# C.OMMMOIDIDINE <br> <br> 64/ 120 

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SOAR WHTH

## 

HHOW to Get The Most
from Gomputer Shows
$>1990$ culde to More Than

- 200 User Groups
-6 Top-syfy joy programs
pus?
64 Softhare In the 90s

Exclusive Survey

Companies \%out
Can Count On!


## GAITHE entelts



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64-Commodore 64, 128-Commodore 128. *- General
Cover photo by Michael Rogalski (See "Horizons")

[^0](and HardDrives

- Four modes of operation: 1541, 1571, 1581 emulation modes for compatibility and Native mode with up to 16 Mb partitions.
- Built-in *GEOS ${ }^{\text {TM }}$ and ${ }^{*} C P / M^{T M}$ compatibility.
- Standard capacities of 21.5, 48.6 and 104 Megabytes with custom capacities in excess of 200 Megabytes.
- Serial bus interface supports Standard Serial as well as high-performance Fast Serial and JiffyDOS protocols.
- $31 / 2^{\prime \prime}$ SCSI technology allows for quiet, cool reliable operation in a compact case about the same size as a 1581 drive.
- Can be interfaced with Amiga, IBM - compatible and MacIntosh computers, allowing you to take it with you when you upgrade.
- Built-in real time clock for time and date stamping of files.



## CMD Hard Drives. . . more drive for your money <br> SWAP feature, the HD reaches levels of compatibility rivaled by none. It

CMD embarked on the HD project with two main goals - to create a hard drive that was compatible with existing hardware and software, and to offer it at a reasonable price. During the developement of the IID, a conscious effort to maintain compatibility with existing hardware and software was made by using standard DOS commands. By using these commands, CMD has made the IID much easier to use and more compatible than previous hard drives. When combined with the use of emulation mode partitions and the
has been said that you get what you pay for. Until now this was true, however, with the IID series drives you get far more drive for your dollar than ever before. Simply compare our features against any other hard drive ever offered for the 641128 and you'll find that the CMD HD always comes out on top. Your drive is waiting, call and place your order today! * GEOS is a Trademark of Berkeley Sofiworks * CPIM is a Trademark of Digital Research

- Builldin two drive file copier. Copy PRG. SEQ, REL and USR files between two dives of any type or to and from REU's. Great for quick backups and moving programs and files between 1541,1571 \& 1581 drives and REU's.
- REU support. The JiffyDOS commands now fully support Commodore REUs (RAM Expansion Units) running under RAMDOS. Access your REU just like a disk drive without having to load special wedge utilites.
-Erhanced text screen dump. Automatic screen mode recognition and printing of uppercase/graphics \& lowercase characters. - Redefinable 64 -mode function keys. Allows you to easily redefine the function keys to suit your specific needs.


## WHap OP Version 6.0

The Ultimate Disk Drive Speed Enhancement System - Ultra-last multi-line serial technology. Enables JiftyDOS to outperform Cartridges, Burst ROMs, Tubo ROMs, and Paralel Systems - without any of the disadvantages. - Speeds up all disk operations. Load, Save, Format, Scratch. Validate, access PRG, SEQ, REL, USR \& direct-access files up 1015 times faster! - $100 \%$ Compatible - or your money back. Guaranteed to work with all your hardware and sotware, including copy protected commercial programs.
Usos no ports or extra cabling. The JifyOOS ROMs upgrade your computer and drive(s) internally for maximum speed and compatibility.

- Easy Installation. No experience or special tools required for most systems
- Supports C54, 54C, SX54, C128, C128D, 1541, 1541C, 1541-H, 1571, 1581 \& more - Can be completely switched out. Hf ever necessary, the lip of a switch returns you to a $100 \%$ stock configuration - without resetting or powering down.
- Built-in DOS Wedge. Plus 17 addtional commands and corvenience features, including file copier, screen dump, directory menu, and single-key load'save'scratch.
- Supports CMD HD Series Hard Drives and RAMLink. Enhances the performance of CMD's new line of integrated C64/C128 products.
- 1581 support. Copy programs and files from 1541 and 1571 drives to any partition on your 1581. Select partitions easily with just a few keystrokes.
- Quick printer output toggle. A simple 3 . key command switches output from screen to printer and back with ease. Eliminates having to type the complicated OPEN4,4:CMD4 and PRINT=4:CLOSE4 command sequences.
- Adjustable sector interleave. Enables youtoincrease disk-access performance even with hard-to-speedup sofware.

[^1]
# COMMODORE CLIPS 

## NEWS, NOTES, AND NEW PRODUCTS

Edited by Mickey McLean


## Video Value

Now you can live out your Indiana Jones fantasies on both your computer and television screens. Lucasfilm Games (P.O. Box 2009, San Rafael, California - 94912) is offering a special promotion in conjunction with the release of the : movie Indiana Jones and the Last Crusade on videocassette.

If you buy one of the games-The Action Game or The Graphic Adventure-- based on the hit movie, you can purchase the VHS video for $\$ 10.00$. Buy both , and you'll receive the video, which retails for $\$ 24.95$, for free.

To qualify for the offer, you must have purchased one or more Indy games - from a participating retailer between February 1 and June 30, 1990. The Action : Game is available for the Commodore 64, but The Graphic Adventure has been - released only for the Amiga, Atari ST, and IBM PC and compatible computers. - Details concerning proof of purchase and other requirements are available at participating retailers throughout the U.S. and Canada.

## Bank on It

- Computer Craftware (17966 Arbolada Way, Tustin, California 92680) has intro: duced $\sqrt{ }$ Book $(\$ 34.95)$, a personal electronic check register for the 64 and 128.

The program uses a single-entry system to record 17 different types of checking transactions including automatic payments, deposits, withdrawals, - electronic transfers, debit-card transactions, interest, monthly and yearly fees, - service charges, ATM transactions, overdraft repayments, and balance - adjustments.

With a printer, you can generate eight types of reports such as transaction , registers, payee reports, daily balance reports, daily balance charts, categorized - transactions, and overdraft history reports. You can also print checks.

A utilities program is included with $\sqrt{ }$ Book that supports the 1581 disk - drive. In addition to directory displays, DOS commands, headers, file copy, and - backup utilities, it provides functions that let you create and access partitioned subdirectories for as many levels as will fit on a disk.

The program disk contains both 64 and 128 versions. The 128 version re-- quires an 80 -column RGB monitor to run in 128 mode and features pull-down : menus, double-processor speed, and utilization of the 128 's additional RAM for - sorting and disk copies.

## Colossal Compilation

Virgin Mastertronic (18001 Cowan, Suites A \& B, Irvine, California 92714)

- has announced the release of Mega Pack for the Commodore 64 and 128. The $\$ 34.99$ package includes ten original games previously available only in Europe.

The ten titles developed by Gremlin Graphics are Bulldog, Cosmic Causeway, Future Knight, Jack the Nipper II, Krackout, Monty on the Run, North Star, Rebounder, The Thing Bounces Back, and Trailblazer.

Mega Pack is distributed under Virgin Mastertronic's new Virgin Games brand of arcade titles.


## Picture This!

The accompanying picture is just a sample of the downloadable Commodore 64 and 128 graphics available on QuantumLink. The graphics software library found in the Commodore area of Q-Link contains more than 6400 graphics files, including some animations. The public domain files were created on a 64 or 128 with 64 K video RAM capabilities.

To locate the Commodore graphics area on Q-Link, access the Computing Support Groups on the Commodore Information Network and call up Graphics. Pictures are stored in both the 64 and 128 sections of the software libraries.

For more information on the QLink Commodore graphics files, contact the Pickfest Q-Link Graphics Support Group at 521 North Street NW, Warren, Ohio 44483.

# COMMODORE CLIPS 

NEWS, NOTES, AND NEW PRODUCTS

## : Japanese Import

- Direct from the Land of the Rising Sun comes Curse of Babylon, an arcadeaction game from Kyodai Software Marketing ( 58 Mitchell Boulevard, San Rafael, California 94903). Curse of Babylon includes some role-playing, but it doesn't require you to learn or memorize any complicated scenarios.

The $\$ 24.95$ game places you in the role of hero, and it's up to you to save the world of Babylon from hordes of monsters including zombies, rock creatures, and giant blue lizards.

Features include 12 increasingly difficult levels with over 150 rooms to explore. Seven different soundtracks accompany the action on the screen.

Kyodai games are distributed in the U.S. by Brøderbund Software.

## Graphics Translator for 128

Starfollower Productions (4224 Bakman, North Hollywood, California 91602) has released Ante Up (\$19.95), a Basic 8 graphics translator that converts $40-$ column graphics from GEOS, Koala, Doodle, ComputerEyes, and The Print Shop into 80 -column Basic 8 -compatible pictures.

Onscreen features include the ability to change 80 -column cell sizes, and the Basic 8 functions allow the changing of colors or the cell size, or the flipping and negating of pictures and brushes. All translations are performed in machine language and take seconds for conversion. Ante $U p$ requires 64 K of video RAM.

: Big Production

- With Screen-Pro (\$24.95), from Accu-
: Tome Productions (36 Myers Court,
- Medford, Oregon 97501 ), you can
- quickly create menus, displays, game
: backgrounds, cartoons, and video - credits on your Commodore 64.

This complete screen-and-anima-
: tion production system comes with

- two disks, various drivers, complete
: documentation, plus sample screens
- and animation sequences. Screen-Pro
- is written entirely in machine
$\therefore$ language.

Make your Commodore a Speed Demon


TURBO MASTER CPU ${ }^{\text {TM }}$ 4.09 MHz Accelerator Cartridge for C64

- Four times faster processing speed combined with five times faster disk Load and Save.
- Software actually runs four times as fast. Basic, wordprocessor scrolling and search, spreadsheets, assemblers, graphics, GEOS etc. Compatible with most software.
- Jiffy DOS compatibility option available (by Creative Micro Designs).
- Why upgrade when you can enjoy dazzling performance from your C64 now?
- Only \$199. Shipping Included


## Data acquisition and control interfaces C64 \& C128



80-line Simplified Digital I/O Board with ROM cartridge socket
Model SS100 Plus \$139. Additional \$129.


Original Ultimate Interface Universally applicable dual 6522 versatile interface adapter board. Model 64IF22 \$169. Additional \$149.
16-Channel, 8 -bit analog-to-digital conversion module. Requires model 64IF22. Model 64IFIADC0816 \$69.
Interface boards include extensive documentation and program disk. Manuals available separately for examination. Call or write for detailed brochure.

## Resources for Serious Programmers

- Symbol Master Multi-Pass Symbolic Disassembler. C64 \& C128. \$49.95
- PTD6510 super-powerful Symbolic Debugger. C64. \$49.95
- MAE64 6502/65C02 Macro Editor /Assembler. \$29.95
- C64 Source Code Book. Kernal and Basic ROMs. \$29.95


# EDIIOR'S notes 

ast month in this column, I reported the results of the "1989 Gazette Readership Survey." All survey questions were designed to let us quickly tabulate your responses, come up with totals, averages, and, finally, meaningful results. The "Additional comments" section at the end of the survey form, however, was impossible to quantify. It's here that many of you let your hair down. While some of the comments were just quick notes of the "good job" or "I enjoy your magazine" variety, many of you responded with incisive humor, biting sarcasm, or remarks straight out of left field.

It was heartening to see how many readers from outside the U.S. and Canada took the time to fill out their surveys. We have greetings from Holland, Israel, Sweden, Colombia, Belgium ("I read your Gazette three times a week"), and Australia ("If you think Commodore's support is bad in the states, then come to Australia. It's nonexistent.").

Many of you commented on the change in binding and paper. Some like it, some don't: "Thanks for the nonglare paper," "The new saddle-stitch binding stinks!" "The new binding helps when I type in programs," "The old binding was better-now I can't read the issue date on the spine," "Like your new bindingmuch easier to tear off the ads," and "I despise stapled magazines. For this reason, I may not resubscribe. Run did it, too, and I'll probably drop it!"

Our columnists earned a lot of positive comments. A Canadian reader writes: "One day when I get my driver's license, I'm going to buzz over to Lansing, Michigan, and meet Fred D'Ignazio. It would be a dream come true." Another reader writes: "Not to take anything away from the rest of the staff, but Jim Butterfield and Larry Cotton could be the backbone of any computer magazine. If they had been with Ahoy!, their ship would still be afloat." A young reader named Jeff notes that he's been reading Gazette for more than half his life. He's now 13. He writes: "I feel like I've known some of your writers, like Jim Butterfield and Fred D'Ignazio, all of my life. I also have favorites, like Rhett Anderson, Randy Thompson, Ervin Bobo, and ... oh, yes, Lance Elko." Jeff, you knew I'd be reading these surveys, didn't you?

Because we serve such a wide audience, we obviously do not (and cannot) meet everyone's needs: "Your magazine is too complicated for beginners," "Make ML programming more advanced. I learned all that stuff when I was 13! Honestly! Stack processing! Ha! Child's play!" "Gazette should be more than a magazine for children," and "If I'm a bit computer literate, I owe it to you (and your readers)." Then there's a reader who told us: "I subscribed to your magazine because you published an article on Boolean algebra."

A lot of readers told us what they wanted to see in the magazine. While many jotted "more utilities," "more pages," or "more programming hints," others took the opportunity to be pretty specific: "Write a Plus/4 compiler and 128 programs without sprites," "Print hobby utilities such as databases for female computerists," and "Use ink that doesn't smear when I rub on your pages!" It might be suggested to the author of the final comment that he or she simply abstain from rubbing on our pages.

One reader from California pledged his loyalty in a unique fashion: " C 'mon, guys, how am I gonna brag at the user group if you don't print some of my ideas, which are better than some I've seen in your mag? I'll give you one more decade, then I ain't gonna renew my subscription."

The winner for Best Non-Comment Comment goes to this reader: "I ignore the articles I dislike and peruse those I like." And the winner for Strangest Remark: "Every time I pick up Run or COMPUTE!, it says: 'Free Disk for IBM Compatibles,' 'This Game for 128 Only!,' 'For Amiga Only!' Don't you think some of us get tired of buying a magazine and three-quarters of it you can't use? That's why I quit Playboy."

See you next month.


Lance Elko
Associate Publisher

COMPUTEP'S
givisix


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# MAVERICK V5 We're Willing To Put Our Cards On The Table... 

For the last two years, we've worked hard to develop and refine Maverick What you see on the left is a testament to how well we've done.
It you've had your Commodore for more than a few weeks, you've probably heard of Maverick. It has become the standard against which all other utility programs are judged. You probably know someone who uses Maverick. Maybe they bought a copy. Maybe they "borrowed" a copy from a friend. Whatever. The time has come to speak trankly and honestly

The Commodore market is in transition. Newer machines have eclipsed the 8 -bit Commodore computer. New buyers are going elsewhere. And many companies are shifting loyalties, dropping Commodore products to pursue greener pastures. Not us. We've always been there pushing the envelope, making your Commodore do things it shouldn't be able to do. We've always supported you. Now we're asking you to support us.

Maverick V5 is our final version of Maverick. We've perfected the program to the very edge of our capabilities. We've made it as good as our skills allow. And while we'll still offer future parameter disks to keep up with new programs and protection schemes, there will never be a Maverick V6. We can look you right in the eye and say "This is our best shot - it worit get any better than this."
Thousands of honest people have spent the money to buy into the best utility system ever made, backed up by the best technical support in the industry. We're hoping that you'll join the crowd.

Products from other companies are described in vague generalities, because they can't elaborate on features they don't have. But take a look at our detailed listing below and you'll understand just why Maverick has become the industry criterion. Protect your software investment. Don't settie for anything less than the product that inspired the comments on the cards on the left. Buy Maverick V5 today - and deal yourself a very good hand.

## MAVERICK V5

- NEW: All modules now have directory files 8 allow fast autobooting with 15417181 . They also support slow boot mode for hard drives $\&$ other compatible devices. The Maverick directory is organized for easy file copying of modules by end user. REU and 64 K Video RAM is auto-sensed and utilized in whenever applicable.
- The Maverick is PAL compatible for overseas users
- Fast Data Copiers: Single and dual 154171 support Single and dual 1581 support
- NEW: Single Drive 1571 Double Sided Copier
- GCR Nybble Copiers: Single and dual 154171 Support. These are the most powerful software based nybblers on the market.
- RAMBOard Nybbler Working in conjunction with one or two 1541, 1541 II, or 1571 RAMBOards. this copier allows automatic coping of many of the toughest protection schemes on the market
- Sector Map Editor W Data Scanner Allows high speed error scans and data searches. Supports 1541 and 1571 tormats.
- Maverick GCR Editor for the experienced hacker
- GEOS Parameter Menu Up to date parameters to completely deprotect your entire GEOS library
- GEOS Sector Editor: Accessible from desktop Includes mouse support.
- GEOS File Copier Desktop accessible Copies multiple files fast.
- NEW GEO-BOOT Now supports 1571. and 1541 drives as well as the 1581 disk drive After using this teature, your entire GEOS library becomes file-copyable.
- Quick Fie Copier Supports 15417181 tormats - any direction Includes more features than any other Commodore file copier ever created
- Parameter Menu: Maverick now boasts almost 500 parameters that either copy or completely strip the copy protection from the world's newest and finest programs.
- Directory Editor: The ultimate tool to organize your library Supports 15417181 disk formats
- 6502 M L. Monitor: Scrolling display Includes Drivemon
- NEW Directory Recovery: Recover blown 1541 disks. Now works with 1571 and 1581 as well.
- Track \& Sector Editor: Supports 1541. 1571. and 1581 formats.
- Relative File Copier: Supports any Commodore compatible disk drive
- REU \& 64 K VDC Quick Test: Exclusive Mavenck teatures.
- RAMBoard Track Editor: Not for the inexperienced. The most powerful, whole track editor on the market - PERIOD. Allows macros to copy every track, even if each track requires special settings. This is the next best thing to writing your own custom copiers. When you use this utility, you'll realize why our customers are trashing unprofessional, poorly coded whole track editors written by incompetent programmers.
- File Track \& Sector Tracer: Identify, view and edit any sector in any program file - fast. Supports 15417181 disk formats
- High Speed Sequential and program File Viewer. Now you can view or print your sequential and program files without having to load the application that created them
- NEW: Disk Compare Program: Supports dual 15417181 . This utility is the lastest most full featured Compare Utility ever created
- Extensive documentation included - over 50 pages of easy to follow instructions!

PLEASE NOTE: Many features now require the use of RAMBOard, the disk drive expansion device avatlable seperately from Software Support International

# THE NEW MAVERICK V5 ONLY \$39.95 <br> Now Includes Parameter Modules 1-8 

Attention Registered Maverick Owners: You may upgrade to the new V5 Master Disk only $\$ 9.95$ !
Parameter Module \#8 is also available only $\$ 9.95$
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## tHIters to the efiliur

Send questions or comments to Letters to the Editor, COMPUTE!'s Gazette, P.O. Box 5406, Greensboro, North Carolina 27403. We reserve the right to edit letters for clarity and length.

## 64 on TV

After all the talk of the death of the 64, I was surprised to see a 64 on TV last night. On the Saturday-night show "Empty Nest" (NBC), there is a 64 and monitor at the nurse's station. It's nice to know that the little 8 -bit machine is still around and on TV.

Larry Martin
Pensacola, FL
As you point out, Larry, the 64 is not dead, but it should be noted that NBC has unfortunately placed it in a hospital.

## A Must for Sysops

I just finished reading "From the Other Side: Sysops Speak Out" (April), by Tom Netsel. I was really pleased to see that someone took the time to allow us sysops to speak. "The BBS 10 Commandments" is a must for all sysops to have posted on their systems.

Samuel D. Adams
Jacksonville, FL

## Fair Count

A word of caution to SpeedScript users who may want to make a choice between Jim Butterfield's Word Count ("Machine Language for Beginners," February 1990) and Buck Childress's SpeedCount (June 1989). Since Word Count requires printing a SpeedScript document to disk as a sequential file, any header will be recounted at the top of each page. It therefore gives a higher tally than SpeedCount, which counts only one header in the command line. Moreover, Word Count counts hyphenated words as one, while SpeedCount treats hyphens as spaces. An example: For a 150 -block document, Word Count returned 6731 words and SpeedCount gave me 6429, a 4-percent difference.

Richard van Frank
Montclair, NJ
Thanks, Richard. We should point out that SpeedCount was written specifically as a SpeedScript utility. Jim Butterfield's Word Count was written as an example of how to use tables in machine language.

While the program works well, its main purpose is to illustrate a technique.

## Tree-Tracing Software?

I've searched your pages and haunted software stores for many months and have yet to find a genealogy program for my 128/64. Can you help?

> Roy N. Kelley
> Hamilton, OH

Over the years, we've seen genealogy software for the 64, but we are not aware of any packages that are currently available. Our readers have been so helpful in detective work, we'll put this one to them.

## Don't Slip with This Chip

What can you tell me about a video chip for the 128 that is present in the 128D? This chip is required, I am told, to run a program called News Maker 128.

John E. Risser
Markham, IL
The 128D features a 64 K video RAM chip (versus the 128 's 16 K chip) that allows 640 $\times 200$ hi-res graphics, and it's true that News Maker 128 requires this extra video RAM. The expanded RAM chip-called the 4464 -is available by mail order (check Gazette's ads) or from many Commodore dealers. Commodore strongly recommends that a skilled technician do the job since the old chips are soldered (not socketed) to the board. Several sources told us that the job is delicate and tedious.

## Connection Needed

I have a 64 and Star NX-1000C printer. I'd like to upgrade to an Amiga 500. Can I connect the printer to the Amiga?

Rob Gresham
San Leandro, CA
Representatives from Star Micronics told us that they know of no interface that will allow you to hook up your 1000C to an Amiga. They did, however, say that they've heard that some interfaces might work. If any of you readers have successfully used your 1000C printers with an Amiga or a PC, write and let us know.

## Faster Yet

Your program 1581 FastLoader [January] is great. I've been using it within the partitions on my $31 / 2$-inch drive with very good results. I wasn't too happy with the loading time, but I was pleased
with the speed of operation after the program was loaded. I wondered if I could use the Fast Load cartridge to speed up FastLoader. Guess what? It works. Thanks for a great program.

Clyde R. Lovelace
Kilauea, HI

## Safe Text

I have some text files in the VIC Typewriter program format. I tried to load the files into my 64 . My machine locked up. Is there any way to transfer the files to a 64 -compatible program?

> Alan Shearer
> Long Beach, CA

Since you're working with text files, you'll need to use a 64 program that's capable of reading them.

The ideal program for handling your VIC text files on the 64 is another word processor-preferably one that uses the same file format as VIC Typewriter. Otherwise, you'll need to convert the text file to a format that can be read by another word processor.

Although we're not familiar with VIC Typewriter, our guess is that it saves text files in Commodore ASCII format. If you use SpeedScript to read these files, you'll need to copy them to disk and then convert them using the program SpeedScript File Converter, published along with SpeedScript (both in the magazine and on our SpeedScript disk).

One last thing: Once you've successfully loaded a text file created with VIC Typewriter into a 64 word processor, you may see unidentifiable characters in the text. These are probably VIC Typewriter formatting commands. Strip these out of the file and then add the corresponding commands used by the 64 word processor.

## Dollhouse

I noticed the dollhouse on your April cover-I have the same dollhouse in my home. The furniture in the house is beautiful. Can you tell me the name and address of the company that sells the furniture?

> Helen Eger
> Woodhaven, NY

The dollhouse and furniture on our April cover are courtesy of Toys \& Co. The company will send a mail-order catalog on request. Write to Toys \& Co., 401 Forum VI, Greensboro, North Carolina 27408.

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## Fred D'Ignazio

We are beginning the last decade of the twentieth century. For almost 50 years, we've regarded the computer as a dataprocessing device. Now it's time for us to discard this dangerously outdated image and create a compelling new image that will carry us into the twentyfirst century.

## Computer Teleportation

Who will ever forget the cry, "Beam me up, Scotty!" from the famous Star Trek TV and movie episodes? Wouldn't it be great if we could teleport ourselves around our world? Travel would be painless, cheap, and instantaneous.

The Enterprise's teleporter is no longer science fiction. It is reality.

We may not be able to teleport human bodies through space, but we can send vast bodies of information. And the result is the same: human travelacross cities, continents, and planets.

Welcome to the world of virtual re-ality-where humans can teleport their presences with the aid of the computer. A teleported presence-or telepre-sence-is already so common it's almost invisible. For example, a few minutes ago, I woke up and teleported Bryant Gumbel and Deborah Norville into my kitchen while I brewed coffee and warmed up a bottle for my baby. Right now, I'm sitting in my study where I have teleported Daniel Ortega to Michigan from Nicaragua. While I write this column, Ortega is actually in Managua, 10,000 miles away, talking about the future of the Sandinista Party after the recent elections.

Ortega, Gumbel, and Norville aren't physically in my house. But that doesn't matter. In a virtual world, all that matters is effect. If I pay more attention to them than to my wife, Janet, as she hurries around the house and out the door to work, then who is more real? Who is really here?

In fact, is "here" really here?

## The Multiway Street

Over the next five years, personal computers will marry with video, TV, compact discs, and telephones. The result will be multiway virtual reality. Today, I can teleport the trio of Gumbel, Norville, and Ortega into my home, but I can't teleport myself back to them. The
travel is one-sided. But not for long.
Think about the conversations TV journalists have with famous people scattered across the world. One person might be in Colombia, another in Japan, a third in Washington, D.C., and a fourth in New York. But we see them all at the same time in little windows on our TVs, and the journalist talks with them as if they were all in one room. What we're seeing is multiway virtual reality. All the participants are being teleported to each other simultaneously.

This process is soon going to be available to all of us. New fiberoptic lines are being installed that can carry voices, images, music, and computer data in any direction instantly across the planet. Meanwhile, new microchips are being fabricated that will compress all this information and further speed its transmission. The result, within five years, will be multimedia computers that can travel the optical highways of tomorrow and make virtual reality a participatory experience for all of us.

## Bryant's Not Home

Bryant Gumbel is not likely to accept a visit from us. But there are plenty of other people who will. Plus the world we visit will not be as simple as a TV news program or someone's home. Instead, it will be a profoundly multiplexed virtual world where we're looking through various windows at the same time-some into the everyday world and some into "data" windows that look nothing like the real world.

News services in the future will be a lot more like MTV than CNN. Reporters around the world will feed stories-fast-breaking, dramatic stories and human-interest stories-into a giant multimedia data bank. At home we'll access the data bank through our multimedia computers. If we want, we can call up a story, tell it to fill the screen, and watch it to its conclusion.

But to most of us, this will be boring.

Instead we'll be multimedia channel-zapping. We'll call up several video windows simultaneously on the screen-or on multiple, flat screens pasted like video wallpaper on our walls. We may use four screens (grouped into a superscreen) to play back the main story-a student demonstration in Beijing, the marriage of two
rock stars, the results of a pro soccer match. Meanwhile, we may play back the announcer's narrative on a fifth screen. We may "patch in" our best friend on a sixth screen and show her the video mosaic we're building. We may call up the Guinness Book of World Records on a separate screen and old documentary clips on still another screen.

We'll be able to control camera shots of everything we see. We can zoom in, zoom out, go to fisheye, wide angle, and extreme closeup. We'll have frame-by-frame control over audio and video. We'll be able to freeze-frame what we see, posterize, replay at fast speed, squish the image, or stretch it out. We'll be able to speed up the audio track, slow it down, change it to French, Japanese, or Russian-or have it signed by a humanlike computer agent who lives inside our machine.

And this is only the start. We can be recording this on read/write optical discs for later playback and for our own personal multimedia compositions. Or we might use all the information as raw data to create a 3-D computer simulation of a sports event, riot, birthday party, or revolution.

This new simulation is another level of virtual reality that we can enter or invite friends to enter with us. The friends may be in a physical room with us or in a virtual room made up of bodies scattered around the world.

## Reach Out!

Think of all the world's optical and electronic communication channels as highways-electronic highways of the twenty-first century. Our multimedia computers will be vehicles we can ride to travel these highways.

What will travel these highways? Our mouths, our eyes, our ears-and our imaginations-as virtual telepresences. Some experts say that we may also be able to send our noses to smell places, events, meals, persons anywhere in the world; and our hands to touch fabrics, to feel heat, cold, velvet, and jagged rock.

And what will we touch? It will be partly real, partly artificial; partly physical and partly simulated; partly in realtime and partly in the past, the future, or in fantasy worlds that one person invents but many can share.

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by Glark and Kathy H. Kidd
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## feethack

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

## Customizing the Gazette Index Disk

I just received a copy of the Gazette In－ dex disk．I like it so much that I decided to use it to index the other five maga－ zines that I subscribe to．But first，I need to change the preassigned items in the category field so that they match the ar－ ticles of each magazine．I would be very grateful if you could tell me whether or not this is possible and，if so，how I＇d go about doing it．

## Yousef E．Ebrahim <br> Doha，Qatar

The indexer program on the Gazette In－ dex disk wasn＇t designed as a general－ purpose database．As a result，it＇s not that easy to alter．However，the following pro－ gram will allow you to change the categories．

EP 100 REM COPYRIGHT 1990 COMP UTE！PUBLICATIONS，INC． \｛2 SPACES\}ALL RIGHTS RE SERVED．
BK 110 REM CUSTOMIZE CATEGORIE $S$ FOR GAZETTE INDEX DIS K
JE 120 IF PEEK $(642)<96$ THEN PR INT＂MOVE BASIC FIRST：P OKE642，96：SYS58260＂：END
CB 130 PRINT＂\｛CLR\}COPYRIGHT 19 9ø＂：PRINT＂COMPUTE！PUBL ICATIONS，INC．＂
EJ 140 PRINT＂ALL RIGHTS RESERV ED．＂
HG 150 IF $A=\emptyset$ THEN $A=1: L O A D " T L$ ＂，8，1
MP 160 IF $A=1$ THEN $A=2: S Y S 4915$ 2
HA 170 IF $A=2$ THEN $A=3: L O A D " I N$ DEX＂， 8,1
AP $18 \emptyset$ POKE5328 $\sigma, \emptyset:$ POKE53281，$\sigma$ ：$M X=40$ ：DIM TS（MX）
KJ 190 C $\$=$＂\｛CLR\}": PRINTCS;CHRS （14）
JC $20 \emptyset$ PRINT＂$\{$ HOME \} \{ 2 DOWN \} \｛CYN\}CHOOSE OPTION"
EQ 210 PRINT＂1．READ IN CATEGO RIES＂
GD 220 PRINT＂2．ADD／DELETE／EDI T CATEGORIES＂
SA 230 PRINT＂ 3 ．START FROM SCR ATCH＂
XK 240 PRINT＂4．SAVE CHANGES T O DISK＂

QX 250 PRINT＂5．EXIT＂
KS 260 GETAS：IF $\bar{A} S=" "$ THEN26 0
FF $270 \quad A=V A L(A S): I F \quad A=\emptyset$ OR $A>5$ THEN PRINTCS＂PRESS 1－5 ＂：GOTO2日6
CX 280 ON A GOSUB $300,360,790,7$ 90，92 9
AD 290 GOTO 200
KC $30 \emptyset \quad B=18036: N=\emptyset: F O R \quad I=\emptyset$ TO
\｛SPACE\}MX:T\$(I)="":NEXT
：PRINT＂$\{$ HOME \}READING...
XF 310 FOR $B=18036$ TO 18999
BX $32 \emptyset \quad C=\operatorname{PEEK}(B): I F \quad C=\emptyset$ THEN $N$ $=\mathrm{N}+1: \operatorname{IF} \operatorname{PEEK}(\mathrm{B}+1)=255 \mathrm{~T}$ HEN 350
FE 330 IF C THEN $T \$(N)=T \$(N)+C$ HRS（C）
FG 340 NEXT
AR 35 PRINTCS；N；＂CATEGORIES R EAD IN＂：N＝N－1：RETURN
GC 360 IF T $\$(\varnothing)=$＂＂THEN PRINT＂N O INFO，READ OR START F ROM SCRATCH＂：RETURN
BP 370 DN $\$="\{D O W N\} ": R T \$="$ \｛RIGHT\}":LES="\{LEFT\}":H \＄＝＂$\{$ HOME $\}\{3$ DOWN $\} ": H 1=0$ ：H2＝ 0
GG 380 FOR $I=1$ TO 6：DNS＝DNS＋DN \＄：RT \＄＝RT \＄＋RT \＄：LF $\$=\mathrm{LF} \$+\mathrm{L}$ FS：NEXT
AR 390 PRINT＂\｛CLR\}\{DOWN\}USE UP AND DOWN TO SELECT＂
EF $40 \theta$ PRINT＂$\{$ RVS \} I \{OFE $\}$ NSERT \｛SPACE\} \{RVS\}D\{OFE\}ELETE \｛RVS\}A\{OFF\}DD \{RVS\}E \｛OFE\}DIT \{RVS\}Q\{OFF\}UIT ＂

GF $41 \varnothing \mathrm{~T}=\mathrm{N}: \mathrm{IF} \mathrm{N}<2 \theta$ THEN 440
JC 420 PRINTHS；：EOR $I=2 \theta$ TO N
EQ 430 PRINTSPC（20）；LEETS（T\＄（I ），19）：NEXT：T＝19
RH 440 PRINTHS；：FOR $I=\varnothing$ TO T：P RINTLEFT \＄（T\＄（I），19）：NEX T
BK $450 \mathrm{~T}=\mathrm{H} 2:$ PRINT＂\｛OFF $\}$＂；：GOSU B680
DA $460 \mathrm{~T}=\mathrm{H} 1:$ PRINT＂\｛RVS\}";:GOSU B680
MB 470 H2 $=\mathrm{H} 1$
RB 48 GETAS：IF AS＝＂＂THEN51 $\sigma$
QR 490 IF ASく＞＂\｛DOWN\}" AND ASく $>"\{$ UP\}" THEN530
XX 50 IF AS＝＂\｛DOWN\}" THEN Hl= $\mathrm{H} 2+1: \mathrm{IF} \mathrm{H} 1>\mathrm{N}$ THEN $\mathrm{Hl}=\mathrm{g}$
PJ 510 IF AS＝＂\｛UP\}" THEN Hl=H2 －1：IF Hl＜$\quad$ THEN Hl＝N
KF 520 GOTO 450
SF 530 IF AS＜＞＂I＂THEN57
AJ 540 IF $N=M X$ THEN PRINT＂ \｛HOME \}TOO MANY FOR INSE RT＂：GOTO45®
CG 550 FOR $I=N$ TO H1 STEP $-1: T$ $\$(I+1)=T \$(I): N E X T: N=N+1$
AC $560 \mathrm{~T}(\mathrm{H}()=" \mathrm{H}:$ GOTO640
BR 570 IE AS＜＞＂D＂THEN6ø
EB 580 FOR $I=H 1$ TO $N-1: T \$(I)=T$ \＄（I＋1）：NEXT：TS（N）＝＂＂：IF $\mathrm{N}>\emptyset$ THEN $\mathrm{N}=\mathrm{N}-1$
KQ 590 GOTO39
QA 60日 IF ASく＞＂A＂THEN63
MX 610 IF $N=M X$ THEN PRINT＂ \｛HOME\}TOO MANY FOR ADD"
：GOTO450
JG 62 g $N=N+1: H 1=N: T \$(H 1)=" ": G O$ T0640
GJ 630 IF AS＜＞＂E＂THEN660
HG 640 PRINT＂$\{$ HOME $\}$ \｛ 2 SPACES $\}^{\prime \prime}$ ；T\＄（H1）；
DC 650 INPUT＂\｛HOME\}";T\$(H1):G OTO39ø
RH 660 IF AS $\langle>$＂ Q ＂THEN 480
BP $67 \emptyset$ PRINTCS：RETURN
XM $680 \mathrm{Y}=\mathrm{T}: \mathrm{X}=\varnothing:$ IF $\mathrm{Y}>19$ THEN $\mathrm{Y}=$ $\mathrm{Y}-2 \boldsymbol{2}: \mathrm{X}=2 \boldsymbol{2}$
SP 690 PRINTHS；LEET $(D N S, Y)$ ；SP $C(X) ; \operatorname{LEFT} \$(T \$(T), 19):$ RE TURN
RM $7 \pi$ IF T $\$(\theta)=" \|$ THEN $74 \theta$
BM 710 PRINT＂ERASE EXISTING CA TEGORIES（ $\mathrm{Y} / \mathrm{N}$ ）？＂
BX 720 GETAS：IF AS＝＂N＂THEN PR INTC§：RETURN
RK 730 IF AS〈＞＂Y＂THEN 720
JB $740 \mathrm{~N}=6$ ：PRINT＂ENTER THE NEW CATEGORIES，BLANK TO E ND＂
FA $750 \mathrm{~T} \$(\mathrm{~N})=\mathrm{F"}:$ PRINT＂C \＃＂； N ；： INPUT TS（N）
SC 760 IF TS（N）$=\| \|$ THEN PRINTC \＄；N；＂CATEGORIES ENTERED ＂：N＝N－1：RETURN
KB $770 \mathrm{~N}=\mathrm{N}+1:$ IF $\mathrm{N}>\mathrm{MX}$ THEN $\mathrm{N}=\mathrm{N}-$ 1：PRINT＂TOO MANY CATEGO RIES＂
AK 780 GOTO750
RP 790 PRINT＂POKING IN STRINGS ＂： $\mathrm{B}=18036$ ：IF $\mathrm{N}=$＝THENPRI NT＂NO ENTRIES＂：RETURN
EG 806 FOR $I=\sigma$ TO $N: T \$=T \$(I)$
HE 810 FOR $\mathrm{J}=1$ TO LEN（T\＄）
BQ 820 POKE B，ASC（MID\＄（T\＄，J，1） ）： $\mathrm{B}=\mathrm{B}+1:$ NEXT J
MB $83 \emptyset$ POKE $B, \emptyset: B=B+1$
AH 835 IF I＜N AND B＋LEN（TS（I +1 ））$>18576$ THEN PRINT＂DAT A CUT OFF AT＂；$I: B=B-1: N$ $=1$
RX 840 NEXT I：POKE B， 255
KH 850 POKE 7178 ，N：POKE 5297 ，N ：POKE5363，N－1：POKE7184， $\mathrm{N}-1$
CC 860 SYS 49155：PRINT：PRINT＂SC RATCHING OLD INDEX＇
CH 870 OPEN15， $8,15, " \mathrm{~S} 0:$ INDEX＂： CLOSE15
GM 880 PRINT＂SAVING NEW INDEX \｛5 SPACES\}"
PB $89 \emptyset$ OPEN1， $8,1, " \emptyset:$ INDEX＂
BR 900 POKE 193，1：POKE 194，8：P OKE174， 0 ：POKE $175,8 \varnothing$
KE 916 SYS 62957：CLOSE1：PRINTC S＂DONE＂：RETURN
MS 920 PRINTC§＂SYS $2061^{\prime \prime}:$ PRINT＂ TO TRY NEW INDEX＂：PRINT HK 930 PRINT＂GOTO145＂：PRINT＂TO REENTER EDITOR＂
GA 940 END
Before you start，make a backup copy of your index disk using a file－copier pro－ gram．Then，type in and save the above customizer program on the backup disk． Next，move up the start－of－BASIC by en－ tering POKE 642，96：SYS 58260 in direct

## The new Star Multi-Font. How did Star get it all in there?

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The ImagePower ${ }^{\mathrm{TM}}$ Printers

# More on Timers 

## Larry Cotton

Last month we began a rather unstructured reaction-timing program that used the Commodore 64's not-so-accurate jiffy-clock timer. This month we'll finish our study of TI and TI\$ and look at a more accurate timer within the Commodore 64.

Recall that our program prints a series of horizontal bars on the screen. While each is being printed, the user must press the space bar to indicate how quickly he or she reacts to the appearance of the $\operatorname{bar}(\mathrm{s})$.

Lines 10-180 of this program were given in last month's column. You'll recall that we'd displayed the first bar and timed the user's reaction by reading the timer-specific variable TI. The bar counter D had been incremented but was still less than the number of bars the user requested at the beginning of the program (NB). To make the display more interesting, let's alternate between red and cyan bars.

## 190 IF $\mathrm{FL}=0$ THEN FL $=1$ :PRINT <br> "\{RED $\}$ " $:$ GOTO 210 200 FL=0:PRINT " $\{C Y N\}$ ";

These two lines illustrate the use of a flag-in this case, FL-to toggle between two colors. Now we need another random-length delay between printing the colored bars. As noted last month, this prevents the user from anticipating when a bar will be printed, thus falsely improving his or her reaction times.

## 210 FOR U=1 TO INT(200*RND(1)) +20 <br> :GET BS:IF B $\$<>$ " $\{$ SPACE $\}$ " THEN <br> NEXT:GOTO 110

At the end of the random-length delay, control is sent back to print a new bar and the clock is reset. If the user jumps the gun and presses the space bar before seeing anything, a glaring message is printed.
220 IF B $\$=$ " $\{$ SPACE $\}$ " THEN PRINT "\{WHT\} \{DOWN\}TOO SOON!"
The next line resets $D$ (number of bars printed), TL (total reaction time), and FL (color flag) and returns the user to ground zero. Such is the penalty for pressing the space bar too soon (line 220) or not pressing it soon enough (last month's line 130).
$230 \mathrm{D}=0: \mathrm{TL}=0: \mathrm{FL}=1:$ GOTO 80

The last five lines of the program are called from line 180, which detects when the number of bars printed (D) equals the user's request (NB).

```
240 AV =TL/D:AV=INT(AV* 100+.5)
    /100
250 PRINT "{WHT}{DOWN}AVERAGE
    REACTION TIME ="AV"SEC."
260 IF AV <BT THEN PRINT "{DOWN}
    BEST TIME ="AV"SEC.":BT=AV
    :GOTO 230
270 PRINT"{DOWN}BEST TIME ="BT
    "SEC."
2 8 0 \text { GOTO 230}
```

The variable $A V$ is the average reaction time for the series of bars, rounded to two decimal places. In line 260, we compare it to BT (defined hypothetically as 100 in line 10 ), to track the user's best reaction time. If AV is less than $B T$, then the new $B T$ is equal to $A V$. Otherwise, BT doesn't change and is printed by line 270.

Try running the program a few times until you achieve your best reaction time. Compare it to a friend's. I usually average about . 22 seconds; youngsters invariably do much better than that.

## II and Music

Since the Commodore 64 is so gifted musically, and since it contains the easy-to-use jiffy-clock timer, let's look at how TI can be useful in timing musi-cal-note durations. Enter the following short program, which plays a musical scale. In lieu of a line-by-line explanation, REMs will be used to let you know what's going on.

## $10 \mathrm{M}=256$ : $\mathrm{D}=10$ :REM MULTIPLIER AND DURATION

$20 \mathrm{~J}=54272:$ FOR $\mathrm{K}=\mathrm{J}$ TO $\mathrm{J}+23:$ POKE K,0:NEXT:REM CLEAR SOUND CHIP 30 POKE J+24,15:REM FULL VOLUME 40 POKE J+3,8:REM VOICE 1 SQUARE WAVE
50 POKE $\mathrm{J}+5,15$ :POKE $\mathrm{J}+6,12$ :REM VOICE 1 ENVELOPE
60 READ X
$70 \mathrm{X} 1=\mathrm{INT}(\mathrm{X} / \mathrm{M}): \mathrm{X} 2=\mathrm{X}-\mathrm{X} 1^{*} \mathrm{M}:$ REM CALCULATE POKEABLE FREQUENCY VALUES
80 POKE J + $1, \times 1$ :POKE J,X2:REM VOICE 1 FREQUENCY VALUES
90 POKE $\mathrm{J}+4,65$ :REM TURN NOTE ON $100 \mathrm{~T}=\mathrm{TI}+\mathrm{D}:$ REM READ TI, ADD DURATION

110 IF TI < > T THEN 110:REM LOOP UNTIL NEW TI = SUM OF OLD TI + DURATION
120 POKE $\mathrm{J}+4,64:$ IF $X=0$ THEN END :REM TURN NOTE OFF
130 GOTO 60:REM GO BACK FOR ANOTHER NOTE
1000 DATA $4291,4817,5407,5728,6430$, 7217,8101,8583,0:REM FROM PROG. REF. GUIDE
You've seen most of these techniques in the columns on 64 music, except for the use of TI in lines 100-110. Here's how they work.

The note is turned on in line 90. We read two values of TI in lines 100 and 110. Duration $D$ (defined in line 10) will be added to the first value. Then, in line 110 , the second value of TI will be compared to T. If they're not equal, the program loops at line 110 , reading more and more values of TI until TI is equal to T. When this occurs, the program falls through to line 120 , which turns the note off.

Try changing the value of $D$ in line 10 to other values from 1 to 500 and observe the results.

## The Good-Timer

As mentioned in the May column, the Commodore 64 has accurate and not-so-accurate timers. We've seen how the latter works, so let's now take a look at the accurate one-the Time of Day (TOD) clock. Actually, there are two TOD clocks built into the 64. Ironically, they count in tenths of seconds instead of sixtieths, as does the jiffy clock.

What makes the TOD clocks more accurate than the jiffy clock? For one thing, the jiffy clock is interrupted by cassette saves and loads and can even vary from one computer to another. (My jiffy clock loses about two seconds a day.) The TOD clocks, on the other hand, are as accurate as the $60-\mathrm{Hz}$ frequency of the power line that your computer is plugged into.

Even though they don't need TI and TI\$ to operate, the TOD clocks are still programmable using BASIC commands that we've already learned. We'll access the TOD clock, which uses memory registers 56328-56331. (The other uses registers 56584-56587 and is accessed similarly.) To set the clock, values must be POKEd into the four time registers which follow.

## Feedback

mode. The BASIC start-up message will appear showing 16383 bytes free; this gives you enough memory for the program INDEX and a patch.

Now, load and run the customizer program. The customizer has five menu options. To choose a particular option, press the number key corresponding to the option. Option 1 reads the existing categories into an array. Option 2 lets you edit the categories. Option 3 is used for starting a new database with entirely different categories. Option 4 saves and replaces the program INDEX. And option 5 exits the program.

If you want to index magazines other than Gazette, select option 3. Then, enter your new categories one at a time. When you've finished, press RETURN. To view and edit the categories you've just entered, select option 2.

Option 2-Add/Delete/Edit catego-ries-displays up to 40 categories. Use the cursor-up and -down keys to move the flashing highlight bar through the categories. The commands available in this mode are I, to insert a category; $D$, to delete one; $A$, to add another category onto the end; $E$, to edit the highlighted category; and $Q$, to quit to the main menu.

Only the first 18 characters of each category are displayed on the screen, but the entire entry is stored in memory. There are about 500 bytes of memory for
categories within the INDEX program. The actual categories used in INDEX take up about 460 bytes. If you enter more than 500, the program cuts off some of your data when you save a new version.

When you've finished editing the categories, select option 4 from the main menu to create a new version of INDEX. When you boot the disk, this new version is loaded. The new program won't be compatible with old data files. In fact, the program may crash if you load in old files and have fewer categories. For this reason, you should dedicate a disk to each magazine or set of categories.

In case you need to manipulate the data files, the first character of each filename is CTRL I. If you have trouble typing that in, use a question mark for the first character. (For example, you could use the commands OPEN1,8,15,"S0:?REVIEWS 83-85":CLOSE1 to delete the 1983-1985 reviews data file.)

After selecting option 5 to exit the program, enter SYS 2061 to try the new INDEX program or enter CONT to return to the customizer (in case you accidentally exit). Note that you can't save INDEX after using this SYS.

The customizer uses the turbo loader included on the index disk. If the program has trouble loading in INDEX with this loader, just delete the command SYS 49152 in line 160.

## A 128 Musical Discovery

For owners of a Commodore 128 or 128 D , there is some music hidden away on the tutorial disk that is supplied with your machine. To access it, you'll have to follow the directions here.

1. Insert your C128 Tutorial Disk.
2. Type BLOAD "'128MUSIC" ${ }^{\prime \prime}$ B0, P32768 and press RETURN.
3. Enter BANK0:SYS8* $4096+3,0,1$ for the Commodore theme song.
4. Enter BANK0:SYS $8 * 4096+3,1,1$ for the song used in the Demo program.
5. Enter BANK0:SYS $8 * 4096+3,2,1$ for the William Tell Overture (the theme song from "The Lone Ranger").

Also, by substituting a 0 (instead of a 1) for the last number in the above SYS commands, the music will play continuously.

David W. Ferguson Pontomac, MS
Thanks for revealing this nifty find.

## BEFORE TYPING...

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

## BASIC for Beginners

| Function | Register |
| :--- | :--- |
| Hours/a.m./p.m. | 56331 |
| Minutes | 56330 |
| Seconds | 56329 |
| Tenths of Seconds | 56328 |

Then, to read the clock, we PEEK these same registers and print out what's there.

## A Simple but Accurate Clock

Here's a short program that uses the TOD clock to display the time, accurate to a tenth of a second, on the screen. Each second that passes is accompanied by a satisfying tick sound. Unlike similar machine language clocks, you can't do anything else while this clock is displayed. At the same time, though, it's educational. Again, instead of a line-by-line explanation, I'll just use REMs to explain briefly what's going on.

## 10 FOR J=54272 TO 54295:POKE

 J,0:NEXT:REM CLEAR SOUND CHIP20 POKE 54275,8:POKE 54296,15:REM
SQUARE WAVE AND FULL
VOLUME, NO ADSR FOR TICK
30 POKE 54273,100:REM SET TICK
PITCH. TRY OTHERS
40 INPUT "\{CLR $\}$ \{WHT \} $\{$ DOWN $\}$
HOURS"; T(1):IF T(1)>12 THEN 40
50 INPUT "\{DOWN\}MINUTES";T(2):IF
T(2)>59 THEN PRINT " $\{3$ UP $\}$ "
:GOTO 50

60 INPUT "\{DOWN\}SECONDS";T(3):IF T(3)>59 THEN PRINT " $\{3$ UP $\}$ " :GOTO 60
99 REM LINE 100 CALCULATES POKEABLE VALUES FOR THREE TIME-OF-DAY MEMORY REGISTERS
100 FOR $\mathrm{I}=1$ TO $3: \mathrm{H}=\mathrm{INT}(\mathrm{T}(\mathrm{I}) / 10): \mathrm{L}=$ $\mathrm{T}(\mathrm{I})-10{ }^{*} \mathrm{H}: \mathrm{T}(\mathrm{I})=16^{*} \mathrm{H}+\mathrm{L}:$ NEXT
$110 \mathrm{C}=56331:$ REM TOP OF FOUR TOD REGISTERS
120 POKE C,T(1):POKE C-1,T(2):POKE C2,T(3):REM FILLS TOP THREE REGISTERS
130 PRINT "\{DOWN\}PRESS ANY KEY TO START CLOCK."
140 GET AS:IF A\$="" THEN 140
150 PRINT " $\{C L R$ \}"
160 POKE C-3,0:REM STARTS CLOCK
169 REM LINES 170-240 FORM LOOP WHICH REPEATEDLY READS THE FOUR MEMORY REGISTERS
$170 \mathrm{H}=$ PEEK (C):M $=$ PEEK(C-1):S = PEEK (C-2):T = PEEK(C-3):REM READING THE REGISTERS
$180 \mathrm{C} 1 \mathrm{~S}=\mathrm{CHR} \$((16$ AND H) $/ 16+48)+$ CHRS( 15 AND H) + 48):REM FORMING HOURS STRING
$190 \mathrm{C} 2 \$=$ CHR $\$((240$ AND M $) / 16+48)+$ CHR\$( $(15$ AND M) + 48):REM FORMING MINUTES STRING
$200 \mathrm{C} 3 \$=$ CHRS $((240$ AND S $) / 16+48)+$ CHR ((15 AND S) + 48):REM FORMING SECONDS STRING
210 IF C $3 \$=$ C 4 S THEN 230:REM IF NOT


Enter the program and save it to tape or disk. When you run it, you're asked to enter three values to set the clock. After doing this, you press any key to start the clock. The values that you enter can range from $0-12$ for hours and 0-59 for minutes and seconds. Once you press a key to start the clock, the program converts the numbers which were entered to those which the TOD clock registers can use.

This is not a 24 -hour clock, and it doesn't distinguish between a.m. and p.m. And it's not necessary to enter any of the values as two digits. For instance, if it's 1:06 p.m., at the three input prompts, just type 1,6 , and then press RETURN. Then press any key to start the clock. Set it with a known accurate electric clock and let it run a while. You'll see that it doesn't vary even slightly from correct time.

## IHI programmers's page

## Printer Spooling

## Randy Thompson

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

In January, I announced a contest of sorts. The contest focused on a somewhat strange program that read ASCII text files from disk and output them to the printer. Nothing odd about that, of course, except that the disk drive and printer didn't need to be connected to the computer once the printing began. In fact, as long as the disk drive remained tethered to the printer, you could disconnect the computer from the disk drive and turn it off-the file would continue to print. (A more practical person might opt to run another program during this unexpected free time.)

All weird programs have their quirks, however, and mine had plenty. Mainly, it didn't work with all printers. And that was my challenge. I offered $\$ 50$ to the first person who could make the program work with all Commodorecompatible printers and $\$ 75$ to the first person who could do that and make it work on both the 64 and 128 (my version ran on the 64 only).

I'm sad to say that I have yet to receive a winning entry; I have yet to receive more than four entries. A couple of people wrote in claiming that the whole idea of a background printer spooler was preposterous, attaching listings of tried-and-true BASIC FORNEXT loops that printed characters from disk one by one. But those people failed to realize the goal.

One person knew exactly what I wanted. Ted Grondski of the Pioneer Valley Computer Club in Springfield, Massachusetts, has sent me more printer spoolers than I know what to do with. Each one is based upon-but a greatly improved version of-the program that I had originally published.

Unfortunately, Mr. Grondski's programs are limited to the same printers and printer interfaces as my original program, so technically, his spoolers are not contest winners. But because of his efforts, I'm awarding Mr. Grondski
$\$ 40$ and presenting his best here.
Ted Grondski's most important improvement to the printer spooler is that the program now runs on both the 64 and the 128. It's also completely re-locatable-just change the value assigned to the variable A in line 120. The starting address must be set to a number that is evenly divisible by 256 .

Mr. Grondski's improved printer spooler is listed below. After running the program, you can print text files by entering the command SYS 15872:"filename",device \#, where filename is the name of a sequential ASCII file and device\# is the device number of your disk drive (usually 8 or 9 ). If you own one of the printers compatible with the program, the drive will whir and the printer will print the specified file. Best of all, you are free to use the computer while the file continues to print.

JH 10 REM PRINT SPOOLER 64/128 (RELOCATABLE)
HC $2 \sigma$ REM BASED ON AN ODD IDEA BY RANDY THOMPSON
BJ $3 \emptyset$ REM THE PROGRAMMER'S PAG E
MK 40 REM COMPUTE!S GAZETTE JA NUARY $199 \emptyset$
FK 50 REM ENHANCED BY TED GRON DSKI 2-24-9の V5.1D
JB 60 REM PIONEER VALLEY COMPU TER CLUB
CA 76 REM 1265 ST. JAMES AVE.
DR 80 REM SPRINGFIELD, MA $\emptyset 11 \emptyset$ 4
MH 90 REM
RC $10 \emptyset$ REM RELOCATE BY CHANGIN G 'A' TO
PX 110 REM AN AVAILABLE MEMORY PAGE-START .
CA $120 \quad \mathrm{~A}=15872$
KR $130 \mathrm{H}=\operatorname{INT}(\mathrm{A} / 256): \mathrm{J}=328$
HS 140 IF $A-H * 256>.1$ THEN PRIN T" $\{$ RVS $\}$ ' $A$ ' MUST BE A MU LTIPLE OF 256.":LIST120 : STOP
XA 150 PRINT"\{CLR\}\{2 DOWN\} \{RVS\} WAIT... POKING DA TA. "
RM 160 FOR $X=\emptyset$ TO $J: R E A D \quad D: C=C$ $+\mathrm{D}$
RS 170 POKE $A+X, D: N E X T X$
PD 180 POKE A $16090, \mathrm{H}:$ POKEA +15 $949, \mathrm{H}+1$
GJ 19 IF C $<>42905$ THEN PRINT" \{DOWN\} \{RVS\} DATA ERROR. .. ": STOP
EE $2 \theta \sigma$ Q $=$ CHRS (34):S $\$=": "+Q \$+"$ FILENAME"+Q\$+",DV"
$A K 210$ AS=STRS (A):AS=MIDS (AS,2 )
QQ 220 PRINT"\{CLR\}\{2 DOWN\} \{RVS\} SYNTAX:\{OFF\} SYS" ASS\$:END

QG 230 DATA $169,0,44,252,255,1$ $6,27,133,254,32,115,0$
AG 240 DATA $201,34,240,12,36,2$ $54,48,5,162,11,76,55$
PD 250 DATA $164,76,131,76,32,2$
$12,225,24,144,17,9,128$
BA 260 DATA $133,254,32,128,3,2$ Ø1,34,208,227,32,174,14 5
DR 270 DATA $32,69,168,165,183$, $240,217,224,8,144,213,2$ 24
JE 280 DATA $12,176,209,134,176$ , 133,177,165,187,133,17 8,165
JP 290 DATA $188,133,179,162,60$ ,160,63,169,5,32,189,25 5
HB 300 DATA $36,254,16,5,162,0$, $32,104,255,169,19,166$
SQ 310 DATA $176,160,15,32,186$, $255,32,192,255,176,43,1$ 69
JX 320 DATA $19,32,195,255,162$, 65,228,187,249,50,165,1 77
EX 336 DATA $166,178,164,179,32$ ,189,255,36,254,16,5,16 2
RC 340 DATA $1,32,104,255,169,1$ $7,166,176,160,2,32,186$
JC 350 DATA $255,32,192,255,144$ , 20, 72, 32, 231, 255,104,1 70
CA 360 DATA $36,254,48,3,76,55$, $164,76,124,77,298,165$
MM $37 \emptyset$ DATA $249,77,169,0,32,18$ $9,255,169,18,162,4,160$
GE 380 DATA $7,32,186,255,32,19$ $2,255,176,217,162,18,32$
XJ 390 DATA $281,255,176,218,16$ $2,17,32,198,255,176,263$ , 162
KE 400 DATA $255,202,208,253,17$ $3,0,221,41,223,141,0,22$ 1
JH 410 DATA $162,249,160,62,12 \sigma$ $, 142,20,3,149,21,3,169$
EB 420 DATA $0,133,252,133,251$, $198,251,88,169,0,133,15$ 3
XA 430 DATA $169,3,133,154,96,2$ 08, 175,240,51,36,251,16
PM 440 DATA $53,173,6,221,197,2$ $53,208,40,230,252,165,2$ 52
CP 450 DATA $201,120,208,38,230$ ,251,32,204,255,162,18, 32
RG 460 DATA $201,255,169,13,32$, $210,255,169,18,32,195,2$ 55
XC 470 DATA $169,17,32,195,255$, $32,204,255,162,65,2$ 日8, 2 01
MP 480 DATA $133,253,169,0,133$, $252,36,254,48,3,76,49$
DD $49 \emptyset$ DATA $234,76,101,250,85$, $48,62,77,48,85,48,62$
EB 50 0 DATA $77,49, \varnothing, 0,0$

# madie hangae proyianiming 

## Split Screen

## Jim Butterfield

The Commodore 128 gives you a builtin screen-splitting feature, but on the 64 you must do the job yourself. This task involves careful use of the IRQ interrupt.

The accompanying program gives an example of screen-splitting code for the 64. If you can locate a copy of COMPUTE!'s First Book of Commodore 64 (published in 1983), you'll find this information in more detail there. We'll work through the program I wrote for the book (it appears on page 102) and look at how it works.

First, an outline of our objectives. The image on the television or monitor screen is continuously being drawn; the raster, which draws the image, runs from the top to the bottom of the screen, taking $1 / 60$ second to draw the whole thing. Our program must "catch" the 64 at the exact moment the rasterdrawing process reaches the split point and then change the screen to some other mode: from text to high resolution, from one background color to another, and so on. The job must be done fast enough that the user sees no flicker in the screen image.

Furthermore, we must arrange to restore our video when the raster drawing completes the bottom of the picture and returns to the top of the screen. That requires two interrupt timings: one to switch and another to switch back.

While all this is going on, another interrupt needs to be serviced: the one that polls the keyboard, flashes the cursor, and updates the clock. This routine must also be serviced at intervals of $1 / 60$ second, but not necessarily at precisely the same speed as our video interrupt. In fact, part of our problem is that the two activities are not synchronized. Sometimes their timing will coincide and other times it will be far apart.

## Priority

Our first approach might be to write the program this way: If the two IRQ interrupts occur at the same time, we'll always do the screen-split job first. That job is time-sensitive, and the keyboard/ clock work won't mind a short delay. The screen split will take precedence, giving us the fast timing we need. Right? Wrong.

Here's the problem. Suppose that the regular interrupt-the keyboard/
clock job-comes a split second before the video chip signals it's ready. The computer will start to service the keyboard, and the next interrupt can't be handled until the previous one is finished. Checking the keyboard, updating the clock, and doing the other tasks (blinking the cursor, checking the RUN/ STOP key, and maintaining the cassette tape interlock) will take too long. By the time they finish, we will have missed our screen-split point and the viewer will see a bounce, or flicker, in the dividing line.

We must use a different approach to the problem-one that at first seems radical. We disconnect the regular interrupt completely. The only interrupt will be that for the screen split. And the code there will ask, "Is the regular routine requesting service?" If so, that routine is serviced after the screen split has taken place.

How can we detect an interrupt request if we've shut off a particular interrupt? The answer lies in two important registers: the IER (Interrupt Enable Register) at \$D019, which switches an interrupt request through to the IRQ line if activated; and the IFR (Interrupt Flag Register) at \$DC0D, which tells us if an interrupt is being requested by that particular event-even if the interrupt is not "cut through."

## The Machine Language

Our routine makes a simple background color change at the screen-split point. By the time this code is activated, BASIC will have switched off the regular interrupt line.

| 033C | LDA | $\# \$ 01$ | ;turn off raster <br> interrupt... |
| :--- | :--- | :--- | :--- |
| 033E | STA | $\$ D 019$ | ;...via IER |
| 0341 | LDX | $\# \$ 92$ | ;raster int $=\$ 92$ |
| 0343 | LDY | $\# \$ 06$ | ;color blue |
| 0345 | LDA | \$D012 | ;test raster |
| 0348 | BPL | $\$ 034 \mathrm{E}$ | ;skip if at top of |
| screen |  |  |  |

The above code does the actual screen-split work. Now it's time to see if the disabled interrupt is asking for service.

```
0357 AND #$01 ;extract timer bit
```

0359 BEQ \$035E ;skip if no request 035B JMP SEA51 ;do timer service 035 E JMP $\$$ FEBC ; exit interrupt

This routine is as streamlined as I can make it. In many cases, you'll need to expand the code. For example, you might need to set (and test) both the high and low parts of the raster register. One secret that I didn't mention in the original article: The IRQ startup code in ROM, together with the above, run in a time that almost exactly matches the time needed to draw one raster line. As a result, the color change will take place one raster line lower than the one it seems you're setting.

Let's do the program in BASIC so that you can see the entire job.
90 POKE 53265,27:REM DEFAULT
SETTING
100 FOR J=828 to 864:READ X
$110 \mathrm{~T}=\mathrm{T}+\mathrm{X}$ :POKE J,X
120 NEXT J
130 IF T < > 4077 THEN STOP
200 DATA $169,1,141,25,208,162,146,160,6$, 173,18,208,16,4,162,1
210 DATA $160,0,142,18,208,140,33,208,173$, 13,220
220 DATA $41,1,240,3,76,49,234,76,188,254$
300 POKE 56333,127:REM DISCONNECT REGULAR IRQ
310 POKE 788,60:POKE 789,3
320 POKE 53274,129:REM CONNECT RASTER IRQ

To handle interrupts, you must grasp some new programming ideas. And you must be careful. Interrupt code is hard to debug, so it helps to get it right the first time.

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

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## Software Leaders' Outlook on the 64

## Mickey McLean

"The Commodore 64 is dead."

Industry experts uttered this phrase four years ago and two years ago. Many continue to say it today. You'll probably hear it again two years from now.

Introduced during the summer of 1982 , the Commodore 64 has inspired more repetition of Mark Twain's famous quotation than any other product of the computer industry. Despite a lack of support from its parent company and a growing list of software developers abandoning it in favor of MS-DOS,

Amiga, Nintendo, and Sega formats, the 64 has become the computer that won't die.

Although PCs and compatibles claim close to 80 percent of the software market, several software companies that have stuck with the 64 report steady sales.
"While a lot of pundits have predicted the demise of the 64 , we're still finding it's a strong platform," says Martin Alper, president of Virgin Mastertronic, which produces arcade and sports simulations for the 64 . "Our 64 sales are running neck-
and-neck with IBM.
"You would have expected Nintendo and Sega to have knocked the feet out from under the $64,{ }^{\prime \prime}$ he says. "They have eroded the market, but not as much as forecasters had predicted."

A major producer of sports simulation titles is SportTime Computer Software-and President Ed Ringler is pleasantly surprised at how well the company's 64 releases are selling.
"Omni-Play Basketball is one of the leading titles at Electronic Boutique," Ringler says, "and the people there are surprised, too.
"I haven't noticed IBM users being any more aggressive than Commodore 64 users," he says, comparing the buying habits of PC and 64 users. "We'll keep putting out 64 products as long as they are aggressive."

Until recently, the top-selling platform for Strategic Simulations (SSI) was the Commodore 64.
"Champions of Krynn is the first product where the MS-DOS initial order was greater than the 64, , says marketing representative Linda Blanchard about SSI's latest Advanced Dungeons \& Dragons release. "We're starting to see a change. But our product line is still very popular with 64 owners, especially the $A D \& D$ products. And as long as people out there keep buying them, we'll keep making them."

## Less Competition

One reason that companies such as Virgin Mastertronic, SSI, and SportTime are able to maintain a strong presence in the 64 market may be reduced competition.
"Because other publishers have dropped out, maybe we're getting a larger slice," Alper says.

Many of the major software companies have scaled back their 64 releases, have stopped support altogether, or have limited 64 releases to the European market.
"We have nothing under development now," says Lisa Petrison, public relations coordinator for Mindscape. "It just hasn't been profitable enough.'

Petrison did add that one of Mindscape's recent titles, Fiendish Freddie's Big Top o' Fun, was released for the 64, but only in Europe, where Mindscape finds the market more to its liking.

According to Joe Hubbard of Free Spirit Software, foreign users are slower to make a change than their U.S. counterparts.
"In certain countries such as the
U.K. and Australia, users tend to run their machines longer," Hubbard says. "They don't upgrade as easily, and some simply find the 64 is all they need."

Although Hubbard is a longtime 64 and 128 supporter, he has decided to concentrate on the Amiga market.
"I doubt we'll introduce any new products for the 64 , but we'll continue to support existing products," says Hubbard, who notes that there's still a great demand for Free Spirit's 1541/1571 drive alignment program.
"I guess as disk drives get older, there is a greater need for the product."

## Quality, Not Quantity

Other software companies have discovered that the 64 user of today is more discerning than ever.
"Commodore users are a very distinct breed," says Greg Malone, media relations manager for Origin, another company that continues to develop 64 products. "They have pride in their machines, and they hate conversions from other machines."

Ringler adds, "Without a doubt, quality is going to be the winning issue. In the long run, a product will succeed because it is a good product."

But with Nintendo and MS-DOS products eating up shelf space in stores, Ringler and other developers are finding it increasingly difficult to get a product to market.

## Shelf Wars

Kyodai Software Marketing, a newcomer to the Commodore market, is owned by 12 different Japanese software manufacturers. The company recently released an arcade title, Curse of Babylon, in the U.S. for the 64 .
"They [Japanese manufacturers] were interested in testing their products in the Commodore market," says John Eaton, chief executive officer of Kyodai. "We determined that Commodore owners may be happy with a Nintendo-type game."

Although it's too soon to determine how well the product is faring, Kyodai has had problems with distribution. "Certain distributors will not

# It will go away unless publishers exploit the 64's capabilities instead of just making a quick port. 

-Martin Alper, Virgin Mastertronic

Despite this knowledge, Malone adds that Origin has recently started developing all of its games, with the exception of Bad Blood, on the IBM PC first. Bad Blood is derived from Times of Lore, which was initially developed for the 64 . Since a new game could be built from the old, Malone says Origin decided to co-develop it on both the 64 and on a PC.

In addition to Origin, companies such as Mediagenic, Accolade, and Electronic Arts are concentrating on the PC market first and foremost and later porting some of the titles over to the 64 .

Virgin Mastertronic's Alper says, "It [the 64] will go away, unless publishers exploit the 64's capabilities instead of just making a quick port."

Based on the experiences of companies that still develop primarily for the 64 , the formula for success in today's market is quality equals sales.

SportTime's Ellen Horiuchi says, "When we come out with a good 64 product, people seem to eat it up!"
take Commodore products," Eaton says.

SportTime's Ed Ringler feels for the 64 users who must hunt down new software for their computer.
"It is definitely harder for the end user," Ringler says. "A lot of decisions are already made for them."

Ringler understands the retailer's dilemma over whether to sacrifice shelf space for 64 products in order to make room for Nintendo cartridges.
"Retailers usually end up having to choose Nintendo," he says. "At least there is no piracy with Nintendo. But if the stores carry 64 products, the products are going to sell."

Babbage's, one of the largest national software retail chains, continues to carry 64 products, but company President Gary Kusin is not very optimistic about the future.
"Unfortunately, it looks like the 64 's fate is sealed," Kusin says. "But we'll continue to carry 64 products as long as they're available."

Kusin attributes the lack of Com-

modore titles on the shelves to the boom of the Nintendo market as well as the declining interest of software publishers to develop 64 products.
"It's less our decision and more the decision of publishers who have quit making products," he says.

Kusin adds that 64 titles coming into the stores have not sold well.

## Bericeley's Solution

Berkeley Softworks, publisher of the immensely popular GEOS, has noticed mass merchants cutting back on shelf space for its line of 64 productivity software. Leland Llevano, Berkeley's vice president of marketing, indicates that the company is experimenting with new ways to market its products.
"We need to be prepared," Llevano says. "We have had a lot of success with direct mail, and with it we can offer price incentives because we won't have to offer discounts to distributors or retailers."

## The software

> companies create the demise of hardware, Just Ilke the Atari 800 , When people stopped making any products, it died.
> -Ed Ringler, SportTime Software

Llevano is quick to add that Berkeley does not plan to compete head-to-head with retailers. "We'll only go to this when the shelf space shrinks."

As for the future of GEOS, Llevano says that no new applications are planned but that a system upgrade is in the works for release next fall.
"We feel as if we have hit on most of the key application areas except entertainment, but we're not really interested in that," he says. "We'll continue to support the existing products and maintain our presence on Q -Link."

Llevano adds that, because of the success of GEORAM, another hardware product is now on the drawing board for possible release in the fall.

With the market changing from week to week, Llevano stresses that it's very important for GEOS-product purchasers to send in their registration

For more information on companies and products mentioned in this article, please use the addresses listed below.

## Accolade

550 S. Winchester Blvd.
Suite 200
San Jose, CA 95128
Berkeley Softworks
2150 Shattuck Ave.
Berkeley, CA 94704
Data East
1850 Orchard St.
San Jose, CA 95125
Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
Free Spirit
P.O. Box 128

58 Noble St.
Kutztown, PA 19530
Kyodai Software Marketing
58 Mitchell Blvd.
San Rafael, CA 94903

## Mediagenic

3885 Bohannon Dr.
Menlo Park, CA 94025

## Mindscape

3444 Dundee Rd.
Northbrook, IL 60062

## Origin

110 Wild Basin Rd.
Suite 330
Austin, TX 78746
SportTime Computer Software
3187-G Airway Ave.
Costa Mesa, CA 92626
Strategic Simulations
675 Almanor Ave.
Sunnyvale, CA 94086-2901
Virgin Mastertronic
18001 Cowan
Suites A \& B
Irvine, CA 92714
cards. "It's the only way we can keep them informed," he says.

## No Hard Disk

As computer entertainment moves into the 1990s, games have become more sophisticated and require much more memory and power than the 64 can deliver. Many of the new MSDOS titles are distributed on three or more disks and need a hard drive to play effectively.
"The biggest headache is that games are becoming more and more advanced," Martin Alper says. "Because the 64 has no hard drive, larger games are tedious to play because of the multiple disks."

Based on the track record of companies now successful in the Commodore market, winning products are usually original arcade games, sports simulations, or productivity packages that utilize the 64's animation, graphics, sound, and playability.
"Sports games and particularly arcade games do very well," Alper says. "Adventures are more difficult to port over to the 64. The game design has to be radically changed."

Data East's Connie Freeman says that her company's genres, arcade and sports games, have kept it strong in the 64 market, but she adds that Data East does not plan to release any of its new role-playing games for the 64 .
"We are being more discerning about what products we release on the 64 ," Freeman says. "We're not going to release the fantasy role-playing titles on the 64 because we're taking technology further and the 64 doesn't have that kind of power."

The booming popularity of MSDOS gaming has caused many of the marketing departments of many 64-
loyal software houses to try and convince executives to turn away from the 64.
"Our marketing people said Omni-Play Horse Racing was more appropriate for the IBM, because it is a more sophisticated market," Ringler says. "But we've had a tremendous response from 64 users. They appreciate the graphics and the detail. In fact, the 64 version is outselling the IBM one."

## Who's Responsibie?

A case can be made to blame Commodore for the demise of the 64, but Ed Ringler sees it differently.
"The software companies create the demise of hardware," Ringler says. "Just like the Atari 800. When people stopped making any products, it died."

To demonstrate its loyalty to the 64, Linda Blanchard reminds us that SSI was one of the last companies to support Atari 8-bit computers.
"We won't jump ship unless the market just doesn't exist anymore," she says.

Could the end finally be in sight for the 64 , making it the next 8 -bit computer to fall by the wayside?
"We're looking at maybe another two years," says Joe Hubbard, using a time frame now very familiar to 64 users. "The demand for 64 products will steadily decline, reaching a point where it's not feasible to develop any more products."

Hubbard optimistically adds, "But there is still demand for $\mathrm{CP} / \mathrm{M}$ products, and CP/M went the way of the dinosaur long ago. The 64 may do the same. For home use, the 64 is still a good introductory computer. For some people it's still all they need."

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# COMMODORE 

 COMPUTER SHOWS
## How to Get the Most Out of Them

I paused near the entrance, considering my next move. For the fourth year running, I was attending a local computer show with my husband. He was excited about one of the seminars. He's a hacker, so I figured the sessions he wanted to sit in on would be way over my head. The speakers I wanted to hear were either late or not coming at all. I noticed there were fewer vendors than in prior years, too. And while I don't claim to know everyone in town, I didn't recognize anybody at this show, either. Basically, this show just didn't look as good as some I had previously attended.

So what could this show do for me? Why didn't I just go back home? I stayed because even the most mediocre computer show has something to offer.

Robin Minnick

> If a computer show makes you think of a convention of geeks and nerds, think again. There's a wealth of knowledge to be gained just by being there. Here's some excellent firsthand advice from an experienced showgoer.

## Of Like Dementia

While many of us like to communicate via bulletin boards or to swap programming hints at user group meetings, the truth is, computing is essentially a solitary endeavor. Even if everyone in the family has a use for
the machine, those uses usually vary. Rarely do you find a soul mate in your own home who can understand (or stand) your ravings about a WYSIWYG word processor or the latest, souped-up version of an assembler. We need to be able to express our enthusiasms and communicate our crazes-and a computer show filled with participants of like dementia is the perfect forum.

Besides this fellowship, there is also the opportunity to learn more about your computer and how to use it. All these hackers can't get together without exchanging tips and methods, and with a sharp pair of ears, you will almost always learn something new.

Shows vary in content. Factors such as the show's size, its budget, who's sponsoring it, and how broad

## Eight Show Tips

Don't be afraid to go. Use the information in this article to familiarize yourself with show concepts. Be determined to make a fool of yourself, if you must. But most important, go.

Don't be afraid to ask questions, especially of the experts. As wiser heads have pointed out, the pros assume we know all the computer basics, whereas many of us don't. If your question seems simple, ask it anyway. Chances are someone else is wondering the same thing. And, by all means, ask everyone: speakers, vendors, and hackers. Most of them love to show off their expertise.

Talk to the vendors. Let them know what you like or dislike about their products and what you'd like to see in the future. Shows are sometimes the best way vendors have to find out exactly what you, as a consumer, want. This is also a good way to let the publishers know if you've had a problem with technical support, documentation, or just getting the right answer. When you discuss a problem with a vendor, give specifics such as names and dates, and you'll have a better chance of finding a solution.

Play around with the computers on display. Whenever possible, test new programs and machines. You can't often do that in a store.

Examine the list of scheduled speakers as soon as you arrive. Pick out whom you want to hear, find out where and when the talk is to be held, and plan to get a good seat. Take notes. Even better, take along a small tape recorder.

Engage in conversation. Sometimes the best programming or applications tips come from other users or hackers. Or you may pass along something you've learned to someone who needs it. Carry cards with your name, address, phone number, and-if you're a member-the name of your user group. It's quicker than jotting down information while leaning on your new friend's back. Plus, having cards with you will encourage you to find people to pass them around to.

Take someone else to the show with you, even if he or she is not as much of a computer freak as you. Your friend can sit in a seminar and hold a tape recorder or take notes so you don't have to miss a speaker scheduled for the same time in another room.

Visit every booth, even if each doesn't have a flashy display to pull you in. One of the best buys I ever made was Xetec's Fontmaster II. I bought it at half-price, and all the booth housed was two systems, one person, and the program.
an audience it attracts affect the way a show is set up. Shows may be held at local hotels or convention centers, schools, or churches. There may or may not be an admission charge. The overall atmosphere may range from glitzy to scholarly; however, there are some elements common to most shows. In general, a computer show, or computer fair, will have three main components: speakers, vendors, and hackers.

Speakers discuss everything from programming techniques and MIDI to newsletter preparation and desktop publishing. Topics are usually covered in a series of seminars presented over the course of the show. Speakers may be drawn from local user groups, computer magazines, software companies, and even Commodore itself. Or they may be authors, programmers, or computer experts (gurus). It depends on the topics covered and the nature of the show.

## Good Buys

Vendors maintain booths at the fairs to showcase their products. You'll often see a mix of local, regional, and national companies represented. They may tout new software, new hardware, gadgets and supplies, infor-
mation on upcoming products, and even new applications for the computer. In addition to standard software and hardware offerings, I've seen booths with such diverse products as disks of Christian graphics for The Print Shop, plus colored ribbons and paper to print them; drive-alignment tools and other repair services; T-shirts bearing titles from popular software; and even disks of poetry composed by local poets (set in various fonts and screen colors). Many times, products are offered at "This Show Only" bargain prices. I've always found something worth buying.

Commodore is frequently asked to participate in these shows. If it does make an appearance, you have your golden opportunity to praise or
criticize its machines and make suggestions as to what the company might do. You can offer feedback and suggestions to software vendors as well. Occasionally, you'll find yourself talking with individuals who actually wrote the software, especially if the company is a one- or two-person operation. In fact, the chance to talk to "the big guys" is the main reason some people attend computer shows.

Not to be overlooked are the booths maintained by area user groups, offering information on group meetings and local BBS numbers. And there are door prizes, too. You might win something to support your computer habit. I won some music software once. (And if I ever trade up to an Amiga, I'll be sure to put it to good use.)

If you haven't gone to a computer fair yet, you may feel you'll be overwhelmed by all the technology and computer talk, especially if you're a new computer user. Don't worryany fears you might have are best conquered by jumping right in.

## Right for the Home

There's no more complete or versatile machine for the money than the Commodore 64 or 128 . It's the perfect first computer, especially for families or individuals without the dollars or inclination to compute at home bigtime. These computers are easy to learn, and they can do everything: speech, graphics, word processing, math, and music. A 64 will always have a place in our home, even if bigger machines move in.

There will always be new computer families, too. It will take a long time for all of us to enter the Home Computer Age, regardless of what the companies would have us think. Computer shows can be a prime source of techniques and equipment for enthusiasts new to this addiction. It may seem like novice users would get the most from a computer show, but old-timers benefit, too. After all, people come up with novel uses for the 64 and 128 every day. So, check out the next show that comes your way. You'll certainly get your money's worth.

## 1990 Commodore Shows Sponsored by The Hunter Group

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World of Commodore/Amiga November 30-December 2 Toronto, Ont., Canada
For more show listings, check with your local Commodore User Group.

## A Guide to Commodore User Groups <br> Part 2

## Edirted by Liz Casey

This annual Gazette feature provides an up-to-date list of user groups across the U.S., throughout Canada, and around the world. Part 1, published in last month's issue, includes states $A$ through $M$ (AlabamaMontana). Part 2 includes user groups from the remaining states (Nebraska-Wyoming), from APO sources, and from foreign countries. Under each state heading, groups are listed in order according to ZIP code. Groups from outside the U.S. are listed alphabetically under each country heading.

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

## Commodore 64/128 User Group Update <br> COMPUTE!'s Gazette <br> P.O. Box 5406 <br> Greensboro, NC 27403

Your group will be listed in "User Group Update" in a future issue.
Note: When writing to a user group for information, please remember to enclose a self-addressed envelope with postage that is appropriate for the country to which you're writing. COMPUTE! Publications does not condone the use of its user group lists by individuals or user groups for the purpose of buying, selling, or trading pirated software. Should we discover any group participating in any such illegal and unethical activity, the club's listing will be permanently deleted from our files.

## NEBRASKA

Pathfinder Commodore User Group, 1817 Briarcliff Rd., Fremont, NE 68025
Greater Omaha Commodore Users Group, P.O. Box 241155, Omaha, NE 68124 (BBS\# 402-292-3628)
The Omaha Computer Society, P.O. Box 44129, Omaha, NE 68144-0129

Mid-Nebraska Users of Commodore (MUC), 1920 N. Huston Ave., Grand Island, NE 68803
KACCK: Kearney Area Commodore Computer Klub, P.O. Box 1611, Kearney, NE 68848-1611
McCook Commodore Users Group, 1010 E. 2nd St., McCook, NE 69001

Platte Valley Computer Users Group (PVCUG), P.O. Box 367, Gering, NE 69341

## NEVADA

Clark County Commodore Computer Club ( 5 C's), 5099 Eldora, Las Vegas, NV 89102

## NEW HAMPSHIRE

Manchester Commodore Users Group, P.O. Box 1641, Manchester, NH 03105

Commodore Help and Information Network (CHAIN Gang), P.O. Box 654, Laconia, NH 03247 (BBS\# 603-286-7362)

## NEW JERSEY

Info 64 Commodore User Group, c/o Jerry Fleischer, 186 Delmar Ave., Glen Rock, NJ 07452
Hillsdale Commodore 64 Users Club, 32 Esplanade Lake Dr., Hillsdale, NJ 07642
Garden State Commodore \& MS-DOS User's Group, 89 Stratford Rd., Tinton Falls, NJ 07724 (BBS\# 201-938-3885)
Commodore User Group of Central New Jersey, 112 Old Bridge Rd., Matawan, NJ 07747
Morris Area Commodore User Group (MACUG), P.O. Box 492, Mt. Tabor, NJ 07878
Data Exchange-Beneficial Users Group 64/128 (DE-BUG 64/128), 713 Second St., Dunellen, NJ 08812
Commodore E. Brunswick Users Group (CEBUG), 9 Kings Rd., E. Brunswick, NJ 08816

## NEW MEXICO

New Mexico Commodore User Group, P.O. Box 37127 , Albuquerque, NM 87176 (BBS\# 505-268-4662)

Los Alamos Commodore Users Group, 4214-A Arizona St., Los Alamos, NM 87544 (BBS\# 505-662-5940)
Taos Area Commodore User's Group, P.O. Box 5686, Taos, NM 87571
The Southern New Mexico Commodore User's Group, P.O. Box 4437, Uni. Park Brch., Las Cruces, NM 88003
Deming Commodore User Group (DCUG), 1400 Mallery Dr., Deming, NM 88030
Commodore Users Group of Roswell (CUGOR), 1619 N. Kansas, Roswell, NM 88201

## NEW YORK

New York Commodore Interest Group ( $\mathrm{NYC}=\mathrm{ig}$ ), 115 Essex St. Box \#146, New York, NY 10002
Kids Computer News, St. Hilda's \& St. Hugh's School, 619 W. 114th St., New York, NY 10025
New York Commodore Interest Group, c/o St. Hilda's \& St. Hugh's School, 619 W. 114 St., New York, NY 10025

Bronx Users Group (BUG), P.O. Box 523, Bronx, NY 10475 (BBS\# 212-671-7050)
Folklife Terminal Club, Box $555-\mathrm{R}, \mathrm{Co}$-op City Station, Bronx, NY 10475
Elite Commodore User Group, c/o Aquil Lynch, 754 E. 23rd St., Apt. 3H, Brooklyn, NY 11210
Queens Commodore Users Group, 37 Skillman Ave., Brooklyn, NY 11211 (BBS\# 718-366-7445)
Brooklyn Commodore User's Group, 1735 E. 13th St. Apt. 7N, Brooklyn, NY 11229 1952 (BBS\# 718-645-1979)
Queens C-64 User Group, P.O. Box 129, Ozone Park, NY 11417
Commodore Users Group of Greater New York, 190-25 Woodhull Ave., Hollis, NY 11423
N.C.C.C., 151 DuBois Ave., Sea Cliff, NY 11579
Commodore Long Island Club, 15 Rochelle Ct., Amityville, NY 11701 (BBS\# 516-4894016)

Brentwood $64 / 128$ Computer Club, Pub. Lib., 2nd Ave. \& 4th St., Brentwood, NY 11717
C64-Five Users Group, P.O. Box 134, East Islip, NY 11730
Club 64, P.O. Box 2265, Patchogue, NY 11772
Mohawk Valley Computer User Group, c/o Wm. Nowak, 3818 Stinson Ave., Tribes Hill, NY 12177
Tri-City Commodore User's Group (TCCUG), P.O. Box 12742, Albany, NY 12212-2742
Hudson Valley Commodore Club, P.O. Box 2190, Kingston, NY 12401
Commodore User Group of Orange County, 30 Square Hill Rd. Box 41, New Windsor, NY 12550
Catskill Commodore Users Group, Box 160 RFD, Woodbourne, NY 12788
Frontier Computer Users, RFD \#1 Box 352A, Chazy, NY 12921 (BBS\# 518-8468803 or 518-846-8934)
Oswego Commodore User Group, 402 Ma har Hall, State University College, Oswego, NY 13126
Central New York Commodore Users Group (CNYCUG), P.O. Box 397, Syracuse, NY 13209 (BBS\# 315-433-0916)
The Commodore Computer Club of Syracuse, P.O. Box 2232, Syracuse, NY 13220 (BBS\# 315-656-3544)

Utica Commodore User Group, 1801 Storrs Ave., Utica, NY 13501
Commodore Users Group of Massena (COMA), Brian Trzakos, c/o Jefferson School, Massena, NY 13662
The Niagara Falls Commodore/IBM Club, 2405 Willow Ave., Niagara Falls, NY 14305
Geneva Commodore Users' Group, 25 Pine St., Geneva, NY 14456
Commodore Users Group of Rochester (CUGOR), P.O. Box 23463, Rochester, NY 14692 (BBS\# 716-621-5908)
Com-puter Club, P.O. Box 4339, Elmira, NY 14904

## NORTH CAROLINA

Mayodan Commodore Users Group, 70 Virginia St., Mayodan, NC 27027
Sanlee Commodore Club, 514 Colonial Dr., Sanford, NC 27505
Baileys User Group (BUG), P.O. Box 70, Holly Springs, NC 27540
Western Carolina Commodore Beginner User Group (WCCBUG), Rt. 4 Box 387 , Forest City, NC 28043 (BBS\# 704-2878052)

Salisbury Compute, Rt. 1 Box 349B, Salisbury, NC 28144
Wilmington Commodore Users Group, 2104 Wisteria Dr., Wilmington, NC 28401 Greater Onslow Commodore Users Group (GOCUG), P.O. Box 1644, Jacksonville, NC 28541
Asheville-Buncombe User Group (ABUG), P.O. Box 15578, Asheville, NC 28813

## NORTH DAKOTA

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

## OHIO

The Commodore User Group (TCUG), P.O. Box 63, Brice, OH 43109 (BBS\# 614-755-2604)
Central Ohio Commodore Users Group, P.O. Box 28229, Columbus, OH 43228 0229 (BBS\# 614-274-6502)
Basic Bits Commodore Group, P.O. Box 447, N. Ridgeville, OH 44039
NorthEast Ohio Computer Users Group (NEOCUG), P.O. Box 196, Wickliffe, OH 44092
Commodore Preference Users Connection (CPU Connection), P.O. Box 42032, Brook Park, OH 44142 (BBS\# 216-2384578)

Portage County Commodore Family User Group (PCCFUG), P.O. Box 901, Ravenna, OH 44266 (BBS\# 216-296-3692)
Trumbull Commodore Users Group (TRUMCUG), P.O. Box 8632, Warren, OH 44484
Mahoning Valley Commodore Club, P.O. Box 1180, Youngstown, OH 44501
Commodore Users Group, 29425 Bettler Rd. Box 175, Dennison, OH 44621
Canton/Akron/Massillon Users Group (CAMUG), P.O. Box 2423, North Canton, OH 44720 (BBS\# 216-453-3319)
Commodore Erie Bay Users Group (CEBUG), P.O. Box 1461 , Sandusky, OH 44870
Shelby Computer User Group, P.O. Box 512, Shelby, OH 44875
Western Cincinnati Commodore Club (WEST-COM 64), P.O. Box 89, Amelia, OH 45102
Southwestern Ohio Commodore Users Group (SWOCUG), P.O. Box 46644, Cincinnati, OH 45246

Dayton Area Commodore Users Group (DACUG), 1117 Lavern Ave., Kettering, OH 45429 (BBS\# 513-878-1408)
Hancock User's Group (HUG), P.O. Box 1651, Findlay OH 45839-1651

## OKLAHOMA

Commodore User's Group of Lawton, P.O. Box 3392, Lawton, OK 73502
Commodore Users of Bartlesville, 2524 SW Mountain Rd., Bartlesville, OK 74003 (BBS\# 918-336-3872)
Tulsa Area Commodore Users Group (TACUG), P.O. Box 52473, Tulsa, OK $74169-$ 1842 (BBS\# 918-428-2284)
Muskogee Commodore Users Group (MCUG), 2429 Georgia, Muskogee, OK 74403 (BBS\# 918-682-0773)
Osage/Kay Commodore User's Group (OKCOM), 317 Woodbury, Ponca City, OK 74601

## OREGON

Commodore East County (CEC), 2424 SE Evans Ave., Troutdale, OR 97060-2328
Crash-64 Salem Area's Commodore User's Group, P.O. Box 241, Salem, OR 97308 (BBS\# 503-585-3092)
Albany Corvallis Commodore Users Group (ACCUG), P.O. Box 1124, Corvallis, OR 97339
United States Commodore Users Group, P.O. Box 2310, Roseburg, OR 97470

CUA, P.O. Box 531, Medford, OR 97501 (BBS\# 503-772-1092 6:00 p.m. to 8:00 a.m. PST)

## PENNSYLVANIA

A-K 64 User Group, 1762 Fairmont St., New Kensington, PA 15068
Bettis Commodore Users Group, 592 Arbor Ln., Pittsburgh, PA 15236
Castle Commodore Computer Club, P.O. Box 961, New Castle, PA 16103
North Coast Commodore Users Group Erie, P.O. Box 6117, Erie, PA 16512-6117 (BBS\# 814-899-1796)
Centre Area Commodore Computer Club, 441 Agricultural Administration Bldg., Penn State University, University Park, PA 16802
Capital Area Commodore Club, P.O. Box 333, Lemoyne, PA 17043
Huntingdon County Hackers, P.O. Box 132, Mill Creek, PA 17060
C.U.G.LEB.CO, P.O. Box 511, Richland, PA 17087
Harrisburg Area Computer Group, 721 S . 29th St., Harrisburg, PA 17111 (BBS\# 717-558-9080)
White Rose Commodore Users Group, P.O. Box 7501, York, PA 17404-0501

Gods of Public Domain, 80 Faith Dr., Catasauqua, PA 18032
Lehigh Valley Commodore User Group, 4315 Crackersport Rd., Allentown, PA 18104
The Scranton Commodore Users Group (SCUG), P.O. Box 244, Scranton, PA 18501-0244 (BBS\# 717-4969-1228 and 717-489-8001)
EPA Commodore Users Group, Edward H. Cohen, 1712 Aidenn Lair Rd., Dresher, PA 19025 (Note: Open to all federal government employees and their families)
Horsham Amiga/64, 20-A Lumber Jack Cir., Horsham, PA 19044
LCC, P.O. Box 48141 , Philadelphia, PA 19144
Main Line Commodore Users Group (MLCUG), 1046 General Allen Ln., West Chester, PA 19382 (BBS\# 215-354-9750)

Worldwide Commodore Users Group (International Headquarters), P.O. Box 337 , Blue Bell, PA 19422
Buxmont Commodore and IBM Users Group, 1206 Cowpath Rd., Hatfield, PA 19440

## RHODE ISLAND

Warwick Commodore Users Group, 110 River St., Riverside, RI 02915
Narragansett Commodore Users Group, P.O. Box 8707, Cranston, RI 02920

## SOUTH CAROLINA

Commodore Computer Club of Columbia, c/o HGC/ST, 710 Vintage Ln., Columbia, SC 29210
BIBS, 658-C Windermere, Charleston, SC 29407 (BBS\# 803-556-9094)
Greenville Commodore Users Network (GCUN), P.O. Box 5272, Station B, Greenville, SC 29606

## TENNESSEE

Clarksville Commodore Users Group, P.O. Box 2171, Clarksville, TN 370422171
Commodore Association of the Southeast (CASE), P.O. Box 2745, Clarksville, TN 37042-2745
Multi-User Computer Club, 213 Holly Ave., South Pittsburg, TN 37380-1313 (BBS\# 615-837-8352)
Chattanooga Commodore Users, 1406 Blackwell Dr., Chattanooga, TN 37412
Raleigh-Bartlett Hackers CUG, James Patrick, 3457 Gatewood Dr., Memphis, TN 38134
Memphis Commodore Users Club, P.O. Box 34095, Memphis, TN 38134-0095 (BBS\# 901-362-0632)

## TEXAS

Society of Computer Owners and PET Enthusiasts (SCOPE), P.O. Box 833095 , Richardson, TX 75083
Texas Commodore User's Group, P.O. Box 623, Royse City, TX 75089
Mid-Cities Commodore Club, P.O. Box 813, Bedford, TX 76095 (BBS\# 817-2684191)

The Wichita County Commodore User's Co-op, 240 Kitchings St., Wichita Falls, TX 76301 (BBS\# 817-855-7557 or 817-6962520)

Central Texas Computer Users Group, 902 Carlisle, Killeen, TX 76541-7321
The Willis Commodore Users Group, 8 Forest Trails, Willis, TX 77378
Tri-County Commodore Users Association (T-CCUA), 557 Lakeview Cir., New Braunfels, TX 78130
Amistad Commodore Users Group, P.O. Box 421212, Del Rio, TX 78842
Top of Texas Commodore (TOTCOM), Box 2851, Pampa, TX 79066-2851
Tri-State Commodore Users Group (TriCUG), P.O. Box 8971, Amarillo, TX 79114-8971 (BBS\# 806-355-3031)
Commodore Users of Texas (CUT), 7007 Memphis Ave., Lubbock, TX 79413 (BBS\# 806-792-7121)
The Software Palace, 11200 Socarro Rd., El Paso, TX 79927 (BBS\# 915-859-8714)
El Paso Commodore User Group, P.O. Box 370934, El Paso, TX 79937 (BBS\# 915-833-1024)

## UTAH

Mountain Computer Society, 3898 Cheryl St., West Valley, UT 84119
Moab Commodore User's Group, 860 S . Antiquity Ln., Moab, UT 84532

Payson Area Commodore Users Group (PAC), P.O. Box 525, Salem, UT 84653 (BBS\# 801-423-2734)

## VERMONT

Maple Valley Commodore Users Group, P.O. Box 106, St. Albans, VT 05478 (BBS\# 802-524-9387)
Green Mountain Commodore Users Group (GMCUG), P.O. Box 6087, Rutland, VT 05702
VIRGINIA
Washington Area Commodore User Group (WAC), P.O. Box 3602, Fairfax, VA 22038-3602
Capitol Area Commodore Enthusiasts (CACE), 607 Abbotts Ln., Falls Church, VA 22046
Dale City Commodore Users Group, P.O. Box 2265, Dale City, VA 22193-0265
Fredericksburg Commodore Club, P.O. Box 8438, Fredericksburg, VA 22404-8438
Middle Peninsula Commodore Users Group (MPCUG), P.O. Box 391, Gloucester, VA 23061 (BBS\# 804-642-0871)
South Richmond Commodore User Group, P.O. Box 1393, Midlothian, VA 23113
CURVE, P.O. Box 28284, Richmond, VA 23228 (BBS\# 804-288-1439)
The Richmond Area Commodore Enthusiasts (TRACE), 2920 Pinehurst Rd., Richmond, VA 23228
Tidewater Commodore Users Group, P,O. Box 61814, Virginia Beach, VA 23462 (BBS\# 804-499-1319)
Portsmouth Commodore Users Group (PCUG), P.O. Box 6561, Portsmouth, VA 23703 (BBS\# 804-488-8372)
Henry County Commodore Computer Club, Rt. 9 Box 61, Martinsville, VA 24112
Lynchburg User Group, Rt. 2 Box 180, Lynchburg, VA 24501
Commodore Users of Lynchburg (CUOL), P.O. Box 3386, Rivermont Station, Lynchburg, VA 24503

## WASHINGTON

Renton Computer Group, 11308 SE 269th St., Kent, WA 98031
E/T, P.O. Box 1767, Bothell, WA 98041 1767
South King County Commodore User Group (SKCCUG), P.O. Box 5241, Kent, WA 98064 (BBS\# 206-874-6289)
NW Commodore User Group, 2565 Dexter N \#203, Seattle, WA 98109 (BBS\# 206-281-7661)
PSACE, 1313 5th Ave. W, Seattle, WA 98119-3410
UW Commodore User Group, P.O. Box 25878, Seattle, WA 98125 (BBS\# 206-2817661)

Club 64, 6735 Tracyton Blvd. NW, Bremerton, WA 98310
La Center Commodore Users Group, Rt. 1 Box 42, La Center, WA 98629
Tri-City Commodore Computer Club (TC CUBED), P.O. Box 224, Richland, WA 99352-0224 (BBS\# 509-588-6822)
Blue Mountain Commodore Users, 550 S . 2nd Ave., Walla Walla, WA 99362-3149 (BBS\# 509-529-5226)

## WEST VIRGINIA

Bluefield User Group 20/64 (BUG), P.O. Box 1190, Bluefield, WV 24701
Commodore Home User's Group (CHUG), 81 Lynwood Ave., Wheeling, WV 26003 Mid-Ohio Valley Commodore Club (MOVCC), P.O. Box 2222, Parkersburg, WV 26101-2222 (BBS\# 304-295-6502)

## WISCONSIN

Lakeshore Commodore Core, 519 Westwood Dr., Sheboygan Falls, WI 53085
Commodore Hobbyists Involved in Personal Systems (CHIPS), P.O. Box 1006 , West Bend, WI 53095
Wisconsin Association of Vic/C = Enthusiasts (WAVE), 1020 Kurtis Dr., Elm Grove, WI 53122
Milwaukee Area Commodore Enthusiasts (MACE), P.O. Box 26216, Milwaukee, WI 53226
COMM-BAY64, P.O. Box 1152, Green Bay, WI 54305 (BBS\# 414-494-1527)
Price County Computer User Group, 630 Knox St., Prentice, WI 54556
Western Wisconsin La Crosse Area Commodore Users Group, 622 Avon St., La Crosse, WI 54603 (BSS\# 608-784-8016)
Excalibar 64/Amiga, Rt. 3 Box $30-\mathrm{AA}$, Cumberland, WI 54829

## WYOMING

Casper Commodore Users Group (CCUG), c/o Crazy Mountain Software, 511 E. 2nd St., Casper, WY 82601 (BBS\# 307-5777400)

## U.S. ARMED SERVICES ABROAD

The Muenster Garrison User's Group, c/o Mr. Maki, 583rd Ord Co., APO, NY 09078
Commodore Computer Users Group Heidelberg, P.O. Box 232 (147th Postal), APO, NY 09102
Chicksands Computer Club (C cubed), c/o Erik Pedersen, Box 1486950 th ESG, APO, New York, NY 09193
Alconbury Commodore Computer User's Group, Attention: SMSgt Willie J. Johnson, Box 58, APO, NY 09238-5000
U.S. Naval Station Guantanamo Bay Cuba Computer Users Group, P.O. Box 160, FBPO Norfolk, VA 23593

## USER GROUPS OUTSIDE THE U.S.

## AUSTRALIA

Commodore Computer Users Group (QLD), P.O. Box 274, Springwood Qld., 4127, Brisbane, Australia
Commodore Hints and Tips Swapping (CHATS), P.O. Box 212, Essendon, 3040, Victoria, Australia
Commodore 64 Users Group, 14 Richards Rd., High Wycombe 6057, Perth, Western Australia, Australia
C64 Computer User, P.O. Box 826, Young, New South Wales 2594, Australia
Melbourne Commodore Computer Club, P.O. Box 177, Box Hill, Victoria 3128, Australia

## BELGIUM

L'Amiral Club Amiga, P.O. Box 41, B-1090, Brussels, Belgium

## BRAZIL

Curitiba Commodore Club, R. Ver. Garcia R. Velho 33, Apto. 41- Bairro Cabral, 80030 Curitiba-PR, Brasil
Tcs Computer Club, Rua Job Ln. 650, 04639 Santo Amaro, São Paulo, Brasil

## CANADA

## Alberta

Calgary Commodore Users Group, $37-$ 11810 Macleod Tr. SE, Calgary, Alb., Canada T2J 2V8
Commodore Users of Edmonton (CUE), Box 3155, Fort Saskatchewan, Alb., Canada T86 2T2


ACCESSORIES
Apro Extender 64 User Ribbon Aprospan 4 Slot Carriidge Holder Covers
Final Cartridge V3
Joysticks
Leroy's Cheatsheet 64 each Leroy's Cheatsheet 128 each Lightpen-Model 184c
Mach 128 Cartridpe
Minimodem C ( 1200 Baud) Minimodem C 2400 Baud Mouse M3 (1351 substitute) Paper
Passport Midi Interface 64/128 Power Supply - C128-Repairable Printer Intice G-Wiz
Printer Intfee Super Graphic Senior Printer Intfce Super Graphic GOLD Quick Brown Box 64 K
Quick Brown Box 128 K
Quick Brown Box 256 K
RAM Expander 1750 clone RAM Expander 1764 (for C64) RS232 Deluxe Interface
Ribbons
Ribbon Renew - Re-Ink w/no Equip Video RAM 64K Cartridge (FULL.) Warpspeed $128 / 64$

## BOOKS

1541 Repair \& Maint. Handbook 1541 Troubleshoot \& Repair Guide 1571 Intermalst Anatomy of C64-
C128 Intemals+
C128 Programmer's Ref. Guide
C128 Tips \& Tricks
C128 Troubiechooting \& Repair
C64 Tips \& Tricks
C64 Troubleshoot \& Repair Guide
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GENERAL BUSINESS

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Pocket Planner 2 Pocket Slanner 2 2 2 (Digital)
Pocket Suppak Pocket Writer 3 Pocket Writer 3
Superbase/Supersc Superbase/Superscriptbook 128 pak Superbase/Superscrip/Book 64 pak Swiftalc of w/sideways Technical Analysis System 64 Wortpro 128 w/Speller \&Filepro Wordpro 64 w/Speller\& Turbo Load
Worduriter 4 for C64 Wordwriter 4 for C64
Write Stuff 128 w/spellchecker Write Stuff 64 w/spellchecker Write Stuff Busnss/Legl Templates

## EDUCATION

Alphabet Zoo
Big Bird's Special Delivery Calculus by Numeric Methods Counting Parade
Designasaurus
Easy Sign
Emic's Big Splash
Emie's Magic Shapes
Evelyn Wood Dynamic Reader
Grandma's House/64
Grover's Animal Adventure
Jungle Book (Reading 2)
Jungle Book (Reading 2)
Learm The Alphabet
Linkword:German
Link word: French 2
Linkword:Spanish
Math (First Men on Moon)
Mavis Beacon Teaches Typing /C64 Mental Blocks
Morse Code Trainer
Numbers Show (The)
Peter Rabbit (Reading 1)
Rocky's Boots
SAT Complete (Hayden SAT Prep) Sky Travel

Stickybear ABC'S
Stickybear Number
Stickybear Typing
Where in Europe Carmen Sandiego
Where in USA is Carmen Sandiego
Where in World Carmen Sandicgo
Where in World Carmen Sandiego
World Classics

## ENTERTAINMENT

1943: Batrle of Midway AD\&D - Champions of Krynn AD\&D - Curse of the Azure Bonds AD\&D - Dragons of Flame
ADED. Heroes of the Lance
AD\&D. War of te Lance
AD\&D. War of the Lance
Altered Beast
Arcade Mega Hits
Aussie Game
B.A.T.
B.A.T.

Batman - The Movie
${ }^{\text {Battle Chess }}$
Blue Angels
Caveman Ugh $\%$ ympics
Chessmaster 2100
Chutes and Ladders
Clue: Master Detective
Curse of Babylon
Death Bringer
Dichard
Double Dragon II
Dragon Wars
Eye Of Horss
F14 Tom Cat
F/16 Combat Pilot*
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Ferrari Formula One
Fire King
Forgotten Worlds
Gauntlet 2
Heat Wave: Offshore Racing
Hole ln One - Miniature Golf
Iron Lord
Jack Nicklaus Course Champ ' 89
Jeopardy 2
John Madden Football
Knights of Legend
Laser Squad ${ }^{\circ}$
Licence to Kill
Magic Candle
Monday Nizht Football

Panzer Battles
Pipe Dream
Pocket Rociets
Pro Tennis Tour
Puffy's Saga
Rambo III
Robocop
Scrabble
Sentinel Worlds Sex Vixens From Space
Sim City Sim City
Skate Wars*
Starnlight
Super Password
Superman
TV Sports Football
Sword of Aragon*
Test Drive 2: European Challenge
Test Drive 2: Muscle Cars
Test Drive 2: The Duel
The Cycles: Grand Prix Racing
Three Stooges
Top 20 Solid Gold
Thud Ridge
Turbo Out Run
Ultima Trilogy $(1,2,3)$
Ultima V
Whecl of Fortune 2
Windwalker
Wizardry - Heart of Maelstrom
Wizardry Trilogy
World Trophy Soccer
Xenophobe

Screen F/X
Slideshow Creator*

## PERSONAL

Bible Search KJV.New T.
Bible Search NIV-New T.
Bridge 5.0
Dream Machine Analyze/64
Family Tree C64/C128 and LDS Great War

UTILITIES/LANGUAGES
1541/1571 Drive Alignment $\$ 25$
1581 Toolkit V2/ Dor Ref
Basic 8
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Basic 8-How to Get the Most Out of
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Basic Complet/22
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## CREATIVITY/GRAPHICS

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Cadpak 128
Codpak 128
Colorez 128
Computer Eyes Doodle
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Printshop

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British Columbia
Cariboo Commodore 64 Club, c/o Nick Sardy, P.O. Box 634, 150 Mile House, B.C., Canada V0K 2G0

Chilliwack Community Computer Club, P.O. Box 413, Sardis, B.C., Canada V2R 1A7
Kelowna Computer User Group, 1070 Felix Rd., Kelowna, B.C., Canada V1X 4L3
Port Coquitlam Computer Club, 1752 Renton Way, Port Coquitlam, B.C., Canada V3B 2R7 (BBS\# 604-942-0947)
Prince George Commodore User's Association (PGCUA), c/o 843 Warren Ave., Prince George, B.C., Canada V2M 3V8

## New Brunswick

Moncton Users Group, Box 2984 STN A, Moncton, N.B., Canada E1C 8 T8 (BBS\# 506-382-4014)

## Ontario

Brampton User's Group (BUG), P.O. Box 384, Brampton, Ont., Canada L6V 2L3 (BBS\# 416-455-3610)
Commodore MicroComputer Users Group (CMUG), c/o Mr. Z. Colynuck, 2 Kingsmill St., Nepean, Ont., Canada K2E 5J1
Ice Software Exchange, Box 188, Warren Ont., Canada POH 2N0
Midland Commodore Users Group, c/o W. E. McKibbon, R.R. \#3, Penetang, Ont., Canada LOK 1P0
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## Pull up a lily pad. Professor Mudfrog is about to give another lesson in simple addition and subtraction on the 128.

Is it study time or lunchtime? For the mathematical genius of the croaking set, it's both!

Bzzz. Zip-CHOMP! If you listen carefully on a hot summer day, you'll hear Professor Mudfrog teaching his math lessons down at the old pond. And when your children sit in with this bright little amphibian, they'll have so much fun they won't even realize how much they're learning.

Mudfrog Math is an entertaining way to present simple addition and subtraction problems to preschool children. Youngsters simply count the number of flies on the screen and type in their answer. Mudfrog then croaks his approval or disapproval.

## Getting Started

Mudfrog Math is written in BASIC 7.0. To prevent typing errors, enter the program using The Automatic Proofreader, found elsewhere in this issue. Once you've finished typing it in, be sure to save a copy of the program to disk.

When you're ready to play Mudfrog Math, load the program and type RUN. After a brief delay, a screen listing five options will appear. Choose Option 1 to alternate between addition and subtraction problems, Option 2 for addition problems only, Option 3 for subtraction problems only, or Option 4 for a random selection of both types of problems. To exit the program, select Option 5.

When you choose Options 1-4, you're placed in Mudfrog's floating classroom. You'll find the professor sitting on his favorite lily pad, anxiously awaiting the arrival of some tasty math problems. To the right is a magic chalkboard where Mudfrog displays the equations he wants you to solve.

Cullen O'Day


With his endearing charm, Professor Mudfrog makes addition and subtraction child's play.

## Lunchtime

Each problem begins with a number flashing on the board. At the same time, an equivalent number of flies buzz into view. Next, depending on the option chosen, either a plus or a minus sign appears on the board. The number that is to be added or subtracted from the first number then appears.

If it's an addition problem, the number of flies to be added buzz out to join the others. If it's a subtraction problem, Mudfrog opens wide and reels in the number of the insects to be subtracted. When the question mark flashes, count the number of flies in the sky and then use the numeric keypad to enter that number.

Mudfrog patiently waits until your children are ready to solve each problem. If they type in an incorrect answer, he croaks quizzically and lets them try
again. When they answer the equation correctly, Mudfrog cheerfully croaks three times. The remaining flies then make a hasty exit, and it's on to the next problem.

After solving ten math problems, the program returns you to the options screen. Another series of problems can be selected or the session can be closed by choosing Option 5.

Zip-CHOMP! Zip-CHOMP! Mudfrog sure is having fun teaching math at the pond. Your children may never develop a taste for his cuisine, but his love of mathematics can't help but get them hopping for more.

## Mudfrog Math

HQ 10 REM COPYRIGHT $199 \emptyset$ COMPU TE! PUBLICATIONS, INC. ALL RIGHTS RESERVED
HB $2 \emptyset$ COLOR $, 4:$ GRAPHIC1, 1: COLO R $\emptyset, 1:$ GRAPHIC $\emptyset, 1: S P R C O L O R$ 2,1
HG $3 \emptyset$ DIMFRS (6),FLS(2), $\operatorname{FP}(20,1$ ),CK (10)
JR $40 \mathrm{X}=\mathrm{RND}(-\mathrm{TI} / 101)$ : $\operatorname{DEFFNR}(\mathrm{X})$ $=$ INT (RND (1) * $\mathrm{X}+1$ )
$\mathrm{RQ} 50 \quad \mathrm{SX}=24: \mathrm{SY}=5 \emptyset: \mathrm{F}=\emptyset: \mathrm{FF}=\emptyset: \mathrm{FOR}$ $\mathrm{I}=1 \mathrm{TOl}$ : $\mathrm{CK}(\mathrm{I})=-1:$ NEXT
MP $60 \mathrm{ND}=10$ : REM NUMBER OF PROB LEMS
QQ 70 FAST:GOSUB1370: GOSUB1620 : GOSUB1170:SLOW
HH $8 \emptyset$ DO:PR= $0:$ SPRITE1, $\sigma: C O L O R \emptyset$ , 1: GRAPHIC $\emptyset$
SR 90 MOVSPR1,79,109:SPRITE1,1
HJ 180 GOSUB1130
MC 110 IFCH $=5$ THENEXIT
ME 120 SPRITE1, $0:$ COLOR $\varnothing, 4:$ GRAP HICl
DB 130 MOVSPR1,88,181:SPRITE1, 1

JM 140 DO: $P R=P R+1: G O S U B 540$
QS 150 ONCHGOSUB $750,710,730,77$ $\sigma$
CR $160 \mathrm{X}=29: \mathrm{Y}=19:$ GOSUB660:GOSU

## MUDFROG MATH

B590
HS 170 ONSNGOSUB280，390
BB 180 GOSUB790：GOSUB1020
HP 190 LOOPUNTILPR＝ND
KH $20 \emptyset$ SLEEP2
DP 210 LOOP
BB $22 \sigma$ FORI $=1$ TO $3: S P R S A V F R \$(I)$ ， 1：FORJ＝1TO12：NEXTJ，I：SO UND1，150日，20，2，50日，40，2 ，360g
XJ 23 EORI $=3$ TO1STEP－1：SPRSAVF RS（I），1：FORJ＝1TO15：NEXT J，I
ES 240 SLEEP2：SCNCLR：GOSUB260： COLOR5，4
SF 250 END
HM 260 FORI＝1TO8：SPRITEI， $0: M O V$ SPRI，$\varnothing \# \square: N E X T$
GH 270 RETURN
HR 280 DOWHILEFP $\angle T N: F P=F P+1: Y=$ FP（FP，1）＋SY：MOVSPR2， 345 ，Y
BD $29 \varnothing$ SPRITE $2,1,1, \sigma, \varnothing, \varnothing, \varnothing: S P R$ SAVFLS（1），2：MOVSPR2，27g \＃11：SOUND2，2250，180，2，1 700，277，1
SM $3 \emptyset \emptyset$ DO：SPRSAVFLS（1）， 2
MR 310 IFRSPPOS $(2,0)<\mathrm{FP}($ FP， 0$)+$ SX＋18THENEXIT
QE 320 SPRSAVFL $\$(2), 2$
CS 330 IFRSPPOS $(2,0)<F P(F P, \theta)+$ SX＋18THENEXIT
RE 340 LOOP
DR 356 SOUND2，$\varnothing, \varnothing: M O V S P R 2, ~ \emptyset \# \emptyset:$ MOVSPR2，FP（EP，$\sigma)+S X, F P($ FP，1）＋SY：SPRSAVFL $(1), 2$
QA 360 COLOR1，1：GSHAPEFLS $(\varnothing), \mathrm{F}$ P（FP，Ø），FP（FP，1）：SPRITE 2， 8
BG $37 \emptyset$ LOOP
HS 380 RETURN
ED $39 \emptyset$ DOWHILEFP＞TN
QM $40 \sigma$ MOVSPR2，FP $(F P, \sigma)+S X, F P($ $\mathrm{FP}, 1)+\mathrm{SY}:$ SPRITE $2,1: \mathrm{GSHA}$ PEFLS（ $\sigma$ ），FP（FP，$\sigma)$ ，FP（FP ，1）， 4
BB 410 EORI $=2$ TO6：SPRSAVFR（I）， 1

PB $42 \theta$ FORJ＝1TOI 0 ：NEXTJ，I
CJ 430 COLOR1，11：WIDTH2：SOUND1 $, 2306,20,0,1300,52,2,40$ 60：DRAW1，88，150TOFP（FP， ஏ）$+12, \mathrm{FP}(\mathrm{FP}, 1)+15$
EK 440 SOUND $2,65006,42,0,5600 \theta$ ，2200，1
DH 450 FORI＝1TO5：SPRSAVFL $(2)$ ， 2：FORJ＝1TO2 $0:$ NEXT
XX 460 SPRSAVFL\＄（1），2：FORJ＝1TO 20：NEXTJ，I
RR 470 SOUND1，2300，20，1，1300，5 2，2，4060
XP 48 0 SPRITE2， $0:$ DRAW $0, F P(F P, ~ \varnothing$ $)+12, \mathrm{FP}(\mathrm{FP}, 1)+15 \mathrm{TO} 8,15$ 0：DRAWの，88，150TOFP（EP， 0 $)+12, \mathrm{FP}(\mathrm{FP}, 1)+15$ ：WIDTH1
AB 490 FORI＝5TO1STEP－1：SPRSAVF RS（I）， 1
SD $56 \emptyset$ FORJ＝1TO6：NEXTJ，I
PC $510 \mathrm{FP}=\mathrm{FP}-1$
XX 520 LOOP
JH 530 RETURN
SQ $54 \theta \quad \mathrm{FP}=\emptyset: \mathrm{Nl}=\mathrm{FNR}(10): \mathrm{N} \$=\mathrm{STR} \$$ （N1）：NS＝MID\＄（NS，2，2）：M\＄ $=" \quad$＂： $\mathrm{X}=31: \mathrm{Y}=18: \mathrm{TN}=\mathrm{N} 1$
FE 550 IFN1＞9THENX $=30: M \$="$ \｛2 SPACES \}"
RH 560 GOSUB66 6
GM 570 IFN1＜＞ 1 THENGOSUB28 0
QP 580 RETURN
JH 590 IFSN＝1THENN2＝FNR（11）－1： $\mathrm{TN}=\mathrm{N} 1+\mathrm{N} 2$
PD 600 IFSN $=2$ THENN $2=\operatorname{FNR}(\mathrm{N} 1+1)-$ $1: T N=N 1-N 2$

CP $61 \varnothing \operatorname{IFCK}(\mathrm{~N} 1)=\mathrm{N} 2$ THEN59 $0:$ ELSE $\mathrm{CK}(\mathrm{N} 1)=\mathrm{N} 2$
GX 62 の $\mathrm{N}=\mathrm{STR} \$(\mathrm{~N} 2): N \$=M I D \$(N \$$ ， $2,2): M S="$＂：$X=31: Y=19$
BB 630 IFN $2>9$ THENX $=30: M \$="$ \｛2 SPACES ${ }^{\prime \prime}$
SM 640 GOSUB660
PX 650 RETURN
FM 660 COLOR1， 8
QE 670 FORI $=1$ TO5：SOUND 2,40500 ， 5，，，，2，4070：CHAR1，X，Y，N S，1：EORJ＝1TO40：NEXT
PD 680 CHAR1，X，Y，MS， $1:$ FORJ $=1$ TO 40：NEXT
BK 690 NEXT：CHAR1，X，Y，NS，1
RA 706 RETURN
DD $710 \mathrm{SN}=1: \mathrm{N} \$="+": M \$={ }^{\prime \prime} \pm$＂
EC 720 RETURN
AE 730 SN＝2：NS＝＂－＂：MS＝＂D＂
RE 740 RETURN
QS $750 \mathrm{~F}=\mathrm{NOT}(\mathrm{F}):$ ：ONF +2 GOSUB 710 ， 730
FH 760 RETURN
MX 770 ONFNR（2）GOSUB710，730
RG 780 RETURN
HE 790 POKE208，$\varnothing$
EE $80 \emptyset$ DO： $\mathrm{AN}=\varnothing$ ：COLOR1，8：CHAR1， $30,21, "\{2$ SPACES $\} ", 1$
KQ 810 IFTN＜1日THENX＝31：ELSEX＝3 $\emptyset$
GR 820 DO：DO：DO
RB 830 CHAR1，X，21，＂？＂， 1
AR 840 GETKS：IEKS〈〉＂＂THENEXIT
QH 850 GOSUBI $00 \emptyset$
XE 860 CHAR1，X，21，＂＂，1
EK 870 GOSUB10 90
GG 880 LOOP
BA 890 LOOPUNTILK $\$>=$＂$\emptyset$＂ANDK $\$<$ ＂9＂
MM 900 CHARI，X，21，K\＄，1
FK 910 IFX＝3ØTHENAN＝VAL $(K \$) * 1 \emptyset$ ：ELSEAN＝AN＋VAL（K\＄）
QC $920 \mathrm{X}=\mathrm{X}+1$ ：POKE 208 ，$\sigma$
JQ 936 LOOPUNTILX＞31
AF 940 IFTN＝ANTHENN $=3: \mathrm{FQ}=1500$ ： $\mathrm{X}=2 \emptyset: E L S E N=1: F Q=12 \sigma 0: X=$ 30
JR 950 FORK＝1TON：$F O R I=1 \mathrm{TO}: \mathrm{SPR}$ SAVERS（I），1：FORJ＝1TO12： NEXTJ，I ：SOUND1，FQ，X，2， 5 あ $0,40,2,36 \emptyset \emptyset$
AP 960 IFX $=3 \emptyset$ THENFORI $=1 \mathrm{TO} 40: \mathrm{NE}$ XT
FF 970 FORI $=4$ TO1STEP－1：SPRSAVF R\＄（I），1：FORJ＝1TO15：NEXT J，I，K
QP 980 LOOPUNTILTN＝AN
CE 990 RETURN
GA $10 \emptyset \emptyset$ IFENR $(2 \emptyset)=20 \mathrm{THENFF}=$ NOT （FE）：SPRSAVFR\＄$(\mathrm{FF}+2), 1$
DS 1010 RETURN
RK $102 \sigma$ DOWHILEFP $>\theta$
SB 1030 MOVSPR2，FP $(F P, \theta)+S X, F P$ （ $\mathrm{FP}, 1)+\mathrm{SY}:$ SPRITE 2,1
MC 1040 GSHAPEFL $\$(\theta)$ ， $\operatorname{FP}(F P, \theta)$ ， FP（ $\mathrm{FP}, 1$ ） $4: 4$ MOVSPR2， 276 \＃15
MB 1050 SOUND2，60ø0 $12,0,1700$ ， 700,1
HP 1060 DO：LOOPUNTILRSPPOS $(2,0$ ）$<2 \emptyset$
PG 1076 SPRITE2，$\sigma: M O V S P R 2, ~ \varnothing \# \varnothing:$ $\mathrm{FP}=\mathrm{FP}-1$
SD 1080 LOOP
QK 1090 IFTN $=0$ THENSLEEP1
AS 11 日g COLOR1，8：CHAR1，29，18，＂ \｛3 SPACES\}",1:CHAR1,29 ，19，＂\｛3 SPACES\}",1:CHA R1，29，21，＂\｛3 SPACES\}", 1
PF 1110 CHAR $, 14,17, "$＂：CHAR 0 ， 12，16，＂\｛6 SPACES \}"
HH 1120 RETURN

RD 1130 DO：CHAR，19，14，＂\｛7\}CHOO SE：＂：GETCH\＄：GOSUB1000： CHAR，19，14，＂\｛YEL\}CHOOS E：＂
DA 1140 LOOPUNTILCH $\$>$＂$g " A N D C H \$$ ＜＂6＂
BX $1150 \mathrm{CH}=\mathrm{VAL}(\mathrm{CH} \$)$
DJ 1160 RETURN
GR 1170 COLOR4，13：COLOR $1,4:$ GRA PHIC1
JB 1180 COLOR1，7：BOX1， $0,160,31$ $9,199,1:$ FORI $=1$ TO99：DR AWØ，FNR（320）-1 ，FNR（38） ＋152：NEXT
EE 1190 DRAW1，88，176：DRAW1，160 ，186
XP 12øø COLORø，6：BOX $\varnothing, \varnothing, 152,31$ 9，159，1
MP 1210 COLOR1，14：FORX＝0TO319： $\mathrm{G}=\mathrm{FNR}(8)-1$ ：DRAW $1, \mathrm{X}, 152$ ＋GTOX，159：NEXT
EB 1220 COLOR1，6：DRAW1，0，144TO 35，148T080，151TOØ，151： PAINT1， 0,145
PR 1236 DRAW1，319，151T0103，151 TO120，147TO155，145TO22 0，147TO29の，149TO319，14 6：PAINT1，319，147
JD 1246 COLOR 4,12
RF 1250 COLOR $0,7:$ BOX0， $0,192,31$ 9，199，1
MX 1260 COLOR $\varnothing, 1:$ BOX $0,224,136$ ， 263，183，，1
FS 1270 COLOR1，8：BOX1，224，136， $263,183,1:$ BOX $, 226,13$ 8，261，181：CHAR1，29，20， ＂DDD＂，1
GE 1280 COLOR $1,6:$ CIRCLE $\varnothing, 88,17$ $6,40,11, \ldots 1:$ PAINT 0,88 ， 176
BD 1290 COLOR1，7：WIDTH2：CIRCLE $1,98,177,3,1:$ DRAW1，97， $177 \mathrm{TO} 121,182 \mathrm{TO} 125,182 \mathrm{~T}$ 097，177：WIDTH1
HB 1300 CIRCLE $\emptyset, 160,180,20,6$, ， ，358：PAINT $\sigma, 160,186$
AM 1310 CIRCLE $\emptyset, 39,191,30,7:$ PA INT $6,40,191$
RJ 1320 COLOR1，14：FORX＝0TO 319： $\mathrm{G}=\mathrm{ENR}(8)-1$ ：DRAW1， $\mathrm{X}, 192$ ＋GTOX，199：NEXT
RR 1330 COLOR $9,9:$ BOX $0,240,184$ ， 247，199，，1
CP 1340 COLOR1，1 19 ：WIDTH $2:$ DRAW1 ，240，184TO246，184TO246 ，199：WIDTH1
HE 1350 COLOR 0,4 ：GSHAPEFL $\$(1)$ ， $\theta, \sigma: \operatorname{SSHAPEFL} S(\theta), \theta, \theta, 2$ 3,16 ： $\operatorname{GSHAPEFLS}(\varnothing), \sigma, \varnothing$ ， 4
GH 1360 RETURN
BP 1370 COLOR 4,16 ：GRAPHIC $\varnothing$
RM 1380 CHAR， $0,0, "\{4\}$
\｛4 SPACES $\} C\{2$ SPACES $\} \cup$
\｛2 SPACES $\}$ \｛ 2 SPACES $\}$ L
\｛2 SPACES $\}$ E $\{2$ SPACES $\} \mathrm{N}$
\｛5 SPACES $\} 0^{\prime}$ D
（2 SPACES $\} A\{2$ SPACES $\} Y$ \｛4 SPACES \}",1
AR 1390 CHAR，17， 2 ，＂\｛CYN\}\{A\}*** ＊＊＊＊＊＊＊＊＊＊＊＊＊＊\｛S\}'
PB $1400 \overline{\text { EORI }=3 \mathrm{TO} 9: C H A R}, 17, I, " \simeq$ \｛17 SPACES\} -": NEXT
XK 1410 CHAR，17，10，＂$\{\mathrm{F}\}$
\｛17 SPACES \}$\{\mathrm{D}\rangle$＂， 1
BR 1420 CHAR， 20,4 ，＂$\{$ WHT $\} M$ U D \｛SPACE\}F R O G"
RC 1430 CHAR， 23,6 ，＂M A T H＂
MR 1440 CHAR， 19,8 ，＂\｛YEL\}ADD \& \｛SPACE\} SUBTRACT!"
XE 1450 CHAR，19，9，＂\｛WHT\}\{@\}\{4\} $\{2$ I $\}\{2$ SPACES $\}\{$ WHT $\}$ \｛＠\}\{YEL\}\{@\} \{4\}\{2 I\}
\{3 SPACES $\}$ (WHT\}\{@\}"
AJ 1460 CHAR, 7,8 , "\{YEL\}\{3 @\}" BM 1470 CHAR, $6,9, "\{L\}\{B L U\}$
$\{2 \mathrm{Y}\}\{R \mathrm{RS}\}$ DD $\{O F E\}\{2 \mathrm{Y}\}$
SP 1480 CHAR,5,11," $\{8\} £$
\{8 SPACES\}\{*\}",1
SC 1490 CHAR, 4,12 ," $£$
(10 SPACES\} § $\left.^{\star}\right\} ", 1$
DD 1500 CHAR, $4,13, "\{5\} \underline{U^{* *} \star \star \star \star \star}$ *** ${ }^{\prime \prime}$, 1
GM $1510 \overline{\text { CHAR }} 4,14$, "\{RVS \}JK 64$\}$ \{OFE\}E\{RVS\}UIUIUI
\{OFF\}行\}(RVS\}\{5\}JK"
HR 1520 FORI $=15$ TO $22:$ CHAR $, 7, I$," $\{4\}-\{5\}=\{8\}=-\{5\}=\{4\}="$ , 1 :NEXT
GM 1530 CHAR, $0,23, "\{R V S\}\{4\}$
\{3 SPACES \} COPYRIGHT 19
$9 \varnothing$ COMPUTE! PUB., INC.
\{3 SPACES\}"
CD 1540 CHAR, $0,24, "\{10$ SPACES $\}$ all Rights reserved \{10 SPACES\}"
BG 1550 CHAR, 0,24, CHRS (148):CH AR, 0,24, "
EM 1560 CHAR, 20,15 ," $\{$ OFE $\}$ \{CYN \} 1. $\{B L U\}$ ADD \& SUBTRACT

MS 1570 CHAR, 20,16 ,"\{CYN\}2. \{BLU\} ADD ONLY"
SR 1580 CHAR, 20,17," $\{C Y N\} 3$. \{BLU\} SUBTRACT ONLY"
 \{BLU\} RANDOM ORDER"
JJ 1600 CHAR, $20,19, "\{C Y N\} 5$. \{BLU\} END LESSON"
CE 1610 RETURN
AF 1620 GOSUB26ø
HG 1630 FORI $=3584 \mathrm{TO} 4095$ : READJ:

POKEI,J:NEXT
ES 1646 FORI $=1$ T06:SPRSAVI,FRS( I) : NEXT

KA 1650 FORI=7TO8:SPRSAVI,FL\$( I-6) : NEXT
ED 1660 SPRSAVFRS(1),1:SPRITE1 , $0,10,0,1,1,1$
BH $1670 \mathrm{C}=\varnothing$ :FORI $=8$ TO1 04 STEP 32 : FORJ $=48$ TO 240 STEP48
QH $1680 \mathrm{C}=\mathrm{C}+1: \mathrm{FP}(\mathrm{C}, \mathrm{g})=\mathrm{J}: \mathrm{FP}(\mathrm{C}, 1$ ) $=$ I: NEXTJ, I
MM 1690 RETURN
PJ 1700 ,, ,, , , , ,', ,', 162
XR 1710 DATA $128,2,123,64,162$, 179,162,179,85,86,179, 85,90,42,149,104,10,14 9,96,2,165,128,10,170, $160,42,34,40,40, \ldots 8$
EH 1720 DATA
,.,',.,',.,',162,128,2,1 23
GG 1730 DATA $64,2,89,64,162,17$ 6,162,176,85,86,176,85 ,90,42,149,164,10,149, 96,2,165,128,10,176,16 6,42,34,40,40,,, 6
GG 1740 DATA
,,162,128,2,123,64,2,8 9,64,2,170,168,2,191
BJ 1750 DATA $240,2,255,192,2,8$ 5,84,42,85,86,170,85,9 0,176,149,106,42,149,1 04,2,165,128,10,176,16 0,42,34,40,40,., 0
KQ 1760 DATA ,,,', $,,,, 162,128$ ,2,123,64,2,89,64,2,17 $0,160,2,170,168,2,191$, 246,2,255,192,2,255
PM 1776 DATA $240,2,127,244,16$,
$85,84,42,85,84,176,85$, 90,170,149,106,42,149, $104,2,165,128,10,170,1$ $60,42,34,40,40,1,6$
JE 1780 DATA $, 162,128,2,123,64$ ,2,89,64,2,170,160,2,1 78,168,2,191,246,2,255 ,192,2,255,192,2,255,2 40,2,127,244,10,95
SX 1790 dATA $244,42,85,84,170$, 85,86,170,85,90,42,149 ,164,16,149,96,2,165,1 28,10,170,160,10,34,40 , 40,34,8,32,,, 6
AD 1800 DATA $2,,, 2,, 182,, 150$ ,,,42,,182,,,150,,,15 Ø, ,,42,, 10,195,212,2, 253
HQ 1810 DATA $84,42,213,84,170$, 85,86,170,85,90,42,85, 88,10,149,96,2,149,128 ,16,170,160,16,34,40,4 0,34,8,32, , 0
FC 1820 DATA $3,192,240,6,97,15$ $6,12,33,6,8,35,2,12,50$ ,6,6,22,12,3,20,56,7,2 26,96,31,253,240,34,15 ,248,42,143
CE 1830 DATA $248,38,31,240,31$, 255,224,6,254,128,4,85 ,64,2,69,,,46,,....... , , , , , 0
SS 1840 DATA ,,,,,,,,,,,,31,,3 1,113,192,113,192,97,1 93,56,51,3,7,220,6,31, 254,28,34,15
HE 1850 DATA $248,42,143,248,38$ ,31,240,31,255,224,6,2 54,128,4,85,64,2,69 40 ,

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In the year 2100, nuclear weapons are relics of a forgotten era. In this day and age, countries settle their differences in a duel between representative gladiators. The site of their engagement is the Arena, a manmade battlefield consisting of treacherous pits and hills.

At the start of each duel, six lethal spheroid bombs are randomly scattered about the Arena. Each contestant moves about in a hovercraft, collecting. the bombs and then firing them at the opposing gladiator. Because of their spherical shape, the bombs roll across the Arena at high speeds. But at the same time, the undulating surface of the playfield makes their movement unpredictable. As you'll soon learn, the keys to survival in Spheroids are quick reflexes and a deadly aim.

## Getting Started

Spheroids consists of three programs. The first two are written in BASIC. To avoid typing errors, enter these using The Automatic Proofreader, located elsewhere in this issue. When you've finished typing, save these programs to disk as SPHEROIDS.BOOT and SPHEROIDS .BASIC, respectively.

The third program is written in machine language, so you'll need $M L X$, the machine language entry program located elsewhere in this issue, to type it in. The MLX prompts, and the values you should enter, are as follows:

## Starting address: \$0801 <br> Ending address: $\$ 1788$

When you've finished typing, save this program to disk as SPHEROIDS.ML.

To play a game, plug in two joysticks; then load and run SPHEROIDS .BOOT. After a short delay, a title screen will appear, showing the various objects you'll encounter in the game. Press any key or a fire button to continue.

## Prepare for Battle

Before each battle, you're presented with a menu for selecting and generating different battlefields. Press f 3 and f 4

## Kevin Dixon

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to cycle through the selections; then press f 1 to generate the chosen battlefield on the screen. Battlefield selection can also be made using a joystick. Push either stick left or right to cycle through the battlefields; then push up or down to generate your choice.


There are six battlefields to choose from: Open, Lattice, Diamond, Cyclone, Quadrate, and Random. Each battlefield, with the exception of Open, contains mounds and depressions. These appear as diamond-shaped objects on the screen and come in four different sizes. Mounds are blue in color, while depressions are gray.

Every battlefield contains a tele-
port device that appears on the screen as a flashing yellow checkerboard. When a hovercraft or a spheroid enters the teleporter, it's transferred randomly to another location on the playfield. In the process, the teleported object retains its original velocity and direction.

After you've selected a battlefield, press $f 7$ or a joystick button to begin a match. Initially, each player is given nine hovercraft with which to do battle. The green ship, controlled by joystick 1, appears at the upper right corner of the screen; the blue ship, controlled by joystick 2, is at the lower left. The number of craft remaining for each player is shown at the top of the screen. A game ends when you've destroyed your opponent's entire hovercraft fleet.

## Playing the Game

Players use bombs, or spheroids, to try to eliminate the opponent. Six spheroids are scattered randomly across the battlefield. These small devices are collected and fired from the hovercraft. When launched, they roll across the battlefield at high speeds. To pick up a spheroid, simply guide your hovercraft over one. When you're ready to fire, push the joystick in the direction you wish to shoot and press the fire button.

Once fired, the spheroid assumes the color of the firing ship. If the opposing player's ship comes into contact with a spheroid armed by your craft, it is instantly destroyed. Armed spheroids have enough momentum to propel themselves about two lengths of the Arena. When its energy has dissipated, the spheroid slows and its color reverts to red. It can now be picked up and rearmed by either player.

Since the spheroid bombs roll along the surface, the mounds and depressions affect the way they travel across the playfield. For example, if a spheroid is fired into a depression, it will roll around the sides until it eventually settles in the center.

When the game is over, press any key or a fire button to return to the main
menu．To pause the game at any time， press the RUN／STOP key．To exit a match before it＇s over，press SHIFT－Q．

## Game Tips

There are several playing strategies that you might like to try．If you fire a spher－ oid into the teleporter，occasionally it will materialize next to your opponent， destroying his or her craft in the pro－ cess．Also，try using the mounds and depressions for bank shots．

At times，your craft will fall into a depression．If you simply thrust in the direction that you want to go，it will take you awhile to escape．The quickest way to get out of a depression is by rocking your hovercraft back and forth until you gain enough momentum to escape．

Sometimes，several spheroids will appear very close together．If you hold down the fire button and maneuver around them，you＇ll fire a deadly volley in the direction you＇re traveling．Firing a stream of spheroids into the teleporter is almost certain death for your oppo－ nent．Since the teleported spheroids materialize in different locations，your opponent will have a hard time evading all of them．

## SPHEROIDS．BOOT

## BS 10 QS＝CHRS（34）

RF 20 POKE53281，0：POKE53280，0
FS $3 \emptyset$ PRINT＂$\{8\rangle\{C L R\} L O A D I N G S P$ HEROIDS．．．＂
HB 40 PRINT＂$\{$ BLK $\}$ \｛HOME \} \｛2 DOWN\}POKE43, 1:POKE44, 40：POKE10240， 0 ：NEW＂
BB 50 PRINT＂$\{2$ DOWN $\} L O " Q \$$ SPHE RE．ML＂Q\＄＂，8，1＂
RH 60 PRINT＂ 4 DOWN $\}$ NEW＂
MM $7 \emptyset$ PRINT＂$\{2$ DOWN $\}$ LO＂QS＂SPHE RE．BAS＂QS＂，8＂
AM 80 PRINT＂$\{4$ DOWN $\}$ RUN $\{H O M E\} "$ ；
FQ 90 POKE198，5：POKE631，13：POK E632，13：POKE 633，13：POKE6 34，13：POKE635，13

## SPHEROIDS．BASIC

HQ 10 REM COPYRIGHT 1990 COMPU TE！PUBLICATIONS，INC．－ ALL RIGHTS RESERVED
XQ 20 POKE54296，15：POKE53280，$\sigma$ ：POKE53281， $0: S Y S 2636: D I M$ PS（4）
$\operatorname{PX} 3 \sigma \operatorname{PS}(\varnothing)="\{R V S\}\{3$ SPACES $\}$ \｛DOWN \} \{3 LEFT $\}$ \｛ 3 SPACES $\}$

SR $40 \mathrm{PS}(1)="\{O F E\} A B\{R V S\}\{U P\}$ \｛2 LEFT \}\{OFF\}CD"
BC $50 \mathrm{P} \$(2)="\{O F F\} E \overline{\text { P }}$（DOWN $\}$ \｛2 LEFT \} \{RVS\} \{OFF\}GH"
RC 60 PS（3）＝＂\｛OFF\}IJ\{RVS\} \｛DOWN \} \{ 2 LEFT\}\{OFE\}KL"
PP 70 PS（4）＝＂$\{O F E\} M N\{U P\}$ \｛2 LEFT \} \{RVS\} \{OFF\}OP"
CD 80 FORI＝1TO6：READTS（I）：NEXT ：S \＄＝T \＄（1）
HE 90 DATA＂OPEN $\{4$ SPACES $\} ", " L$ ATTICE＂，＂DIAMONDS＂，＂CYC LONE＂，＂QUADRATE＂，＂RANDO M\｛2 SPACES ${ }^{\prime \prime}$
KX $100 \mathrm{~T} 1 \$="\{A\} \star\{S\}\{A\} \star\{S\}\{R\}$ \｛SPACE\}\{神\}\{A\}*\{矛\}\{A\}*
\｛S\}\{A\}*\{S\}\{A\} $\bar{R}\}\}\{S\}\{\bar{R}\} \star$ \｛S\}\{A\}₹\{S\}"
GP 110 T $2 \$=$＂$\{\bar{Z}\} \star\{S\}\{Q\} \star\{x\}\{Q\} \star$ $\{W\}\{Q\} \star \bar{*} Q\}\{R\}\{\bar{x}\}_{-}==$ \｛SPACE\}- $二\{Z\} \star\{S\}^{\bar{\prime}}$
JF 120 T $3 \$="\{2 \overline{\}} \star \overline{\{ } X\}\{\bar{E}\}$ $\{2$ SPACE $\bar{S}\}\{E\}\{E\}\{Z\} \star$ $\{X\}\{E\}\{Z\}\{X\}\{Z\} \star\{x\}\{\bar{Z}\}$
\｛E\}\{X\}\{E\}ぇ\{X\}\{Zすぇ\{x\}"
SR 130 TCS＝＂\｛WHT\}\{8\}\{5\}ई4\}\{2\} \｛RED\} $\{1\}\{3\}\{Y E L\} "$
QB 140 GOSUB228ø
PC 150 PRINT＂\｛CLR\}";
GC $160 \mathrm{~S}=1: \mathrm{MO}=1:$ GOTO $38 \emptyset$
PB 170 PRINT＂\｛HOME $\}\{3\}\{$ RVS $\}$ SE LECTED：＂；T\＄（S）；＂
\｛5 SPACES ${ }^{\prime \prime}$ SHOWN：＂；S\＄；＂
AC 180 POKE198， 0
QE 190 GETAS
KQ 2 Ø日 $\mathrm{J}=(\operatorname{PEEK}(5632 \theta)$ ANDPEEK（ 5 6321））
AH 210 IFAS＝＂$\{F 5\}$＂THENGOSUB133 ๆ：GOSUB139ø
QH 22 IFAS＝＂\｛E7\}"THENGOSUB133 0：SYS2633：SYS2624：GOTO4 50
KR 230 IF（JAND16）$=$ ØTHENGOSUB13 30：SYS2633：SYS2624：GOTO 450
GK 240 IFAS＝＂\｛F3\}"THEN32 $\varnothing$
XA 250 IF（JAND8）$=$ ØTHEN $32 \varnothing$
EA 260 IFAS＝＂\｛F4\}"THEN35ø
HG $27 \emptyset$ IF（JAND 4）$=$ ØTHEN $35 \emptyset$
DG 280 IFAS $=$＂$\{$ F1 $\}$＂THEN38 0
XD 290 IF（JAND1）$=\emptyset 0 R$（JAND2）$=\emptyset_{T}$ HEN38 $\varnothing$
BC 300 IFAS＝＂\｛F8\}"THENGOSUB133 छ：GOSUB228日：SYS2633：GOT 0450
CJ 310 GOTO190
CS $320 \mathrm{~S}=\mathrm{S}+1$ ： $\mathrm{IFS}=7$ THENS $=1$
EJ 330 GOSUB133ø
AK 348 GOTO170
GC $350 \mathrm{~S}=\mathrm{S}-1:$ IFS $=0$ THENS $=6$
JM 360 GOSUB1330
QQ 370 GOTO17
PF 380 PRINT＂$\{$ HOME $\}$ \｛RVS\} $\$ 3\}$ GE NERATING＂；T\＄（S）；＂
\｛19 SPACES $\}^{\prime \prime}$ ：POKE1024＋3 9，160
FH 390 POKE55296＋39，10
XS 400 POKE 218 ，PEEK（ 218 ）OR128
HX 410 GOSUB133ø
BR 420 ON S GOSUB $1740,1790,143$ の，159＠，212の，195
PA 430 S $\$=T \$(S)$
GK 440 SYS 2630
QB 450 IFMO $=1$ THENGOSUB 1130
ED 460 GOSUB133ø
JC 476 GOTO17 9
PX 480 REM DRAW MOUND／DEPRESSI ON
BA 490 PRINTMIDS（CS，1，1）；
RA 500 FORI $=1$ TOX
DE 510 PRINTPS（1）；＂\｛UP\}";
EB 520 NEXT
GJ 536 PRINTMID $(C \$, 2,1) ; "$ \｛DOWN\}";
RE 540 FORI $=1$ TOX
HK 550 PRINTPS（2）；＂\｛DOWN\}";
EE 560 NEXT
SJ 578 FORI $=1$ TO2＊$\times$
KA 580 PRINT＂$\{3$ LEET $\} "$ ；
JH 590 NEXT
BJ 600 PRINTMIDS（C\＄，3，1）；
SK 610 FORI $=1$ TOX
FC 620 PRINTPS（3）；＂\｛DOWN\}";
FJ 630 NEXT
FK 640 PRINTMID $\mathrm{n}(\mathrm{C} \$, 4,1) ; "\{\mathrm{UP}\}$
SM 650 FORI $=1$ TOX

BB 660 PRINTPS（4）；＂\｛UP\}";
FP 670 NEXT
SF 680 PRINT＂\｛UP\}";
DM 690 IE $\mathrm{X}=1$ THEN920
ME 700 FORJ $=\mathrm{X}-1$ TOISTEP－1
MD 710 EORI $=1$ TOJ＊ $2+1$ ：PRINT＂
\｛3 LEET $\}$＂；：NEXT
KD 72 PRINTMIDS（CS，1，1）；
DE 730 FORI＝1TOJ
HM 740 PRINTPS（ $\sigma)$ ；＂\｛3 UP\}";
HA 750 NEXT
MS 760 PRINTMIDS（CS，2，1）；＂ \｛2 DOWN\}";
DK 770 FORI $=1 T 0 \mathrm{~J}$
SM 78 ＠PRINTPS（ $\varnothing$ ）；＂ （DOWN\}";
HD 790 NEXT
HP 800 FORI $=1 \mathrm{TO} 2^{*} \mathrm{~J}$
BC 810 PRINT＂\｛3 LEFT\}";
GE 820 NEXT
EK 830 PRINTMIDS（C\＄，3，1）；
ER 840 FORI $=1 \mathrm{TOJ}$
XS 85ø PRINTPS（ $)$ ；＂\｛DOWN\}";
GH 860 NEXT
HS 870 PRINTMIDS（C $\$, 4,1)$ ；＂
\｛2 UP\}";
ES 880 FORI $=1$ TOJ
KQ $89 \emptyset$ PRINTP\＄（ø）；＂\｛3 UP\}";
BK 900 NEXT
RM 910 NEXT
XS 920 RETURN
EB 930 REM DRAW TELEPORTER
ED $940 \mathrm{X}=\mathrm{INT}($ RND $(\sigma)$＊ 38 ）
PC $95 \| \mathrm{Y}=\mathrm{INT}(\operatorname{RND}(\sigma) * 23)+1$
PS 960 IF（PEEK（ $55296+\mathrm{Y} * 40+\mathrm{X})$ AN D15）＜＞4THEN93 $\sigma$
KR 970 IF $(\operatorname{PEEK}(55296+\mathrm{Y} * 4 \theta+\mathrm{X}+1)$ AND15）＜＞4THEN930
FK 980 IF（PEEK $(55296+Y * 40+X+4 \emptyset$ ）AND15）＜＞4THEN930
DP 990 IF（PEEK（55296 + Y＊ $40+\mathrm{X}+41$
）AND 15）＜＞4THEN930
AB 1000 REM ENTER HERE FOR SET location
HA 1010 POKE1024 $+\mathrm{Y} * 40+\mathrm{X}, 102$
QG 1020 POKE1 $1024+\mathrm{Y} * 4 \theta+\mathrm{X}+1,162$
CA 1030 POKE1024＋Y＊ $4 \theta+X+4 \sigma, 102$
XD 1040 POKE $1024+\mathrm{Y} * 40+\mathrm{X}+41,102$
JM 1050 POKE $55296+\mathrm{Y} * 4 \theta+\mathrm{X}, 7$
BG 1060 POKE $55296+\mathrm{Y} * 40+\mathrm{X}+1,7$
QG 1076 POKE $55296+\mathrm{Y} * 46+\mathrm{X}+40,7$
AA 108 ＠POKE55296 $+\mathrm{Y} * 40+\mathrm{X}+41,7$
DA $1090 \mathrm{M}=1024+\mathrm{Y} * 40+\mathrm{X}$
RE $1100 \mathrm{~L}=\mathrm{M}$ AND 255： $\mathrm{H}=\mathrm{INT}(\mathrm{M} / 25$ 6）
PB 1110 POKE 2639 ，L：POKE 2640 ，H
HH $112 \emptyset$ RETURN
JJ 1130 REM DISPLAY MENU
RX $1140 \quad \mathrm{MO}=1$
FQ 1150 GOSUB1240
BA 1160 PRINT＂\｛HOME\}\{DOWN\}\{1\} \｛RIGHT\}\{RVS\}\{K\}Fl GENE RATE SELECTED TERRAIN \｛OFF\}\{K\}"
KA 1170 PRINT＂\｛RIGHT\}\{RVS\}\{K\}F 3 INCREASE SELECTED TE RRAIN $\{0 F E\}\{K\} "$
FH 1180 PRINT＂\｛RIGHT\}\{RVS\}$\}$ K $\} F$ 4 DECREASE SELECTED TE RRAIN\｛OFE\}$\{\mathrm{K}\} "$
DH 1190 PRINT＂\｛RIGHT\}\{RVS\}\{K\}F 5 MENU ON／OFE \｛14 SPACES $\}$ \｛OFF\}\{K\}"
JJ 12 øø PRINT＂\｛RIGHT\}\{RVS\}\{K\}F 7 START BATTLE \｛13 SPACES $\}\{O F F\}\{K\} "$
MB 1210 PRINT＂\｛RIGHT\}\{RVS\}\{K\}F 8 RETURN TO TITLE SCRE EN\｛3 SPACES $\}$ \｛OFF\} $\{K\} "$
HK 1220 PRINT＂\｛RIGHT\}\{C\}\{RVS\} \｛28 I\}\{OFF\}\{V\}"
CQ 1230 RETURN
KB 1240 REM CLR LOGICAL LINES $\triangleright$

## Spheroids

PE 1250 FORI $=217 \mathrm{TO} 242$
GF 1260 POKEI，PEEK（I）OR128
DB 1270 NEXT
CA 1280 RETURN
SG 1290 REM SELECT DEPRESSION \｛SPACE\}OR MOUND
PB $130 \emptyset$ IERND $(\sigma)<.5$ THENC $\$={ }^{\prime \prime}$ \｛BLU\} $\{7\}\{4\}\{C Y N\} ": G O T O$ 1320
EH $1310 \quad \mathrm{C} \$="\{8\}\{4\}\{$ WHT \}$\{5\} "$
MD $132 \theta$ RETURN
DA 1330 REM BEEP
GS 1340 POKE54272， $0:$ POKE54273， 200
HF 1350 POKE54277， $0:$ POKE54278， 244
KR 1360 POKE54276，33：FORI＝1TO1 00：NEXT
EX 1370 POKE54276，32
JG 1380 RETURN
CX 1390 REM TOGGLE MENU ON／OEF
DG 1400 IF $M O=1$ THENMO $=\emptyset:$ SYS 263 3：RETURN
KR 1410 GOSUB113 0
AJ 142 g RETURN
DJ 1436 REM DIAMONDS
DE 1440 SYS 2627
SD 1450 POKE781，12：POKE782，6： P OKE783， $0: S Y S 65520$
QE 1460 GOSUB129 0
PJ $1470 \mathrm{X}=2$ ：GOSUB480
DR 148 14 POKE781，12：POKE782，22： POKE783，0：SYS6552＠
FG 1490 GOSUB129
AK $1500 \mathrm{X}=2$ ：GOSUB480
GH 1510 POKE781，6：POKE782，14：P OKE783， $0:$ SYS65520
CK 1520 GOSUB1290
KX $1530 \mathrm{X}=2$ ：GOSUB48 0
DD 1540 POKE781，18：POKE782，14： POKE783，Ø：SYS6552の
PM 1550 GOSUB129ø
RC $1560 \mathrm{X}=2$ ：GOSUB480
EH 1570 X＝19： $\mathrm{Y}=12$ ：GOSUB10 00
XF 1580 RETURN
SD 1590 REM CYCLONE
PX 1600 SYS2627
AK 1610 POKE781，3：POKE782，1：PO KE783， $0: S Y S 6552 \varnothing$
CE 1620 GOSUB1290：X＝1：GOSUB48 0
KB 1630 POKE781，3：POKE782，33：P OKE783，Ø：SYS6552の
JG 1640 GOSUB1290：X＝1：GOSUB480
JA 1650 POKE781，21：POKE782，33： POKE783， $0: S Y S 65520$
SA 1660 GOSUB1290：X＝1：GOSUB48 0
CM 1670 POKE781，21：POKE782，1：P OKE783， $0: S Y S 65520$
ED 1680 GOSUB1290：X＝1：GOSUB480
HC 1690 POKE781，12：POKE782，5：P OKE783，$\emptyset: S Y S 6552 \theta$
CX 1700 GOSUB1290：X＝5：GOSUB48 $\varnothing$
SR 171月 GOSUB930
BR 1720 RETURN
JS 1730 ；
HH 1740 REM OPEN
DJ 1750 SYS2627
CB 176 GOSUB93日
XB 1778 RETURN
JC 1780；
EM 1790 REM LATTICE
QM 180 SYS 2627
BR 1810 PRINT＂$\{$ HOME \} \{DOWN\}";
KC 1820 EORI $=1$ TO 12 ：PRINT＂ \｛RIGHT\}";:T=7
KG 1830 IF（IAND1）$=$ ØTHENPRINT＂ \｛3 RIGHT $\}^{\prime \prime} ;: T=6$
GP 1840 FORJ＝1TOT
XX 1850 IFRND $(\sigma)<.5$ THENPRINT＂ \｛BLU\}A\{7\}H\{DOWN\} $\{2 \mathrm{LE} \overline{\mathrm{F} T}\}\{\overline{4}\} \underline{I}\{C Y N\} \underline{P}\{U P\}$ ＂；：GOTO1870

MC 1860 PRINT＂$\{5\}$ A $\{4\}$ H\｛DOWN\}
\｛2 LEET $\}\{\overline{8}\}$ I $\{\overline{5}\} P\{U P\} " ;$
XX 1870 PRINT＂$\{4 \text { RI } \bar{G} H T\}^{\bar{\prime}}$ ；
QK 1880 NEXT
MR 1890 IFI $=12$ THEN 1920
FR $19 \emptyset \emptyset$ PRINT＂\｛DOWN\}\{3 LEFT\}";
GQ 1910 IF（IAND1）$=$ ØTHENPRINT＂
\｛3 RIGHT\}";
EP 1920 NEXT
HP 1930 GOSUB930
MP 1940 RETURN
AE 1950 REM RANDOM
KH 1960 SYS2627
PH $1970 \mathrm{~N}=$ RND $(\varnothing) / 1.5$
XA 1980 PRINT＂$\{$ HOME $\}$ \｛3 DOWN \}";
QG 1990 FORK＝1TO7：PRINT＂
\｛RIGHT\}";:T=5
GQ 2ø日も IF（KAND1）＝日THENPRINT＂
\｛3 RIGHT \}"; $\mathrm{T}=4$
KB 2010 FORL＝1TOT
BP $2 \varnothing 2 \sigma$ IFRND $(\sigma)>$ NTHENPRINT＂
\｛UP\}\{6 RIGHT\}";:GOTO2曰
50
QK 2030 GOSUB1290
GS $2040 \quad \mathrm{X}=1$ ：GOSUB 480
JB 2050 PRINT＂${ }^{\text {（DOWN }\}\{2 \text { RIGHT }\} " ~}$
SD 2060 NEXT
HM 2070 PRINT＂ 22 DOWN $\}$＂；
FA 2080 IF（KAND1）$=$ ØTHENPRINT＂
\｛3 RIGHT\}";
BE 2090 NEXT
EC 2100 GOSUB930
HC 2110 RETURN
CG 2120 REM QUADRATE
JB 2130 SYS2627
EH 214 2 POKE781，7：POKE782，2：PO KE783，Ø：SYS6552ø
BJ 2150 GOSUB129 $0: \mathrm{X}=\mathrm{INT}$（RND（ 0 ）
＊3）+1 ： $\mathrm{IEX}<3 \mathrm{THENFORI}=1 \mathrm{~T}$ O3－X：PRINT＂$\{3$ RIGHT $\}$＂； ：NEXT
KJ 2160 GOSUB48 0
DB 2170 POKE781，17：POKE782，20： POKE783，$\varnothing: S Y S 6552 \varnothing$
FM 2180 GOSUB1290：IFX＜3THENEOR
I＝1TO3－X：PRINT＂
\｛3 RIGHT \}"; :NEXT
CM 2190 GOSUB48
FP 2200 POKE781，5：POKE782，25：P OKE783， $0:$ SYS6552ø
MP 2210 GOSUB1290：X＝INT（RND（ 0$)$
＊2）+1 ：IFX＝1THENPRINT＂
\｛3 RIGHT \}";
XR 2220 GOSUB48 9
QB 2230 POKE781，19：POKE782，3： P OKE783， $0: S Y S 65520$
XR 2240 GOSUB1290：IFX＝1THENPRI NT＂$\{3$ RIGHT $\}$＂；
AX 2250 GOSUB480
JS 2260 GOSUB930
PS 2270 RETURN
JH 2280 REM TITLE SCREEN
GH 2290 PRINTCHRS（142）；＂\｛WHT\} \｛H\}\{CLR\}"
RK 2300 POKE53248 $+16,0$
AH 2310 POKE $2949,33:$ POKE 2041,3 4 ：POKE 2 Ø 42 ， 34
DM 2320 POKE53248＋38，2：POKE532 $48+39,14$ ：POKE $53248+40$ ， 10：POKE5 $3248+41,5$
PC 2330 POKE53248，142：POKE5325 Ø，142：POKE53252，142
AP 2340 POKE53249，147：POKE5325 1，187：POKE53253， 227
CP 2350 POKE53248＋28，7
HD 2360 PRINTTAB（6）；T1\＄
GB 2370 PRINTTAB（6）；T2\＄
KA 2380 PRINTTAB（6）；T3\＄
BX 2390 PRINTTAB（12）；＂\｛DOWN\}
\｛5\}COPYRIGHT 199ø"
XS 2401 PRINTTAB（6）；＂\｛DOWN\}
\｛WHT \} COMPUTE! PUBLICAT IONS，INC．＇
MB 2410 PRINTTAB（10）；＂\｛DOWN\}
〔5\}ALL RIGHTS RESERVED
QB 2420 POKE $53248+16,0$
GF 243a POKE53248＋21，7
EH 2440 PRINT＂$\{2$ RIGHT $\}\{$ WHT $\}$
\｛2 DOWN\}BATTLE
\｛14 SPACES \} \{BLU\}AB\{UP\}
\｛LEET \}C\{7\}E\{DOWN\}
\｛LEFT \} $\overline{G H}\left\{7^{-}\right.$SPACES \}
\｛WHT\}MOUND"
FE $245 \emptyset$ PRINT＂\｛2 RIGHT $\}$ CRAFT
\｛15 SPACES $\}$ \｛4\}IJ \{DOWN\}
\｛LEFT \}K $\{C Y N\} N\{\overline{U P}\}$
\｛LEFT\} $\bar{O} P\{W H T\}^{\prime \prime}$
JM 2460 PRINT＂$\{$ WHT $\}\{2$ RIGHT $\}$
\｛3 DOWN\}UNARMED
\｛13 SPACES\}\{8\}AB\{UP\}
\｛LEFT\}C\{4\}E\{DOWN\}
\｛LEFT \} $\overline{\mathrm{G}} \mathrm{H}\left\{2^{-}\right.$SPACES $\}$
\｛WHT \}DEPRESSION"
HE 2470 PRINT＂ 2 WHT $\}\{2$ RIGHT $\}$ SP HEROID $\{12$ SPACES $\}\{$ WHT $\}$ I J \｛DOWN \} \{LEET\} K $\{5\}$ N \｛UP\}\{LEFT\}OP"
RH 248日 PRINT＂\｛WHT\}\{2 RIGHT \} \｛3 DOWN\}ARMED
$\{16$ SPACES \}\{YEL\} $\langle 2+\}$
\｛ 3 SPACES $\}$ \｛WHT \}TELEPOR TER＂
BJ $249 \emptyset \mathrm{X}=\emptyset: \mathrm{Y}=\varnothing$
MP 25g $\quad$ FORI $=\emptyset T O 8$
JG 2510 Tl＝I
EC $2520 \mathrm{~T} 2=\mathrm{I}+1:$ IET $2>8$ THENT $2=\mathrm{T} 2$ －9
HQ 2530 T3＝I $+2:$ IET $3>8$ THENT $3=T 3$ －9
GP 2540 PRINT＂$\{H O M E\}\{D O W N\} " ;$
HK 2550 PRINTTAB（6）；MIDS（TC\＄，T $1+1,1)$ ；T1\＄
MQ 2560 PRINTTAB（ 6 ）；MIDS（TC\＄，T $2+1,1)$ ； 2 2
RD 2570 PRINTTAB（6）；MIDS（TC\＄，T $3+1,1)$ ；T3\＄
QG 2580 POKE781，22：POKE782，23： POKE783，$\varnothing$ ：SYS $6552 \emptyset$
HD 2590 IFX＝øTHENX＝1：PRINT＂ \｛RVS\}\{YEL\} $<2+$ \｛DOWN \} \｛2 LEFT \} $<2$＋＞＂：GOTO261

QH $260 \emptyset \mathrm{X}=\emptyset:$ PRINT＂\｛YEL\}$\langle 2+\}$ \｛DOWN\}\{2 LEFT\}<2 $+{ }^{\prime \prime}$
MH 2610 GETAS：IFAS〈＞＂＂THENY＝1： $\mathrm{I}=8$
SB $2620 \mathrm{~J}=(\operatorname{PEEK}(5632 \theta)$ ANDPEEK（ 56321））
FM $2630 \operatorname{IF}($ JAND 1$)=\varnothing O R($ JAND 2$)=\emptyset$ OR $($ JAND 4$)=\emptyset 0 R($ JAND 8$)=\emptyset$ OR $($ JAND 16$)=$ OTHENY $=1: I=$ 8
AB 2640 NEXTI
XP $265 \emptyset$ IEY $=1$ THEN $267 \emptyset$
FK 2660 GOTO250 0
AR 2670 POKE53248 $+21,0$
CJ 2680 RETURN

## SPHEROIDS．ML

9801：16 98 E8 93 8F 20 53 50 5F 0809：48 $45 \quad 524 \mathrm{~F} 49445320 \mathrm{EF}$ Ø811： 42 4F $4 \mathrm{~F} \quad 54 \quad \emptyset 0 \quad 2 \mathrm{~B} \quad 98 \quad \mathrm{~F} 2 \mathrm{~F} 4$ $0819: \wp 3 \quad 8 \mathrm{~F} \quad 20 \quad 42 \quad 59 \quad 20 \quad 4 \mathrm{~B} \quad 45 \mathrm{DD}$ 0821：56 $49 \quad 4 \mathrm{E} \quad 20 \quad 44 \quad 49 \quad 58 \quad 4 \mathrm{~F} \quad \mathrm{Cl}$ 6829： 4 E g0 4B 98 FC 03 8F 20 7D $\begin{array}{llllllllll}0831: 41 & 55 & 47 & 20 & 31 & 2 C & 20 & 31 & C D\end{array}$ $0839: 39 \quad 38 \quad 39 \quad 20 \quad 2 \mathrm{D} \quad 20 \quad 41 \quad \emptyset \emptyset \quad 89$
 9849：ØE AC ØØ ØE AC ØØ $3 A \quad A B \quad F 1$




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 9911：08 0D 76 06 日D 5C 00 63 51 0919：5C ø0 03 Fø øø ø0 Cø ø0 4A 9921：00 08 00 00 00 00 00 00 33 6929：00 0800 ø0 00000000 3B 0931：00 00 00 00 00 00 ø0 00 43 －0939：00 00 00 06 00 00 00 00 4B 0941：00 00 00 00 00 00 C0 00 D4 9949：03 F0 00 OF 7C 日6 6D 5C 64 ब951：00 35 5F 003557 日0 3D E® ब959：57 O8 ØD 5C Ø6 OF 5C Ø6 73 9961：03 F0 C0 ø6 Cø 00000637 9969：00 0000000000 00 00 7B 9971：00 00 00 00 00 00 00 00 83
 9981：Cø 68 63 F6 06 0F 7C 06 98 0989：0D 5F $08 \quad 3 \mathrm{D} 57 \quad 00 \quad 35 \quad 574 \mathrm{~A}$ ब991：CØ F5 55 C 61557 C 6 F5 BB 0999：5700 3507003 DCO 0021
 09A9：00 00.000000 00 0000 BB 99B1：08 00.080008000000 C 3
 99C1：C8 08 0D 7C 08 35 5C 00 2B 99C9： 37 D7 $00 \quad 37 \quad 37$ 06 D7 3575 ब9D1：Cव DC 日D C0 DC 35 C0 D7 3E 99D9：37 06 37 D7 $96 \quad 37$ DC 9682
 09E9：00 06000000000000 FB 69F1：00 00 000000 00 00 0004 69F9：00 00000000 00 ø0 00 वC

 ØA11：00 30 ø3 Ø0 30 ØF Ø0 3С 8B gA19：0C 00 वC 3C 00 бC 30 00 09 0A21：0F F0 0003 CD 0000002 F
 0А31：00 00 00 00 00 00 00 ø0 45 бА $39: 080800000808004099$ gA41：D5 13 4C FC 12 4C $65 \quad 13$ FD
 0A51：01 01 0101010101010266 ga59：02 05050505050508 EE 0A61：08 070707070707 日C FA gA69：0C 08070700000000 D6 9A71：06 00 00 08 06 06 00 06 85 gA79：00 080000 08 00 00 00 8D 9А81：00 00 00 00 00 00 00 00 95 0A89：08 00000000000000 9D
 0A99：00 00 00 00 00 00 00 00 AD gAA1：F8 F8 F8 F8 F8 F8 F7 F7 B2 øАА9：08 08 ø8 08080809 ø9 Сव gabl：01 01 01 01 01 01 01 01 C5 वАВ9：05 $05 \quad 650505 \quad 6503 \quad 03 \quad \mathrm{C7}$ gAC1：01 01 01 0101010101 D5 gAC9：01 01 01 01 01 01 बB बB FB gadl：03 0308 FF Fe 000080 A9 gAD9：20 80 6E 8765 g0 Cø 0187
øAE9：FE FA FC FE F8 F9 FD FB F3 GAFl：E7 $12 \begin{array}{llllllll} & 28 & 43 & 52 & 41 & 46 & 54 & 37\end{array}$ gaF9：53 $20 \quad 20$ 06 9A 12424 CB B1 ©B01：55 $45 \quad 28 \quad 57494 \mathrm{AE} 5321 \quad \mathrm{D7}$

 ØB19：0日 01 03 日F 1F 7F FF 3 FF E6 GB21：7E FE FF FF FF FF FF 06 F6

 GB39：E6 F8 FC FE FF FF FF 00 9D ØB41：00 00 06 00 80 Eの Fø FC BD GB49：FE FF FF FF FF FF FE 80 DE ØB51：0日 80 C $\emptyset$ F 6 F8 FE FF FE 72 gB59：7F 1F $0 \mathrm{EF} 0301 \quad 0000 \mathrm{FE} \quad 11$ ©B61： FF FF FF FF FF $7 \mathrm{FF} \quad 3 \mathrm{~F}$ ØF 63 0B69：07 01 00 00000000 FF 43 GB71：FF FF FF $3 \mathrm{FF} 1 \mathrm{~F} 97 \quad 63 \mathrm{FF} 96$ GB79：FF FF FF FC F8 Eø Cø Fø 1D ดB81：E0 806068060006 FF 28 ØB89： FF FF FF FF FF FE FC FF 95 ØB91：FE F8 F6 C6 80 g0 06 A2 36 бв $99: 06$ AC 51 ØA CA Dø FD 88 C3 gBA1：D8 FA 60 AD 1F D9 A9 0055 ØBA9：8D DF gA 68 AD 1F Dg gD 5E gBB1：DF ga 8D DE gA 68 CE D3 2D
 ØBC1：AD 4F gA 85 FB AD 58 OA 5D ØBC9：85 FC Aø 08 Bl FB 1869 øD ØBD1：89 91 FB Ag 01 Bl FB 18 F4 ØBD9：69 8091 FB Ag 28 B1 FB BB GBE1：18 $6989 \quad 91$ FB Ag 29 B1 ED GBE9：FB 18698091 FB 68 AD 24 GBE1：GE DC 29 FE 8D gE DC A5 5F øВ $9: 0129$ FB 8501 A9 0085 E 6 øC 01 ：FB A9 2085 FC A9 0085 Fl
 ØC11：00 B1 FD 91 FB 88 D 8 F9 0 CC ØC19：E6 FC E6 FE CA D8 F6 A5 D1 ØC21：01 090485 01 AD 日E DC 8C ØC29： 69 Ø1 8D ØE DC AG 00 B9 BB ØC31：18 日B 99 ø8 22 C8 C $680 \quad 02$ øC39：Dø F5 A9 18 8D 18 Dø 60 BC øC41：BD 99 ØA Dø 65 de CB ØA 35 øC49：Dø 60 AD 6A gA 9D CB 日A A6 øC51：A9 00 9D D6 øA BD FA DB 18 ØC59：29 18 D 80320 FC 18 BD 27 ØC61：FA DB 2961 Dø 66 FE Dø 96 ØC69：0A 20 AC $0 C$ BD FA DB 29 9E øC71：62 D8 66 FE Dø ØA $2 \varnothing$ B9 18 øC79：8C BD FA DB 2904 Dø 0625 gC81：FE D8 gA 28 C6 øC BD FA 6D ØC89：DB 29 Ø8 DØ 06 FE DØ ØA BE ØC91：2ø D3 øC AD D6 ØA D 9 gD 98 ØC99：AD D7 ØA D6 Ø8 A9 8ø 8D 42 ØCA1：12 D4 4C AB ØC A9 81 8D D3 ØCA9：12 D4 $6 \varnothing$ BD 91 ØA $1 \varnothing 04 \mathrm{C} \varnothing$ ØCB1：C9 F7 F6 03 DE 91 ØA 60 AC øCB9：BD 91 øA 3604 C9 09 F6 A3 øCC1：03 FE 91 0A 60 BD 89 ØA 05 ØCC9：18 04 C9 F7 F6 63 DE $897 E$ gCD1：$\sigma_{A} 60$ BD 89 ØA 3004 C9 3A ØCD9： 69 F0 03 FE 89 ØA 68 BD F5 ØCE1：99 ØA Dø 71 BD 71 ＠A D $\varnothing 13$ øCE9：6C DE B1 0A D 677 BD 52 b8 ØCF1：ØA 9D B1 ØA DE A9 GA FE FD ØCF9：A1 0A BD 89 бA 3613 F6 DD øD01：1F BC A9 ØA BD 89 ØA D9 B1 øD69：E6 ØA 98 14 20 ø8 ØE 4C F2 øD11：21 ØD BC A9 øA B9 E9 ØA 46 gD19：DD 89 0A 9ø 63 2ø B9 0D E7 ØD21：BD 91 gA 3013 F 01 F BC 1 A ØD29：A9 ØA BD 91 øA D9 Eø ØA EE ØD31：9ø 1428 88 0D 4C 47 gD 5A бD39：BC A9 бA B9 E9 ØA DD 91 BD ØD41： 0 A $96 \quad 632657$ 6D BD A9 FA ØD49：6A Dø бA A9 69 9D A9 ØA 94 ØD51：A9 F7 9D A1 ØA 68 8A A8 9 AB øD59：48 6A AA BD 01 Dø C9 3A 64 øD61：Dg 1F A9 g6 38 F9 91 ØA B7 øD69：99 91 ØA 8A 4898 AA $2 \varnothing$ B8

9D71：B9 日C 20 B9 日C A9 018 D A1 6D79：6D 6A 8A A8 68 AA 4C 85 B4 ØD81：ØD DE 61 D 68 AA 60 8A 40 ØD89：A8 48 ØA AA $B D \quad 01$ D $\emptyset C 953$ 6D91：EE D 0 1F A9 0038 F9 91 3C ØD99：0A 9991 日A 8A 4898 AA 43 ØDA1： 20 AC ØC 20 AC ØC A9 0164 ØDA9：8D 6D 9A 8A A8 68 AA 4C 58 GDB1：B6 GD EE 01 D 68 AA 6038 gDB9：8A A8 48 0A AA AD 10 D $\emptyset$ E9 ØDC1：2D D8 9A F® 13 BD 90 D $\varnothing 59$ GDC9：C9 Øø Dø 32 AD 18 D $\varnothing$ 2D 82 ＠DD1：D9 gA 8D 10 D 04 C FF 9D D2 6DD9：BD Ø0 D6 C9 16 D 1 lF A9 65 ØDE1：Øø 38 F9 89 ØA 9989 ØA B5 ØDE9：8A 48 98 AA 26 D3 0 C 20 21 ØDE1：D3 ØC A9 61 8D 6D ØA 8A FE ØDF9：A8 68 AA 4C 95 ØE DE 90 BA ØE＠1：D D DE Øø D 68 AA 60 8A 83 9E09：A8 48 gA AA AD 10 D 6 2D F3 ØE11：D8 ØA Dø 13 BD Øø D6 C9 C6 ØE19：FE D 032 AD 10 D $\emptyset$ ØD D8 C 6 ØE21： 0 A $8 D 10$ D 104 C 4 E 日E BD 2 A
 0E31：38 F9 89 0A 9989 0A 8A 4B ØE 39：48 98 AA 20 C6 ØC 2 Ø C6 64 ØE41：ØC A9 Ø1 8D 6D 0A 8A A8 18 ØE 49：68 AA $4 \mathrm{C} \quad 54$ ØE FE 00 Dø 50 0E51：FE 60 D 06 AA 60 BD 7959 0E59：0A D $\emptyset 2 B$ DE C9 0A D0 2640 のE61：BD 89 ØA 30 Ø8 $\mathrm{F} \emptyset \quad 99$ DE F7 ØE69：89 ØA 4C 71 ØE FE 89 ØA F6
 ØE79：91 ØA 4C 81 ØE FE 91 日A 1C gE81：BD 62 gA 9D C9 日A 60 BD 25日E89：71 日A F6 63 4C 6C GE DE 46
 ØE99：5A gA 9D B9 6A AD DF gA 85 ØEA1：2D D8 日A D6 03 4C 6C 日F 0A ØEA9：AD DF ØA 2D D9 ØA 8D DE 9A ØEB1：ØA 8A 48 gA AA BC 91 D $\emptyset$ 3A

 ØEC9：A5 FE 1869 D4 85 FE Aの 6D OED 1： 0068 AA B1 FD 29 0F 85 B 0
日EE1： 06 20 AC ØC 4C D3 ØC A5 CE ØEE9：02 C9 ØF FØ 04 C9 03 D $\emptyset 88$ ØEF1： 0620 B9 ØC 4C D3 ØC A5 $8 \emptyset$日EF9：02 C9 ØC E0 04 C9 06 D $\emptyset$ 3E日EØ1：06 2ø AC 日C 4C C6 ØC A5 BB
日F11：20 C6 日C A5 Ø2 C9 07 D6 E2 0F19：52 AD D8 gA 49 FE 8D D9 C6 gF21：gA 8A 48 ga AA AD 1B D4 A7 0F29：8D DB 日A C9 B4 B0 F6 1851 QE31：69 3A 9D 01 Dø AD 1B D4 9E

日F49：90 ØC AD 10 D 0 ØD D8 ØA DF日F51：8D 10 D $\emptyset$ 4C 60 日F AD 10 C3 0F59：D6 2D D9 0A 8D 10 D 6 A9 FE gF61：FF 8D 01 D4 A9 618 D 6D 2A日F69：0A 68 AA 60 8E DC 0A 8C 8A 9F71：DD 6A BD 99 日A F6 03 4C B8 ØF79：Eの ØF B9 99 ØA FØ Ø3 4C 03 ØF81：Eの ØF 8A ØA AA 98 ØA A8 3A 0F89：BD 01 D $018 \quad 69 \quad 06$ D9 01 7A ØF91：DØ Bø 03 4C EØ ØF BD Ø1 29 0F99：D6 38 E9 67 D9 01 D 6 90 E 0 GFA1：03 4C E GF AD 10 D 6 2D DD gFA9：D8 0 日 20.941248 AD DD EE ØEB1：$\emptyset_{A}$ gA AA AD $1 \emptyset$ D $\emptyset$ 2D D9 7F
 ØFC1：18 $69 \quad 94$ CD DB 0 日 $\mathrm{B} \emptyset \quad 03 \quad \emptyset \mathrm{~F}$ ＠FC9：4C Eg 0F 38 E9 99 CD DB 96 ØFD1： 0 A $9 \emptyset \quad 034 \mathrm{C}$ E $\emptyset$ ØF AE DC BB


日FF1：Fの 37 C9 ØA F＠ 03 4C $2 \mathrm{~B} \quad 87$

ØFF9：10 BD CE＠A C9 FF DØ 2923 1001：B9 71 gA Dg 24 BD 99 ØA FD 1009：D D 1F 8A 49 Ø1 AA BD 9967
 1019： 0 A 8A 9971 ØA 98 9D CE E7 1021：0A A9 Øø 9989 ØA 999183 1029：0A 60 A9 60 8D 79 0A 8D 8F 1031：7A 日A 8D 7B 6A 8D 7C 6A 94 1039：8D 7D ØA 8D 7E ØA A9 ØA 13 1041：8D 27 Dø 8D 28 Dø 8D 29 AD 1049：Dの 8D 2A Dø 8D 2B Dø 8D CF 1051：2C Dø 8A 49 Ø1 A8 B9 9959 1059：0A Dø 1B A9 23 9D 99 6A 7D 1061：A9 81 8D ØB D4 A9 62 8D F7 1069：08 D4 8A 29 Ø1 AA A9 Øø AC 1071：9D D6 0A 8D 6E 9A 60 AD 3A 1079：6D ØA FØ 2A A9 21 8D 0484 1081：D4 AD 6D 0A C9 FD F0 gF FC 1089：AD 6D GA 18 69 gE 8D 6D AA 1091：0A 8D 00 D4 4C A7 18 A9 32 1099：80 8D 6D 8A A9 20 8D 9458 10Al：D4 A9 6A 8D 01 D4 60 8A 57 16A9：48 BD 79 日A $\mathrm{FO} \quad 10$ DE 8134 10Bl：0A D 045 A9 09 9D 81 6A 1A 10B9：DE 79 0A 4C F9 18 A9 6A 1B 10C1：9D 27 Dø 98 DD 71 日A Dø B7 10C9：2F 8A ØA AA 98 ØA A8 B9 08 1øD1： 01 D $\varnothing$ 9D $01 \mathrm{D} \varnothing$ B9 $0 \emptyset$ D $\emptyset$ A8 10D9：9D ø日 Dø AD $1 \varnothing$ Dø 2D DA B6 10E1：0A Fの ØC AD 10 D $\varnothing$ ØD D8 56 10E9：0A 8D 10 D 04 C F9 10 AD 99 10F1：10 Dø 2D D9 ØA 8D 10 Dø Ø9 10F9：68 AA 60 BD CE 6 A C9 FF 13 1101：Fg 6A A8 B9 79 6A D6 64 E6 1109：A9 Øø 9989 ØA 99 91 ØA AF 1111：BD FA DB 2901 D 06 A9 DD 1119：F7 9991 gA BD FA DB 29 2B 1121：02 D8 05 A9 999991 ØA 8F 1129：BD FA DB 2964 D 605 A9 6 E 1131：F7 9989 日A BD FA DB 2942 1139：68 D 605 A9 699989 日A 9A 1141：B9 89 ØA Dø 98 B9 91 ØA 45 1149：D0 03 4C 6D 11 A9 0099 BD 1151：71 0A A9 FF 9D CE 0A A9 C9 1159：50 $99 \begin{array}{llllllll} & 79 & \text { 日A A9 } & 99 & 99 & 81 & \mathrm{FF}\end{array}$ 1161：$\emptyset$ A BD 27 D 9927 D 9 A9 9 E 1169：5F 8D 6E 6A 60 BD 99 ØA 44
 1179：10 9D Cl 0A BD 99 6A 9D E9 1181：F8 07 FE 99 ØA BD 99 gA DF 1189：C9 2A D $\emptyset$ GE AD 15 Dg 2D A6 1191：D9 9A 8D 15 Dø A9 80 8D E1 1199：ØB D4 BD 99 ØA C9 40 D 9 9 9 11A1：09 8A 29 01 AA A9 01 9D BB 11A9： 6 F gA 60 AD 6 E gA Fg 1D 87 11B1：A9 81 8D 0B D4 CE 6E 9A 34 11B9：Fg 69 AD 6E 6A 8D 08 D4 9E 11Cl：4C CE 11 A9 øØ 8D 6E 6A 97
 11D1：A9 AØ 99 Ø0 64 A9 日A 9998 11D9：00 D8 C8 C6 28 Dø F1 A9 69 11E1：13 20 D2 FF A9 9A 20 D2 BA 11E9：FF A9 F2 A 0 日A 20 1E AB 97 11F1：A9 2020 D2 FF A $\emptyset$ IE A2 83 11F9：00 1820 Fg FF A9 1E 2038 1201：D2 FF A9 F2 Aø ØA 2ø 1E 7E 1209：AB A9 05 8D 27 D8 2016 D9 1211：12 $2 \varnothing \quad 31 \quad 1260$ A0 08 A2 C5 1219：00 1820 FO FF A9 9A $2 \varnothing 52$ 1221：D2 FF A9 1220 D2 FF AE FF
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1281：FE $85 \mathrm{FE} 88 \mathrm{D} \emptyset \mathrm{F} \emptyset 18$ 8A F3 1509： 01 9D A9 ØA E8 E 0 2B D 0 E2 1289：65 FD 85 FD A9 0665 FE 87 1511：F8 A9 FE 8D A1 9A 8D A2 ED 1291：85 FE 60 8D DB ØA BD 06 9F 1299：D® 4A 48 AD DB $\mathrm{gA} \mathrm{F}^{\mathrm{F}} 0489$ 12A1： $68 \quad 99 \quad 8048 \quad 68 \quad 6 \emptyset$ Aø $\begin{array}{lllllll}27 & \text { FD }\end{array}$ 12A9：A9 A 99 Øø 04 8A 99 Ø0 7B 12B1：D8 $88 \mathrm{C} \varnothing \mathrm{FF}$ D 0 E2 60 AD 3D 12B9：00 DC 2D 01 DC 2910 D 647 12C1：F6 AD 00 DC 2 D 01 DC 29 EA 12C9：10 F0 F6 60 A9 20 8D 0404 12D1：D4 A9 808 D 日B D4 A9 8033 12D9：8D 12 D4 6020 El FF Dø 43 12E1：19 A9 øø 8D 18 D4 20 E1 øC 12E9：FF Fø FB $2 \varnothing$ E1 FF D $\varnothing$ FB 78 12F1：20 El FF Fø FB A9 ØF 8D DF 12F9：18 D4 60 A9 13 20 D2 FF C4 1301：A9 11 20 D2 FE A9 9C 2071 1309：D2 FF Ag 0C A2 0D A9 DB E5 1311：20 D2 FF A9 C C 20 D2 FF C2 1319：A9 C 0 2ø D2 FF CA D 0 EE 31 1321：A9 DB 28 D2 FF A2 GD A9 92 1329：DD 20 D2 FF A9 20 20 D2 81 1331：FE A9 2020 D2 FF CA D 0 C 4 1339：EE C0 01 F0 08 A9 DD 20 F8 1341：D2 FF 88 D6 C7 A9 9D 20 2F 1349：D2 FF A9 DD 20 D2 FF A9 E1 1351：9D 20 D2 FE A9 9420 D2 5 B 1359：FF A9 $20 \quad 20$ D2 FF A9 13 EC 1361：20 D2 FE 60 A 0 øø B9 28 F2 1369：04 99 ø0 C 6 B9 28 D8 99 BD 1371：00 C4 B9 28 ø5 99 øø C1 D2 1379：B9 28 D9 99 Ø6 C5 B9 28 ØE 1381：06 99 øø C2 B9 28 DA 99 FA 1389：00 C6 B9 $28 \quad 8799 \quad 00$ C3 7D 1391：B9 28 DB 99 g0 C7 88 D 0 B4 1399：CD 60 Ag 00 B9 80 C 099 BB 13A1：28 64 B9 00 C4 9928 D8 C9 13A9：B9 60 C1 $9928 \quad 65$ B9 $08 \quad 47$ 13B1：C5 9928 D9 B9 $9 \varnothing$ C2 99 B $\emptyset$ 13B9：28 66 B9 ø0 C6 9928 DA 74
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 14C9： 08 8D D8 日A A9 E7 8D D9 37 14D1：ØA A2 03 20 1A 日F A9 16 7A 14D9：8D D8 gA A9 EF 8D D9 6A 4E 14E1：A2 $04201 A$ 日F A9 20 8D EE 14E9：D8 0A A9 DE 8D D9 0A A2 BE 14F1：05 20 1A ØF A9 9A 8D 01 6A 14F9：D4 A2 ø日 A9 $6 \emptyset$ 9D 6D GA 2B
 1521：A5 0A 8D A6 ØA 8D A7 0A 9C 1529：8D A8 6A 8D D4 6A 8D D5 1E 1531：0A 20 ØF 1220 A4 ØB A9 BE 1539：FF 8D 15 D $\varnothing$ AD 6F 日A $\mathrm{F} \emptyset$ A6 1541：0B CE 6B 日A F0 03 4C 5433 1549：14 4C 6017 AD 70 ØA F0 42 1551：0B CE 6C ØA F0 03 4C 5463 $\begin{array}{lllllllll}1559: 14 & 4 C & 43 & 17 & 20 & 98 & \text { ØB } & 20 & 14\end{array}$ 1561：DD 1220 AD 日B 20 B7 ØB 31 1569：20 78 10 $2 \varnothing$ AC 11 A2 66 BA 1571：20 41 ØC A2 07 20 41 ØC EE 1579：A9 01 8D D8 6A A9 FE 8D 7A 1581：D9 ØA A2 0020 Eの ดC 20 2C 1589：88 日E 20 57 ØE A9 40 8D 1A 1591：DA 日A Ag $06 \quad 20$ A8 10 A9 8D 1599：8の 8D DA ØA AØ 0720 A8 6D 15A1：10 A9 02 8D D8 6A A9 FD 97 15A9：8D D9 ØA A2 0120 EØ वC D2 15B1：20 88 ØE $20 \quad 57$ ØE A9 $40 \quad 58$ 15B9：8D DA ØA Aø $66 \quad 2 \emptyset$ A8 10 BE
 15C9：A8 18 A9 64 8D D8 日A A9 4 F 15D1：FB 8D D9 ØA A2 62 20 Eø 77 15D9：ØC 2088 日E $20 \quad 57$ ØE A9 28 15E1：40 8D DA ØA Aø 0620 A8 91 15E9：10 A9 80 8D DA 9 A A0 07 B6 15F1：20 A8 10 A9 08 8D D8 0 A 25 15F9：A9 F7 8D D9 0A A2 $03 \quad 2047$ 16ø1：Eの ØC $2 \emptyset 88$ ØE $2 \emptyset 57$ ØE DA 1609：A9 40 8D DA 日A AØ $06 \quad 2078$ 1611：A8 10 A9 8 8 8D DA gA AØ 5 F 1619：07 20 A8 10 A9 10 8D D8 68 1621：0A A9 EF 8D D9 0A A2 84 D3
 1631：日E A9 40 8D DA gA A0 66 F5 1639：20 A8 10 A9 80 8D DA 0A 36 1641：AØ 07 2ø A8 10 A9 20 8D 03 1649：D8 gA A9 DF 8D D9 GA A2 22 1651：05 20 Eの ØC 2088 日E 2044 1659：57 ØE A9 40 8D DA ØA AØ 7A 1661： 66 20 A8 10 A9 80 8D DA F3
 1671：8D D8 ØA A9 BF 8D D9 日A 68 1679：A2 062 2 Eの ØC $2 \emptyset 88$ 日E 8A 1681：20 57 ØE 20 6E 11 A9 80 E2 1689：8D D8 0A A9 7F 8D D9 0A 7E 1691：A2 0720 Eの ØC $2 \emptyset 88$ ØE E2 1699：20 57 ØE 20 6E 11 A9 40 BA 16A1：8D D8 GA A9 618 D D9 gA A2 16A9：A2 06 A 0 øの $2 \emptyset 6 \mathrm{D}$ ØF A9 3B 16B1： 62 8D D9 gA A2 96 Ag 018 D 16B9：20 6D ØF A9 94 8D D9 0A El 16C1：A2 Ø6 Aø g2 26 6D ØF A9 73 16C9： 08 8D D9 gA A2 96 AØ 03 AA 16D1：20 6D 0F A9 16 8D D9 0A 5A 16D9：A2 $\wp 6$ A $\emptyset \quad \emptyset 4$ 2ø 6D ØF A9 AB 16E1：20 8D D9 gA A2 06 Aの 05 Dø 16E9：20 6D ØF A9 8ø 8D D8 gA F3 16F1：A9 018 DD D9 日A A2 07 Ag ØC 16F9：日0 20 6D ØF A9 ब2 8D D9 17
 1769：A9 64 8D D9 日A A2 67 A0 E5 1711： 62 20 6D øF A9 98 8D D9 49 1719：0A A2 07 Aø 03 2ø 6D ØF 62 1721：A9 10 8D D9 ØA A2 67 AØ 01 1729： 84 20 6D ØF A9 2ø 8D D9 C2 1731：ØA A2 97 AØ 65 20 6D 0F 8A 1739：20 E4 FF C9 D1 Fg 3A 4C 6ø 1741：3D $15 \quad 20$ CD 12 A2 0 日E 20 8B 1749：A7 12 Ag ØE A2 Øø 18 20 2A 1751：F0 FF A9 FD AØ 0A 20 1E 98 1759：AB 20 B8 12 4C 7 7A $17 \quad 20 \quad 38$ 1761：CD 12 A2 0528 A7 12 Aด 64 1769：0E A2 $\quad 0018$ 28 Eの FE A9 37 1771：$\emptyset_{A}$ A $\emptyset$ 日B 20 1E AB 20 B8 C8 1779：12 A9 60 8D 15 D6 20 CD ED



Looking for a way to impress your friends? Try Starburst Graphics. This powerful machine language program features more than 20 options for creating colorful, stunning graphics on the 64's high-resolution screen.

With Starburst Graphics, you begin with a basic star cluster that emerges from the center of the screen. From there, you can easily manipulate the paths of the streaming stars to simulate fireworks, spiral nebulas, ocean waves, swirls, kaleidoscopes, and much more.

## Getting Started

Since Starburst Graphics is written entirely in machine language, you'll need to type it in using MLX, the machine language entry program located elsewhere in this issue. The MLX prompts, and the values you should enter, are as follows:

## Starting address: 0801 <br> Ending address: 15C8

When you've finished typing, be sure to save a copy of the program before exiting MLX.

Although Starburst Graphics is written in machine language, it loads and runs like a BASIC program. When you run it, the title screen with a list of command options will appear (see accompanying table). This list serves only as a reference; the commands don't have any effect until the graphics screen is displayed.

To start the show, press any key. You'll see a series of "stars" streaming outward from the center of the screen. Before you continue, you may want to adjust your screen's brightness and color until the stars appear in distinct contrast to the background. (For a really dazzling display, turn off the lights in the room.) Then you're ready to try Starburst Graphics' many options.

Each command option in Starburst

Graphics is activated using a specific keypress. You can press any command key at any time, in whatever order you like. Each time you activate an option, that function remains active until you turn it off. You can also combine several options, one after another, to produce a great variety of graphics patterns.

## Create a menagerie

## of scintillating

hi-res displays
with this unique graphics

## entertainment

program for the 64.
Bob Masters
Most of Starburst Graphics' commands toggle on and off. To activate a particular option, press the corresponding command key once; to deactivate it, press the same key a second time. Also, should your star pattern become a jumbled mess, use the master control key D to return all options to their default condition.

## A Galaxy of Options

Initially, the stars appear as colored dots moving across the screen. To make them leave a trail of "dust," press the C key (for continuous drawing); to disable this option, press C again. Press a digit (1-9) to give each star a tail; the higher the digit, the longer the tail. To turn off
the tails option, press either 0 or T .
Normally, the stars go offscreen when they reach the border and are replaced by new stars. To force the existing stars to remain on the screen, press J or B. Pressing J makes the stars jump back in the direction from which they came; pressing B makes them bounce off the borders.

To change the number of stars, press N . You'll be asked how many stars you want to see. Enter a value in the range $1-256$ (the default is 80 ), or press RETURN if you decide that you're satisfied with the current number.

Stars appear in three colors. To cycle these, press $\mathrm{f} 1, \mathrm{f} 3$, and f 5 . The f 7 key restores the default colors.

To mirror the star pattern horizontally, press the $X$ key; to mirror it vertically, press Y.

If the screen becomes cluttered, press CLR/HOME. After the screen is cleared, the stars will resume their movements at the points from which they were erased. This option is especially useful when you've produced a great design but find it's becoming lost on a crowded screen.

The space bar works almost the same as the CLR/HOME key. The stars are erased, but their paths are changed. Each star returns to its starting position and is assigned a new speed and direction. This option can be really handy. For instance, when you're using bounce or jump or you're in atom mode (see below), each star tends to stay on the screen indefinitely. So, to force the stars offscreen and replace them with new stars that travel in different directions, you'd press the space bar.

To pause the graphics display, hold down SHIFT or press SHIFT LOCK.

## Four Primary Patterns

There are four special directional patterns: fountain, spiral, atom, and ocean.

Press F for a fountain（or fireworks）ef－ fect， S for a spiral motion， A to make the stars appear like atomic electrons，and O to produce an oscilloscopic or oceanic wave effect．

Examine these four options in turn by pressing the respective key．Between patterns，press D to restore the default display．For an interesting wave effect， try the following sequence：Type DN and set the number of stars to 12 ；then type OCVBXY（the V command is de－ scribed in the next couple of para－ graphs）．To change this pattern， periodically press the space bar．

Each star moves at its own random speed and direction．All together，there are 14 different speeds．To increase the average star velocities，press V ．This in－ creases the range of possible speeds－ and directions－available for each star． Notice that sometimes the stars are more interesting to watch when they＇re moving slower．

Note，too，that although V will in－ crease the average speed，the velocities are also affected by the number of stars present；the fewer the stars on the screen，the faster they move．Some－ times，when there are only a handful of stars，even the slower ones move too quickly to watch．When this happens， press P．This puts a speed limit on the stars．

Notice the difference between the velocity option and the speed limit．The V command is your primary speed and directional control．You＇ll use it fairly often；$P$ is used only when things get much too fast．To see what is meant by this，type DF3N and set the number of stars to 4 ．Watch how fast the stars fly by．Now alternately press P and V to see the effect of each keypress．

You can control the size of the graphics display screen by pressing H or $W$ ；H changes the height of the
screen，while $W$ changes its width．You can use these two keys separately or to－ gether to produce four different height and width combinations．

## Other Options

Normally，all stars flow from the center of the screen．Press $Q$ and they will burst out from all over the place．The program，however，will attempt to group the stars so that several appear together．

A variation on this pattern can be achieved using the $Z$ option．The stars will still have random starting points， but they won＇t be grouped into clusters． For an example of this，type DN and set the number of stars to 100；then type ZW．This creates a swirling pattern sim－ ilar to a Star Trek transporter beam．

For random star movement，press $R$ ．This command can be used to create kaleidoscopic effects．For example，try this command combination：DQRXYC． Press the space bar now and then for a new pattern．Note that when random movement is in effect，the tails option operates differently．The tail length （1－9）determines how far the stars trav－ el before changing direction．Randomly moving tails also add a twist to the di－ rectional options（ $\mathrm{F}, \mathrm{S}, \mathrm{A}$ ，and O ）．

To limit the lifespan of each star， press L．This command makes the stars slow down and disappear sooner than they normally would．This option isn＇t needed most of time，but it can be effec－ tive with fireworks or random movements．

To make all stars appearing on the screen at the same time the same color， press $U$（for unicolor mode）．This com－ mand is especially useful with fire－ works．For example，try the command sequence DFVQLU2 and observe how each command contributes to the final result．

## Starburst Graphics Commands

| Keypress | Command |
| :--- | :--- |
| X | Mirror horizontally |
| Y | Mirror vertically |
| B | Bounce |
| J | Jump back |
| 1－9 | Tail length |
| 0 or T | Turn off tails |
| C | Continuous drawing |
| N | Number of stars |
| U | Unicolor bursts |
| f1－f5 | Change colors <br> f7 |
| Reset all colors |  |
| D | Defaults restored <br> H |
| Height of screen |  |
| W | Width of screen <br> Q |
| Random start for |  |
| Z | whole burst <br> Random start for <br> each star |
|  | lat |

## The Sky＇s the Limit

If you ever forget which key corre－ sponds to which function，press M to return to the options menu．You＇ll be able to use any option after you have returned to the graphics screen．

You can have a lot of fun with Star－ burst Graphics．Just experiment with the many different command combina－ tions．It will take you awhile to realize all of the artistic possibilities．In the meantime，bon voyage on your journey to the stars！

## Starburst Graphics

 0809：31 日の øの øø A9 ø0 8D 21 3B

 0821：18 $8 \mathrm{C} \quad 30 \quad 19 \begin{array}{llllll}8 \mathrm{C} & 58 & 19 & \text { A2 } & 92\end{array}$ 0829：06 B9 Aø $17 \begin{array}{llllllll}18 & 69 & 91 & 99 & 32\end{array}$ 0831：A1 17 B9 $68.18 \quad 69$ g0 $99 \quad 95$ 0839：69 18 C8 CA 18 EB CG C7 43 Ø841： $\mathrm{Fg} \quad 15 \mathrm{B9}$ Ag $17 \begin{array}{llllll}18 & 69 & 39 & 75\end{array}$ 0849：99 A1 17 B9 $68 \quad 18 \quad 69 \quad 0184$ $\begin{array}{llllllllll}0851: 99 & 69 & 18 & C 8 & 4 \mathrm{C} & 28 & 08 & \mathrm{~A} & \mathrm{CB}\end{array}$ 0859： 00 B9 $\quad 30 \quad 19 \quad 18 \quad 69 \quad 08 \quad 99 \quad 7 \mathrm{~F}$ 0861：31 19 B9 $58 \quad 19 \quad 69$ gø 9915 Ø869：59 19 C8 CØ $27 \mathrm{D} \quad \mathrm{CA}$ A9 8D 0871：52 85 F8 A9 $96 \quad 85$ F9 A9 A9 0879：C8 $85 \quad 9 \mathrm{~F}$ A9 $28 \quad 85$ 9E 85 F7 $0881: \mathrm{BF}$ A9 4 F 85 BE 85 AB A9 2B 0889： $09 \quad 85$ 9B A9 $04 \quad 85$ 9C A9 A6
 0899：00 88 10 F7 8D CB 16 A9 BE
 Ø8A9：ØØ 85 B6 2 Ø 21 ØF AØ 80 FA ஏ8B1：8C 18 D4 A9 FF 8D 日E D4 6A Ø8B9：8D 日F D4 8C 12 D4 A6 BE A7 98C1：A9 0085 FA 20 4A 0 F CA 1 A 98C9：A5 AA F 日 04 E 4 BF 9094 g1 Ø8D1：EØ FF DØ EC A9 0185 FA 92 08D9：A9 D8 85 FE A9 8485 FC FA Ø8E1：AA Aø Øŋ $84 \mathrm{FB} 84 \mathrm{FD} A 54 \mathrm{~B}$ 98E9：F8 91 FB A5 F9 91 FD C8 8F Ø8F1：D 0 F5 E6 FC E6 FE CA D $\emptyset$ 2E 08F9：EE A9 1D 8D 18 DG A9 D8 98 9901：8D 16 Dg A9 3B 8D 11 D $\emptyset 17$ 9909：A9 g0 85 A2 AC 11 D A AD C3 9911：12 Dg Dg 04 A9 FA Ag gø 35 Ø919：38 E9 8185 C4 84 F7 $\mathrm{C} 6 \quad 29$ 0921：B6 10 04 A9 9485 B6 A5 F6 6929：A5 Dø 2B A6 BE A5 AA D $\emptyset$ C4 6931：18 A4 C4 CC 12 Dg Dg FB 4 F 6939：AD 11 D 645 F7 30 F4 20 5F
 9949：ØD BD 80 1E D 063 20 4F 65 9951：ØD CA E4 BF B6 F3 A5 A9 7F 0959：29 02 FO 03 2の 21 GF AD 20 $0961: 1 \mathrm{~B}$ D4 29 g3 C9 03 F6 F7 BE 0969：日A 日A GA 8D C5 16 A5 A6 95 9971： F 0 Ø8 A5 A2 $\mathrm{F} \emptyset \mathrm{FC}$ A9 $0 \emptyset \mathrm{AB}$ 6979：85 A2 CE CC 16 A6 BE BD 24 $0981: 80$ 1C C9 80 F 0 57 A5 AA F 6 0989：Fの ØF BD 8Ø 1E Fの ØA E4 45 6991： $\mathrm{BF} \quad 90 \quad$ ब3 DE 80 IE $4 \mathrm{C} 48 \quad 53$ 6999：0A A9 Ø3 8D C9 16 CE C9 62 69A1： 16 30 3A A5 A8 Fg 日8 AD 33 99A9：CC $\begin{array}{lllllllll}16 & 10 & \emptyset 3 & 20 & 28 & 10 & \text { A5 } & 41\end{array}$ 09B1：B6 29 Ø1 F0 0E A5 B4 FØ F9 99B9： 03 20 AC बE A5 B3 $\mathrm{F} 0 \quad 03 \mathrm{AC}$ Ø9C1：20 DD ØC BD 801918 7D CE 99C9：8 1 1C A8 38 E5 B2 C5 9F E $\emptyset$ 99D1： $\mathrm{B} \emptyset \quad 87 \quad 98$ 9D $80 \quad 19$ 4C F3 $\quad$ DF 09D9： 69 A5 $\mathrm{B} \emptyset \mathrm{D} \emptyset \quad 66 \quad 20$ 4A 日F 51
 99E9：C9 ब1 FO B2 $20 \quad 68$ 日E 4C 75 69F1：9F 99 BD 80 1B 18 7D $80 \quad 8 \mathrm{~A}$ 99F9：1D 85 C3 C9 $98 \quad 90 \quad 1 \mathrm{E}$ BD 8D

## Starburst Graphics

GA01：80 1A A8 BD 80 1D 100469 9Aø9：C8 4C 日E 0A 88 98 38 E5 F3 9A11：Bl C5 9E Bø $9 E 98$ 9D 80 DC gA19：1A A5 C3 $29 \quad 07$ 9D 80 1B 79 0A21：4C 3D ØA A5 B6 D 0620 3B GA29：4A GF 4C 48 gA 2068 日E E3 ØA31：A5 B6 C9 01 F6 BC 20 5C A4 ØA39：0E 4C 9F 69 A5 AA F6 64 A9 gA41：E4 BF B6 032847 gD CA 01 6A49：E0 FE F0 03 4C $80 \quad 09$ AD 40 gA51：CC $1610 \quad 106$ AD CB 16 8D 9A gA59：CC 16 AC 11 D 0 AD 12 Dø 32 ØA61：D® 04 A9 FA A0 00 38 E9 23 GA69：01 85 C4 84 F7 AD 8D 62 D3 gA71：D0 FB A5 913001 00 A5 E5 छА79：C6 D6 03 4C 2809 A9 00 C2 gA81：85 C6 AD 77 छ2 C9 44 D 67 6A89： 63 4C 70 08 C9 4E D6 03 EC gA91：4C 72 10 C9 42 D6 0 日 A5 18 gA99：B0 49 01 29 Ø1 85 B0 4C D6 ØAA1：69 ØC C9 4A Dø 日B A5 B6 F9 ØАA9：49 Ø2 29 02 85 B 04 C 6919 ØAB1：øC C9 56 Dø ØF A5 9B 49 A5 бAB9：18 85 9B A5 9C 49 ØC 85 Bб BACl：9C 4C 2009 C9 57 Dg 1C 35 gAC9：A5 9E C9 28 Fg ØB A9 2843 gADl： 85 9E A9 0085 Bl 4 C Ag Bl gAD9：08 A9 0985 9E A9 0F 8515 gAE1：B1 4C Ag 98 C9 48 D 01 C A3 0AE9：A5 9F C9 C8 F6 日B A9 C8 4E ØAF1：85 9F A9 0685 B2 4 C A 016 ØAF9：ø8 A9 4085 9F A9 44858 E ØB01：B2 4C A0 08 C9 58 Dø 0972 GB09：A5 B5 $49 \quad 62 \quad 85$ B5 4 C EC 31 GB11：10 C9 59 D 09 A5 B5 49 6D ØB19：01 85 B5 4C EC 10 C9 43 ØB 9B21：D0 11 A5 A5 498185 A5 F1 ＠B29：A5 AA F0 13 A9 6085 AA 0 E 0B31：4C EC 10 C9 5A D 0 0B A5 19 ØB39：A9 49 01 290185 A9 4C E6 ØB41：28 99 C9 51 D6 ØB A5 A9 9F ØB49：49 $02 \quad 29 \quad 0285$ A9 $4 \mathrm{C} \quad 20 \quad 55$ ØB51：09 C9 46 D 08 A5 B3 49 BB日B59：01 29011022 C9 4F D6 03 0B61： 08 A5 B3 $49 \quad 02 \quad 29 \quad 02 \quad 10$ B8 ØB69：16 C9 41 D6 08 A5 B3 49 B9日B71：04 290410 日A C9 53 D6 44 ØB79：ØB A5 B3 $\begin{array}{llllllllll}49 & \boxed{ } & 29 & 98 & 85 & 94\end{array}$ ØB81：B3 4C 69 ØC C9 55 Dø $09 \mathrm{C} \varnothing$ ØB89：A5 A7 49 61 85 A7 $4 \mathrm{C} \quad 20 \quad 19$ ØB91：09 C9 13 Dø Ø6 20 ØA ØF E1 øB99：4C 26 б9 C9 4C Dø 09 A5 F8 ØBA1：B4 49 Ø1 85 B4 4 CC 69 ØC 92 gBA9：C9 52 D 6 IF A5 A8 4901 A8 gBBl：85 A8 Eg gF AD CB 16 8D 1A gBB9：CC 16 Fg 83 A9 6085 AA 15 ØBCl：4C EC 10 AD CB 16 D 06 DB ØBC9：4C $20 \quad 99$ C9 85 D 016 A5 $0 D$ ＠BDI：F8 29 F0 85 C3 A5 F8－18 E3 ØBD9：69 01 29 0E E6 F9 65 C3 38 ＠BE1：85 F8 4C D5 98 C9 86 D 015 ØBE9：0E A5 F8 1869 10 C9 1040 ØBE1：98 F9 85 F8 4C D5 98 C9 A2 GBF9：87 D 6 GE A5 E9 18690128 ØC01：29 日F F6 F9 85 F9 4C D5 B1 ØC09：08 C9 88 Dø 曰B A9 5285 DE ØC11：F8 A9 0685 F9 4C D5 98 DD øC19：C9 54 Dø ø2 A9 30 C9 3037 ØC21：9＠ 21 C9 3A B $\emptyset 1 \mathrm{D} 29$ ØF $\quad$ Ø2 ØC29：8D CB 16 8D CC 16 A4 A8 47 ØC31：F0 63 4C 20 Ø9 Ag 0084 5D ØC39：A5 GA GA 6D CB 1685 AA 2B 0C41：4C EC 10 C9 4D Dब 062033 ØC49：8A OF 4 C A 0 Ø8 C9 50 D 0 D6 ØC51：0D A5 A6 490185 A6 A9 D7 ØC59：00 85 A2 4 C 2069 C 920 C4
 ØC69：A5 AA F0 22 2の ØA ØF A9 30 ØC71： $0085 \mathrm{FA} A 6 \mathrm{BE} A 4 \mathrm{BE} 8845$ ØC79：B9 80 1E E0 06 20 4A 9 EE B5 ØC81：4C 87 ØC 20 Aの ロC CA 8878 0C89：10 EE A9 0185 FA 4 C 287 B ØC91：09 86 03 8A 38 E5 BE AA 5C ØC99：20 55 日F 8A A8 A6 93 B9 41 ØCA1：80 19 9D 8019 B9 80 1A C6

ØCA9：9D 80 1A B9 80 1B 9D 80 BB ØCB1：1B B9 8ø 1С 9D 80 1С B9 78 ØCB9：80 1D 9D 80 1D B9 C5 1585 ØCCl：9D C5 15 B9 80 1С C9 $8 \varnothing$ EØ ØCC9：D0 04 A9 $00 \mathrm{~F} 065 \mathrm{A5}$ AA 12 6CD1： 38 E5 FA 9D 80 1E A9 9688 ØCD9：99 80 1E 60 A5 B3 C9 0139 ØCE1：D0 03 4C 74 ØE A6 00 BD A4
 ØCE1：84 BD A0 00 BD 8019 C9 BB ØCF9：64 90 02 A A 929895 BD EC ØD01：85 BD A5 B3 C9 02 Fg 1C 91 ØD09：C9 04 Fø 21 A5 BD F0 0B 4A 6D11：C9 01 Fg 6A C9 62 Fb 9950 6D19：4C 90 0E 4C 9E 0E 4C 74 3E GD21：gE 4C 82 日E A5 BD 29 92 FE GD29：E0 F4 4 C C 82 ØE A5 BD 2956 ØD31：02 FG 06 20 82 0E 4C 3D 6D 0D39：0D $20 \quad 74$ OE A5 BD 2901 C8 ØD41：E0 D9 4C 90 日E 60 A5 AA C4 ØD49：Eの 64 E4 BE 90 60 20 OF E2 ØD51：日E A5 B5 D6 0160 BD 8025 ØD59：19 48 BD 80 1A 48 BD 80 BF ØD61：1B 48 A5 B5 C9 63 D 0 0C 33 ØD69：A9 C7 38 FD 8ø 19 9D 8ø 55 GD71：19 20 日F 日E A5 B5 2902 3B 6D79：F0 15 A9 2738 FD 80 1A CD ＠D81：9D 80 1A A9 9738 FD 80 FD ØD89：1B 9D 80 1B 20 0E 0E A5 59 ØD91：B5 29 61 $\mathrm{F} \emptyset$ बC A9 C7 38 CE 0D99：FD 8019 9D 801920 ØF 87 ØDA1：0E 68 9D 80 1B 68 9D 80 CE GDA9：1A 68 9D 801960 2g 1D 4 E ØDB1：0E A5 B5 Dg 6160 BD 8085 ØDB9：19 48 BD 80 1A 48 BD $80 \quad 26$ gDC1：1B 48 A5 B5 C9 93 D0 वC 93 9DC9：A9 C7 38 FD $80 \quad 19$ 9D 80 B5 ØDD1：19 2ø 1D 日E A5 B5 29 g2 5D gDD9：F0 15 A9 2738 FD 80 1A 2 E ØDE1：9D 80 1A A9 $97 \quad 38$ FD 80 5E gDE9：1B 9D 80 1B 20 1D GE A5 Fl ØDE1：B5 29 Ø1 F0 øC A9 C7 38 2F gDE9：FD 8019 9D 801920 1D F5 gE01：のE 68 9D $8 \varnothing 1 B 689 \mathrm{D} 8030$ gE09：1A 68 9D $80 \quad 1968 \quad 20 \quad 37$ C9 ØE11： 0 E A8 B9 4C 11 A0 00 3196 gE19：FB 91 FB $60 \quad 28 \quad 37$ OE 18 2F 9E21：7D C5 $1585 \quad 92$ A 0 日 0 Bl AC ØE29：FB A4 $02 \begin{array}{lllllll} & 39 & 4 \mathrm{C} & 11 & 19 & 34 & 4 D\end{array}$ 0E31：11 A0 0091 FB 60 BD 8074 GE39：19 A8 B9 A 91785 FB B9 CD gE41：68 18 85 FC BD 80 1A A8 E4 ØE49：B9 $30 \quad 1918 \quad 65 \mathrm{FB} 85 \mathrm{FB} 15$ बE51：B9 581965 FC 85 FC BD 8F gE59：80 1B 60 BD 80 1C 49 FF 6B gE61：18 $69 \quad 61$ 9D 80 1C 60 BD Dg 9E69：80 1D 49 FF 1869019 D 3C ØE71：80 1D 60 BD 80 1C C9 9A GF gE79：F6 301869019 D 801 C 4 F 9E81：60 BD 8ø 1C C9 E6 F6 22 3D ØE89：38 E9 01 9D 80 1C 60 BD 29 9E91：80 1D C9 08 Fg 14186960 0E99：01 9D 80 1D 60 BD 80 1D 97 ØEA1：C9 F8 Fg 0638 E9 91 9D 68 ØEA9：80 1D 60 BD 801 C C9 92 3F øEB1：90 10 C9 FE B 0 gC A8 10 6A ØEB9：06 2074 日E 4C C3 日E 20 FD ØEC1：82 日E BD 80 1D C9 62 9ø 97 ØEC9： $08 \mathrm{C} 9 \mathrm{FF} \mathrm{B} \emptyset \quad 0410 \mathrm{CE} 3095$ gED1：BE $68 \quad 684 \mathrm{C}$ DE 99 C9 92 E9 gED9：Fg 062021 0F 4C F5 GE A9 gEE1：A4 B6 F6 10 A9 C7 9D 80 45 GEE9：19 A9 27 9D 8® 1A A9 80 FB GEF1：9D 80 1C 60 AD C6 16 9D D8 ØEF9：80 19 AD C7 16 9D 8g 1A 11 gF01：AD C8 16 9D 801 B 4 C 8452日Fø9：0F A9 2085 FC AA A9 00 5B ＠F11：85 FB A8 91 FB C8 D $\emptyset \mathrm{FB} \mathrm{BF}$ ØF19：E6 FC E8 E6 40 D 0 E4 60 A4 ＠F21：AD 1B D4 C5 9F B6 F9 65 EC GF29：B2 8D C6 16 AD 1B D4 29 EA日F31：3F C5 9E Bø E7 65 B1 8D 85 gF39：C7 16 AD 1B D4 $29 \quad 97$ 8D 日F बF41：C8 1660 A9 FF 9D 80 1E 85 9F49：60 A5 AA Fg 67 E4 BE 90 41

9F51：F2 4C 92 ØC A5 A7 F6 66 C2 GF59：AD C5 16 4C 6B 6F AD 1B 55 0F61：D4 29 63 C9 03 F6 F7 0A 07 0F69：0A 6A 9D C5 15 A5 A9 F6 A2 0E71：03 4C D7 0E A9 64 9D 80 9A 9F79：19 A9 14 9D 80 1A A9 07 B1 9F81：9D $80 \quad 1 \mathrm{~B} \quad 20 \quad 28 \quad 104 \mathrm{C} 47 \quad 55$ ØF89：のD 20 ØA ØF A9 93 20 D2 17 gF91：FF A9 日B 8D 11 D6 A9 17 8A 9F99：8D 18 D6 A9 C8 8D 16 D 6 B2 gEAl：A9 A6 Ag 11201 E AB A9 DD gFA9：D＠A＠ 112018 AB A9 A6 16 ØFBl：Aの 1120 1E AB A9 C0 Aø 78 ดFB9：12 2ø 1E AB A9 87 A0 1327 gFCl： 20 1E AB A9 62 Ag 142065 gFC9：1E AB A9 3F AØ 15 20 1E C2 gFDl：AB A9 20 8D $88 \quad 62$ A9 90 AC gFD9：8D CA 16 A9 1B 8D 11 D 6 D6 gFE1：A9 00 85 C6 85 A2 A5 C6 BA बFE9：D6 2E A5 A2 C9 93 90 FA 51 ØEF1：A9 Ø0 85 A2 A9 BA Ag 154 E øFE9：20 1E AB AC CA 16 B9 29 3B 1001：11 8D 86 ø2 A9 26 26 D2 DE 1009：EF EE CA 16 C8 C 0 ØB 908 F 1011：D5 A9 ø0 8D CA 16 E0 CE BE 1019：A9 04 8D 88 02 A5 913043 1021：01 00 A9 8085 C6 60 AD AC 1029：1B D4 C5 9B B6 E9 38 E5 42 1031：9C 9D 80 1D D 07 AD 1B 92 1039：D4 2903 D6 EA AD 1B D4 94 1041：C5 9B B6 F9 38 E5 9C 9D 11 1049：80 1C D $\varnothing 07 \mathrm{AD} 1 \mathrm{~B} \quad \mathrm{D} 4 \quad 29$ E7 1051： 63 D 6 EA BD 80 1D DD 8615 1059：1C F0 06187 D 80 1C D6 FC 1061：07 AD 1B D4 2901 Fg BE 10 1069：BD 80 1C 1D 80 1D Fg B7 EF 1071：60 A9 0B 8D 11 D6 28 9A 7C 1079：0F A9 15 8D 18 Dg A9 C8 27 1081：8D 16 D $\emptyset$ A9 64 Ag 1120 8A 1089：1E AB A9 00 A6 AB E8 D 05 E 1091： 02 A9 0120 CD BD A9 8F 87 1099：A＠ 11201 E AB A9 1B 8D FB 1＠A1：11 D 0 A 006 A2 B3 20 A5 10A9：CF FF C9 0 D FG 28 C9 30 A7 10B1：90 1A C9 3A Bg 1629 0F BC 10B9：48 20 E2 BA 20 日C BC 6821 10C1：A8 2g A2 B3 A5 6120 6A 2B 10C9：B8 4C A8 18 A9 82 A6 1119
 10D9：B1 C9 019067 Dø ED 98 5E
 10E9：88 84 AB A4 AB C8 A5 B5 Bס 10F1：29 61 Fb 日B 1898 D 0017 B 10F9：38 6A A8 D 062 A 01 A5 2D 1101：B5 29 g2 F 0 बB 1898 D 052 1109：01 38 6A A8 D0 02 A0 9162
 1119：02 Ag g0 88 84 BE 981855 1121：69 61 6A 85 BE 4 C Ag 0856 1129： $0 \mathrm{D} \quad 05 \quad 97 \quad$ 日A $\quad 98 \quad 99 \quad 92 \quad 04 \quad 61$ 1131：06 0E 03 01 01040410 7A 1139：10 $40 \quad 40 \quad 02 \quad 92 \quad 0808 \quad 20 \mathrm{FB}$ 1141：208080 日3 日3 日С वС 3064 1149：30 C 0 C 0 EC FC F3 F3 CF 0 B 1151：CF 3 F 3F FC FC F3 F3 CF 52 1159：CE 3 F 3F EC FC F3 F3 CF 5A 1161：CF $3 \mathrm{~F} \quad 3 \mathrm{~F} 93 \quad 9 \mathrm{~F} 111 \mathrm{D} 431 \mathrm{~B}$ 1169：55 5252454 E 54204 E BB 1171：55 4D $4245 \quad 52$ 20 $4 \mathrm{~F} 46 \quad 26$ 1179：20 $53 \quad 54415253$ 3A $2 \varnothing 93$ 1181：00 GD ØD 1D 5452592019 1189：41 4741494 E 21 gD GD F8 1191：10 $43 \quad 48414 \mathrm{E} 4745 \quad 206 \mathrm{~A}$ 1199：54 4F $20.28 \quad 312 \mathrm{D} \quad 323518$ 11A1：36 29 3A 26 ga 9 E 2A 2 A 6B 11A9：2A 2A $2 A \quad 2 A \quad 2 A 2 A 2 A 2 A C B$ 11B1：2A $2 \mathrm{~A} \quad 2 \mathrm{~A} \quad 2 \mathrm{~A} \quad 2 \mathrm{~A} 2 \mathrm{~A} 2 \mathrm{~A} 2 \mathrm{~A}$ D3 11B9：2A $2 A \quad 2 A \quad 2 A \quad 2 A 2 A 2 A 2 A \quad D B$ 11C1：2A $2 \mathrm{AA} 2 \mathrm{2A} 2 \mathrm{AA} 2 \mathrm{AA} 2 \mathrm{~A} \quad 2 \mathrm{~A} \quad 2 \mathrm{~A}$ E 3 11C9：2A $2 \mathrm{~A} \quad 2 \mathrm{~A} \quad 2 \mathrm{~A} \quad 2 \mathrm{~A} \quad 2 \mathrm{~A}$ 11D1：9F $2 \varnothing 9 \mathrm{~A} 2 \emptyset 1 \mathrm{~F} 2 \emptyset 9 \mathrm{C} 2 \emptyset \mathrm{~F} 3$ 11D9：1C 20952081209620 Ag 11E1：9E $20 \quad 1 \mathrm{E} \quad 20 \quad 99$ D3 9 E D4 51 11E9：9A C1 1F D2 9C C2 1C D5 D8 11F1：95 D2 81 D3 96 D4 9E $26 \quad 66$


Randy Dethman

When Commodore introduced the 1581 disk drive, it claimed that the drive supported subdirectories through a mechanism called partitions. What the company didn't say was that the commands necessary to access these partitions were often so cumbersome as to be impractical.

1581 Path lets you use pathnames to access partitions as if they were true subdirectories (similar to those on MSDOS and Apple computers). So now, for instance, instead of having to use unwieldy commands like OPEN15,9, 15,"/0:FRED":CLOSE15:LOAD" ${ }^{\prime \prime}$ ", 9 to examine the contents of the partition FRED, you can employ the more intuitive command LOAD"/FRED/\$",9.

## Getting Started

Since 1581 Path is written in machine language, you'll need to enter it using $M L X$, the machine language entry program found elsewhere in this issue. The $M L X$ prompts, and the values you should enter, are as follows:

## Starting address: 031 A <br> Ending address: 0401

When you've finished typing, be sure to save a copy of the program before exiting MLX.

1581 Path wedges itself into the system by directly overwriting the page3 vector for the 64's Kernal OPEN routine. To activate 1581 Path, simply type LOAD"filename", device, 1, where filename is the name you used when you saved the program from MLX and device is the number of the disk drive. After the program loads, the wedge is active; you don't need a SYS or RUN command to execute it. To deactivate it, simply press RUN/STOP-RESTORE.

> With this short machine language routine for the 64, you can access 1581 partitions as easily as you would a subdirectory on an MS-DOS machine.

## Pathnames

1581 Path simulates actual hierarchical subdirectories by allowing you to include partition names along with filenames. The name of a file, plus the partition names needed to locate the file on the disk, is referred to as the pathname for the file.

You can substitute a pathname for a filename in any BASIC command. Commands using pathnames can be entered from direct mode or from program mode and can even be used from within other programs that prompt you for a filename. However, you can't use pathnames with DOS commands such as SCRATCH or COPY (for example, PRINT\#1,"S0:filename" or OPEN15,8, 15, "C0:newname = oldname"). For these commands, you'll have to rely on the standard DOS partition commands described in the 1581 Disk Drive User's Guide.

1581 Path's syntax for pathnames is similar to that used with MS-DOS or Apple's ProDOS.

## /partitionname/.../filename

The root directory of a disk is indicated by a null partition name (//). Other
partition names are always preceded by a slash (/) and may be nested to any depth. If you don't include the root directory as part of the pathname, the 1581 begins the path from the current partition (as usual). Some commands demonstrating valid pathnames follow.

## LOAD"/MYDIR/MYFILE", 8 LOAD"//SOURCE/ASSEMBLER/ ARC04.ASM" ${ }^{\prime \prime} 8$

In the first example, the file MYFILE in the partition MYDIR is loaded. Here, it's assumed that the partition MYDIR is in the current directory (or partition); if it's not, a FILE NOT FOUND error will be returned. In the second example, the full path to the file, starting from the root directory of the disk, is specified. This ensures that the command will succeed regardless of the current directory.

To access a file whose name already begins with a slash, add 0 : to the beginning of the filename. For example, you'd refer to the file /FILE as 0:/FILE.

1581 Path supports standard Commodore wildcards within pathnames. For instance, the pathname //MYD* /DIR*/?FILE would cause the 1581 to search the root directory of a disk for a partition that matches MYD*. If one is found, it searches within that partition for another partition matching DIR*. Finally, if it finds a match for the first two wildcards, it looks for a file that matches ?FILE.

## To Err Is Human

Attempting a load from an invalid path results in a "?FILE NOT FOUND" error. This message will be followed by the link in the path that caused the problem. Saving to an invalid path will
return a similar error message but will not show the location of the error． Using an invalid path in an OPEN com－ mand passes the invalid path to the disk drive．This causes the drive to re－ turn the message 62 FILE NOT FOUND on the error channel．In all cases，the new current directory is the last one successfully selected along the attempt－ ed path．

If you try to access a filename that ends with a slash，the LOAD and SAVE commands will return ？MISSING FILE－ NAME ERROR．The same syntax with an OPEN command passes a null file－ name to the disk drive．Because open－ ing files without a filename is legal，no error will be generated．If you use a pathname with only one slash at the beginning，the slash is simply discard－ ed．（A valid partition name requires at least two slashes，one before and one after the partition name．）

If you attempt to use pathnames on disk drives that aren＇t capable of using partitions（ 1541 or 1571 ），the drive will return error messages indicating that those partitions or files don＇t exist （which they don＇t）．

Beware of programs that automati－ cally append 0 ：to the beginning of file－ names． 1581 Path can＇t catch these，and the disk drive will try to open a file using your entire pathname as the filename （0：／MYDIR／MYFILE，for example）．

## How It Works

1581 Path loads over the top of the IOPEN vector at $\$ 31 \mathrm{~A}$（794）and uses all of the memory normally reserved for the cassette buffer．It doesn＇t use any memory outside of this area．If you＇re using any other program that alters the IOPEN vector，load 1581 Path first be－ cause it doesn＇t check or save the origi－ nal vector values．

The program intercepts all file－ names that go through the Kernal OPEN routine，including BASIC＇s LOAD，SAVE，and OPEN commands， and calls to the Kernal from machine language．It splits the pathname into separate partition commands for each step in the path and then passes the re－ maining filename to the Kernal routine that was originally called．

1581 Path won＇t intercept calls to a device number less than 8 or with a sec－ ondary address of 15 （the disk drive＇s command channel）．This allows com－ mands sent to disk drives and other peripherals to remain unchanged．The program also doesn＇t intercept path－ names that don＇t begin with a slash，so existing filenames are still valid．

A final word of warning about OPEN statements：The 1581 drive won＇t allow you to open two logical files in separate partitions at the same time．Be sure that all files opened simul－ taneously are in the same partition，and
select the partition only in the first OPEN statement．If your program uses only one file at a time，you may select a new partition with each OPEN state－ ment as long as the previous file has been properly closed．

## 1581 Path

Ø31A：49 ब3 91 F2 ØE F2 50 F2 B6 ఏ322：33 F3 57 F1 CA F1 ED E6 B9 ＠32A：3E F1 2F F3 66 FE 43 g3 A9
 ஏ33A： 93 4C ED E5 A2 84 6C ø0 EF 9342：03 20 5B 03 4C A5 E4 2 20 70 $034 \mathrm{~A}: 4 \mathrm{~F} \quad 93 \quad 4 \mathrm{C} \quad 4 \mathrm{~A}$ F3 $98 \quad 48$ 8A Cl Ø352：48 $98 \quad 48$ A5 B8 $48 \quad 4 \mathrm{C} \quad 6 \mathrm{~B} \mathrm{Fg}$ 935A： 03 08 48 8A 48 98 48 A5 78 Ø362：B8 48 20 E7 FF A9 0F 85 A3 036A：B8 A5 B9 48 A5 BA C9 g8 A5 ஏ372：90 ØE A5 B9 C9 日F FØ 98 Ø9 037A：A2 gØ A1 BB C9 2 F Fg 03 B 1 $0382: 4 \mathrm{C}$ F3 03 A9 0F 85 B9 Ag 49 038A： $0 \emptyset$ C8 98 C5 B7 9063 4C 84 0392 ：EB $\quad 3 \quad \mathrm{Bl}$ BB C9 2F D§ F1 DF 039A：A5 B7 48 B4 B7 20 AA $\begin{array}{llllll} & \text { B } & 79\end{array}$ Ø3A2：90 08 C9 92 D 0 日A 68 4C 18
 Ø3B2：20 E2 $03 \mathrm{BA} A 9$ g 90 D 96 1C 93BA： 01 Fg EB A6 B8 20 C 6 FF 39 Ø3C2：20 CF FF C9 30 D0 E9 2822 ఏ3CA：E2 03 A5 B7 1865 BB 8586 ＠3D2：BB A5 BC 69 g 85 BC 6846 छ3DA： 38 E5 B7 85 B7 $4 \mathrm{C} 89 \quad 93 \mathrm{CA}$ ＠ $3 \mathrm{E} 2: 20 \mathrm{CC} \mathrm{FF}$ A5 B8 20 C 3 FF 54 03EA： 60 C6 B7 E6 BB D 0.02 E6 44 ＠3F2：BC $\quad 68 \quad 85$ B9 $68 \quad 85$ B8 68 Fg g3FA：A8 68 AA $68 \quad 28 \quad 60$ gの gの gE

## Starburst Graphics

11F9：1E C7 99 D2 9F C1 9A Dg 87 12ø1：1F C8 9C C9 1C C3 95 D3 06 $\begin{array}{lllllllll}12 \sigma 9: 2 \theta & 2 \theta & 2 \theta & 2 \theta & 2 \theta & 2 \theta & 2 \theta & 2 \theta & 2 D\end{array}$ 1211：20 20 9E 2 AA $2 A \quad 2 \theta \quad 20 \quad 20$ F5 1219：20 $2 \theta \quad 2 \theta \quad 2 \theta \quad 2 \theta \quad 2 \theta \quad 2 \theta \quad 2 \theta \quad 3 D$ 1221：20 25 C2 $59 \quad 20$ C2 24 F 4295 1229：20 CD $4153 \begin{array}{llllll}54 & 45 & 52 & 53 & D D\end{array}$
 $1239: 2 \sigma \quad 2 \sigma \quad 2 \sigma \quad 2 \sigma$ 9E 2A 2 AA $2 \sigma 8 \mathrm{D}$ 1241：20 $2 \sigma \quad 2 \sigma \quad 2 \sigma 1 \mathrm{~F} \quad 28$ C3 29 CD 1249：20 $31 \quad 39$ 39 $30 \quad 20$ C3 $4 \mathrm{~F} \quad$ 5D 1251：4D 50 1259：55 $42 \begin{array}{llllllll}12 \mathrm{E} & 2 \mathrm{C} & 20 & \mathrm{C} 9 & 4 \mathrm{E} & 43 & 49\end{array}$ $\begin{array}{lllllllll}1261: 2 \mathrm{E} & 2 \emptyset & 2 \theta & 2 \emptyset & 2 \emptyset & 2 \emptyset & 9 \mathrm{E} & 2 \mathrm{~A} & 93\end{array}$
 1271：20 20 1F C1 4C 4C 20 52 D3 1279：49 $47 \begin{array}{llllllll}127 & 54 & 53 & 20 & 52 & 45 & 67\end{array}$ 1281：53 $45 \quad 5256$



 12A9：45 $59 \begin{array}{llllllll} & 20 & 54 & 4 \mathrm{~F} & 20 & 42 & 45 & \mathrm{D} 4\end{array}$ 12B1： $47494 \mathrm{E} \quad 29 \quad 92 \quad 20 \quad 20 \quad 20 \quad 9 \mathrm{D}$ 12B9：2の $2 \sigma \quad 2 \emptyset \quad 2 \emptyset \quad 9 \mathrm{E}$ 2A $\quad$ Øの 81 1B 12C1：12 20 D8 20.9220 CD 49 日E 12C9：52 52 4F 52 20 $484 \mathrm{~F} \quad 52 \mathrm{CD}$ 12D1： 49 5A $4 \mathrm{~F} \quad 4 \mathrm{E} 54414 \mathrm{C} 5 \mathrm{C} \quad 8 \mathrm{C}$ 12D9：59 9A 12 20 CD 20.92 20 C9 12E1：D4 $4849 \begin{array}{lllllll} & 43 & 20 & 4 D & 45 & 4 \mathrm{E} & \mathrm{EF}\end{array}$ 12E9：55 日D 81 12F1：20 CD $49 \quad 52 \quad 524 \mathrm{~F} 52 \quad 20 \quad 7 \mathrm{C}$ 12F9：56 $45 \quad 52 \quad 54 \quad 49 \quad 43414 \mathrm{C}$ 1301：4C $59 \quad 20 \quad 20$ 9E 12 20 CF F6 1309：20 92 20 CF 4345414 E E4

 $\begin{array}{lllllllll}1321: 2 \sigma & 2 \sigma & 2 \sigma & 2 \sigma & 2 \sigma & 2 \theta & 2 \sigma & 2 \sigma & 47\end{array}$ $\begin{array}{lllllllll}1329: 2 \theta & 20 & 12 & 2 \sigma & C 6 & 2 \sigma & 92 & 2 \theta & \text { A7 }\end{array}$ 1331：C6 $4 \mathrm{~F} \quad 55 \quad 4 \mathrm{E} \quad 54 \quad 41 \quad 49 \quad 4 \mathrm{E} \quad \mathrm{A} 6$ 1339：$\varnothing \mathrm{D} 12$ 20 CA 2092 20 CA 71

1341：55 4D $50 \quad 20 \quad 42 \quad 41 \quad 43$ 4B 5 A $1349: 2 \theta \quad 2 \theta \quad 2 \theta \quad 2 \theta \quad 2 \theta \quad 2 \theta \quad 2 \theta \quad 2 \theta \quad 6 \mathrm{~F}$ $\begin{array}{lllllllll}1351: 2 \theta & 2 \theta & 12 & 2 \theta & \text { D3 } & 2 \theta & 92 & 2 \theta & 38\end{array}$ 1359：D3 $50 \quad 49 \quad 52414 \mathrm{C} \quad$ 日D 9 F C $\emptyset$ 1361：12 $31 \quad 2 \mathrm{D} \quad 39 \quad 92 \quad 20 \quad$ D4 $41 \quad 16$ $\begin{array}{lllllllll}1369: 49 & 4 \mathrm{C} & 20 & 4 \mathrm{C} & 45 & 4 \mathrm{E} & 47 & 54 & 56\end{array}$ $1371: 48 \quad 2 \theta \quad 20 \quad 2 \sigma \quad 20 \quad 2 \sigma \quad 2 \sigma \quad 2 \sigma \quad \mathrm{AB}$ 1379：20 9E 12 2б Cl $20 \quad 92$ 2ஏ 6 F
 1389：30 2 F D4 92 20 D4 $55 \quad 52$ A8 1391：4E $20 \quad 4 \mathrm{~F} \quad 46 \quad 46$ 1399：49 4C $53 \quad 20 \quad 20 \quad 20 \quad 1 \mathrm{E} \quad 12$ B3 13A1：D3 50 13A9：4C $\quad 45 \quad 41 \quad 52$ 2Ø $\quad 53$ 43 52 BB 13B1：45 454 E 日D 9F $122^{2} \mathrm{C} 3 \mathrm{AF}$ 13B9：20 $92 \quad 20$ C3 $4 \mathrm{~F} \quad 4 \mathrm{E} \quad 54497 \mathrm{~A}$ $13 \mathrm{Cl}: 4 \mathrm{E} \quad 55 \quad 4 \mathrm{~F} \quad 55 \quad 53 \quad 20 \quad 445259$ 13C9：41 $57 \begin{array}{llllllll} & 49 & 4 \mathrm{E} & 47 & 20 & 20 & 20 & 8 \mathrm{~F}\end{array}$ 13D1：20 20 1E 41 13D9：45 $53 \quad 54 \quad 41 \quad 52 \quad 54 \quad$ 日D $9 \mathrm{C} ~ \mathrm{~B} \emptyset$ 13E1：12 20 CE 2092 20 CE 55 FC 13E9：4D $42 \begin{array}{lllllll}45 & 52 & 20 & 4 \mathrm{~F} & 46 & 20 & \mathrm{FE}\end{array}$
 13F9：20 $20 \quad 20 \quad 20 \quad 20$ 1E 41 4C 86 1401：4C $20 \quad 5354145253$ ØD $\quad$ 日E 1409：12 20 D5 $20 \quad 92$ 20 D5 4 E 日E 1411：49 $43 \quad 4 \mathrm{~F} \quad 4 \mathrm{C} \quad 4 \mathrm{~F} \quad 52$ 20 42 A3 1419：55 $52 \begin{array}{llllllll}106 & 54 & 53 & 20 & 20 & 20 & A B\end{array}$ 1421：12 C8 CF CD C5 92 20 C3 D7
 $1431: 45 \quad 45 \quad 4 \mathrm{E} \quad$ 日D $81 \quad 12 \quad 46 \quad 31 \quad \mathrm{F9}$ 1439：2D $\quad 46$ 1441： $4 \mathrm{E} \quad 47 \quad 45 \quad 20 \quad 43 \quad 4 \mathrm{~F} \quad 4 \mathrm{C} \quad 4 \mathrm{~F} \quad 4 \mathrm{C}$ $\begin{array}{lllllllll}1449: 52 & 53 & 2 \sigma & 2 \sigma & 2 \sigma & 2 \sigma & 2 \sigma & 2 \sigma & 57\end{array}$ 1451：20 20 1E $42 \begin{array}{lllllll}55 & 54 & 2 \emptyset & 43 & \text { F8 }\end{array}$ 1459：4F $4 \mathrm{AE} \quad 54 \quad 49 \quad 4 \mathrm{E} \quad 5545$ 1461：00 81 1469：D2 $45 \quad 53 \quad 45 \quad 54 \quad 20 ~ 41 ~ 4 C ~ F C ~$ 1471： $4 \mathrm{C} \quad 20 \quad 43 \quad 4 \mathrm{~F} \quad 4 \mathrm{C} \quad 4 \mathrm{~F} \quad 52 \quad 53 \quad \mathrm{BC}$
 $1481: 53 \quad 54 \quad 41 \quad 52 \quad 53 \quad 20 \quad 57 \quad 48 \quad C 7$

1489：45 $52 \quad 45$ gD 9A $12 \quad 20$ C4 84 1491：20 92 20 C4 45464155 D9 1499：4C $54 \begin{array}{llllllll}53 & 2 \emptyset & 52 & 45 & 53 & 54 & \text { gC }\end{array}$ $14 \mathrm{Al}: 4 \mathrm{~F} \quad 52 \quad 45 \quad 44 \quad 20 \quad 20 \quad 20 \quad 20 \quad \mathrm{D} 4$ 14A9：20 20 1E $54 \begin{array}{llllll} & 48 & 45 & 59 & 20 & 1 D\end{array}$ 14B1：4C $45 \quad 46$ 14B9：9E $12 \begin{array}{llllllll}12 \sigma & \text { C8 } & 2 \sigma & 92 & 2 \sigma & \text { C8 } & 9 A\end{array}$ $\begin{array}{lllllllll}14 \mathrm{Cl}: 45 & 49 & 47 & 48 & 54 & 20 & 4 \mathrm{~F} & 46 & 54\end{array}$ 14C9：20 $\quad 53 \quad 43 \begin{array}{lllllll}52 & 45 & 45 & 4 \mathrm{E} & 20 & 60\end{array}$ 14D1：20 20 9A 12 20 D2 20 92 A5
 14E1：4D $4 \mathrm{~F} \quad 56 \quad 45 \quad 53$ ØD $9 \mathrm{E} \quad 12 \mathrm{Cl}$ 14E9：20 D7 $20 \quad 92$ 20 D7 $49 \begin{array}{llllll}44 & 7 C\end{array}$ 14F1：54 $48 \quad 20 \quad 4 \mathrm{~F} \quad 46 \quad 20 \quad 5343$ EB
 1501：81 12 20 D6 2092 20 9644 1509：45 $4 \mathrm{C} \quad 4 \mathrm{~F} \quad 43 \quad 495459$ 日D 62 1511：98 12 20 D1 $20 \quad 92$ 20 D2 8B 1519：41 $4 \mathrm{4E} \quad 44 \quad 4 \mathrm{~F} \quad 4 \mathrm{D} \quad 20 \quad 53 \quad 54 \mathrm{DA}$ 1521：41 $5254 \quad 20 \quad 46$
 1531：20 $\quad$ D3 $\quad 50 \quad 45 \quad 4544 \quad 20 \quad 4 \mathrm{C} 86$ 1539：49 4D $49 \quad 54$ 日D 0日 20 20 92 $\begin{array}{lllllllll}1541: 20 & 20 & 98 & 57 & 48 & 4 \mathrm{~F} & 4 \mathrm{C} & 45 & 69\end{array}$ 1549：20 $42555 \begin{array}{lllllll}52 & 53 & 54 & 20 & 2 \sigma & 30\end{array}$ 1551：20 20 2б 20 9C 12 D3 C8 37 1559：C9 C6 D4 92 20 DG 4155 F9 1561：53 45 gD $9812 \quad 20$ DA $20 \quad 98$ 1569：92 20 D2 $414 \mathrm{E} \quad 44 \quad 4 \mathrm{~F} 4 \mathrm{D} \quad \mathrm{C} 2$ 1571：20 $25354 \quad 41 \quad 52 \quad 54 \quad 20 \quad 46$ $1579: 4 \mathrm{~F} \quad 52 \quad 20 \quad 20 \quad 20 \quad 9 \mathrm{E} \quad 12 \mathrm{2} \mathrm{\emptyset}$ A5 1581：CC $20 \quad 92$ 20 CC 49 4D 49 DD 1589：54 $45 \begin{array}{llllllll}44 & 2 \theta & 4 \mathrm{C} & 49 & 46 & 45 & 13\end{array}$ 1591： $0 \mathrm{D} 98 \quad 20 \quad 20 \quad 20 \quad 204541 \mathrm{BB}$ 1599：43 $48 \quad 20 \quad 53 \quad 5441 \quad 52 \quad 2010$ 15A1： 20 O $2 \sigma \quad 2 \sigma \quad 2 \sigma$ 9A 12 D2 D5 82 15A9：CE 2F D3 D4 CF D 92 20 D5
 15B9： $601311119 \mathrm{E} \quad 141413135$


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BUSINESS *6 - Wordmaster Sr. word processor, plus address database, home money manager, disk cataloger, disk utility, file copier.

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EDUCATION \&A - atrica \& asia, capitals, chemist, geography, hamiet, states \& cap, and morel EDUCATION a6-england map, geog, capitals, geog test, trench topics, geography, italian quiz. EDUCATION a7 - clock, count 1 to 10, count ten, count-five, dart, dates, hangmath, and more! EDUCATION \#8-equations 1 , equations 2 , exponent mult, tactor trinom, factor wholes, tactors, tast math, and morel

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For Commodote printers (Print Shop side B): PS GRAPHICS 81, PS GRAPHICS 22, PS GRAPHICS
a3

## C128 DISKS

C128 \#1 - Personal Checking, two fle copiers. Memo Filer, Auto menus, Ultracat, and more!
C128 \#2 - Several database programs, math programs, two programs for cataloging your floppy disks, disk label and envelope makers, notepad, and letter writer

C128 *3 - Boomerang. (allows you to send and recelve filies at the same time)) Aso a viewer for Doode pictures, a utility for sending the screen display to the printer. Halley's Comet, printer setup programs, CPM fle transter utility, anagrams
C128 45 - Text adventures to keep you occupied for hours!
C128 46 - Nezterm, a full-featured telecommunications program with help file. Also a calculator for 40-column mode, and more!

C128 $\mathbf{8 7}$ - Telecommunications terminals, graphics routines, sound etlects, ham radio log. disk labeler, maling list, Nightmare text adventure, Deep Six graphics game, Quick File mini database, and more!

C128 u9 - Databases for maling lists and phone numbers. Print maling labels, phone lists. Also on this disk, an office-type calculator with a running log of calculations.
C128 \#12 - The Data Base, a shareware menu-driven data filing program. Supports one or two drives extensive on-line help is included. Plus 4 -minute disk copier and a viewer for Doode graphics.
C128 814- Outine 128 creates numbered outines. Plus, a check register program a miles-per galon
calculator, abum lister, simple file lister, weather forecaster, and more!
C128 815 - Play Wheel Ot Fortune! Vanna appears on screen to tlip the letters. Thity puzzes are included, along with a program for making your own puzzies. Other games on this disk: Star Trek. TicTacToe, Lexitron, Labelle de Lucie, Bingo, Zapped, Jam.Pich-6, Farm Game.

C128 a17-Games - Space Wars, Tiefighter, Pro Football, Artilery, Shoot-em-up, Casino, Catacombs, Castequest. Super Hacker, Racecar, more.
C128 a18 - More games - land a lunar module on the moon, land an airplane at an arport, tell fortunes with Tarot. play bingo, keno, love game. Plus Hexpluzzer, Demo Derby. Fill or Bust, others.

## GAMES

Chess, Planes, Adventures.
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GAMES \&2 - monopole (monopoly), blackjack, backgammon, star treck.1, poker, concentration, pinball: and morel
GAMES a3-bowling, car race, cavernt, computer craps, day at the races, devil's tower, and more
GAMES \#5 - acey ducey, checker jump, chipaway, critcal mass, five card draw, indian poker, memory test, miniature golf, and more!

GAMES $\quad$ - connect a dot, hot ice tace, kubics rube, ladybug, mommy slither, nuke buster, petman. and morel

GAMES 37 - checkers, bowling, cent-what, chess-64, connect four, dominoes, dm master, and more!
GAMES 49 - black hole, build a quiz, mad I bomber, 3d tank assault, racerfoystick, bug bopper), track racer, star pilot +, and morel

## MISCELLANEOUS

Games, utilites, educational, and an assortment of other programs.
Misc. 11 - Digtal and roling-balls clocks. Several programs to improve your typing, and a speed reading exercise. Math, alphabet, and shape recogntion programs. Games incluce one that pits you against a cheating computer. Also sound effects, kaleidoscope, graphic demos, and music.

MISC. 12 - Shoot aliens, bugs, space debris, other players. Code-breaking, dice, maze \& obstacle games. Uulities allow you to clean a disk drive, check alignment, change 10 , and view pages of memory. Watch screen magic using the Print statement. Included is Relax, a classic music and graphics program (also known as Swish or Swinth).
MISC. E3. Find lost gold, capture aliens, drive in an auto rally, Superman, other text adventures Accounting programs calculate cash flow, building costs, annutes, real estate costs, electricity usage growth. Let Eliza the psychiatist shrink your head. Edvcational quizzes tost your knowledge of math element symbols, capial cites.
misc. 34 - Figure interest rates, car costs, apartment building profits, Print banners, big letters, BASIC keywords. Fahrenhet-Celsius converter. Physics, math. mechanics, speling quizzes. Eleven games include solitaire checkers, battieship, osero, and a text adventure.

MISC. A5- Educational programs for math, chemistry, cryptograms, including some from Commodore Menu planner analyzes the nutritional value of your meals. Also simple spreadsheet and a sprite viewer.
MISC. \#6 - This disk has bowling, u-boat, football and hangman games. Print labels with the mailing list program or the general-purpose label maker.


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Refer to price table at left to calculate cost per disk (note some programs comprise multiple disks). Shipping and handling please add $\$ 3.00$ per order. COD welcome, additional $\$ 3.50$. Foreign orders additional $\$ 4.00$ air mail US funds only please. drawn on US bank. WA residents please add $8.1 \%$ sales tax. We ship by UPS and US Mail depending on weight. UPS blue available for rush orders at extra charge.

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## Other Menu Options

Two more menu selections let you save programs and load them back into the computer．These are Save File and Load File．When you press S or L，MLX asks you for the filename．You＇ll then be asked to press either D or T to select disk or tape．

You＇ll notice the disk drive starting and stopping several times during a load or save．This is normal behavior． MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands．Also note that the drive prefix 0 ：is added to the file－ name（line 750），so this should not be included when entering the name．This also precludes the use of＠for save－ with－replace，so be sure to give each version saved a different name．

Remember that MLX saves the en－ tire workspace area from the starting address to the ending address，so the save or load may take longer than you might expect if you＇ve entered only a small amount of data from a long list－ ing．When you＇re saving a partially completed listing，make sure to note the address where you stopped typing．

MLX reports the standard disk or tape error messages if any problems are detected during the save or load．It also has three special load error messages： INCORRECT STARTING ADDRESS， which means the file you＇re trying to load does not have the starting address you specified when you ran MLX； LOAD ENDED AT address，which means the file you＇re trying to load ends before the ending address you specified when you started MLX；and TRUNCATED AT ENDING ADDRESS， which means the file you＇re trying to load extends beyond the ending ad－ dress you specified when you started MLX．If you see one of these messages and feel certain that you＇ve loaded the right file，exit and rerun MLX，being careful to enter the correct starting and ending addresses．

The Quit menu option has the ob－ vious effect－it stops MLX and enters BASIC．The RUN／STOP key is dis－ abled，so the Q option lets you exit the program without turning off the com－ puter．（Of course，RUN／STOP－ RESTORE also gets you out．）You＇ll be asked for verification；press $Y$ to exit to BASIC，or press any other key to return to the menu．After quitting，you can type RUN again and reenter MLX with－ out losing your data，as long as you don＇t use the Clear Workspace option．

## The Finished Product

When you＇ve finished typing all the data for an ML program and saved your work，you＇re ready for the results．Refer to the corresponding article for details on loading and running the program．

## An Ounce of Prevention

By the time you＇ve finished typing in the data for a long ML program，you may have several hours invested in the project．Don＇t take chances－use The Automatic Proofreader to type the new MLX，and then test your copy thorough－ ly before first using it to enter any sig－ nificant amount of data．Make sure all the menu options work as they should． Enter fragments of the program starting at several different addresses；then use the display option to verify that the data has been entered correctly．And be sure to test the save and load options several times to ensure that you can re－ call your work from disk or tape．

## 64 MLX

EK 100 POKE 56，50：CLR：DIM INS，I， $J, A, B, A S, B S, A(7), N S$
DM $110 \mathrm{C} 4=48: \mathrm{C} 6=16: C 7=7: 22=2: 24=$ $254: Z 5=255: Z 6=256: z 7=127$
CJ 12 FA $=$ PEEK（45）+ Z6＊PEEK（46）：B $\mathrm{S}=\operatorname{PEEK}(55)+26 *$ PEEK $(56)$ ：HS ＝＂0123456789ABCDEF＂
SB $130 \mathrm{R} S=\operatorname{CHR} \$(13): \mathrm{LS}="\{\operatorname{LEFT}\} ": S$ s＝＂＂：DS＝CHRS（2 0 ）： $\mathrm{z} \$=$ CHR $\$$ （ ()$:$ ：$\$=$＂$\{13$ RIGHT $\} "$
CQ $140 \quad \mathrm{SD}=54272$ ：FOR $\mathrm{I}=\mathrm{SD}$ TO $\mathrm{SD}+2$ 3：POKE 1，0：NEXT：POKE SD +2 4，15：POKE 788，52
EC 150 PRINT＂（CLR\}"CHRS (142)CHRS （8）：POKE 53280，15：POKE 53 281，15
EJ 160 PRINT TS＂\｛RED\}\{RVS\} （2 SPACES $\} 8$ e\} \{2 SPACES \} ＂SPC（28）＂\｛2 SPACES\}\{OFF] \｛BLU）MLX II（RED）（RVS） \｛2 SPACES ${ }^{2}$＂SPC（28）＂ （12 SPACES\}\{BLU\}"
FR 170 PRINT＂ 3 DOWN $\}$（ 3 SPACES $\} C$ ompute！＇s machine languag E EDITOR\｛3 DOWN\}"
JB 180 PRINT＂$\{$ BLK $\}$ STARTING ADDRE SS\｛4\}"; :GOSUB300:SA=AD:GO SUB1040：IF F THEN180
GE 190 PRINT＂$\{$ BLK $\}\{2$ SPACES\}ENDI NG ADDRESS\｛4\}"; :GOSUB300: $\mathrm{EA}=\mathrm{AD}: \operatorname{GOSUB} 1030:$ IF F THEN 198
KR 200 INPUT＂$\{3$ DOWN $\}$ \｛BLK $\}$ CLEAR \｛SPACE \}WORKSPACE [Y/N]\{4\} ＂；AS：IF LEETS（AS，1）＜＞＂Y＂T HEN22ø
PG 210 PRINT＂ 22 DOWN $\}$ \｛BLU \}WORKIN G．．．＂；：FORI $=$ BS TO BS＋EA－S A +7 ：POKE I， $0:$ NEXT：PRINT＂D ONE＂
DR 220 PRINTTAB（ 10 ）＂$\{2$ DOWN $\}$ \｛BLK）\｛RVS）MLX COMMAND ME NU \｛DOWN\}\{4\}": PRINT TS" （RVS）E\｛OFE\}NTER DATA"
BD 230 PRINT TS＂${ }^{2}$ RVS $\}$ D $\{O F F\}$ ISPLA Y DATA＂：PRINT TS＂\｛RVS\}L \｛OEF ${ }^{\text {O }}$ OAD FILE＂
JS 240 PRINT TS＂\｛RVS\}S\{OFF\}AVE F ILE＂：PRINT TS＂$\{$ RVS $\}$ Q $\{0 \mathrm{FF}\}$ UIT \｛ 2 DOWN \} \{BLK ${ }^{\prime \prime}$
JH 250 GET AS：IF AS＝NS THEN25
HK 260 A＝ $0:$ ：FOR $I=1$ TO $5:$ IF $A \$=M I$ DS（＂EDLSQ＂，I，1）THEN $A=I: I$ $=5$
FD 270 NEXT：ON A GOTO $420,610,690$ ，700，280：GOSUB1060：GOTO25 o
EJ 280 PRINT＂\｛RVS\} QUIT ": INPUT" \｛DOWN）\｛4\}ARE YOU SURE [Y/ N］＂；AS：IF LEETS（AS，1）＜＞＂Y ＂THEN220
EM 290 POKE SD＋24，0：END

JX 300 INS＝NS：AD＝ $0:$ INPUTINS：IFLE N（INS）＜＞4THENRETURN
KF $310 \mathrm{~B} \$=\mathrm{IN} \$: \operatorname{GOSUB} 320: \mathrm{AD}=\mathrm{A}: \mathrm{B} \$=\mathrm{M}$ IDS（INS，3）：GOSUB $32 \sigma: A D=A D$ ＊256＋A：RETURN
PP $320 \quad A=\emptyset: F O R \quad J=1$ TO $2: A S=M I D S$（ $B S, J, 1): B=A S C(A S)-C 4+(A S>$ ＂（＂）＊C7：$A=A * C 6+B$
JA 330 IF $B<\theta$ OR $B>15$ THEN $A D=\theta$ ： $A=-1: J=2$
GX 340 NEXT：RETURN
$\mathrm{CH} 35 \emptyset \mathrm{~B}=\mathrm{INT}(\mathrm{A} / \mathrm{C} 6): \mathrm{PRINT}$ MIDS（H\＄ ，$B+1,1) ;: B=A-B * C 6:$ PRINT M IDS（HS，B＋1，1）；：RETURN
RR $360 \quad A=I N T(A D / Z 6): G O S U B 350: A=A$ D－A＊Z6：GOSUB350：PRINT＂：＂；
BE $370 \quad \mathrm{CK}=\mathrm{INT}(\mathrm{AD} / \mathrm{Z} 6): C K=A D-Z 4 * C K$ ＋Z5＊（CK＞27）：GOTO39ø
PX 38 G $\mathrm{CK}=\mathrm{CK}^{*} \mathrm{Z} 2+25^{*}(\mathrm{CK}>27)+\mathrm{A}$
JC $39 \emptyset$ CK＝CK $+25^{*}(C K>Z 5)$ ：RETURN
QS 400 PRINT＂$\{D O W N\}$ STARTING AT〔4＞＂；：GOSUB3øø：IE INS＜＞N\＄ THEN GOSUB1030：IF F THEN 400
EX 416 RETURN
HD $42 \sigma$ PRINT＂\｛RVS\} ENTER DATA ": GOSUB460：IF INS＝NS THEN22 $\sigma$
JK 436 OPEN 3,3 ：PRINT
SK 440 POKE198， 0 ：GOSUB 360 ：IF F T HEN PRINT INS：PRINT＂\｛UP\} \｛5 RIGHT\}";
GC 450 FOR $I=\emptyset$ TO 24 STEP $3: B \$=S$ $S: F O R \quad J=1$ TO 2：IE F THEN \｛SPACE $\}$ BS＝MIDS（INS，$I+J, 1$ ）
HA 460 PRINT＂\｛RVS\}"BSLS;:IF I<24 THEN PRINT＂\｛OEE\}";
HD 476 GET AS：IE AS＝NS THEN 470
FK 480 IF（AS＞＂／＂ANDAS〈＂：＂）OR（AS＞ ＂＠＂ANDAS＜＂G＂）THEN540
GS $485 \mathrm{~A}=-\left(\mathrm{AS}={ }^{\prime \prime} \mathrm{M}^{\prime \prime}\right)-2^{*}(\mathrm{~A} S=", ")-3 *$ （AS＝＂．＂）- 4＊$^{*}(\mathrm{~A} S=" / ")-5$＊（AS $=" J ")-6$＊（AS＝＂K＂）
 $-9 *(A S=" U ")-1 \sigma *(A S=" I ")-1$ $1^{*}(A S=" O ")-12^{*}\left(A S=" P^{\prime \prime}\right)$
CM $487 \mathrm{~A}=\mathrm{A}-13^{*}(\mathrm{~A} \$=S \$): I E$ A THEN \｛SPACE\}AS=MIDS ("ABCD123E4 56Fg＂，A，1）：GOTO 546
MP $49 \emptyset$ IF AS＝RS AND（ $(\mathrm{I}=\varnothing)$ AND $(\mathrm{J}=1$ ）OR F）THEN PRINT B $;: J=2$ ： NEXT： $\mathrm{I}=24$ ：GOTO 550
KC 500 IF $A S="\{H O M E\}$ THEN PRINT $B \$: J=2: N E X T: I=24: N E X T: E=$ 0：GOTO440
MX 510 IF（AS＝＂$\{$ RIGHT $\} ")$ ANDE THEN PRINT BSLS；：GOTO540
GK $52 \sigma$ IF AS＜＞LS AND AS＜＞DS OR（ $I=g$ ）AND $(J=1)$ ）THEN GOSUB 19 60：GOTO470
HG 530 AS＝LS＋SS＋LS：PRINT BSLS；：J $=2-J: I E$ J THEN PRINT LS；： $\mathrm{I}=\mathrm{I}-3$
QS 540 PRINT AS；：NEXT J：PRINT $S \$$
PM 550 NEXT I：PRINT：PRINT＂\｛UP\} \｛5 RIGHT\}";:INPUT\#3, INS: I F INS＝NS THEN CLOSE 3：GOTO 228
QC 560 FOR $I=1$ TO 25 STEP3：B $\$=M I$ DS（INS，I）：GOSUB326：IF I＜2 5 THEN GOSUB $380: A(1 / 3)=A$
PK 570 NEXT：IF A $\langle>C K$ THEN GOSUB1 g60：PRINT＂\｛BLK\} \{RVS\} ERRO

PK 570 NEXT：IF A $\langle>C K$ THEN GOSUB1 060：PRINT＂（BLK）\｛RVS\} ERRO R：REENTER LINE $\{4\}^{\prime \prime}: \mathrm{F}=1$ ： GOTO446
HJ 580 GOSUB $1080: B=B S+A D-S A: F O R$ $\{S P A C E\}=\varnothing$ TO 7：PORE B＋I A（I）：NEXT
QQ $590 \quad A D=A D+8: I F \quad A D>E A$ THEN CLO SE 3：PRINT＂$\{$ DOWN\} \{BLU\}** E ND OF ENTRY＊＊\｛BLK\}
\｛2 DOWN \}": GOTO7日0

GQ $600 \mathrm{~F}=0$ ：GOTO 440
QA 610 PRINT＂\｛CLR\} \{DOWN\} \{RVS \} DI SPLAY DATA＂：GOSUB400：IF \｛SPACE\}INS=NS THEN22
RJ 620 PRINT＂$\{D O W N\}\{B L U\} P R E S S:$ \｛RVS\} SPACE \{OFF\} TO PAUSE, \｛RVS\}RETURN\{OFE\} TO BREA K\｛4\}\{DOWN\}"
KS 630 GOSUB $360: B=B S+A D-S A: F O R I=$ BTO $\mathrm{B}+7: \mathrm{A}=\operatorname{PEEK}(\mathrm{I}):$ GOSUB35 0：GOSUB38 0 ：PRINT S ；
CC 640 NEXT：PRINT＂$\left\{\right.$ RVS ${ }^{\prime \prime} ;: A=C K: G$ OSUB350：PRINT
KH $650 \mathrm{~F}=1: \mathrm{AD}=\mathrm{AD}+8: \mathrm{IF} \quad \mathrm{AD}>\mathrm{EA}$ THEN PRINT＂$\{D D W N\}\{B L U\} * *$ END 0 F DATA＊＊＂：GOTO226
KC 660 GET AS：IF AS＝RS THEN GOSU B1080：GOTO 220
EQ 679 IF $A S=S \$$ THEN $F=F+1: G O S U B$ $108 \sigma$
AD 680 ONFGOTO630，660，630
CM 690 PRINT＂$\{D O W N\}$ \｛RVS\} LOAD DA TA＂：OP＝1：GOTO710
PC 700 PRINT＂$\{D O W N\}$ \｛RVS \} SAVE FI LE＂：OP＝$\sigma$
RX $71 \varnothing$ INS＝NS：INPUT＂$\{$ DOWN\}FILENA ME $\{4\}$＂；INS：IF INS＝NS THEN 220
PR $720 \mathrm{~F}=\emptyset:$ PRINT＂$\{\mathrm{DOWN}\}\{B L K\}$ \｛RVS\}T\{OFF\}APE OR \{RVS\}D \｛OFF\}ISK: $\{4\}^{\prime \prime}$ ；
FP 730 GET AS：IE AS＝＂T＂THEN PRIN T＂T \｛DOWN\}": G0T088
HQ 740 IF ASく＞＂D＂THEN730
HH 750 PRINT＂D \｛DOWN\}": OPEN $15,8,1$ 5，＂I日：＂：B＝EA－SA：INS＝＂ $0: "+$ INS：IF OP THEN810
SQ 760 OPEN $1,8,8$, INS + ＂，P，$W^{n}:$ GOS UB860：IF A THEN220
FJ $779 \mathrm{AH}=\mathrm{INT}(\mathrm{SA} / 256): \mathrm{AL}=\mathrm{SA}-(\mathrm{AH} *$ 256）：PRINT\＃1，CHRS（AL）；CHR $\$(\mathrm{AH})$ ；

PE 786 FOR $I=\emptyset$ TO B：PRINT\＃1，CHRS （PEEK（BS＋I））；：IF ST THEN8 $\emptyset \sigma$
FC 790 NEXT：CLOSE1：CLOSE15：GOTO9 40
GS 809 GOSUB1660：PRINT＂$\{D O W N$ \} （BLK）ERROR DURING SAVE： \｛4\}": GOSUB86も: GOTO220
MA 810 OPEN $1,8,8, I N \$+", P^{\prime \prime}: G O S$ UB860：IF A THEN 220
GE 820 GET\＃1， $\mathrm{AS}, \mathrm{BS}: \mathrm{AD}=\mathrm{ASC}(\mathrm{A} \$+\mathrm{ZS})$ $+256^{*}$ ASC $(B \$+Z S): I F \quad A D\langle>S A$ THEN $\mathrm{F}=1$ ：GOTO850
RX 830 FOR $I=g$ TO B：GET\＃1，AS：POK $E$ BS $+I, A S C(A S+Z S): I F(I<>B$ ）AND ST THEN $\mathrm{F}=2: \mathrm{AD}=\mathrm{I}: \mathrm{I}=\mathrm{B}$ FA 840 NEXT：IF ST＜＞64 THEN $\mathrm{E}=3$
FQ 850 CLOSE1：CLOSE15：ON ABS（F＞0 ）+1 GOTO960，978
SA 860 INPUT \＃ 15, A，AS：IE A THEN C LOSE1：CLOSE15：GOSUB1660：P RINT＂\｛RVS\}ERROR: "AS
GQ 870 RETURN
EJ 880 POKE183，PEEK（FA＋2）：POKE 18 7，PEEK $(F A+3)$ ：POKE 188 ，PEEK （ $\mathrm{FA}+4$ ）：IFOP＝0THEN926
HJ 890 SYS 63466：IE（PEEK（783）AND 1）THEN GOSUB1960：PRINT＂
\｛DOWN\} \{RVS\} FILE NOT FOUN D＂：GOT0690
CS $900 \mathrm{AD}=\operatorname{PEEK}(829)+256$＊ $\operatorname{PEEK}(830$ ）：IF AD＜＞SA THEN $\mathrm{F}=1$ ：GOTO 978
SC $910 \mathrm{~A}=\operatorname{PEEK}(831)+256 * \operatorname{PEEK}(832)$ $-1: \mathrm{F}=\mathrm{F}-2^{*}\left(\mathrm{~A}\langle\mathrm{EA})-3^{*}(\mathrm{~A}\rangle \mathrm{EA}\right):$ $A D=A-A D: G 0 T O 93 B$
KM $920 \mathrm{~A}=\mathrm{SA}: \mathrm{B}=\mathrm{EA}+1:$ GOSUB1 010 ：POK E780，3：SYS 63338
JF $930 \mathrm{~A}=\mathrm{BS}: \mathrm{B}=\mathrm{BS}+(\mathrm{EA}-\mathrm{SA})+1: \mathrm{GOSUB}$ 1010：ON OP GOTO950：SYS 63 591
AE 940 GOSUB1日80：PRINT＂$\{$ BLU $\} * *$

AVE COMPLETED＊＊＂：GOTO22日
XP 950 POKE147，0：SYS 63562：IE ST $>0$ THEN978
ER 960 GOSUB1 880 ：PRINT＂$\{$ BLU $\} *$＊ OAD COMPLETED＊＊＂：GOTO22ø
DP 970 GOSUB1060：PRINT＂$\{$ BLK \} \｛RVS\}ERROR DURING LOAD: \｛DOWN\} \{4\}": ON F GOSUB980 990，10日0：GOTO22日
PP 980 PRINT＂INCORRECT STARTING \｛SPACE\}ADDRESS ( ${ }^{\prime \prime}$ ；：GOSUB3 60：PRINT＂）＂：RETURN
GR 990 PRINT＂LOAD ENDED AT＂；：AD $=$ SA + AD：GOSUB 360 ：PRINT DS： RETURN
ED 10øø PRINT＂TRUNCATED AT ENDIN G ADDRESS＂：RETURN
RX $1010 \quad A H=I N T(A / 256): A L=A-(A H * 2$ 56）：POKE193，AL：POKE194，A H
FE $1020 \quad \mathrm{AH}=\mathrm{INT}(\mathrm{B} / 256): \mathrm{AL}=\mathrm{B}-(\mathrm{AH} * 2$ 56）：POKE 174，AL：POKE 175 ，A H：RETURN
EX 1630 IF AD＜SA OR AD $>$ EA THEN1 $\sigma$ 50
CR 1040 IF（AD＞511 AND AD＜6528日） THEN GOSUB1の8』： $\mathrm{F}=0$ ：RE TURN
HC 1050 GOSUB1060：PRINT＂$\{$ RVS \} IN VALID ADDRESS \｛DOWN\} \｛BLK\}":F=1:RETURN
$A R 1660$ POKE $\mathrm{SD}+5,31: \mathrm{POKE} S D+6,2$ 08：POKE SD， 240 ：POKE SD +1 ，4：POKE SD＋4，33
DX 1070 FOR $S=1$ TO $100:$ NEXT：GOTO 1090
PF 1080 POKE $S D+5,8:$ POKE $S D+6,24$ $9:$ POKE SD， $0:$ POKE $S D+1,90$ ：POKE SD＋4，17
AC 1090 FOR $S=1$ TO $100:$ NEXT：POKE $S D+4,0:$ POKE $S D, \theta:$ POKE $S$ $\mathrm{D}+1, \theta$ ：RETURN

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## REVIEWS

## Search for the Titanic

Have you ever wondered how sailors pass the time on long sea voyages? What could they possibly do with so much time on their hands while their vessel slowly churns its way across the big blue? If they have the foresight to take along Search for the Titanic, by Capstone, they can immerse themselves in a realistic oceanographic and rather complex adventure simulation.

Patience and perseverance are a good sailor's best qualities, and players better have both in tow when they launch into this simulation. The game title may be a little deceiving. Indeed, the actual searching for and finding of the sunken luxury liner, downed in 1912 by an enormous ice cube, happens only at the game's climax. This game is truly an adventure in finding numerous historical shipwrecks. From Spanish treasure galleons, lost in the stormy waters of the Gulf of Mexico, to Noah's Ark, a player could spend much of his or her adult life locating and exploring the 77 or so other undersea relics.


In painstakingly true-to-life form, the program is divided into two sections. The first phase of the simulation deals with planning the expedition, which includes buying necessary technical equipment, hiring a ship, choosing a crew, acquiring provisions, and going hat-in-hand to corporations for funding. If you've done adequate planning, the scurvy dog of a safety inspector just might let the expedition leave one of the game's 47 ports you've selected as a base of operation.

In phase 2 of the program, you get under way and search for the chosen wreck. Equipped with all the technical gadgetry you can afford to buy or rent, along with the wreck coordinates and
the provided world map, you set off on your adventure.

To aid in your exploration, eight screens can be called up for special purposes. Included are a radio screen to record messages and call for help, plus navigation, piloting, sonar, and dive screens. There are reportedly more than 100 map screens to help you navigate the world waterways. I didn't count them but there was a multitude.

This game is truly an adventure in finding numerous historical shipwrecks-from

## Spanish treasure galleons

## to Noah's Ark to the Titanic itself.

Don't expect to start off with a reputation like Bob Ballard (who found and photographed the Titanic) or Jacques Cousteau. You start the simulation as a nobody. You have to build a reputation as a master wreck finder by starting small. With limited funding, a player just starting out is restricted to a very small boat and few crew members. As your list of found wrecks grows, so does your reputation. At that point, big money investors begin to turn loose their funds for larger vessels and more costly expeditions.

For landlubbers, there is a built-in cheat device so they can immediately begin to search for the Titanic without reputation development. Selecting this option from the menu grants a player notoriety and plenty of money. The largest exploring ship available, the Voyager, can be outfitted with the most expensive equipment, a crew of 55 , and a minisub. Even with these advantages, it's a large, deep, and wide ocean out there, and locating the 46,000-ton pride of the White Star Line is not easy. To make the challenge tougher, your investors insist that you seek out and retrieve the ship's three safes as tangible proof of your success.

Actual digitized photos of the Titanic wreck, taken by the Bob Ballard
expedition, are your reward for finding her. Personally, I think it's only fair that any salt who can complete this be allowed to keep the contents of all three safes. How about it, Bob?
-Steve Hedrick
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Capstone Software
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\$34.95

## Faceoff!

What's black and round, weighs $41 / 2$ ounces and goes 100 miles per hour? No, not your favorite burger-a hockey puck! And while FaceOff! by Gamestar can only simulate the $100-\mathrm{mph}$ speed, it still puts you smack into the action world of professional hockey. All right, it's not Hockey Night in Canada, but if you live in a hockey-starved area of the world as we do, it's a terrific substitute.


From the TV-camera perspective to the constant glide-and-circle motion of the skaters, this program has an uncanny feeling of reality. Graphics and sound are good, but these are not what make FaceOff! seem so real. It's something less definable. When playing FaceOff!, joystick gripped in the usual whiteknuckle fashion, you get the same excitement you feel cheering at rinkside.

FaceOff! allows you to practice the three main skills needed for hockey: shooting at the goal, tending goal, and punching out other players. You can play exhibition games and then enter league action as player, coach, general manager, or commissioner of the Gamestar Hockey League.

You set up your own season and decide the number of regular and playoff games and intra- and interdivisional games. You choose the length of a period, the number of players per squad, and what type of rules you play under: full, relaxed, or Aussie, which means no rules at all. Skill levels for skaters controlled by the computer are Rookie, Veteran, and All Star.

One can play against the computer, two can play against each other, or two on the same team can challenge the computer. You change which skater you control at will, yours being a slightly different color than the skater's teammates. This works well except when two people are playing on the same side. Here's where things can get confusing, especially when your man is offscreen.

> FaceOff! gives you the
> same excitement you feel
> cheering at rinkside.

The screen tracks the puck, just as TV cameras do. It's easy for your skater to end up in a corner talking to the crowd and signing autographs while you struggle frantically to get him skating in the right direction. With two identical skaters . . . well, we had more fights over who was who while playing on the same team than we had battles while playing against each other!

During the game, you can change lines, pull or reinstate the goalie, and make calls from the playbook. ShotCam gives you a closeup view of shots made on the goal. And for those who object to how you play, there's FightCam. On the ice, gloves off, you and your opponent flail away at each other to the delight of an array of fans featuring two exuberant nuns and some rowdy downing popcorn. When one skater knocks out the other, the referee drags the loser off the ice by the skates and throws him into the penalty box.

For most of us, playing the hockey game would be enough. There's plenty here: Skating against an opponent, punching him out, slipping the puck into the net, listening to the crowd and the music (although it could use more music, and a proper siren when a goal is scored), and seeing goals, assists, and penalties listed between periods (the only stat missing is shots made on goal). But FaceOff! offers more.

As general manager you control and coach your team. This means that you purchase a team, trade, promote, demote, and retire players. Change the personal attributes of your players, including their name, age, position, and jersey number.

As coach, you can move players from one position to another. You can also devise plays for your team and enter them into the league playbook. A play is designed from three maneuvers: Move, Pass, and Slapshot. You assign actions to the players of your choice. Once a play has been blocked out, you can add it to the playbook to be selected by any team for use in a game. There's room for 16 plays; 4 are already provided. This feature opens up a new aspect to the program by allowing you to con-trol-for a time-the entire team. And it works so well, you might even be able to use this to test plays for your local hockey team.

A lot is built into this program. Everything works well, and, as noted, the excitement is just about as high as watching the real thing. For hockey fans, it's great-the next best thing to going out to a game. All that's missing is the Zamboni.
-David and Robin Minnick

## FaceOff!

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## Batman: The Movie

Don't confuse Batman: The Movie with an earlier Batman game from Data East. Although the above title does not appear on the packaging, there's an important distinction between this Data East release and the earlier effort titled Batman, The Caped Crusader.


The earlier game was released prior to the hit movie and was based only on the Batman we know from comic books. The new game, recognizable by the movie's lettered logo and a picture of Michael Keaton as Batman, is based on the plot of the movie and is as different from the original as it can be.

I had criticized The Caped Crusader for, among other things, presenting Batman as a fat, diminutive figure much as he was portrayed years ago in a classic Mad Magazine lampoon. Here, he
appears as tall and lithe as the Dark Knight we've come to know through the movie and the trade paperbacks.

Following the plot of the movie, your first adventure finds you in a maze at the Axis Chemical Plant, where you throw Batarangs to dispatch villain Jack Napier's henchmen. As you leap among the broken levels of the plant and swing on your Batrope, avoid chemical leaks, collisions with henchmen, and falls. Each hazard weakens you, and, when weak enough, one of your three lives will end.

## Graphics, sound, and

## animation are excellent-

and the challenges
prevent a quick and easy solution.

Atop the screen are a scorecard, a timer, and a unique health indicator. The indicator begins by showing Batman's face. As you grow weaker, the face transforms into that of the Joker-a nice bow to the dualism expressed in the movie.

Finding and dispatching Jack Na pier is the object of level 1. If you hit him with a Batarang, he'll fall into a vat of chemicals that will transform him into the Joker. (Jack Napier, jackanapes, joker. Get it?)

Level 2 has you careening through Gotham City in the Batmobile. You and Vicki Vale are trying to escape to the Batcave while avoiding the Joker's vehicles as well as police roadblocks.

A special radar in the Batmobile tells you when to turn in order to escape. If you come to a turn before you're ready, don't worry. Firing a Batrope with grappling hook will help you make a 90-degree turn with no hesitation.

Assuming you make it to the Batcave, you'll then have to work out the formula for Smilex, the Joker's deadly cosmetic. To do this, use the joystick to select various cosmetics from a roster. Remember that only one combination will work and the clock is running.

Next comes the Batwing. Fly over the Joker's parade, releasing his balloons by snipping the lines with the Batwing. Why? Surely you remember these balloons are filled with Smilex, and, if released by the Joker, it will wipe out Gotham City's population.

If you're successful, advance to the climactic scene on Gotham Cathedral. Climb the tower, avoiding henchmen, rabid rats, and crumbling floors. The object is to prevent the Joker from reaching his helicopter. While we all know how the movie ended, we're not

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$\dagger$ North Carolina, New York, and Pennsylvania residents must add appropriate sales tax.
sure how your adventure will turn out.
In graphics, sound, and animation, Batman: The Movie is excellent, and the brief documentation is all that's required. All controls for each level are accessed via joystick, and the movements are logical rather than contrived. While you won't have trouble controlling your character, you should be aware that the challenges will prevent a quick and easy solution. I can recommend Batman highly, with only one caveat: My son advises you to toggle the music off to prevent being distracted.
-Ervin Bobo
Batman: The Movie
Data East
1850 Little Orchard St.
San Jose, CA 95125
\$29.95


## Spanada 128

Two questions occurred to me when I first learned about Spanada 128. The first had to do with wondering why any new program was written exclusively for the Commodore 128. After all, much larger companies have covered all bets by producing 64 software that might, incidentally, support a 128 mode.

The answer came easily enough: Spanada 128 apparently uses the greater memory capacity of the 128 and makes good use of the 80 -column display. The 1571 disk drive is another requirement, and it may be that the full disk is utilized without flipping.

The second question, Why bother? is not so easily answered.

Spanada 128 is a Spanish-to-English translator. You type in a sentence or a phrase of Spanish such as La paloma volando en el cielo toca la alma en el cielo, and after a few seconds the computer begins breaking down the sentence in this manner:

LA-THE, HER, IT
PALOMA-DOVE, PIGEON
VOLANDO-FLYING, BLOWING UP, BECOMING FURIOUS
EN-IN, ON, AT
EL-THE
CIELO-SKY, HEAVEN
And so on.
Then you are presented with the complete sentence, in this case, The dove flying in the sky touches the soul in heaven.

How are the different uses of words determined? I have no idea. Perhaps those who wrote the program are inherently poetic, but it would seem the translation could as easily have been The pigeon blowing up in the sky plays the soul in heaven.

Although English-to-Spanish translation is not a function of Spanada

128 , it can be done-but only if enough English words have been stored in RAM as a result of previous Spanish-toEnglish translations. And if you're tempted to make back-and-forth translations, you will probably find cause for alarm.

For example, Las golondrinas son rumbo a Capistrano translates neatly to The swallows are on their way to Capistrano. English to Spanish then yields El swallows son en their via hacia Capistrano which translates as The ?swallows they are in ?their way toward Capistrano. The question marks denote words not recognized by the program.

Several modes of operation are supported, such as Advanced, which allows input of up to 253 characters instead of the usual 160; and Trace, which lists the steps the computer takes in searching for a word.

Still, my second question remains: Why bother?

Spanada 128 does not purport to teach Spanish or to replace textbook teaching. In fact, you must know Spanish in order to use it, for you'll quickly tire of the sample phrases in spite of their occasional humor.

> "How smart you are
> depends on what part of the country you're standing in." -Burt Reynolds

And if you plan to be in a Spanishspeaking country, a pocket translator will be much more effective than running back to the hotel to type into your computer what you thought that guy in the restaurant said.

In the end, Spanada 128 seems to be a very good bit of programming, doing exactly what it says it will do, but it comes close to being dangerously narrow in topic as a 128 -only program.

To be absolutely fair, I must recall what Burt Reynolds said in the movie Smokey and the Bandit: "How smart you are depends on what part of the country you're standing in." In the Southwest, where Spanada 128 was produced, there will certainly be a need for such a program among the Hispanic population. But if you're an Anglo looking to learn Spanish, study this program carefully before purchasing.
-Ervin Bobo
Spanada 128
Spanada Enterprises
1 Sands Ranch Rd.
Huachuca City, AZ 85616
$\$ 49.95$

## horinums

## Design-a-64 Contest Winners

## Rhett Anderson

In November, I invited readers to redesign their 64 s and send in pictures of the results. I'd like to thank all those who participated. I enjoyed each entry.

Below are the winning entries. As promised, each winner gets to choose any three titles from the Gazette disk library. Below each photo, you'll find some revealing words from the artists.


The Commodore 64-AS Dennis Joslin
To make the 64-AS (Awesome System or Advanced System), I first took apart the disk drive. Then I took all the circuitry and the keyboard out of the computer. I lengthened the wires on the power LED so that it would reach to the front of the box. As you can see, I have a detached keyboard on my system. The last step was to make orange lightning bolts.


The Commando 64 Michael Rogalski
My entry is actually a reworked VIC-20. The artwork took all of two minutes to do, since I had about five cans of spray paint in my paint cabinet. The photos were taken at the Mojave Airport, where Dick Rutan launched and landed the Voyager aircraft. If I win, I'd like the Gazette 5-Year Index disk, GEOS disk, and Best Games disk.


The 64 c.c.
Aaron Woolf
When I made my 64 c.c. (completely custom), I used LEDs to make the 64 at the top where the power indicator used to be. Around the keyboard section, I painted it light blue. Outside of the blue section, I painted it with aluminum paint to give it that metallic look. I also painted a Commodore 1670 modem, a Suncom Tac-3 joystick, and a Suncom disk notcher.



It's professional golf at its best with the game's most aggressive and successful player, Greg Norman . . . a state-of-the-art golf simulation with more realistic threedimensional graphics than you've ever seen before!

Rich in detail, Shark Attack is packed with features not included in lesser games, including:


- Pre-game Practice, Matchplay,

Greensomes, Strokeplay, and Texas Scramble, all handicapped according to adjustable attributes, with single and team play options (up to four players).

- A professional caddy who can recommend the club to use for each shot.
- On-screen ability to design your own swing, for a game which is more dependent on skill than luck.
- Greg Norman's swing digitized for your instruction in the best golfing form.
- Ability to open and close the club face and adjust the loft, totally on-screen, for greater control.
- A 3-D perspective, which can be rotated through 360 degrees from any point. You can really walk each hole, and study the lie of each shot just like you would on.a real golf course (one of the features that make this a simulation, not just a game).
- Changing wind and weather conditions, to add to the challenge.

Greg Norman's Shark Attack: the first true golf simulation, produced under the guidance of the Great White Shark himself! As on the pro circuit, total concentration, strategy and control are all required to come in under par!

## WINAFABULOUSTRIP TO AUSTRALIAINTHE SHARK ATTACK SWEEPSTAKES!

To enter, fill out and return your Shark Attack warranty card. Here's what you may win:

- Two round trip airfaires to Australia - Hotel accomodations for nine nights - Tickets to the Australian Open Golf Championship • Opportunity to meet the "Great White Shark" himself • \$1,000 in cash
Send in your warranty card today!
Entries must be postmarked no beer than Jiy 31. 1990. Oller void where prohibited by bw.



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Melbourne House is a member of the Virgin Mastertronic Group.

Look for Shark Attack at your favorite software store. For these fine computers:


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[^1]:    JifiyDOS Ordering Information
    C-64SX-54 systoms \$59.95; C. 22 C C.126D systoms 569.95 ; Addilional dive ROMs $\$ 29.95$ Ploase specily computor (w serial number) and dive(s) when ordoring.
    
    
    

[^2]:    Residents of New York，Pennsylvania，and North Carolina add appropriate sales tax for your state．All orders must be paid in U．S．funds by a check drawn on a U．S．bank．Please allow 4－6 weeks for delivery．For delivery outside the U．S．or Canada，add $\$ 1$ for surface mail or $\$ 3$ for airmail．

