09 20 8D 11 D0 60 48
0AA9:A9 04 85 FC A9 00 85 FB 68
0AB1:A2 00 A9 01 A0 00 91 FB 80
0AB9:C8 C0 00 D0 F9 E6 FC E8 BD
0ACL:E0 04 D0 F2 60 90 46 49 AB
0AC9:4C 45 3A 20 00 00 80 40 DF
0AD1:20 10 08 04 02 01 00 00 4F
0AD9:C0 30 0C 03 C0 30 0C 03 ED
0AE1:E6 19 D0 02 E6 1A 60 E6 31
0AE9:1B D0 02 E6 1C 60 00 00 D0
0AF1:00 00 00 A9 20 85 FC A9 5B
0AF9:00 85 FB A8 91 FB C8 D0 58
0B01:FB E6 FC A5 FC C9 A0 B0 C9
0B09:04 A9 00 F0 EF 60 C6 19 42
0B11:A5 19 C9 FF D0 02 C6 1A AF
0B19:C6 1B A5 1B C9 FF D0 02 B1
0B21:C6 1C 60 A5 19 18 69 F8 FC
0B29:85 19 90 02 E6 1A A5 1A 7F
0B31:18 69 21 85 1A A5 1B 18 DF
0B39:69 F8 85 1B 90 02 E6 1C 1B
0B41:A5 1C 18 69 21 85 1C 60 82
0B49:A5 19 38 E9 F8 85 19 B0 DE
0B51:02 C6 1A A5 1A 38 E9 21 5E
0B59:85 1A 1A 1B 38 E9 F8 85 FF
0B61:1B B0 02 C6 1C A5 1C 38 C5
0B69:E9 21 85 1C 60 00 00 00 32

0939:40 39 BD 61 0C 9D C0 38 18
0941:BD A1 0C 9D 00 39 BD E1 38
0949:0C 9D 80 39 BD A1 0A 9D 92
0951:C0 39 BD E1 0A 9D 00 3A E8
0959:BD 21 0B 9D 40 3A BD 61 95
0961:0B 9D 80 3A CA 10 C1 A9 D7
0969:32 8D 7A 0A 8D 78 0A 8D D7
0971:7B 0A 8D 79 0A A0 00 20 FF
0979:56 08 20 2E 08 A9 78 8D 05
0981:79 0A A9 1E 8D 7B 0A A0 F8
0989:02 20 56 08 20 2E 08 A9 63
0991:78 8D 79 0A A9 6E 8D 7B B0
0999:0A A0 01 20 56 08 20 2E 3C
09A1:08 A9 78 8D 79 0A A9 28 79
09A9:8D 7B 0A A0 04 20 56 08 02
09B1:20 2E 08 A9 78 8D 79 0A F1
09B9:A9 64 8D 7B 0A A0 03 20 1C
09C1:56 08 20 2E 08 20 86 08 BD
09C9:A9 01 8D 2B D0 A9 04 8D 18
09D1:27 D0 A9 02 8D 28 D0 A9 59
09D9:07 8D 29 D0 A9 05 8D 2A AB
09E1:D0 A9 00 8D 21 D0 8D 20 27
09E9:D0 A9 93 20 D2 FF A9 8E BB
09F1:20 D2 FF A9 8E 20 D2 FF C9
09F9:A9 56 8D F3 05 8D 1B 06 02
0A01:8D 43 06 8D 6B 06 8D 93 68
0A09:06 A9 A0 8D BB 06 8D E3 6C
0A11:06 8D 0B 07 8D 33 07 8D 32
0A19:5B 07 A9 64 8D 5A 07 8D 89
0A21:5C 07 A9 79 8D CB 05 20 B7
0A29:D6 10 20 FA 15 A9 0C A0 68
0A31:FA 88 99 00 D8 99 FA D8 14
0A39:99 F4 D9 99 EE DA D0 F1 A2
0A41:A9 1F 20 D2 FF A9 01 8D 59
0A49:F3 D9 8D 1B DA 8D 43 DA 9F
0A51:8D 6B DA 8D 93 DA AD 7C 1B
0A59:16 C9 41 D0 99 A2 00 A0 1B
0A61:0B 18 20 F0 FF A2 00 BD 5C
0A69:67 16 F0 07 20 D2 FF E8 7A
0A71:4C 68 0A EA 4C 84 0D 00 44
0A79:00 00 00 00 00 00 00 00 8D
0A81:00 00 00 00 00 00 00 00 95
0A89:00 00 00 00 00 00 00 00 9D
0A91:01 02 04 08 10 20 40 80 A9
0A99:FE FD FB F7 EF DF BF 7F A9
0AA1:00 00 00 00 00 00 00 00 B7 6D
0AA9:00 03 D7 C0 0D E7 70 1C 8A
0AB1:EF 78 1B 6E E8 37 9E CC 54
0AB9:2E 7D D0 1D BD DC 3B DD E5
0ACL:DC 35 E3 8C 16 7C 54 17 39
0AC9:9F D8 0B E3 90 02 7C 60 69
0AD1:00 BB 80 00 00 00 00 00 E4
0AD9:00 00 00 00 00 00 00 00 ED
0AE1:00 00 00 00 00 00 00 BB B1
0AE9:80 02 7C 60 0B E3 90 17 74
0AF1:9F D8 16 7C 54 35 E3 8C 62
0AF9:3B DD DC 1D BD DC 2E 7D CB
0B01:D0 37 9E CC 1B 6E E8 1C 6E
0B09:EF 78 0D E7 70 03 D7 C0 55
0B11:00 E7 00 00 00 00 00 00 15
0B19:00 00 00 00 00 00 00 00 2F
0B21:00 00 00 00 00 00 00 00 2E
0B29:00 03 EB C0 0E E7 B0 1E 19
0B31:F7 38 17 76 D8 33 79 EC 0F
0B39:0B BE 74 3B BD B8 3B BB C9
0B41:DC 31 C7 AC 2A 3E 68 1B 0C
0B49:F9 E8 09 C7 D0 06 3E 40 8F
0B51:01 DD 00 00 00 00 00 00 5F
0B59:00 00 00 00 00 00 00 00 6F
0B61:00 00 00 00 00 00 01 DD 57
0B69:00 06 3E 40 09 C7 D0 1B F0
0B71:F9 E8 2A 3E 68 31 C7 AC 2C
0B79:3B BB DC 3B BD B8 0B BE 11
0B81:74 33 79 EC 17 76 D8 1E FE
0B89:F7 38 0E E7 B0 03 EB C0 14
0B91:00 ED 00 00 00 00 00 00 23
0B99:00 00 00 00 00 00 00 00 AF
0BA1:00 00 00 00 00 00 00 7F 37
0BA9:E0 01 FF F8 07 E1 F8 0F C0
0BB1:FE FC 0E 0F FC 0E 8F 8C 05
0BB9:1E CF F4 3F 0F F4 3F C7 7F
0BC1:8C 0C 1F FC 07 FF F8 03 02
0BC9:FF F0 01 FF E0 00 FF 80 C3
0BD1:00 1E 00 00 1C 00 00 0E 5E
0BD9:00 00 0E 00 00 FF 00 8C 3E

Arcade Volleyball

See instructions in article on page 32 before typing in.

0801:0C 08 0A 00 9E 20 32 30 64
0809:36 32 00 00 00 4C 92 08 1F
0811:00 A9 7F 8D 0D DC A9 FF 83
0819:8D 00 DC AD 11 D0 29 80 05
0821:D0 F9 AD 12 D0 D0 FB A9 5A
0829:81 8D 0D DC 60 98 AA 0A 91
0831:A8 AD 8F 0A 99 7D 0A BD 28
0839:99 0A 2D 8C 0A 8D 8C 0A B0
0841:AD 8E 0A F0 09 BD 91 0A 88
0849:0D 8C 0A 8D 8C 0A AD 8D 92
0851:0A 99 7C 0A 60 AD 79 0A B3
0859:18 69 32 8D 8F 0A A9 00 E6
0861:8D 8E 0A AD 7B 0A 8D 8D A4
0869:0A 8D 7A 0A 0A 2E 8D 0A 08
0871:2E 8E 0A AD 8D 0A 18 69 86
0879:18 8D 8D 0A AD 8E 0A 69 70
0881:00 8D 8E 0A 60 A0 10 B9 C6
0889:7C 0A 99 00 D0 88 10 F7 4E
0891:60 A9 FF 8D 15 D0 A9 E1 36
0899:8D F8 07 A9 E2 8D F9 07 72
08A1:A9 E3 8D FA 07 A9 E4 8D 17
08A9:FB 07 A9 E7 8D FC 07 A9 45
08B1:00 8D 78 0A 8D 79 0A 8D C8
08B9:7A 0A 8D 7B 0A 8D 8D 0A 9E
08C1:8D 8E 0A 8D 8F 0A 8D 90 A6
08C9:0A A0 11 99 B0 0E 8E 10 A1
08D1:FA 8D 6B 0F 8D 6C 0F 8D EA
08D9:6D 0F 8D 6E 0F 8D 6F 0F 99
08E1:8D 70 0F 8D 71 0F 8D 72 E4
08E9:0F 8D A3 15 8D A4 15 8D 61
08F1:D7 15 8D 5E 16 8D 5F 16 86
08F9:A9 01 8D 37 15 8D A2 15 7D
0901:8D 8D 15 A9 00 8D B5 0F FD
0909:8D B6 0F 8D B7 0F 8D B9 19
0911:0F 8D BA 0F 8D BB 0F A9 79
0919:8C 8D B8 0F A9 7D 8D BC F7
0921:0F A9 00 8D 66 16 A2 3F 0E
0929:BD A1 0B 9D 40 38 BD E1 FD
0931:0B 9D 80 38 BD 21 0C 9D EB

0BE1:00 00 00 00 00 00 7F 77
0BE9:0E 01 FF F8 07 E1 F8 0F 05
0BF1:FE FC 0E 0F FC 0E 8F 8C 41
0BF9:1E CF F4 3F FF F4 3F C7 BF
0C01:8C 0C 1F FC 07 FF F8 03 43
0C09:FF F0 01 FF 0E 00 FF 00 05
0C11:00 3F 00 00 73 00 00 63 F7
0C19:80 00 61 C0 01 E7 00 8C DD
0C21:00 7F E0 01 FF F8 07 E1 19
0C29:F8 0F FE FC 0E 0F FC 0E E5
0C31:8F 8C 1E CF F4 3F FF F4 8E
0C39:3F C7 8C 0C 1F FC 07 FF 30
0C41:F8 03 FF F0 01 FF E0 00 6F
0C49:FF 80 00 1E 00 00 1C 00 9B
0C51:00 0E 00 00 0E 00 00 1F 7C
0C59:00 00 30 00 00 C0 00 00 7A
0C61:00 00 00 00 00 00 07 FE 86
0C69:00 1F FF 80 1F 87 E0 3F 69
0C71:7F F0 3F F0 70 31 F1 70 19
0C79:2F F3 78 2F FF FC 31 E3 62
0C81:FC 3F F8 30 1F FF E0 0F D3
0C89:FF C0 07 FF 80 01 FF 00 BA
0C91:00 78 00 00 38 00 00 70 F9
0C99:00 00 70 00 00 FF 00 8C 4C
0CA1:00 00 00 00 00 00 07 FE C6
0CA9:00 1F FF 80 1F 87 E0 3F A9
0CB1:7F F0 3F F0 70 31 F1 70 59
0CB9:2F F3 78 2F FF FC 31 E3 A2
0CC1:FC 3F F8 30 1F FF E0 0F 14
0CC9:FF C0 07 FF 80 01 FF 00 FA
0CD1:00 FC 00 00 CE 00 01 C6 68
0CD9:00 03 86 00 00 E7 80 8C B0
0CE1:07 FE 00 1F FF 80 1F 87 F6
0CE9:E0 3F 7F F0 3F F0 70 31 11
0CF1:F1 70 2F F3 78 2F FF FC C1
0CF9:31 E3 FC 3F F8 30 1F FF FD
0D01:E0 0F FF C0 07 FF 80 01 95
0D09:FF 00 00 78 00 00 38 00 1B
0D11:00 70 00 00 70 00 00 F8 C3
0D19:00 00 0C 00 00 03 00 00 C0
0D21:AD 00 DC 8D B1 0E AD 01 A8
0D29:DC 8D B0 0E A9 00 8D 6E E2
0D31:0F 8D 6D 0F AD B0 0E 29 4A
0D39:10 D0 05 A9 01 8D 6D 0F F2
0D41:AD B1 0E 29 10 D0 05 A9 6A
0D49:01 8D 6E 0F EA AD B1 0E 85
0D51:29 04 D0 10 CE B3 0E A9 27
0D59:01 8D BC 0E A9 00 8D BA F2
0D61:0E 4C C5 0E AD B1 0E 29 A8
0D69:08 D0 10 EE B3 0E A9 01 D6
0D71:8D BC 0E A9 01 8D BA 0E 9F
0D79:4C C5 0E A9 00 8D BC 0E 45
0D81:4C C5 0E 20 12 08 20 21 09
0D89:0D 20 FA 0E 20 F0 12 20 7B
0D91:9C 14 20 83 F0 20 BD 11 C8
0D99:20 4B 12 20 BD 0F 20 23 60
0DA1:10 20 DB 0D 20 86 08 20 63
0DA9:A5 15 AD 66 16 F0 D4 A9 BF
0DB1:00 8D 5E 16 8D 5F 16 A9 1C
0DB9:01 8D D8 15 8D A2 15 A9 EE
0DC1:00 8D AF 0E 20 73 11 CE D5
0DC9:AF 0E AD AF 0E D0 F5 A9 39
0DD1:00 85 C6 A5 C6 F0 FC 4C C0
0DD9:92 08 AD B3 0E 8D 7B 0A D7
0DE1:A9 9B 38 ED 6F 0F 8D 79 E9
0DE9:0A A9 00 8D 7A 0A 8D 78 DB
0DF1:0A A0 00 20 56 08 20 2E 7C
0DF9:08 AD B3 0E 18 69 20 8D 0F
0E01:7B 0A A0 01 20 56 08 20 0C
0E09:2E 08 AD B7 0E 8D 7B 0A 17
0E11:A9 9B 38 ED 70 0F 8D 79 23
0E19:0A A9 00 8D 7A 0A 8D 78 0D
0E21:0A A0 02 20 56 08 20 2E ED
0E29:08 AD B7 0E 18 69 20 8D C0
0E31:7B 0A A0 03 20 56 08 20 5C
0E39:2E 08 AD BA 0E 0A 18 69 02
0E41:E1 8D F8 07 8D F9 07 AD 51
0E49:BD 0E 18 6D BC 0E 8D BD 98
0E51:0E 29 08 4A 4A 8D BB B6
0E59:0E 18 6D F8 07 8D F8 07 27
0E61:AD F8 07 8D F9 07 AD C0 54
0E69:0E 0A 18 6D E1 8D FA 07 EA
0E71:8D FB 07 AD BF 0E 18 6D E2
0E79:BE 0E 8D BF 0E 29 08 4A 95
0E81:4A 4A 8D BB 0E 18 6D FA 69

0E89:07 8D FA 07 AD FA 07 8D 51
0E91:FE 07 AD 6B 0F F0 08 A9 CF
0E99:EB 0D F8 07 8D F9 07 AD AB
0EA1:6C 0F F0 08 A9 E6 8D FA 55
0EA9:07 8D FB 07 EA 60 00 75
0EB1:00 00 00 00 00 00 00 CD
0EB9:00 00 00 00 00 00 00 D5
0EC1:00 4C D1 14 AD 11 08 D0 FE
0EC9:F8 AD B0 0E 29 04 D0 0E CD
0ED1:CE B7 0E A9 01 8D BE 0E 69
0ED9:A9 00 8D C0 0E 60 AD B0 86
0EE1:0E 29 08 D0 0E EE B7 0E 07
0EE9:A9 01 8D BE 0E A9 01 8D 5F
0EF1:C0 0E 60 A9 00 8D BE 0E 5A
0EF9:60 A9 00 8D 6F 0F 8D 70 CC
0F01:0F AD 6B 0F F0 0A AA BD 33
0F09:40 0F 8D 6F 0F CE 6B 0F 4D
0F11:EA AD 6C 0F F0 0A AA BD 51
0F19:40 0F 8D 70 0F CE 6C 0F 6F
0F21:AD 6B 0F D0 0A AD 6E 0F D2
0F29:F0 05 A9 28 8D 6B 0F AD 9E
0F31:6C 0F D0 0A AD 6D 0F F0 36
0F39:05 A9 28 8D 6C 0F 60 00 82
0F41:00 04 08 0B 0E 11 14 17 06
0F49:19 1B 1D 1F 21 22 23 24 4C
0F51:25 26 26 26 26 25 24 23 E3
0F59:22 21 1F 1D 1B 17 14 11 F4
0F61:0E 0B 00 04 00 00 00 8A
0F69:00 00 00 00 00 00 00 87
0F71:00 00 A9 00 8D 71 0F 4C 61
0F79:11 0F A9 00 8D 72 0F 4C B9
0F81:21 0F AD B7 0E C9 01 B0 6F
0F89:05 A9 01 8D B7 0E AD B7 96
0F91:0E C9 21 90 05 A9 21 8D F4
0F99:B7 0E EA AD B3 0E C9 4F 08
0FA1:B0 05 A9 4F 8D B3 0E AD 88
0FA9:B3 0E C9 6F 90 05 A9 6F B0
0FB1:8D B3 0E 60 00 00 00 8C D7
0FB9:00 00 00 7D AD BB 0F 18 42
0FC1:6D B9 0F 8D BB 0F AD BC F1
0FC9:0F 6D BA 0F 8D BC 0F AD 3E
0FD1:BC 0F 18 69 32 C9 33 B0 7B
0FD9:21 A9 00 8D A4 15 A9 02 9A
0FE1:8D BC 0F 20 39 11 A9 00 3B
0FE9:38 ED B9 0F 8D B9 0F A9 E2
0FF1:00 ED BA 0F 8D BA 0F 4C 95
0FF9:20 10 AD BC 0F C9 90 90 FE
1001:1E A9 00 8D A3 15 A9 8F C7
1009:8D BC 0F 20 39 11 A9 00 64
1011:38 ED B9 0F 8D B9 0F A9 0C
1019:00 ED BA 0F 8D BA 0F 4C BE
1021:55 10 AD BB 0F 8D 7A 0A 0F
1029:AD BC 0F 8D 7B 0A AD B7 21
1031:0F 8D 78 0A AD B8 0F 8D E7
1039:79 0A A0 04 20 56 08 20 77
1041:2E 08 EE 38 11 AD 38 11 9C
1049:4A 4A 4A 29 03 18 69 E7 30
1051:8D FC 07 60 AD 37 15 D0 A3
1059:11 AD B5 0F 18 69 03 8D 0F
1061:B5 0F AD B6 0F 69 00 8D EC
1069:B6 0F AD B7 0F 18 6D B5 43
1071:0F 8D B7 0F AD B8 0F 6D 40
1079:B6 0F 8D B8 0F AD B8 0F A5
1081:C9 A0 90 30 A9 9F 8D B8 63
1089:0F 20 39 11 A9 00 38 ED 1A
1091:B5 0F 8D B5 0F A9 00 ED 6D
1099:B6 0F 8D B6 0F AD BC 0F AD
10A1:C9 46 90 08 A9 00 8D A2 D5
10A9:A5 4C B2 10 A9 01 8D A2 CD
10B1:15 20 38 15 AD B8 0F C9 F4
10B9:0E B0 19 A9 0F 8D B8 0F F9
10C1:20 39 11 A9 00 38 ED B5 6F
10C9:0F 8D B5 0F A9 00 ED B6 5C
10D1:0F 8D B6 0F 60 A9 42 A2 75
10D9:00 20 E6 10 A2 26 20 E6 B4
10E1:10 20 23 11 60 9D 50 04 A5
10E9:9D 78 04 9D A0 04 9D C8 6A
10F1:04 9D F0 04 9D 18 05 9D CE
10F9:40 05 9D 68 05 9D 90 05 7A
1101:9D B8 05 9D E0 05 9D 08 F8
1109:06 9D 30 06 9D 58 06 9D F3
1111:80 06 9D A8 06 9D D0 06 81
1119:9D F8 06 9D 20 07 9D 48 83
1121:07 60 A9 63 A2 26 9D 70 A3
1129:07 CA 10 FA A9 64 A2 26 7D

1131:9D 28 04 CA 10 FA 60 00 86
1139:EA A9 8F 8D 18 D4 A9 10 7D
1141:8D 05 D4 8D 13 D4 A9 64 82
1149:8D 06 D4 A9 5A 8D 14 D4 EE
1151:A9 10 8D 12 D4 A9 15 8D 24
1159:04 D4 A9 18 8D 01 D4 A9 2D
1161:0D 8D 0F D4 20 73 11 A9 37
1169:14 8D 04 D4 A9 10 8D 12 81
1171:D4 60 A2 00 A0 02 8D 00 59
1179:FD CA D0 F8 60 60 A9 00 CE
1181:8D 37 15 A9 8F 8D 18 D4 2D
1189:A9 10 8D 05 D4 8D 13 D4 5E
1191:A9 64 8D 06 D4 A9 5A 8D 43
1199:14 D4 A9 10 8D 12 D4 A9 39
11A1:15 8D 04 D4 A9 10 8D 01 29
11A9:D4 A9 05 8D 0F D4 20 73 99
11B1:11 A9 10 8D 04 D4 A9 10 78
11B9:8D 12 D4 60 AD BA 0F 29 67
11C1:8D 0C AD BC 0F C9 44 B0
11C9:90 31 C9 48 B0 2D AD B8 8C
11D1:0F C9 4B 90 26 C9 82 B0 6E
11D9:23 20 7F 11 4C 0F 12 AD 07
11E1:BC 0F C9 49 90 15 C9 4D AD
11E9:B0 11 AD B8 0F C9 4B 90 B7
11F1:0A C9 82 B0 10 20 7F 11 F7
11F9:4C 0F 12 60 A9 01 8D A2 5D
1201:15 20 38 15 60 A9 00 8D 47
1209:A2 15 20 38 15 60 A9 00 C8
1211:38 ED B9 0F 8D B9 0F A9 10
1219:00 ED BA 0F 8D BA 0F 60 D6
1221:FE FE FE FE FE FE FE 4C
1229:FF 00 00 00 00 00 00 4D
1231:01 01 01 01 01 B5 CE 4B
1239:E2 F6 F8 FA FF FF 01 01 5E
1241:06 08 0A 1E 32 4B 50 09 F5
1249:14 50 20 76 12 AD BA 0F C2
1251:C9 03 F0 15 C9 04 F0 11 DB
1259:C9 05 F0 0D C9 FD F0 0F C9
1261:C9 0C F0 0B C9 FD F0 0F 9F
1269:60 A9 02 8D BA 0F 60 A9 BD
1271:FE 8D BA 0F 60 AD B6 0F F6
1279:C9 05 F0 15 C9 06 F0 11 8C
1281:C9 07 F0 0D C9 0F 0F 0A 6A
1289:C9 FA F0 0B C9 F9 F0 07 3F
1291:60 A9 04 8D B6 0F 60 A9 06
1299:FC 8D B6 0F 60 00 FF 6A
12A1:FF FF FF FF FF FF FF C5
12A9:FF FF FF FF FF FF FF CD
12B1:FF 00 00 00 00 00 00 D5
12B9:00 00 00 00 00 00 00 DD
12C1:00 00 00 00 00 00 00 E5
12C9:FC FD FE FE FE FE FE 8D
12D1:FF FF FF FF FF FF FF B7 21
12D9:FF FF 00 00 00 00 00 FD
12E1:00 00 00 00 00 01 01 0D
12E9:01 02 02 03 00 00 AD 2D
12F1:B6 0F 30 65 AD B8 0F 18 18
12F9:6D 70 0F 29 F8 C9 90 D0 46
1301:59 AD BC 0F 18 69 0A 38 7A
1309:ED B7 0E AA E0 00 90 4A F2
1311:E0 14 B0 46 A9 00 38 ED D2
1319:B5 0F 8D B5 0F A9 00 ED F7
1321:B6 0F 8D B6 0F AD B9 0F 35
1329:18 7D 36 12 8D B9 0F AD C1
1331:BA 0F 7D 21 12 8D BA 0F 85
1339:AE 6C 0F AD B5 0F 38 FD E6
1341:9E 12 8D B5 0F AD B6 0F F3
1349:FD C7 12 8D B6 0F EE A3 EE
1351:15 A9 00 8D A4 15 20 7F 7E
1359:11 60 AD B6 0F 30 65 AD F2
1361:B8 0F 18 6D 70 0F 29 F8 8C
1369:C9 90 D0 59 AD BC 0F 38 FE
1371:E9 16 38 ED B7 0E AA E0 24
1379:00 90 4A E0 14 B0 46 A9 B4
1381:00 38 ED B5 0F 8D B5 0F F7
1389:A9 00 ED B6 0F 8D B6 0F D8
1391:AD B9 0F 18 7D 36 12 8D D6
1399:B9 0F AD BA 0F 7D 21 12 84
13A1:8D BA 0F AE 6C 0F AD B5 BA
13A9:0F 38 FD 9E 12 8D B5 0F 50
13B1:AD B6 0F FD C7 12 8D B6 76
13B9:0F EE A3 15 A9 00 8D A4 F5
13C1:15 20 7F 11 60 AD B6 0F B1
13C9:30 65 AD B8 0F 18 6D 6F C5
13D1:0F 29 F8 C9 90 D0 59 AD AD

BEFORE TYPING . . .

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

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13D9:BC 0F 18 69 0A 38 ED B3 7C
13E1:0E AA E0 00 90 4A E0 14 59
13E9:B0 46 A9 00 38 ED B5 0F 23
13F1:8D B5 0F A9 00 ED B6 0F C3
13F9:8D B6 0F AD B9 0F 18 7D 09
1401:36 12 8D B9 0F AD BA 0F C9
1409:7D 21 12 8D BA 0F AE 6B 2E
1411:0F AD B5 0F 38 FD 9E 12 DC
1419:8D B5 0F AD B6 0F FD C7 E7
1421:12 8D B6 0F EE A4 15 A9 5B
1429:00 8D A3 15 20 7F 11 60 FB
1431:AD B6 0F 30 65 AD B8 0F 25
1439:18 6D 6F 0F 29 F8 C9 90 F8
1441:00 58 AD BC 0F 38 E9 16 AC
1449:38 ED B3 0E AA A0 00 90 C9
1451:49 E0 14 B0 45 A9 00 38 EC
1459:ED B5 0F 8D B5 0F A9 00 DD
1461:ED B6 0F 8D B6 0F AD B9 EF
1469:0F 18 7D 36 12 8D B9 0F 7B
1471:AD BA 0F 7D 21 12 8D BA FF
1479:0F AE 6B 0F AD B5 0F 38 CD
1481:FD 9E 12 8D B5 0F AD B6 67
1489:0F FD C7 12 8D B6 0F EE 27
1491:A4 15 A9 00 8D A3 15 20 CB
1499:7F 11 60 AD B6 0F 30 2E 2D
14A1:AD B8 0F 29 FC C9 4C D0 BB
14A9:25 AD BC 0F C9 44 90 1E F6
14B1:C9 4C B0 1A 4E B6 0F 6E 63
14B9:B5 0F 20 7F 11 A9 00 38 E3
14C1:ED B5 0F 8D B5 0F A9 00 46
14C9:ED B6 0F 8D B6 0F 60 00 04
14D1:AD 08 DC 29 1F 69 14 CD 95
14D9:BC 0F 90 4D AD BC 0F 38 C1
14E1:E9 06 CD B7 0E F0 1F B0 D8
14E9:10 CE B7 0E A9 01 8D BE D0
14F1:0E A9 00 8D C0 0E 4C 07 42
14F9:15 EE B7 0E A9 01 8D BE 6B
1501:0E A9 01 8D C0 0E AD B8 E7
1509:0F C9 7C 90 1B AD BA 0F D9
1511:29 80 8D BB 0E AD BC 0F 0D
1519:38 ED B7 0E 29 80 4D BB 54
1521:0E D0 05 A9 01 8D 6D 0F E9
1529:60 AD BC 0F 38 E9 16 CD DA
1531:B7 0E B0 C5 90 B3 01 AD 30
1539:D8 15 CD A2 15 D0 03 20 0B
1541:D9 15 AD A2 15 8D 08 15 23
1549:A9 00 8D B9 0F 8D BA 0F C8
1551:8D B5 0F 8D B6 0F 20 C6 63
1559:15 AD 11 08 F0 16 A9 08 57
1561:8D B7 0E A9 00 8D 6D 0F BC
1569:8D 6C 0F 8D B6 0E 8D BB F4
1571:0F 8D B7 0F A9 00 8D A3 7A
1579:15 8D A4 15 AD A2 15 F0 8A
1581:10 A9 01 8D 37 15 A9 8C 05
1589:8D B8 0F A9 7D 8D BC 0F CF
1591:60 A9 01 8D 37 15 A9 8C 3D
1599:8D B8 0F A9 14 8D BC 0F 94
15A1:60 01 00 00 AD A3 15 C9 2C
15A9:04 F0 08 AD A4 15 C9 04 FE
15B1:F0 0A 60 A9 01 8D A2 15 16
15B9:20 38 15 60 A9 00 8D A2 B5
15C1:15 20 38 15 60 A9 00 8D 0E
15C9:D7 15 20 73 11 CE D7 15 E8
15D1:AD D7 15 D0 F5 60 00 01 AA
15D9:AD A2 15 D0 0E EE 5E 16 32
15E1:20 FA 15 AD 5E 16 C9 0F 46
15E9:F0 75 60 EE 5F 16 20 FA 73
15F1:15 AD 5F 16 C9 0F F0 67 33
15F9:60 A9 05 20 D2 FF A2 00 3D
1601:A0 01 18 20 F0 FF AD 5E 04
1609:16 C9 0A 90 32 A9 31 20 B7
1611:D2 FF AD 5E 16 38 E9 0A B1
1619:18 69 30 20 D2 FF A2 00 8F
1621:A0 24 18 20 F0 FF AD 5F ED
1629:16 C9 0A 90 22 A9 31 20 57

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1631:D2 FF AD 5F 16 38 E9 0A E1
1639:18 69 30 20 D2 FF 60 A9 D4
1641:30 20 D2 FF AD 5E 16 69 64
1649:30 20 D2 FF 4C 1F 16 A9 A4
1651:30 20 D2 FF AD 5F 16 69 78
1659:30 20 D2 FF 60 00 00 A9 AC
1661:01 8D 66 16 60 00 41 52 77
1669:43 41 44 45 20 56 4F 4C A9
1671:4C 45 59 42 41 4C 4C 00 38
1679:47 4F 20 41 4D 49 47 41 94
1681:21 00 00 00 00 00 00 00 3E

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Ramdisk 64

See instructions in article on page 44 before typing in.

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0801:0C 08 2E 04 9E 32 30 36 73
0809:38 3A 00 12 08 38 04 80 8E
0811:00 00 00 A0 08 A9 4C 99 44
0819:2B 00 A9 0B 99 2C 00 88 AA
0821:88 10 F2 AD 00 03 AC 01 19
0829:03 8D 4C 08 8C 4D 08 A9 7B
0831:45 A0 08 8D 00 03 8C 01 0C
0839:03 A9 00 8D 00 8D 01 AC
0841:A0 4C 74 A4 A5 3A C9 FF 37
0849:F0 06 4C FF FF 4C 83 09 1E
0851:E0 09 D0 F6 A4 B7 D0 04 47
0859:A2 08 D0 EE AD 00 02 C9 01
0861:93 F0 EA C9 94 D0 E3 20 41
0869:8F F6 20 31 09 38 A5 2D B7
0871:E5 2B 85 02 A5 2E E5 2C ED
0879:85 03 A0 00 A5 05 C9 D0 C6
0881:B0 01 C8 18 A5 04 65 02 CE
0889:A5 05 65 03 B0 05 D9 F5 CD
0891:08 90 08 20 31 09 A2 10 CF
0899:4C 4B 08 A5 B7 C9 11 90 95
08A1:02 A9 10 A8 A9 00 F0 02 DA
08A9:B1 BB C8 C8 91 04 88 88 5D
08B1:88 10 F5 A4 B7 C8 C8 C8 4E
08B9:98 18 65 04 85 08 A5 05 A5
08C1:69 00 85 09 A9 4C 85 06 57
08C9:A9 0B 85 07 A5 04 85 0A E4
08D1:A5 05 85 0B 20 45 09 A0 20
08D9:00 A5 08 85 04 91 0A C8 EF
08E1:A5 09 85 05 91 0A C8 A9 F7
08E9:00 91 04 88 10 FB 20 31 49
08F1:09 4C 74 A4 FF EF 93 20 79
08F9:20 20 20 20 20 20 20 0A
0901:20 20 20 20 20 20 12 52 29
0909:41 4D 44 49 53 4B 36 34 94
0911:92 20 20 20 20 0D 00 C9
0919:20 42 59 54 45 53 20 46 3A
0921:52 45 45 2E 00 00 00 A0 D9
0929:00 00 00 00 00 00 00 3B
0931:A0 09 B9 02 00 AA B9 25 70
0939:09 99 02 00 8A 99 25 09 84
0941:88 10 EF 60 20 74 09 A0 25
0949:00 A6 02 D0 07 C6 03 10 BB
0951:03 4C 7A 09 C6 02 B1 06 7F
0959:91 08 A2 02 F6 06 D0 0C 28
0961:F6 07 B5 07 C9 D0 00 04 0F
0969:A9 0E 95 07 CA A0 0C 3A
0971:4C 4A 09 78 C6 01 C6 01 AD
0979:60 E6 01 E6 01 58 60 4C 7A
0981:34 0A 20 D2 F5 20 31 09 FC
0989:A4 B7 C0 01 D0 F1 A0 00 93
0991:B1 BB C9 24 D0 E9 A0 00 56
0999:B9 F7 08 F0 06 20 D2 FF EC
09A1:C8 D0 F5 A9 00 A0 00 85 EE
09A9:06 84 07 20 74 09 A0 01 CC
09B1:B1 06 99 0A 00 88 10 F8 2D
09B9:A5 0B F0 3A A0 01 A9 22 A1
09C1:D0 08 B1 06 D0 04 A9 22 E0
09C9:A0 FF 20 7A 09 20 D2 FF 46
09D1:20 74 09 C8 D0 EC 20 7A B3
09D9:09 38 20 F0 FF C0 14 B0 6D
09E1:09 A0 14 18 20 F0 FF 4C B5
09E9:F0 09 A9 0D 20 D2 FF A5 AE
09F1:0A A4 0B 4C A8 09 20 7A 7C
09F9:09 A0 0C A9 0D 2C A9 20 61
0A01:20 D2 FF 88 D0 F8 38 A9 E6
0A09:FF E5 06 AA 08 A5 07 C9 B0

```

```

0A11:D0 90 05 28 A9 FF 30 03 85
0A19:28 A9 EF E5 07 20 CD BD 1A
0A21:A0 00 B9 19 09 20 D2 FF BC
0A29:C8 C0 0C D0 F5 20 31 09 FB
0A31:4C 74 A4 20 74 09 A9 00 3A
0A39:A0 A0 85 06 84 07 A0 01 59
0A41:B1 06 99 0A 00 88 10 F8 BE
0A49:A5 0B D0 03 4C 00 00 00 9F

```

Graphics Wedge

See instructions in article on page 54 before typing in.

```

0801:0D 08 0A 00 9E 28 32 30 05
0809:36 33 29 00 00 00 A2 08 73
0811:A0 56 84 FB 86 FC A2 C9 8E
0819:A0 34 84 FD 86 FE A2 02 6E
0821:A0 00 B1 FB 91 FD C8 D0 5E
0829:F9 E6 FC E6 FE CA D0 F2 B5
0831:B1 FB 91 FD C8 C0 CC D0 DE
0839:F7 AE 08 03 AC 09 03 8E 40
0841:40 C9 8C 41 C9 A2 34 A0 6B
0849:C9 8E 08 03 8C 09 03 20 C1
0851:44 A6 4C 7B E3 C9 FE D0 85
0859:07 AD 00 02 C9 2E F0 03 64
0861:4C FF FF 20 73 00 A9 73 FB
0869:A0 CB 20 1E AB 20 E4 FF 4A
0871:F0 FB C9 42 D0 03 4C 7E FF
0879:C9 C9 43 D0 03 4C BE C9 E6
0881:C9 44 D0 03 4C D7 C9 C9 F0
0889:4B D0 03 4C FC C9 C9 4D 88
0891:D0 03 4C 2D CA C9 50 D0 16
0899:03 4C 8C CA 4C 7B E3 A2 37
08A1:C0 A0 00 84 FB 86 FC A2 19
08A9:80 A0 00 20 53 CB A2 C4 F7
08B1:A0 00 84 FB 86 FC A2 D8 A8
08B9:A0 00 20 53 CB A2 01 A0 DE
08C1:08 20 3C CB A5 01 29 FE A4
08C9:85 01 AD 80 BF 8D 21 D0 E1
08D1:AD 7F BF 8D 20 D0 A5 01 F9
08D9:09 01 85 01 4C E2 CA A2 95
08E1:C0 A0 00 84 FB 86 FC A2 59
08E9:80 A0 00 20 53 CB A2 01 74
08F1:A0 08 20 2D CB 4C DE C9 42
08F9:A2 02 A0 78 20 2D CB 20 E4
0901:E4 FF C9 00 F0 F9 C9 85 47
0909:D0 06 EE 20 D0 4C DE C9 24
0911:C9 89 D0 06 CE 20 D0 4C C9
0919:DE C9 4C 11 CB A2 7F A0 30
0921:40 84 FB 86 FC A2 40 A0 EF
0929:00 20 53 CB A2 83 A0 28 F6
0931:84 FB 86 FC A2 D8 A0 00 DE
0939:20 53 CB A2 02 A0 08 20 96
0941:3C CB AD 10 87 8D 21 D0 A0
0949:8D 20 D0 4C E2 CA A2 18 A8
0951:A0 F0 84 FB 86 FC A2 5C 0A
0959:A0 00 20 53 CB A2 1C A0 B6
0961:D8 84 FB 86 FC A2 D8 A0 AD
0969:00 20 53 CB A2 20 A0 C0 42
0971:84 FB 86 FC A2 60 A0 00 3D
0979:84 FD 86 FE A2 02 A0 78 E4
0981:20 3C CB AD DC 18 8D 21 8A
0989:D0 AD DD 18 8D 20 D0 A2 DD
0991:1F A0 00 B1 FB 91 FD C8 61
0999:D0 F9 E6 FC E6 FE CA D0 08
09A1:F2 B1 FB 91 FD C8 C0 40 07
09A9:80 F7 4C E2 CA A2 02 A0 5F
09B1:80 20 2D CB A9 10 A2 60 A1
09B9:A0 00 84 FB 86 FE A2 03 05
09C1:A0 00 91 FD C8 D0 FB E6 9E
09C9:FE CA D0 F6 91 FD C8 C0 6E
09D1:FE D0 F9 20 E4 FF C9 00 88
09D9:F0 F9 C9 85 D0 06 EE 20 11
09E1:D0 4C B2 CA C9 89 D0 06 8E
09E9:CE 20 D0 4C B2 CA C9 86 25
09F1:D0 05 A9 01 4C 95 CA C9 0B
09F9:8A D0 05 A9 10 4C 95 CA 68
0A01:4C 11 CB 20 E4 FF C9 00 B5
0A09:F0 F9 C9 85 D0 06 EE 20 42
0A11:D0 4C E2 CA C9 89 D0 06 C5
0A19:CE 20 D0 4C E2 CA C9 86 D7
0A21:D0 06 EE 21 D0 4C E2 CA 57

```

0A29:C9 8A D0 06 CE 21 D0 4C 28
 0A31:E2 CA A9 93 20 D2 FF A9 CD
 0A39:97 8D 00 DD A9 15 8D 18 2F
 0A41:D0 A9 C8 8D 16 D0 A9 1B 7C
 0A49:8D 11 D0 4C 7B E3 8E 00 CF
 0A51:DD 8C 18 D0 AD 11 D0 09 EF
 0A59:20 8D 11 D0 60 8E 00 DD 2B
 0A61:8C 18 D0 AD 16 D0 09 10 CC
 0A69:8D 16 D0 AD 11 D0 09 20 BC
 0A71:8D 11 D0 60 84 FD 86 FE D8
 0A79:A2 03 A0 00 B1 FB 91 FD 52
 0A81:C8 D0 F9 E6 FC E6 FE CA 28
 0A89:D0 F2 B1 FB 91 FD C8 C0 8F
 0A91:E8 D0 F7 60 93 11 8E 47 98
 0A99:52 41 50 48 49 43 53 20 D3
 0AA1:57 45 44 47 45 0D 28 43 A1
 0AA9:29 31 39 38 38 20 43 4F 61
 0AB1:4D 50 55 54 45 21 20 50 AF
 0AB9:55 42 2E 2C 20 49 4E 43 97
 0AC1:0D 11 20 42 2E 20 42 4C 8B
 0AC9:41 5A 49 4E 47 20 50 41 BF
 0AD1:44 44 4C 45 53 0D 11 20 08
 0AD9:43 2E 20 43 41 44 50 41 50
 0AE1:4B 0D 11 20 44 2E 20 44 62
 0AE9:4F 4F 44 4C 45 0D 11 20 67
 0AF1:4D 2E 20 4B 4F 41 4C 41 49
 0AF9:0D 11 20 4D 2E 20 4D 49 87
 0B01:43 52 4F 20 49 4C 4C 55 A2
 0B09:53 54 52 41 54 4F 52 0D CD
 0B11:11 20 50 2E 20 50 52 49 D4
 0B19:4E 54 20 53 48 4F 50 0D D1
 0B21:00 00 00 00 00 00 00 37

0969:FD AC BF 02 A9 51 91 FB 6F
 0971:A5 FB 8D BC 02 A5 FC 8D 01
 0979:BD 02 60 A9 00 8D AF 02 29
 0981:4C 28 09 A9 00 8D AC 02 11
 0989:4C 41 09 B1 FB C9 20 D0 66
 0991:05 C9 20 D0 01 60 AD AB 3A
 0999:02 49 FF 8D AB 02 B1 FB 9C
 09A1:C9 A0 D0 08 A9 01 8D AF 77
 09A9:02 20 44 06 60 B1 FB C9 89
 09B1:20 D0 05 C9 20 D0 01 60 EB
 09B9:AD AA 02 49 FF 8D AA 02 AF
 09C1:B1 FB C9 A0 D0 08 20 44 1A
 09C9:0B A9 01 8D AC 02 60 C0 B3
 09D1:05 90 07 AD 1B D4 C9 2F 35
 09D9:F0 01 C8 C0 28 D0 03 4C A0
 09E1:F8 09 60 C0 23 B0 07 AD 62
 09E9:1B D4 C9 FC B0 01 88 C0 23
 09F1:FF D0 03 4C F8 09 60 AD B7
 09F9:00 DC 29 10 F0 06 A5 C5 1A
 0A01:C9 15 D0 F3 CE 43 0B AD DF
 0A09:43 0B 8D 26 04 C9 30 D0 0E
 0A11:03 4C 07 0B 20 83 0A 20 8E
 0A19:0E 0D 4C 39 08 A5 FC C9 98
 0A21:05 B0 09 A5 FB C9 28 B0 67
 0A29:03 4C F8 09 60 A5 FC C9 DE
 0A31:07 90 09 A5 FB C9 E8 90 D1
 0A39:03 4C F8 09 60 A9 07 AA F3
 0A41:A8 CA D0 FD 88 D0 FA 60 34
 0A49:EE 32 0D AD 32 0D C9 03 3A
 0A51:B0 01 60 A9 00 8D 32 0D 4C
 0A59:A9 F6 85 FB A9 D8 85 FC 29
 0A61:A0 00 AD 1B D4 29 0F F0 87
 0A69:F9 91 FB C8 C0 1C 90 F2 75
 0A71:A0 00 20 9D 08 A5 FC C9 4E
 0A79:DA 90 E7 A5 FB C9 F2 90 F3
 0A81:E1 60 A0 00 A9 20 99 28 DB
 0A89:04 99 C0 07 C8 C0 28 90 B8
 0A91:F5 A9 04 85 FC A9 27 85 46
 0A99:FB A2 00 A9 20 A0 00 91 04
 0AA1:FB C8 91 FB 20 90 08 E8 48
 0AA9:E0 18 90 EF 60 30 30 30 99
 0AB1:30 30 30 30 30 30 30 C5
 0AB9:30 30 30 A9 04 85 FC A9 6C
 0AC1:F6 85 FB A0 00 B1 FB C9 C4
 0AC9:20 D0 03 20 E6 0A C8 C0 36
 0AD1:1C 90 F2 A0 00 20 9D 08 44
 0AD9:A5 FC C9 06 90 E7 A5 FB 05
 0AE1:C9 F1 90 E1 60 A2 0A FE 28
 0AE9:AE 0A BD AE 0A C9 3A 90 F6
 0AF1:A9 A9 30 9D AE 0A CA 4C 54
 0AF9:E8 0A BD AE 0A 9D 00 04 72
 0B01:E8 0E 0B 90 F5 60 A2 00 A4
 0B09:BD 25 0B F0 07 20 D2 FF 16
 0B11:E8 4C 09 0B A5 C5 C9 40 98
 0B19:F0 FA C9 3F F0 03 4C 36 F5
 0B21:08 4C E2 FC 9A 13 11 50 0E
 0B29:52 45 53 53 20 52 45 54 82
 0B31:55 52 4E 20 54 4F 20 50 C2
 0B39:4C 41 59 20 41 47 41 49 E5
 0B41:4E 00 00 AD 1B D4 29 07 DE
 0B49:AA BD C7 0B 8D BE 0B BD 09
 0B51:BF 0B 8D BD 0B A9 08 8D 34
 0B59:00 D4 8D 01 D4 8D 07 D4 26
 0B61:8D 08 D4 A9 0F 8D 18 D4 29
 0B69:A9 0F 8D 05 D4 8D C0 D4 E3
 0B71:A9 FC 8D 06 D4 8D 0D D4 79
 0B79:A9 15 8D 0B D4 60 AD BE 4E
 0B81:0B 18 69 C8 8D BE 0B 90 EA
 0B89:03 EE BD 0E BE BD 0B AD 75
 0B91:BE 0B 8D 00 D4 18 69 0A 5F
 0B99:8D 07 D4 8E 01 D4 90 01 39
 0BA1:LE 8E 08 D4 AD BD 0B C9 62
 0BA9:1E 90 08 A9 10 8D 04 D4 22
 0BB1:8D 0B D4 60 00 C9 51 D0 8C
 0BB9:02 A9 20 60 00 00 02 02 4B
 0BC1:02 02 03 03 03 04 18 5A 9C
 0BC9:A3 CC 23 86 F4 30 A2 00 5F
 0BD1:A9 30 9D AE 0A E8 00 0E 2B
 0BD9:90 F6 60 A5 FB 18 69 28 97
 0BE1:85 FB 90 02 E6 FC A5 FD 60
 0BE9:38 E9 28 85 FD B0 02 C6 71
 0BF1:FE 60 A5 FB 38 E9 28 85 53
 0BF9:FB B0 02 C6 FC A5 FD 18 79
 0C01:69 28 85 FD 90 02 E6 FE C1
 0C09:60 AD 50 04 8D 12 0D AD 83

0C11:4F 04 8D 13 0D AD C1 07 5E
 0C19:8D 14 0D AD BF 07 8D 15 C3
 0C21:0D A0 26 A2 02 B9 28 04 22
 0C29:8D 16 0D BD C0 07 CA C8 8B
 0C31:9D C0 07 AD 16 0D 99 28 44
 0C39:04 E8 E8 88 C0 FF D0 4B
 0C41:E4 A0 00 A9 28 85 FB A9 87
 0C49:04 85 FC A9 E7 85 FD A9 F9
 0C51:07 85 FE A2 00 20 DC 0B 9D
 0C59:A1 FB 8D 16 0D A1 FD 8D CC
 0C61:17 0D 20 F3 0B AD 16 0D D3
 0C69:81 FB AD 17 0D 81 FD 20 F2
 0C71:DC 0B C8 C0 17 90 DE AD 46
 0C79:12 0D 8D 28 04 AD 13 0D 1C
 0C81:8D 77 04 AD 14 0D 8D C0 4A
 0C89:07 AD 15 0D 8D E7 07 7E
 0C91:AD 29 04 8D 12 0D AD 77 BB
 0C99:04 8D 13 0D AD 98 07 8D B5
 0CA1:14 0D AD E6 07 8D 15 0D D0
 0CA9:A0 26 A2 02 B9 C0 07 8D 7C
 0CB1:16 0D BD 28 04 CA C8 9D CC
 0CB9:28 04 AD 16 0D 99 C0 07 55
 0CC1:E8 E8 88 88 C0 FF D0 E4 AE
 0CC9:A0 00 A9 C0 85 FB A9 07 E9
 0CD1:85 FC A9 4F 85 FD A9 04 91
 0CD9:85 FE A2 00 20 F3 0B A1 51
 0CE1:FB 8D 16 0D A1 FD 8D 17 26
 0CE9:0D 20 DC 0B AD 16 0D 81 3E
 0CF1:FB AD 17 0D 81 FD 20 F3 5F
 0CF9:0B C8 C0 17 90 DE AD 12 C0
 0D01:0D 8D 28 04 AD 14 0D 8D AF
 0D09:C0 07 AD 15 0D 8D E7 07 C1
 0D11:60 00 00 00 00 00 A5 01
 0D19:C5 C9 3C F0 01 60 A5 C5 B9
 0D21:C9 40 D0 FA A5 C5 C9 3C 0E
 0D29:D0 FA A5 C5 C9 40 D0 FA 67
 0D31:60 00 AD 8D 02 D0 01 60 BF
 0D39:A2 00 A0 20 CA D0 FD 88 D8
 0D41:D0 FA 60 20 C3 0D A0 00 24
 0D49:A9 A0 99 C0 07 99 28 04 92
 0D51:C8 C0 28 00 F5 A9 28 85 3A
 0D59:FB A9 04 85 FC A9 E7 85 98
 0D61:FD A9 07 85 FE A2 00 A0 41
 0D69:00 A9 A0 81 FB 81 FD 20 1C
 0D71:DC 0B C8 C0 17 90 F2 A0 63
 0D79:00 B9 86 0D F0 24 99 0C FA
 0D81:04 C8 4C 7A 0D 0A 05 12 AD
 0D89:09 03 08 0F 20 20 10 12 8E
 0D91:05 13 13 20 06 09 12 05 D4
 0D99:20 14 0F 20 13 14 01 12 A9
 0DAL:14 00 20 03 09 20 BC 0A 46
 0DA9:20 3E 0A 20 7F 0B 20 49 58
 0DB1:0A 20 3E 0A AD 00 DC 29 91
 0DB9:10 F0 06 A5 C5 C9 15 D0 83
 0DC1:E1 60 A9 93 20 D2 FF A9 49
 0DC9:8E 20 D2 FF A9 08 20 D2 0E
 0DD1:FF A9 20 8D E8 07 20 A9 80
 0DD9:08 20 C3 08 20 CF 00 20 6F
 0DE1:3A 0E A9 FF 8D AC 02 8D 82
 0DE9:AB 02 8D AA 02 A9 06 8D 07
 0DF1:BD 02 A9 D8 8D C1 02 A9 4F
 0DF9:F6 8D C0 02 A9 08 8D 12 A7
 0E01:D4 8D 0E D4 8D 0F D4 AD F9
 0E09:1B D4 C9 08 90 F9 C9 1E BF
 0E11:B0 F5 8D BF 02 A9 08 8D 05
 0E19:BC 02 A0 00 8C C2 02 8C 28
 0E21:21 D0 8C 20 D0 60 00 AD 4B
 0E29:28 04 C9 A0 D0 0A AD 50 F7
 0E31:04 C9 20 D0 03 20 3A 0E ED
 0E39:60 A0 00 A9 A0 99 28 04 08
 0E41:99 D4 07 A9 20 99 C0 04 BE
 0E49:99 C0 07 C8 C0 14 90 EB 33
 0E51:A9 28 85 FB A9 04 85 FC 22
 0E59:A9 E7 85 FD A9 07 85 FE 48
 0E61:A2 00 A0 00 20 DC 0B A9 17
 0E69:20 81 FB 81 FD C8 C0 17 39
 0E71:90 F2 60 00 00 00 00 9E

Jericho

See instructions in article on page 66 before typing in.

0801:0B 08 FF FF 9E 32 30 39 EF
 0809:39 00 31 08 FF FF 8F 14 8F
 0811:14 14 14 14 14 14 14 21
 0819:43 20 31 39 38 38 20 43 B2
 0821:4F 4D 50 55 54 45 20 50 D3
 0829:55 42 4C 2E 20 20 20 0A A2
 0831:00 00 20 44 0D 20 C3 0D 07
 0839:20 63 08 20 3E 0A 20 63 F2
 0841:08 20 3E 0A 20 63 08 20 84
 0849:03 09 20 49 0A 20 BC 0A 0A
 0851:20 7F 0B 20 18 0D 20 33 1D
 0859:0D 20 BC 0A 20 28 0E 4C 3A
 0861:39 08 AD 00 DC 29 0F C9 39
 0869:0F F0 11 C9 0D D0 03 4C F9
 0871:91 0C C9 0E D0 03 4C 0A 9C
 0879:0C 4C 3E 0A A5 C5 C9 40 23
 0881:F0 F7 C9 02 D0 03 4C 91 1E
 0889:0C C9 07 D0 EC 4C 0A 0C B8
 0891:A5 FB 38 E9 28 85 FB B0 19
 0899:02 C6 FC 60 A5 FB 18 69 B8
 08A1:28 85 FB 90 02 E6 FC 60 B5
 08A9:A9 D8 85 FC A9 00 85 FB 99
 08B1:A0 00 A9 07 91 FB C8 D0 96
 08B9:FB E6 FC A5 FC C9 DC 90 D4
 08C1:F1 60 A9 04 85 FC A9 F6 C2
 08C9:85 FB A9 DB A0 00 91 FB B2
 08D1:C8 C0 1C 90 F9 20 9D 08 96
 08D9:A5 FC C9 06 90 EC A5 FB 15
 08E1:C9 F1 90 E6 A9 39 8D 43 64
 08E9:0B 8D 26 04 A0 00 A9 01 41
 08F1:99 00 D8 C8 C0 28 90 F8 37
 08F9:A9 00 A8 99 00 D4 C8 D0 43
 0901:FA 60 AC BF 02 8C 27 0E D8
 0909:AD BC 02 85 FB 85 FD AD 59
 0911:BD 02 85 FC 85 FE B1 FB 8A
 0919:C9 A0 00 07 A9 E0 91 FB B2
 0921:4C 28 09 A9 20 91 FB AD 0C
 0929:AB 02 F0 09 20 D0 09 20 B6
 0931:8C 09 4C 3C 09 20 E4 09 B4
 0939:20 8C 09 AD AF 02 D0 3B DC
 0941:AD AA 02 D0 0C 20 91 08 2E
 0949:20 AE 09 20 1E 0A 4C 5B 47
 0951:09 20 9D 08 20 AE 09 20 12
 0959:2E 0A AD AC 02 D0 24 8C AD
 0961:BF 02 AC 27 0E A9 20 91 C4

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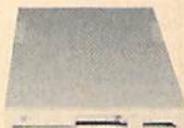
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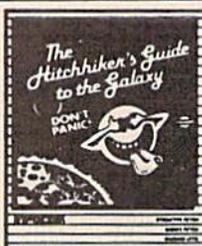
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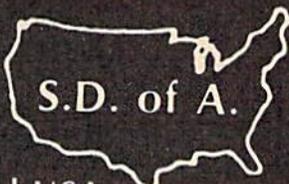


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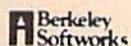
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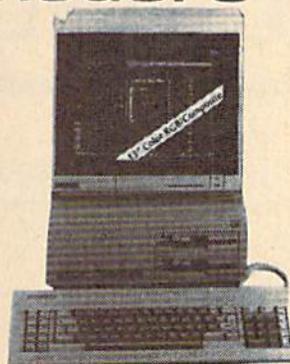
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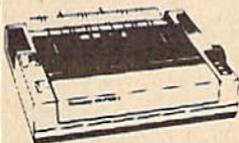
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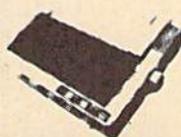
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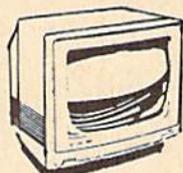


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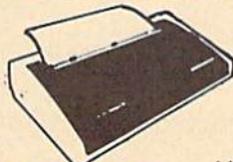
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How To Type In COMPUTE!'s Gazette Programs

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, [] , 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:
{CLR}	SHIFT CLR/HOME	
{HOME}	CLR/HOME	
{UP}	SHIFT ↑ CRSR ↓	
{DOWN}	↑ CRSR ↓	
{LEFT}	SHIFT ← CRSR →	
{RIGHT}	← CRSR →	
{RVS}	CTRL 9	
{OFF}	CTRL 0	
{BLK}	CTRL 1	
{WHT}	CTRL 2	
{RED}	CTRL 3	
{CYN}	CTRL 4	

When You Read:	Press:	See:
{PUR}	CTRL 5	
{GRN}	CTRL 6	
{BLU}	CTRL 7	
{YEL}	CTRL 8	
{F1}	f1	
{F2}	SHIFT f1	
{F3}	f3	
{F4}	SHIFT f3	
{F5}	f5	
{F6}	SHIFT f5	
{F7}	f7	
{F8}	SHIFT f7	

When You Read:	Press:	See:
←	←	
↑	SHIFT ↑	

For Commodore 64 Only

[1]	COMMODORE	1	
[2]	COMMODORE	2	
[3]	COMMODORE	3	
[4]	COMMODORE	4	
[5]	COMMODORE	5	
[6]	COMMODORE	6	
[7]	COMMODORE	7	
[8]	COMMODORE	8	

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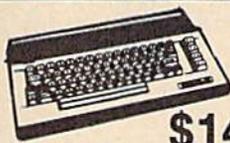
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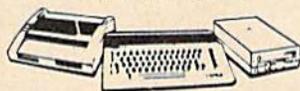
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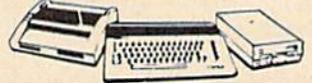


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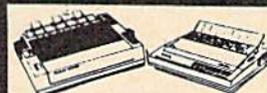


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The Automatic Proofreader

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 RETURN. 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.

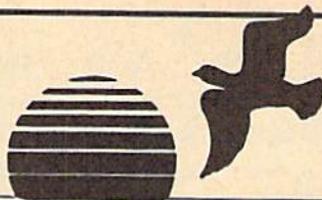
When using the Proofreader with another utility, you should disable *both* programs before running a BASIC program. While the Proofreader seems unaffected by most utilities, there's no way to promise that it will work with any and every combination of utilities you might want to use. The more utilities 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 PROOFREADER FOR ";:IF VEC=42364 THEN [SPACE]PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VIC-20"
40 IF VEC=35158 THEN GRAPHIC CLR: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:POKE 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+LF, LB:POKE SA+HF, HB:NEXT
110 IF CHK<>22054 THEN PRINT "*ERROR* RELOAD PROGRAM AND [SPACE]CHECK FINAL LINE":END
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 (PEEK(LO)+256*PEEK(HI))-1,0:NEW
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 0,141,0,255,162,31,181,199,157,227,3
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 200,185,0,2,240,46,201,34,208,8,72
220 DATA 165,176,73,255,133,176,104,72,201,32,208
230 DATA 7,165,176,208,3,104,208,226,104,166,180
240 DATA 24,165,167,121,0,2,133,167,165,168,105
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 104,74,74,74,168,185,211,3,32,210
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 13,2,7,167,31,32,151,116,117,151,128,129,167,136,137
```

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Compute!'s Gazette
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MLX Machine Language Entry Program For Commodore 64 and 128

Ottis R. Cowper

"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 COMPUTE!'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 worry—even 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 MLX-format 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 proof-reading 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

7	8	9	0
4 U	5 I	6 O	F P
1 J	2 K	3 L	E :
A M	B ,	C .	D /
0 Space			

128 MLX Keypad

A (F1)	B (F3)	C (F5)	D (F7)
7	8	9	E (+)
4	5	6	F (-)
1	2	3	E N T E R
0	.		

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



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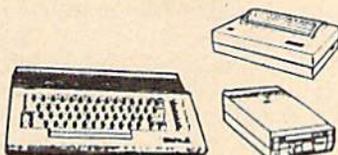
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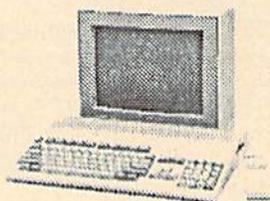
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number prompt.

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 ADDRESS, 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 CATALOG 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-RESTORE 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 work.

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}{BLU}"
FR 170 PRINT "{3 DOWN}
{3 SPACES}COMPUTE!'S MA
CHINE LANGUAGE EDITOR
{3 DOWN}"
JB 180 PRINT "{BLK}STARTING ADD
```

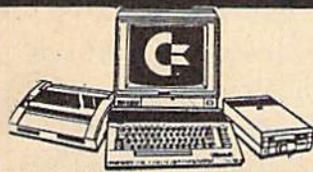
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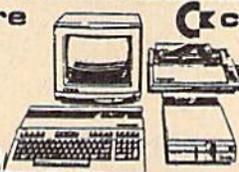
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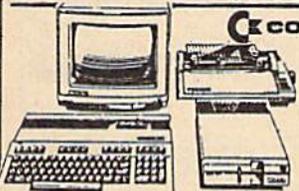
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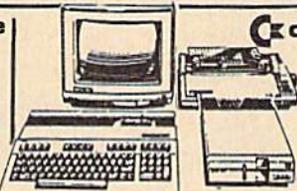
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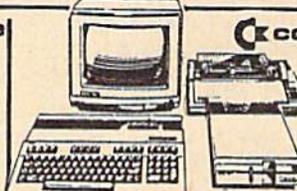
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	RESS[4];:GOSUB300:SA=A D:GOSUB1040:IF F THEN18 0				
GF 190	PRINT{BLK}{2 SPACES}EN DING ADDRESS[4];:GOSUB 300:EA=AD:GOSUB1030:IF {SPACE}F THEN190	FX 486	3*(A\$=".")-4*(A\$="/")-5 *(A\$="J")-6*(A\$="K") A=A-7*(A\$="L")-8*(A\$="":)-9*(A\$="U")-10*(A\$="I ")-11*(A\$="O")-12*(A\$="	HH 750	PRINT"D[DOWN]":OPEN15,8 ,15,"I0":B=EA-SA:IN\$="
KR 200	INPUT{3 DOWN}{BLK}CLEA R WORKSPACE [Y/N][4];A \$:IF LEFT\$(A\$,1)<>"Y"TH EN220	CM 487	A=A-13*(A\$=S\$):IF A THE N A\$=MID\$("ABCD123E456F 0",A,1):GOTO 540	SQ 760	OPEN 1,8,8,IN\$+",P,W":G OSUB860:IF A THEN220
PG 210	PRINT{2 DOWN}{BLU}WORK ING...":FORI=BS TO BS+ EA-SA+7:POKE I,0:NEXT:P RINT"DONE"	MP 490	IF A\$=R\$ AND((I=0)AND(J =1)OR F)THEN PRINT B\$; J=2:NEXT:I=24:GOTO550	FJ 770	AH=INT(SA/256):AL=SA-(A H*256):PRINT#1,CHR\$(AL) ;CHR\$(AH);
DR 220	PRINTTAB(10){2 DOWN} {BLK}{RVS} MLX COMMAND {SPACE}MENU {DOWN}[4]; PRINT T\$[RVS]E{OFF}NTE R DATA "	KC 500	IF A\$="{HOME}" THEN PRI NT B\$:J=2:NEXT:I=24:NEX T:F=0:GOTO440	PE 780	FOR I=0 TO B:PRINT#1,CH R\$(PEEK(BS+I));:IF ST T HEN800
BD 230	PRINT T\$[RVS]D{OFF}ISP LAY DATA:PRINT T\$" {RVS}L{OFF}OAD FILE "	MX 510	IF (A\$="{RIGHT}")ANDF TH ENPRINT B\$;:GOTO540	FC 790	NEXT:CLOSE1:CLOSE15:GOT 0940
JS 240	PRINT T\$[RVS]S{OFF}AVE FILE":PRINT T\$[RVS]Q {OFF}UIT{2 DOWN}{BLK} "	GK 520	IF A\$<>L\$ AND A\$<>D\$ OR ((I=0)AND(J=1))THEN GOS UB1060:GOTO470	GS 800	GOSUB1060:PRINT"{DOWN} {BLK}ERROR DURING SAVE: [4];:GOSUB860:GOTO220
JH 250	GET A\$:IF A\$=N\$ THEN250	HG 530	A\$=L\$+S\$+L\$:PRINT B\$;: J=2-J:IF J THEN PRINT {SPACE}L\$;:I=I-3	MA 810	OPEN 1,8,8,IN\$+",P,R":G OSUB860:IF A THEN220
HK 260	A=0:FOR I=1 TO 5:IF A\$= MID\$("EDLSQ",I,1)THEN A =I:I=5	QS 540	PRINT A\$;:NEXT J:PRINT {SPACE}S\$;	GE 820	GET#1,A\$,B\$:AD=ASC(A\$+Z \$)+256*ASC(B\$+Z\$):IF AD <>SA THEN F=1:GOTO850
FD 270	NEXT:ON A GOTO420,610,6 90,700,280:GOSUB1060:GO TO250	PM 550	NEXT I:PRINT:PRINT"{UP} {5 RIGHT}";:INPUT#3,IN\$:IF IN\$=N\$ THEN CLOSE3: GOTO220	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
EJ 280	PRINT{RVS} QUIT ":INPU T"[DOWN][4]ARE YOU SURE [Y/N]";A\$:IF LEFT\$(A\$, 1)<>"Y"THEN220	QC 560	FOR I=1 TO 25 STEP3:B\$= MID\$(IN\$,I):GOSUB320:IF I<25 THEN GOSUB380:A(I /3)=A	FA 840	NEXT:IF ST<>64 THEN F=3
EM 290	POKE SD+24,0:END	PK 570	NEXT:IF A<>CK THEN GOSU B1060:PRINT"{BLK}{RVS} {SPACE}ERROR: REENTER L INE [4]":F=1:GOTO440	FQ 850	CLOSE1:CLOSE15:ON ABS(F >0)+1 GOTO960,970
JX 300	IN\$=N\$:AD=0:INPUTIN\$:IF LEN(IN\$)<>4THENRETURN	HJ 580	GOSUB1080:B=BS+AD-SA:FO R I=0 TO 7:POKE B+I,A(I):NEXT	SA 860	INPUT#15,A,A\$:IF A THEN CLOSE1:CLOSE15:GOSUB10 60:PRINT"{RVS}ERROR: "A \$
KF 310	B\$=IN\$:GOSUB320:AD=A:B\$ =MID\$(IN\$,3):GOSUB320:A D=AD*256+A:RETURN	QQ 590	AD=AD+8:IF AD>EA THEN C LOSE3:PRINT"{DOWN}{BLU} ** END OF ENTRY **{BLK} {2 DOWN}":GOTO700	GQ 870	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	GQ 600	F=0:GOTO440	EJ 880	POKE183,PEEK(FA+2):POKE 187,PEEK(FA+3):POKE188, PEEK(FA+4):IFOP=0THEN92 0
JA 330	IF B<0 OR B>15 THEN AD= 0:A=-1:J=2	QA 610	PRINT"{CLR}{DOWN}{RVS} {SPACE}DISPLAY DATA ":G OSUB400:IF IN\$=N\$ THEN2 20	HJ 890	SYS 63466:IF(PEEK(783)A ND1)THEN GOSUB1060:PRIN T"[DOWN]{RVS} FILE NOT {SPACE}FOUND ":GOTO690
GX 340	NEXT:RETURN	RJ 620	PRINT"{DOWN}{BLU}PRESS: {RVS}SPACE{OFF} TO PAU SE, [RVS]RETURN{OFF} TO BREAK[4]{DOWN} "	CS 900	AD=PEEK(829)+256*PEEK(8 30):IF AD<>SA THEN F=1: GOTO970
CH 350	B=INT(A/C6):PRINT MID\$(H\$,B+1,1);:B=A-B*C6:PRI NT MID\$(H\$,B+1,1);:RETU RN	KS 630	GOSUB360:B=BS+AD-SA:FOR I=BTO B+7:A=PEEK(I):GOS UB350:GOSUB380:PRINT S\$;	SC 910	A=PEEK(831)+256*PEEK(83 2)-1:F=F-2*(A<EA)-3*(A> EA):AD=A-AD:GOTO930
RR 360	A=INT(AD/Z6):GOSUB350:A =AD-A*Z6:GOSUB350:PRINT ":	CC 640	NEXT:PRINT"{RVS}";:A=CK :GOSUB350:PRINT	KM 920	A=SA:B=EA+1:GOSUB1010:P OKE780,3:SYS 63338
BE 370	CK=INT(AD/Z6):CK=AD-Z4* CK+Z5*(CK>Z7):GOTO390	KH 650	F=1:AD=AD+8:IF AD>EA TH ENPRINT"{DOWN}{BLU}** E ND OF DATA **":GOTO220	JF 930	A=BS:B=BS+(EA-SA)+1:GOS UB1010:ON OP GOTO950:SY S 63591
PX 380	CK=CK*Z2+Z5*(CK>Z7)+A	KC 660	GET A\$:IF A\$=R\$ THEN GO SUB1080:GOTO220	AE 940	GOSUB1080:PRINT"{BLU}** SAVE COMPLETED **":GOT 0220
JC 390	CK=CK+Z5*(CK>Z5):RETURN	EQ 670	IF A\$=S\$ THEN F=F+1:GOS UB1080	XP 950	POKE147,0:SYS 63562:IF {SPACE}ST>0 THEN970
QS 400	PRINT{DOWN}STARTING AT [4];:GOSUB300:IF IN\$<> N\$ THEN GOSUB1030:IF F {SPACE}THEN400	AD 680	ONFGOTO630,660,630	FR 960	GOSUB1080:PRINT"{BLU}** LOAD COMPLETED **":GOT 0220
EX 410	RETURN	CM 690	PRINT{DOWN}{RVS} LOAD {SPACE}DATA ":OP=1:GOTO 710	DP 970	GOSUB1060:PRINT"{BLK} {RVS}ERROR DURING LOAD: {DOWN}[4]":ON F GOSUB98 0,990,1000:GOTO220
HD 420	PRINT{RVS} ENTER DATA {SPACE}":GOSUB400:IF IN \$=N\$ THEN220	PC 700	PRINT{DOWN}{RVS} SAVE {SPACE}FILE ":OP=0	PP 980	PRINT"INCORRECT STARTIN G ADDRESS (:;:GOSUB360: PRINT")":RETURN
JK 430	OPEN3,3:PRINT	RX 710	IN\$=N\$:INPUT"{DOWN}FILE NAME[4];:IN\$:IF IN\$=N\$ {SPACE}THEN220	GR 990	PRINT"LOAD ENDED AT ";: AD=SA+AD:GOSUB360:PRINT D\$:RETURN
SK 440	POKE198,0:GOSUB360:IF F THEN PRINT IN\$:PRINT" {UP}{5 RIGHT}";	PR 720	F=0:PRINT{DOWN}{BLK} {RVS}T{OFF}APE OR {RVS} D{OFF}ISK: [4];	FD 1000	PRINT"TRUNCATED AT END ING ADDRESS":RETURN
GC 450	FOR I=0 TO 24 STEP 3:B\$ =S\$:FOR J=1 TO 2:IF F T HEN B\$=MID\$(IN\$,I+J,1)	FP 730	GET A\$:IF A\$="T"THEN PR INT"T[DOWN]":GOTO880	RX 1010	AH=INT(A/256):AL=A-(AH *256):POKE193,AL:POKE1 94,AH
HA 460	PRINT{RVS}"B\$;:IF I< 24THEN PRINT{OFF}";	HQ 740	IF A\$<>"D"THEN730	FF 1020	AH=INT(B/256):AL=B-(AH *256):POKE174,AL:POKE1 75,AH:RETURN
HD 470	GET A\$:IF A\$=N\$ THEN470			FX 1030	IF AD<SA OR AD>EA THEN 1050
FK 480	IF (A\$>"/"ANDAS<"")OR(A \$>"@")ANDAS<"G")THEN540			HA 1040	IF(AD>511 AND AD<40960
GS 485	A=-(A\$="M")-2*(A\$=",")-				


```

)OR(AD>49151 AND AD<53
248)THEN GOSUB1080:F=0
:RETURN
HC 1050 GOSUB1060:PRINT"[RVS]
[SPACE]INVALID ADDRESS
[DOWN][BLK]":F=1:RETR
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$(8):COLOR 0,15:COLOR
4,15:COLOR 6,15
GQ 160 PRINT TAB(12)"[RED]
[RVS]{2 SPACES}[9 0]
[2 SPACES]"RT$;TAB(12)"
[RVS]{2 SPACES}[OFF]
[BLU] 128 MLX [RED]
[RVS]{2 SPACES}"RT$;TAB
(12)"[RVS]{13 SPACES}
[BLU]"
FE 170 PRINT"[2 DOWN]
[3 SPACES]COMPUTE!'S MA
CHINE LANGUAGE EDITOR
[2 DOWN]"
DK 180 PRINT"[BLK]STARTING ADD
RESS[4]";GOSUB 260:IF
[SPACE]AD THEN SA=AD:EL
SE 180
FH 190 PRINT"[BLK]{2 SPACES}EN
DING ADDRESS[4]";GOSUB
260:IF AD THEN EA=AD:E
LSE 190
MF 200 PRINT"[DOWN][BLK]CLEAR
[SPACE]WORKSPACE [Y/N]?
[4]":GETKEY A$: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

```

```

[OFF]AVE FILE"RT$;TAB(1
3)"[RVS]C[OFF]ATALOG DI
SK"RT$;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
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 BE$;:
RETURN
SQ 300 GOSUB 950:PRINT"[RVS] I
NVALID ADDRESS [DOWN]
[BLK]":AD=0:RETURN
RD 310 CK=FNHB(AD):CK=AD-Z4*CK
+Z5*(CK>Z7):GOTO 330
DD 320 CK=CK*Z2+Z5*(CK>Z7)+A
AH 330 CK=CK+Z5*(CK>Z5):RETURN
QD 340 PRINT BE$;"[RVS] ENTER
[SPACE]DATA ":GOSUB 250
:IF A$=NL$ THEN 220
JA 350 BANK 0:PRINT:F=0:OPEN 3
,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 A$:IF (A$>"/" AN
D A$<"=") OR(A$>"@" AND
A$<"G") THEN 470
AC 400 IF A$="+" THEN A$="E":G
OTO 470
QB 410 IF A$="-" THEN A$="F":G
OTO 470
FB 420 IF A$=RT$ AND ((I=0) AN
D (J=1) OR F) THEN PRIN
T B$;:J=2:NEXT I=24:GOT
O 480
RD 430 IF A$="[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 A$;:NEXT J:PRINT
[SPACE]SP$;
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 A$:GOTO 3:GOT
O 220
BA 500 A$=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$

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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 BE$:B=BS+AD-SA:FO
R I=0 TO 7:POKE B+I,A(I
):NEXT I
XB 530 F=0:AD=AD+8:IF AD<=EA T
HEN 360
CA 540 CLOSE 3:PRINT"[DOWN]
[BLU]** END OF ENTRY **
[BLK]{2 DOWN}":GOTO 650
MC 550 PRINT BE$;"[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
$(CK),2)
GR 600 F=1:AD=AD+8:IF AD>EA TH
EN PRINT"[BLU]** END OF
DATA **":GOTO 220
EB 610 GET A$:IF A$=RT$ THEN P
RINT BE$:GOTO 220
QK 620 IF A$=SP$ THEN F=F+1:PR
INT BE$;
XS 630 ON F GOTO 570,610,570
RF 640 PRINT BE$"[DOWN][RVS] L
OAD DATA ":OP=1:GOTO 66
0
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
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$<>"D" T
HEN 680
SP 690 PRINT"DISK[DOWN]":IF OP
THEN 760
EG 700 DOPEN#1,(F$+"P"),W:IF
[SPACE]DS THEN A$=DS$:G
OTO 740
JH 710 BANK 0:POKE BS-2,FNLB(S
A):POKE BS-1,FNHB(SA):P
RINT"SAVING ";F$:PRINT
FOR A=BS-2 TO BS+EA-SA:
PRINT#1,CHR$(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 A$:G
OTO 220
FD 760 DOPEN#1,(F$+"P"):IF DS
THEN A$=DS$:F=4:CLOSE
[SPACE]1:GOTO 790

```

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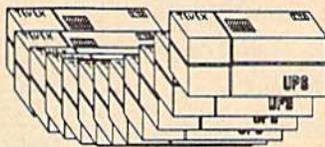
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```

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$:PRIN
T:BLOAD(F$),B0,P(B$):AD
=SA+FNAD(174)-BS-1:F=-2
*(AD<EA)-3*(AD>EA)
RQ 790 IF F THEN 800:ELSE PRIN
T"[BLU]** LOAD COMPLETE
D WITHOUT ERRORS ***:GO
TO 220
ER 800 GOSUB 950:PRINT"[BLK]
[RVS] ERROR DURING LOAD
:[43]"ON # GOSUB 810,8
20,830,840:GOTO220
QJ 810 PRINT"INCORRECT STARTIN
G ADDRESS (";HEX$(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
+2)
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$:
AB 880 A=BS:B=BS+(EA-SA)+1:GOS
UB 920:SYS DEC("EA18"):
PRINT"[DOWN]{BLU]** TAP
E SAVE COMPLETED ***:GO
TO 220
CP 890 SYS DEC("E99A"):PRINT:I
F PEEK(2816)=5 THEN GOS
UB 950:PRINT"[DOWN]
{BLK}{RVS} FILE NOT FOU
ND ":GOTO 220
GQ 900 PRINT"LOADING ...{DOWN}
":AD=FNAD(2817):IF AD<>
SA THEN F=1:GOTO 800:EL
SE AD=FNAD(2819)-1:F=-2
*(AD<EA)-3*(AD>EA)
JD 910 A=BS:B=BS+(EA-SA)+1:GOS
UB 920:SYS DEC("E9FB"):
IF ST>0 THEN 800:ELSE 7
90
XB 920 POKE193,FNLB(A):POKE194
,FNHB(A):POKE 174,FNLB(
B):POKE 175,FNHB(B):RET
URN
CP 930 CATALOG:PRINT"[DOWN]
{BLU]** PRESS ANY KEY F
OR MENU ***:GETKEY A$:G
OTO 220
MM 940 PRINT BE$"[RVS] QUIT
[43]"RT$:"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$=DSS:RESUME 800
DQ 990 IF ER=30 THEN RESUME:EL
SE PRINT ERR$(ER);" ERR
OR IN LINE";EL

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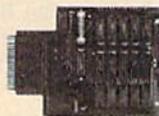
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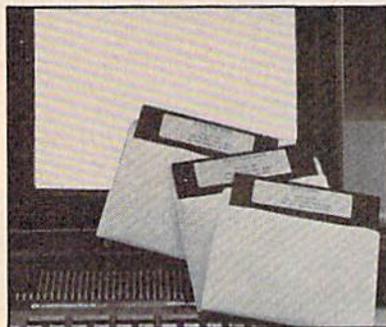
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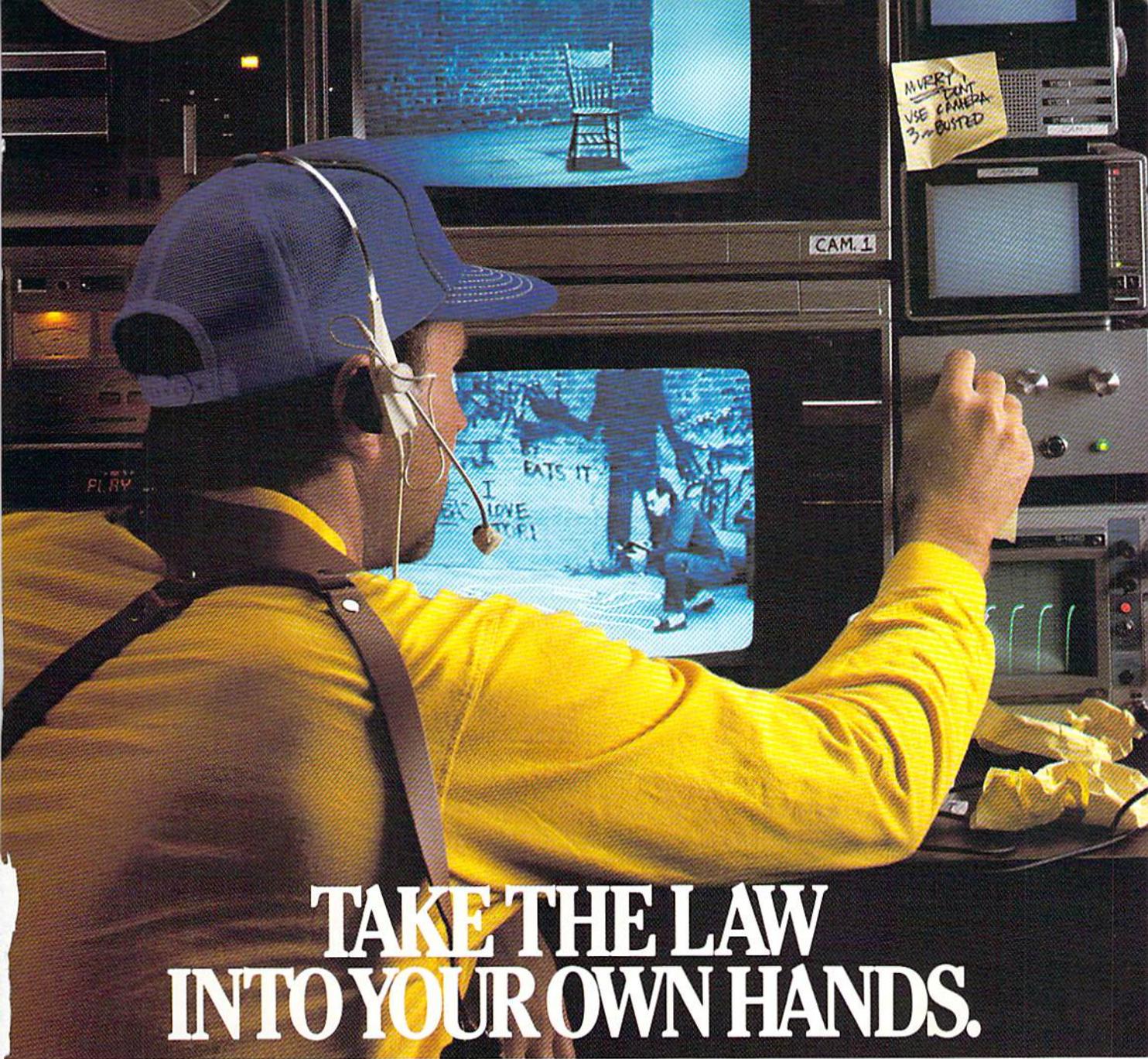
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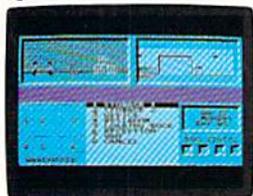
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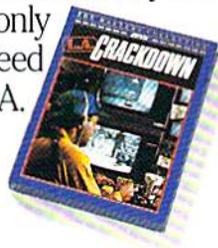
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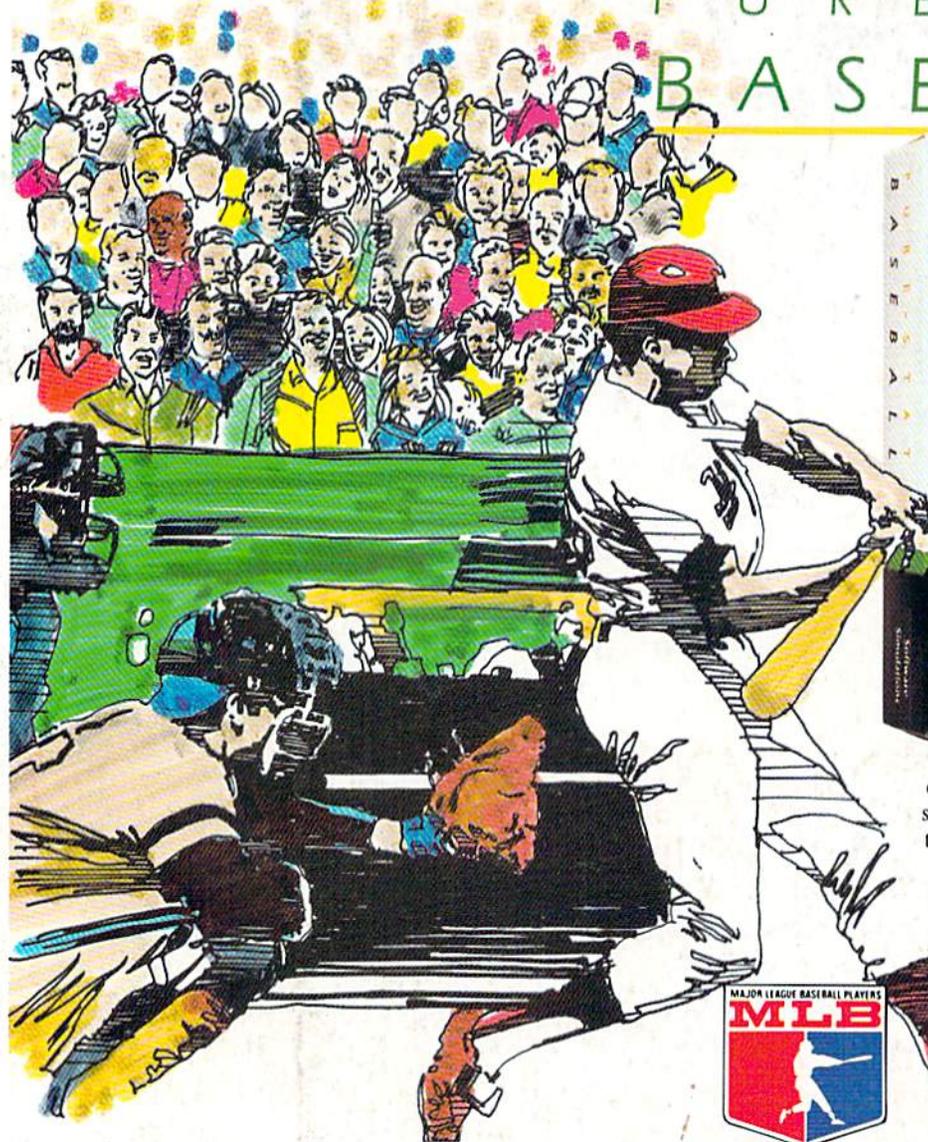
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