

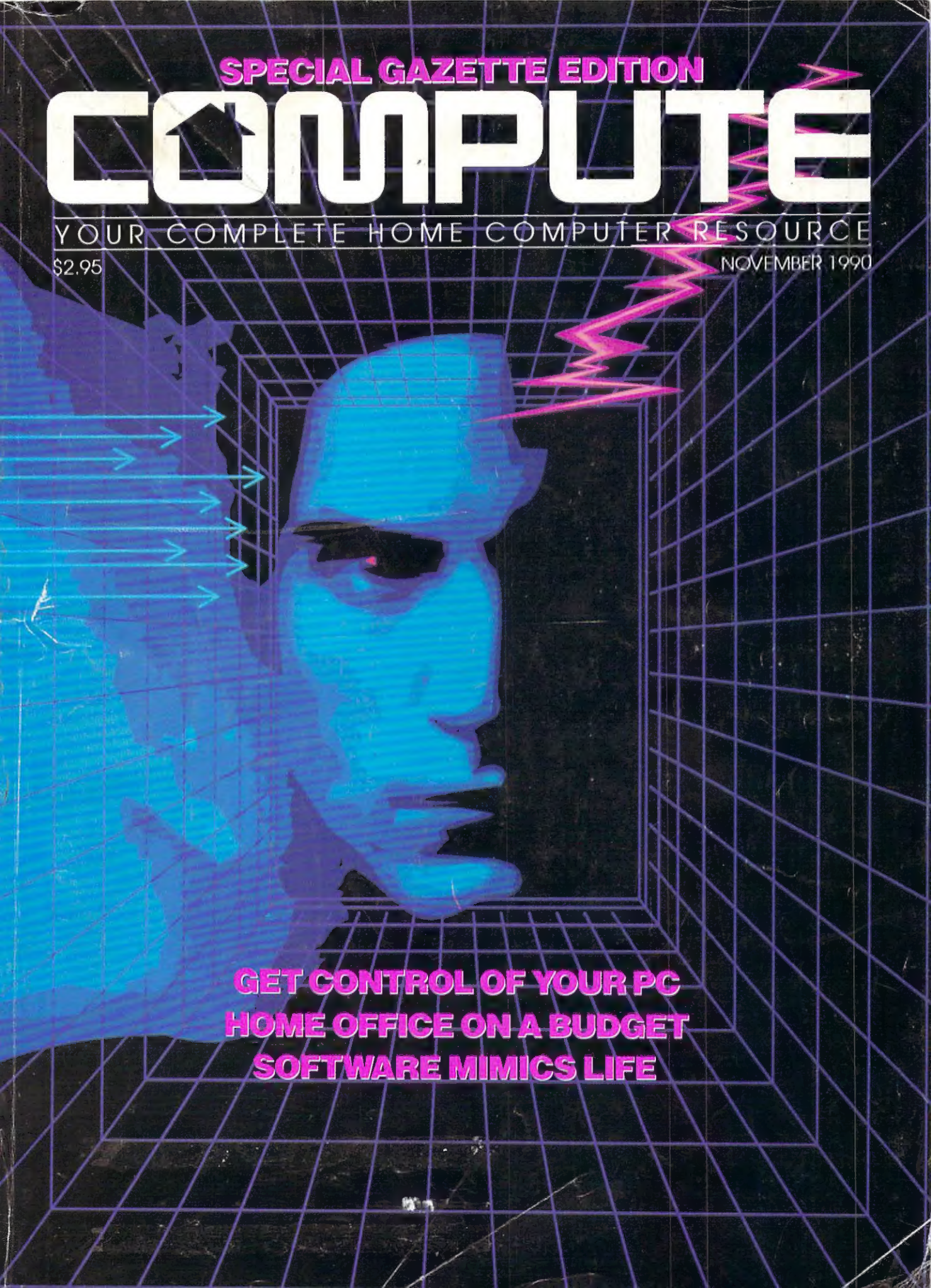
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NOVEMBER 1990

VOLUME 12 • NO. 8 • ISSUE 123

GAZETTE SUBSCRIBER EDITION

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Playing with the Big Boys: A Hard Drive for the 64/128 G-6

MORTON KEVELSON

Take a hands-on tour of CMD's new hard drive for the 64 or 128. It's the most exciting new product to hit the 8-bit Commodore market in years.

DEPARTMENTS

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TOM NETSEL

We want to publish your 64/128 artwork in "Gazette Gallery," a new feature added to the *Gazette Disk*.

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A new hand-held scanner for the 64. Check out Q-Link's new services. New software includes a baseball title and a soft-drink character.

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EDITORS and READERS

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GABRIEL RIVERA

Mastering the multiplication tables takes time, patience, and practice. This helpful tutor makes the job easier in a colorful way.

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FRED KARG

Now that you've discovered all eight entrances to the Pharaoh's pyramid, open them in the proper sequence to find the hidden treasure. Cheat Pharaoh of his revenge.

Ditto G-29

DAVID BRAY

Grab sections of code, partial lines, or blocks of text and copy them elsewhere in your program with this handy programming utility for the 64.

Right/Side G-30

ROBERT COOK

If your file is too wide to print across the page, this ingenious program for the 64 or 128 turns it sideways and lets your printer print it down the page.

Caveman G-33

MIKE SEDORE

Take a whack at the pterodactyls, but watch out for the tyrannosaurs. Save your tribe of cave people from these fierce carnivores, or you'll all end up as snacks.

Tank Shootout G-36

HUBERT CROSS/LIGIA LATINO

Call out the infantry! Send in the tanks! Prepare to launch missiles! Capture your opponent's command post in this two-player war game for the 64 or 128.



64/128 VIEW

T O M N E T S E L

For some time we've been thinking about providing a showcase for 64 and 128 artists, a place to display their computer masterpieces. Beginning with this month's *Gazette Disk*, we'll be publishing some of your best submissions in what we call "Gazette Gallery."

By selecting COMPUTE's Gazette Gallery Viewer from the disk menu, you'll see some of the best 64/128 artwork available in a slide-show format. Each piece will be presented just as the artist created it and as it was meant to be seen, on a computer monitor.

We pay \$50 for each picture that we select for display in "Gazette Gallery." From those selected, we'll name one Picture of the Month and award it an additional \$50. So if you have original computer artwork that you're proud of, send it in. We want to see your best work. Pictures may be in *Koala*, *Doodle*, or any other popular format. Send no more than five entries per disk per month to Gazette Gallery, COMPUTE Publications, 324 West Wendover Avenue, Greensboro, North Carolina 27408. Be sure to put your name, address, and daytime telephone number on your disk. And enclose a self-addressed, stamped disk envelope if you want your artwork returned.

For years we've done our best to provide Gazette readers with outstanding type-in programs for the 64 and 128. Whether they're games, programming utilities, or productivity or educational programs, we try to publish a variety of the best programs submitted to us each month.

Occasionally we come across programs

we like but which are just too large to offer as type-ins. By adding so many outstanding features, the programmer has made the program too big. The listing would run for pages and pages, and it would take weeks for the average reader to type it in. In the past we've been forced to reject these programs, but now we've found a way around this problem.

Each month on the *Gazette Disk*, we're presenting these larger programs and certain others as bonuses. We started with the October disk with a program called *geoGammon*. This computer version of backgammon for GEOS and GEOS 128 was simply too large for us to offer as a type-in, but we felt it was an excellent program that our subscribers would appreciate. The game, with complete documentation, appears only on the October disk. There's nothing to type in; it's ready to run. Two other programs, *Multi-Color Lister* and *64-Shell*,

rounded out last month's bonus package on the *Gazette Disk*.

This month's disk features two bonus programs. *Bastion* is a futuristic, one- or two-player arcade-style shoot-'em-up in which your spaceship tries to blast its way through layers of rotating shields. *Eye Catcher* is a scrolling text utility that's handy for announcing special events and the time they're scheduled.

Speaking of utilities, we've noticed a shortage of them recently. Most of our recent submissions have been games. Many of these are excellent, but the 64 and 128 are more than just great game machines. So if you have a programming utility—a piece of software that helps out around the house or office or is educational in nature—we'd like to look at it. We especially need programs for the 128 that take advantage of its unique features. Now's a great time to send your best original programs to our submissions reviewer.

In an effort to allot more magazine pages to type-in programs, we won't be printing *The Automatic Proofreader* and *MLX* in every issue of *Gazette* as we have done in the past. These programs will still be used, however, to help readers enter the programs correctly. Copies of these handy programs can be found in back issues of the magazine, and we'll print them whenever space allows. If you don't have access to back issues and you need a copy, we'll be glad to send you a free listing. Simply write to Typing Aids at the address listed above. Be sure to enclose a self-addressed, stamped envelope and remember to mention which program listing you need. □





NEWS & NOTES



TLC for Your 64

Remove dust and debris from hard-to-reach areas on your 64/128 with the Mini-Vac (\$21.95).

The Mini-Vac comes with interchangeable directional wands and brushes and a one-year, money-back guarantee. It's available from The GiftHorse (4975 Hunters Run, Colorado Springs, Colorado 80911, Department C-P).

—LIZ CASEY

Win the War Between the States

Data East (1850 Little Orchard Street, San Jose, California 95125) has scheduled for release *North & South* (\$24.95), a Civil War strategy game for the 64.

Three levels of difficulty and four stages of battle offer hours of play as you control armies and territories, launch attacks, and maneuver your troops through conflict, storms, and even Native American attacks.

Choose the perspective of either a Union or Confederate captain, sergeant, or corporal as you test your skill against the computer or a friend.

—LIZ CASEY

See SPOT Run

SPOT, the cool 7-UP character seen on soft drink cans and advertisements everywhere, is featured in a new release from Virgin Mastertronic (18001 Cowan, Suites A & B, Irvine, California 92714) appropriately called *SPOT the Computer Game* (\$29.99).

SPOT is a game as easy to learn as checkers, yet it has levels of complexity that will challenge chess players. Five difficulty levels and the ability to customize the play screen ensure additional play value.

"SPOT has fun everywhere," says 7-UP brand manager Bart Johnson. "It was only a matter of time before he invaded computers."

—TOM NETSEL

Be a Blockhead

California Dreams, maker of *Street Rod* and *Tunnels of Armageddon*, has announced the release of *Blockout* (\$29.95) for the 64/128.

This 3-D mind teaser challenges you to maneuver falling blocks within a three-dimensional enclosure and position the blocks to form complete layers. Completing layers adds to your point score and gives you more room to maneuver.

Blockout features a pause mode, animated help screens, a practice mode, and a save feature to store your favorite setup.

Also available from California Dreams is *Vegas Gambler* for the 64/128. Try your luck with blackjack, video poker, roulette, and slots. California Dreams products are distributed by Electronic Arts (1820 Gateway Drive, San Mateo, California 94404).

—LIZ CASEY

Connect with Q-Link

QuantumLink (8619 Westwood Center, Suite 200, Vienna, Virginia 22182), the 64/128 online service, recently announced the addition of five new services for subscribers.

The new Online Writer's Pen (Interactive Novels) encourages members to contribute to a group-written story. Topics include science fiction, fantasy, mystery, and romance.

Auto Vantage Online offers information and savings on late-model autos and used cars. Savings on maintenance is available through participating Auto Vantage service centers, including many Firestone, Goodyear, Maaco, and AAMCO locations.

The Romance Fiction Area lets you share your interests with Bantam LoveSwept Series author, Courtney Henke. Members can also submit short stories for fun or critique.

Also offered is the new Play SID Files of Billboard Magazines' Top Tunes and Forum-Level Search. Q-Link has also updated its Grolier Academic American Encyclopedia and enhanced its Investment and Business News.

—LIZ CASEY

continued on page G-4

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Boys of Summer II

MicroLeague Sports Association (2201 Drummond Plaza, Newark, Delaware 19711-5711) has released *Enhanced MicroLeague Baseball II* (\$39.95) for the 64/128. No minor-league joystick game, this simulation forces you to think. You win or lose based on your managerial decisions.

New features include enhanced ballpark graphics of the Polo Grounds, Yankee, and Dodger stadiums, pop-up screens for easy access to midgame statistics and substitutions, expanded offensive and defensive options, pitching and hitting stats against left- or right-handed batters, stealing and base-running ratings, field averages plus throwing range and arm strength, fatigue and power factors, and more.

Enhanced MicroLeague Baseball II comes with a general manager function, an automatic stat compiler, and 26 all-time great teams. Look for MicroLeague Sports to release an Owner's disk, Stadium disks, Season disks, a League Leader disk, and even World Series, Franchise History, and All-Star disks in the future.

—TOM NETSEL

Desktop Publishing Power

Datel Computers (3430 East Tropicana Avenue #65, Las Vegas, Nevada 89121) has been named exclusive distributor for Handyscanner 64 and *Pagefox*, two products that create a powerful desktop publishing system for the 64/128.

Handyscanner 64 is the first hand-held scanner for the 64. Completely printer independent, the unit will read graphics from magazines, books, photographs, or original artwork, which will then appear in a digitized format on the computer screen.

Utilizing an elaborate gray-tone processing method, the Handyscanner 64 promises excellent results for digitized color or black-and-white photographs. There are three processing methods, and the scanner has separate control switches for light intensity and contrast, which help produce superior results with difficult copies such as photographs with little contrast.

Handyscanner 64 operates independently of the computer and requires only the included interface for use with a 64 or 128 and any other paint or graphics program. The software interfaces with the *Pagefox* desktop publishing program module.

The unit sells for \$299.95.

The second item distributed by Datel is *Pagefox*, a desktop publishing program with a 100K-memory storage-expansion module. The program operates via menus, mouse, or joystick to define text, place pictures, and control the total graphic editor. Text can be placed in any area and expanded or contracted to eliminate the need to format lines.

Ready-to-use layouts for one, two, or three columns are included, and text overflows automatically into the next column in a user-selected sequence. Text also automatically flows around graphics. Frames can be subsequently moved, enlarged, reduced, or eliminated.

Text functions provide direct entry of headlines, legends, and so on through the keyboard with any of 12 character sets. There are eight variations of the sets that can be formatted in any combination for more than 3000 script possibilities such as italics, shadows, outlines, and 3-D outlines. Additional character sets are reloadable.

The *Pagefox* module, with its 96K, plugs into the 64 or 128 expansion port; it costs \$139.95.

—TOM NETSEL

Unlock the Secret of Maramon

MicroProse (180 Lakefront Drive, Hunt Valley, Maryland 21030) will distribute *The Keys to Maramon* (\$39.95), Mindcraft Software's newest 64 release.

You're hired as the defender of the island town Maramon. Each night monsters attack the city, and you must fight them. By day, you gather equipment, supplies, and information in town to help you battle the creatures at night. You won't rest until all the monsters are dead.

Choose to be either the Huntsman, Courier, Blacksmith, or Scholar, and use each character's unique strengths to win the keys to the city, and your pay.

—LIZ CASEY

For What Bugs You

Arlington Software (P.O. Box 916, North Arlington, New Jersey 07032) has released the *Code Shadow Symbolic Debugger* (\$19.95) for the 64. With its many features and transparency, it can provide a sophisticated environment for debugging, testing, and analyzing an ML program.

Complete symbolic capabilities are provided, from assembling or disassembling code to program-stepping to addresses referenced in command arguments. Symbol tables from any assembler can be imported into the debugger, or the debugger can generate its own coded symbols. The program supports conditional breakpoints, automatic code patching, a watch window, one-keystroke program freezing, separate debugger and application screens, and a complete DOS manager.

The program, which is not copy-protected, is RAMDOS compatible and can load into an REU, leaving virtually all of its computer memory free.

—MICKEY McLEAN

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GEORFREY GOVE

Creative Micro Designs (CMD) has worked for years to improve the user interface to Commodore floppy disk drives and to improve their performance. Now CMD has taken the sum of its Commodore disk drive knowledge and expertise and condensed it into its HD Series of hard drives for the 64 and 128.

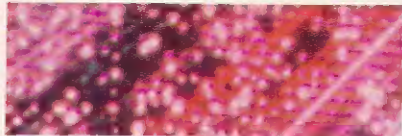
By doing so, CMD hopes to extend the useful life of the 64 and the 128 well into this decade. After having worked with a 20-megabyte version of the CMD HD Series hard

drive, I think CMD has an excellent chance of doing just that.

Compatibility is the biggest hurdle to overcome when designing a mass storage device for Commodore 8-bit computers. The 1541, the basic Commodore disk drive, has a unique way of formatting and storing data on a floppy disk. Since the 1541 is considered the bottom line for the 64, most software developers have chosen to adopt its format in order to ensure compatibility with the largest number of machines. Unfortunately, the 1541's 170-kilobyte storage capacity, along with its limited data-transfer speed, is considered inadequate by today's standards. ▶



Interestingly enough, it was Commodore's introduction of the double-capacity 1571 disk drive followed by the 800-kilobyte 1581 drive that relaxed the compatibility requirements. This relaxed compatibility approach was taken by CMD when designing the operating system for its HD Series of hard drives.



A Standard Design

CMD has chosen to design its HD Series around the SCSI standard. As a result, although the storage capacity of the basic HD drive can be as small as 20 megabytes, the system can be expanded theoretically to a total of four gigabytes (a gigabyte is 1,000 megabytes, or more than a billion bytes) spread over as many as 13 physical hard drives. At the risk of having to eat my words later, I will state that four gigabytes is more online capacity than any 64 user will ever need.

Physically, the HD is not much larger than a 1581. The external dimensions of its all-metal case are 2.75 inches high, 5 inches wide, and 10 inches deep. The system is FCC certified to meet the limitations on radio interference. Its external power supply, about half the volume of the HD, is U/L certified and provides power at 5 volts, 12 volts, and -12 volts.

The power supply has its own on/off switch and is fitted with six-foot long input and output cables. The HD also has its own on/off switch on its back panel. CMD recommends that the drive be turned on and off via its own power switch. The power supply should be left on to extend the life of the back-up battery for the HD's built in realtime clock.

The HD's front panel is a flat-membrane keyboard that sports eight indicator lights and four push buttons. The lights indicate power (on), activity (two lights), errors, and GEOS. These are followed by push buttons for SWAP8, SWAP9, and WRITE PROTECT, each with an associated indicator light and a RESET button. In addition to their designated functions, the lights flash through a diagnostic pattern whenever the HD is powered up.



Up Front and Out Back

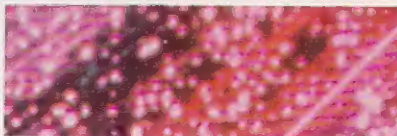
The unique SWAP8 and SWAP9 buttons enhance the HD-20's compatibil-

ity with existing software. When one of these buttons has been pressed, the HD's serial bus device number is changed, however, to the corresponding value. If another disk drive set to either device 8 or device 9 is already connected to the serial bus, its device number will be exchanged automatically with the HD-20's. The HD-20's default device number is 12. This can be easily changed to any other device number from 8 to 30 through software control.

The HD's back-panel connectors include a four-pin power plug and a pair of standard six-pin serial bus connectors. The official capacity of the Commodore serial bus is four devices; however, I was able to run the HD-20 (device 12) on a 128 with a pair of 1571 disk drives (devices 8 and 9), a 1581 disk drive (device 10), and a Xetec Super Graphix printer interface (device 4) without any problems.

The remaining back-panel connectors are unique to this drive. A six-pin auxiliary port, which is physically identical to the six-pin serial bus connectors, is for future versions of the operating system that will allow the HD to intercept and store data being sent to device 4 or 5 and then spool it out to the printer.

A round, 14-pin, parallel port connector is for the just-released RAMLink parallel interface between the HD and the 64/128. RAMLink has space for up to four megabytes of RAM and can be used to boost data-transfer speeds between the computer and the hard disk drive.



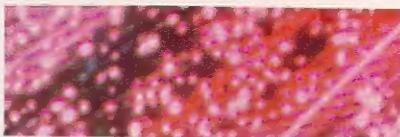
Daisychain

Last, but not least, a 25-pin SCSI connector on the back panel lets you connect up to six additional SCSI devices to the HD-20. Since SCSI ports are inherently bidirectional, you can actually use this connector to access the HD-20 from another computer equipped with a SCSI interface. Thus, it's possible to utilize the hard disk drive in the HD-20 with more than one computer system. In order for this to work, each computer has to be careful not to trash the parts of the hard drive that are used by the other system.

Inside the HD-20, the connection between the system's electronics and the 20-megabyte Conner hard drive is made via a standard 50-pin SCSI connector and a short flat ribbon cable. If you know what you're doing, you can daisychain additional SCSI drives to the system by using the internal 50-pin connector. Since there is no space

inside the HD-20 for additional hard drives, you'll have to pass the ribbon cable to the outside of the case. You'll also have to provide power and an enclosure for the external hard drive.

Of course this setup will also violate the HD's six-month warranty and will probably compromise the integrity of the system's radio frequency shielding. Therefore, I do not recommend this approach to the average user, although I suspect that there are plenty of hackers who will take advantage of the available hardware.

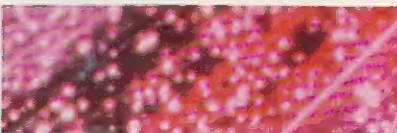


The Operating System

Like all other Commodore 8-bit disk drives, the HD hard drive is an intelligent device with its own DOS in 16 kilobytes of ROM and its own 6502 microprocessor running at 2 MHz with 64 kilobytes of RAM. In effect, the HD is a stand-alone microcomputer. The input/output hardware consists of a pair of 6522A VIA chips and an 8255 chip. Most of the HD's DOS is actually stored on a small part of the hard drive. The operating system's program code is downloaded into part of the HD's RAM when it's powered up.

By placing a part of the operating system on the hard disk, CMD is able to upgrade the system by simply sending a floppy disk to the end user. Installing the updated operating system is a very simple process that takes only a few minutes and does not affect any of the data already stored on your drive.

CMD has given a lot of thought toward maintaining the compatibility of the HD-20's operating system with existing 64/128 software. In general, any software that does not rely on disk-based copy protection and uses any of the standard Commodore DOS functions can be transferred to and run from the CMD hard drive. It's safe to say that any software originally distributed on a 1541 floppy disk that you've been able to copy successfully onto a 1571- or 1581-format floppy disk should run from the HD-20.



Native Partitions

The 20-megabyte capacity of the hard disk drive cannot be accessed as a single chunk. Instead, the HD-20's operating system divides up the available space into partitions. You can choose



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Vizastar
DataManager
& many more |
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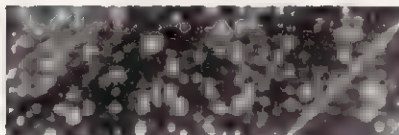
from a variety of partition types, depending on your needs. Native partitions can be as small as 256 blocks (64 kilobytes) or as large as 65,280 blocks (about 16 megabytes). They can store more than 59,000 files, any one of which can be as large as the entire partition. Relative files in a native partition can have as many as 65,535 records. Native partitions also support true subdirectories similar to those used with MS/DOS or Amiga-DOS systems.

The HD also supports partitions that mimic the 1541, 1571, and 1581 disk drives. These partitions have all of the characteristics of the original disk drives, such as storage capacity and file-size limitations. The 1581 partitions even support 1581-style subdirectories.

Compatibility with the various drives has been maintained by supporting all Commodore DOS functions, including the various direct access commands and the direct memory access commands. For 128 users, the 1571 and 1581 burst-command instruction set is supported with the exception of the MFM formatting commands. It would make no sense to support the MFM formatting commands because the drive medium in the HD is fixed. CMD has even gone so far as to emulate 1541, 1571, and 1581 job queue instructions.

To the 64 or 128, the HD looks like a multiple floppy disk drive with up to 254 drive units. Think of the HD as a floppy drive with units numbered between 0 and 254. You do not have to have 254 partitions, though; just create as many as you want using the provided software. The current partition is the one that responds as drive 0 to the 64/128. You can make any partition the current partition by issuing an instruction over the HD's command channel. You can also set any of the partitions to be the current partition when the drive is powered up. Thus, any software that lets you issue standard Commodore DOS commands can access any of the HD partitions.

It's also possible to change the current partition via the push buttons on the HD's control panel. But the procedure is cumbersome, as it requires the entry of the partition number as three binary digits using the front panel's indicator lights.

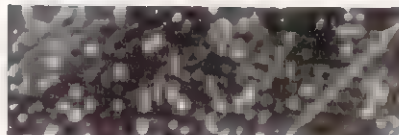


GEOS and CP/M

To use GEOS with the HD, replace the GEOS Configure program with

the one provided by CMD. You also install the CMD HDTime program on your GEOS boot disk, which lets GEOS automatically set its clock from the HD's built-in realtime clock. GEOS can only access 1581 partitions on the HD. Thus, to GEOS the HD looks like a 1581 disk drive whose floppies are changed with the CMD QuickMove utility. QuickMove also lets you copy GEOS files between 1581 partitions on the HD. It's also possible to boot GEOS directly from the HD. According to CMD, the Maverick utility, available from Software Support International, can be used to install GEOS onto a 1581 partition.

If you have the May 28, 1987, version of CP/M Plus 3.0, you'll be able to access 1541, 1571, and 1581 CP/M partitions on the CMD. Note that the 1581 CP/M partition can only be accessed from CP/M, as it isn't the same as a standard 1581 partition. Earlier versions of CP/M can only access 1541 and 1571 partitions. As with GEOS, CP/M treats the HD as another floppy disk drive whose disks can be changed under software control. The SPORT.COM utility is a CP/M program provided with the HD that issues Commodore DOS commands via the serial port. SPORT.COM is used to swap partitions on the HD under CP/M.

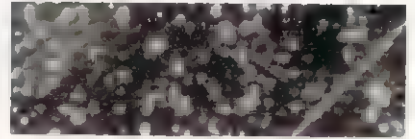


More Utilities

A set of generic utilities comes with the HD in addition to specific utilities for GEOS, CP/M, and QuantumLink. These utilities include a versatile file copier; a whole disk copier that can duplicate a 1541, 1571, or 1581 floppy disk into the corresponding HD partitions; and a variety of partition and HD system-maintenance utilities. Most of these utilities come in both 128 and 64 versions. In general, the utility programs are easy to use with onscreen menus and built-in prompts.

Since the HD supports the serial port's burst modes, it works very well with the 128. However, the 64 lacks the burst-mode hardware, which limits its data-transfer speed over the serial port. CMD's JiffyDOS greatly improves the performance of the HD with a 64. JiffyDOS consists of a replacement ROM chip for the computer's operating system. To install it, you'll have to open your computer and replace the existing ROM. You'll also have to replace the ROM in your floppy disk drive. On the 128, separate ROMs are provided for the 64 and the 128 modes. Replacing the

ROMs can be a problem if the original chips in your particular model are soldered in or if you aren't familiar with handling semiconductor components.



Speed

Serial-port transfer speeds between the HD and the computer are the same as for a 1541 disk drive when run with a stock 64. On a 128, transfer speeds were comparable to a 1581. Internal drive operations, such as formatting a partition, generally take only a few seconds. Loading a 150-block file from the HD, with JiffyDOS, takes only 5 seconds. Saving the same file to the HD, with JiffyDOS, takes 19 seconds. Booting CP/M from an HD partition requires only 24 seconds. Copying a double-sided 1571 disk to an HD partition, using the included MCOPY whole disk copy program, requires only 74 seconds.

Copying a 1581 disk to an HD partition using MCOPY takes 81 seconds.

CMD has done an excellent job of designing a SCSI hard drive interface for the 64/128 computers. It has addressed compatibility issues by providing both hardware emulation and custom software. In general, the limitations of the system are due to the built-in limitations of the Commodore operating system.

The HD series of hard drives is intended for serious users of productivity software who can justify its cost. In particular, Creative Micro Designs has indicated that a number of bulletin board programs will work with the HD hard drives. GEOS users should find the HD an effective tool. Keep in mind, however, that the HD operates as a collection of 1581 disk drives as far as GEOS is concerned. A similar limitation applies to CP/M users. Also, be prepared to add JiffyDOS to your system in order to obtain the maximum possible performance from the HD. □

CMD Hard Drives

Standard capacities of 20, 40, and 100 megabytes.

HD-20—\$599.95

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Memory Expansion!

GEORAM

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Believe it or not, GEORAM's disk transfer rate is actually 35 times faster than the 1541, 1571, or 1581 disk drive! This means that screens redraw in a flash, and that your Commodore doesn't waste time spinning disks looking for data. GEORAM makes the GEOS family of programs faster and more powerful than ever. NOTE: GEORAM is designed for use ONLY in the GEOS environment—it cannot be used with non-GEOS software.

GEORAM (requires GEOS)

88604 \$124.95

1750 Clone

\$199⁹⁵



The 1750 Clone offers 512K, and works with all software that is 1750 compatible (e.g., GEOS, Paperclip III, and Mavernick). Furthermore, you can use it to create a RAM disk to store files or programs for lightning-fast access. (Unlike GEORAM, the 1750 Clone works with non-GEOS software. Some computers may require power supply.)

1750 Clone 89517 \$199.95

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Includes GEOS 1.5 Plus Graphic & Utility Software!



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2400 Baud C64/C128

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Both the Minimodem-C and C24 are completely Hayes compatible (not just partially compatible like the 1670 and some Avatex models) and 1670 compatible. This means they'll work with ALL communications software for the 64, 64C, and 128. Key features include seven status indicators, Busy Detect, DTR signal support, High Speed Detect Line, and Auto Answer/Auto Dial. Includes Multiterm 64 and 128 software so you can start communicating right away, plus a free trial hour on CompuServe! Full-year warranty.

1200 Baud C64/C128

\$59⁹⁵

The Amiga versions of the Minimodems are equipped with a female connector to plug directly into the Amiga 500 or 2000. They need no external wall plug for power, and they use the Amiga's audio output for maximum fidelity.

Minimodem-C24 (2400 Baud for C64/C128)
88148 \$79.95
Minimodem-C (1200 Baud for C64/C128)
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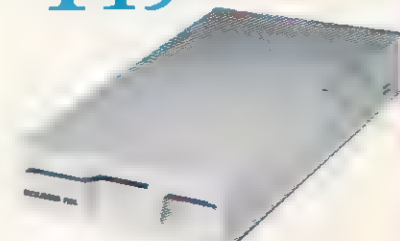
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C64/C128, Disk 78919 \$32.95
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FEEDBACK

QUESTIONS FROM OUR READERS

Wait and See

I was dismayed yesterday when I called the circulation department of your magazine to find out why I had not received my July issue. I was informed that *Gazette* magazine was being combined with the parent magazine. The primary reason I subscribed to *Gazette* was that I wanted a magazine dedicated to the Commodore 8-bit computers and this was the best one on the market. Now I fear that if Commodore machines will have to compete for magazine space with other computers, there will be fewer articles and programs for mine. I have a 128. I will wait and see, but if it is not the quality I have enjoyed and grown accustomed to, I will sadly not renew my subscription.

TIMOTHY GROSSER
COPPERAS COVE, TX

As a *Gazette* reader and subscriber since December 1984 (still have 'em all), it should make little difference as to your choices in format, paper, binding, and so on. *Gazette* is *Gazette* is *Gazette*. Whatever it takes to move ahead into the nineties is OK. Content, not format is what is important to me.

M. R. PLECHATY
SARATOGA, CA

Autobooting

I was at a friend's house (who has an IBM), and when he turned on his computer all the programs booted automatically with something called a CONFIG.SYS file. Is there something for the 64 that can do this?

NICK D'ALONZO
COATESVILLE, PA

Your friend's IBM probably has a file called AUTOEXEC.BAT in the directory of its default startup disk. DOS automatically executes whatever commands are in this file whenever the computer is switched on. This command is often used to load and run a commonly used program. The 128 has a similar autoboot feature for 128 programs, but it's unavailable for the 64 or for use

with 64 programs. We did run a program for the 128 called Fast Boot (May 1987) that lets you insert a disk in the drive, turn on the computer, and have a 64 program appear on the screen.

A Jiffy Proofreader Tip

I am a contented user of a 128D and JiffyDOS, and I like to type in some of the interesting programs you publish in your excellent magazine. In order to use *The Automatic Proofreader* with JiffyDOS, however, I find it necessary to make two small changes to the program since JiffyDOS alters the vector found at 772 and the *Proofreader* checks this vector twice to identify which machine is being used. In lines 30 and 90, change IF VE = 17165 to IF VE = 61137. Earlier versions of the *Proofreader* have a different line number but the same PEEK. I hope this may save one or two readers who have the same setup a few minutes of head scratching.

JOHN SPIRA
AUSTINMER, N.S.W
AUSTRALIA

Thanks for the tip and the kind words, John. The JiffyDOS speed enhancement system from Creative Micro Designs does indeed alter the vector you mentioned and could interfere with the Proofreader. Those of you using JiffyDOS installed on a 64 might want to make a similar change in your version of the Proofreader. Change the value of VE in line 20 from 42364 to 60004. Also, check out the review of JiffyDOS 6.0 elsewhere in this issue.

Tree Tracing Revisted

In the June "Letters" column of Gazette, we asked readers to help Roy N. Kelley of Hamilton, Ohio, locate genealogy programs for his 64/128. Dozens of people wrote, and here are some of their suggestions.

Byteware, 906 West 6th Avenue,

Monmouth, Illinois 61462, has shareware, *FGS and PED C*, \$21.95, that produces family group sheets and pedigree sheets. I have been using the original for two years, and I like it very much. An improved version is also available.

J. M. KINABREW JR
NEW ORLEANS, LA

The following companies provide 64 and 128 genealogy software of various degrees of sophistication and pricing: *Traces*, P.O. Box 168, Center, Missouri 63436; PFA, 8600 Old Spanish Trail #79, Tucson, Arizona 85710; and *Quinsept*, P.O. Box 216, Lexington, Massachusetts 02173.

I have used *Traces'* program for recording census data, and it generally works well. I use *Jenny II, the Genealogist*, from Basic Fundamentals, 3366 South 2300 East, Salt Lake City, Utah 84109, \$19.95, regularly to update my family files.

JAMES H. HOOD
SALT LAKE CITY, UT

COMPUTE!'s Third Book of Commodore 64 provided a program titled *Family Tree* on pages 82-92. It provided for disk and printer output.

HARRY L. ADAIR
LAS VEGAS, NV

Try Remsoft, P.O. Box 2249, Camarillo, California 93011-2249. You get a lifetime membership, a disk full of software, and a catalog for \$7.98. It's all worth it. Disk number 5066 has a program called *Family Tree* for \$4.00 and \$2.00 for postage.

PAUL DU'BEY
ATHOL, MA

Here are several outlets for genealogy programs: *Family Roots* (64 and 128 versions), *Quinsept*, P.O. Box 216, Lexington, Massachusetts 02173, \$185.00; *Your Ancestors*, Ken Barber, 5785 Brickyard Road, Tillamock, Oregon 97141, \$10.00; *Family/64*, Petrocci Freelance, 651 Houghton Road, Tucson, Arizona 85748, \$29.95; *Gleaner*, Kudzu Software, P.O. Box 993, Morrow, Georgia 30260, \$19.95; *Your Family Tree*, Hurdware, P.O.

FEEDBACK

Box 241746, Memphis, Tennessee
38124, \$44.95.

ROBERT D. YATES
VIRGINIA BEACH, VA

QuantumLink's Your Family Tree has several genealogy programs available for downloading. Also try the Roots board on CompuServe and the Genealogy board on GEnie.

M. R. PLECHATY
SARATOGA, CA

I have been using a program for several years now on my 128 in 128 mode. It is *Family Tree* and can be obtained from Briwall, P.O. Box 129/58 Noble Street, Kutztown, Pennsylvania 19530.

R. A. CARTER
NORTH BAY, ONT., CANADA

Sandy and Don Ritzinger of Software Solutions, 7378 Zurawski Court, Custer, Wisconsin 54423, have created *Arbor-Aid*, which is easy to use and can be adapted to virtually any family recordkeeping system.

BILL HARROP
TAMPA, FL

Software Support International has *Family Tree 128/64 Version II*. It sells for \$36.97, and its catalog number is C00523. The address is 2700 NE Andersen Road, Suite A-10, Vancouver, Washington 98661.

MARK VAVRA
MILLIGAN, NE

The only ones I have found are from QS! Alliance, 5846 Highway 111 South, New Albany, Indiana 47150. Its disk number X007 contains programs for both the 128 and 64. Disk number B018 contains one for the 64.

WILLIAM EVANS
GOWER, MO

Powerful Utilities

Most of the time machine language programs conflict with each other in memory, but I use three great ones simultaneously. First I load *Quick!* (December 1988), relocated to block 202. Next, *Function Key Magician* (February 1988) goes in, giving me 16 tailor-made function keys. One of these loads my all-time favorite utility, *Triple 64* (April 1985). I can now load and edit three separate 25-block BASIC programs quickly and efficiently. That's a lot of muscle for a 64! Thanks and keep encouraging authors.

LUIS MORENO
WINDSOR, NY

You're right, Luis. Those utilities do pack a lot of power. Gazette is always looking for handy utilities and productivity tools to make the 64 even more useful. So, if you're a programmer, we want to see your best efforts. Send them on disk to our Submissions Reviewer at the

address listed below.

If you have a question, comment, or problem, we want to hear from you, too. Send your letters to Gazette Feedback, COMPUTE Publications, 324 West Wendover Avenue, Greensboro, North Carolina 27408.

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(6026) THE DATA BASE FOR C-128 - Database that can be customized, tutorial & help on disk

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- (6055) C-128 TELECOMM / 1 - Two of the best PD communications software, 80 column mode.
(6050) C-128 TELECOMM / 2 - Four of the best terminal programs for the 128, 80 column.

GAMES

- (6049) C-128 GAMES / 1 - 40 column Galactic, Castle & Damsels, 80 column Star Trek.
(6054) C-128 GAMES / 2 - 80 column Norad, Wargames, not Lunar Land. Print Spock & Kirk
(6088) C-64 GAMES / 1 - Action games like Robbers, Whirly Bird, Blue Thunder & more
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RECIPES

- (6249) RECIPES / 1 - This disk contains 50 miscellaneous recipes.
(6250) RECIPES / 2 - This disk contains 51 misc. recipes

UTILITIES

- (6056) C-128 DISK MANAGING UTILITIES - 40 & 80 column utilities to manage disks, copy, format, etc.
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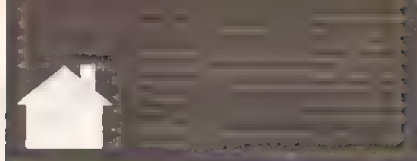
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D'IVERSIONS

F R E D D ' I G N A Z I O

It's 5:00 a.m. It's dark. My daughter, Catie, and I have just finished doing "her" paper route. It's a Tuesday morning, and the routine never varies. Deliver the papers. Feed Mowie the cat. Take the trash out to the curb. Brew a fresh pot of coffee. Now, steaming cup of coffee in hand, I trudge up the stairs to my study, where I spend many long minutes staring with bleary eyes into an empty computer screen.

Suddenly my fingers start to itch. I feel a subliminal, submuscular trembling begin to wriggle up my nerve fibers. In anticipation, I place my fingers on the keyboard. Miraculously the fingers begin tapping, and words appear magically on the computer screen. The cursor flies across the screen like a kite, sweeping across the blue sky, uncovering clouds shaped like letters, words, entire sentences.

I push away from the keyboard and gaze fondly at the screen. Now that's real writing, I think admiringly. I grab my empty coffee cup. Coffee break time!

As I sit watching the steam rise from my fresh cup of coffee, it occurs to me how strange it is that we interact with our computers by using a keyboard. Think about it. Dancing fingers. Ballerina fingertips that tap and skip across the keys. Is this normal? Have we as a species spent millions of years evolving just for this moment—so we could poke a few keys and communicate with a computer?

Isn't there a better way?

We all know that computers require input through a keyboard because that's the way they evolved. Once upon a time (approximately 40 years ago), they were highly specialized beasts that required communication through special symbols—originally numerical, later alphanumeric. First cables were used, later switches on the computer's front panel. For a while computer punch cards were in vogue. Finally it occurred to someone that perhaps the simplest solution was to just attach a QWERTY,

typewriterlike keyboard to the machines and have at it.

But it's no longer the 1940s and 1950s. It's 1990, and maybe it's time to look beyond keyboards. After all, how many *regular* human beings actually feel cozy around a keyboard anyway?

One of the most advanced computers to grace the movie screen in recent years was Johnny Five, the hero of the two *Short Circuit* movies. Johnny loved input. But did you ever see him getting it through a keyboard? Never. Instead he used his powerful optical sensors (his eyes), auditory sensors (his ears), and tactile sensors (his fingers and hands) to gain his prodigious knowledge of the real world.



In addition, Johnny looked distinctly uncomputerlike. Instead of sitting on someone's desk meekly and quietly waiting for the gentle tap of little keys, he was rolling around cities and forests, combing the countryside for more input. "Input! Input!" he cried. "More input!"

Johnny Five is a good example of a computer that doesn't look like a computer. There are many more examples in everyday life. Take your car or your wristwatch. Take your telephone, your microwave, your video camera, your CD, or your Walkman. Or how about fax machines and phone mail at offices? All these are computers. Some still have keys, control panels, or buttons, but they accept other forms of input as well—images,

voices, light waves, and so on.

As computer chips keep getting smaller and more powerful, the pressure will grow to transform desktop computers into something totally new. Already, incredibly powerful computers can fit in a briefcase, on your lap, or even in your pocket. A new computer from Sony lets you write on the computer screen with a plastic stylus. A new touchscreen from IBM lets you point at the screen and abandon the keyboard entirely!

If computers keep shrinking, it will soon get impractical to try to attach a full QWERTY keyboard. For many years experts have been predicting that computers of the future will be built right into our clothing—our eyeglasses, our credit cards, our shirts, even our underwear and socks.

In his award-winning book *Neuromancer*, William Gibson speculates that in the future computers will become so small that they'll be able to dangle from necklaces, hang from our ears like earrings, or nestle inside of fillings in our teeth. Gibson imagines that human-computer interfaces will evolve into small "terminals" implanted in our skulls directly behind our ears. We'll carry small cartons of *microsofts*—intelligent cosmetic jewelry that contains huge databases, new skills libraries (like juggling or speaking French), and antennae (cellular phones the size of a sugar crystal).

Whenever we need to communicate with our computer, we'll just pop open the case, pull out a *microsoft*, and plug it into our head. Rich people will have real diamonds, emeralds, and pearls aboard their *microsofts*. The rest of us will settle for inexpensive, synthesized replicas.

So, what do you think? Write me and tell me your gut reaction to this question: How do you feel about your computer keyboard? Could you give it up if something better came along? What kinds of new computer interfaces can you imagine? Send your ideas to Fred D'Ignazio, COMPUTE's Gazette, 324 West Wendover Avenue, Greensboro, NC 27408. □

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Why wait any longer to join the Information Revolution? Especially when Arotek has just made it so easy for you to buy today! How? By giving you easy to use high-speed modems at breakthrough prices! A modem is just a device that allows your computer to talk to other computers over ordinary phone lines. Modems come in different speeds. Right now, 2400 baud is the fastest speed that's practical for the dial-up phone system.

For the more experienced among you, the Arotek Minimodems are completely Hayes "AT" command set and are 2400 baud "ampersand command" compatible, auto-dial, auto-answer devices that auto-switch between 300, 1200, and 2400 baud for maximum communications flexibility and service compatibility. Minimodems carry built-in sound capabilities (internal speaker on the RS-232 & C64/128 versions, monitor speaker on the Amiga version) and a full array of status indicator lights.

If you're new to telecommunications, don't let the terms above throw you - it's just a technical way of saying that Minimodems will give you every feature you could ever need in a modem.

The C64/128 Minimodem plugs directly into the user port on the back of your computer. The Amiga version plugs right into the serial port and comes with a built in extension cable so you'll be able to use it with an Amiga 500 or 2000 series and still be able to see the status indicator lights. The Commodore version works on ALL 64's or 128's ever made, while the Amiga version works on the 500 or the 2000/2500 series of computers. A separate RS-232 and Amiga 1000 version is also available (please call for details).

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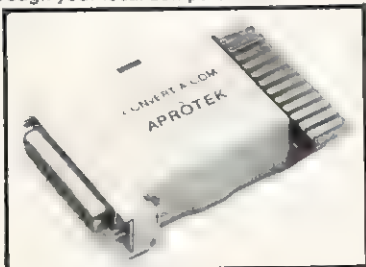
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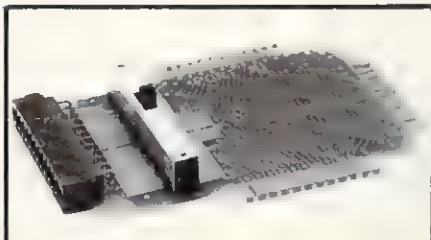


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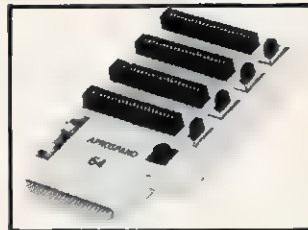


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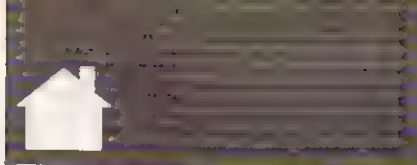
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PROGRAMMER'S PAGE

R A N D Y T H O M P S O N

Feel like giving your 64 a frontal lobotomy? Try this: POKE 1,PEEK(1) AND 253. You've just removed your computer's intelligence. Hit RUN/STOP-RESTORE to return your 64 to a more productive state.

Experienced programmers will recognize the above command as the one that switches out the computer's ROM (Read Only Memory). Every time your computer prints READY, flashes the cursor, or complains about your syntax, it's because the instructions located in ROM told it to do so. Without its ROM, your computer is functionally brain dead.

Two ROMs. The 64 has two types of ROM: 8K of BASIC ROM, which is responsible for interpreting and executing BASIC instructions, and 8K of Kernal ROM, which handles the computer's more specialized functions, such as reading characters from the keyboard and moving the cursor. Together they form the 64's operating system.

BASIC ROM is located at 40960-49151 (\$A000-\$BFFF), and Kernal ROM is located at the top of the 64's memory map at 57344-65535 (\$E000-\$FFFF). As you might expect, reading one of these locations returns the value that's stored in ROM. After all, that's what the computer sees here. However, when you switch out ROM as we did above, RAM takes its place. At this point, reading one of these locations returns the value that's stored in RAM. Interestingly, values written to these locations are *always* stored in the RAM that resides here, no matter what the in-out status of the ROM is.

The reason your computer hangs when you switch out ROM from BASIC is because the underlying RAM doesn't contain any coherent machine language routines for the computer to execute. That is, not unless you put them there.

Customizing ROM. Because the underlying RAM can be written to at any time, it's easy to move the contents of ROM to the corresponding

RAM addresses. Once that's accomplished, switching out ROM has no ill effects. Best of all, you can now modify the ROM code to your liking, thus changing the way the computer behaves.

To copy ROM to RAM and then switch out ROM, type in and run the following program. Be patient; this takes more than a minute to run.



```
10 FOR I=40960 TO 49151:POKE
I,PEEK(I):NEXT
20 FOR I=7344 TO 65535:POKE I,
PEEK(I):NEXT
30 POKE 1,PEEK(1) AND 253
```

Line 10 copies BASIC ROM, and line 20 copies Kernal ROM. Line 30 switches out ROM by clearing bit 1 of memory location 1 (the computer's R6510 register). Bit 0 of this register controls BASIC ROM, while bit 1 controls Kernal ROM. You should note that we simply clear bit 1 in line 30 because BASIC ROM is automatically switched out whenever Kernal ROM is. Only BASIC ROM can be switched independently.

READY? Now that the dirty work is done and ROM has been moved into RAM, it's time to have some fun. To begin with, let's change the READY prompt. Enter **POKE 41849,65:POKE 41850,78** after running the program above. A familiar name should appear in place of the computer's normal greeting. If you

like, you can add these POKES to the end of the program above.

On the more practical side, disk drive owners can force their computers to default to loading from and saving to device 8, the disk drive, instead of device 1, the datasette. Enter **POKE 57818,8** and you won't have to type a ,8 after every load and save command.

In an old issue of *COMPUTE!* magazine, Jim Butterfield lists a POKE that stops BASIC from shouting ILLEGAL QUANTITY ERROR every time you try to get the ASCII value of a null string. Enter **POKE 46991,5** and the computer will return a value of 0 when you PRINT ASC("").

Sheldon Leemon mentions changing INPUT's prompt character from a question mark to a colon in his book *Mapping the Commodore 64*. Enter **POKE 53846,58** to make this change. Actually, you could POKE the ASCII value of any character here, such as a 32 for a space.

Enter **POKE 61765,252** and BASIC's GET statement will wait until it receives a valid keypress before continuing on (no more GET K\$:IF K\$="" THEN... commands).

Adventuresome machine language programmers might go even further and replace the 64's ROM code entirely. BASIC could be replaced with a Pascal interpreter, or the whole computer could be converted into a dedicated word processor or database system.

Of course, switching out ROM does make your computer more vulnerable to stray POKE commands. If you accidentally destroy a sensitive ROM location, your computer could easily lock up. You can switch back to the normal ROM by entering **POKE 1,PEEK(1) OR 3** (assuming the computer is still responding to your commands), hitting RUN/STOP-RESTORE, or turning your computer off and on. Any mistakes (or improvements) that you make while modifying your 64's ROM code are quickly forgotten when the power goes out. ☐

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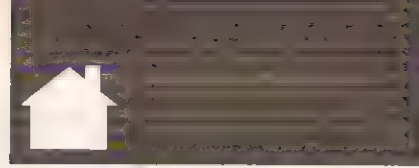
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BEGINNER BASIC

L A R R Y C O T T O N

Last month, we began a program that moves a musical sprite with a joystick. Let's continue from the point where we placed a green quarter note on a musical treble clef staff.

We'll be able to play 41 notes, from two octaves below middle C to the fourth A above middle C. *The 64's Programmer's Reference Guide* provides the frequency values; from them we calculate POKEable values. First we must dimension the arrays.

200 DIMFU(41),FL(41),C(41)

FU() and FL() are the upper- and lower-frequency arrays that will hold the values to be POKEd into voice 1's frequency control registers. C() is the array for the colors that correspond to the musical notes.

Let's read the 41 decimal values and colors and calculate two POKEable values for each.

```
210 K=256:FORJ=41TO1STEP-1:
  READD,C(J):FU(J)=INT(D/K):
  FL(J)=D-FU(J)*K:NEXT
220 DATA1072,5,1204,2,1351,3,1432,
  4,1607,12,1804,6,2025,7,2145,5,
  2408,2,2703,3
225 DATA2864,4,3215,12,3608,6,4050,
  7,4291,5,4817,2,5407,3,5728,4,
  6430,12,7216,6
235 DATA8101,7,8583,5,9634,2,10814,
  3,11457,4,12860,12,14435,6,16203,
  7,17167,5
240 DATA19269,2,21629,3,22915,4,
  25721,12,28871,6,32407,7,34334,
  5,38539,2
250 DATA43258,3,45830,4,51443,12,
  57743,6
```

Now we define JS, the memory register for joystick port 2.

300 JS=56320

Lines 310-390 form an infinite loop; the only way to break out is to press the Run/Stop key or to turn off the computer. First, PEEK at the joystick port to see what value is there (JD means Joystick Direction).

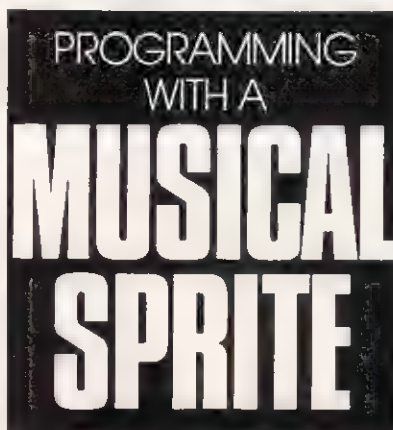
310 JD=PEEK(JS)

We need to check only for certain values that correspond to particular directions. To detect if the stick is pushed up, enter

320 IFJD=126THENN=N-4:IFN<49THENN=49

The note should move up when the stick is pressed up. N is the vertical position of the sprite on the screen (see lines 110 and 180). N must be decremented by four pixels for the sprite to move up a note.

We limit the value of N to keep the note on the screen. In this case, the top line's position has the value N=49. Now look to detect a downward press.



330 IFJD=125THENN=N+4:IFN>209THENN=209

In this case N is incremented by 4 and the bottom line of the staff corresponds to a value of 209 for N.

We haven't moved the sprite yet; we've only assigned it a new vertical position. Let's look at the port again to detect a press of the fire button, which will sound a note.

340 IFJD=111THENGOSUB400

Press the fire button and port 2

contains the value 111. We also want to detect if the joystick is pushed up or down with the button pressed. This sounds notes as it moves, with gliding arpeggios. GOSUB400 to play the note, assign a new vertical position to the sprite, and check vertical limits.

```
350 IFJD=110THENGOSUB400:
  N=N-4:IFN<49THENN=49
360 IFJD=109THENGOSUB400:
  N=N+4:IFN>209THENN=209
```

Here's where we actually move the sprite to the new position N:

370 POKEV+1,N:Q=INT(N/4-11)

V+1 is sprite 1's vertical position. Q is a calculated index to the color array. (Remember reading the color numbers in line 210?). The colors cycle through seven changes, then repeat.

Thus all Cs are green, all Ds are red, and so on. Now POKE the color number into sprite 1's color memory register.

380 POKEV+39,C(Q)

End the main loop by returning to its beginning:

390 GOTO 310

To sound the note, POKE voice 1's frequency registers with the figures calculated in 210:

400 POKES,FL(Q):POKES+1,FU(Q)

S and S+1 are the first two registers of the sound chip; they control voice 1's frequency. We now turn on the note in a rather strange way: by turning it off first. This, combined with our envelope (defined in line 20), ensures that our notes can sound either one at a time or as an arpeggio.

```
410 POKES+4,64:POKES+4,65
420 RETURN
```

When you run the program, try playing a tune with the joystick. □

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MACHINE LANGUAGE

J I M B U T T E R F I E L D

This month, we'll show how the BIT command may be used to perform certain tests. Here's our project: Given a 6502-based opcode, we want to find out how long the instruction might be.

A pattern in the opcodes allows us to guess the length: If an instruction (in hexadecimal) ends with D, it's a length-3 opcode. But some patterns are not that simple. Opcode \$20 (JSR) has length 3, code \$30 (BMI) has length 2, and code \$40 (RTI) has length 1. The test will need to be constructed carefully.

Standard disassemblers use a lookup table to determine an instruction's length.

The code that follows is more compact, and it shows a new way to use the BIT instruction.

Normally, a programmer would examine specific bits by masking them with AND and then performing a comparison. To continue testing, the original value would need to be loaded again so that a new mask could be applied. The BIT instruction has a built-in AND test that doesn't disturb the values being tested. It's more efficient.

The following program runs on all Commodore 8-bit computers. Assume that the opcode to be analyzed is in the A register. It won't be disturbed during our analysis program; it will still be there when we've finished, and the length value will be in the X register.

First, test specifically for the one instruction that defies the pattern—JSR, opcode \$20, with a length of 3.

```
2045 LDX #S03 ;may be length 3
2047 CMP #S20 ;test for $20
2049 BEQ $2069 ;yes, so we're done
```

Address \$2069 represents the end of our analysis. As you can see above, we've preloaded X with 3—the right value—so we can branch directly to our completion address. Preloading X makes for smooth coding.

Next, we test the opcode in A

against a fixed mask of \$9F stored at address \$2081. (Wouldn't it be nice to have immediate-mode addressing available for the BIT instruction?)

If none of the bits match, the Z flag will be set. Mask \$9F has six bits set. The only instructions that will set the Z flag are opcodes \$00 (BRK), \$40 (RTI), and \$60 (RTS). Value \$20 would also match, but we've already handled it. When any of the length-1 codes are detected, the program goes to \$2069.

```
204B LDX #S01 ;may be length 1
204D BIT $2081 ;test against $9F
2050 BEQ $2069 ;exit if it is
```



Now we test against a mask of \$08 stored at \$2082. Only a single bit is set in this number. Which opcodes will it extract? If you wrote the opcode in hexadecimal, you'd see that this coding will identify all instructions whose last digit (in hex) is less than 8. Opcodes like \$A2 (LDX), \$30 (BMI), \$85 (STA), and dozens of others will take this exit with length 2.

```
2052 LDX #S02 ;may be length 2
2054 BIT $2082 ;test against $08
2057 BEQ $2069 ;exit if it is
```

About half of the possible opcodes now have been identified. Next, we extract the codes whose hex representation ends in 8 or A. We accomplish this by using a mask of \$05, which is stored at \$2083.

```
2059 LDX #S01 ;may be length 1
```

```
205B BIT $2083 ;test against $05
205E BEQ $2069 ;exit if it is
```

All that's left are opcodes ending in (hex) 9, B, C, D, E, and F. Those ending in B and F are not legitimate instructions. The remaining opcodes are length 3, with one important exception. An even first digit (in hex) followed by 9 will be a length-2 instruction. For example, LDA immediate is coded as \$A9. We can test for this combination with a mask of \$16.

```
2060 LDX #S02 ;may be length 2
2062 BIT $2084 ;test against $16
2065 BEQ $2069 ;exit if it is
2067 LDX #S03 ;else set length 3
2069 (analysis is complete)
```

The BIT instruction came through with stunning elegance and efficiency. It takes time and care to get the masks correct and in their most efficient order.

In the accompanying BASIC program, I've added a hex input routine to precede the above code and a brief output routine to follow it.

```
QR 100 DATA 160,0,185,133,32,3
      2,210,255,200,201
MJ 110 DATA 32,200,245,32,228,
      255,201,71,176,249,201
RF 120 DATA 48,144,245,32,210,
      255,56,233,48,201,10
GJ 130 DATA 144,2,233,7,10,10,
      10,10,141,0,37
EK 140 DATA 32,228,255,201,71,
      176,249,201,48,144,245
JR 150 DATA 32,210,255,56,233,
      48,201,10,144,2,233,7
PB 160 DATA 13,0,37,162,3,201,
      32,240,30,162,1
GP 170 DATA 44,129,32,240,23,1
      62,2,44,130,32,240,16
BX 180 DATA 162,1,44,131,32,24
      0,9,162,2,44,132,32
JF 190 DATA 240,2,162,3,160,0,
      185,138,32,32,210,255
KP 200 DATA 200,201,58,208,245
      ,138,9,48
PS 210 DATA 32,210,255,169,13,
      76,210,255
XG 220 DATA 159,8,5,22,72,69,8
      8,63,32
HD 230 DATA 61,76,69,78,58
PP 300 FOR J=8192 TO 8334
DS 310 READ X:T=X
SA 320 POKE J,X:NEXT J
KX 330 IF T<>16245 THEN STOP
BH 340 SYS 8192
```



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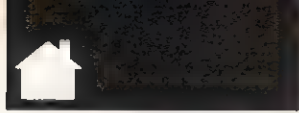
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Natalie, by Wayne Schmidt of New York City, is this month's winning entry. Enjoy it and the rest of the fine pictures found only on the *Gazette Disk*.

Welcome to "Gazette Gallery." Each month the *Gazette Disk* features a collection of the best 64/128 artwork submitted by our readers. We pay \$50 for each piece of art we accept and an extra \$50 for the one selected Picture of the Month.

Send your 64/128 art in Doodle, Koala, or other popular format. (No more than five entries per disk per month, please.) Rejected submissions are returned only to artists who enclose a self-addressed, stamped disk envelope. □

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BUG-SWATTER

• Some of our readers have had trouble with *Think Tank*, from the April 1990 issue of *Gazette*. A crucial character in line 1080 was inadvertently dropped from our program listing.

Here's the corrected line:

```
1080 RETURN:DATA0,0,16,0,0,0,0,
      0,0,0,16,0,66,0,136,0,0,40,8,0,3,
      32,32,32
```

• The *Disk Editor* program (February 1990) does not function as written for plotting the current file sector chain in BAM mode (Ctrl-P). To make the corrections, load and run *MLX*. Enter 8000 as the starting address and 8F97 as the ending address; then load your copy of *Disk Editor*.

A LOAD ERROR message will appear because this new ending ad-

dress exceeds the ending address of the original program. This is not a problem. Choose the ENTER DATA option to modify the following lines.

```
8AA0 84 8F AE 40 80 E8 E8 AC DB
```

```
8298 54 53 20 43 55 52 53 4F BE
82A0 52 20 43 48 41 49 4E 20 AF
```

```
8F80 8F 4C 5A 8F AE 95 80 E8 74
8F88 8E 3F 80 AE 96 80 8E 40 CD
8F90 80 4C 2B 8B 00 00 00 00 21
```

Note: Watch your line numbers and make sure you enter them correctly; they aren't all consecutive. For example, hit Return after entering the first line to return to the *MLX* menu. Select Enter Data again and start at 8298 for the next two lines. Then, save the program with a new name. □

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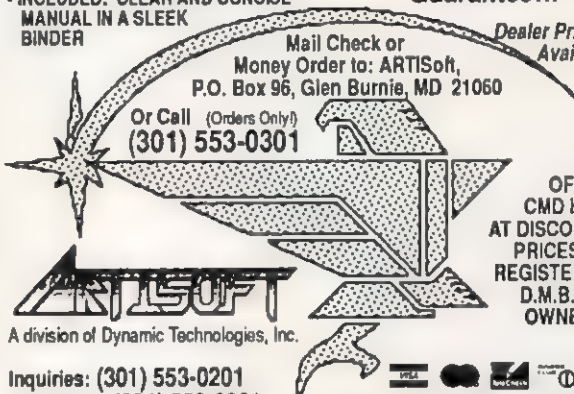
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ONLY ON DISK

There's something new on the *Gazette Disk*. In addition to the type-in programs found in every issue of the magazine, we're putting more features and programs on the *Gazette Disk* each month. Often, these programs would be too large for readers to type in. Check out the original 64 and 128 artwork on display in "Gazette Gallery," and look for our bonus programs as well. These programs and their instructions appear only on disk. Here are descriptions of this month's bonus programs.

Bastion

Steve Harter

This challenging one- or two-player game is based on the popular arcade hit *Star Castle*. *Bastion* is written entirely in machine language and features beautiful vectored graphics. The object is to destroy an enemy spacecraft protected by a multilayered force field.

Eyecatcher

Michael Lalonde

Eyecatcher is perfect for posting notices at user group meetings, school functions, or parties. Messages scroll across the top and bottom of the screen in huge letters while a large clock displays the time in the center.



PROGRAMS

G A B R I E L R I V E R A

Knowing the multiplication tables is intrinsic to all multiplication and division operations. Multiplication is one of the major components in the study of mathematics. Therefore, memorizing the multiplication tables is a necessary ingredient in understanding mathematics.

Memorizing the multiplication tables takes time, effort, and plenty of practice. This educational program is designed to help students learn those tables in a colorful and friendly environment.

Getting Started

Times Table Tutor is written in BASIC. Enter the program by using *The Automatic Proofreader*; see "Typing Aids" elsewhere in this section. When you've finished typing in *Times Table Tutor*, be sure to save a copy to disk.

Using the Program

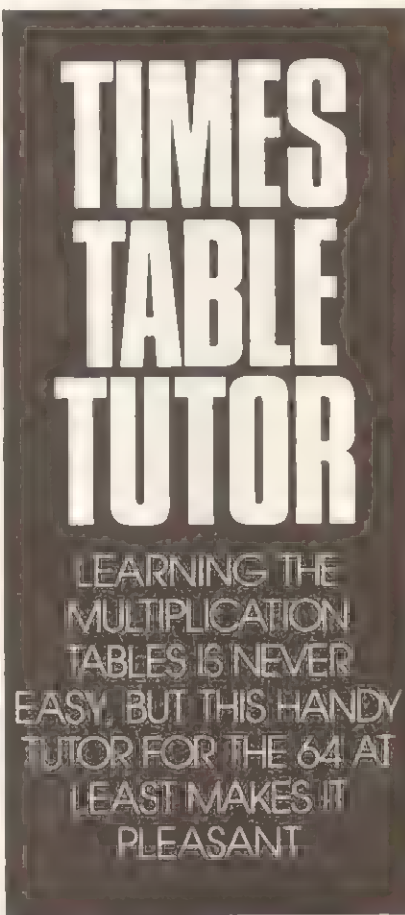
Times Table Tutor begins with a menu. Students have the choice of practicing an entire set of multiplication tables, a single set, or quitting the program.

Practicing an entire set drills students with random multiplication problems, with numbers ranging from 0 to 9. The program provides correct answers whenever a user gives an incorrect answer. Students can correct mistakes before they press Return by using the Delete key. The drilling continues until the user presses the back-arrow key.

Practicing a single set drills students with a specific set of problems. *Times Table Tutor* asks which set to drill. Students may choose any set from 0 to 9. If the user enters 5, for example, the program presents $5 \times 2 =$, $5 \times 3 =$, $5 \times 9 =$, and so on. This continues until the user has correctly answered all of the problems in the set. At this point, the program asks whether or not the student wants to repeat the set. Entering *No* returns the student to the main menu.

Times Table Tutor uses large and colorful digits that help make learning

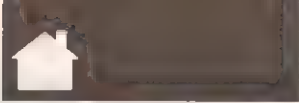
pleasant. Sound effects after correct or incorrect answers also add to the learning environment. While nothing can make memorizing the multiplication tables easy, *Times Table Tutor* makes it more exciting than doing repetitive drills with pencil and paper. Some might even think it's fun.



TIMES TABLE TUTOR

```
FD 10 REM COPYRIGHT 1990 COMPUTE PUBLICATIONS, INTL -
      (SPACE)ALL RIGHTS RESERVED
MX 100 COS="{4}{8}{2}{1}{BLU}
      {7}{RED}{3}{RED}"
QM 110 POKE53280,0:POKE53281,0
      :PRINT"(H)"
GS 120 GOSUB10000
BJ 1000 PRINT"{CLR}{N}"SPC(14)
      "{PUR}{A}*****{S}"
      "
```

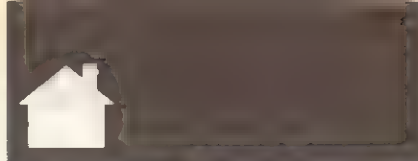
```
QB 1010 FORX=0TO6:PRINTSPC(14)
      "-{10 SPACES}-":NEXT
PA 1020 PRINTSPC(14)"{Z}*****
      *****{X}"
QQ 1030 PRINT"{HOME}"SPC(15)"
      {DOWN}{8}";
EH 1040 FORX=0TO2:PRINT"{A}{R}
      {S}{DOWN}{2 LEFT}
      {DOWN}{LEFT}{E}";NEXT
CG 1050 PRINT"{5 UP}{4 LEFT}IM
      ES{2 DOWN}{2 LEFT}ABLE
      {2 DOWN}{2 LEFT}UTOR"
DH 1060 PRINTTAB(13)"{YEL}
      {3 DOWN}COPYRIGHT 1990
      "
PD 1061 PRINTTAB(7)"COMPUTE PU
      BICATIONS, INTL"
RD 1062 PRINTTAB(11)"ALL RIGHT
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KM 1100 PRINTTAB(14)"{2 DOWN}C
      HOOSE ONE:"
FC 1110 PS="F1-ENTIRE SET":GOS
      UB40000:PS="F3-SINGLE
      (SPACE)SET":GOSUB40000
FE 1120 PS="F5-QUIT":GOSUB4000
      0
GD 1150 GETXS:IFXS<"{F1}"ORXS>
      "{F5}"THEN1150
KK 1160 GOSUB16000
BF 1170 IFXS="{F5}"THEN6000
SC 1180 IFXS="{F1}"THEN2000
GP 1190 GOTO3000
RB 2000 GOSUB5000
CE 2010 FORX=0TO1:N(X)=INT(RND
      (1)*10):NEXT:GOSUB40000
QP 2020 IFETHENE=0:GOTO1000
SQ 2030 GOTO2010
HH 3000 PRINT"{CLR}":PS="SINGL
      E SET":GOSUB40000ADY.
FG 3010 GOSUB30000:PRINT"
      {DOWN}WHICH SET? (0-9)
      ";
GS 3020 GETXS:T=VAL(XS):IFXS<>
      "0"ANDT=0THEN3020
BD 3030 PRINT"{CLR}CHRS(142):
      GOSUB30000:PRINT"
      {2 DOWN}THE {HOME}
      {4 RIGHT}"NS(T)"{HOME}
      {7 RIGHT}{3 DOWN}
      {3 RIGHT}{OFF}SET!"
EJ 3040 FORX=0TO800:NEXT:GOSUB
      5000
FC 3050 N(0)=T:FORX=0TO9:D(X)=
      0:NEXT:R=0
DR 3060 X=INT(RND(1)*10):IFD(X)
      )THEN3060
QH 3070 N(1)=X:GOSUB40000:IFETH
      ENE=0:GOTO1000
HF 3080 IFW=0THENR=R+1:D(N(1))
      =1:IFR=10THEN3100
AF 3090 GOTO3060
GB 3100 PRINT"{CLR}":PS="YOU'V
      E COMPLETED THE"+STR$(
      T)+" SET!":GOSUB40000
RR 3110 GOSUB30000:PRINT"
```



PROGRAMS

GAZETTE COMMODORE 64/128

AR 3120	{DOWN}PRACTICE" T"SET A GAIN? (Y/N)" GETXS:IFXS<>"Y"ANDXS<>"N"THEN3120	GJ 6000	TO6:PRINT" {LEFT} {UP} _" :NEXT:RETURN PRINT" {CLR}":P\$="QUIT" :GOSUB40000	BJ 10065	{DOWN} {5 LEFT} {3 RIGHT} {DOWN} {5 LEFT}" N\$(6)=N\$(6)+" {OFF} {*}" {RVS} {3 Y} {OFF} {*}"
AA 3130	IFXS="N"THEN1000	SK 6010	PRINT" {DOWN} {YEL} ARE Y OU SURE? (Y/N)"	RK 10070	N\$(7)=" {RVS} {4 P}" {DOWN} {LEFT} {DOWN} {LEFT} {DOWN} {2 LEFT} {OFF} {DOWN} {3 LEFT} {RVS} {OFF} {DOWN} {3 LEFT} {RVS} {OFF} {DOWN} {3 LEFT} {RVS} {OFF} {3 RIGHT}"
EM 3140	GOSUB5000:GOTO3050	HE 6020	GETXS:IFXS<>"Y"ANDXS<>"N"THEN6020	JR 10080	N\$(8)=" {RVS} {3 P}" {*} {DOWN} {5 LEFT} {3 RIGHT} {DOWN} {5 LEFT} {OFF} {*} {3 O}" {DOWN} {5 LEFT} {RVS} {OFF} {3 U} {RVS} {*}" {DOWN} {5 LEFT} {3 RIGHT} {5 LEFT} {3 RIGHT} {DOWN}"
PR 4000	PRINT" {HOME} {9 DOWN}"; {2 RIGHT}";	GR 6030	IFXS="N"THEN1000	BC 10085	N\$(8)=N\$(8)+" {5 LEFT}" {3 RIGHT} {DOWN} {5 LEFT} {OFF} {*} {RVS} {3 Y} {OFF} {*}"
AH 4010	FORX=0TO6:PRINT" {RIGHT} {38 SPACES} {RIGHT}";:NEXT	QG 6040	PRINT" {CLR} {YEL} {I} "CH RS (142);:END	EH 10090	N\$(9)=" {RVS} {3 P}" {*} {DOWN} {5 LEFT} {3 RIGHT} {DOWN} {5 LEFT} {OFF} {*} {3 O}" {DOWN} {5 LEFT} {RVS} {OFF} {3 U} {RVS} {*}" {DOWN} {5 LEFT} {3 RIGHT} {5 LEFT} {3 RIGHT} {DOWN}"
CK 4020	PRINT" {HOME} {9 DOWN} {2 RIGHT}";	PA 10000	N\$(0)=" {RVS} {3 P}" {*} {DOWN} {5 LEFT} {3 RIGHT} {DOWN} {5 LEFT} {3 RIGHT} {DOWN} {5 LEFT} {3 RIGHT} {DOWN} {5 LEFT} {3 RIGHT} {DOWN} {5 LEFT} {3 RIGHT} {DOWN}"	AG 10100	MS="{*} {RVS} {*}" {OFF} {DOWN} {5 LEFT} {*} {RVS} {2 SPACES} {OFF} {DOWN} {4 LEFT} {RVS} {2 SPACES} {*}" {DOWN} {5 LEFT} {*}" {OFF} {*} {RVS} {*}"
GX 4030	GOSUB30000:PRINTN\$(N(0))	DQ 10005	N\$(0)=N\$(0)+" {5 LEFT}" {OFF} {*} {RVS} {3 Y}" {OFF} {*}"	AD 10110	ES="{RVS} {5 SPACES}" {2 DOWN} {5 LEFT} {5 SPACES}"
RP 4040	GOSUB30000:PRINT" {4 UP} {RIGHT} {OFF} "M\$;	EQ 10010	N\$(1)=" {RIGHT} {RVS} {*}" {DOWN} {3 LEFT} {*}" {OFF} {RVS} {DOWN} {3 LEFT} {OFF} {*}" {RIGHT} {RVS} {DOWN} {LEFT} {DOWN} {LEFT} {DOWN} {LEFT} {DOWN} {3 LEFT} {2 Y} {2 Y}"	DQ 10120	S=54272:FORX=0TO24:PO KES+X,0:NEXT
PH 4050	GOSUB30000:PRINT" {5 UP} {RIGHT} {OFF} "N\$(N(1));	RB 10020	N\$(2)=" {RVS} {3 P}" {*} {DOWN} {5 LEFT} {3 RIGHT} {DOWN} {2 LEFT} {OFF} {*}" {DOWN} {3 LEFT} {RVS} {*}" {OFF} {DOWN} {3 LEFT} {RVS} {OFF} {DOWN} {3 LEFT} {RVS} {OFF} {DOWN} {2 LEFT} {RVS} {4 Y}"	PR 10130	POKES+24,15:POKES+5,1 7:POKES+12,17:POKES+6 ,234:POKES+13,234
KJ 4060	GOSUB30000:PRINT" {4 UP} {RIGHT} {OFF} "E\$" {4 UP} {RIGHT} {OFF} "A\$="	MC 10030	N\$(3)=" {RVS} {3 P}" {*} {DOWN} {5 LEFT} {3 RIGHT} {DOWN} {2 LEFT} {OFF} {*}" {DOWN} {3 LEFT} {RVS} {2 SPACES} {DOWN} {LEFT} {OFF} {*} {RVS} {*} {DOWN} {5 LEFT} {3 RIGHT} {DOWN} {5 LEFT} {OFF} {*} {RVS} {3 Y} {OFF} {*}"	MR 10140	POKES+1,16:POKES+8,24 :RETURN
FP 4070	GETXS:IFXS=" "THEN4070	AF 10050	N\$(5)=" {RVS} {4 P}" {DOWN} {5 LEFT} {DOWN} {LEFT} {DOWN} {LEFT} {4 P} {*} {DOWN} {LEFT} {SPACE} {DOWN} {5 LEFT} {3 RIGHT} {DOWN} {5 LEFT} {OFF} {*} {RVS} {3 Y} {OFF} {*}"	DA 15000	POKES+4,17:FORX=16TO4 STEP-1:POKES+1,X:FOR Y=0TO30:NEXT:NEXT
BJ 4080	IFXS="<"THENE=1:RETURN	PD 10060	N\$(6)=" {RVS} {3 P}" {*} {DOWN} {5 LEFT} {3 RIGHT} {DOWN} {5 LEFT} {OFF} {*} {RVS} {3 Y} {OFF} {*}"	MF 15010	POKES+4,16:RETURN
PR 4090	IFXS="0"ORVAL(X\$)>0THE NIFLEN(A\$)<2THEN4130			MQ 16000	POKES+11,17:POKES+11, 16:RETURN
EF 4100	IFXS=CHR\$(20)ANDLEN(A\$) THEN4140			HC 30000	C=C+1:IFC=10THENC=1
PQ 4110	IFXS=CHR\$(13)ANDLEN(A\$) THEN4160			HK 30010	C\$=RIGHT\$(LEFT\$(C\$,C ,1):PRINTC\$;:RETURN
EH 4120	GOTO4070			GF 40000	P\$=" "+P\$+" " :Z=LEN(P \$)
JP 4130	GOSUB30000:PRINTN\$(VAL (X\$))" {6 UP} {RIGHT} {OFF}";:A\$=A\$+X\$:GOTO4 070			AS 40010	X=20-(Z/2)
PF 4140	A\$=LEFT\$(A\$,LEN(A\$)-1) :PRINT" {6 LEFT} {UP}";			PF 40020	PRINTSPC(X);:GOSUB300 00:PRINT" {D}";:FOR Y=1 TOZ-1:PRINT" {I}";:NEX T:PRINT" {F} {DOWN}" {LEFT} {V} {UP}"
SD 4150	FORX=0TO6:PRINT" {DOWN} {5 SPACES} {5 LEFT}";:N EXT:PRINT" {6 UP} {OFF}"; :C=C-1:GOTO4070			BH 40030	PRINTSPC(X);:GOSUB300 00:PRINT" {RVS} "P\$: RET URN
EX 4160	A=N(0)*N(1):PRINT" {8 DOWN}":IFVAL(A\$)=AT HEN4190				
GE 4170	W=1:P\$="SORRY!":GOSUB4 0000:PRINT" {DOWN} {8}" {8 SPACES} THE CORRECT {SPACE} ANSWER IS {WHT} " A" {8} {LEFT} . "				
SP 4180	GOSUB15000:FORX=0TO250 0:NEXT:GOTO4200				
DF 4190	W=0:P\$="CORRECT!":GOSU B40000:GOSUB16000				
RS 4200	FORX=0TO500:NEXT:PRINT " {HOME} {17 DOWN}"				
XM 4210	FORX=0TO4:PRINT" {33 SPACES}":NEXT:RETU RN				
FA 4999	PRINT:RETURN				
AR 5000	PRINT" {CLR} "CHR\$(142) " {8} {12 P}":PRINT" {5}" {RVS} {4} EXITS. "				
SA 5010	PRINT" {4} {12 Y}" {5 DOWN}"				
JA 5020	PRINT" {WHT} U";:FORX=0T O37:PRINT" *";:NEXT				
HS 5030	PRINT" I";:FORX=0TO6:PR INT" {DOWN} {LEFT} _";:NE XT				
EJ 5040	PRINT" {DOWN} {LEFT} K";: FORX=0TO38:PRINT" {2 LEFT} *";:NEXT				
JF 5050	PRINT" {LEFT} J";:FORX=0				



PROGRAMS

F R E D K A R G

After months of backbreaking labor, digging at the base of Pharaoh's Pyramid, you've finally uncovered the doors to eight crypts that may lead to a fabulous treasure. You check each crypt, but there's no treasure to be found. Has the Pharaoh outwitted you?

You're not about to give up before you've solved the Pharaoh's riddle. You're sure the entrance to the pyramid is here, if only you can unravel its key. You deduce that if opening no single door provides access to the pyramid and its hidden treasure, then perhaps all of the doors must be open before the secret entrance reveals itself.

As you set out to test your theory, you're surprised to find that the doors are linked mechanically. Opening and closing one door triggers a mechanism in one or more of the others. There seems to be a consistent pattern as to how the doors are linked, but you realize that you'll need luck, persistence, and intelligence to open all doors.

Getting Started

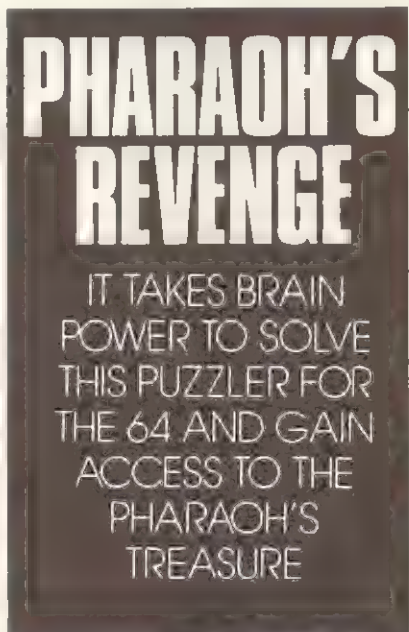
Pharaoh's Revenge is written entirely in BASIC. Type it in using *The Automatic Proofreader*; see "Typing Aids" elsewhere in this section. Be sure to save a copy after you've finished typing it in. When you're ready to take on the Pharaoh, simply load and run the program.

Playing the Game

Three challenging levels of play have been included in the game. At the easy level, all doors are connected in pairs. Open one door and a second one opens. If that second door is already open, then it closes. At the difficult level, each door may be linked to one, two, or three others. Finally, the level for superbrains requires you to pass successfully through three tiers before you can gain entrance. To open a specific door, just type the number that appears above it. Depending on their previous states, other doors associated with it will either open or close.

The game keeps track of how

many moves it takes in your attempt to gain access to the treasure. If you get frustrated, you can close all the doors at any time by pressing the A key. If the Pharaoh's curse proves to be too much, press S to see the solution. The numbers of the key doors will be highlighted in green. Enter these numbers to solve the puzzle. If you choose to look at the solution, the treasure will, of course, elude you, and the Pharaoh will have his revenge on yet another treasure seeker.



PHARAOH'S REVENGE

```
GM 1 REM COPYRIGHT, 1990, COMPUTE PUBLICATIONS, INTL, LTD(2 SPACES)ALL RIGHTS RESERVED
QK 10 V=53248:Y=222:DIMB%(3,8,3),DE%(3,8),S%(3,5):S1=10:POKEV+21,0:C=255
RF 20 BLS="{40 SPACES}":POKE53281,5:POKE53280,13
CX 30 PRINT"[CLR][7 DOWN]":PRINTSPC(11);"{WHT}{RVS}{19 SPACES}"
HP 35 PRINTSPC(11);"{WHT}{RVS} PHARAOH'S REVENGE {BLK}"
GA 40 PRINTSPC(11);"{WHT}{RVS}
```

```
{19 SPACES}{BLK} "
QE 45 PRINTSPC(11);"{WHT}{RVS}{9 SPACES}BY(8 SPACES){BLK} "
RA 50 PRINTSPC(11);"{WHT}{RVS}{19 SPACES}{BLK} "
XS 55 PRINTSPC(11);"{WHT}{RVS}{5 SPACES}FRED KARG{5 SPACES}{BLK} "
SG 60 PRINTSPC(11);"{WHT}{RVS}{19 SPACES}{BLK}":PRINTSPC(13);"{BLK}{RVS}{18 SPACES}"
AR 70 PRINT"{6 DOWN}{12 RIGHT}{8}COPYRIGHT 1990"
RR 71 PRINT"{4 RIGHT}{8}COMPUTE PUBLICATIONS, INTL, LTD"
GH 75 FORN=16128TO16383:READD:POKEN,D:NEXT
MS 80 PRINT"[CLR]{5 DOWN}":POKE53281,2:POKE53280,10:SC=0:SS=0
XX 90 PRINT"[CLR]{5 DOWN}":POKE53281,2:POKE53280,10:SC=0:SS=0
QK 95 PRINTSPC(S1);"{WHT}{RVS}{22 SPACES}"
GG 100 PRINTSPC(S1);"{WHT}{RVS}{5 SPACES}DIFFICULTY{7 SPACES}{BLK}{2 SPACES}"
BF 105 PRINTSPC(S1);"{WHT}{RVS}{5 SPACES}{10 Y}{7 SPACES}{BLK}{2 SPACES}"
FQ 110 PRINTSPC(S1);"{WHT}{RVS} 1. EASY{14 SPACES}{BLK}{2 SPACES}"
JM 115 PRINTSPC(S1);"{WHT}{RVS}{22 SPACES}{BLK}{2 SPACES}"
CM 120 PRINTSPC(S1);"{WHT}{RVS} 2. DIFFICULT{9 SPACES}{BLK}{2 SPACES}"
EP 125 PRINTSPC(S1);"{WHT}{RVS}{22 SPACES}{BLK}{2 SPACES}"
CX 130 PRINTSPC(S1);"{WHT}{RVS} 3. SUPERBRAINS ONLY{2 SPACES}{BLK}{2 SPACES}"
AJ 135 PRINTSPC(S1);"{WHT}{RVS}{22 SPACES}{BLK}{2 SPACES}"
GD 140 PRINTSPC(S1);"{2 SPACES}{BLK}{RVS}{22 SPACES}"
CC 145 PRINTSPC(S1);"{2 SPACES}{BLK}{RVS}{22 SPACES}"
KM 150 PRINT"{3 DOWN}{8 RIGHT}PLEASE CHOOSE FROM 1 TO 3 {P}{LEFT}";
```



PROGRAMS

GAZETTE COMMODORE 64/128

RM 160	GETK\$:IFK\$=""THEN160			QA 660	GETK\$:IFK\$=""THEN660
CG 170	K=ASC(K\$):IFK>32ANDK<90 THENPRINTK\$"{LEFT}";			EA 670	GOTO80
MK 180	IFK>51ORK<49THEN160	SG 470	T=DE%(M,R1):DE%(M,R1)=D E%(M,R2):DE%(M,R2)=T:NE XT:NEXT:RETURN	AE 680	POKE53280,0:POKE53281,0 :KI=0:PRINT"{CLR}";:PRI NTSPC(19)"{RVS}{6}{5}E {4}{*}"
QB 190	K=K-48:PRINT:PRINT" {2 DOWN}{15 SPACES} {RVS}PLEASE WAIT...":IF K=1THENP=0:CL=1	DD 480	J=0:FORN=0TO6STEP2:J=J+ 1:S%(P,J)=DE%(0,N)+1:NE XT:S%(P,5)--1	DC 685	FORN=18TO0STEP-1
RX 200	IFK=2THENP=0:CL=1	JG 490	FORI=0TO6STEP2:B%(0,DE% (0,I),0)=DE%(0,I+1)	RG 690	PRINTSPC(N)"{RVS}{5}E" :FORJ=0TOKI/2:PRINT" {RVS}{T}";:NEXT:FORM=0T OKI/2:PRINT"{RVS}{4}{T}" ":NEXT:PRINT"{RVS}{*}" :KI=KI+2:NEXT:RETURN
AP 210	IFK=3THENP=2:CL=8	AQ 500	R1=INT(RND(0)*8):IFR1=D E%(0,I+1)ORR1=DE%(0,I)T HEN500	MP 695	FORM=0TOKI/2:PRINT" {RVS}{4}{T}";:NEXT:PRIN T"{RVS}{*}":KI=KI+2:NEX T:RETURN
ES 220	GOSUB450	DC 510	B%(0,DE%(0,I+1),0)=R1:N EXT:FORI=0TO7:B%(0,DE%(0,I),1)--1:NEXT:RETURN	SC 700	FORN=1TO4:POKE(56093+S% (P+1,N)*5),7:IFS%(P+1,N +1)--1:THEENN=4
AQ 225	ONKOSUB480,520,530:GOS UB680:X=32:FORN=0TO7:PO KE2040+N,255:POKEV+39+N ,2	HQ 520	GOSUB540:S%(P,1)=DE%(0, 0)+1:S%(P,2)=DE%(0,4)+1 :S%(P,3)--1:RETURN	BE 710	NEXT:SO=0:RETURN
FF 230	POKEV+2*N,X:POKEV+1+2*N ,Y:X=X+40:IFX>255THENX= X-255	FS 530	FORM=0TO2:S%(M,1)=DE%(M ,0)+1:S%(M,2)=DE%(M,4)+ 1:S%(M,3)--1:NEXT	CR 720	FORN=1TO4:POKE(56093+S% (P,N)*5),5:IFS%(P,N+1)= -1:THEENN=4
RA 240	NEXT:POKEV+27,255:POKEV +23,0:POKEV+28,255:POKE V+29,0	GC 535	GOSUB540:RETURN	CA 730	NEXT:SO=1:SS=1:RETURN:D ATA000,084,000,000,168, 000,001,169
RD 250	POKEV+16,192:POKEV+27,0 :POKEV+21,255:POKEV+37, 7:POKEV+38,CL	RH 540	FORM=0TO2:FORI=0TO7:FOR J=0TO2	KS 740	DATA000,000,168,000,005 ,069,064,008,000,000,02 1,069,080,010,170,128
HE 260	PRINT"{UP}{YEL}{RVS} {2 SPACES}1{4 SPACES}2 {4 SPACES}3{4 SPACES}4 {4 SPACES}5{4 SPACES}6 {4 SPACES}7{4 SPACES}8 {2 SPACES}";	XA 550	R1=INT(RND(0)*8):IFR1=D E%(M,I)GOTO550	AE 750	DATA021,085,080,010,170 ,128,005,085,064,002,17 0,000,005,085,064,002
GS 270	PRINTSPC(10)"{WHT} {7 UP} OPEN CRYPT NUMBE R ";	CM 560	B%(M,DE%(M,I),J)=R1:NEX T:B%(M,DE%(M,I),3)--1:N EXT:NEXT:FORM=0TO2:FORJ =0TO2	EB 760	DATA170,000,001,085,000 ,000,168,000,001,085,000 0,000,168,000,001,085
DQ 280	PRINT"{HOME}{WHT}{RVS} {SPACE}{RED} MOVES {WHT} ":PRINT" {3 SPACES}"SC;K\$=?":G OSUB580:POKE204,0	HX 570	B%(M,DE%(M,0),J)=DE%(M, J+1):B%(M,DE%(M,4),J)=D E%(M,J+5):NEXT:NEXT:RET URN	PR 770	DATA000,000,168,000,000 ,084,000,012,000,042,00 0,002,170,160,010,170
EE 290	GETK\$:POKE207,0:IFK\$="" THEN290	PH 580	POKE781,14:POKE782,30:P OKE783,0:SYS65520:PRINT K\$"{LEFT}";:RETURN	JG 780	DATA168,010,170,168,042 ,130,170,042,128,170,17 0,160,170,154,096,170
JM 300	K1=ASC(K\$)-49:IFK1>34OR K1<0THEN290	FD 590	FORN=0TO7:POKE2040+N,C: NEXT:RETURN	DG 790	DATA170,160,170,170,160 ,170,176,226,168,048,20 2,168,010,042,160,000
AA 310	POKE204,1:IFK\$="A"THENG OSUB590	KF 600	IFSS=1THENPRINT:POKEV+2 1,0:PRINT"{5 DOWN}{GRN} {RVS}";	CQ 800	DATA170,168,010,170,170 ,042,162,170,170,138,04 2,162,168,168,168,162
SE 320	IFK\$="Q"THENGOTO420	HJ 605	IFSS=1THENPRINT" {4 SPACES}PHARAOH'S TRE ASURE ELUDES YOU {5 SPACES}";	FP 810	DATA168,170,042,160,042 ,170,128,000,002,170,00 0,010,170,128,043,171
AS 330	IFK\$="S"THENGOSUB590:GO SUB720	KX 610	IFSS=1THENPRINT"{RVS} {9 SPACES}BETTER LUCK N EXT TIME!{10 SPACES}";: GOTO650	BP 820	DATA160,058,238,176,186 ,186,184,187,087,184,18 7,087,184,185,085,184
QP 340	IFK1>7THEN290	QE 620	PRINT:PRINT"{3 DOWN} {5}{RVS}E{5 SPACES} {YEL}{5 SPACES}{5} {8 SPACES}{4}{8 SPACES} {YEL}{5 SPACES}{4} {5 SPACES}{*}{OFF}	SJ 830	DATA184,016,184,185,153 ,184,185,085,184,185,08 5,184,185,069,184,184
MS 350	SC=SC+1:PRINTK\$"{LEFT}" ;:I=0:IFPEEK(2040+K1)=C THENPOKE2040+K1,C-1-P:G OTO370	MC 630	PRINT"{5}{RVS}E {6 SPACES}{YEL} {5 SPACES}{5}{8 SPACES} {4}{8 SPACES}{YEL} {5 SPACES}{4}{6 SPACES} {*}{OFF}"	BG 840	DATA084,184,184,220,184 ,176,152,056,176,236,05 6,176,184,056,128,236
PP 360	POKE2040+K1,C	XS 635	POKEV+21,0:PRINT"{RVS} {UP}{BLK}"BLS{UP}";	FG 850	DATA008,128,184,008,000 ,236,000,231,000,255,00 0,015,255,240,255,255
CS 370	IFB%(P,K1,I)<>-1THENGOS UB430:I=I+1:GOTO370	DR 640	PRINTSPC(10)"{GRN} {2 SPACES}CONGRATULATIO NS{2 SPACES}"	CS 860	DATA255,000,000,000,048 ,000,012,048,000,012,04 8,000,012,048,000,012
MR 380	WI=1:FORN=0TO7:IFPEEK(2 040+N)<>254-PTHENWI=0	MX 645	PRINT"YOU GAINED THE T REASURE IN "SC-1"MOVES {SPACE}"	SA 870	DATA048,000,012,048,000 ,012,048,000,012,048,00 0,012,048,000,012,048
RS 390	NEXT:IFWI=1THENP=P-1:CL =-CL-1:IFP=-1THEN600	JG 650	PRINT"{WHT}{RVS} {7 SPACES}PRESS ANY KEY TO CONTINUE{8 SPACES}	PK 880	DATA000,012,048,000,012 ,048,000,012,048,000,01 2,048,000,012,048,000
MC 400	IFWI=1THENGOSUB590:POKE V+38,CL:IFSO=1THENGOSUB 700			PG 890	DATA012,000,000,000,252 ,000,063,231
SX 410	GOTO280				
JX 420	END				
QF 430	IFPEEK(2040+B%(P,K1,I)) =CTHENPOKE2040+B%(P,K1, I),C-1-P:RETURN				
RS 440	POKE2040+B%(P,K1,I),C:R ETURN				
HM 450	SO=0:FORM=0TO2:FORN=0TO 7:DE%(M,N)=N:NEXT:NEXT				
AA 455	FORM=0TO2:FORN=0TO7:DE% (M,N)=N:NEXT:NEXT				
XB 460	FORM=0TO3:FORN=1TO20:R1				



PROGRAMS

DAVID BRAY

Programmers often use commands and routines repeatedly in their source code. Since Commodore's BASIC editor and the majority of assembly language editors don't have a cut-and-paste option, you have to retype a lot of code. Well, not anymore. With *Ditto*, you can grab sections of code, partial lines, or blocks of text and then copy them elsewhere in your program.

Experiment with *Ditto*. You'll find dozens of useful applications for this versatile little program.

Getting Started

Ditto is written entirely in BASIC. Type it in using *The Automatic Proofreader*. See "Typing Aids" elsewhere in this section. Be sure to save a copy to disk when you've finished typing. When you're ready to use *Ditto*, simply load and run the program.

First, you're asked if you want to create a disk file. This option is used for customizing *Ditto*. For the time being, answer *No*, as we'll discuss customizing later. You'll then see a message that says *Editor Activated*. Now you can load and edit a program or begin to write one. *Ditto* is especially useful when writing assembly language programs. When using *Ditto*, you have the following commands at your fingertips.

- f1 Begin block define.
- f3 End block define.
- f5 Clear defined block.
- f7 Copy defined block.

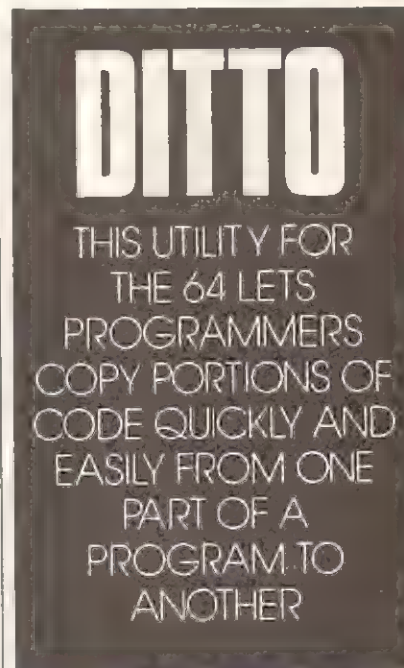
When you want to copy something, move your cursor to the beginning of the block and press f1. Move your cursor to the end of the block and press f3. This defined block is then highlighted. Move the cursor to the place you want to copy the block and press f7.

Customizing the Program

To customize *Ditto*, first load the BASIC program and list the first few lines. The default highlight color is determined by the COLR variable in

line 3. The default color is black, but you can change it to any of the 64's 16 colors by supplying a new value, ranging from 0 to 15. Once you've entered a new highlight color, run the program.

You are then asked if you want to create a disk file. Answer *Yes*, and the program saves a machine language (ML) version of itself to disk with the filename you specify. The new ML version of *Ditto* can be loaded by typing LOAD"filename",8,1 and activated by typing SYS49152.



How It Works

As *Ditto* runs, it constantly checks for keyboard input at vector 788 and 789. When the f1 and f3 keys are detected, *Ditto* memorizes the entire screen to keep the data intact.

When f7 is pressed, the block is stored in the keyboard buffer one character at a time to simulate the user actually retyping the information. This allows the Commodore editor to do the work of inserting lines when necessary. For example, if you add something to a line that contains approximately 35 characters, an extra

line is inserted to hold the additional data so it doesn't overwrite the following line.

Ditto is designed to let a programmer copy segments from one line to another. Although it will let you copy large sections of text, the outcome may not be as you had desired because when the copy takes place, the Commodore editor is unable to determine where the line boundaries are, causing some lines to wrap together. This can be avoided by copying only segments from one line to another. Since the 64's screen editor lets you move to certain lines and change the line number, there is no real purpose in copying whole lines of text to another section of a program.

When you want to deactivate *Ditto*, press Run/Stop-Restore. It stays in memory, so if you want to reactivate it, simply type SYS49152.

DITTO

```

BS 1 REM COPYRIGHT 1990 COMPUT
  E PUBLICATIONS, INTL., LT
  D. - ALL RIGHTS RESERVED
HM 2 PRINT"{CLR}{2 DOWN}READIN
  G DATA...(DOWN)"
HH 3 COLR=0:T=0
BB 10 FOR A=0TO491:READB:T=T+B
  :POKE49152+A,B:NEXT:POKE
  49544,COLR
MP 20 IF T<>70387 THEN PRINT"E
  RROR IN DATA":END
ES 30 PRINT"CREATE A DISK FILE
  [Y/N] ?"
KD 40 POKE198,0:WAIT198,1:GETA
  S
HA 50 IF A$<>"Y" THEN 101
MM 60 INPUT "{DOWN}FILENAME";A
  S
DE 70 OPEN2,8,2,"0:"+A$+"",P,W"
AQ 80 PRINT#2,CHR$(0)CHR$(192)
  ;
DJ 90 FOR T=49152TO49643:PRINT#
  2,CHR$(PEEK(T));:NEXT
MB 100 CLOSE2
GM 101 SYS49152
QB 49152 DATA 120,169,51,141,2
  0,3,169,192
ME 49160 DATA 141,21,3,169,0,1
  41,230,193
MM 49168 DATA 141,233,193,141,
  234,193,88,169
XJ 49176 DATA 31,160,192,32,30
  ,171,96,17
ER 49184 DATA 69,68,73,84,79,8
  2,32,65
KB 49192 DATA 67,84,73,86,65,8

```



PROGRAMS

GAZETTE COMMODORE 64/128

EX 49200	DATA 46,17,0,173,230,193,240,3	DF 49352	173,232,193,133	FE 49504	DATA 65,254,197,252
BS 49208	DATA 76,237,192,165,197,205,235,193	FQ 49360	DATA 254,169,1,141,234,193,173,233	KF 49512	DATA 144,110,208,6,165,253,197,251
KC 49216	DATA 240,19,141,235,193,201,3,240	RB 49368	DATA 193,240,3,32,92,193,76,49	PX 49520	DATA 144,102,160,0,185,0,4,153
FE 49224	DATA 45,201,4,240,76,201,5,240	JH 49376	DATA 234,173,233,193,240,14,173,234	KC 49528	DATA 0,194,185,0,5,153,0,195
AR 49232	DATA 104,201,6,240,3,76,49,234	PK 49384	DATA 193,240,9,173,134,2,141,229	FF 49536	DATA 185,0,6,153,0,196,185,0
XC 49240	DATA 173,134,2,141,229,193,173,233	XG 49392	DATA 193,32,140,193,96,160,0,177	XS 49544	DATA 7,153,0,197,200,208,229,169
PR 49248	DATA 193,240,8,173,234,193,240,3	XB 49400	DATA 251,32,49,193,141,119,2,169	QK 49552	DATA 0,141,229,193,165,253,56,229
JP 49256	DATA 32,140,193,169,0,141,233,193	FA 49408	DATA 1,133,198,165,251,197,253,208	XC 49560	DATA 251,141,227,193,165,254,229,252
AR 49264	DATA 141,234,193,76,49,234,173,233	QP 49416	DATA 11,165,252,197,254,208,5,169	MS 49568	DATA 141,228,193,165,251,133,2,165
GF 49272	DATA 193,240,27,173,234,193,240,22	EX 49424	DATA 0,141,230,193,230,251,208,2	RE 49576	DATA 252,24,105,22,133,3,238,227
CB 49280	DATA 173,134,2,141,229,193,32,140	CE 49432	DATA 230,252,76,49,234,165,209,141	KP 49584	DATA 193,208,3,238,228,193,160,0
DE 49288	DATA 193,169,1,141,230,193,169,0	DF 49440	DATA 231,193,165,210,141,232,193,173	RK 49592	DATA 173,229,193,145,2,173,227,193
EB 49296	DATA 141,233,193,141,234,193,76,49	AD 49448	DATA 231,193,24,101,211,141,231,193	BJ 49600	DATA 208,3,206,228,193,206,227,193
RG 49304	DATA 234,32,217,192,32,21,193,173	KE 49456	DATA 173,232,193,105,190,141,232,193	EF 49608	DATA 200,208,2,230,3,173,227,193
QX 49312	DATA 231,193,133,251,173,232,193,133	GE 49464	DATA 96,162,0,134,199,72,41,128	CE 49616	DATA 208,230,173,228,193,208,225,96
QS 49320	DATA 252,169,1,141,233,193,173,234	CH 49472	DATA 240,4,169,1,133,199,104,41	DJ 49624	DATA 166,251,164,252,165,253,133,251
RR 49328	DATA 193,240,3,32,92,193,76,49	XD 49480	DATA 127,201,32,176,6,24,105,64	EX 49632	DATA 165,254,133,252,134,253,132,254
HB 49336	DATA 234,32,217,192,32,21,193,173	QQ 49488	DATA 76,91,193,201,64,144,12,201	BH 49640	DATA 76,106,193,0,0,0,0,0
BG 49344	DATA 231,193,133,253,173,232,193,133	FK 49496	DATA 127,176,6,24,105,128,76,91		

R O B E R T B . C O O K

Sometimes 80 columns just aren't enough. You may want to print a spreadsheet or other document, but it won't fit on an 80-column printer. It's too wide. You could print it smaller if your printer supports condensed type, but that's not always the best answer. For times like this, you need *Right/Side*.

Right/Side is a sideways file printer for sequential files. It's designed primarily to be used with *SpeedScript* for printing word processor files and charts that are up to 255 columns wide. It's also handy for printing addresses on large manila envelopes that have to be fed vertically into narrow-carriage printers. *Right/Side* should work with all odd-numbered Commodore and compatible dot-matrix printers such as the Okidata 120 and the Star Gemini II.

Typing It In

Right/Side consists of two programs. The first program is written in BASIC. To ensure accurate entry, use *The Automatic Proofreader*. See "Typing

RIGHT/SIDE
 GOT A FILE THAT'S
 TOO WIDE FOR YOUR
 80-COLUMN PRINTER?
 PRINT IT SIDEWAYS
 WITH THIS HANDY
 PROGRAM FOR
 THE 64.

Aids" elsewhere in this section. When you've finished, be sure to save a copy to disk.

The second program is written in machine language. To enter it, you'll need to use *MLX*, our machine language entry program (see "Typing Aids"). The *MLX* prompts, and the values you should enter, are as follows:

Starting address: C000

Ending address: C157

When you've finished typing, be sure to save a copy of the program with the filename *RIGHT/SIDE.ML* before you leave *MLX*. When you're ready to use *Right/Side*, simply load and run it as you would any BASIC program.

Using the Program

When creating a sequential file for *Right/Side*, the margin for the right side of the text will be printed at what's normally the top of the paper. In *SpeedScript*, set the right margin to



PROGRAMS

your choice of widths up to 255. If you choose a number that is more than the length of the longest line, the printer will space down that number of lines. The maximum number of lines *Right/Side* will print is 80, the normal printer width. The left margin should be set to 0.

Before you can use *Right/Side*, you must first convert your original file or document to a sequential file. To do that from *SpeedScript*, press Shift-Ctrl-P, then press D to print your document to disk as a sequential file. Next, load and run *Right/Side*.

When the *Right/Side* menu appears, you must first select fl, Create *Right/Side* File, to convert the sequential file into a *Right/Side* file. Enter the name of your sequential file and then the name of the file you'll be creating. The letters *R/S* are added automatically as a prefix to indicate to the program that this is a *Right/Side* document. Press Return on a blank line to return to the main menu.

To print your file sideways, simply choose f2, Print *Right/Side* Files, and enter the name of the newly created *Right/Side* file. You don't have to include the *R/S* prefix—it's added automatically. Next, choose between normal density (draft mode) and high density (NLQ mode); then press any key to start printing. To stop printing, press and hold the space bar.

RIGHT/SIDE

```
DS 0 REM COPYRIGHT 1990 COMPUT
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D. - ALL RIGHTS RESERVED
RP 100 GOSUB302:REM INITIALIZE
AH 102 GOSUB264:REM MAIN SCREE
N
DH 104 POKE198,0:WAIT198,1:GET
GS:G=ASC(G$)-132:IFG<10
RG>4THEN104
FK 106 ONGGOSUB114,158,206,108
:GOTO102
MR 108 POKE53280,14:POKE53281,
6:POKE53272,(PEEK(53272
)AND240)OR4
FM 110 PRINT"{7}{CLR}":END
MM 112 REM{2 SPACES}CREATE FIL
E
FB 114 PS=1:GOSUB266:PS=0
AK 116 PRINTTAB(7)"{2 DOWN}
{RVS}{RED}"#####
#####"
FF 118 PRINTTAB(7)"{RVS}'{OFF}
{GRN}CREATE {RVS}{BLK}
R{OFF}IGHT/{RVS}S{OFF}I
DE {GRN}FILE {RVS}{RED}
{BLK}"
CR 120 PRINTTAB(7)"{RVS}{RED}'
$$$$$$$$$$$$$$$$$$$$
${BLK}"
```

```
FK 122 PRINTTAB(9)"{RVS}{BLK}
{24 SPACES}"
RJ 124 POKE214,10:PRINT"{DOWN}
{2 SPACES}{RVS}{BLU}F
{OFF}ILE TO BE READ?"
{GRN}"BF$;
FS 126 LN=16:GOSUB218:F1$=IN$:
IFF1$=""THENRETURN
AC 128 DE=63:GOSUB232:IFEN<>63
THEN124
EF 130 DE=0:GOSUB234:IFEN>19TH
EN124
BE 132 POKE214,13:PRINT"{DOWN}
{2 SPACES}{RVS}{BLU}F
{OFF}ILE TO BE CREATED?"
{GRN}/R/S."MID$(BF$,5,2
4);
GF 134 LN=12:GOSUB218:IN$="R/S
."+IN$:F2$=IN$:IFF2$="R
/S."THENRETURN
RG 136 DE=62:GOSUB232:IFF2$=F1
$THEN132
MP 138 IFDE=ENTHEN146
AH 140 PRINT"{UP}{2 SPACES}
{RVS}{RED}O{OFF}VERWRI
E FILE? [{GRN}Y/N{RED}]
{GRN}"":IN=1:GOSUB218
GB 142 IFIN$<>"Y"THENPRINT"
{UP}"BL$:GOTO132
DB 144 OPEN15,8,15,"S0:""+F2$:C
LOSE15
MS 146 POKE214,19:PRINTTAB(7)"
{DOWN}{PUR}{5 Q} CREATI
NG{2 SPACES}FILE {5 Q}
{HOME}"
PB 148 SA=49152:FORL=1TO2
RJ 150 OPEN8,8,8,F1$+"S,R":SY
S SA:SA=49194:CLOSE8:NE
XT:REM READ & CONVERT
JR 152 OPEN8,8,8,F2$+"S,W":SY
S49285:CLOSE8:REM WRITE
TO DISK
FA 154 RETURN
CF 156 REM PRINT FILE
JK 158 PS=1:GOSUB266:PS=0:NP=0
AH 160 PRINTTAB(7)"{2 DOWN}
{RVS}{RED}'#####
#####"
MQ 162 PRINTTAB(7)"{RVS}'{OFF}
{GRN}PRINT {RVS}{BLK}R
{OFF}IGHT/{RVS}S{OFF}ID
E {GRN}FILE {RVS}{RED}
{BLK}"
CM 164 PRINTTAB(7)"{RVS}{RED}'
$$$$$$$$$$$$$$$$$$$$
${BLK}"
SJ 166 PRINTTAB(9)"{RVS}{BLK}
{23 SPACES}"
EB 168 POKE214,10:PRINT"{DOWN}
{2 SPACES}{RVS}{BLU}F
{OFF}ILE TO BE PRINTED?"
{GRN}/R/S."MID$(BF$,5,2
4);
GJ 170 LN=12:GOSUB218:IN$="R/S
."+IN$:F1$=IN$:IFF1$="R
/S."THENRETURN
JF 172 DE=63:GOSUB232:IFEN<>63
THEN168
BC 174 DE=0:GOSUB234:IFEN>19TH
EN168
KF 176 POKE214,13:PRINT"{DOWN}
{2 SPACES}{RVS}{BLU}N
{OFF}ORMAL OR HIGH DENS
ITY? [{GRN}N/H{BLU}]
{GRN}"":
EH 178 IN=1:LN=1:GOSUB218:GM=8
0:IFIN$="H"THENGM=81
JP 180 IFIN$=""THENRETURN
```

```
FG 182 OPEN15,4,15:CLOSE15:ON-
(ST=0)GOTO188:IFNP=1THE
NRETURN
GE 184 POKE214,16:PRINT"{DOWN}
{2 SPACES}{RVS}{RED}C
{OFF}ONNECT PRINTER THE
N PRESS A KEY":GOSUB258
:NP=1
BG 186 POKE198,0:WAIT198,1:GET
QS:GOTO182
QX 188 POKE214,16:PRINT"{DOWN}
{2 SPACES}{RVS}{PUR}P
{OFF}RESS ANY KEY TO BE
GIN PRINTING ":GOSUB252
XX 190 POKE198,0:WAIT198,1
QH 192 POKE214,19:PRINT"{DOWN}
{PUR}{2 SPACES}{5 Q} PR
ESS {RVS}{RED}SPACE
{RIGHT}BAR{OFF} {PUR}TO
ABORT {5 Q}{HOME}"
XE 194 OPEN 4,4,7:PRINT#4,CHRS
(27)CHRS(GM)
RC 196 PRINT#4,CHRS(8):REM GRA
PHICS MODE
EA 198 OPEN 8,8,8,F1$+"S,R":S
YS49356:CLOSE8:CLOSE4
FA 200 OPEN 4,4,7:PRINT#4,CHRS
(15):CLOSE 4
CC 202 RETURN
QJ 204 REM DIRECTORY
QJ 206 PRINT"{CLR}{RVS}{GRN}D
{OFF}IRECTORY{BLU}"
JC 208 SYS57812"$",8:POKE43,1:
POKE44,48:POKE768,174:P
OKE769,167:SYS47003,1
MJ 210 POKE782,48:SYS65493:SYS
42291:LIST:POKE44,8:POK
E768,139:POKE769,227
DF 212 PRINT:PRINT" {RVS}{GRN}
PRESS ANY KEY TO RETUR
N {HOME}"
PP 214 POKE198,0:WAIT198,1:RET
URN
SP 216 REM INPUT
BC 218 CP=0:IN$="" :GOSUB252
GF 220 POKE204,0:POKE198,0:WAI
T198,1:GETQS
JQ 222 IFQS=CHRS(20)ANDCP>0THE
NCP=CP-1:IN$=LEFT$(IN$,
CP):PRINTQS;
KF 224 IFQS=>" "ANDQS<="Z"ANDC
P<LNTHENCP=CP+1:IN$=IN$
+QS:PRINTQS;
KC 226 POKE212,0:IFQS<>CHRS(13
)THEN220
CE 228 POKE204,1:PRINT"{OFF}"
:RETURN
KG 230 REM DISK CHECK
PF 232 OPEN15,8,15,"R0:""+IN$+"
="+IN$:CLOSE15:GOTO236
HJ 234 OPEN8,8,8,IN$+"S,R":CL
OSE8
KA 236 OPEN15,8,15:INPUT#15,EN
,EM$:CLOSE15
PA 238 IFDE=ENOREN<20THENRETUR
N
XF 240 PRINT"{2 DOWN}
{2 SPACES}{RVS}{1}D
{OFF}ISK ERROR: {BLK}"E
N;EM$:GOSUB258:POKE198,
█
BR 242 FORL=0TO1500:GETQS:IFQS
=" "THENNEXT
GM 244 PRINT"{UP}"BL$
CG 246 RETURN
HC 248 REM SOUNDS
XD 250 REM BING
JH 252 POKEAT,10:POKESR,73:POK
```



PROGRAMS

GAZETTE COMMODORE 64/128

EWV, 17:POKEHF, 50:POKELL	Y"	C028:77 C0 A2 08 20 C6 FF A9 30
SJ 254 FORI=1TO333:NEXT:POKEWV	XM 294 PRINTTAB(7)"(2 DOWN)	C030:00 85 F7 A9 30 85 F8 A2 D8
, 16:RETURN	{BLU}F 7(2 SPACES){RVS}	C038:00 A0 00 84 FD 20 B7 FF 0A
AQ 256 REM BUZZ	{GRN}Q(OFF)UIT PROGRAM"	C040:D0 35 E8 20 CF FF C9 0D B5
AE 258 POKEHF, 5:POKEAT, 0:POKES	KX 296 FORL=1TO4:POKE214, 6+L*3	C048:D0 1A E4 FC F0 09 A9 20 44
R, 240:POKEWV, 33	:PRINTTAB(6)"(DOWN){5}	C050:20 6F C0 E8 4C 4A C0 A2 14
CA 260 FORI=1TO500:NEXT:POKEWV	{2}{3 S}{P}{5 LEFT}	C058:00 E6 FD A5 FD C9 50 90 F5
, 32:RETURN	{DOWN}{A}{3 RIGHT}{E}	C060:DC 4C 77 C0 20 6F C0 20 BE
SC 262 REM SCREEN	{5 LEFT}{DOWN}{R}{3 W}	C068:E1 FF D0 D1 4C 77 C0 91 65
PF 264 POKE53280, 3:POKE53281, 1	{H}{HOME}":NEXT	C070:F7 C8 D0 02 E6 F8 60 20 56
:POKE53272, (PEEK(53272)	SP 298 RETURN	C078:CC FF A9 08 20 C3 FF A9 CF
AND240)OR10	RJ 300 REM INITIALIZE	C080:04 20 C3 FF 60 A2 08 20 42
AA 266 PRINT"(CYN){CLR}{I}{T}	BF 302 IFPEEK(10240)+PEEK(4915	C088:C9 FF 20 B7 FF D0 E8 C6 4A
{I}{T}{I}{T}{I}{T}{I}	2)=222THEN322	C090:FC A5 FC 85 FE 18 A9 FF 9D
{T}{I}{T}{I}{T}{I}{T}	PH 304 IFA=0THENA=1:LOAD"RIGHT	C098:65 FC 85 F7 A9 2F 69 00 19
{I}{T}{I}{T}{I}{T}{I}	/SIDE.ML", 8, 1	C0A0:85 F8 A6 FD A0 00 B1 F7 38
{T}{I}{T}{I}{T}{I}{T}	JK 306 PRINT"(CLR){2 DOWN}READ	C0A8:20 D2 FF 18 A5 F7 65 FE 47
{I}{T}{I}{T}{I}{T}{I}	ING DATA...."	C0B0:85 F7 A5 F8 69 00 85 F8 86
{T}{I}{T}";	HB 308 POKE56334, 0:POKE1, 51	C0B8:CA D0 EB A9 D0 20 D2 FF 7A
SS 268 PRINT"{0}-----	HX 310 POKE781, 9:POKE782, 1:POK	C0C0:C6 FC F0 B3 20 E1 FF D0 97
-----	E88, 0:POKE89, 48:POKE90,	C0C8:CC 4C 77 C0 A9 00 85 FB 13
EE 270 POKE214, 22:PRINT"(DOWN)	0:POKE91, 224	C0D0:85 02 A2 08 20 C6 FF 20 A6
{0}{40 0}";	MB 312 SYS41964:POKE1, 55:POKE5	C0D8:EA FF AA 20 B7 FF D0 0E 91
GS 272 PRINT"(CYN)	6334, 1	C0E0:8A C9 0D F0 0D A4 FF 99 57
{SHIFT-SPACE}{K}	FA 314 FORL=0TO255:POKE11776+L	C0E8:00 30 E6 FB D0 E9 A9 02 96
{SHIFT-SPACE}{K}	, PEEK(10752+L):NEXT	C0F0:85 02 A0 00 88 D0 20 6D
{SHIFT-SPACE}{K}	QP 316 FORL=0TO255:POKE10752+L	C0F8:CC FF 80 D0 FD A2 04 20 A1
{SHIFT-SPACE}{K}	, PEEK(10240+L):NEXT	C100:C9 FF A9 00 85 FC A2 08 0B
{SHIFT-SPACE}{K}	FC 318 FORL=0TO247:POKE11528+L	C108:A4 FC B9 00 30 85 FD A9 91
{SHIFT-SPACE}{K}	, PEEK(11016+L):NEXT	C110:00 85 F7 A9 28 85 F8 18 EF
{SHIFT-SPACE}{K}	AX 320 FORL=11008TO11175:READK	C118:A5 F7 65 FD 85 F7 A5 F8 49
{SHIFT-SPACE}{K}	:POKEL, K:NEXT	C120:69 00 85 F8 CA D0 F0 A0 B4
{SHIFT-SPACE}{K}	DP 322 LF=54272:HF=54273:WV=54	C128:00 B1 F7 30 03 18 69 80 E5
{SHIFT-SPACE}{K}	276:AT=54277:SR=54278:V	C130:20 D2 FF C8 C0 08 D0 F1 BE
{SHIFT-SPACE}{K}	L=54296:POKEVL, 15	C138:E6 FC A5 FC C5 FB D0 C6 79
{SHIFT-SPACE}{K}	RX 324 BL\$="(38 SPACES)"	C140:A9 0D 20 D2 FF 20 CC FF 27
{SHIFT-SPACE}{K}	XP 326 BF\$="(16 SPACES)	C148:A5 02 D0 09 A5 C5 C9 3C DD
{SHIFT-SPACE}{K}	{16 LEFT}"	C150:F0 03 4C CC C0 4C 77 C0 4A
{SHIFT-SPACE}{K}	XQ 328 RETURN	
{SHIFT-SPACE}{K}	HB 330 REM CUSTOM CHARACTERS	
{SHIFT-SPACE}{K}	SX 332 DATA 3,7,7,7,3,0,0,0,19	
{SHIFT-SPACE}{K}	2,224,224,224,192,0,0,0	
{SHIFT-SPACE}{K}	CJ 334 DATA 0,0,0,3,7,7,7,3,0,	
{SHIFT-SPACE}{K}	0,0,192,224,224,224,192	
{SHIFT-SPACE}{K}	PS 336 DATA 0,0,0,0,126,0,0,0,	
{SHIFT-SPACE}{K}	170,170,170,170,170,170,	
{SHIFT-SPACE}{HOME}":PO	170,170	
KE2023,97	EQ 338 DATA 85,85,85,85,85,85,	
QE 274 IFPSTHENRETURN	85,85,255,128,191,160,1	
JH 276 PRINTTAB(12)"(DOWN){3}	75,168,171,170	
{M}{14 E}E"	SB 340 DATA 255,0,255,0,255,0,	
AF 278 PRINTTAB(12)"(G)	255,0,255,1,253,5,245,2	
{14 SPACES}{RED}{+}	1,213,85	
{RVS}{BLK} "	CR 342 DATA 170,171,168,175,16	
KC 280 PRINTTAB(12)"(3){G}	0,191,128,255,0,255,0,2	
{2 SPACES}{RVS}{BLK}R	55,0,255,0,255	
{OFF}IGHT/{RVS}S(OFF)ID	PH 344 DATA 85,213,21,245,5,25	
E{2 SPACES}{RED}{+}	3,1,255,0,0,0,15,24,20,	
{RVS}{BLK} "	19,19	
KE 282 PRINTTAB(12)"(3){G}	EE 346 DATA 0,0,0,255,0,0,255,	
{14 SPACES}{RED}{+}	0,0,0,0,240,24,56,248,2	
{RVS}{BLK} "	48	
AQ 284 PRINTTAB(12)"(RED){N}	AP 348 DATA 18,18,18,18,18,18,	
{14 Q}{D}{RVS}{BLK} "	18,18,120,120,120,120,1	
ED 286 PRINTTAB(13)"(RVS)	20,120,120,120	
{16 SPACES}"	AX 350 DATA 19,19,23,31,15,0,0	
XQ 288 PRINTTAB(7)"(2 DOWN)	,0,0,255,255,255,255,0,	
{BLU}F 1(2 SPACES){RVS}	0,0	
{GRN}C(OFF)REATE {RVS}	XS 352 DATA 248,184,216,248,24	
{BLK}R(OFF)IGHT/{RVS}S	0,0,0,0	
{OFF}IDE {GRN}FILE"		
JF 290 PRINTTAB(7)"(2 DOWN)		
{BLU}F 3(2 SPACES){RVS}		
{GRN}P(OFF)RINT {RVS}		
{BLK}R(OFF)IGHT/{RVS}S		
{OFF}IDE {GRN}FILE"		
QM 292 PRINTTAB(7)"(2 DOWN)		
{BLU}F 5(2 SPACES){RVS}		
{GRN}D(OFF)ISK DIRECTOR		

TYPING AIDS

MLX, the machine language entry program for the 64 and 128, and *The Automatic Proofreader* are utilities that help you type in Gazette programs without making mistakes. These labor-saving utilities are on each *Gazette Disk* and printed in issues of *Gazette* through June 1990.

If you don't have access to a back issue or to one of our disks, write and we'll send you free copies of both of these handy utilities. We'll also include instructions on how to type in Gazette programs. Please enclose a self-addressed, stamped envelope.

Write to Typing Aids, COMPUTE!'s Gazette, 324 West Wendover Avenue, Greensboro, North Carolina 27408.

RIGHT/SIDE.ML

C000:A2 00 A0 00 84 FC A2 08 4C
C008:20 C6 FF 20 B7 FF D0 67 14
C010:C8 20 CF FF C9 0D D0 0A 26
C018:C4 FC 90 02 84 FC A0 00 C6
C020:A2 00 20 E1 FF D0 E4 4C 6E



PROGRAMS

M I K E S E D O R E

You live in the savage world of 2 million B.C. The earth is dominated by dinosaurs, all roaming the planet each day in search of food. Surprisingly, these huge reptiles crave one of the smallest and weakest creatures on the planet: the Neanderthal. Neanderthals are neither man nor ape, but a tasty breed of evolution caught in the middle.

You belong to a caveman tribe that dwells on a mountainside. Your people live in constant fear of being devoured by the huge carnivores. So, you've been appointed as cave sentry. You must patrol the mountain ledges and use your trusty club to knock off any dinosaurs posing a threat to your people. Green tyrannosaurs and red pterodactyls are your chief concerns.

Typing It In

Caveman is written entirely in machine language, so you must use *MLX* to type it in. After you've loaded and run *MLX*, respond to the prompts with the values below.

Starting address: \$0801

Ending address: \$1951

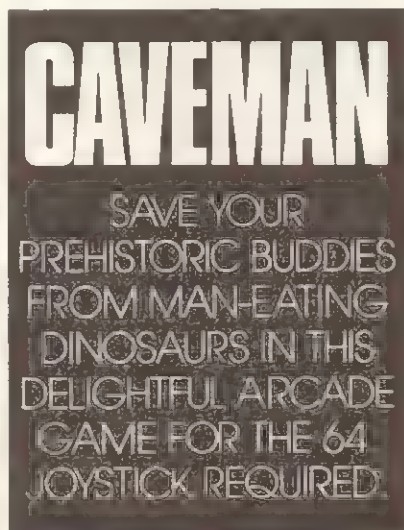
When you've finished typing, be sure to save the program to disk. To play, plug a joystick in port 2 and then load and run the program. At the right side of the screen, the high score, current score, lives remaining, and level number are displayed.

Playing the Game

Caveman is set on a mountainside that's divided into 28 levels, each one subdivided into eight ledges. Once you've conquered a level, you move on to a higher, more difficult one with faster dinosaurs. If you survive through the 28th level, you return to the 1st level.

Move the joystick up or down to change the level. When you're ready to begin, press the fire button. The caveman will appear in the center of a ledge. Initially, he appears in a protected state and will remain safe until you press the fire button.

The caveman is quite agile and moves around by jumping or walking off the ledges. Push the joystick forward to jump straight up. While airborne, push the stick left or right to move onto a higher ledge. Pull back on the stick to leap across small gaps. Be careful though—falling off the bottom ledge spells doom for one of the caveman's five lives.



To clear a level, you must knock the green tyrannosaurs from the ledge while avoiding the red pterodactyls. When you're lined up with a dinosaur, press the fire button to throw the club. If you hit him, he falls from the ledge and you score 100 points.

You must avoid the pterodactyls because they cannot be knocked down. You can use your club to momentarily stun them, or you can leap over them when they're close. You receive ten points each time you hit a pterodactyl even though you can't knock one down. When all dinosaurs have been eliminated, the caveman moves on to the next level.

Caveman

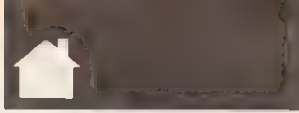
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0811:4B 45 20 53 45 44 B0 45 33
0819:00 00 00 20 26 19 4C 87 E0

0821:18 00 00 00 00 00 00 00 3D
0829:20 EC 15 4C 35 09 A9 13 20
0831:20 D2 FF A9 0D 20 05 09 9C
0839:A9 01 4C EA 08 A2 00 BD 1F
0841:71 08 2D 34 03 CD 34 03 AF
0849:D0 06 20 7B 08 4C 54 08 21
0851:20 CF 08 E8 E0 09 D0 E7 A9
0859:A9 0D 20 D2 FF 20 F5 08 27
0861:20 F5 08 0E 34 03 AD 34 1E
0869:03 C9 00 D0 7F 60 00 00 F7
0871:B2 6F DF 55 98 55 DF 6F 51
0879:B2 00 A9 11 20 D2 FF A9 1F
0881:12 20 D2 FF A9 98 20 D2 BF
0889:FF AD 35 03 C9 01 D0 08 D7
0891:A9 2F 20 D2 FF 4C 9E 08 E9
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08A9:D2 FF C8 C0 1B D0 F5 4C 9C
08B1:E2 08 92 98 A4 A4 A4 11 53
08B9:9D 9D 9D 12 98 2F 2F 92 47
08C1:A9 11 9D 9D 9D 9D 98 B8 CB
08C9:B8 B8 91 91 00 00 A9 1D 20
08D1:20 D2 FF 20 D2 FF 20 D2 52
08D9:FF A9 00 8D 35 03 60 00 A3
08E1:00 A9 01 8D 35 03 60 00 CB
08E9:00 8D 34 03 A9 00 8D 35 1B
08F1:03 4C 3E 08 AD 34 03 C9 EC
08F9:80 F0 05 A9 0D 20 05 09 BD
0901:60 00 00 00 20 D2 FF A9 39
0909:1D 4C D2 FF AE AF 2F AE 58
0911:2E 31 AA 2D 05 05 05 05 F9
0919:05 02 09 09 00 00 00 00 DF
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0929:82 00 00 00 34 4C 64 7C 94
0931:94 AC C4 DC A9 06 A2 20 E9
0939:A0 5C 20 85 09 A9 0A A2 B4
0941:20 A0 66 20 85 09 A9 0E 0C
0949:A2 20 A0 70 20 85 09 A9 A2
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09B9:F5 B9 7A 09 20 D2 FF C8 2A
09C1:C0 0A D0 F5 4C FA 09 9A 2B
09C9:92 B0 60 60 60 60 60 AE 57
09D1:11 9D 9D 9D 9D 9D 9D 9D 9D
09D9:62 9F 9A 62 11 9D 9D 9D 56
09E1:9D 9D 9D 9D 62 05 9A 62 76
09E9:11 9D 9D 9D 9D 9D 9D 9D B5
09F1:ED 60 60 60 60 60 BD 00 25
09F9:00 BD C8 09 20 D2 FF E8 5A
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0A19:0A 20 D2 FF E8 C8 E0 08 C8
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0A29:4C 58 0A B0 B2 B2 B2 B2 3E
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0A39:7B 7B B3 AB 7B 7B 7B 05 E0
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0A51:E5 A4 02 60 00 00 00 A2 6A



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0A71:00	00 00 00 00 00 00 00 85	0CF1:00 8D FD 91 A9 01 8D 00 B2	0F71:FD A9 01 C0 00 F0 06 18 0D
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0A81:00	00 00 00 00 00 00 A0 00 D6	0D01:2D FB 91 8D FC 91 A9 00 3D	0F81:71 08 D0 03 4C 1D 0F 86 20
0A89:02	A8 00 02 90 00 28 94 52	0D09:2D FB 91 4A EA EA 0D 75	0F89:02 18 46 02 C0 00 D0 0A 49
0A91:00	AA A8 00 AA AA 00 2A 8F	0D11:FD 91 8D FD 91 AD FC 91 EE	0F91:A9 2F A4 02 99 F8 07 4C 10
0A99:AA	00 0A A4 00 02 69 00 69	0D19:0A EA EA EA 0D FD 91 8D 10	0F99:39 0F C0 08 D0 AD A9 AF F0
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0AE1:01	5A 00 01 6A 80 01 AA 1F	0D61:40 85 FE A5 FC 69 00 85 E9	0FE1:00 4C B9 18 A2 08 BD E2 5F
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0B79:00	03 F0 00 00 00 65 00 39	0DF9:03 A9 34 8D C5 0D 8D 0B E7	1079:FE 07 29 2B 49 80 8D FE 19
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0B89:00	00 00 18 00 00 1C 00 59	0E09:37 03 BD 1A 0E 8D 4C D0 66	1089:29 2B 8D FE 07 60 AD 70 30
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0B99:07	FF F8 0F F0 FC 3F C0 FD	0E19:FE 09 D1 81 33 6E CE 43 A1	1099:17 4C 4E 15 AD 62 03 C9 3A
0BA1:7F	FF 8F 7F FF 80 3F F7 07	0E21:8D B1 B0 B1 B1 31 30 B0 05	10A1:08 D0 0D A9 00 8D 62 03 34
0BA9:00	0F FA 00 07 FC 00 03 12	0E29:31 00 20 B9 0D 4C D8 17 DF	10A9:20 09 19 49 01 8D 0F 07 17
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0BE9:00	07 DC 00 00 0E 00 03 54	0E69:0E 09 18 F0 0A C9 FB D0 1B	10E9:F0 10 A9 04 8D 70 03 A9 D9
0BF1:EE	00 01 CC 00 01 F7 00 60	0E71:08 BD 22 0E 49 80 9D 22 CF	10F1:00 8D 72 03 8D 73 03 60 94
0BF9:00	00 00 00 00 00 F5 00 FB	0E79:0E AD 3A 03 C9 00 D0 08 77	10F9:00 00 00 00 4C 69 10 EE 31
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0C09:0A	88 00 02 A2 00 02 A2 24	0E89:CA 10 CB EE 3A 03 AD 3A EA	1109:08 A9 00 20 1C 12 EA EA 85
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0C31:FC	00 3F FF FC FF FF FF 97	0EB1:3C 03 C9 06 F0 03 4C 2E A0	1131:EE 73 03 AE 73 03 0E 31 8D
0C39:C0	3F 00 00 00 00 67 00 50	0EB9:0E A9 00 8D 3C 03 AD 08 5B	1139:D0 08 A9 00 20 1C 12 4C DC
0C41:00	00 00 00 00 00 00 00 69	0EC1:BD 01 D0 C9 02 B0 10 4C F2	1141:DD 0F 0E 19 D0 0E AD 00 DD
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0C69:00	00 00 00 00 00 00 00 81	0EE9:CA E2 A9 FF 8D 0F D4 A9 55	1169:4C 22 11 00 00 00 00 AD 8A
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0C81:3E	B1 FB 99 00 C0 88 10 62	0F01:03 4C DB 0E A9 00 8D 3D B5	1181:4C B8 10 85 02 A9 60 8D 57
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0C99:FB	88 88 80 10 ED A0 3E 23	0F19:09 88 10 F8 4C EE 12 4C FD	1199:C9 04 D0 04 CA 4C A2 11 D9
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0CB1:BE	0C A9 01 8D C2 C0 A9 AA	0F31:F8 86 02 18 46 02 A4 02 B4	11B1:A5 02 4C 3D 10 A2 19 4C 0E
0CB9:00	2D FB 91 C9 00 D0 08 AD	0F39:B9 F8 07 29 80 F0 06 DE 98	11B9:55 11 A9 06 8D 70 03 A9 3E
0CC1:A9	00 0D FC 91 8D FC 91 6E	0F41:00 D0 4C 49 0F FE 00 D0 F6	11C1:FF 8D 68 03 60 00 00 87
0CC9:4E	B9 0C 4E BE 0C 0E C2 E2	0F49:4C A9 0F 86 02 18 46 02 41	11C9:AD 70 03 C9 06 F0 03 4C 22
0CD1:0C	AD C2 0C C9 00 D0 DF 44	0F51:A4 02 B9 F8 07 29 2F 99 DD	11D1:8F 10 EE 68 03 AE 68 03 CA



PROGRAMS

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12A1:60	00	AD	FE	07	85	02	29	17	1521:7E	03	D0	F6	A9	00	A2	0F	76	17A1:67	15	4C	7D	17	CE	A4	06	6D	
12A9:AA	18	69	02	8D	FE	07	A5	92	1529:9D	F0	03	CA	10	FA	20	A1	B9	17A9:AD	A4	06	C9	2F	D0	F0	A9	7D	
12B1:02	60	29	0F	49	0F	C9	00	1F	1531:15	4C	F5	13	60	00	00	00	EB	17B1:39	8D	A4	06	CE	A3	06	4C	32	
12B9:F0	0A	AD	FE	07	29	03	D0	32	1539:A9	06	8D	86	02	A0	00	A9	10	17B9:A0	17	20	00	17	A2	0F	A9	0D	
12C1:03	CE	FE	07	4C	E5	0F	AD	31	1541:02	60	AD	5F	03	F0	03	4C	5E	17C1:00	9D	F0	03	CA	10	FA	4C	7E	
12C9:FE	07	29	03	D0	D4	AD	FE	B8	1549:55	13	4C	FE	12	AD	FE	07	48	17C9:C4	0F	A2	09	A9	00	9D	00	8B	
12D1:07	60	29	10	D0	0F	AD	6A	40	1551:29	04	D0	06	EE	62	03	4C	DE	17D1:D0	CA	10	FA	4C	F5	13	AD	DA	
12D9:03	C9	00	D0	0D	A9	01	8D	9D	1559:9D	10	4C	B1	10	8D	70	03	95	17D9:00	70	C9	01	D0	03	4C	C4	5D	
12E1:6A	03	4C	6B	12	A9	00	8D	01	1561:A9	01	8D	6A	03	60	20	7E	51	17E1:0F	A9	01	8D	00	70	A9	00	10	
12E9:6A	03	4C	4E	12	FE	01	D0	D1	1569:18	18	0A	10	0A	10	0A	18	45	17E9:8D	0D	D0	4C	7D	17	A9	00	9C	
12F1:FE	01	D0	60	00	00	00	A0	96	1571:6D	5D	03	8D	7A	15	A2	08	58	17F1:8D	00	70	4C	85	13	86	02	41	
12F9:07	98	AA	E8	E0	08	D0	02	76	1579:BD	00	16	9D	71	08	CA	10	70	17F9:18	46	02	A4	02	A9	0D	99	BA	
1301:A2	00	AD	0F	D0	D9	2D	09	70	1581:F7	A9	13	20	D2	FF	A0	17	65	1801:27	D0	4C	E5	14	86	02	18	7	
1309:D0	40	BD	1A	0E	ED	08	0E	16	1589:A9	00	D2	D2	FF	A9	20	A2	86	1809:46	02	A4	02	A9	05	99	27	4D	
1311:C9	02	B0	36	20	48	18	C9	32	1591:1F	20	D0	2D	FF	CA	10	FA	88	C2	1811:D0	4C	EB	14	CE	53	03	10	55
1319:2D	D0	0C	BD	1A	0E	18	69	0A	1599:10	EE	20	2F	08	4C	78	18	F8	1819:FB	AD	5D	03	49	1F	18	4A	CF	
1321:05	9D	1A	0E	4C	31	13	BD	60	15A1:EE	5D	03	AD	5D	03	C9	1C	7C	1821:8D	5D	03	4C	35	12	FE	61	63	
1329:1A	0E	38	E9	05	9D	1A	0E	66	15A9:00	12	A9	00	8D	5D	03	A9	87	1829:05	BD	61	05	C9	3A	D0	08	A8	
1331:A9	00	8D	0E	D0	BD	1A	0E	7E	15B1:30	8D	A3	06	A9	31	8D	A4	FD	1831:A9	30	9D	61	05	CA	10	EE	6E	
1339:C9	F6	90	05	A9	F7	9D	1A	E6	15B9:06	4C	CF	15	EE	A4	06	AD	09	1839:4C	55	18	06	04	A2	02	20	1F	
1341:0E	C9	1A	B0	05	A9	19	9D	CD	15C1:A4	06	C9	3A	D0	08	A9	30	C6	1841:27	18	A6	04	4C	F7	17	86	17	
1349:1A	0E	88	10	AC	AD	0E	D0	1B	15C9:00	A4	06	EE	A3	06	20	67	70	1849:04	A2	03	20	27	18	A6	04	71	
1351:60	4C	43	15	A0	07	98	AA	71	15D1:15	60	00	A9	02	A0	01	AA	78	1851:AD	FF	07	60	A2	00	38	BD	82	
1359:E8	E0	00	D0	02	A2	00	B9	8E	15D9:2D	75	08	D0	07	8A	18	0A	A2	1859:01	06	FD	61	05	30	09	E9	46	
1361:2D	09	38	ED	0D	D0	18	69	8B	15E1:C8	4C	D8	15	B9	2D	09	8D	12	1861:01	10	13	E8	0E	05	D0	EE	B2	
1369:02	C9	06	B0	11	BD	1A	0E	90	15E9:0D	00	60	20	67	15	A9	00	BF	1869:A2	04	BD	61	05	9D	01	06	60	
1371:38	ED	0C	D0	18	69	00	C9	FD	15F1:8D	15	D0	60	00	00	00	00	48	1871:9D	6B	09	CA	10	F4	60	A9	D7	
1379:10	B0	03	20	BD	13	00	10	91	15F9:00	00	00	00	00	00	00	B2	06	1879:FF	8D	15	D0	60	A9	00	8D	F3	
1381:D5	4C	F8	12	A9	00	A2	CB	44	1601:6F	0F	55	00	55	DF	6F	B2	CC	1881:15	D0	AD	5D	03	60	A2	18	F2	
1389:9D	34	03	CA	E0	FF	D0	F8	3A	1609:5D	FA	D5	AB	76	AB	D5	FA	21	1889:BD	95	18	9D	00	D4	CA	10	D3	
1391:A9	A6	8D	13	10	4C	00	0E	B0	1611:5D	B1	FB	5E	AC	A0	AC	5E	5D	1891:F7	4C	EF	17	00	00	00	00	40	
1399:A9	07	8D	70	03	60	00	C9	72	1619:FB	B1	55	AA	55	AA	55	AA	AF	1899:11	00	E1	00	00	00	00	81	10	
13A1:07	F0	03	4C	31	11	EE	0D	65	1621:55	AA	55	18	34	66	C3	89	1B	18A1:00	E1	00	00	00	00	00	00	4A	
13A9:0D	EE	0D	0C	4D	DD	0F	AD	48	1629:C3	66	34	18	F1	E2	C5	8B	0B	18A9:00	00	00	0F	00	00	00	A0	F2	
13B1:0D	D0	C9	FD	B0	03	4C	70	46	1631:17	AF	CA	D5	6A	05	8B	57	61	18B1:00	8C	01	D4	3D	71	08	60	92	
13B9:11	4C	E8	13	EE	6D	03	D0	CD	1639:AF	DE	FC	F8	70	20	58	9A	73	18B9:AD	5F	03	F0	12	AD	70	03	33	
13C1:FB	EE	6E	03	D0	F6	4C	99	34	1641:B5	AB</																	



PROGRAMS

HUBERT CROSS AND LIGIA LATINO

Tank Shootout begins with two hostile armies lined up like pieces on a chess board. Instead of an open space between these opposing forces, the field is filled with numerous obstacles that block the armies' field of fire. Across the bottom of the screen, a row of missiles waits.

You command one army, and your opponent controls the other. The object of the game is to maneuver your forces around the obstacles and capture the enemy command post.

Each player starts with a force of ten tanks, 11 soldiers, five rockets, and a command post that resembles a castle. Once you start a soldier or tank moving, it will continue until it strikes an obstacle. If an enemy piece is within range, your soldier or tank will automatically fire at it.

Getting Started

Tank Shootout is written entirely in machine language. Enter the program with *MLX*, our machine language entry program. See "Typing Aids" elsewhere in this section. When *MLX* prompts you, respond with the values given below.

Starting address: 0801
Ending address: 1A80

When you've finished typing in the data, be sure to save a copy to disk before exiting *MLX*.

Although it's written in machine language, *Tank Shootout* loads and runs like a BASIC program. When you and a friend are ready to play, plug a joystick into each port; then load the program and type RUN.

Into Battle

Before starting the game, the two players should agree on whether to play until one of the command posts is destroyed or until one of the players loses all of his or her pieces.

To play, use the joystick to move your flickering rectangle until it covers the piece you want to move. Press the fire button and hold it down while you move the stick in the direction

you want the piece to move. Hold it in that direction and then release the fire button. The piece will move on its own until it strikes an obstacle or reaches an edge of the screen. To halt a piece, put the rectangle on it and press and release the fire button.

Please note that pieces will shoot automatically when they meet an enemy. (If a piece does not shoot when you think it should, look closer; you will find that the enemy piece is out-

TANK SHOOTOUT

ORDER SOLDIERS,
TANKS, AND MISSILES
INTO BATTLE IN THIS
TWO-PLAYER GAME
FOR THE 64.
JOYSTICKS REQUIRED.

side your piece's field of fire.)

The tanks can move and shoot in all four directions. The soldiers can move in all four directions but can shoot only left and right. (Soldiers are still dangerous because they fire much faster than the tanks.)

The rockets work in a different manner. Once you've ordered them to move with the joystick, they will only move up. Once launched, they will destroy any piece in their path, friend or foe. They continue until they hit a wall and explode or until they hit the top of the screen. Be extra careful with the two missiles that are located beneath your army. Generally, you should use those two as a defensive

measure and only as a last resort.

Soldiers will take 5 hits before dying. Tanks will take 15, and rockets, 25. The command post is the weakest piece. It will explode with the first hit. If you are playing to destroy command posts, plan carefully how to defend yours. You can start a fresh game at any time by tapping the Restore key. ☐

Tank Shootout

0801:0A	08	00	00	09	32	30	36	6C
0809:31	00	00	00	A9	17	8D	18	8E
0811:03	A9	08	8D	19	03	78	A2	4F
0819:F0	9A	A9	31	8D	14	03	A9	FC
0821:EA	8D	15	03	AD	0D	DC	58	90
0829:20	4E	13	A9	0A	85	F9	A9	DD
0831:0F	8D	18	D4	A9	01	8D	25	0E
0839:D0	A2	08	A9	07	9D	26	D0	C1
0841:CA	10	FA	A2	35	8A	9D	7A	CD
0849:1A	CA	10	F9	A2	1F	A9	00	9F
0851:9D	00	78	CA	10	FA	A2	00	9D
0859:BD	00	19	9D	B0	1A	BD	00	AE
0861:1A	9D	B0	1B	E8	D0	F1	20	3C
0869:44	E5	20	80	11	A2	35	20	BE
0871:25	0C	CA	10	FA	A9	DF	8D	3D
0879:F8	07	8D	F9	07	A9	03	8D	8B
0881:15	D0	A2	01	BD	D8	0D	9D	BD
0889:C3	02	A9	17	9D	C5	02	20	CA
0891:FA	0B	CA	10	EF	A9	03	8D	F5
0899:15	D0	A0	0F	B9	C7	08	99	04
08A1:F0	3B	88	10	F7	A9	7E	8D	F8
08A9:00	3D	8D	07	3D	A9	AA	8D	9E
08B1:CB	02	A9	28	8D	CC	02	78	FB
08B9:A9	D7	8D	14	03	A9	08	8D	E3
08C1:15	03	58	4C	C4	08	00	00	33
08C9:00	00	FF	FF	00	00	3C	3C	8E
08D1:3C	3C	3C	3C	3C	3C	CE	BE	89
08D9:02	D0	17	A9	04	8D	BE	02	72
08E1:A0	01	B9	CB	02	BE	3E	3F	3D
08E9:99	3E	3F	8A	99	CB	02	88	6F
08F1:10	F0	A2	02	DE	E2	02	D0	12
08F9:17	BD	DA	02	9D	E2	02	DE	DB
0901:EA	02	D0	09	AD	15	D0	3D	54
0909:E2	0D	8D	15	D0	FE	F8	07	4E
0911:E8	E0	08	D0	DF	EE	BD	02	16
0919:AD	BD	02	4A	B0	5A	A2	1F	A9
0921:BD	00	78	F0	50	BD	20	78	62
0929:8D	59	09	8D	52	09	18	7D	B6
0931:60	78	9D	20	78	8D	74	09	33
0939:8D	61	09	BD	40	78	8D	5A	C0
0941:09	8D	53	09	7D	80	78	9D	B2
0949:40	78	8D	75	09	8D	62	09	EE
0951:2C	FF	FF	30	05	A9	20	8D	19
0959:FF	FF	DE	00	78	F0	16	2C	27
0961:FF	FF	10	0B	A9	00	9D	00	AE
0969:78	20	5A	10	4C	76	09	BD	18
0971:A0	78	8D	FF	FF	CA	10	A8	97
0979:A2	00	A0	00	2C	A0	1B	B9	C4
0981:F4	1B	F0	1B	B9	7A	1A	38	C8
0989:E9	01	99	7A	1A	10	10	B9	96
0991:CA	18	F0	03	A9	0A	2C	A9	D4
0999:18	99	7A	1A	20	30	0E	C8	B5
09A1:C0	30	F0	07	C0	15	D0	D7	82
09A9:E8	D0	D2	C6	F9	F0	03	4C	11



PROGRAMS

09B1:3D	0A A9 0A 85 F9 A2 35 49	0C19:90	03 1D DA 0D 8D 10 D0 1B	0E81:6D	C9 02 9D 20 78 B9 41 78
09B9:BD	F4 1B F0 79 BD 88 1B 49	0C21:60	A9 80 2C A9 00 8D BC CB	0E89:10	69 00 9D 40 78 AC D6 F5
09C1:30	74 85 05 BD CA 18 0A 5D	0C29:02	86 06 BD B0 1A 85 02 7B	0E91:02	BD 20 78 18 79 91 0F 82
09C9:0A	65 05 A8 BD E6 1A 85 A8	0C31:BD	E6 1A 85 03 BD CA 18 3A	0E99:9D	20 78 8D C9 0E 8D C4 DA
09D1:F8	BD 1C 1B 18 79 EA 0D 8E	0C39:F0	15 C9 01 F0 08 C9 02 95	0EA1:0E	BD 40 78 79 95 0F 9D A1
09D9:9D	1C 1B BD B0 1A 79 F6 D8	0C41:F0	1C A9 00 F0 21 BD BE 54	0EA9:40	78 8D CA 0E 8D C5 0E A2
09E1:0D	85 F7 DD B0 1A D0 17 5F	0C49:1B	D0 1C A9 01 D0 18 BD 7A	0EB1:B9	99 0F 9D 60 78 B9 9D C2
09E9:BD	52 1B 18 79 02 0E 9D E1	0C51:88	1B 4A A9 03 90 02 69 20	0EB9:0F	9D 80 78 B9 A1 0F 9D 6C
09F1:52	1B BD E6 1A 79 0E 0E FA	0C59:03	7D BE 1B D0 09 A0 0B D2	0EC1:A0	78 2C FF FF 30 03 8D 26
09F9:85	F8 DD E6 1A F0 37 A5 DF	0C61:BD	88 1B 30 01 C8 98 85 C2	0EC9:FF	FF 98 F0 0F 88 F0 15 99
0A01:F7	C9 26 B0 31 A5 F8 C9 2F	0C69:04	A6 03 BD F0 EC 18 65 3A	0ED1:88	F0 18 A9 17 38 ED CA 4C
0A09:18	90 16 BD CA 18 C9 02 38	0C71:02	85 FB 85 FD BD 41 10 3D	0ED9:02	4C EF 0E A9 25 38 ED 29
0A11:D0	24 A9 00 9D F4 1B 8E 51	0C79:69	00 85 FC 69 D4 85 FE 6F	0EE1:C9	02 4C EF 0E AD CA 02 AA
0A19:1F	0A 20 42 12 A2 00 F0 73	0C81:A6	06 A9 02 E0 1B 90 02 5A	0EE9:4C	EF 0E AD C9 02 9D 00 56
0A21:15	20 C9 0C D0 10 20 22 EA	0C89:A9	05 A6 04 1D CB 0D 8D 8C	0EF1:78	A4 A5 BE CA 18 BD 8F D5
0A29:0C	A5 F7 9D B0 1A A5 F8 B7	0C91:B2	0C 8A 0A 85 05 0A 65 B1	0EF9:0F	20 1A 0E 8A 0A 0A C7
0A31:9D	E6 1A 20 25 0C CA 30 32	0C99:05	AA 00 00 2C A0 28 BD E4	0F01:D6	02 A8 20 61 0F B0 53 1E
0A39:03	4C B9 09 A2 01 BD 27 65	0CA1:7D	0D 2C BC 02 30 05 C9 B1	0F09:B9	6F 0F 9D F8 07 A4 A5 6E
0A41:D0	29 0E D0 04 BD 2D 0E 5E	0CA9:20	F0 1C 2C A9 20 91 FB BF	0F11:B9	CA 18 F0 03 A9 03 2C C1
0A49:2C	A9 01 9D 27 D0 BD 00 CF	0CB1:A9	00 2C BC 02 10 02 A9 ED	0F19:A9	0A 9D DA 02 9D E2 02 3E
0A51:D0	29 10 F0 03 4C E9 0A 56	0CB9:01	91 FD E8 C8 C0 03 F0 45	0F21:A9	01 9D EA 02 A9 00 20 8D
0A59:BC	E5 0B B9 F4 1B F0 10 48	0CC1:DC	C0 2B D0 DA A6 06 60 C8	0F29:77	0F A9 01 20 7A 0F A9 BE
0A61:B9	B0 1A DD C3 02 D0 08 6F	0CC9:BD	CA 18 C9 02 F0 3E BC 20	0F31:00	20 7D 0F 8A 0A A8 AD 73
0A69:B9	E6 1A DD C5 02 F0 09 56	0CD1:E6	1A B9 F0 EC 38 E9 29 6F	0F39:CA	02 0A 0A 0A 69 2E 99 0B
0A71:C8	98 DD E6 0B D0 E4 F0 90	0CD9:85	FB B9 41 10 E9 00 85 AC	0F41:01	D0 AD C9 02 0A 0A 69 1C
0A79:7E	8E C2 0A 8C 8C 0A 20 34	0CEL:FC	A5 FB 18 7D B0 1A 85 4B	0F49:06	0A 99 00 D0 A0 10 20 69
0A81:E9	0B B9 CB 0A 9D F8 07 01	0CE9:F5	90 02 E6 FC BD 88 1B DD	0F51:80	0F AD 15 D0 1D DA 0D 38
0A89:84	05 A2 00 BD CA 18 0A C8	0CF1:0A	0A A8 B9 6D 0D 85 05 F1	0F59:8D	15 D0 A6 A4 A4 A5 60 6B
0A91:0A	7D CA 18 65 05 A8 B9 2F	0CF9:C8	B9 6D 0D 8C 08 0D A8 AA	0F61:A2	07 AD 15 D0 0A 90 05 6E
0A99:D5	0A 0A 08 A4 05 B9 D0 5A	0D01:B1	FB C9 20 D0 06 A0 00 0E	0F69:CA	0E 01 D0 F8 60 D3 D4 18
0AA1:0A	28 B0 1C 85 05 BD CA 23	0D09:C6	05 D0 EC 60 8E 5B 0D B1	0F71:D5	D6 D1 00 D2 00 A0 1C 5E
0AA9:18	C9 02 08 A5 05 28 00 5F	0D11:BD	B0 1A 8D CD 02 BD E6 2B	0F79:2C	A0 1D 2C A0 17 4A B9 EB
0AB1:0C	DD 88 1B F0 07 48 A9 E3	0D19:1A	8D CE 1E 8D CE 02 A9 FC	0F81:00	D0 3D E2 0D 90 03 1D 77
0AB9:04	20 1A 0E 68 9D 88 1B E1	0D21:03	8D CF 02 AE CE 02 AC 9B	0F89:DA	0D 99 00 D0 60 05 02 9F
0AC1:A2	00 A9 80 9D BF 02 4C A0	0D29:CD	02 2F 10 B1 FB C9 AA	0F91:03	D9 FF 51 00 FF FF 00 BC
0AC9:DB	0B DE DD DC DB DA 80 D4	0D31:20	F0 1D 10 23 B1 FD 29 41	0F99:03	D8 FF 28 00 FF FF 00 F0
0AD1:01	03 02 00 40 00 00 00 69	0D39:07	C9 01 F0 20 8E D5 02 61	0FA1:7E	7F 7E 7F 98 DD E5 0B B9
0AD9:00	40 40 40 00 00 80 40 4B	0D41:8C	D4 02 20 09 12 30 08 12	0FA9:90	08 DD E6 0B 00 03 A9 07
0AE1:80	80 80 80 80 80 80 80 85	0D49:A9	00 9D F4 1B 20 42 12 2B	0FB1:80	60 B9 CA 18 60 AC C9 71
0AE9:1E	BF 02 90 0A A9 DF 9D 9A	0D51:EE	CD 02 CE CF 02 D0 CC 78	0FB9:02	C8 AE CA 02 CA 30 10 39
0AF1:F8	07 A9 14 9D C1 02 BD 70	0D59:08	A2 00 28 60 AE 5B 0D 24	0FC1:20	2F 10 B1 FB 10 F6 B1 98
0AF9:C1	02 F0 05 DE C1 02 D0 B0	0D61:A9	00 9D F4 1B 20 42 12 43	0FC9:FD	29 07 CD 07 02 F0 4E E5
0B01:C6	20 E9 0B F0 C1 A9 05 57	0D69:AE	5B 0D 60 02 2C 54 00 C2	0FD1:AE	CA 02 E8 E8 E0 19 00 76
0B09:9D	C1 02 88 F0 6A 88 F0 5A	0D71:03	01 72 03 02 28 50 00 0F	0FD9:4E	20 2F 10 B1 FB 10 F4 A0
0B11:2B	88 F0 2B A9 80 8D C7 E1	0D79:03	79 0A 7B FA FE FB FF 46	0FE1:B1	FD 29 07 CD 07 02 F0 B0
0B19:02	BC E5 0B B9 F4 1B F0 95	0D81:FD	FC E3 E1 F8 E2 E0 DF 69	0FE9:3B	D0 3C AE CA 02 20 2F 1A
0B21:12	B9 B0 1A DD C3 02 90 F8	0D89:F8	DD DB DE DC DA 20 E4 78	0FF1:10	AC C9 02 88 30 0D B1 6D
0B29:0A	F0 08 CD 07 02 B0 03 09	0D91:F8	F7 F6 F5 20 F9 20 F7 85	0FF9:F7	10 F9 B1 FD 29 07 CD E4
0B31:8D	C7 02 C8 98 DD E6 0B E1	0D99:F6	F5 F8 E4 20 F7 F6 F5 DE	1001:DF	02 F0 1D AC C9 02 C8 D6
0B39:D0	E2 F0 32 4C AA 0B A9 7E	0DA1:20	EF 20 F7 F4 F5 20 E4 EF	1009:C8	C8 C0 26 B0 19 B1 FB 83
0B41:00	8D C7 F2 8D C8 02 BC 24	0DA9:F8	F3 F1 F2 20 F9 20 F3 C7	1011:10	F7 B1 FD 29 07 CD 07 26
0B49:E5	0B B9 F4 1B F0 13 B9 18	0DB1:F1	F2 F8 E4 20 F3 F1 F2 96	1019:02	D0 0C A9 00 2C A9 01 8F
0B51:B0	1A DD C3 02 B0 0B CD F4	0DB9:20	EF 20 F3 F0 F2 20 EE A5	1021:2C	A9 02 2C A9 03 2C A9 20
0B59:C7	02 90 06 8D C7 02 6E 44	0DC1:20	EB ED EC EA E8 E6 E9 26	1029:80	AA 8D D6 02 60 BD F0 D0
0B61:C8	02 C8 98 DD E6 0B D0 70	0DC9:E7	E5 08 00 00 00 00 52	1031:EC	85 F8 85 FD BD 41 70 7A
0B69:E1	2C C8 02 10 6C AD C7 0A	0DD1:00	00 00 00 00 08 08 01 1D	1039:85	FC 18 69 D4 85 FE 60 10
0B71:02	30 67 9D C3 02 10 5F 01	0DD9:24	01 02 04 08 10 20 40 C7	1041:04	04 04 04 04 04 04 05 62
0B79:A9	00 8D C7 02 8D C8 02 6C	0DE1:80	FE FD FB F7 EF DF BF 7A	1049:05	05 05 05 05 06 06 06 70
0B81:BC	E5 0B B9 F4 1B F0 13 75	0DE9:7F	30 00 D0 00 20 00 E0 3E	1051:06	06 06 06 07 07 07 07 80
0B89:B9	E6 1A DD C5 02 B0 0B F9	0DF1:00	00 00 00 00 00 00 FF 0C	1059:07	86 A4 A2 18 AD 61 09 A0
0B91:CD	C7 02 90 06 8D C7 02 C1	0DF9:00	00 00 FF 00 00 00 00 14	1061:DD	F0 EC AD 62 09 FD 41 99
0B99:6E	C8 02 C8 98 DD E6 0B FA	0E01:00	00 D0 00 30 00 E0 00 7A	1069:10	B0 06 CA 10 EF A6 A4 5D
0BA1:D0	E1 2C C8 02 10 33 30 91	0E09:20	00 00 00 00 00 FF 00 35	1071:60	8E D5 02 AD 61 09 38 7D
0BA9:26	A9 80 8D C7 02 BC E5 CB	0E11:00	00 FF 00 00 00 FF 00 2D	1079:FD	F0 EC 8D D4 02 20 09 43
0BB1:0B	B9 F4 1B F0 12 B9 E6 36	0E19:00	8D 34 03 AD 1B 0E 18 5D	1081:12	30 57 DE F4 1B F0 55 DA
0BB9:1A	DD C5 02 90 0A F0 08 C3	0E21:69	07 C9 49 D0 02 A9 34 97	1089:20	61 0F B0 8A DA D7 9D 35
0BC1:CD	C7 02 B0 03 8D C7 02 DB	0E29:8D	1B 0E 60 02 05 02 86 49	1091:F8	07 A9 06 9D AD 02 9D 7F
0BC9:C8	98 DD E6 0B D0 E2 AD A3	0E31:A4	84 A5 B9 B0 1A 8D C9 E3	1099:E2	02 A9 01 9D EA 02 A9 37
0BD1:C7	02 30 06 9D C5 02 20 DA	0E39:02	B9 E6 1A 8D CA 02 BD 9C	10A1:01	20 77 0F A9 00 20 7A 32
0BD9:FA	0B CA 10 03 4C A3 12 2D	0E41:2E	0E 8D 07 02 B9 CA 18 CB	10A9:0F	A9 00 20 7D 0F 8A 0A 05
0BE1:4C	3F 0A 1B 00 1B 36 1B D4	0E49:C9	01 F0 D7 B0 26 20 B7 2F	10B1:A8	AD D5 02 0A 0A 0A 69 62
0BE9:BD	00 DC 0A 0A 0A 0A A0 48	0E51:0F	10 05 20 EC 0F 30 1C BB	10B9:2E	99 01 D0 AD D4 02 0A 53
0BF1:04	0A 90 03 88 D0 FA 98 E4	0E59:A4	A5 D9 BE 1B 99 BE 1B 30	10C1:0A	69 07 0A 99 00 0A 0A D1
0BF9:60	8A 0A A8 BD C5 02 BA C1	0E61:F0	08 A6 A5 20 22 0C 20 E8	10C9:10	20 80 0F AD 15 D0 1D 7B
0C01:0A	0A 69 32 99 01 D0 BD 21	0E69:25	0C A2 20 BD 00 78 F0 41	10D1:DA	0D 8D 15 D0 A9 01 20 F4
0C09:C3	02 0A 0A 69 0C 0A 99 8E	0E71:08	CA 10 F8 A6 A4 A4 A5 8C	10D9:1A	0E 4C E1 10 20 42 12 C9
0C11:00	D0 AD 10 D0 3D E2 0D 62	0E79:60	AC CA 02 B9 F0 EC 18 ED	10E1:A6	A4 60 00 0C 18 24 30 C3



PROGRAMS

GAZETTE COMMODORE 64/128

10E9:3C	48	54	60	6C	78	84	00	19	1351:5E	13	A9	34	8D	61	13	A0	9C	15B9:00	00	00	00	00	00	00	00	00	E3
10F1:00	00	00	01	00	00	00	00	22	1359:04	A2	00	BD	0A	15	9D	40	26	15C1:00	00	00	00	00	00	00	00	00	EB
10F9:00	00	00	00	00	00	00	00	1B	1361:34	E8	D0	F7	EE	5E	13	EE	7B	15C9:00	00	18	00	00	3C	00	00	E7	
1101:00	00	00	00	00	00	00	00	24	1369:61	13	88	D0	EE	78	A9	33	03	15D1:7E	00	00	7E	00	00	66	00	EF	
1109:00	00	00	00	00	00	00	00	2C	1371:85	01	A9	D0	8D	83	13	A9	27	15D9:00	24	00	00	00	00	00	00	0D	
1111:00	00	00	01	00	00	00	00	43	1379:38	8D	86	13	A0	08	A2	00	8B	15E1:00	00	00	00	00	00	00	00	0C	
1119:00	00	00	01	00	00	00	00	4B	1381:BD	00	D0	9D	00	38	E8	D0	FD	15E9:00	00	00	00	00	00	00	00	14	
1121:00	00	00	01	00	00	00	00	53	1389:F7	EE	83	13	EE	86	13	88	49	15F1:00	00	00	00	00	00	00	00	1C	
1129:00	00	00	00	00	00	00	00	4B	1391:D0	EE	A9	37	85	01	58	BD	23	15F9:00	00	00	00	00	00	00	00	24	
1131:00	00	00	01	00	00	00	00	64	1399:D2	13	9D	C8	3E	BD	D2	14	D0	1601:00	00	00	00	00	00	00	00	2D	
1139:00	00	00	00	00	00	00	00	5C	13A1:9D	C8	3F	E8	D0	F1	A9	D8	B9	1609:00	00	00	00	00	00	00	00	35	
1141:00	00	00	01	01	01	01	01	82	13A9:8D	16	D0	A9	01	8D	86	02	1E	1611:00	00	00	00	00	00	00	00	3D	
1149:00	00	00	00	00	00	00	00	6B	13B1:8D	20	D0	A9	00	8D	21	D0	A4	1619:00	00	00	00	00	00	38	00	B5	
1151:00	00	00	01	00	00	00	00	83	13B9:A9	01	8D	22	D0	A9	07	8D	91	1621:00	FC	00	00	FC	00	00	38	AC	
1159:00	00	00	00	00	00	00	00	7C	13C1:23	D0	A9	1D	8D	18	D0	A9	CC	1629:00	00	00	00	00	00	00	00	55	
1161:00	00	00	00	00	00	00	00	84	13C9:0E	20	16	E7	A9	08	4C	16	5C	1631:00	00	00	00	00	00	00	00	5D	
1169:00	00	00	00	00	00	00	00	8C	13D1:E7	FF	FF	FF	FF	AA	AA	AA	96	1639:00	00	00	00	00	00	00	00	65	
1171:01	01	01	01	00	00	00	00	84	13D9:28	40	C0	C0	80	80	DC	FE	08	1641:00	00	00	00	00	00	00	00	6D	
1179:00	00	00	00	00	00	00	00	45	13E1:E7	00	80	80	80	80	FC	BC	C0	46	1649:00	00	00	00	00	00	00	00	75
1181:08	8D	FE	11	A9	04	8D	FF	74	13E9:80	77	1F	7F	FB	73	71	F1	8C	1651:00	00	00	00	00	00	00	00	7D	
1189:11	A2	00	A9	0C	85	05	BC	B4	13F1:F0	0F	1F	1F	0E	EF	FF	ED	48	1659:00	00	00	00	00	00	00	00	85	
1191:E4	10	B9	F0	10	20	F6	11	70	13F9:7F	00	00	00	00	00	00	00	DF	1661:00	00	00	00	00	00	00	00	8D	
1199:C8	C6	05	D0	F5	88	A9	C0	B0	1401:03	00	00	00	00	00	00	00	AA	1669:00	00	00	00	00	00	00	00	95	
11A1:85	05	B9	F0	10	20	F6	11	0E	1409:C0	EE	F8	FE	DF	CE	8E	8F	43	1671:00	00	00	00	00	00	00	3C	D9	
11A9:88	C6	05	D0	F5	AD	FE	11	E4	1411:0F	F0	F8	F8	70	F7	FF	B7	C6	1679:00	00	7E	00	00	7E	00	00	6F	
11B1:18	69	10	8D	FE	11	90	03	75	1419:FE	02	03	03	01	03	3B	7F	DB	1681:3C	00	00	3C	00	00	18	00	BF	
11B9:EE	FF	11	E8	E0	0C	D0	CB	A8	1421:E7	00	01	01	01	3F	3D	03	EF	1689:00	00	00	00	00	00	00	00	B5	
11C1:CA	A9	0C	85	05	BC	E4	10	82	1429:01	00	00	7E	FF	7E	7E	FF	B0	1691:00	00	00	00	00	00	00	00	BD	
11C9:B9	F0	10	20	F6	11	C8	C6	5D	1431:7E	50	50	50	50	00	00	00	3E	1699:00	00	00	00	CC	C0	00	3F	6E	
11D1:05	D0	F5	88	A9	0C	85	05	7F	1439:00	00	00	00	00	00	00	40	A1	16A1:C0	00	F7	00	00	15	C0	00	03	
11D9:B9	F0	10	20	F6	11	88	C6	EC	1441:50	FF	FF	FF	FF	AA	AA	28	B9	16A9:D5	00	00	37	C0	00	FF	00	3A	
11E1:05	D0	F5	AD	FE	11	18	69	2A	1449:00	3C	FF	FF	FF	FF	FF	FF	80	16B1:00	CF	C0	00	0C	00	00	00	4A	
11E9:10	8D	FE	11	90	03	EE	FF	D6	1451:FF	05	05	05	05	00	00	00	D3	16B9:00	00	00	00	00	00	00	00	E5	
11F1:11	CA	10	CD	60	B9	F0	10	0A	1459:00	00	00	00	00	00	00	01	82	16C1:00	00	00	00	00	00	00	00	ED	
11F9:4A	6A	09	20	8D	FF	FF	EE	5A	1461:05	00	00	01	05	05	05	05	67	16C9:00	00	00	00	00	00	00	00	F5	
1201:FE	11	D0	03	EE	FF	11	60	2D	1469:05	00	00	40	50	50	50	50	CC	16D1:00	00	00	CC	00	03	30	67		
1209:AE	D5	02	CA	8E	3B	12	AE	1B	1471:50	FF	FF	FF	FF	FF	FF	FF	C1	16D9:0C	FF	C0	00	F7	7C	33	1F	5B	
1211:4D	02	CA	8E	2B	12	1A	CB	E8	1479:FF	00	00	00	00	00	3C	FF	FF	92	16E1:F0	00	F5	CC	03	D7	70	33	9D
1219:2F	12	A2	35	BD	F4	1A	F0	E9	1481:FF	00	00	00	7E	BD	BD	FF	88	16E9:7D	CC	03	F7	70	0C	DF	30	8B	
1221:1C	BD	B0	1A	CD	D4	02	F0	31	1489:3C	BD	BD	BD	DB	E7	FF	81	D2	16F1:00	FF	C0	0C	04	30	00	3F	17	
1229:00	C9	00	F0	04	C9	00	D0	EA	1491:81	FF	FF	FF	FF	FF	FF	81	FB	16F9:10	03	00	C0	00	CC	00	00	2E	
1231:0C	BD	E6	1A	CD	D5	02	F0	04	1499:81	FF	F0	F0	F0	F0	F0	F0	3A	1701:00	00	00	00	00	00	00	00	2F	
1239:07	C9	00	F0	03	CA	10	DC	A2	14A1:90	0F	09	0F	09	0F	09	0F	8D	1709:00	00	00	00	0C	33	00	00	64	
1241:60	BD	B0	1A	8D	D4	02	BD	3E	14A9:09	BD	BD	BD	18	C3	C3	00	B0	1711:0C	C0	30	40	0C	03	0C	40	44	
1249:E6	1A	8D	05	02	20	02	0C	57	14B1:FF	FF	C7	BB	38	86	8C	18	B3	1719:0C	33	30	C0	C4	0C	30	30	13	
1251:20	61	0F	B0	48	A9	D7	9D	01	14B9:F0	FF	FF	FF	3C	C3	C3	00	D2	1721:C1	04	CC	33	03	01	CC	30	E3	
1259:F8	07	A9	0A	9D	DA	02	9D	8B	14C1:FF	FF	E3	DD	DC	61	31	18	2B	1729:D3	03	03	30	C4	0C	00	30	EB	
1261:E2	02	A9	03	9D	EA	02	A9	23	14C9:0F	00	00	00	00	FF	FF	00	79	1731:30	C3	00	04	1C	03	00	33	C8	
1269:01	20	77	0F	A9	01	20	7A	02	14D1:00	18	3C	3C	7E	FF	DB	E7	DE	1739:10	03	0C	CC	00	00	00	33	B1	
1271:0F	A9	01	20	7D	0F	8A	0A	F0	14D9:3E	00	00	0F	0F	0F	0F	00	E4	1741:0C	C0	00	40	30	0F	30	00	8B	
1279:A8	AD	D5	02	0A	0A	0A	09	2E	14E1:00	00	00	00	00	00	00	00	0A	1749:00	00	00	00	00	00	00	00	77	
1281:25	99	01	D0	AD	D4	02	0A	9A	14E9:00	22	22	AA	A8	A8	A8	6B		1751:00	00	00	00	00	00	00	00	7F	
1289:0A	69	05	0A	99	00	D0	0A	5D	14F1:A8	BE	BE	AA	AA	82	82	82	87	1759:00	06	00	00	07	80	07	FF	51	
1291:10	20	80	0F	AD	15	D0	1D	47	14F9:82	00	00	FC	FC	FC	FC	3C	45	1761:E0	07	FF	E0	00	07	80	00	EC	
1299:DA	00	8D	15	D0	A9	03	4C	F0	1501:3C	88	88	AA	2A	2A	2A	2A	9F	1769:06	00	00	00	00	00	00	00	9A	
12A1:1A	0E	A2	14	BD	46	03	9D	96	1509:2A	00	00	00	00	00	00	00	48	1771:00	00	00	00	00	00	00	00	9F	
12A9:00	D4	CA	10	F7	A2	0E	BC	80	1511:00	00	00	00	00	00	00	00	3B	1779:00	00	00	00	00	00	00	00	A7	
12B1:34	03	F0	3F	88	98	0A	0A	87	1519:00	00	02	00	00	05	18	00	C7	1781:00	00	00	00	00	00	00	00	AF	
12B9:0A	A8	A9	00	9D	34	03	9D	A3	1521:1A	16	00	3E	0E	00	3D	18	C4	1789:FF	00	00	00	00	00	00	00	B7	
12C1:05	D4	9D	06	D4	BD	4A	03	E6	1529:00	1E	00	00	05	00	00	02	05	1791:00	00	00	00	00	00	00	00	BF	
12C9:29	FE	9D	04	D4	A9	06	8D	1D	1531:00	00																	



AUTO PROOFREADER

PHILIP I. NELSON

1821:00	00	18	00	00	18	00	00	B4
1829:18	00	00	18	00	00	18	00	17
1831:00	18	00	00	00	00	00	00	67
1839:00	00	00	00	00	00	00	00	69
1841:00	00	00	00	00	00	00	00	71
1849:00	00	00	00	00	00	00	00	79
1851:00	00	00	00	00	00	00	00	81
1859:00	FF	00	00	FF	00	00	FF	89
1861:00	00	FF	00	00	FF	00	00	91
1869:FF	00	00	00	00	00	00	00	99
1871:00	00	00	00	00	00	00	00	A1
1879:00	00	00	00	00	00	00	00	A9
1881:00	00	00	00	00	00	00	00	B1
1889:FF	FF	FF	FF	C0	00	03	C0	86
1891:00	03	C0	00	03	C0	00	03	B8
1899:C0	00	03	C0	00	03	C0	00	24
18A1:03	C0	00	03	C0	00	03	C0	80
18A9:00	03	C0	00	03	C0	00	03	D0
18B1:C0	00	03	C0	00	03	FF	FF	BA
18B9:FF	00	00	00	00	00	00	00	E9
18C1:00	00	00	00	00	00	00	00	F1
18C9:FF	00	00	00	00	00	00	00	F9
18D1:00	00	00	01	01	01	01	01	21
18D9:01	01	01	01	01	01	02	02	0D
18E1:02	02	02	03	00	00	00	00	04
18E9:00	00	00	00	00	00	01	01	1D
18F1:01	01	01	01	01	01	01	01	22
18F9:01	02	02	02	02	02	03	00	A9
1901:00	00	00	00	00	00	00	00	33
1909:00	04	04	04	04	04	04	04	39
1911:04	04	04	04	01	05	09	0D	42
1919:11	00	25	25	25	25	25	25	F7
1921:25	25	25	25	21	21	21	21	17
1929:21	21	21	21	21	21	21	14	4E
1931:18	1C	20	24	25	00	02	04	ED
1939:06	08	0C	0E	10	12	14	00	C3
1941:02	04	06	08	0A	0C	0E	10	63
1949:12	14	17	17	17	17	17	0A	2B
1951:00	02	04	06	08	0C	0E	10	81
1959:12	14	00	02	04	06	08	0A	0C
1961:0C	0E	10	12	14	17	17	17	82
1969:17	17	0A	80	80	80	80	80	BD
1971:80	80	80	80	80	80	80	80	A3
1979:80	80	80	80	80	80	80	80	AB
1981:80	80	80	80	80	80	80	80	B3
1989:80	80	80	80	80	80	80	80	BB
1991:80	80	80	80	80	80	80	80	C3
1999:80	80	80	80	80	80	80	80	CB
19A1:80	80	80	80	80	80	80	80	D3
19A9:80	80	80	80	80	80	80	80	DB
19B1:80	80	80	80	80	80	80	80	E3
19B9:80	80	80	80	80	80	80	80	EB
19C1:80	80	80	80	80	80	80	80	F3
19C9:80	80	80	80	80	80	80	80	FB
19D1:80	80	80	80	80	80	80	80	04
19D9:80	80	80	80	80	80	80	80	0C
19E1:80	80	80	80	80	80	80	80	14
19E9:80	80	80	80	81	81	81	81	2B
19F1:81	80	82	82	82	82	82	82	23
19F9:82	82	82	82	82	82	82	82	2C
1A01:82	82	82	82	82	82	82	81	34
1A09:81	81	81	81	80	00	00	00	AA
1A11:00	00	00	00	00	00	00	00	45
1A19:00	00	00	00	00	00	00	00	4D
1A21:00	00	01	01	01	01	01	00	93
1A29:02	02	02	02	02	02	02	02	5D
1A31:02	02	02	02	02	02	02	02	65
1A39:02	02	02	02	02	01	01	01	66
1A41:01	01	0F	0F	0F	0F	0F	0F	09
1A49:0F	0F	0F	0F	0F	05	05	05	37
1A51:05	05	05	05	05	05	05	05	85
1A59:19	19	19	19	19	0F	0F	0F	0F
1A61:0F	0F	0F	0F	0F	0F	0F	0F	95
1A69:05	05	05	05	05	05	05	05	9D
1A71:05	05	05	19	19	19	19	19	14
1A79:01	00	00	00	00	00	00	00	2E

The Automatic Proofreader helps you type in program listings for the 128 and 64 and prevents nearly every kind of typing mistake.

Type in the Proofreader exactly as listed. Because the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy before running it.

Next, type RUN and press Return. When the program displays the message *Proofreader Active*, 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 not, check for your mistake and correct the line.

The Proofreader ignores spaces not enclosed in quotation marks, so you can omit or add spaces between keywords and still see a matching checksum. However, spaces inside quotes are significant, so the program pays attention to them.

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

If you're using the Proofreader on the 128, 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 it 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. 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 (65341 for the 128, 64738 for the 64). These reset routines erase any program in memory, so be

sure to save the program you're typing in before entering the SYS command.

When using the Proofreader with another utility, disable both programs before running a BASIC program.

The Automatic Proofreader

```

10 VE=PEEK(772)+256*PEEK(773):
   LO=43:HI=44:PRINT"{CLR}
   {WHT}AUTOMATIC PROOFREADER
   {SPACE}FOR ";
20 IF VE=42364 THEN PRINT "64"
30 IF VE=17165 THEN LO=45:HI=4
   6:GRAPHIC CLR:PRINT"128"
40 SA=(PEEK(LO)+256*PEEK(HI))+
   6:FOR J=SA TO SA+166:READ B
   :POKE J,B:CH=CH+B:NEXT
50 IF CH<>20570 THEN PRINT "*E
   RROR* CHECK TYPING IN DATA
   {SPACE}STATEMENTS":END
60 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
70 CH=CH+RF+LF+HF:POKE SA+LF,L
   B:POKE SA+HF,HB:NEXT
80 IF CH<>22054 THEN PRINT "*E
   RROR* RELOAD PROGRAM AND CH
   ECK FINAL LINE":END
90 IF VE=17165 THEN POKE SA+14
   ,22:POKE SA+18,23:POKESA+29
   ,224:POKESA+139,224
100 POKE SA+149,PEEK(772):POKE
   SA+150,PEEK(773):PRINT"
   {CLR}PROOFREADER ACTIVE"
110 SYS SA:POKE HI,PEEK(HI)+1:
   POKE (PEEK(LO)+256*PEEK(HI)
   )-1,0:NEW
120 DATA120,169,73,141,4,3,169
   ,3,141,5,3,88,96,165,20,133
   ,167
130 DATA165,21,133,168,169,0,1
   41,0,255,162,31,181,199,157
   ,227
140 DATA3,202,16,248,169,19,32
   ,210,255,169,18,32,210,255,
   160
150 DATA0,132,180,132,176,136,
   230,180,200,185,0,2,240,46,
   201
160 DATA34,208,8,72,165,176,73
   ,255,133,176,104,72,201,32,
   208
170 DATA7,165,176,208,3,104,20
   8,226,104,166,180,24,165,16
   7
180 DATA121,0,2,133,167,165,16
   8,105,0,133,168,202,208,239
   ,240
190 DATA202,165,167,69,168,72,
   41,15,168,185,211,3,32,210,
   255
200 DATA104,74,74,74,74,168,18
   5,211,3,32,210,255,162,31,1
   89
210 DATA227,3,149,199,202,16,2
   48,169,146,32,210,255,76,86
   ,137
220 DATA65,66,67,68,69,70,71,7
   2,74,75,77,80,81,82,83,88
230 DATA 13,2,7,167,31,32,151,
   116,117,151,128,129,167,136
   ,137

```



HOW TO TYPE IN

Each month, Gazette publishes programs for the Commodore 128 and 64. 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 regularly publish two programs designed to make typing easier: *The Automatic Proofreader*, for BASIC programs, and *MLX*, 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 and then on, erasing what was in memory. This could cause you to lose valuable data, 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 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 graphics symbol for cursor left. In this case, you can use the Del key to back up and edit the line. Type another quotation mark and you're out of quote mode. If things really get confusing, you can exit quote mode simply by pressing Return. Then cursor up to the mistyped line and fix it. If the mistake involves cursor movement, however, you must press the quote key to reenter quote mode. □

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		
	COMMODORE 1	
	COMMODORE 2	
	COMMODORE 3	
	COMMODORE 4	
	COMMODORE 5	
	COMMODORE 6	
	COMMODORE 7	
	COMMODORE 8	