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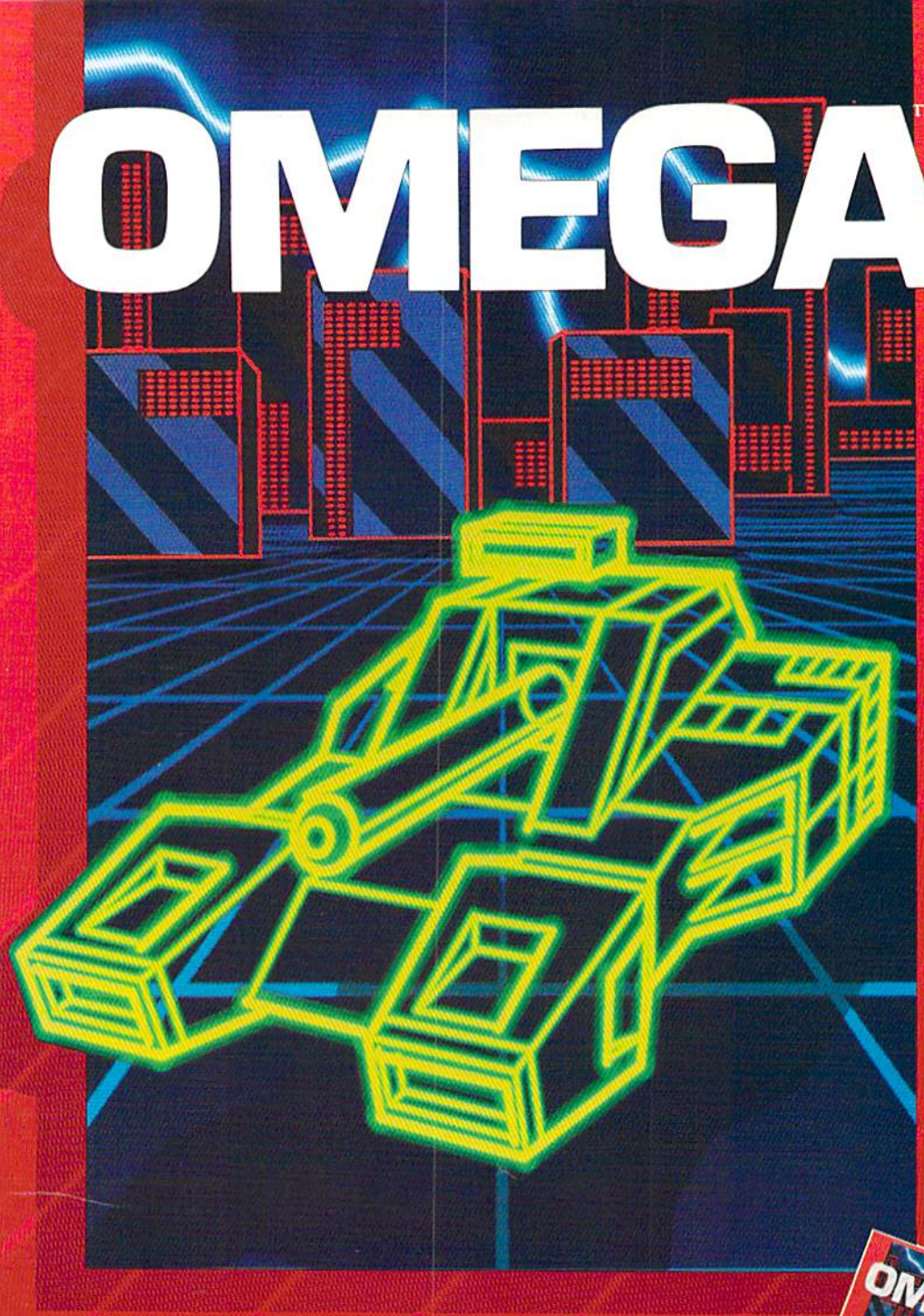

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Cover photo by Mark Wagoner ©1989

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EDITOR'S notes

Last month, we promised an update on the rumored new Commodore machine we affably dubbed the 64GS. As we go to press, the latest rumor is that such a machine will never see the light of day. What is not rumor, however, is that Commodore has recently announced two significant appointments which tell us something of Commodore's direction.

In late April, Harold Copperman left Apple to join Commodore as its new president. He recruited Howard Diamond, also from Apple, a few weeks later. Diamond was named director of education in June. Another promotion by Copperman, announced in mid-July, was that of C. Lloyd Mahaffey to vice president of marketing. Mahaffey, it turns out, is also an Apple alumnus. In fact, Mahaffey directed Apple's education marketing activities. He was responsible for the creation of many of Apple's education programs for grades K–12 and for higher education. According to a Commodore press release, Mahaffey will be working closely with Copperman to increase sales and marketing support in the business, education, government, and consumer markets. (For more on Commodore's activities in the education market, see "About Face!" in last month's issue.)

Copperman appears to be aggressively moving Commodore toward the education market. We've seen other press releases in the past couple of months that indicate Commodore's attempted positioning of the Amiga as a legitimate classroom computer (*Amiga Logo*, published by Commodore, was recently announced). We wish them luck, but we'd like to see that same aggressiveness applied to the consumer market and to support for the 64/128 line. (Readers, take note of "National Petition to Commodore" in this month's "Letters to the Editor" column.)

We heard through the grapevine that the closing of *Commodore Magazine* was a decision of Copperman's. Apparently, the story goes, his feeling is that Commodore should be in the computer business, not the publishing trade. The October issue of *Commodore Magazine* will be the last. (A tip of the hat to the staff of that magazine for a job well done, especially to editor Susan West and managing editor Jim Gracely for their cordial assistance to us over the years.) By all accounts—and by all rumors—Copperman has not been lollygagging in the decisive-action department. We'll be monitoring Commodore's activity over the coming pre-Christmas months which are so critical to the health of not just Commodore, but all hardware and software companies.

In closing, I suggest you read this month's "Horizons" column (page 60). Rhett Anderson tells how he copes with the perplexing enigma that is the Commodore market.

Lance Elko
Associate Publisher/Editorial

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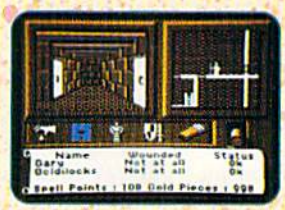
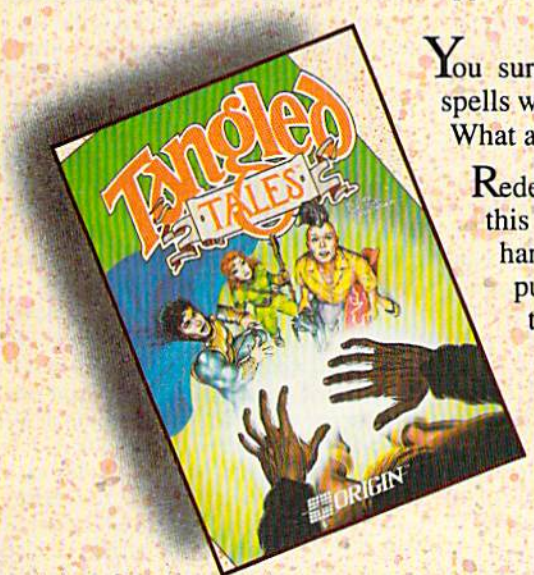
Myth, Magic and Mirth



Screens shown are for Apple II.

What do a "tubed-out" California surfer, a knight in shining armor and a Shakespeare-spouting elf maiden have in common? Typically nothing! But you'll recruit this off-beat crew and meet more than 50 other peculiar characters in TANGLED TALES, the Misadventures of a Wizard's Apprentice.



You sure aren't the wizard's star pupil. In fact, he took away your spells when you spilled his precious adamantite dust on the squirrel. What a mess that turned out to be!

Redeem yourself, fill your spell book and save Violet Valley on this fractured journey where time stands still — or maybe just hangs around. It's filled with stirring combat and perplexing puzzles, and features dazzling graphics with animated illustrations, 3-D dungeons and detailed overhead views.

You've seen fantasy, role-playing and graphic adventure games before, but never one that combines myth, magic and mirth like TANGLED TALES.

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LETTERS to the editor

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.*

Whose Program?

I'd like to know something about the rights of the people that write programs for your magazine. Can they modify a program, add a trick, then send it to you to be published under their name? Or do they have to put the name of the original author along with their name?

Raul Graciano
Sacramento, CA

If an author submits changes of a few more-or-less minor components (say, color and menu design) to a published program, we would certainly not see this to be a substantive, conceptual change. We wouldn't publish such a revision. However, if certain modifications make a program substantially more powerful or significantly improve its application, utility, or playability, we would consider this a worthwhile upgrade. There's not enough space to describe all the various criteria we use in deciding what are "substantial" or "significant" changes. We look at each program submission on a case-by-case basis. If we purchase a revision or an upgrade, we decide on single or shared bylines after looking closely at the changes made to the original program.

Wayfaring Word Processor

In response to Dennis Linde's search for Cardco's cartridge-based *Write Now!* word processor (August), I've found that Cardco's product line was purchased by Supra Corporation, 1133 Commercial Way, Albany, Oregon 97321. Supra offers a satisfactory disk version of *Write Now!* I checked the disk thoroughly, and all functions seem identical to the cartridge version.

Gene Allen Carr
Lawrence, KS

National Petition to Commodore

In view of all of the rumors about Commodore's dropping the 64 and 128 lines, the Heartland Users' Group (HUG) is organizing a national petition drive for user groups. Our petition urges Commodore to continue production and support of these versatile and affordable machines. If such support is economically impossible for Commodore, we are asking that they allow another company to provide support for the millions of Commodore users. Any groups that have not yet received petition information can write HUG, P.O. Box 281, Cape Girardeau, Missouri 63702-0281. Individual users worried about soon owning an orphan might want to drop a line to Harold Copperman, the new Commodore president. Thanks for helping to spread the word.

Lee Pasborg
Secretary, HUG
Cape Girardeau, MO

Dr. Evil Update

Cartridge sales have been brisk since our coverage in the *Gazette* feature (July) and *Info*. Please inform your readers of our new address: Dr. Evil Laboratories, P.O. Box 3432, Redmond, Washington 98073-3432. Also, please note that the cartridge is $34.95 *postpaid*. (We've received tons of orders with extra money added for shipping.) Washington residents must include 8.1 percent sales tax ($2.83 per cartridge). Readers can contact us on Q-Link—we're DrEvil (no period).

Kent Sullivan
Dr. Evil Laboratories
Redmond, WA

From Schnedler Only

In the August "Feedback" column, page 51, several machine language assemblers are recommended, including Eastern House Software's *MAE Macro Assembler/Editor*. You might tell your readers that *MAE* is now (and has been for years) exclusively published by, supported by, and sold by Schnedler Systems under license from Eastern House. Likewise, we have advertised *MAE* for years in *Gazette*. (Also, you might save your readers some frustration by pointing out that Commodore's *MADS* assembler may be difficult to find; it is my understanding that it is no longer published.)

Steven C. Schnedler
Schnedler Systems
P.O. Box 5406
Asheville, NC 28813

Tomcat Tops!

I've been reading you for about three years now and have come to respect your software reviews. Your *F-14 Tomcat* review (August) was almost as good as the game itself, with one small exception. I've been servicing aircraft for all service branches for years, and the review states that the T-2 Buckeye is propeller-driven. Wrong. I think it takes a lot away from the researchers and programmers to say they made a mistake as simple as this. You can tell on your first flight that it took great effort to create a flight simulator of this quality. For my vote, *F-14 Tomcat* is the best flight simulator yet for the 64!

Boyd Nelson
Myrtle Beach AFB, SC

The Printer Hump

When I first bought my 64, I also bought a Commodore-compatible printer. How great! It didn't even need an expensive interface. My next purchases were *The Print Shop* and *The Toy Shop*. I spent the next two years wondering why someone would make cards or letterheads that didn't fit the paper, and why someone would design a car with oval instead of round wheels. I was starting to think a home computer was not all it was cracked up to be. As I learned more about computers, printers, and interfaces from friends and from reading magazines, a light went on in my head. I then bought a noncompatible printer with an interface. Now I have round wheels and cards that fit the paper. I love my Commodore system, but it wasn't until I got over that printer hump that I realized the full potential of my equipment.

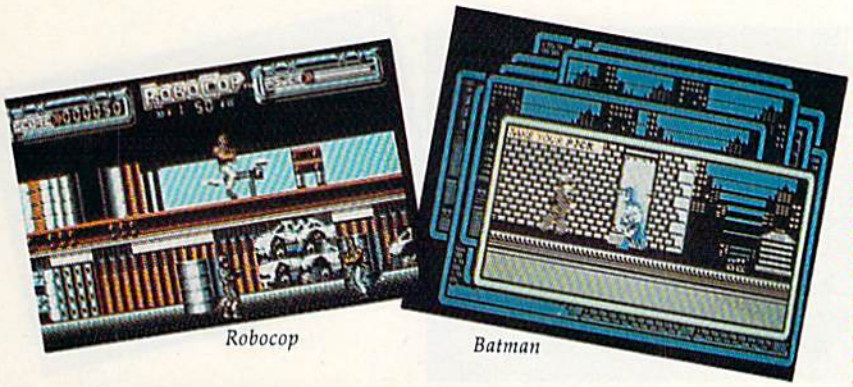
Carol L. Hazlett
Issaquah, WA

You didn't note specifically which printers you had, but our guess is that your new printer has a character aspect ratio of 1:1 (that is, there is an equal number of dots both vertically and horizontally for each character cell). Your Commodore-compatible printer likely had an aspect ratio of 9:8 (height greater than width), which caused your graphics to appear distorted. Both the Commodore 1525 and 1526 printers—and their successors—have these nonproportional aspect ratios. **G**

COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS

Edited by Mickey McLean



Robocop Batman

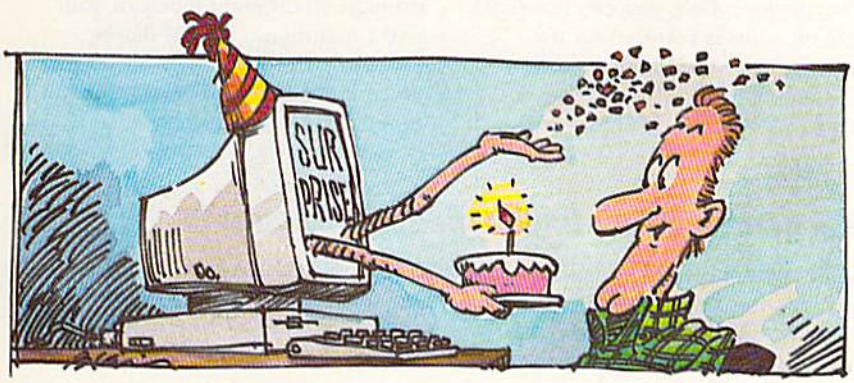
From the Boob Tube to the Big Screen

Data East USA (470 Needles Drive, San Jose, California 95112) has been inspired by television sports and adventures from the silver screen in its next three releases.

The software company enters the sports-game arena with *ABC's Monday Night Football* ($34.95), the first in a series from the Data East MVP Sports Line. The program gets its name from the series of NFL games seen on Monday nights for the past 20 years on the ABC television network.

Following this past summer's blockbuster screen hit *Batman*, Data East is releasing *Batman, The Caped Crusader* ($24.95). You assume the role of the cowled crime fighter as he travels through the streets of Gotham City, battling familiar evil foes such as the Penguin and the Joker.

Also inspired by the silver screen, *Robocop* ($34.95) puts you in the role of the half-man/half-machine character as you fight a corrupt group of thugs that have taken over Old Detroit. It's up to you to save the city.



Harry Blair

You Say It's Your Birthday?

Keep track of dates and know what to buy with *Home Data Base* 2.6 ($49.95 plus $3.00 shipping and handling) for the Commodore 128.

The program from Robertson Software (1200 North 70th Avenue, Hollywood, Florida 33024) prints out birthdays and anniversaries for any month along with ages, gift lists, mailing lists, birth records, marriage records, telephone and address lists, and mailing labels. The menu-driven program includes help screens at the enter prompt that return you to the point where you left off. Personal information disks can be created for each member of the family.

Home Data Base requires a Commodore 128 or 128D, one or two 5¼-inch disk drives, and a printer. The program is displayed in 40-column color.

128 Products Become Free-Spirited

Free Spirit Software (P.O. Box 128, 58 Noble Street, Kutztown, Pennsylvania 19530) has entered into an exclusive agreement with Viza Software that allows Free Spirit to market *Viza Write Classic* ($59.95) and *ViziStar 128* ($69.95) in North America.

ViziWrite Classic, a word processing program for the Commodore 128, uses a page-based WYSIWYG format that includes word-wrap and text formatting. Other features include full-screen and document scrolling, the ability to merge almost any other word processing file directly into a document, a glossary of frequently used words or phrases, mail merge, a full-function calculator, and a 30,000-word spelling checker. *ViziWrite Classic* requires an 80-column monitor.

ViziStar 128 is an integrated spreadsheet, database, and business-graphics program. Its spreadsheet contains a ruled worksheet display and a 1000 row × 64 column worksheet. The database allows full-screen design of records, up to 8000 characters per record, and an unlimited number of records per file. The business graphics function uses data from the spreadsheet and database to draw two- or three-dimensional full-color graphs and charts.

ShareData Introduces New Line

ShareData has introduced a new product line, Monarch Software, which consists of arcade-style games. The company plans to license highly recognizable titles for distribution in established channels.

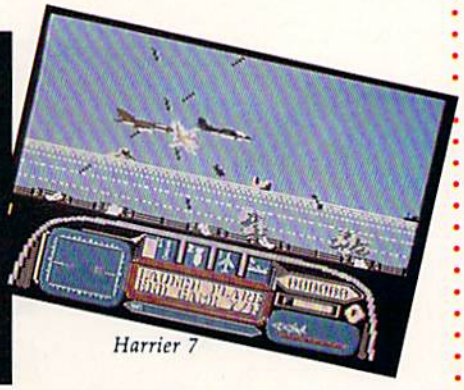
Monarch's first release will be *A Nightmare on Elm Street 3: Dream Warriors*, based on the film series, followed by *Rollergames*, which is patterned after the television show of the same name.

COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS

Frightmare

Shoot 'Em Up



Harrier 7

Accolade Falls In

Accolade (550 South Winchester Boulevard, Suite 200, San Jose, California 95128) has announced its new fall lineup for the Commodore 64 and 128. New releases include one game title and four supplemental disks for existing games. The company has also added four new games to its budget-priced Advantage line.

The designer of Accolade's racing simulations, *Grand Prix Circuit, Test Drive,* and *The Duel: Test Drive II,* has produced *The Cycles: International Grand Prix Racing* ($29.95). You'll compete against nine computer-controlled world-class Grand Prix riders on 15 of the toughest motorcycle courses in the world including tracks in Monaco, Holland, Great Britain, Japan, and Canada. You can race on any of the individual race courses or compete on all 15 and challenge for the circuit championship.

Accolade is also releasing two new supplemental disks for *The Duel: Test Drive II.* Drive the highways and byways of Europe with the *European Challenge* scenery disk ($14.95). A new selection of cars is also available with *The Muscle Cars* ($14.95).

If you've broken all the course's records on the three layouts from *Jack Nicklaus' Greatest 18 Holes of Major Championship Golf,* you can now compete on courses featured on two brand-new course disks. Volume 1 ($14.95) features the host courses from this year's U.S. Open, British Open, and PGA Championship, while Volume 2 ($14.95) presents tough challenges from some of the best courses from around the world.

The new Advantage lineup includes *Mental Blocks* ($14.95), a strategic beat-the-clock collection of brain teasers; *Shoot 'Em Up Construction Set* ($14.95), which contains tools many developers use to make arcade games; *Harrier 7* ($14.95), an action-arcade air-combat game that features missions in a Harrier fighter jet; and *Frightmare* ($14.95), which takes you through 80 different levels of your worst nightmare. *Mental Blocks, Harrier 7,* and *Frightmare* are available on combination 64/128 and IBM PC flippy disks.

Future Copter

You find yourself in the year 1997 and in control of an AH-64 Apache attack helicopter in *Apache Strike* ($14.95) from Activision Entertainment (Mediagenic, 3885 Bohannon Drive, Menlo Park, California 94025).

Your chopper, equipped with a sophisticated radar tracking device, assists you on a seek-and-destroy mission. You must fly through city streets dodging buildings and overpasses while the enemy fires at you from tanks and choppers. With the radar system, track down the enemy and attack with gunfire or missiles. As you progress to the next level, the game increases in difficulty.

Telecomsoft Now Under Medalist Umbrella

MicroProse Software, now known as MPS Technolgies, has purchased Telecomsoft, the entertainment software division of United Kingdom–based British Telecom. Telecomsoft's games will be marketed by Medalist International (a division of MicroProse) under the MicroPlay label in the U.S. and by MicroProse Europe in Europe.

"This is, by far, the biggest deal in MicroProse history, and probably the most significant business acquisition since Activision bought Infocom in 1986," said MicroProse president and cofounder Bill Stealey.

The addition of Telecomsoft, according to Stealey, will double the size of the European operations and has the potential to increase the growth of MicroProse U.S.A. by 40 percent.

Medalist International plans to market between 6 and 12 products from Telecomsoft's design teams every year and 6–8 for the remainder of 1989.

Telecomsoft was established in 1984 and is known for arcade games as well as simulations. Its titles include *Starglider, Carrier Command, Stunt Car, 3-D Pool,* and *Savage,* all of which Medalist International plans to bring to the U.S. in the near future.

COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS

Awardasaurus

Curriculum Product News, an educational curriculum publication, has presented Britannica Software with an Award of Merit for *Designasaurus*. The program was selected as one of the District's Choice—The Top 100 Products of the Year.

The June issue of *CPN* contains a compilation of the top 100 products of 1988–1989. District-level administrators and supervisors, who comprise the publication's circulation, made the final selections.

Middle Earth—Final Chapter

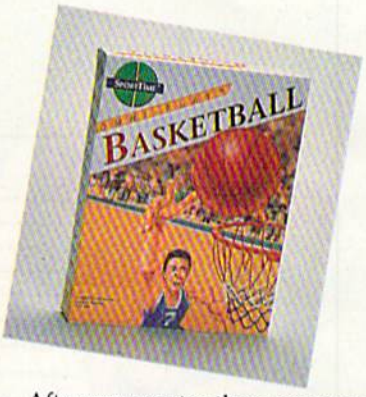
With the release of *The Crack of Doom* ($29.95), Addison-Wesley (Route 128, Reading, Massachusetts 01867) marks the final chapter of a four-part series of software based on the J. R. R. Tolkien literary journeys through Middle Earth.

Based on Tolkien's *The Return of the King* (book 3 of the trilogy *The Lord of the Rings*), *The Crack of Doom* features mazes, creeping lava, and the ever-present evil force of Sauron, The Dark Lord. In this final episode of the Tolkien Software Adventure series, you assume the role of Sam Gamgee, whose life depends upon how quickly and efficiently he and Frodo move through the different locations in the game. Food and water are scarce as you try to complete the noble quest of the Ringbearer: to hurl the Ring of Power into the fires of Mount Doom.

Jump Ball!

Now you can own, manage, and coach your own basketball team with *Omni-Play Basketball* ($34.95) from SportTime Computer Software (3187-G Airway Avenue, Costa Mesa, California 92626), the creators of Mindscape's *Superstar Ice Hockey*.

The package includes League and Game modules that allow you to build a team, determine season lengths and playoff structures, and recruit and trade players. As owner and general manager, you must be aware that players can suffer injuries and slow down as they grow older. Stats on all 288 league players are available to help you make the right personnel and coaching decisions. Down on the floor, you can play the game as well. In addition to shooting, passing, and playing defense, you can execute vicious, backboard-shattering slam dunks. Pregame and halftime shows, featuring SportTime's own announcing crew, provide game analysis and stats.



After you master these aspects of the game, SportTime offers extra disks that provide new ways to play the game, including a Pro League that simulates the NBA, a College League that allows you to set up an NCAA-style tournament, and a Fantasy League in which you create your own teams and compete with other players from around the country. Other disks can change your viewing perspective of the game and utilize different play styles. One even offers cheerleaders ready to support your hoopsters. Option modules sell for $19.95 each, while support disks will retail for $14.95.

Have a Baal

Only you can save Earth from the evil Baal, whose army of undead have stolen a war machine. In *Baal*, from Psygnosis (Century Buildings, Tower Street, Liverpool L3 4BJ, United Kingdom), you become leader of a band of time warriors that must invade the Baal's domain, fight off his monstrous beasts, retrieve the war machine, and kill the evil one.

Released under the Psyclapse label, *Baal*, available on disk ($12.99) or tape ($9.99), features eight-way scrolling through three different domains that contain multiple levels. You'll encounter more than 100 monsters and 400 traps that show up in over 250 detailed screens.

Third Time's a Charm

The third scenario in the *Wizardry* series, *Legacy of Llylgamyn* ($39.95), has been released by Sir Tech Software (P.O. Box 245, Ogdensburg, New York 13669).

Set in the mountain world of Llylgamyn, *Wizardry III* uses the descendants of characters created in *Wizardry I* and *II* to carry on the quest. The scions go in search of the fabled Orb of Earithan which would restore peace to the world. You must perfect the balance between good and evil search parties in order to survive.

Game features include six dungeon levels, window graphics, riddles, chests, and many traps. *Wizardry III* supports the 1700 series of RAM expanders, the 128 mode of the 128, additional keys found on the 128, and the burst mode of the 1571 disk drive. **G**

Photo by Mark Wagoner ©1989

Looking Good!

Tips and More Tips for Desktop Publishers

Tom Netsel

A newsletter published on your 64 or 128 needs more than good editorial content—it has to look good, too. Here are some tips to help your newsletter look better and make it easier to read.

Have you looked at your newsletter recently? I know you've read it, but have you *looked* at it? Does its layout and design attract readers, or does it deter them from wading through it?

Thanks to desktop publishing software, it's possible to turn out a multipage newsletter on your 64 or 128 in a fraction of the time it once took using conventional methods. But most desktop publishers have little publishing experience, and the ease with which these new tools are used doesn't necessarily equip an editor with a designer's eye for good layout.

If you are the editor of your user group's newsletter, or any other newsletter for that matter, you may think you have an audience waiting to devour every word no matter how it's presented—but think again. People are sensitive to how words look on paper. If reading your newsletter is a chore, your publication won't get the audience you want. As the editor, remember that the design is as important as its content.

It takes time to learn good page design, but there are a number of basic rules and tips that can help any newsletter editor over many layout hurdles. Here's a list of the important ones.

Design Tips

☞ Keep it simple.

☞ Select a distinctive newsletter name and typeface.

☞ Resist the temptation to use all your attention-grabbing tricks on one page. Too many design elements compete for attention.

☞ Your newsletter's logotype or nameplate is its most important design element. Select it with care. It will bring favorable recognition or create design nightmares.

☞ Decide on a logo that identifies your group. The Commodore User Group of Rochester (CUGOR) uses a picture of a cougar. The group in York, Pennsylvania, borrowed from English history's White Rose of Yorkshire to call itself the White Rose Commodore Users Group. It uses a white rose as its logo.

☞ It's smart to use a dummy, a rough layout of your newsletter on paper. It can help you see your newsletter's visual impact and appearance. If you make a mistake, it's easy to restart. ▷

BYTES OF INFO

BYTES

THE OFFICIAL MONTHLY PUBLICATION OF THE PENINSULA COMMODORE USERS GROUP

JUNE 1989 ISSUE VOL. 7 NO. 6

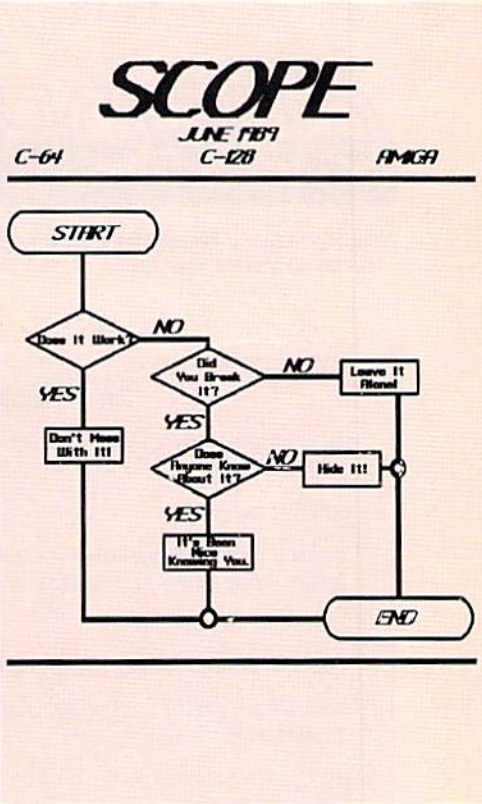
HEY FELLOW MEMBERS!

SUMMER IS HERE AND MOST OF YOU ARE THINKING OF OTHER ACTIVITIES OTHER THAN COMPUTING! WELL..... PCUG IS TOO! WE HAVE TWO PICNICS SCHEDULED THIS SUMMER. THE FIRST WILL BE JULY 30TH AND THE SECOND WILL BE ON AUGUST 30TH. BOTH PICNICS WILL BE HELD AT NEWPORT NEWS PARK AND IN LIGHT OF LAST YEAR'S PICNIC, THESE SHOULD ALSO BE A GREAT SUCCESS! PLEASE GET IN CONTACT WITH DAVE HOWARD IF YOU WOULD LIKE TO HELP PLAN THE ACTIVITIES OR BRING FOOD AND DRINK!

HOW WOULD YOU LIKE TO SEE THE SOFTWARE SELECTION OF YOUR CHOICE PREVIEWED AND DEMONSTRATED AT THE JUNE MEETING? WELL..... YOU CAN! IT HAS BEEN ARRANGED WITH GAMES -N- GADGETS TO HAVE A REPRESENTATIVE FROM THAT STORE PRESENT AT THE JUNE MEETING TO DO JUST THAT! TO MAKE YOUR SELECTION OF SOFTWARE THAT YOU WISH TO SEE, SIMPLY CALL OR DROP BY GAMES -N- GADGETS AT THE COLISEUM MALL AND STATE YOUR CHOICE! THE PHONE NUMBER IS 827-0877 AND THE ACTING REPRESENTATIVE TO OUR MEETING WILL BE RAY ERICKSON. THIS IS YOUR TIME TO GET A GOOD VIEW OF THE NEWEST RELEASED SOFTWARE, SO DON'T MISS IT!!!

LAST, IN HOPES OF INCREASING ARTICLE CONTRIBUTIONS TO OUR NEWSLETTER, IT WAS DECIDED AND AGREED UPON TO GIVE A FREE RAFFLE TICKET FOR THOSE WHO DO CONTRIBUTE. THIS WILL GIVE THE AUTHOR OF A ARTICLE A FREE CHANCE TO WIN WHAT IS BEING RAFFLED OFF THE NIGHT OF THE MEETING. THERE ARE LIMITATIONS; THE ARTICLE HAS TO BE ACTUALLY USED IN THE NEWSLETTER. YOU MUST BE PRESENT TO WIN AND THE EXECUTIVE BOARD IS EXCLUDED FROM RECEIVING THE FREE RAFFLE TICKET UNLESS THE ARTICLE SUBMITTED IS ABOUT SOMETHING OTHER THAN THEIR NORMAL DUTIES WITHIN THE CLUB. KEEP THOSE SUGGESTIONS AND IDEAS COMING! PCUG IS ON A ROLL, LET'S KEEP IT THAT WAY.

BOB ARTHUR PRESIDENT



Balance your text with graphics, headlines, and copy. Left: This example shows an organized, easy-to-read format with boldface type for events and other important information. Right: The flowchart sitting alone on the title page could send a confusing message to some readers; it would have been better used as a smaller graphic with some accompanying text. This example also contains a lot of usable space.

Keep it simple. Keep it brief.

☞ Start a *swipe file* of newsletter formats you like. Feel free to swipe or adopt ideas and design features that appeal to you. Your user group may already subscribe to other groups' newsletters. Look for one you like, and then adopt or modify format ideas for your own work.

☞ Balance the text on your page with graphics and headlines.

☞ Don't crowd your text. It's a mistaken belief that readers don't care how information is presented, just as long as they get it. Long lines of text can be difficult to read because the eye often rereads or skips a line when it returns to the left margin.

Getting More Type on a Page

Reduce the size of your graphics. A small picture with white space around it is more effective than a larger picture on a crowded page.

Try another typeface. Some typefaces consume less space than others of the same size.

If you use subheads, try putting them in smaller type. Try a subhead the same size as your text, but put it in bold type. Cut the amount of leading by one point.

Try increasing your line length by half a pica (but in general, don't sacrifice margins to gain space).

Trim the bottom margin.

Don't trim the width of your gutters unless they are already wider than a quarter inch.

☞ Break up large gray areas of text. A page of solid text without headlines or pictures is a page readers will skip.

Your logo is your newsletter's most important design element. Choose one that strongly identifies your group or club for instant recognition.

☞ Consider switching to two or three columns if your newsletter now is one column. It's easier to read, and it looks good. Some designers suggest no more than 45 characters per line, regardless of the type size.

☞ Use wider columns if you plan to use justified type.

☞ Don't justify type unless your program hyphenates words.

9 Tips for Newsletter Writers

Style is not enough for any newsletter. In addition to looking good, a successful newsletter must have exceptional editorial content. Here are nine tips for newsletter writers.

- Keep it simple.
- Keep it brief. A newsletter should convey essential information in a clear, concise manner. Condense. Remember, a longer newsletter isn't necessarily a better one.
- Use short sentences.
- Use the active, rather than the passive, voice.
- Use strong nouns and verbs. Adjectives only boost weak nouns. Remember: Too many adjectives strung together slow the reader.
- Jump into your subject. You don't have room to ramble.
- Try to make your opening paragraph hook the reader into wanting to read more. Start with a pointed statement; then provide background or explanatory information.
- A headline should tell the reader what an article is about. Write the headline after you've written the story.
- Have someone other than yourself proofread your material. Typos and misspelled words detract from your message.

DOn't MAKe YouR neWsleTTEr LoOk liKe A rAnsom NoTE.

☞ Pick a typeface that's easy to read. You may have access to hundreds of fonts, but resist the temptation to use a lot of them. Above all, pick one that's readable when it comes off your printer.

☞ You can squeeze more words onto a page by using smaller type, but for readability, 9-point type is the smallest normally used for text. The largest is usually 12 points.

☞ Use *serif* type in the body of your text. Most design experts agree, *sans serif* type is attractive in headlines, but it just doesn't work in the text.

☞ Don't be afraid to use white space. It can emphasize or highlight the type set next to it. Used judiciously, white space can add a sense of style and class to your publication.

AmigaTalk determines which win-
ently working with, and speaks
Where a sighted user selects the
by using the mouse, AmigaTalk
so with keyboard commands.

ow can have many features which
e use of the mouse to activate.
res are called menus and gadgets.
lecting and specifying options for
hen you hold down the right
a strip of menu choices appears
nt window. Move the mouse to
hoice, and a list of sub choices is
the mouse to any of the sub-
another list is displayed. With
of this investigating and selecting
hrough the keyboard.

re usually pictures with some cen-
like "hang up modem" or "quit
noving the mouse to a gadget on
clicking the mouse's left button,

Serif type features small cross strokes at the end of each character. Use serif in the body of your text, but think twice before using it in headlines.

☞ Use variety. Break up solid gray text with graphics and headlines—but avoid a symmetrical look when using multiple graphics; it makes a page look dead.

☞ Consider subheads to break up long stretches of text and give the reader a break.

☞ Type set in upper- and lowercase reads about 13-percent faster than type set in all capitals. Keep this in mind when writing long headlines set in capital letters.

☞ Don't make your newsletter look like a ransom note. Strive for variety, but don't use too many fonts and typefaces on one page. Such a mixture can make your newsletter look like something a kidnapper might send to the victim's family. Use the same typeface throughout your newsletter for the body of your text. ▷

6 Questions an Editor Should Answer Before Publishing

When designing a newsletter for any group, think about the impact your publication will have on its readers. Answer these six basic questions before you publish, and there's a good chance you'll keep your readers and even gain some new ones.

1. What do you want to achieve?
Do you want to keep user group members informed of club happenings and events? Do you want to attract new members? Do you want to publicize club events, review software, promote the sale of club disks? Decide what you want to do and what results you are seeking; then design your newsletter to accomplish those goals.

2. Who are you trying to reach?
Determine your audience. As newsletter editor, you probably want to reach other 64 or 128 owners. Gear your message to your readers and give them what they want.

3. Where's the best place for your message to appear?
A newsletter may be the best vehicle for what you have to say, but is it the best one? Would a simple flyer or even a form letter be better? It depends on what you want to say, how much you have to say, and how much effort you are prepared to devote to the project.

4. When do your readers need this information?
No sense telling group members about upcoming events after they've happened. Create deadlines and be sure to allow enough time for the writing, layout, printing, and distribution of your publication.

5. Why do people need this information?
You want group members to be informed about their computers and interested enough to attend meetings. You also want to attract new members to your group. Give readers information they can't get elsewhere.

6. How are you going to produce this message?
Multipage newsletters are ambitious undertakings. Reading a newsletter takes minutes of a reader's time, but preparing a newsletter takes hours of an editor's time. Make sure of your publishing capabilities, your software, and your hardware before you start.

☞ Poor readers have an easier time reading ragged right columns than columns set in justified type. Good readers have no problem with either. Justified type with large gaps between words can be annoying.

☞ Color is an effective design element that can add spice to your newsletter, but it can be expensive. Consider shading instead. A light-gray screen behind a box of text or a graphic can be appealing.

☞ Place your articles in well-defined spaces. Readers shouldn't have to guess where an article starts or ends.

☞ Make certain that photos or graphics relate to their articles and are placed nearby.

☞ Don't use graphics simply to use graphics. Think twice about importing a piece of clip art; unless you have a good reason for using it, don't.

☞ Minimize clutter. Articles should have their own designated areas, separate from others.

☞ Use a thin line or rule to separate unrelated stories or articles.

☞ Don't overuse boxes, rules, and lines.

☞ Don't feel you have to fill every bit of space on a page with text or graphics.

☞ Don't use two spaces after a period. That's fine for business letters, but it wastes space in a newsletter.

☞ Don't butt heads. Headlines should not be placed next to one another—they tend to fuse.

4 Questions After You're Up and Running

Now that you've planned and designed your newsletter and have an issue or two under your belt, here are a few more questions you should ask yourself.

1. Do I have to do *everything*?
Newsletter editors shouldn't write every word themselves. Solicit articles and contributions from other club members. But there's other work involved with publishing a newsletter. After it's been written, proofed, and laid out, someone has to take the newsletter to the printer. Then, someone has to pick up the completed newsletters, fold them, address them, take them to the post office, and mail them to members. The editor is often stuck with these chores. Look for additional help, and delegate, delegate, delegate.

2. How do I fill three more pages?
Have a realistic idea of how much space you need to fill. When you ask for contributions, make sure writers know how much copy you expect. No sense asking for a two-page software review when you have space for only a couple of paragraphs. On the other hand, trying to fill a whole page by padding a 200-word article is just as bad.

3. Why can't I load this file?
Make certain that contributors submit material in a format compatible with your word processor or publishing program. If not, you'll have to retype everything. If there is a compatibility problem, have contributors submit text as a sequential ASCII file. Most word processors can convert files in this mode.

4. What happens when I'm on vacation?
One newsletter staff member may love doing all the critical tasks, but what happens if that person goes on vacation or for some other reason isn't available? Train other club members to do your job, and make sure more than one person can complete all the other necessary tasks.

☞ Give a page a center of interest; the reader's eye will find one if you don't. Lead the reader to a story with a headline or a large, well-placed graphic.

☞ Pay attention to photos and graphics. Most pictures draw the eye in one direction or another. A photo of a person looking to the reader's right will cause the reader's eye to drift right. If this photo is placed near the newsletter's right-hand margin, the reader's eye will drift off the page. Place a right-facing graphic on the left side of the page. Place it to the left of its story, and the reader's eye will be drawn to that story.

☞ You wouldn't use a copyrighted article in your newsletter, so don't use copyrighted graphics without permission.

☞ Proofread everything; then have someone else proofread everything.

☞ Design, like tact, is a failure if it's noticed. Readers should notice the information and not the method in which it is presented.

Publisher's Glossary

body. The main text of an article.

body type. The type style used in the main text.

boldface. Printing in a similar style and size as text type, but made to appear darker with thicker lines.

box. A section of type enclosed by a square or rectangle.

caption. The text that identifies or explains a photo or graphic. Also called a *cutline.*

column. Vertical sections of text in a page layout.

condensed. A style of type that takes up less space than a font's normal amount.

copy. The text that appears in a publication (excluding heads and graphics).

crop. The elimination of unwanted detail from a photograph or graphic.

dummy. A mockup of a newsletter page used for planning or design purposes.

expanded. A style of type that takes up more space than a font's normal amount.

flush left. Type that is aligned along the left margin of a column.

flush right. Type that is aligned along the right margin of a column.

font. A complete set of letters and numbers in one typeface and size.

gutter. The white space between columns or between two facing pages.

headline. A title usually set above an article and made larger than the normal type.

justify. To align text along the margin of a column. (See *ragged.*)

kern. To adjust spacing between letters.

layout. The arrangement of text and graphics on a page.

lead. The opening sentence or paragraph in an article.

leading. The space between lines of type. (Pronounced *ledding.*)

logo. Short for *logotype.* Usually a stylized combination of text or drawings used as a symbol for a corporation or an institution.

pica. A printing unit of measure, approximately equal to 1/6 inch. Heights and widths of pages and columns are often measured in picas.

point. A unit of measure in typesetting. One point equals 1/12 pica and approximately 1/72 inch.

ragged. Unjustified text (not vertically aligned). Almost all the type in this magazine is set ragged right, while the left margin is justified.

sans serif. Type styles that do not have the small strokes (serifs) at the ends of characters.
This is sans serif type.

serif. Type styles that have small strokes at the end of characters. Most of the type in this magazine is done in this style. **This is serif type.**

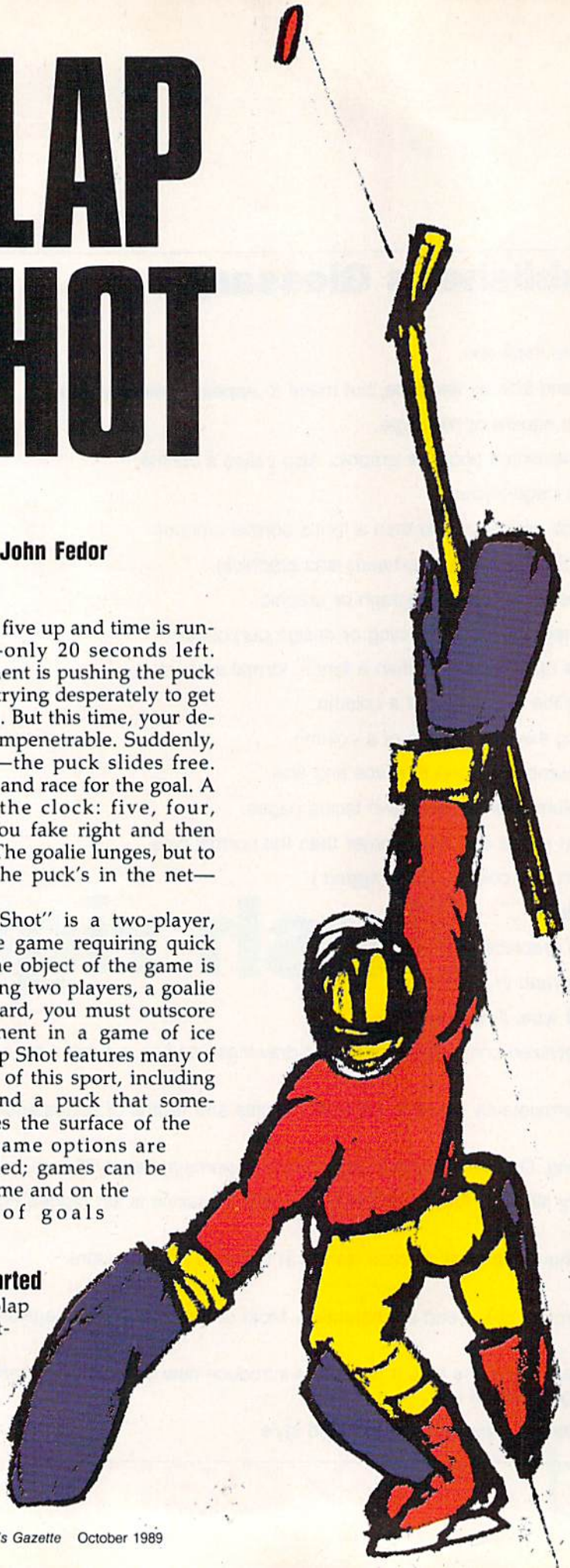
subhead. A headline used within the body of the text. It is used to introduce new sections in the article and as a design element to break up large areas of text.

typeface. A complete set of characters in a particularly designed style. **G**

SLAP SHOT

Lace up your skates and hit the ice in this fast-paced, two-player, ice hockey game for the 64. Two joysticks required.

John Fedor



The score's five up and time is running out—only 20 seconds left. Your opponent is pushing the puck up the ice, trying desperately to get around you. But this time, your defenses are impenetrable. Suddenly, a mistake—the puck slides free. You grab it and race for the goal. A glance at the clock: five, four, three. . . . You fake right and then shoot left. The goalie lunges, but to no avail. The puck's in the net—you win!

"Slap Shot" is a two-player, arcade-style game requiring quick reflexes. The object of the game is simple: Using two players, a goalie and a forward, you must outscore your opponent in a game of ice hockey. Slap Shot features many of the aspects of this sport, including checking and a puck that sometimes leaves the surface of the ice. Two game options are also provided; games can be based on time and on the number of goals scored.

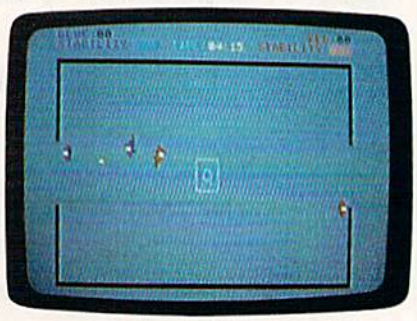
Getting Started

Although Slap Shot is written in machine language, it loads and runs like a BASIC program. To enter it, use "MLX," the machine language entry program found elsewhere in this issue. When MLX prompts you, respond with the values given below.

Starting address: 0801
Ending address: 1B00

When you've finished entering the program, be sure to save a copy to tape or disk before you exit MLX.

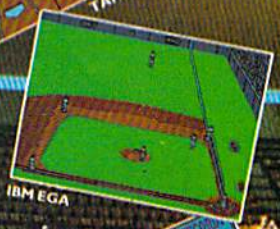
To start the game, plug two joysticks into your computer; then load the program and type RUN. A title screen will appear showing a time limit (labeled *TIME*) of five minutes and a score limit (labeled *SCORE*) of ten goals. A highlight bar is positioned over the word *TIME*. Push either joystick up and down to move the bar between TIME and SCORE. The position of the highlight bar when the game begins determines whether the game will be based on elapsed time or on the number of goals a player scores.



The red forward attempts a shot on goal from close range.

continued on page 18. ▷

Orel Hershiser's STRIKE ZONE



THE *ONLY* AUTHORIZED VERSION OF THE ARCADE HIT "STRIKE ZONE!"

Take Orel Hershiser's place on the pitcher's mound and BLISTER that horsehide over the plate! Mix your fastballs with sliders and sinkers to keep the batter off his guard.

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BACKDROPS

Add a professional look to text and graphics screens with this short machine language routine for the 64.

Richard Penn

The 64's screen, with its simple border frame, was fine when the computer was introduced, but it pales in comparison to the displays generated using today's state-of-the-art video techniques. With "Backdrops," you can bring your 64's video display up to date. This program lets you specify the color of each screen line and then superimposes text over the custom background. What results is a dramatic 3-D effect. Because the backdrop includes the border region, the screens you create resemble those seen in television commercials, sports telecasts, and news programs.

Getting Started

Backdrops is a two-part program. The first part (lines 10–220) is a demo. The remainder contains the machine language routine (lines 1010–1110) that actually creates the backdrop, a FOR-NEXT loop to clear the backdrop to black (line 1030), and the code for three sample backdrops (lines 1120–1360). To prevent typing mistakes while entering Backdrops, use "The Automatic Proofreader," found elsewhere in this issue. Be sure to save a copy of the program to disk or tape when you've finished typing.

To install Backdrops, load and run the program. Once the ML data has been POKEd into memory, follow the instructions on the screen to view the sample backdrops. If you wish to use the backdrop routine or any of the sample backdrops in your own programs, simply add lines 1010–1360 to your program and execute a GOSUB 1010 before using Backdrops' commands.

This screen illustrates a dramatic 3-D effect achieved with "Backdrops."

Using the Program

To access Backdrops' features, you must use three SYS commands. The first, SYS 49152, activates Backdrops.

The second command, SYS 49185, toggles the screen on and off (the backdrop remains visible). This

continued on page 18.

No other training—in school, on the job, anywhere—shows you how to trouble-shoot and service computers like NRI

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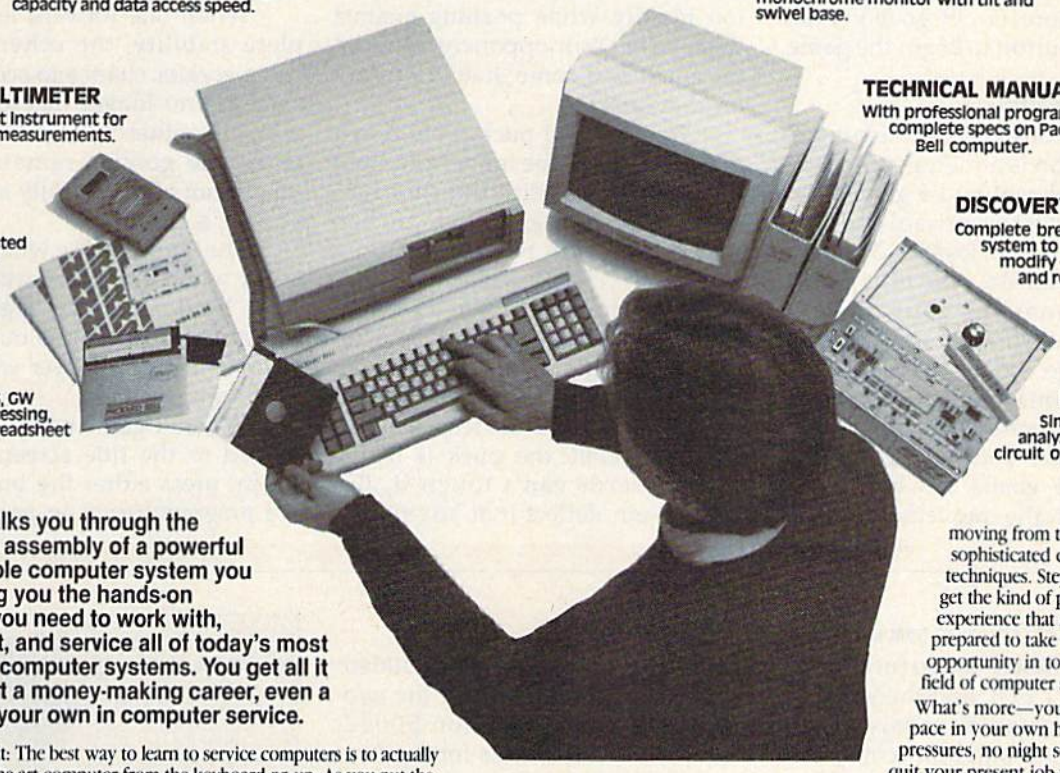
LESSONS
Clearcut, illustrated texts build your understanding of computers step by step.

DISCOVERY LAB
Complete breadboarding system to let you design and modify circuits, diagnose and repair faults.

SOFTWARE
Including MS-DOS, GW BASIC, word processing, database and spreadsheet programs.

DIGITAL LOGIC PROBE
Simplifies analyzing digital circuit operation.



Only NRI walks you through the step-by-step assembly of a powerful XT-compatible computer system you keep—giving you the hands-on experience you need to work with, troubleshoot, and service all of today's most widely used computer systems. You get all it takes to start a money-making career, even a business of your own in computer service.

No doubt about it: The best way to learn to service computers is to actually *build* a state-of-the-art computer from the keyboard on up. As you put the machine together, performing key tests and demonstrations at each stage of assembly, you see for yourself how each part of it works, what can go wrong, and how you can fix it.

Only NRI—the leader in career-building, at-home electronics training for 75 years—gives you such practical, real-world computer servicing experience. Indeed, no other training—in school, on the job, *anywhere*— shows you how to trouble-shoot and service computers like NRI.

You get in-demand computer servicing skills as you train with your own XT-compatible system—now with 20 meg hard drive

With NRI's exclusive hands-on training, you actually build and keep the powerful new Packard Bell VX88 PC/XT compatible computer, complete with 512K RAM and 20 meg hard disk drive.

You start by assembling and testing the "intelligent" keyboard, move on to test the circuitry on the main logic board, install the power supply and 5¼" disk drive, then interface your high-resolution monitor. But that's not all.

Only NRI gives you a top-rated micro with complete training built into the assembly process

Your NRI hands-on training continues as you install the powerful 20 megabyte hard disk drive—today's most wanted computer peripheral—included in your course to dramatically increase your computer's storage capacity while giving you lightning-quick data access.

Having fully assembled your Packard Bell VX88, you take it through a complete series of diagnostic tests, mastering professional computer servicing techniques as you take command of the full power of the VX88's high-speed V40 microprocessor.

In no time at all, you have the confidence and the know-how to work with, troubleshoot, and service every computer on the market today. Indeed you have what it takes to step into a full-time, money-making career as an industry technician, even start a computer service business of your own.

No experience needed, NRI builds it in

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- ☐ Data Communications

Name _____ (please print) Age

Address _____

City/State/Zip _____

Accredited by the National Home Study Council 153-109

▶ Slapshot continued from page 14.

If you want the game to last for a certain length of time, position the highlight bar over TIME; then push either joystick left or right to increase or decrease the time limit (1–99 minutes). If you want the game to be decided by the number of goals a player scores, move the highlight bar to SCORE; then push either stick left or right to select a winning score (1–99 goals). Press either fire button to begin the game.

Player Control

Each team consists of two players: a forward, who is a roving offensive/defensive player, and a goalie. Joystick 1 controls the forward and goalie for the red team; joystick 2 controls the players for the blue team.

To maneuver your players, push the joystick in the direction you want to move. Response isn't instantaneous because you're on ice; at the same time, it's not so sluggish that you'll become frustrated. The goalie moves up and down with the movement of the joystick, so take care if you're trying to move the goalie and the forward at the same time. The goalie can only block the puck (by touching it). The forward can grab the puck when it is moving freely on the ice.

To steal the puck from your opponent's forward, press the fire button when you come in contact with this player. To check your opponent's forward, press the fire button rapidly while pushing against this player. Your opponent will lose the puck and some stability (more on that later).

To shoot the puck, hold down the fire button. The longer you hold it, the more velocity the shot has. The puck will begin moving when you release the button or when maximum velocity is reached. Since the puck travels in the direction your stick faces, you must be careful not to shoot it into your own goal. If you shoot the puck hard enough, it lifts off the ice, casting a shadow. While the puck is in the air, forwards can't touch it. But goalies can deflect it at any time.

Stability

Below each player's score is a *stability* bar. The longer the bar, the more stable the forward. If a forward is checked, he loses stability. When all stability is lost, a forward will no longer be able to move (the goalie can still move). Control returns to the forward as soon as his stability bar increases to a third of its full length.

When one forward loses complete stability, the other forward has a greater chance to score a goal since he no longer has to contend with the other forward. However, since the goalies remain active, you're not automatically assured of scoring a goal.

The game ends when time is up or when one player reaches the score limit set at the beginning of the game. If time runs out and the score is tied, the player who scores next wins.

When a game ends, you're returned to the title screen. To play again, press either fire button.

See program listing on page 82. **G**

▶ Backdrops continued from page 16.

command allows you to turn off the screen, print to it, and then make it reappear instantaneously. Thus, the user sees only the completed screen. By calling this command repeatedly, you can flash the contents of the screen.

The third and last command, SYS 49201, turns off Backdrops.

Design Considerations

For many applications, the three backdrops provided with the demo will suffice. To select one of these custom backdrops, execute the GOSUB that corresponds to that backdrop. To draw a laserlike backdrop, type GOSUB 1130; to draw a line backdrop, type GOSUB 1240; and to draw a plank-like backdrop, type GOSUB 1290.

If you wish to design and program your own backdrops, you'll need to understand a little about how Backdrops works. Much like text and graphics screens, Backdrops reserves an area of memory for color storage, specifically locations 50040–50254. Every other byte in this range contains the color value (0–15) for two *raster*, or screen, lines. Thus, location 50040 contains the color value for the two top screen lines, location 50042 contains the color value for the two lines below this, and so on.

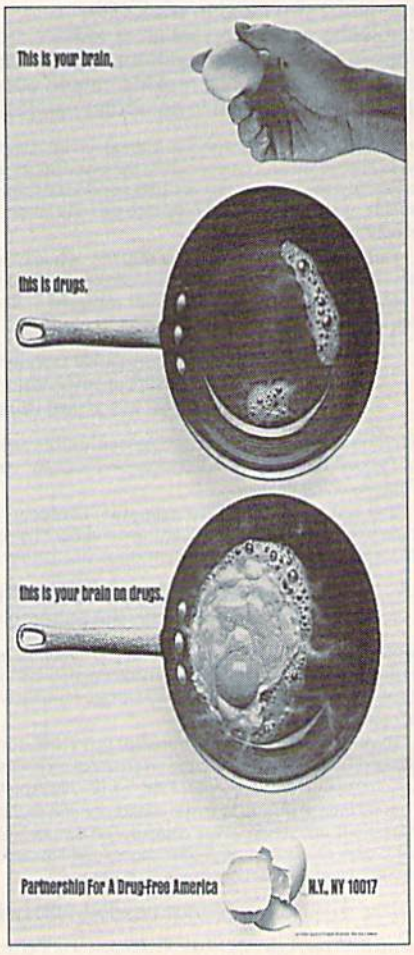
By POKEing different color values in the range 0–15 into the backdrop color memory, various backdrops can be created. For example, the following line:

```
FOR T=50040 TO 50254 STEP
  2:POKE T,0:T=T+2:POKE
  T,1:NEXT
```

draws a zebra pattern of black and white lines. To see how more complicated backdrops are created, take a look at the sample routines in the demo.

When using Backdrops, you'll find that large letters look best, especially if a shadow is added to enhance the 3-D effect. But most importantly, Backdrops can also be used with multicolor graphics mode. For an eye-catching title screen, combine a graphics screen containing fancy letters (drawn with a paint program) with a backdrop. The results are really impressive.

See program listing on page 85. **G**



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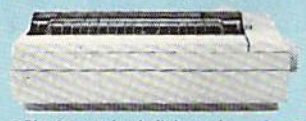

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REVIEWS

Overrun!

Overrun! is possibly the most complex war game available for the 64. But complexity is not a problem here: The user interface makes *Overrun!* easy to control, and the pace of the game is fast. SSI, long known for its line of computer war games, has put into this latest release the same effort and attention to detail we've come to expect.

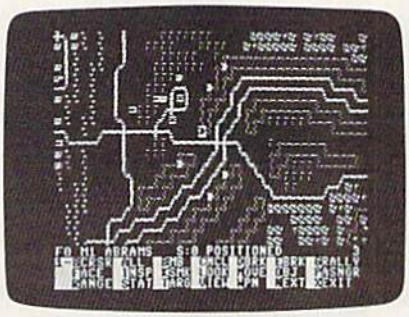
Overrun! is an excellent simulation of the modern battlefield. Four basic elements are used: Armor, Artillery, Infantry, and Air. Command, Control, and Communications, the all-important links between the forces, are also present. *Overrun!*'s detail is amazing: Units are individual tanks, guns, and squads. All details are tracked by the computer—strength of armor, unit morale, and ammunition—right down to the last bullet in an infantryman's rifle.

Overrun! ***is an excellent simulation of war at its most complex: the modern battlefield.***

Despite all of the elements and details, the program is easily controlled. You move the units and plot the fire, and the computer handles the rest. With a tabletop game of this complexity, it would take days to complete a major battle, but *Overrun!* handles the job in less than three hours. Likewise, a full campaign would take tabletop gamers well over a year to run, but the program takes you through World War III in less than two days.

Play isn't all that simple, however. As with all war games, decisions are many and situations are ever-changing. After selecting a scenario and passing the copy-protection question, you set up your forces. Move each unit into place, or let the computer set up for you. Once in position, the game begins.

Orders are given to units through their headquarters (HQ). It is very important that a player understand the use of an HQ. Lose just one, and all of its subordinate units become computer-controlled. Lose the supreme HQ, and all your units become computer-controlled.



Reading the manual isn't enough to fully understand and play the game. You must master all the options if you expect to succeed. Fire is handled by the computer. You control who shoots at whom, where your units move, how fast and high your helicopters fly, and so on. Gameplay is fast and furious, but I never lost time hunting for any available option.

The *Overrun!* package includes two games. The first is the NATO–Warsaw Pact battles of World War III, probably the game most people will select first. All major and minor units are here, from the powerful M-1 Abrams Main Battle tank to the smallest infantry squad. French, German, and British units also appear, along with their Soviet counterparts.

The second game, the Mideast Wars, lets you fight battles on World War III's southern front or control the fighting between Israel and the Arab countries. There's no lack of detail here. The scenarios are well designed and promise to keep your attention for many months.

The next attraction is the Map/Scenario design utilities, where you can create a full battle, including maps. If you're not ready to tackle the editor, the program will build a map and recruit the forces for you, while you set the parameters.

Overrun!'s documentation is almost faultless. Along with SSI's usual manual comes briefing books for the built-in scenarios, listing standard formations and statistics for all individual units. The information is extremely detailed and mostly accurate, although many veteran war gamers and U.S. Army servicemen and -women will quickly note some errors. (All the listings for U.S. tanks contain errors in one form or another.) But play isn't affected terribly by this.

All things considered, *Overrun!* delivers excellent play and great value for the price.

—Erik Olson

Overrun!
Strategic Simulations
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Chomp!

Chomp!'s subtitle is *Just when you thought it was safe to go back in the water.* It might have been called *Just when you thought goldfish led easy lives*—try this game and learn otherwise.

You begin life in a pet-shop goldfish bowl. You are alone save for brine shrimp dropped in as food. The object is to eat enough shrimp to grow large enough to leap out of the bowl and into an adjacent tank. If you think that's easy, then it's obvious you've never been a goldfish.

Should you refuse this mission, you'll turn green and die from lack of oxygen. (Really, I'm not making this up.) It might seem to be a nice idea to simply relax and eat whatever shrimp fall your way—you probably thought your own goldfish did this—but it is in the nature of life to strive for something better. In this case, something better is the river.

To get to the river, however, you have to grow large enough to leap from your fishbowl into the tank. Miss, and you'll land on a shelf and suddenly find your carcass being flushed away—a fate endemic to dead fish.

Succeed, and you'll end up in a partially covered tank inhabited by oth-

er fish, all intent upon taking bites out of you. Since bites sap your strength, the idea is to eat and grow large enough to take bites out of them. All of you are competing for the same food supply, so you'll have to be fast. If you're not fast enough, you'll turn blue, an indication that you're about to shrink. Eat something quickly and you may be able to stave off the change.

Staving off the cat is another matter. From time to time you'll see its paw reach into the water, fishing for . . . you guessed it. It is simply not interested in the other fish, and you have no escape once caught. In the scene after you are caught, the cat is licking its chops.

If you manage to stay away from the cat, you'll still have to contend with a monkey equipped with a fish net. Apparently, the pet-shop owner is away. Or perhaps he has a most liberal attitude toward his charges.

Avoiding the cat and the monkey is a matter of diving deep among the aquarium plants or hiding under the lid that partially covers the tank. Of course, if you don't move you'll suffocate, and if you don't eat you'll starve. The choice is yours: green death or yellow death. But you can get lucky.

There is as much challenge in this game as in anything I've seen.

The partial cover presents an additional hazard to your progress. As you try to make the leap from this tank to the next larger tank, you'll want to aim for the correct opening in the cover. Otherwise, you'll probably hear that flushing sound again.

The object of the game is to progress from one tank to another. Each tank is larger than the last, giving you more opportunity for growth, but each succeeding tank also holds larger fish. When you've completed all the tanks on one shelf, you'll have to leap to the next shelf. If successful at every level, you'll be able to leap through the window to the river and freedom.

How many shelves are there? I don't know. And modesty—or shame—forbids me telling you the level I've attained.

Chomp! is controlled by a joystick. Jumping is a matter of using the stick and the fire button in combination, perhaps the simplest controls I've seen in a long time. But don't let that give you the idea the game is easy. There is as much challenge here as in anything I've seen.

Graphics and animation are excellent, with the movements of the fish realistic. Sound consists of music reminiscent of the monotonic theme from the movie *Jaws*. The documentation is more than I expected for a game of this type, but it never takes itself seriously and can be read with pleasure.

Besides attaining the freedom of the river, you'll also earn points for your actions. Eating brine shrimp, flake food, and a water bug will add to your score, as will eating other fish. Further, if you are in a tank with a shark and eat the water bug, you'll switch sizes with the shark. What a joke on him.

Your running score is shown in a status line at the bottom of the playing screen. At the end of a game, after you've used your allotted lives, enter your name or initials next to your score on a hall of fame roster.

As a new idea in computer gaming (or a cleverly disguised old idea), *Chomp!* scores high marks for originality and innovation. It should provide hours of fun and challenge for anyone tired of shooting at pink aliens.

—Ervin Bobo

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The Honeymooners

Jackie Gleason's smiling face rises on a harvest moon above the Brooklyn skyline, while the computer warbles a squeaky rendition of the theme song from "The Honeymooners." The lyrics appear at the bottom of the screen, replete with a bouncing ball that keeps time with the music for those who want to sing along.

The primary purpose of First Row's *The Honeymooners* is to entertain, but there's more than that. The game pays affectionate tribute to the television classic that inspired it, providing "Honeymooners" fans with the perfect vehicle to indulge their nostalgia for the show.

The premise of the game is based on an actual "Honeymooners" episode and revolves around one of the show's favorite themes: Ralph Kramden's eternal quest for money. This time, he needs to raise $223 within a week for train fare to attend the Raccoon Lodge's annual convention in Miami.

Up to four Ralph surrogates can join in the scramble for cash, competing against each other and the clock. Players earn money by participating in various moneymaking schemes that take the form of several arcade game sequences. (*The Honeymooners'* plot bears more than a passing resemblance to another game with its roots in television's past: Cinemaware's *The Three Stooges.*)

In the first game-within-a-game, you join Ralph on the job, driving a bus around New York City. Stealing a scene from *Pac-Man*, this sequence requires you to maneuver the bus through the city's maze of streets, gobbling up passengers instead of little dots. Your pay at the end of the day depends on how many passengers you manage to deliver to their destinations.

The game provides fans of the TV classic with the perfect vehicle to indulge their nostalgia.

As I'm sure anyone who has ever driven in New York can attest, other vehicles pose a primary threat to your safety, not to mention to your paycheck. Suffer a single fender bender, and you forfeit your earnings for the turn. The same occurs if you fail to return to the bus depot before the time limit expires. Your pay gets docked for each passenger who remains on board—if you make it back to the depot. The bus-driving segment is unquestionably the most challenging part of *The Honeymooners*, and you may wonder how anyone ever earned a living this way.

The game's second act also features a maze, but this time it gives you a rat's-eye view of the New York City sewer system. Ed Norton stars in this scene. The script calls for Norton to fix as many leaks as he can find and return to the surface within a designated amount of time. He carries a map showing the layout of the pipes and the location of the leaks, but, true to the stupidity for which he was famous, he quickly loses it.

Nevertheless, compared to the demolition derby your bus negotiated on the streets above, tramping around in the sewers is like a walk in the park. The only hazard here is the possibility of becoming irrevocably lost. But, given the limited size of the sewer network, it

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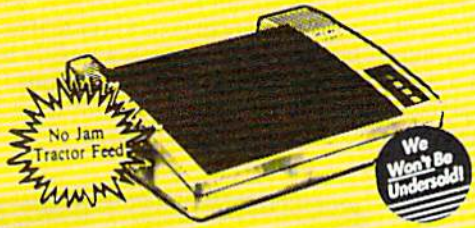

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would take a mentality the size of Norton's to accomplish that feat.

The third segment brings Alice and Trixie into the picture. Enlisted by Ralph to help him solve his cash-flow problems, the women have landed jobs at Morgan's Department Store, assembling jigsaw puzzles for display in its toys section.

The puzzles take the form of scenes from actual "Honeymooners" episodes scrambled on a four-by-five-block grid. The program rewards you with a dollar for each piece correctly placed before time runs out, regardless of whether you complete the entire puzzle. Admittedly, at this payment rate, your earnings will probably fall short of even the 1960s' version of minimum wage. But at least you are guaranteed something for your labors, as opposed to the bus scenario where scores of 0 are routine.

The game injects an element of strategy by letting you choose which sequences you'd like to repeat once you've run through them all. The program also gives you the chance of doubling your daily winnings by answering a "Honeymooners" trivia question.

In the annals of computer games, *The Honeymooners* certainly occupies a strange niche. Consider again what the program asks you to do—drive a bus, repair sewer leaks, and assemble puzzles. In contrast to the fantastic and frenetic pursuits found in most arcade games, *The Honeymooners* seems positively mundane by comparison.

But in the context of its subject, this kind of activity makes sense and accounts for a large measure of *The Honeymooners*' charm. After all, Ralph was a bus driver on the TV show, while Norton worked in the sewers. The game's content, from the opening screen to the final graphic of Ralph in his Raccoon Lodge garb, is deeply rooted in and neatly recalls the world of the TV series. As an exercise in nostalgia, *The Honeymooners* resurrects many memories for anyone who has seen the TV show.

Unfortunately, a couple of problems detract from the product's appeal. First, if you aren't a fan of "The Honeymooners," or if the series simply predates your own time, then at least some of the game's charm will be lost on you. The manual does a brave job of attempting to enlighten the uninformed as to what the show was all about, but it's hard to bridge the generation gap in a few pages of exposition. Second, the program suffers from the computer-game equivalent of too many commercial breaks—lengthy pauses every time a new screen is loaded.

Is *The Honeymooners* a game for the faithful only? Not exactly. But if mention of a television show about honeymooners makes you think of "The Love Boat," then perhaps you should ask yourself whether it's worth spending $30 for the privilege of driving a bus.

—Jeff Seiken

The Honeymooners
First Row Software
3624 Market St.
Philadelphia, PA 19104
$29.95

Modem Wars

Violence in the twenty-first century has moved from the battlefield to the football field, and *Modem Wars*, courtesy of Electronic Arts, brings the action into your home. Each team still has a goal line, but robots have replaced linemen, and pads and helmets have evolved into armor and bionics.

After the opening scenes of this Dan Bunten game (Bunten is the creator of several classics, including *M.U.L.E.*), you're asked to find a map in the 52-page manual and identify it. Once past this copy-protection scheme, several options appear: Compete with a modem opponent, practice with solo trainer, watch, save, or load a game film.

Try the practice mode, and *Modem Wars* offers seven war scenarios: Scrimmage, QB Sneak, The Bomb, Face-Off, Sluggers, Full War, and Defenders. These games range from simple to complex, allowing you to field from 2 to 50 players per side.

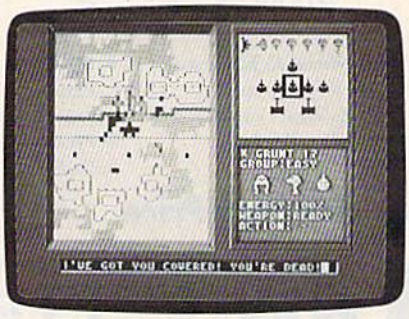
Modem Wars *brings realtime, twenty-first-century combat action into your home.*

You are the quarterback, and the mobile Command Center (Comcen) is your headquarters. If it gets knocked out, the game is over. Under your command are Grunts, basic foot soldiers; Riders, your cavalry; Boomers, big guns; and Spies, your reconnaissance units. Once a scenario is selected from the menu, the main playing field appears in the form of a topographic map. Your forces are represented by the red squares, but your opponent's blue squares don't appear until your troops make contact with them.

To the right of the main screen is a closeup area that lets you identify individual robots. Place your cursor on a robot, and its profile appears on a screen below. Listed are its type, energy level, weapon mode, and action taken: moving, repairing, fighting, stunned, or dug in.

To move your forces, place the cursor on a robot and press the fire button. You'll see *setting destination* appear on the profile screen. Move the cursor anywhere on the playing field and press the fire button again. The unit begins moving to that destination. Move to another robot and repeat the process as often as you like.

You may want to hide your Comcen behind a hill or in a forest for protection while sending out spies and troops to locate and engage the enemy. The enemy will be searching for you. Robots fire automatically when the enemy is within range. You may wish to commit more of your forces to that area, but, remember, this is a mobile battlefield: The enemy may have pulled back and disappeared by the time your Grunts and Riders arrive.



In a game such as Scrimmage, there are two ways to win: Knock out the enemy Comcen or move more troops than your enemy moves across his back (goal) line before time runs out.

After a game, watch an accelerated replay of the entire battle on the game film. All forces are visible, and you can see your enemy's tactics and where you made mistakes or earned points.

But there's plenty more to do with *Modem Wars*. In advanced scenarios you have a radar console and a drone console. Drones are your offensive air units that can be launched and guided toward enemy positions. They pack a wallop. If you hear a drone alert, immediately go to your radar console. You can spot an incoming drone and attempt to shoot it down with your guided missiles. Radar also helps you spot hidden enemy units. A repair screen and a statistics screen round out your Comcen's capabilities.

Playing solo is fun, but the computer is tough to beat. *Modem Wars* comes into its own when you compete against a human opponent. The game supports ten different modems—Commodore, Hayes, and others—but it took me several frustrating attempts to make cross-town contact. Finally, I discovered that my Aprotek modem works only in the game's 1670 modem mode. You may have to experiment if your

modem isn't listed on the game disk.

Once contact is made, one player chooses from the seven scenarios and play begins. Comments, quips, and insults may be typed while the game is in progress. If a problem arises, you can also signal for your opponent to pick up the telephone and talk.

I contacted *Gazette* reviewer Erik Olson and challenged him to a few rounds of *Modem Wars*. (Players can be found by contacting Commodore user groups or by leaving messages on local bulletin boards. CompuServe or QuantumLink also have online areas to help you locate other modem gamers.) Since I edit Olson's reviews and arrange for him to be paid, I assumed he would be an ideal opponent. At this point I'll relinquish control of this review to him and let him call the play-by-play action as I take control of the blue team and he commands the red forces.

Olson: The two sides set up in a scrimmage formation much like the old American football lineup. The whistle blows, and the game begins. Incredibly, both quarterbacks decide to sweep their robots right. Blue gains an early advantage when the Red QB moves his flankers into a strongly held Blue position. While Red is pinned down, Blue's flankers get a clear run to the back line and earn terrain points.

Red, however, commits his rear line to the battle. Lasers fly, and the balance returns as Red kills enough robots to make up for Blue's early lead, leaving several Blue and Red robots smoking on the battlefield. No Comcens are detected, so both sides make the run for the back line with their remaining forces. Red reaches first, followed rapidly by Blue. Both sides then turn back to the battlefield, looking for enough kills to break the tie. No joy in Mudville, however—time runs out and the score shows a draw.

The second game, The Bomb, is even simpler—just the two Comcens, hiding somewhere, each armed with drones and missiles. At the starting gun, Blue charges straight across the center line, while Red flanks left, looking for cover.

Several clicks pass while the two quarterbacks eye their radar consoles, each looking for the other. Blue gets first spot and lobs a drone at red. Red misses the interception shot but manages to dodge the heavy missile. Red returns fire, with little luck, but notices the Blue Comcen trying to cross the river—a tactical mistake. Red fires all of his drones into the Blue Comcen, damaging it badly, but not enough. Now Red is helpless against Blue's drones. Red runs for the forest, while Blue sends up drones and missiles. Fortunately for Red, the whistle blows just before Blue can finish him off. Red wins on points—96 to 84. Not the best of endings, thinks Red, but any victory is better than nothing. The two quarterbacks meet after the game, watch the game film, and discuss mistakes and surprises.

Netsel: OK, Olson, I didn't like the way that last game ended. That was a lucky shot. I was robbed, and I demand a rematch. The next time your phone rings, be ready to face one mean *Modem Wars* veteran.

By the way, your check is in the mail.

—Tom Netsel and Erik Olson

Modem Wars
Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
$34.95

Time & Magik

As an adventure, *Time & Magik* follows a familiar pattern: making danger-filled trips through mazes and rooms, pursuing artifacts needed to complete your mission, then dashing for home without getting killed.

Where the game makes its mark is through the use of time. Rather than being a single adventure, *Time & Magik* is a trilogy where rooms exist in different times. And it has graphics, although they are of the slide-show (nonanimated) variety.

> ***It's the stuff of which good adventures are made.***

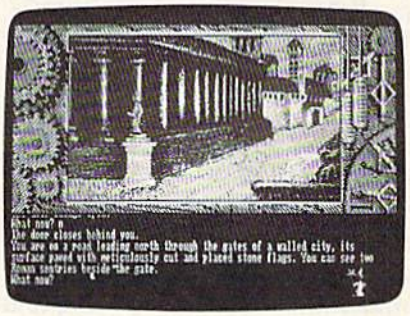
In the first section of the trilogy, your mission is to thwart the Time Lords who would seize control of time and bend eternity to their will. To do this, you must locate nine artifacts, one from each time zone that range from the far past to the far future.

The second section deals with finding the lost Red Moon Crystal, the last source of magical power. The conclusion of the trilogy centers on recovering the stolen Crystal from the mad Myglar before he can misuse its power.

The first scenario deals with time travel; the other two seem to take place on a single stage where magic is the key; hence the name of the game.

Though this brief summary of the plot may make *Time & Magik* appear to be just another adventure game, I'll point out that you can add more substance to the scenario by reading the short story that makes up most of the documentation.

The adventures begin in the your own house in the wake of a blinding flash caused by the meddling Time Lords. Make the proper moves and Father Time will appear to explain both the plot and your mission, as well as how to travel in time by entering the grandfather clock. There you'll find a cogwheel with the numbers 1–9, each number representing a different time zone.



Each time zone holds an artifact necessary to the game's ultimate solution, but, of course, you have no idea what you're looking for or even where to look until you find an object marked with the symbol of a magical hourglass. The solution is to explore and examine everything—houses, gardens, volcanic wastelands—and pick up everything you can. Artifacts should be used only as necessary to stay alive. Try to make it to your destination, a cauldron at the End of Time, with the rest.

Some artifacts are necessary only to advance the game and, once used, may be discarded. You'll find examples of this in various stages of the game. In one house, as you ascend the stairs, you are told there seems to be a hollow wall panel in the stairwell. The panel appears utterly sealed until you go to the second floor, enter the music room, take a lute, descend the stairs, and play the lute before the panel, which magically opens.

This scene is indicative of the mixture of legend, myth, and science evident throughout *Time and Magik*. It's the stuff of which good adventures are made.

While *Time & Magik* does share some common ground with other adventure games, the use of time travel to navigate safely through various periods of past and future gives the game a needed inventive twist.

About 75 percent of the screen is occupied by a graphic, with the remaining space reserved for communications. A bit of advice: Side 1 of the disk shows only a picture of the grandfather clock, but after you've booted the game, flip the disk over and access the entire library of scenes. Should you wish to review moves, the graphic may be pushed out of the way to reveal more text.

The parser, that part of the game

with which you communicate, is very good. It understands simple sentences and reacts to requests phrased in a variety of ways.

Another interesting device is the Undo feature. Should you become hopelessly entangled, Undo will move you back several spaces in time to a point before you made your mistakes. It can even bring you back from the dead. This seems entirely appropriate in a game whose main theme is time travel. The documentation is sparse and hindered by the necessity of including instructions for five computer systems. The slide-show graphics are very nicely done, but they contribute nothing to the game except for scenery. And if you get hopelessly stuck, there is always the clue book.

The arrangement of clues is as arcane as the game itself. You are directed from one numbered paragraph to another rather than simply being told what you need to know. But I doubt the game would be any fun at all if the answers were easy, and it's better to have obscure clues than to have none at all.

On a 5-point rating system, I give *Time & Magik* an overall grade of 3. It's entertaining but not extraordinary, fun but not completely captivating, and puzzling but not unsolvable—a fair value for the money.

—Ervin Bobo

Time & Magik
Datasoft
19808 Nordhoff Pl.
Chatsworth, CA 91311
$29.95

Western Games

What do arm wrestling, tobacco-quid spitting, cow milking, dancing, bean eating, and shooting bottles of beer have in common? They're all contests enjoyed by people in the Old West. And they all comprise *Western Games*, a frontier spoof for the 64 from DigiTek.

This no-frills, one-disk package has you playing these off-the-wall pastimes against either the computer or another varmint of your choice. All your favorite Western characters are here in humorous, full-color scenes, from the beer drinkers and the bartender to the dance-hall girl and the piano player. Their comments about the goings-on appear over their heads in cartoon-style balloons. Western music even sneaks into the background from time to time. Here's a rundown of the events:

Arm wrestling. You and your opponent meet arm to arm. Best two out of three wins.

Beer-bottle shooting. While the village idiots hold the bottles, mugs, and glasses, you try to shoot them out of their hands. Hit all five targets faster than your opponent to win.

Quid spitting. Bite, chew, and spit tobacco juice into a spittoon. Part of the object is *not* to swallow the quid of tobacco during the contest.

Everyone's favorite Western characters—from beer drinkers and bartenders to dance-hall girls and piano players—are here in humorous, colorful scenes.

Milking: Dairy farming has long been mechanized and computerized, but here you get a chance to milk a cow by hand. Fill up the milk can before your opponent.

Dancing: Follow the dance-hall girl and keep the beat. There's audience participation in this one: A cowboy who don't like your dancin' will bash the piano player. He won't play agin less'n you buy him a beer.

Eating competition: First to eat the pot of beans wins. Burping is discouraged 'cause it takes up time, an' it ain't polite, neither.

The games are fairly self-explanatory. Perhaps that's why DigiTek saw fit to supply only the sparsest of documentation. For each one there is a description of the windows that take you through each event, brief directions for the joystick, and remarks from Cowboy Tottle—sort of a Western-style commentary on what's going to happen.

There are no loading instructions, no explanations of scoring or the dollar amounts that appear in the window, no words about what to expect between games. What hints there are about how to play exist solely in Tottle's remarks. You have to read between the lines—a lot.

Now, ideas zip down the concept pike in the computer world. They fly along in bunches, knocking into each other, rubbing off bits, and picking up scraps from other ideas like a mutual exchange of lint on a crowded city street. Many bear a close resemblance to others in the crowd, but that doesn't mean they're equal. Two ideas can be great in concept, but while one succeeds brilliantly in execution, the other stumbles. *Western Games*' concept is fine. It's something like *Caveman Ugh-lympics* updated about a million years in that it parodies more serious "games" programs. It's amusing, clever, and graphically superb. Yet where *Caveman Ugh-lympics* stays within the bounds of manageability, *Western Games* overreaches itself.

Its playability is in the difficult-to-impossible range (barring extended sessions at the computer). Although you supposedly can play it by using the keyboard, the game favors joystick users. While the computer and joystick are certainly capable of doing all the game requires, it asks too much. Joystick moves are intense and too refined. The milking game demands a motion similar to continually shifting from first gear on up to fifth, to reverse, and back again.

Dancing requires ten different joystick movements. Even if you can remember all the moves, computer response can be poor and occasionally nonexistent. The quid-spitting game seemed impossible. Simplifying the joystick moves would make *Western Games* a bit easier to master and a lot easier to enjoy.

However, if you don't mind spending a lot of time working past the frustration of conquering these games, they are fun. Artistic, animated cartoons; a clever sense of humor; a well-conceived, balanced (if nutty) concept—*Western Games* has all of these. In some sections it loses out only in its execution. For dedicated game players, however, that can be part of the challenge.

—Robin Minnick

Western Games
DigiTek
8910 N. Dale Mabry
Suite 37
Tampa, FL 33612
$29.95 **G**

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TRIPLE SEARCH

Mike Bloustine

Generate and print three types of puzzles—word-search, number-search, and pictogram-search—with this versatile program for the 64. A printer is required.

Word-search puzzles have been popular for many years. They're great for developing pattern-recognition, vocabulary, and spelling skills. Many newspapers offer word-search puzzles daily, and dozens of books devoted to them have been published. Over the years, many forms of this puzzle have evolved. Number-search and pictogram-search puzzles (constructed using graphics symbols) are two of the most common variations.

With "Triple Search," you can generate your own word-search, number-search, and pictogram-search puzzles. Not only does this program assist you in designing the puzzles, it prints them out as well. With it, you can create large, complex puzzles with words running vertically, horizontally, and diagonally; or you can build smaller, simpler puzzles where the words are restricted to only a vertical or horizontal orientation. If needed, Triple Search will even print an answer key for you.

Getting Started

Triple Search is written in BASIC. To avoid typing errors while entering it, use "The Automatic Proofreader," found elsewhere in this issue. When you've finished entering the program, be sure save a copy to tape or disk. To get started, simply load and run the program.

Triple Search's menu screen allows you to select the type of puzzle you want to design. Begin by pressing the number key corresponding to the type of puzzle you want to create. Then enter the size of your puzzle. Puzzles may be as small as a 10 × 10 character grid or as large as a 40 × 40 character grid.

Enter the number of words, numbers, or pictograms to include in your puzzle. Then type each in. If you're building a number-search puzzle, be sure to enter only numbers. If you're making a pictogram-search puzzle, enter the graphics characters shown on the front face of the 64's keys. If you're designing a word-search puzzle, enter only alphabetic characters. You can use spaces in your words, but Triple Search fills them with random characters when it generates the puzzle. To prevent this from happening, don't include any spaces when you enter your words. For example, you'd enter JOHN DOE as JOHNDOE.

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If you're generating a number-search or pictogram-search puzzle, you can have the program randomly generate the numbers or pictograms for you. If you choose this option, Triple Search prompts you for the length of the puzzle entries. Keep in mind that if you enter a length that is longer than one-third the size of the puzzle, Triple Search may not be able to generate the puzzle.

Once you've typed in the entries, the program asks whether you want to list them at the end of the puzzle. If so, it also asks whether or not you want to sort them before printing. Answer both prompts with *Y* (for *Yes*) or *N* (for *No*).

The Finishing Touches

Before Triple Search constructs your puzzle, it asks you to select which orientations should be used in building the puzzle. You can have the program position entries vertically, horizontally, diagonally, both vertically and horizontally, or in all directions.

Next, Triple Search lets you enter a title and a message for the puzzle. The title appears above the puzzle, and the message, below it. An example title and message might read: *The Presidents Puzzle* and *Find the names of all the presidents in this puzzle*. Type the title and message exactly as you want them to appear. Because the program prints a quotation mark at the beginning of the prompt, you may enter commas, colons, or any other punctuation marks as part of your title or message.

After you've answered all the prompts in the program, Triple Search builds the puzzle. This generally takes only a couple of minutes. The time required depends on the number of entries that must fit into the puzzle relative to its overall size. Smaller puzzles containing many entries may take a long time to generate; some may even be impossible. If the program gets stuck placing a word, press RUN/STOP and then run the program again. On your next attempt, create a puzzle with fewer words or increase the puzzle's dimensions.

THE PRESIDENTS PUZZLE KEY

```
S * * * * J * * * * * * * * *
M * * * * E * * * * * * * * *
A * * * * F * * * * * * R W *
D * * * * F * * * * * O * A *
A * B J * E * * * * O * * S *
* * U A * R * * * S * * * H *
* * C C * S * * E * * * * I *
* * H K * O * V L * * * * N *
* * A S * N E * I T * * * G N
* * N O * L * * N R * * * T O
* * A N T * * * C U * * * O X
* * N * * * * * O M * * * N I
* * * * * * * * L A * * * * N
K E N N E D Y * N N * * * * *
* * * * * * * * * * * * * * *
```

"Triple Search" generates an answer key (above) with the puzzle (below).

THE PRESIDENTS PUZZLE

```
S V A M F J D E N S Q Q R L I
M N T C Z E H D M E Z P U C K
A V F Z G F S K R D W R R W U
D C S O Y F P D X G O O B A L
A S B J M E T Q U I O P F S C
F H U A F R T O A S I F Y H L
Z B C C H S X R E U R O Q I C
L B H K L O X V L E J U W N X
G S A S M N E P I T W E W G N
E D N O B L J K N R D X Z T O
V H A N T I V G C U O M C O X
S K N V C Q C E O M J Q V N I
I N L Z P Y G J L A B Z S C N
K E N N E D Y A N N P F N Q C
N E W N Z V H R K P A Y F O Q
```

FIND THE NAMES OF ALL THE PRESIDENTS IN THIS PUZZLE

ADAMS	BUCHANAN
JACKSON	JEFFERSON
KENNEDY	LINCOLN
NIXON	ROOSEVELT
TRUMAN	WASHINGTON

Printing

Triple Search prints the answer key using asterisks to mark the blank spots; then it prints the puzzle on the following page. When the program finishes printing, it asks whether you want to generate another puzzle or quit the program. Type *Y* to return to the main menu or *N* to exit to BASIC.

Triple Search is designed to work with all printers, but it may require some minor changes for certain printers. After the program prints the answer key, it advances to the next page to print the puzzle. It assumes that the length of a printed page is 66 lines. If your printer uses a different page length, change the value of LN in line 190 to the correct length. Triple Search also assumes a page width of 80 characters. If your printer has a different page width, change the value of WD in line 190 to the proper width.

To print pictogram-search puzzles, Triple Search uses ASCII codes 191–254. If your printer can't print these characters, you won't be able to print pictogram puzzles.

See program listing on page 85. **G**

BOOT MAKER

Tai Bush

Make your programs boot like commercial software with this simple, yet powerful utility for the 64. Disk drive required.

If you've ever spent time looking through back issues of your favorite magazine for a program's starting address, then "Boot Maker" is for you. Boot Maker causes BASIC and machine language programs to run automatically when you load them—no more searching for starting addresses or typing RUN.

Getting Started

Boot Maker is written in BASIC with machine language routines stored in DATA statements. To ensure accurate entry, use "The Automatic Proofreader," found elsewhere in this issue, to type it in. Be sure to save a copy of the program to disk when you've finished typing.

Before you run the program, determine the exact filename of the program you wish to make bootable. Next, load and run Boot Maker; then put the disk containing this program into the drive. At the prompt, enter the filename of the program. Next, enter *Y* if the program is written in BASIC or *N* if it requires a SYS command. (Note that you must enter *Y* for a machine language program that loads and runs as if it were in BASIC—a program like *SpeedScript*, for example.) If you type *N*, you'll be prompted for the starting address.

Finally, enter a unique filename for the new bootable program. (The filename must be different from any filename on the disk.) Boot Maker then creates the new program on disk with the filename you specified.

To use the new bootable program, enter LOAD "*filename*",8,1, and your program will load and run automatically. Boot Maker works with any program except those that load into the cassette buffer at location 828.

See program listing on page 81. **G**

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DIAMONDS

Hubert Cross

Generate beautiful kaleidoscopic patterns on a multicolor, medium-resolution screen with this short machine language program for the 64.

Kaleidoscopes have long been a source of fascination and entertainment for many. "Diamonds," a 375-byte machine language (ML) routine, turns your 64 screen into a giant kaleidoscopic display. By passing parameters from a BASIC program, you can control the size and color of a diamond-shaped pattern. A demo is included to illustrate some of the capabilities of the program.

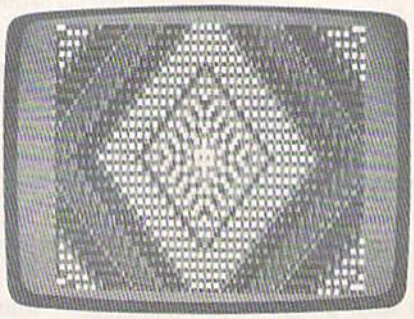
Getting Started

Program 1, Diamonds, is written entirely in ML. To enter it, use "MLX," the machine language entry program found elsewhere in this issue. When MLX prompts you, respond with the values given below.

Starting address: 0801
Ending address: 0978

Before you exit MLX, be sure to save a copy of the program to tape or disk.

Although Diamonds is written in machine language, it loads and runs like a BASIC program. To activate the program, type LOAD "DIAMONDS",8; then type RUN. Diamonds places a multicolor character set at location 14336, sets the top-of-BASIC pointer to this address, and then installs itself at location 16384.



A beautiful, quilt-like, kaleidoscopic pattern generated by "Diamonds."

Program 2 is a demo that shows you how to access Diamonds from within a BASIC program. To prevent typing errors when entering this program, use "The Automatic Proofreader," also located elsewhere in this issue.

To get an idea of what Diamonds can do, load and run Demo. This program displays five different types of constantly changing diamond-shaped patterns. To advance to the next pattern type, press any key. To pause the display sequence, press SHIFT-LOCK; to continue, release this key. To return to BASIC, press a key during the fifth pattern or press RUN/STOP at any time.

Create Your Own

Diamonds' medium-resolution screen is 80 pixels across and 50 pixels high. The origin (0,0) for this screen is located in the upper left corner of the screen. To paint a diamond, specify its location (the coordinates for the center of the diamond), its size (the distance in pixels from the center of the diamond to one of its corners), and its colors. Then, call the machine language routine with the command SYS 16384. The ML routine sets up the medium-resolution screen and draws the diamond. ▷

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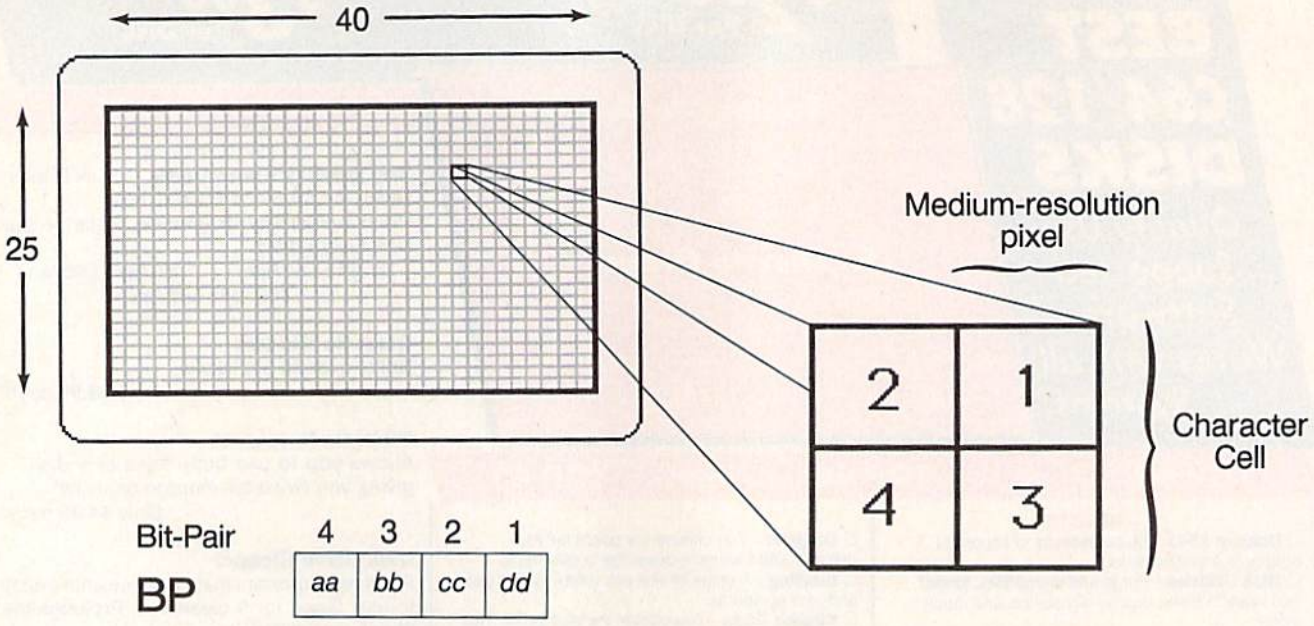
Character Cell for Medium-Resolution Screen



To specify the coordinates of a diamond, place the *x*-coordinate (the horizontal position in the range 0–79) in location 251, and the *y*-coordinate (the vertical position in the range 0–49) in 252. Next, put the size value into location 253. Finally, specify the colors as a four–*bit pair* value (BP) in location 254. (More on this below.)

For example, to draw a large, randomly colored diamond in the center of the screen, enter the following lines:

```
10 POKE 251,40:POKE 252,25:POKE
   253,19:POKE 254,INT(RND(0)*256)
   :SYS 16384
20 GOTO 10
```

Note that Diamonds must be used from program mode. The ML routine turns off medium-resolution mode when you enter direct mode.

To understand how to use the variable BP, you need to know a little bit about the medium-resolution screen (see accompanying figure). Four pixels occupy each character cell on this screen. In Diamonds, these pixels are numbered 1 to 4. The pixel in the upper right corner of a character cell is 1, the pixel in the upper left corner is 2, the pixel in the lower right is 3, and the pixel in the lower left is 4. Each pixel number corresponds to its respective bit-pair number in BP.

The color of each pixel is taken from the registers at locations 2–5 (see "BP Color Source Table"). The bit pairs in BP determine which color register is used for each pixel. Each bit pair can have one of four values: %00, %01, %10, and %11. If the bit pair has a value of %00, the color for the pixel is taken from location 2. If the value is %01, location 3 is the color source; if the value is %10, location 4 is the color source; and if the value is %11, location 5 is used.

The color registers default to black (0), red (2), blue (6), and yellow (7). Using the default colors, if you set BP to 228 (%11100100; bit pair 1 = %00, bit pair 2 = %01, bit pair 3 = %10, and bit pair 4 = %11), a pixel drawn in the upper right corner of a character cell would be colored black; one drawn in the upper left, red; in the lower right, blue; and in the lower left, yellow.

To change the pixel colors, POKE the new color values into addresses 2–5 before calling the machine language routine. Because of hardware limitations, you can use only eight color values (0–7) in location 5. In the other color registers (locations 2–4), you can use any of the 16 Commodore color values (0–15).

If you wish to paint a diamond in a single color, use the following values:

BP 0 (%00000000) Color from location 2
BP 85 (%01010101) Color from location 3
BP 170 (%10101010) Color from location 4
BP 255 (%11111111) Color from location 5

Any other value for BP will give you a diamond with pixels that alternate colors.

If this discussion of BP has left you confused, don't worry. You really don't need to understand how it works in order to enjoy Diamonds. In fact, using random numbers for BP creates beautiful patterns.

See program listings on page 78. **G**

BP Color Source Table

Bit-Pair Values (*aa,bb,cc,dd*)	Color Source Register	Default Colors	Acceptable Color Values
%00	2	0 (black)	0–15
%01	3	2 (red)	0–15
%10	4	6 (blue)	0–15
%11	5	7 (yellow)	0–7

TEXT SCREEN EDITOR

Shao-Tien Pan

Creating title screens like this is a cinch with "Text Screen Editor."

Create custom screens that you can load into your BASIC programs with this easy-to-use utility for the 64. Disk drive required.

Have you ever tried to create a title screen from direct mode by typing in text and graphics characters? If so, you know the meaning of the word *frustration*. Although the 64's keyboard offers many choices, getting characters properly positioned on the screen is no easy task. And, if you use insert or quote mode, rather than moving the cursor, you may suddenly find yourself printing the equivalent control codes.

Your next challenge comes when you attempt to incorporate your finished product, especially one containing color, into a BASIC program. When you add PRINT statements, everything on the screen tends to shift. Unfortunately, it's only after you've run the program and lost your original design that you discover what has happened to your masterpiece.

"Text Screen Editor" lets you design and save text screens without all this hassle. It disables insert and quote mode, clears the screen, and lets you type any key you wish, including control codes for color. When you've finished designing your screen, you can save it to disk and later load it into your BASIC program.

Getting Started

Program 1, Text Screen Editor, is written in machine language. Programs 2 and 3 are binary files containing the screen and color data, respectively, for a sample screen. Use "MLX," the machine language entry program found elsewhere in this issue, to type in these programs. When MLX prompts you, respond with the values given below.

Program 1:
Starting address: C000
Ending address: C2A7

Program 2:
Starting address: 0400
Ending address: 07E7

Program 3:
Starting address: D800
Ending address: DBE7

Be sure you save each program to disk before typing in the next one. Save Program 1 with the name TSE, Program 2 with the name EXS, and Program 3 with the name EXC.

Program 4, "Demo," shows you how to load a screen (files EXS and EXC) created with Text Screen Editor from within a BASIC program. To prevent typing errors, use "The Automatic Proofreader," located elsewhere in this issue, to enter this program.

Using Text Screen Editor

To load and activate Text Screen Editor, place the disk containing TSE in the drive and type the following:

```
LOAD"TSE",8,1
SYS 49152
```

To design a screen, simply move around the screen using the cursor keys and enter text or graphics characters as desired. While Text Screen Editor is running, BASIC is disabled, but the BASIC editor itself

is not. All the control commands you're familiar with still work. For example, to change the text color, press 1–8 while holding down CTRL or the Commodore key; to clear the screen, press SHIFT–CLR/HOME; and so on.

Text Screen Editor works like the BASIC screen editor but it eliminates several problems that can occur when using this editor. First, it disables quote and insert mode, enabling you to insert characters or type quotation marks without control codes being printed. Second, the computer no longer inserts a line when you type characters beyond column 40 in a logical line. And third, the screen won't scroll when you attempt to move the cursor beyond the last screen position.

In addition to fixing some of the problems of the BASIC editor, Text Screen Editor adds several new features. To change the border and background colors, press f1 and f2, respectively. To delete the line the cursor is on, press f3; to insert a line at the cursor's position, press f4. To select the line the cursor is on for copying, press f5; to copy the selected line to the current cursor line, press f6.

Saving and loading pictures in Text Screen Editor is as easy as pressing a key. Press f7 to load a screen, f8 to save a screen. When loading or saving a program, the bottom screen line is temporarily cleared and the cursor moves there. Type in a filename of no more than 15 characters and then press RETURN (press the RETURN key alone to abort the load or save). Each screen is saved as two files: one for screen memory (saved with an *S* appended to the end of the filename) and one for color memory (ending in *C*). Note: To load a screen from within Text Screen Editor, just enter the filename without the *S* or *C* suffix.

Once you've created a text screen, you can load it into your own programs using a nonrelocatable load (LOAD"*filenameS*",8,1 and LOAD"*filenameC*",8,1). Take a look at the demo program to see how this is done.

To exit Text Screen Editor and return to BASIC, press the RUN/STOP key. To reactivate Text Screen Editor, type SYS 49152.

See program listings on page 75. **G**

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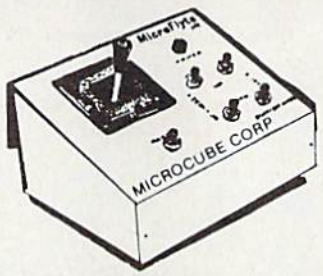

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Beyond Super

RAMBOard does just what the other copy card on the market does: it adds RAM to your 1541 disk drive. This RAM is used to create a workspace where custom software can work its magic. Copy protection is evolving past the point of nibblers and other software-only solutions. Believe us, card based copiers are the future of archival technology.

So how do you decide between our card and "Brand X"? Don't compare the similarities - compare the differences. Their card is just "out there". You buy it, and that's pretty much it. RAMBOard was designed from the very beginning as an integral component in Maverick™, a complete system of archival tools and products. Their card puts the burden of the work on you. Are you good at soldering? You better be - their card REQUIRES it. On the other hand RAMBOards require NO soldering to install, the only exception being a handful of older 1541C's. That's not all - the other guys say they don't use parameters, but what they really mean is they don't WRITE parameters. The user is required to make special critical "copy adjustments" to copy software. Sounds like creating parameters to us. On the other hand, RAMBOard uses Maverick parameters, designed by experts to instantly and easily copy today's toughest titles. So when the other guys say that their card will copy "everything", that may be true - providing that you can figure out the proper "copy adjustment" settings for everything. Good luck!

The differences go beyond the product itself. Software Support International is the company that began with the award winning Kracker Jax series of archival parameters. Our customer support system has earned industry praise, and we've established a reputation for honesty and integrity. A close look at the track record of the other guys will show just how deep our differences run. So when you're ready to get involved with the future of archival technology, pick RAMBOard - a product you can trust, from a company you can trust.

The RAMBOard
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The RAMBOard is an optional Maverick accessory

THE 1750 CLONE

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That's right. These RAM units are almost impossible to buy. We've always specialized in finding solutions to Commodore related problems - here's what we came up with.

First, we bought brand new Commodore 1764 RAM expansion units, the ones with only 256k of RAM onboard. Next, we had Chip Level Design engineer and produce a custom upgrade that takes a 1764 to a full 512k! That's the same half meg of RAM as a regular 1750! Finally, we tested each and every cartridge, and warranteed them to be free from defects.

Now there's nothing to stop you from taking your Commodore 64 or 128 to levels of power and sophistication that the original designers never even dreamed of! If you're using programs like GEOS from Berkeley; the Pocket Series from Digital Soutions; future versions of Maverick from Kracker Jax; Fleet System IV from Professional Software; or the potent PaperClip III from Batteries Included; if you're using ANY of these programs, you won't believe the difference that the extra memory makes!

IMPORTANT NOTES - READ CAREFULLY

*C-64/64c (but NOT C-128/128D) owners MUST buy a heavy-duty power supply to use these units. The power supply is NOT included - it is available from us seperately.

* If you ALREADY own a 1764 RAM cartridge, we can upgrade it for you. Your unit MUST be in perfect working order for us to upgrade it. The turnaround time on upgrades is approx. 2 weeks. It will NOT be necessary for you to purchase a new power supply - the one that came with your 1764 will still work fine.

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ALL NEW

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And V2 adds many new or enhanced features, like the fact that both our single drive fast data copier and fast file copier now support the 1764/1750 RAM expansion units for super-fast one pass copies, or like our 64k video RAM support for 128 owners! And remember also that all of our 1581 Toolkit utilities use hyperfast read/write routines and, wherever appropriate, allow full access to partitions.

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

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

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RGB KIT

EDITOR'S CHOICE

Stephane Edwardson

A standard Commodore 64 has a clock speed of 1 MHz, but 128 owners have been using their machines' faster 2-MHz clock speed from 64 mode for years. The problem with this practice is that the VIC-II, which generates the 128's 40-column screen and the 64's screens, can't keep up at 2 MHz. The most common solution to this problem is to blank the screen while the machine runs at this faster rate.

Another common solution is to speed up to 2 MHz at times when the screen won't be affected. Some utility programs can gain about 20–25 percent more speed using this method. Since the 8563, the chip that generates the RGB display, can keep up at 2 MHz, the best solution to the problem would be to use the RGB display. Unfortunately, 64 mode doesn't support the RGB display.

"RGB Kit" allows the 64 to use the RGB display just as if it were the composite display—most programs won't even know it's running. Even more importantly, it speeds up the 64 to nearly double its normal speed. RGB Kit not only speeds up the 64 and allows you to use the RGB display from 64 mode, but it also includes a set of handy utilities for manipulating RGB screens.

Use an RGB monitor from the 128's 64 mode and run programs at twice their normal speed.

Typing It In

RGB Kit consists of three programs: Program 1, RGB Kit, Program 2, "RGB Demo," and Program 3, "RGB Char Set." All programs must be typed in and used from 64 mode.

RGB Kit is written in machine language, so you'll need to use "MLX," the machine language entry program located elsewhere in this issue, when entering it. RGB Char Set is an example character set and also must be entered using MLX. The MLX prompts, and the values you should enter, are as follows:

Program 1:

Starting address: **CB20**
Ending address: **CF9F**

Program 3:

Starting address: **A000**
Ending address: **A7FF**

When you've entered the data for each program, be sure to save copies to tape or disk before exiting MLX. Save Program 1 as RGB KIT and Program 3 as CHRSET.

RGB Demo is written in BASIC, so use "The Automatic Proofreader" to prevent typing errors while entering it.

When you're ready to get started, type LOAD"RGB KIT",8,1, and then type SYS 52000. You can get an idea of what RGB Kit can do by running RGB Demo.

RGB Kit occupies a block of memory starting at location 52000. If you use other utilities that use the 4K block of memory at location 49152, be sure that they don't corrupt RGB Kit's memory space.

The Commands

All of RGB Kit's commands are accessed using BASIC's SYS command. Some commands require one or two parameters, while others require no parameters at all. Below is a list of commands for RGB Kit along with an explanation of how each is used.

• **SYS 52000:** Start RGB Kit. After executing this command, the RGB screen displays an exact duplicate of what you see on the composite screen. While RGB Kit is active, the CAPS LOCK key toggles between fast (2 MHz) and slow (1 MHz) mode. In fast mode (CAPS LOCK down), the composite screen is blanked and the computer runs at almost twice the normal speed. Most BASIC, compiled BASIC, and machine language programs run in this mode. In slow mode (CAPS LOCK up), the composite screen is displayed as normal and the computer runs at its usual speed. If your program must use a serial device (disk drive, printer, and so on), be sure to go into slow mode before accessing it.

• **SYS 52003:** Disable RGB Kit. This command is useful if you have a program that uses a serial device often. Since all RGB Kit's commands work in direct or program mode, you can control the speed of the

computer using SYS 52000 and SYS 52003. Use SYS 52000 to reactivate RGB Kit after calling SYS 52003.

• **SYS 52006,*x*:** Set the character color for the RGB screen. This command changes the color of all the characters on the RGB screen to the standard RGB color specified in *x*. The value of *x* can range from 0 to 15.

• **SYS 52009,*x*:** Set the RGB screen refresh rate. The *x* value (0–255) represents the number of jiffies (1/60 second) to wait between updates. RGB Kit must transfer 1000 bytes to the 8563 at each update, so the speed of the computer is greatly affected by changing the update value. Lower values cause the screen to refresh more quickly, but reduce the increased speed gained by using 2-MHz mode. Higher refresh values cause RGB Kit to refresh the screen less frequently and allow the machine to run faster, but screen scrolling becomes very jerky. The default update rate is set to 20 (three times per second). Values between 5 and 30 give the best results.

• **SYS 52012,*x*:** Set the base address of the composite screen to be transferred to the RGB chip. The *x* value can range from 0 to 65535. The default value is 1024 (the default location for the composite screen). As you can see in Program 2, this value doesn't have to point to the composite screen. You can have RGB Kit transfer any 1000-byte block of memory to the 8563's video memory.

• **SYS 52015,*x*,*y*:** Load a new character set into the 8563's video RAM. The *x* parameter is the address in the 64's RAM where the character set is stored. This address can range from 0 to 65535, so the character set can be stored anywhere, even under the BASIC ROM, Kernal ROM, or I/O chips. The *y* parameter specifies which character set to replace and can have a value of either 0 or 1. Use 0 to replace the uppercase/graphics character set and 1 to replace the uppercase/lowercase set.

• **SYS 52018,*x*,*y*:** Display a hi-res bitmap picture (320 × 200 with 16 colors) on the RGB screen. The *x* parameter specifies the starting address of the bitmap; the *y* parameter specifies the starting address of the color memory. For example, to display a *Doodle* screen, load it using LOAD"*filename*",8,1. Then type **SYS 52018,24576,23552** to display it on the RGB screen. To see a GEOS 64 screen, load and exit the GEOS environment. Then load RGB Kit and type **SYS 52018,40960,35840**. After this command is executed, RGB Kit is disabled. To reenable RGB Kit, type 52000. Program 2 generates a sample hi-res screen and displays it on the RGB screen.

• **SYS 52021,*x*,*y*:** Write to an 8563 register. The *x* parameter specifies which register (0–37) to write to, and *y* specifies the value (0–255) to put in the register. *The 128 Programmer's Reference Guide* by Bantam Computer Books provides a complete description of the 8563's registers.

• **SYS 52024,*x*:** Read an 8563 register. The *x* parameter specifies the register (0–37) to read. After executing the SYS, use PEEK(780) to get the value in the register.

• **SYS 52027,*x*,*y*:** Put a value in the 8563's video RAM. The *x* parameter is the address within the 8563's video RAM where the value is to be placed. It must be a value within the range 0–16383. The *y* parameter is the value to place at location *x* and must range from 0 to 255. When RGB Kit is in character mode, the video RAM is organized as follows:

Character display area (screen)	**0–999**
Character attributes set 0	**2048–3047**
Character attributes set 1	**3072–4071**
Character set 0 (uppercase/graphics)	**8192–12287**
Character set 1 (uppercase/lowercase)	**12288–16383**

In the graphics mode, the video RAM is arranged as follows:

Bitmap screen	**0–7999**
Color attributes	**8192–9191**

• **SYS 52030,*x*:** Read a byte from the 8563's video RAM. The *x* parameter is the address within the 8563's video RAM from which the byte is to be read. It must be a value in the range 0–16838. After executing the SYS, use PEEK(780) to get the value.

See program listings on page 79. **G**

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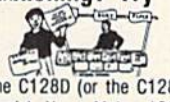

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128 GRAPHICS COMPACTOR

Bret M. Timmins

Running out of disk space? With this 128 utility, you can crunch text and graphics screens by 50 percent or more. Disk drive required.

"128 Graphics Compactor" is a graphics utility that can dramatically reduce the size of high resolution and text screens saved to disk. Written in machine language, the compactor quickly compresses and saves all types of 40-column screens: text screens and associated color memory, standard bitmap-graphics screens, and multicolor bitmap screens.

Getting Started

128 Graphics Compactor is written in machine language. To enter it, you'll need to use the 128 version of "MLX," the machine language entry program found elsewhere in this issue. When MLX prompts you, respond with the values given below.

Starting address: 1300
Ending address: 178F

Be sure to save a copy of the program to disk as GR.COMPACTOR when you've finished typing.

Program 2 is a demo program that shows how to save and load compacted screens from BASIC programs. To avoid typing errors when entering this program, use "The Automatic Proofreader," also found elsewhere in this issue.

After you've entered both programs, load and run the demo. It installs Graphics Compactor, draws a picture of a happy face on the screen, then saves the picture as PIC with a normal BSAVE command. Next, the demo saves the same picture as COMPRESSED PIC using 128 Graphics Compactor's PSAVE command. When the demo has finished, type DIRECTORY to compare the sizes of these two files.

Using 128 Graphics Compactor

To activate 128 Graphics Compactor, type the following line in direct mode:

```
BLOAD "GR.COMPACTOR":SYS
4864
```

128 Graphics Compactor adds two new commands to BASIC: PSAVE and PLOAD. These commands save and load compressed screens.

Saving or loading a compressed screen is as easy as saving or loading a program. To save a compressed screen, load or create a picture you'd like to compact and then use the PSAVE command. The syntax for this command is

PSAVE *"filename"*[,M*graphic mode*]

where *graphic mode* specifies the type of screen to compact (0–3). Use 0 for a text screen, 1 for a standard bitmap screen, and 2 or 3 for multicolor screens. For example, the command PSAVE "CLOWNS" ,M3 compacts and saves a multicolor screen as the file CLOWNS.

Note that the graphics-mode parameter is optional; if it's not included in the PSAVE command, the compactor defaults to graphics mode 0 (the text screen).

To load a compacted screen, type PLOAD *"filename"*. The program loads the file from disk, unpacks it, and then places it at its proper place in memory. Note that the PLOAD command does not automatically display the screen after it has been loaded.

Before you use the PLOAD command, you must allocate the graphics screen (establish the bitmap screen at 8192). To do this, use the commands as shown in line 10 in the program below.

```
10 GRAPHIC 1:GRAPHIC 0
20 PLOAD "CIRCLES"
30 GR=PEEK(6023)
40 GRAPHIC GR
50 REM VIEW MORE SCREENS . . .
```

If you're not sure which mode a screen is in, execute the commands in line 10; then PEEK location 6023 after the PLOAD. Use the value that's returned to set the proper screen mode. This approach is especially useful in viewer programs where more than one screen is to be displayed.

PSAVE and PLOAD work in both direct and program mode and can accept string variables for filenames. The standard BASIC 7.0 disk modifiers D and U are also acceptable (PSAVE A$,M0,D0,U9 or PLOAD "CIRCLES",D1,U9, for example).

How It Works

128 Graphics Compactor searches through graphics memory looking for sequences of repetitive byte values (ten 0s in a row, for example). These repetitive sequences are not saved to disk but are replaced by two-byte control codes. The first byte is a count byte; the second byte is the character value. In this example, the count is 10 and the character is 0. PLOAD reverses the process and uses the control codes to reconstruct the screen in memory.

The amount a given file is compressed depends on how many repetitive sequences of bytes the screen contains. In general, simple screens compact better than finely detailed screens.

See program listings on page 76. **G**

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feedback

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

Call 555-KING

I'm trying to write a program on my 64 that will generate words from telephone numbers. That is, I want the program to print out a list of all the words that can be created using the series of letters that appear on the phone's number keys. So far, I can't seem to find the right approach. Can you give me some hints? Thanks.

Robert Snellman
Wyandotte, MI

Below is a program that generates a list of "words" containing all possible letter combinations in a telephone number and outputs this to the screen or to the printer. If the program encounters a 0 or a 1 in the phone number, it prints a space because only the digits 2–9 have letters associated with them.

If you wish to print only "words" that include a vowel, change VF=1 in line 280 to VF=0. Also, you may want to break up your phone numbers into groups that contain the first three and last four numbers, and see if these alone form any interesting words.

```
XC 10 A$="":DIM C$(10,2),V 10,
      2),N(10),CN(10)
QK 20 FORI=0TO9:FORJ=0TO2
AG 30 READT$:V(I,J)=0:C$(I,J)=
      T$:IFT$="0"ORT$="1"THENC
      $(I,J)=" "+T$
JQ 40 IFT$="A"ORT$="E"ORT$="I"
      ORT$="O"ORT$="U"THENV(I,
      J)=1
HS 50 NEXT:NEXT
DB 60 DATA0,0,0,1,1,1,A,B,C,D,
      E,F,G,H,I,J,K,L,M,N,O,P,
      R,S,T,U,V,W,X,Y
PK 70 PRINT"{CLR}{DOWN}OUTPUT
      {SPACE}TO (S)CREEN OR (P
      )RINTER?":PRINT
FK 80 GETQ$:IFQ$=""THEN90
SM 90 IF Q$<>"S" AND Q$<>"P" T
      HEN80
PA 100 PRINT"ENTER TELEPHONE #
       (WITH NO SPACES OR
      {4 SPACES}HYPHENS)":INP
      UTTN$:C=0:BF=0
JH 110 FORI=1TOLEN(TN$):T=ASC(
      MID$(TN$,I,1))
SJ 120 IFT<58ANDT>47THENA$=A$+
      CHR$(T):N(I-1)=T-48
AK 130 NEXT:MX=LEN(A$)-1:IFQ$=
      "P"THENOPEN4,4
BK 140 VA=MX
CA 150 VF=1:IF VF THEN180
KG 160 FORL=0TOMX:IFV(N(L),CN(
      L))=1THENVF=1:L=MX
SQ 170 NEXT
FX 180 IF VF THEN GOSUB200
AK 190 GOSUB220:GOTO150
PH 200 IF Q$="S" THEN FOR L=0
      {SPACE}TO MX:PRINT C$(N
      (L),CN(L));:NEXT:PRINT:
      RETURN
PA 210 FOR L=0 TO MX:PRINT#4,C
      $(N(L),CN(L));:NEXT:PRI
      NT#4:RETURN
RJ 220 CN(VA)=CN(VA)+1
MH 230 IFN(VA)<2ORCN(VA)=3THEN
      CN(VA)=0:VA=VA-1:IFVA>=
      0THEN220
PC 240 IF VA=-1 THEN260
EP 250 VA=MX:RETURN
XS 260 IF Q$="P" THEN PRINT#4:
      CLOSE4
```

Screen Protector

I am writing a menu program on a Commodore 64, and I need to keep text from scrolling into two areas at the top and bottom of the screen where certain information will be displayed. Can you show me how to do this?

Glenn P. Davis
Chicago, IL

In the August "Programmer's Page," we published a short machine language subroutine by Sean Ganess of Woodside, New York, that protected the top two screen lines from being scrolled. This routine copied the Kernal ROM to RAM, changed a location that referenced the top screen line, and then switched in the underlying Kernal RAM.

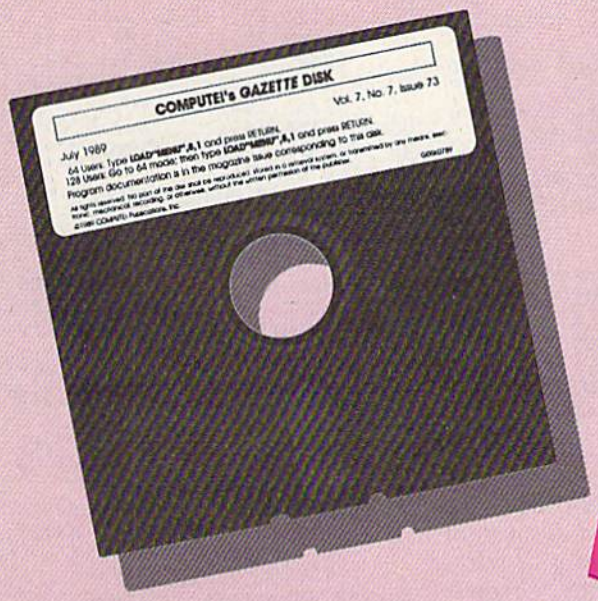
We've modified Mr. Ganess's routine, with somewhat mixed results, so that it also protects four lines at the bottom of the screen. Here's the resulting routine, along with a brief demo:

```
ES 100 SYS 58692:REM CLEAR SCR
       EEN
FJ 110 GOSUB 3000:REM PROTECT
       {SPACE}SCREEN AREAS
DQ 120 REM THIS IS JUST A DEMO
       , YOU PUT YOUR PROGRAM
       {SPACE}HERE
SD 130 SYS 58692:FOR I=1 TO 30
       :PRINT I,"XXX":FOR K=1
       {SPACE}TO 300:NEXT K,I:
       END
KM 3000 FOR I=828 TO 875:READ
       {SPACE}D:POKE I,D:NEXT
       :SYS 828
BM 3005 T=1:POKE 59639,1:REM T
       OP
JX 3006 BOT=20:POKE 59522,BOT:
       POKE 59428,BOT:POKE 59
       504,BOT:BOT=BOT+1:REM
       {SPACE}BOTTOM
EG 3007 POKE 59789,BOT:POKE 59
       088,BOT:POKE 59522,BOT
       :POKE 59589,BOT
RP 3010 POKE 64982,53:POKE 1,5
       3:REM SELECT KERNAL RA
       M
ER 3020 RETURN
AH 3030 DATA 160,0,132,38,169,
       224,133,39,177,38,145,
       38,200,208,249,230,39,
       165
PD 3040 DATA 39,201,0,208,241,
       160,0,132,38,169,160,1
       33,39,177,38,145,38,20
       0,208
GK 3050 DATA 249,230,39,165,39
       ,201,192,208,241,96,0
```

To use this routine in your own programs, simply GOSUB 3000 whenever you want to protect the top and bottom areas of the screen. You only need to execute the routine once when you first run your program.

This routine lets you print text in the top area, but not in the bottom. To display text in the lower screen area, you'll need to POKE the character data directly to screen memory. To protect more or less of the screen, change the variables T (for top) and BOT (for bottom) at the beginning of lines 3005 and 3006, respectively. For example, to reenable output to the bottom screen area, you'd set BOT in line 3006 to 24.

As you'll see, this routine has a



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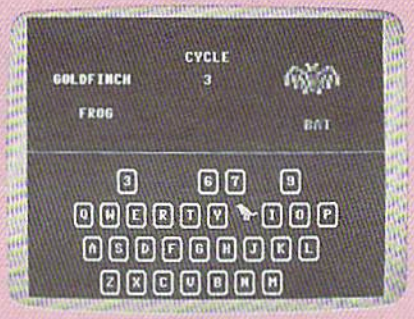

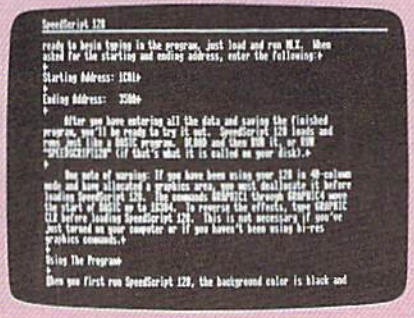

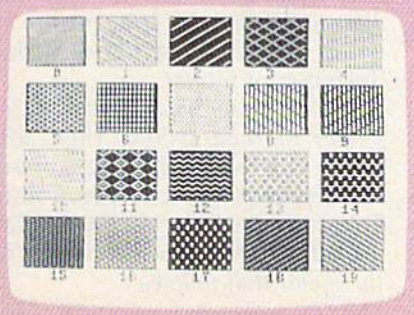

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few quirks. (If any readers know of a better solution to Mr. Davis's problem, we'd like to hear from you.) Most notably, it crashes when you print the CLR/HOME character from within a program. One way around this, though, is to call the ROM routine at 58692 when you need to clear the screen (see line 130).

Highlight Bar Menu

I saw an Apple II program that showed a menu with the line of choice highlighted. When you moved the cursor up or down, the highlight bar moved. I want a program for the Commodore 64 that does exactly the same thing.

Chris Warden
Lisbon Falls, ME

Here's a short program that illustrates this technique on the Commodore 64. It displays a menu of five options: change background color, change border color, change text color, set default colors, and exit the program. The current selection appears in inverse.

```
MG 10 N=0
JM 20 READ A$(N):IF A$(N)<>"-"
      AND N<9 THEN N=N+1:GOTO
      20:REM READ IN DATA
DG 30 N=N-1:REM # OF ITEMS
GA 40 REM PUT YOUR DATA STATEM
      ENTS HERE
KP 50 DATA "1. CHANGE BACKGROU
      ND COLOR"
RM 60 DATA "2. CHANGE BORDER C
      OLOR"
GA 70 DATA "3. CHANGE TEXT COL
      OR"
HC 80 DATA "4. SET COLORS TO D
      EFAULTS"
EB 90 DATA "5. EXIT PROGRAM"
SF 100 DATA "-":REM END OF DAT
      A MARKER
SC 110 R$=CHR$(29):D$=CHR$(17)
      :RV$=CHR$(18):REM CRSR
      {SPACE}RIGHT, CRSR DOWN
      , AND REVERSE
JX 120 FOR I=0 TO 5
MR 130 R$=R$+R$:D$=D$+D$
BP 140 NEXT I:D$=CHR$(19)+D$
PX 150 REM SET STARTING COORDI
      NATES
GR 160 SX=5:SY=5:MC=0:M2=0
HR 170 PRINT CHR$(147);LEFT$(D
      $,SY);
GH 180 FOR I=0 TO N
XG 190 PRINT LEFT$(R$,SX);A$(I
      ):NEXT I
BS 200 REM HIGHLIGHT MENU ITEM
HB 210 PRINT LEFT$(D$,SY+MC);L
      EFT$(R$,SX);RV$;A$(MC)
BG 220 GET A$:IF A$="" THEN220
XB 230 IF VAL(A$)>0 AND VAL(A$
      )<=N+1 THEN MC=VAL(A$)-
      1:GOTO310:REM NUMBER KE
      Y
RH 240 IF A$=CHR$(17) THEN MC=
      MC+1:IF MC>N THEN MC=0:
      REM CRSR DOWN
RP 250 IF A$=CHR$(145) THEN MC
      =MC-1:IF MC<0 THEN MC=N
      :REM CRSR UP
KJ 260 IF A$=CHR$(13) THEN310:
      REM RETURN
PR 270 REM RESTORE OLD SELECTI
      ON
EG 280 PRINT LEFT$(D$,SY+M2);L
      EFT$(R$,SX);A$(M2)
MQ 290 M2=MC:GOTO210
FF 300 REM EXECUTE COMMAND
SE 310 ON MC+1 GOTO330,340,350
      ,360,370
SG 320 GOTO310
DX 330 A=53281:POKE A,(PEEK(A)
       AND 15)+1:GOTO220
RJ 340 A=53280:POKE A,(PEEK(A)
       AND 15)+1:GOTO220
RX 350 A=646:POKE A,(PEEK(A) A
      ND 15)+1:GOTO170
AS 360 POKE53280,14:POKE53281,
      6:POKE 646,14:GOTO170
KB 370 PRINT CHR$(147):END
```

To choose one of the options, move the cursor up and down until the highlight bar is over your selection; then press RETURN. Or press the corresponding number key (1–5).

The program is liberally commented with REMs, so you shouldn't have too much trouble following the code. Notice how the program reads each menu item into a string. This approach allows you to expand the menu by making just a few, simple modifications in the program.

BASIC to *SpeedScript*

I'm a frequent user of *SpeedScript* 3.2 and would like to know how to make a disk directory into a text file so I can page up and down through it. Is this possible?

F. J. Carleton
Metairie, LA

Yes—it's a two-step process. First, you convert the disk directory into a sequential file; then you convert the sequential file into a SpeedScript *file. Actually, this approach allows you to convert any BASIC program—not just a disk directory—into a text file.*

To begin, type in the following program and save it to disk with the filename SFC. If you have a copy of "Sequential File Converter," published with SpeedScript *3.2, skip this step. (Sequential File Converter is also found on the* SpeedScript *disk as SEQ FILE CNVT.)*

```
FD 5 FORI=828TO920:READA:POKEI
     ,A:X=X+A:NEXT:IFX<>11720T
     HENPRINT"DATA ERROR":STOP
GH 10 DATA76,93,3,76,204,255,1
     33,251,41,64,10,5,251,41
FP 15 DATA 191,133,251,41,32,7
     3,32,10,5,251,201,95,208
BQ 20 DATA 2,169,13,133,251,96
     ,32,225,255,240,221,32
AS 25 DATA 135,3,201,13,208,2,
     169,31,72,41,128,74,133
SX 30 DATA 251,104,41,63,5,251
     ,133,251,32,183,255,72
MK 35 DATA 32,143,3,104,41,64,
     240,217,76,204,255,162
EC 40 DATA 1,32,198,255,76,207
     ,255,162,2,32,201,255
QQ 45 DATA 165,251,76,210,255
RS 50 INPUT"{DOWN}{N}INPUT FIL
     E NAME";I$
CG 55 INPUT"{DOWN}OUTPUT FILE
     {SPACE}NAME";O$
DE 60 DV=8:SA=7:OPEN15,8,15,"I
     0":
EB 65 OPEN1,8,3,I$:INPUT#15,EN
     ,EM$:F$=I$:IFEN=0THEN80
HQ 70 PRINT"{DOWN}DISK ERROR F
     OR ";F$:PRINTEM$
PR 75 PRINT"{3 DOWN}RUN{3 UP}"
     :CLOSE1:CLOSE2:CLOSE15:E
     ND
SM 80 OPEN2,DV,SA,"0:"+O$+",P,
     W":INPUT#15,EN,EM$:F$=O$
GX 85 IFEN=0THEN115
HM 90 IFEN<>63THEN70
CM 95 PRINT"{DOWN}";O$;" EXIST
     S... REPLACE? {RVS}Y
     {OFF}/{RVS}N{OFF}:"
KD 100 GETA$:IFA$<>"Y"ANDA$<>"
     N"THEN100
PD 105 IFA$="N"THEN75
HS 110 PRINT#15,"S0:"+O$:CLOSE
     2:GOTO80
RS 115 SYS828:IF(PEEK(144)AND1
     91)=0THENPRINT"{DOWN}DO
     NE.":GOTO75
QR 120 PRINT"I/O ERROR DURING
     {SPACE}CONVERSION.":INP
     UT#15,EN,EM$:IFEN<>0THE
     N70
CA 125 GOTO75
```

Next, load the disk directory (with LOAD"$",8) or a BASIC program that you wish to convert. Then, create an ASCII listing of the directory or BASIC program by executing the following series of commands from immediate mode:

OPEN2,8,1,"*sequential program filename*,S,W":CMD2:LIST
PRINT#2:CLOSE2

Whatever is in the BASIC workspace will be written to disk as a sequential file. Be sure you assign this file a unique filename.

Now, to convert the sequential file to SpeedScript *format, load and run SFC or Sequential File Converter. Both converters prompt you for the name of the sequential file (or input file) and the* SpeedScript *file (or output file). After you've entered both, SFC reads the sequential file from disk, performs the conversion, and writes the resulting file to disk in* SpeedScript *format.*

If you use Sequential File Converter instead of SFC, then, after you've entered the filenames, press D at the prompt Disk, Screen, Printer, Other. *Then select option 3—Commodore ASCII to* SpeedScript*—from the menu that follows.* G

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machine language programming

Random-Number Test

Jim Butterfield

Computers don't do random things. At least, we hope they don't. So, when we need a random number to create certain effects—say, to roll a pair of dice, scramble the order of a list, or simulate real-world events, we are faced with a puzzle. We want a precisely organized machine to behave in a random manner.

The art and science of random-number generation is a whole field of study in itself. Methods for testing numbers for true randomness can fill textbooks. With most computers, numbers are not truly random. Each "pseudo-random" value is a scrambled version of the previous one.

The Commodore 64 and 128 have a built-in random-number generator; it's part of the SID chip. If we set voice 3 for "noise," we can read random values from the chip by PEEKing location 54296.

Hardware generators of random numbers are viewed with suspicion by technical experts. They are often based on components containing electronic noise, which may favor certain values over others. Such devices may also change as they age, and a good "white noise" device may become "colored," or less random, over time. The SID chip, however, likely uses a digital scrambler to generate its noise waveform. As such, it won't deteriorate with age. But is it truly random?

This month's program tests the SID generator for true randomness in a simple way. It asks for 65,536 random numbers, each of which might be in the range 0–255. As the numbers appear, they are tabulated.

We would expect that 65,536 random numbers split among 256 possible values to yield 256 samples of each. But it won't be exact. In fact, we would reject the generator if it did produce exactly 256 of each. Random numbers should not be that predictable. We'd expect most numbers to occur about 256 times, with the occasional one going as low as 200 or as high as 300. The figures are not exact. After all, these are random numbers.

How long will it take to generate 65,536 random numbers? You'll be surprised at the speed. If the SID chip's sound is enabled, you may even hear the "crash" of the noise generator as you start it up.

The BASIC portion of the program POKEs the machine language (ML) code into place and sets up the SID chip. After the random values have been calculated and tabulated by the machine language routine, the BASIC program prints the count of each occurrence, beginning with the number of times 0 was generated and going up to the incidence of value 255.

You'll find that the generator produces a fairly good distribution of values. Keep in mind that this test is not the only one that would be needed to prove randomness, but it's one indication.

The ML Program

We must set up 256 counters. Because the values can go over 255, each counter needs two bytes to hold its value. However, these bytes do not need to be together. For example, we'll count the number of occurrences of value 0 in hexadecimal 3000 (low order) and 3100 (high order); occurrences of value 1 go into $3001 and $3101, and so on. But before we start the count, we need to zero the counters.

```
2000 LDA #$00     ;Clear counters.
2002 LDY #$00
2004 STA $3000,Y
2007 STA $3100,Y
200A DEY
200B BNE $2004
   ; The 65,536 counter is in Y
   ; (low) and $1FFF (high).
200D STY $1FFF    ;value 0
   ; Loop here for next
   ; random number.
2010 LDX $D41B
   ; The number is in X. Count
   ; in the table at $3000.
2013 INC $3000,X
   ; If overflow, add to high
   ; byte of counter.
2016 BNE $201B
2018 INC $3100,X
   ; Count the number of times
   ; we have done this.
201B INY
201C BNE $2010
201E INC $1FFF
2021 BNE $2010
2023 RTS
```

It's interesting to note that INY and DEY are interchangeable in this program, as are INC and DEC at $201E. Whether we count up or down, it takes 256 steps to get back to 0.

The BASIC Program

I've picked an arbitrary setup for the SID chip in the program below. You might like to change the values that are POKEd into the chip and repeat the test to see what happens.

```
10 REM RANDOM TEST
20 DATA 169,0,160,0,153,0,48
30 DATA 153,0,49,136,208,247
40 DATA 140,255,31,174,27,212
50 DATA 254,0,48,208,3,254,0
60 DATA 49,200,208,242,238
70 DATA 255,31,208,237,96
80 FOR J=8192 TO 8227:READ X
90 T=T+X:POKE J,X:NEXT J
100 IF T<>4693 THEN STOP
110 REM CHECK RANDOM
    OSCILLATOR
120 POKE 54290,129
130 POKE 54287,255
140 SYS 8192
150 FOR J=0 TO 255
160 X=PEEK(J+12544)*256+PEEK
    (J+12288)
170 PRINT RIGHT$("{4 SPACES}"
    +STR$(X),5);
180 NEXT J
190 END
```

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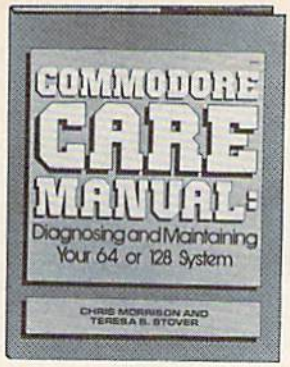

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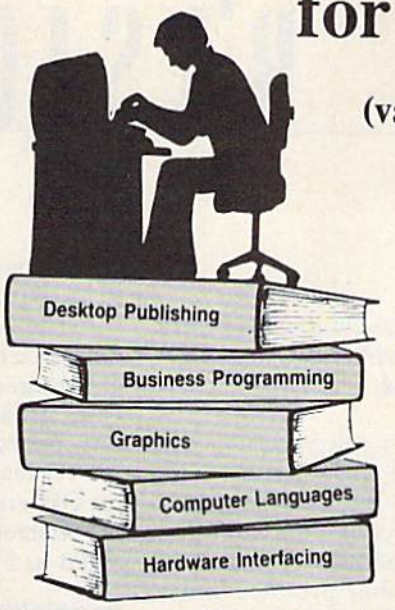

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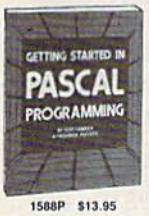

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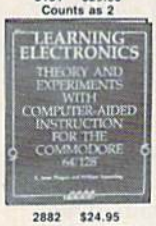

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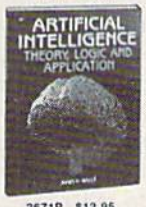

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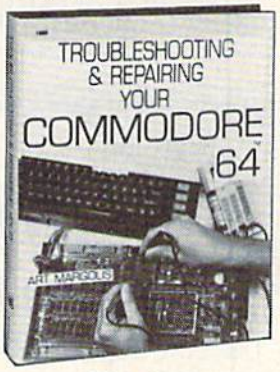

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power BASIC

Screen Play

Shao-Tien Pan

Jazz up your screen displays with these short machine language routines for the 64.

In last month's column ("On the Border"), we presented three raster-interrupt routines that created colorful special effects in the border. This month, we'll look at two routines that produce some zany effects in the screen area itself. Like the border routines, the screen routines are short—under 200 bytes—and are compatible with most other programs. They can be used in tandem or combined with the border routines to enliven your BASIC-program displays.

Getting Started

"Screen Play" consists of three short BASIC loaders. The first two programs create the screen effects; the third turns off each effect. Program 1, "Bounce," and Program 2, "Waves," both cause the text to waver from side to side. Bounce produces this effect in three portions of the screen simultaneously. Each undulating area moves up and down to give the illusion of bouncing. Waves uses a similar effect to produce a wave pattern over the entire screen. Program 3, "Off," restores the screen to normal. It appeared last month as Program 4; if you already have a copy of it, don't bother typing it in.

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

To install and activate one of the screen effects, load and run Bounce or Waves. To turn off the effect, load and run Off or press RUN/STOP–RESTORE.

The SYS command in the last line of each program, executed from either direct or program mode, activates a particular screen effect. To turn on Bounce, enter SYS 49617; for Waves, enter SYS 49810; and for Off, enter SYS 49974. To reactivate a screen effect after you've disabled it, SYS to it a second time.

Combining Effects

Because the Screen Play and On the Border routines reside at different locations in memory, they can all be loaded at the same time. And, as long as you leave the IRQ interrupt vector and memory locations in the range 49152–50174 intact, you'll have five special effects at your disposal. To set this up, just include all six loaders in your program. Then, to switch quickly from one effect to another, execute the appropriate SYS. For example, you could activate Wave with SYS 49810 on a title screen, turn it off with SYS 49974, and then activate Bounce with SYS 49617.

See program listings on page 82. **G**

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THE programmer's page

Printing with Style

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.*

I receive more stylized printing routines than any other kind of programming tip. It only makes sense. After all, every programmer has to output text at one time or another. So the next time you find yourself printing a program title, high score, or important input prompt, try jazzing it up a bit with one of the routines below.

Easy Centering

This tip shows how you can use DEF FN to easily center text.

```
CE 10 DEF FNA(X)=(40-LEN(M$))/
      2
HR 20 PRINT CHR$(147)
DA 30 M$="FIRST LINE":PRINT TA
      B(FNA(X))M$
ED 40 M$="THIS IS THE SECOND L
      INE":PRINT TAB(FNA(X))M$
ME 50 M$="ETC.":PRINT TAB(FNA(
      X))M$
```

As you can see, all you have to do to print centered text is precede it with a TAB(FNA(X)). If you're using 80-column mode on the 128, change the 40 in line 10 to an 80.

Helen Roth
Los Angeles, CA

Printing Backwards

Kids love this little routine:

```
KH 10 PRINT CHR$(147):PRINT "T
      YPE YOUR NAME AND PRESS
      {SPACE}RETURN":INPUT M$
ER 20 L=LEN(M$)
QK 30 PRINT:PRINT "NICE TO MEE
      T YOU, ";
QS 40 FOR I=L TO 1 STEP -1:PRI
      NT MID$(M$,I,1);:NEXT
FB 50 PRINT "!"
```

This polite program asks you to enter your name, tells you that it's nice to meet you, and then prints your name in reverse order (first character last, last character first).

htoR neleH
Los Angeles, CA

Expanding Messages

A simple but effective way to attract attention is to make your title screens or menus expand onscreen. The following program prints messages by "pushing" them out from the middle of the screen. To use it, simply set M$ in line 10 to the message you wish to print and then run the program.

```
KA 10 M$="*** EXPANDING MESSAG
      ES ***"
PC 20 L1=LEN(M$):L2=INT(L1/2)
XD 30 FOR T=1 TO L2
ES 40 PRINT CHR$(145);TAB(20-T
      );LEFT$(M$,T);RIGHT$(M$,
      L1-(L2*2)+T)
PR 50 FOR D=1 TO 100:NEXT D
EQ 60 NEXT T
```

This program works on the 64 and 128. It automatically centers the message on the screen. If you plan to use the program on an 80-column screen, change the TAB statement in line 40 to read TAB(40−T). The delay loop in line 50 can also be varied to speed up or slow down the printing of your message.

Thomas M. Turner
Waterloo, IA

Falling Letters

This 64 program prints messages by shooting letters down from the top of the screen while flashing the text colors. Any message can be printed this way; simply set M$ in line 40 to the message you choose.

```
AM 10 PRINTCHR$(147)
GM 20 FORZ=49152TO49269:READC:
      POKEZ,C:S=S+C:NEXT
BQ 30 SYS49152
EC 40 M$="**FALLING LETTERS BY
       JACQUES BINGHAM**"
KH 50 CR=10
RH 60 B=LEN(M$):WA=(40-B)/2-1:
      FORA=1TOB:M1$=MID$(M$,A,
      1):PRINTCHR$(19)
PB 70 IF M1$<>" "THEN FOR T=1
      {SPACE}TO CR-2:PRINTTAB(
      WA+A)M1$CHR$(145):PRINTT
      AB(WA+A)" "
BD 80 NEXT:PRINTTAB(WA+A)M1$:N
      EXT
QF 90 REM FLASHING DATA
DX 100 DATA 120,169,21,141,20,
       3,169,192,141,21,3,160,
       0,140,84,192,140
PM 110 DATA 86,192,88,96,172,8
       4,192,200,140,84,192,19
       2,3,208,49,160,0
QF 120 DATA 140,84,192,172,86,
       192,185,87,192,162,0,15
       7,0,216,157,0,217
GX 130 DATA 157,0,218,157,0,21
       9,141,134,2,232,208,238
       ,169,0,141,32,208
KB 140 DATA 141,33,208,200,192
       ,30,208,002,160,0,140,8
       6,192,76,49,234,0
XF 150 DATA 1,7,6,9,11,2,8,4,1
       4,12,10,5,7,15,7,13,1
RX 160 DATA 1,13,7,15,4,5,10,1
       2,14,4,8,7,11,9,6,15
```

You can shorten the program if you take out the color cycling. To do this, delete lines 20, 30, and 90–160. This also makes it work on the 128, since only the color-cycling portion is 64-specific.

Jacques Bingham
DeSoto, MO

Fade-Ins

Using the 64/128's different shades of gray, this printing routines fades text onto the screen. To center text, it uses the "Easy Centering" trick.

```
CE 10 DEF FNA(X)=(40-LEN(M$))/
      2
QF 20 M$="COMMODORE 64 - COSTS
       LESS, DOES MORE"
FB 30 POKE 53281,0::C$=CHR$(15
      1)+CHR$(152)+CHR$(155)+C
      HR$(5)
RE 40 FOR I=1 TO 4:PRINT TAB(F
      NA(X))MID$(C$,I,1)M$CHR$
      (145)
HH 50 FOR J=1 TO 20:NEXT J,I
```

As with the other tips, you can set the variable M$ equal to any message you choose. You may also alter the speed of the fade-in by modifying the FOR-NEXT loop found in line 50.

Randy Thompson
Greensboro, NC

G

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BASIC for beginners

Good Vibes

Larry Cotton

What do the Italian opera singer Pavarotti, a siren, and a telephone have in common? Give up? *Vibrato.* Vibrato causes a tone's pitch to rise and fall with time. A siren's pitch fluctuations are great, while Pavarotti's and a telephone's are relatively small.

Two other characteristics distinguish vibrato: shape and speed. This month we'll use the BASIC function PEEK to add vibrato to the Mozart sonata programmed in the August column. Of course, this means partially rewriting the program.

Let's begin with two constants that define the speed and shape of the vibrato (you don't have to enter the REMs):

```
10 S=110:REM VIBRATO SPEED
20 T=17:REM VIBRATO SHAPE
```

We'll use voice 1 as our primary voice and vary its pitch using voice 3. The Commodore 64 is able to read four registers of its music chip (SID), specifically 54297–54300. But we only need the register at 54299, which has the ability to influence the sound of voice 1.

For now, let's define the shape of voice 1, our main voice, as a pulse wave:

```
30 U=65:REM VOICE 1'S
   WAVEFORM
```

We'll define the first SID-chip register as the constant V:

```
40 V=54272:REM FIRST SID
   REGISTER
```

and the PEEKable register at 54299, as P:

```
50 P=V+27:REM P=54299
```

Next, we'll clear the sound chip:

```
60 FOR L=V TO V+24:POKE
   L,0:NEXT:REM CLEAR SID CHIP
```

and give voice 1 an envelope to keep the notes sounding:

```
70 POKE V+5,4:POKE
   V+6,255:REM ADSR VOICE 1
```

Mellow Pulses

We want our tune to sound mellow; we can do this by controlling the shape of the pulse wave. Later, we'll look at this register (54275) in greater detail and POKE some new values there.

```
80 POKE V+3,8:REM VOICE 1 50%
   SQUARE
```

Do the same for voice 3:

```
90 POKE V+17,8:REM VOICE 3
   50% SQUARE
```

Now, POKE voice 3's low-frequency register with the constant S (defined in line 10):

```
100 POKE V+14,S:REM VIBRATO
    SPEED
```

Without going into too much detail about the SID, suffice it to say that this line gives voice 3 a very low pitch (you can't hear it), which in turn causes the pitch of voice 1 to rise and fall at a slow speed. What results is vibrato. We also want voice 1's pitch to rise and fall smoothly. Thus, we POKE a 17 (for a triangle waveform) into voice 3's control register:

```
110 POKE V+18,T:REM VIBRATO
    SHAPE
```

If you don't understand all of this so far, don't worry. The SID chip still has programmers scratching their heads seven years after its debut. Hopefully though, your understanding of the chip will improve as we continue.

```
120 POKE V+24,15:REM MAX
    VOLUME
```

Finally—a graspable concept. This line sets the volume for all three voices. Now, turn on voice 1 with the pulse waveform:

```
130 POKE V+4,U:REM VOICE 1'S
    WAVEFORM
```

A Nested FOR-NEXT Loop

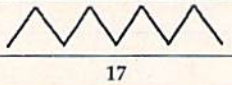
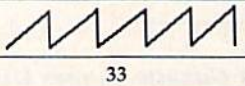
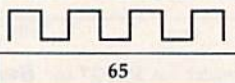
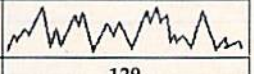
We want to play seven notes, so we set up a FOR-NEXT loop:

```
140 FOR N=1 TO 7:REM SEVEN
    NOTES
```

First, we READ each note's coarse (or high) frequency and duration from DATA statements. The frequency values are not necessarily the same as those listed in the musical-note value table in the *Programmer's Reference Guide.* Adding vibrato influences those values. (Voice 1's fine, or low, frequency is controlled by the vibrato, so we don't need to READ it.)

```
150 READ F,D:REM FREQUENCY
    AND DURATION
```

Effect of Waveform on Register 54299

Waveform	Triangle	Sawtooth	Square (Pulse)	Noise
Waveform Shape				
Value in 54290	17	33	65	129
Values returned in 54299	0,1,2,3 . . . 255,254,253 . . . 0	0,1,2,3 . . . 255,0,1,2,3 . . . 255,0	0,255,0,255,0,255	random values

Next, POKE voice 1's high frequency into the appropriate register:

```
160 POKE V+1,F:REM POKE HIGH
    VALUE
```

Now, we use a nested FOR-NEXT loop to start a delay, which also starts the note's vibrato:

```
170 FOR J=1 TO D:REM BEGIN
    VIBRATO
```

At Last—PEEK

Here's where we use PEEK to look at register 54299:

```
180 W=PEEK(P):REM READ
    REGISTER 54299
```

PEEK is the opposite of POKE; it monitors a particular register or address. In this case, it returns a constantly changing stream of values from 0 to 255. Since we chose the triangle waveform for voice 3 (lines 20 and 110), the PEEKed values will rise smoothly from 0 to 255, drop smoothly back to 0, and rise again to 255 (see the accompanying table). This pattern repeats as long as the register at 54290 (V+18 in line 110) is *gated*, or turned on, with the waveform value.

PEEK, of course, has many uses; we'll see more in forthcoming columns. Now, POKE the PEEKed value W into the low-frequency register for voice 1:

```
190 POKE V,W:REM POKE LOW
    VALUE
```

Include a NEXT, which ends the note's vibrato and sends control back to line 170:

```
200 NEXT J:REM END NOTE'S
    VIBRATO
```

This is important: As long as the program is in this inner FOR-NEXT loop, voice 1's low-frequency register is continually being POKEd with a constantly varying PEEKed value from voice 3. Result: vibrato!

The Turnoff

Next, we need to turn off the note. One way to do that is to make voice 1's frequency 0. This is often better than setting the volume register (54296) to 0 because it avoids an audible pop or click. Here's the line; be sure that both high- and low-frequency registers are set to 0:

```
210 POKE V,0:POKE V+1,0:REM
    TURN OFF NOTE
```

Add a NEXT for our outer note-counting loop, which returns control to line 140 to start another note:

```
220 NEXT N
```

Only the DATA line with alternating frequency and duration values remains:

```
230 DATA 20,80,25,40,30,40,19,60,20,
    8,22,8,20,80
```

Now, run the program. You'll hear the first seven notes of Mozart's sonata in C (transposed to F), with a nice touch of vibrato.

The pulse wave doesn't always sound mellow. You can vary its timbre by POKEing various values from 1 to 15 into V+3 (location 54275) in line 80 and V+17 (location 54289) in line 90. This varies the *duty cycle* of the pulse waveform, or the percentage of the waveform cycle spent at maximum amplitude. The sound will range from tinny to mellow and back again. (For the more adventurous, it's fun to modify the pulse wave in realtime.)

Telephone Bells

At the beginning of this column, we mentioned that the telephone uses vibrato in its signaler (bell). If it uses real bells, they are often tuned to slightly different frequencies. The signaler frequencies for an electronic telephone are often tuned to a minor third. You can simulate that signaler with the following short program.

```
10 R=20:REM BASIC PITCH
20 S=155:REM VIBRATO SPEED
30 U=65:REM VOICE 1'S
   WAVEFORM
40 X=55:REM DIVISOR; SEE LINE
   150
50 T=65:REM VIBRATO SHAPE
60 V=54272:P=V+27:REM SEE
   MOZART SONATA
70 FOR L=V TO V+24:POKE
   L,0:NEXT:REM CLEAR CHIP
80 POKE V+5,4:POKE
   V+6,255:REM VOICE 1'S
   ENVELOPE
90 POKE V+3,8:REM VOICE 1 50%
   SQUARE
100 POKE V+17,8:REM VOICE 3
    50% SQUARE
110 POKE V+4,U
120 POKE V+14,S
130 POKE V+18,T
140 POKE V+24,15
150 W=R+PEEK(P)/X
160 POKE V+1,W:REM VOICE 1'S
    HIGH FREQ
170 GET A$:IF A$="" THEN
    150:REM WAIT FOR KEYPRESS
180 POKE V+1,0:END
```

Enter this program with or without the REMs. When you've finished, save it to disk or tape and then type RUN. You'll hear an electronic telephone "bell."

This program is similar to the one for the Mozart sonata. The lines that differ are as follows:

- Line 40. X is a divisor that we'll use in line 150 to modify the PEEKed values. This is necessary to achieve the extreme pitches in vibrato.
- Line 150. The only difference here is that we're dividing each PEEKed value by our divisor, X.
- Line 160. We're POKEing only the high-frequency register (54273) for voice 1; the low frequency stays at 0.
- Line 170. Unlike with the Mozart sonata, we put this program in a continuous loop; the only way to break out of it is by pressing a key. We use the GET statement to detect the keypress. If one isn't forthcoming, control returns to line 150. We aren't counting notes, so we don't need any FOR-NEXT loops.
- Line 180. Turn off the sound by POKEing voice 1's high-frequency register with 0. Then END the program. If you were to end the program without this POKE, the sound would linger *ad nauseam* (and without vibrato).

Some Bizarre Variations

Here are three more variations that often produce bizarre results. Change the variables in lines 10–50 to the values shown below. Run each variation separately.

	R	S	U	X	T
1	0	250	33	4	33
2	0	15	65	6	129
3	0	255	65	1	33

Note that the second variation uses the noise waveform as the vibrato source. Remember that the pitch of voice 1 follows the shape of voice 3's waveform; in this case, PEEKing memory register 54299 yields random numbers in the range 0–255. **G**

horizons

What's Going On?

Rhett Anderson

Commodore's doing great financially. Commodore's in big trouble red-ink-wise. Commodore's going to sell a game machine based on the Amiga. Commodore's going to sell a game machine based on the 64. Commodore's bailing out of the 8-bit market. Commodore sells a million 64s a year. Commodore's building a new computer based on the 64.

The software market is healthy. It's weak. *Ahoy* has gone under. *Commodore Magazine* is going under. *Info* has gone Amiga. *RUN* is down to 64 pages for three issues straight.

Max Toy is doing great. Toy's out, Copperman's in. Commodore's going for the business market. Now going for the education market. Doesn't matter—everyone's producing games.

What does it all mean? How can it mean anything? Just about every statement we hear anymore from Commodore or from the press contradicts something we heard the week before. Clearly someone's telling the truth (if only accidentally). My solution is to believe everything but to not care one way or the other until the rumor becomes a fact. Another popular strategy is to disbelieve everything.

Remember *Power Play?*

So what are the facts? *Commodore Magazine* (formerly the alternating tag team of *Power Play* and *Commodore Microcomputing*) has decided to cease publication. This fact came to light when a deluge of their columnists and freelance writers wrote to us, called us, and even dropped by our office, looking for a place to peddle their words.

Rumor has it that the magazine (despite its newfound profitability) was nixed by new chief Harold Copperman because "Commodore's a *computer* company."

And what about that 8-bit super-64 that was mentioned in last issue's "Editor's Notes"? The last word that I've heard is that it has been dropped. But who can tell?

Despite everyone's assurances that the 64 software market is a desert, a steady stream of new products continues to wash up.

Smart Computers

I get some great letters. I read them all, but I must admit that many of them are soon adrift in the great sea of paper that is my office. Recently, one of my favorite letters has resurfaced.

The letter addresses a point I made in the January 1989 "Horizons." I said: "Using paper and pencil, add up the 100 consecutive numbers which start at the number 98765. Then write a BASIC program which does the same thing. Your 64 will win handily."

Now carefully read Ed Christophersen's introduction. "In the 'Horizons' article of January 1989, the point was proposed that the 64 could outperform the human brain in solving the problem of adding the 100 consecutive numbers that start with 98765, including the time needed to write the program."

Well, Mr. Christophersen didn't buy it.

"All you have to do with your brain is to add the first and last numbers (98,765 + 98,864) of the sequence (getting 197,629); realizing that there are 50 matched pairs in the sequence (98,766 + 98,863 . . .), divide by 2 (1/2 of 197,629 = 98,814.5); move the decimal point two places to the right to multiply by 100, and you have the correct answer of 9,881,450! Your hypothetical 'beginning programmer' would still be on line 30 S=S+X by the time your brain has the answer."

Wow! The problem is that it took me longer to figure that out than it would have taken me to write the program. For those who can't quite see the trick, let's take a simpler example: the sum of the numbers from 1 to 10.

Add the first and the last numbers to get 11. There are five "matched pairs" that all add up to 11 (1 and 10, 2 and 9, 3 and 8, 4 and 7, 5 and 6), so we divide 11 by 2 and get 5.5. (The division by 2 is necessary because we are pairing the numbers.) Multiply by 10 (because we're adding ten numbers together) and get 55, the correct answer.

Gazette copy editor Karen Uhlendorf points out that an even better way to do the calculation is to add together the highest and lowest numbers in the sequence and multiply the result by one-half the number of integers you are summing.

Mr. Christophersen has found a fascinating mathematical trick (and it seems as if I've run across it before—do any readers know the origin of this insight?), but he hasn't refuted the statements I made in January.

If you don't have the issue handy, I said that the human brain was much more flexible, but that the computer was much quicker at certain rote tasks. Indeed, Mr. Christophersen has used his flexible brain to cheat by restating my challenge. Reread the challenge as I stated it and as Mr. Christophersen stated it. I said, "Using paper and pencil, add up the 100 consecutive numbers which start at the number 98765." He says, "The point was proposed that the 64 could outperform the brain in solving the problem of adding." A subtle difference, perhaps, but I would maintain that Mr. Christophersen broke the rules when he added by multiplying.

Like it or not, computers are getting smarter. Next month *Gazette* begins a special series on neural networking. Be sure to catch it. **G**

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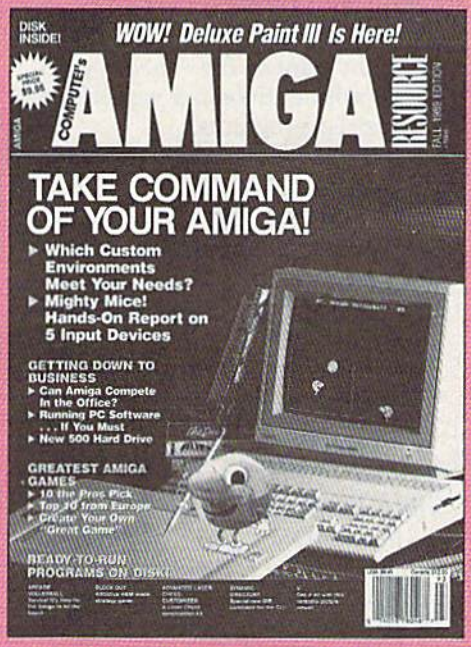

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d'versions

Commodore vs. Nintendo: Strong Words from Readers

Fred D'Ignazio

I've been writing this column for years, and I've never had this much mail before! I love it! (Readers, keep those cards and letters coming!)

I want to compliment everyone who has written. Most of you feel very strongly about Nintendo and about Commodore computers, and your letters have been thoughtful, responsible, and clever. And, most of the time, they were written with a word processor!

And now, here's a sampling of the readers' latest ideas and opinions—these are provocative ones—on the debate we've been covering for several months now.

One-Track Mind

Here's an acronym for Nintendo: No INTerest in ENDing the cycle of Doing nothing Other than playing games.

—Chris Thompson, Simpson, LA

Have you noticed that Nintendo's games all have the same pattern? Finish a stage, fight a super creature, and so on.

—Ben Gross, Redwood Falls, MN

Count Your Games!

I've had my Nintendo for a little less than a year now, and I only have three games. When my family bought a 64, we had about 50 games in three months.

—Josh Majka, Cary, IL

Nintendo Chic

All the hype has created a Nintendo chic. Quality and cost are nothing compared to the all-important Ninny chic; how else can one explain a phenomenon in which we find the Nintendo "cereal system" on the supermarket shelf? Besides, the word processing capability of the 64 is a pointless feature to most Ninnies, since the majority of them don't seem to be able to read or write anyway. . . . Most of the Ninny chic was built on the fact that a baboon could operate it.

—Joe Gillis, Mt. Savage, MD

Long Live the 64!

There is a good reason why the 64 does not want to die. The longer it sticks around, the more we see new low-priced programs.

—David Hutton, Newark, DE

Make 'Em and Play 'Em

A kid was saying that his Nintendo had over 140-odd games. When I told him that my 64 had over 2000 programs available for it and you can make more yourself, his jaw dropped.

—Ron Willey, Shelton, WA

Do Ten-Year-Olds Word Process?

So the Nintendo can't do anything productive. Try and convince a ten-year-old kid that he should buy a 64 so that he can word process or learn how to use a database.

—Jon Bock, Morris, MN

The Computer Says "Boo!"

A lot of people are afraid of computers. They don't want to have to take a course in computers to play *Donkey Kong*.

—Steven John Satak, USN

Fred, I think you and Dennis both missed what's probably the most important reason for people choosing a Nintendo over a 64: *simplicity.*

—Bryan Lawrence, W. Frankfort, IL

My sergeant at Fort Carson (Colorado Springs) bought his five-year-old son some preschool game software. In just a few weeks his son had learned to turn on the computer and use his favorite game. Nobody can use the excuse that a 64 is too hard to learn.

—Brian Randleas, Wallace, ID

So, There!

I totally disagree with Mr. Joslin. I also say that you can't compare a computer to a game machine. It's like comparing an apple to an orange. Mr. Joslin says you can't do anything productive with Nintendo. So what? Nintendo never said you could!

—Eric Dashofy, Mission Viejo, CA

Predicting the Future

Since the great Commodore vs. Nintendo debate began, there have been some news flashes that may affect the future of both Commodore and Nintendo, namely:

- Atari has sued Nintendo for monopolizing the game market. Nintendo has countersued Atari for copyright infringement.
- Nintendo is introducing its new Game Boy hand-held game (the size of a Walkman). For about $90, the game offers headphones and stereo sound, hi-res graphics that scroll across the screen; and a video-link accessory that allows two players to connect and compete.
- Mattel is introducing the $80 Power Glove that allows a user to control the Nintendo game on the screen with the wave of a hand.
- Nintendo is introducing *Nobunaga's Ambition*, a 2.5-megabyte game cartridge with a battery backup.

What's the future to be like for Nintendo and the 64? Will Nintendo fall victim to the boom-or-bust cycle for home videogames? Will Commodore abandon the 64 in favor of glitzier computers like the Amiga? Or will both survive, perhaps in some totally new form?

Please send your comments to Fred D'Ignazio, c/o *COMPUTE!'s Gazette*, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. **G**

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THE geos column

Disk Usage

Douglas S. Curtis

Determine available disk space without having to exit your current application with this desk accessory for GEOS or GEOS 128 (40 columns only), versions 1.3 and higher.

You're running an application and need to know how much space remains on a disk. Normally, you'd have to exit the application and examine the disk from the deskTop. With "Disk Usage," you can determine free disk space without exiting to the deskTop.

Disk Usage is particularly valuable if you're converting several text files to GEOS format with a conversion program that preserves the original files (*Wrong Is Write*, for example). Another area where Disk Usage can be helpful is when you're adding data to text or photo albums. If the application you're using allows you to swap disks, you can check new disks for available space from within your application before continuing with your work.

Typing It In

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

Starting address: 1503
Ending address: 1DB2

When you've entered all the data for Program 1, save two copies to disk, one with the filename DISK USAGE and one with the name DISKUSAGE.BKUP. One copy will be converted by Program 2 into a GEOS desk accessory. The other is a backup copy in case you have a problem with the conversion.

Now type in Program 2, "GeoConverter." Be sure to use "The Automatic Proofreader" to prevent typing mistakes when you enter the program. Save a copy of GeoConverter to the disk containing Program 1. Be very careful when typing in GeoConverter. It writes directly to your disk, so a typing error could cause GeoConverter to scramble your disk.

To prepare Disk Usage for use with GEOS, load Program 2 and type RUN. When prompted for a filename, enter DISK USAGE. GeoConverter then converts the file into a GEOS desk accessory.

Getting Started

You can run Disk Usage either by selecting its name from the geos menu or by double-clicking on its icon. When Disk Usage runs, it places a small window in the center of the screen. In this window, it displays information about the disks in drives A and B: the type of drive, the percentage of disk space used, and the amount of disk space used.

The drive types displayed by Disk Usage are 1541, 1571, 1581, and NULL. If one of the drives isn't connected, NULL is displayed in the type field for that drive. If one of the drives is a ramdisk, Disk Usage displays the type identifier for the drive the ramdisk is simulating. The next field, labeled *Graph*, is a horizontal bar graph representing the percentage of disk space currently being used. The last field is labeled *Usage*. This field contains the amount of disk space in use and is measured in kilobytes.

In addition to disk information, the display window contains two gadgets. The first gadget, Info, displays a copyright message. The second gadget, OK, exits Disk Usage and returns to the deskTop or the application that was running before Disk Usage was opened.

See program listings on page 77. G

bug-swatter

- The last example program in the August 1989 "BASIC for Beginners" is missing part of one line. There should be a NEXT command after the PRINT statement at the end of the last line.

```
50 PRINT F(I),H,L:NEXTI
```

- The conversion program developed by Larry Cotton in his column, "BASIC for Beginners" (March and April 1989), doesn't convert miles-to-meters or meters-to-miles correctly. According to the conversion program, there are 160.9344 meters in a mile; the conversion factor should be 1609.344 meters in a mile. In the March version of the program, line 1030 on page 56 should be changed to the following:

```
1030 DATA 1.609344,1609.344,16
     093.44,160934.4
```

Line 1030 on page 57 should be changed as follows:

```
1030 DATA 1.609344,MI,KM,1609.
     344,MI,M,16093.44,MI,CM,
     160934.4,MI,MM
```

Line 340 in the April version of the program also contains this mistake. It should read:

```
340 DATA 1.609344,MI,KM,1609.3
     44,MI,M,16093.44,MI,CM,1
     60934.4,MI,MM
```

- Several users have had trouble loading files using "Memo Card" (September 1989). A bug in the load routine prevents files containing cards with 80 or more characters from loading. However, once you've taken care of this bug, you'll be able to recover any files you've saved. To make the correction, add the following lines to the program:

```
KS 1350 INPUT#1,HR
KQ 1352 FOR I=0 TO HR:T$=""
DS 1354 GET#1,A$:IF A$=CHR$(13
        ) THEN 1358
SB 1356 T$=T$+A$:GOTO1354
BA 1358 IF T$="<" THEN T$=""
XP 1359 MS$(I)=T$
```

G

User Group Update

Edited by Mickey McLean

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

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

Commodore 64/128 User Group Update
COMPUTE!'s Gazette
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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.

Note: 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.

User Group Notes

The **Association for Sharing Commodore Information (ASCI)** has changed its address to 6160 Malvern Avenue, Rancho Cucamonga, California 91701-3736.

New Listings

ARIZONA

Arizona Commodore Enthusiasts (ACE), P.O. Box 46227, Phoenix, AZ 85063

ILLINOIS

United Northern Commodore Learning Exchange (U.N.C.L.E.), 533 N. 4th Ave., Des Plaines, IL 60016

TechNiVision Commodore Club, 189 Yuma, Carol Stream, IL 60188 (BBS# 312-690-1373)

Ken's Program Exchange Group, 12 Melvin Dr., Cahokia, IL 62206

IOWA

Commodore Players & Users of Iowa, P.O. Box 493, Essex, IA 51638

NORTH DAKOTA

The Computer Club, P.O. Box 5521, Bismarck, ND 58502

TENNESSEE

Nashville Commodore Users Group, P.O. Box 121282, Nashville, TN 37212 (BBS# 615-333-2919)

VERMONT

Maple Valley Commodore Users Group, P.O. Box 106, St. Albans, VT 05478

WASHINGTON

South King County Commodore User Group (SKCCUG), P.O. Box 5241, Kent, WA 98064 (BBS# 206-874-6289)

La Center Commodore Users Group, Rt. 1 Box 42, La Center, WA 98629

Outside the U.S.

AUSTRALIA

Plus/4 & C16 Users Group, 22 Wallace Ave., Lenah Valley, Hobart, Tasmania, Australia

INDIA

Bombay Commodore Club, c/o Haji Bilal Malbarwala, Apna Ghar Housing Society, Bldg. No. 46, 'B' Wing, Lokhandwala Complex, Versova, Andheri (West), Bombay 400 058, India

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MLX Machine Language Entry Program For Commodore 64 and 128

Ottis R. Cowper

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

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

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

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

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

Entering A Listing

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

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

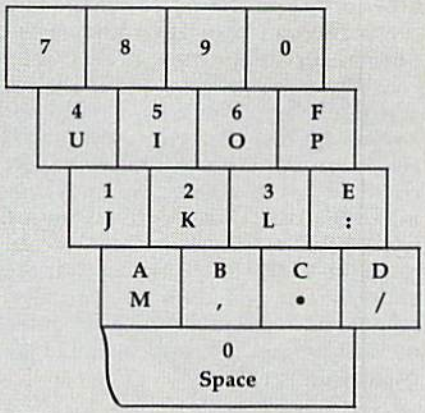
Invalid Characters Banned

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

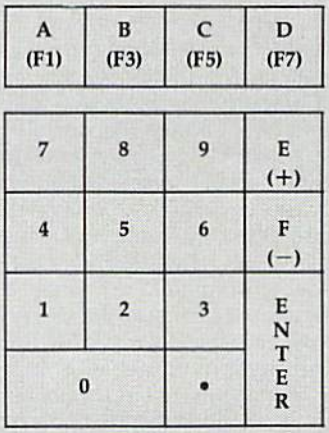
Only the numerals 0–9 and the letters A–F can be typed in. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, 128 MLX redefines the function keys and + and − keys on the numeric keypad so that you can enter data one-handed. (The 64 version incorporates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

MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, MLX will catch your mistake. There is one error that can slip past MLX: Because of the checksum formula used, MLX won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take reasonable care while entering data.

64 MLX Keypad



128 MLX Keypad



Editing Features

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

number prompt.

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

Display Data

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

Other Menu Options

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

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

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

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

The 128 version also has a CATALOG DISK option so you can view the contents of the disk directory before saving or loading.

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

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. Some ML programs are designed to be loaded and run like BASIC programs, so all you need to type is LOAD *"filename"*,8 for disk (DLOAD *"filename"* on the 128) or LOAD *"filename"* for tape, and then RUN. Such programs will usually have a starting address of 0801 for the 64 or 1C01 for the 128. Other programs must be reloaded to specific addresses with a command such as LOAD *"filename"*,8,1 for disk (BLOAD *"filename"* on the 128) or LOAD *"filename"*,1,1 for tape, then started with a SYS to a particular memory address. On the Commodore 64, the most common starting address for such programs is 49152, which corresponds to MLX address C000. In either case, you should always refer to the article which accompanies the ML listing for information on loading and running the program.

An Ounce of Prevention

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

Program 1: MLX for Commodore 64

```
SS 10 REM VERSION 1.1: LINES 8
      30,950 MODIFIED, LINES 4
      85-487 ADDED
EK 100 POKE 56,50:CLR:DIM IN$,
      I,J,A,B,A$,B$,A(7),N$
DM 110 C4=48:C6=16:C7=7:Z2=2:Z
      4=254:Z5=255:Z6=256:Z7=
      127
CJ 120 FA=PEEK(45)+Z6*PEEK(46)
      :BS=PEEK(55)+Z6*PEEK(56
      ):H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}"
      :S$=" ":D$=CHR$(20):Z$=
      CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD
      +23:POKE I,0:NEXT:POKE
      {SPACE}SD+24,15:POKE 78
      8,52
FC 150 PRINT"{CLR}"CHR$(142)CH
      R$(8):POKE 53280,15:POK
      E 53281,15
EJ 160 PRINT T$" {RED}{RVS}
      {2 SPACES}[8 @]
      {2 SPACES}"SPC(28)"
      {2 SPACES}{OFF}{BLU} ML
      X II {RED}{RVS}
      {2 SPACES}"SPC(28)"
      {12 SPACES}{BLU}"
FR 170 PRINT"{3 DOWN}
      {3 SPACES}COMPUTE!'S MA
      CHINE LANGUAGE EDITOR
      {3 DOWN}"
JB 180 PRINT"{BLK}STARTING ADD
```

```
      RESS[4]";:GOSUB300:SA=A
      D:GOSUB1040:IF F THEN18
      0
GF 190 PRINT"{BLK}{2 SPACES}EN
      DING ADDRESS[4]";:GOSUB
      300:EA=AD:GOSUB1030:IF
      {SPACE}F THEN190
KR 200 INPUT"{3 DOWN}{BLK}CLEA
      R WORKSPACE [Y/N][4]";A
      $:IF LEFT$(A$,1)<>"Y"TH
      EN220
PG 210 PRINT"{2 DOWN}{BLU}WORK
      ING...";:FORI=BS TO BS+
      EA-SA+7:POKE I,0:NEXT:P
      RINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}
      {BLK}{RVS} MLX COMMAND
      {SPACE}MENU {DOWN}[4]":
      PRINT T$"{RVS}E{OFF}NTE
      R DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISP
      LAY DATA":PRINT T$"
      {RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE
       FILE":PRINT T$"{RVS}Q
      {OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=
      MID$("EDLSQ",I,1)THEN A
      =I:I=5
FD 270 NEXT:ON A GOTO420,610,6
      90,700,280:GOSUB1060:GO
      TO250
EJ 280 PRINT"{RVS} QUIT ":INPU
      T"{DOWN}[4]ARE YOU SURE
       [Y/N]";A$:IF LEFT$(A$,
      1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF
      LEN(IN$)<>4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$
      =MID$(IN$,3):GOSUB320:A
      D=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID
      $(B$,J,1):B=ASC(A$)-C4+
      (A$>"@")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=
      0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(
      H$,B+1,1);:B=A-B*C6:PRI
      NT MID$(H$,B+1,1);:RETU
      RN
RR 360 A=INT(AD/Z6):GOSUB350:A
      =AD-A*Z6:GOSUB350:PRINT
      ":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*
      CK+Z5*(CK>Z7):GOTO390
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT
      [4]";:GOSUB300:IF IN$<>
      N$ THEN GOSUB1030:IF F
      {SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA
      {SPACE}":GOSUB400:IF IN
      $=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F
       THEN PRINT IN$:PRINT"
      {UP}{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:B$
      =S$:FOR J=1 TO 2:IF F T
      HEN B$=MID$(IN$,I+J,1)
HA 460 PRINT"{RVS}"B$L$;:IF I<
      24THEN PRINT"{OFF}";
HD 470 GET A$:IF A$=N$ THEN470
FK 480 IF(A$>"/"ANDA$<":")OR(A
      $>"@"ANDA$<"G")THEN540
GS 485 A=-(A$="M")-2*(A$=",")-
      3*(A$=".")-4*(A$="/")-5
      *(A$="J")-6*(A$="K")
FX 486 A=A-7*(A$="L")-8*(A$=":
      ")-9*(A$="U")-10*(A$="I
      ")-11*(A$="O")-12*(A$="
      P")
CM 487 A=A-13*(A$=S$):IF A THE
      N A$=MID$("ABCD123E456F
      0",A,1):GOTO 540
MP 490 IF A$=R$ AND((I=0)AND(J
      =1)OR F)THEN PRINT B$;:
      J=2:NEXT:I=24:GOTO550
KC 500 IF A$="{HOME}" THEN PRI
      NT B$:J=2:NEXT:I=24:NEX
      T:F=0:GOTO440
MX 510 IF(A$="{RIGHT}")ANDF TH
      ENPRINT B$L$;:GOTO540
GK 520 IF A$<>L$ AND A$<>D$ OR
       ((I=0)AND(J=1))THEN GOS
      UB1060:GOTO470
HG 530 A$=L$+S$+L$:PRINT B$L$;
      :J=2-J:IF J THEN PRINT
      {SPACE}L$;:I=I-3
QS 540 PRINT A$;:NEXT J:PRINT
      {SPACE}S$;
PM 550 NEXT I:PRINT:PRINT"{UP}
      {5 RIGHT}";:INPUT#3,IN$
      :IF IN$=N$ THEN CLOSE3:
      GOTO220
QC 560 FOR I=1 TO 25 STEP3:B$=
      MID$(IN$,I):GOSUB320:IF
       I<25 THEN GOSUB380:A(I
      /3)=A
PK 570 NEXT:IF A<>CK THEN GOSU
      B1060:PRINT"{BLK}{RVS}
      {SPACE}ERROR: REENTER L
      INE [4]":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FO
      R I=0 TO 7:POKE B+I,A(I
      ):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN C
      LOSE3:PRINT"{DOWN}{BLU}
      ** END OF ENTRY **{BLK}
      {2 DOWN}":GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"{CLR}{DOWN}{RVS}
      {SPACE}DISPLAY DATA ":G
      OSUB400:IF IN$=N$ THEN2
      20
RJ 620 PRINT"{DOWN}{BLU}PRESS:
       {RVS}SPACE{OFF} TO PAU
      SE, {RVS}RETURN{OFF} TO
       BREAK[4]{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FOR
      I=BTO B+7:A=PEEK(I):GOS
      UB350:GOSUB380:PRINT S$
      ;
CC 640 NEXT:PRINT"{RVS}";:A=CK
      :GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA TH
      ENPRINT"{DOWN}{BLU}** E
      ND OF DATA **":GOTO220
KC 660 GET A$:IF A$=R$ THEN GO
      SUB1080:GOTO220
EQ 670 IF A$=S$ THEN F=F+1:GOS
      UB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"{DOWN}{RVS} LOAD
      {SPACE}DATA ":OP=1:GOTO
      710
PC 700 PRINT"{DOWN}{RVS} SAVE
      {SPACE}FILE ":OP=0
RX 710 IN$=N$:INPUT"{DOWN}FILE
      NAME[4]";IN$:IF IN$=N$
      {SPACE}THEN220
PR 720 F=0:PRINT"{DOWN}{BLK}
      {RVS}T{OFF}APE OR {RVS}
      D{OFF}ISK: [4]";
FP 730 GET A$:IF A$="T"THEN PR
      INT"T{DOWN}":GOTO880
HQ 740 IF A$<>"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8
      ,15,"I0:":B=EA-SA:IN$="
      0:"+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+",P,W":G
      OSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(A
      H*256):PRINT#1,CHR$(AL)
      ;CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CH
      R$(PEEK(BS+I));:IF ST T
      HEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOT
      O940
GS 800 GOSUB1060:PRINT"{DOWN}
      {BLK}ERROR DURING SAVE:
      [4]":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+",P,R":G
      OSUB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z
      $)+256*ASC(B$+Z$):IF AD
      <>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,A$:P
      OKE BS+I,ASC(A$+Z$):IF(
      I<>B)AND ST THEN F=2:AD
      =I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F
      >0)+1 GOTO960,970
SA 860 INPUT#15,A,A$:IF A THEN
       CLOSE1:CLOSE15:GOSUB10
      60:PRINT"{RVS}ERROR: "A
      $
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE
      187,PEEK(FA+3):POKE188,
      PEEK(FA+4):IFOP=0THEN92
      0
HJ 890 SYS 63466:IF(PEEK(783)A
      ND1)THEN GOSUB1060:PRIN
      T"{DOWN}{RVS} FILE NOT
      {SPACE}FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(8
      30):IF AD<>SA THEN F=1:
      GOTO970
SC 910 A=PEEK(831)+256*PEEK(83
      2)-1:F=F-2*(A<EA)-3*(A>
      EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:P
      OKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOS
      UB1010:ON OP GOTO950:SY
      S 63591
AE 940 GOSUB1080:PRINT"{BLU}**
       SAVE COMPLETED **":GOT
      O220
XP 950 POKE147,0:SYS 63562:IF
      {SPACE}ST>0 THEN970
FR 960 GOSUB1080:PRINT"{BLU}**
       LOAD COMPLETED **":GOT
      O220
DP 970 GOSUB1060:PRINT"{BLK}
      {RVS}ERROR DURING LOAD:
      {DOWN}[4]":ON F GOSUB98
      0,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTIN
      G ADDRESS (";:GOSUB360:
      PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT ";:
      AD=SA+AD:GOSUB360:PRINT
       D$:RETURN
FD 1000 PRINT"TRUNCATED AT END
      ING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH
      *256):POKE193,AL:POKE1
      94,AH
FF 1020 AH=INT(B/256):AL=B-(AH
      *256):POKE174,AL:POKE1
      75,AH:RETURN
FX 1030 IF AD<SA OR AD>EA THEN
       1050
HA 1040 IF(AD>511 AND AD<40960
```

```
        )OR(AD>49151 AND AD<53
        248)THEN GOSUB1080:F=0
        :RETURN
HC 1050 GOSUB1060:PRINT"{RVS}
        {SPACE}INVALID ADDRESS
         {DOWN}{BLK}":F=1:RETU
        RN
AR 1060 POKE SD+5,31:POKE SD+6
        ,208:POKE SD,240:POKE
        {SPACE}SD+1,4:POKE SD+
        4,33
DX 1070 FOR S=1 TO 100:NEXT:GO
        TO1090
PF 1080 POKE SD+5,8:POKE SD+6,
        240:POKE SD,0:POKE SD+
        1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:PO
        KE SD+4,0:POKE SD,0:PO
        KE SD+1,0:RETURN
```

Program 2: MLX for Commodore 128

```
AE 100 TRAP 960:POKE 4627,128:
       DIM NL$,A(7)
XP 110 Z2=2:Z4=254:Z5=255:Z6=2
       56:Z7=127:BS=256*PEEK(4
       627):EA=65280
FB 120 BE$=CHR$(7):RT$=CHR$(13
       ):DL$=CHR$(20):SP$=CHR$
       (32):LF$=CHR$(157)
KE 130 DEF FNHB(A)=INT(A/256):
       DEF FNLB(A)=A-FNHB(A)*2
       56:DEF FNAD(A)=PEEK(A)+
       256*PEEK(A+1)
JB 140 KEY 1,"A":KEY 3,"B":KEY
        5,"C":KEY 7,"D":VOL 15
       :IF RGR(0)=5 THEN FAST
FJ 150 PRINT"{CLR}"CHR$(142);C
       HR$(8):COLOR 0,15:COLOR
        4,15:COLOR 6,15
GQ 160 PRINT TAB(12)"{RED}
       {RVS}{2 SPACES}{9 @}
       {2 SPACES}"RT$;TAB(12)"
       {RVS}{2 SPACES}{OFF}
       {BLU} 128 MLX {RED}
       {RVS}{2 SPACES}"RT$;TAB
       (12)"{RVS}{13 SPACES}
       {BLU}"
FE 170 PRINT"{2 DOWN}
       {3 SPACES}COMPUTE!'S MA
       CHINE LANGUAGE EDITOR
       {2 DOWN}"
DK 180 PRINT"{BLK}STARTING ADD
       RESS{4}";:GOSUB 260:IF
       {SPACE}AD THEN SA=AD:EL
       SE 180
FH 190 PRINT"{BLK}{2 SPACES}EN
       DING ADDRESS{4}";:GOSUB
        260:IF AD THEN EA=AD:E
       LSE 190
MF 200 PRINT"{DOWN}{BLK}CLEAR
       {SPACE}WORKSPACE [Y/N]?
       {4}":GETKEY A$:IF A$<>"
       Y" THEN 220
QH 210 PRINT"{DOWN}{BLU}WORKIN
       G...";:BANK 0:FOR A=BS
       {SPACE}TO BS+(EA-SA)+7:
       POKE A,0:NEXT A:PRINT"D
       ONE"
DC 220 PRINT TAB(10)"{DOWN}
       {BLK}{RVS} MLX COMMAND
       {SPACE}MENU {4}{DOWN}":
       PRINT TAB(13)"{RVS}E
       {OFF}NTER DATA"RT$;TAB(
       13)"{RVS}D{OFF}ISPLAY D
       ATA"RT$;TAB(13)"{RVS}L
       {OFF}OAD FILE"
HB 230 PRINT TAB(13)"{RVS}S
       {OFF}AVE FILE"RT$;TAB(1
       3)"{RVS}C{OFF}ATALOG DI
       SK"RT$;TAB(13)"{RVS}Q
       {OFF}UIT{DOWN}{BLK}"
AP 240 GETKEY A$:A=INSTR("EDLS
       CQ",A$):ON A GOTO 340,5
       50,640,650,930,940:GOSU
       B 950:GOTO 240
SX 250 PRINT"STARTING AT";:GOS
       UB 260:IF(AD<>0)OR(A$=N
       L$)THEN RETURN:ELSE 250
BG 260 A$=NL$:INPUT A$:IF LEN(
       A$)=4 THEN AD=DEC(A$)
PP 270 IF AD=0 THEN BEGIN:IF A
       $<>NL$ THEN 300:ELSE RE
       TURN:BEND
MA 280 IF AD<SA OR AD>EA THEN
       {SPACE}300
PM 290 IF AD>511 AND AD<65280
       {SPACE}THEN PRINT BE$;:
       RETURN
SQ 300 GOSUB 950:PRINT"{RVS} I
       NVALID ADDRESS {DOWN}
       {BLK}":AD=0:RETURN
RD 310 CK=FNHB(AD):CK=AD-Z4*CK
       +Z5*(CK>Z7):GOTO 330
DD 320 CK=CK*Z2+Z5*(CK>Z7)+A
AH 330 CK=CK+Z5*(CK>Z5):RETURN
QD 340 PRINT BE$;"{RVS} ENTER
       {SPACE}DATA ":GOSUB 250
       :IF A$=NL$ THEN 220
JA 350 BANK 0:PRINT:F=0:OPEN 3
       ,3
BR 360 GOSUB 310:PRINT HEX$(AD
       )+":";:IF F THEN PRINT
       {SPACE}L$:PRINT"{UP}
       {5 RIGHT}";
QA 370 FOR I=0 TO 24 STEP 3:B$
       =SP$:FOR J=1 TO 2:IF F
       {SPACE}THEN B$=MID$(L$,
       I+J,1)
PS 380 PRINT"{RVS}"B$+LF$;:IF
       {SPACE}I<24 THEN PRINT"
       {OFF}";
RC 390 GETKEY A$:IF (A$>"/" AN
       D A$<":") OR(A$>"@" AND
        A$<"G") THEN 470
AC 400 IF A$="+" THEN A$="E":G
       OTO 470
QB 410 IF A$="-" THEN A$="F":G
       OTO 470
FB 420 IF A$=RT$ AND ((I=0) AN
       D (J=1) OR F) THEN PRIN
       T B$;:J=2:NEXT:I=24:GOT
       O 480
RD 430 IF A$="{HOME}" THEN PRI
       NT B$:J=2:NEXT:I=24:NEX
       T:F=0:GOTO 360
XB 440 IF (A$="{RIGHT}") AND F
        THEN PRINT B$+LF$;:GOT
       O 470
JP 450 IF A$<>LF$ AND A$<>DL$
       {SPACE}OR ((I=0) AND (J
       =1)) THEN GOSUB 950:GOT
       O 390
PS 460 A$=LF$+SP$+LF$:PRINT B$
       +LF$;:J=2-J:IF J THEN P
       RINT LF$;:I=I-3
GB 470 PRINT A$;:NEXT J:PRINT
       {SPACE}SP$;
HA 480 NEXT I:PRINT:PRINT"{UP}
       {5 RIGHT}";:L$="
       {27 SPACES}"
DP 490 FOR I=1 TO 25 STEP 3:GE
       T#3,A$,B$:IF A$=SP$ THE
       N I=25:NEXT:CLOSE 3:GOT
       O 220
BA 500 A$=A$+B$:A=DEC(A$):MID$
       (L$,I,2)=A$:IF I<25 THE
       N GOSUB 320:A(I/3)=A:GE
       T#3,A$
AR 510 NEXT I:IF A<>CK THEN GO
       SUB 950:PRINT:PRINT"
       {RVS} ERROR: REENTER LI
       NE ":F=1:GOTO 360
DX 520 PRINT BE$:B=BS+AD-SA:FO
       R I=0 TO 7:POKE B+I,A(I
       ):NEXT I
XB 530 F=0:AD=AD+8:IF AD<=EA T
       HEN 360
CA 540 CLOSE 3:PRINT"{DOWN}
       {BLU}** END OF ENTRY **
       {BLK}{2 DOWN}":GOTO 650
MC 550 PRINT BE$;"{CLR}{DOWN}
       {RVS} DISPLAY DATA ":GO
       SUB 250:IF A$=NL$ THEN
       {SPACE}220
JF 560 BANK 0:PRINT"{DOWN}
       {BLU}PRESS: {RVS}SPACE
       {OFF} TO PAUSE, {RVS}RE
       TURN{OFF} TO BREAK{4}
       {DOWN}"
XA 570 PRINT HEX$(AD)+":";:GOS
       UB 310:B=BS+AD-SA
DJ 580 FOR I=B TO B+7:A=PEEK(I
       ):PRINT RIGHT$(HEX$(A),
       2);SP$;:GOSUB 320:NEXT
       {SPACE}I
XB 590 PRINT"{RVS}";RIGHT$(HEX
       $(CK),2)
GR 600 F=1:AD=AD+8:IF AD>EA TH
       EN PRINT"{BLU}** END OF
        DATA **":GOTO 220
EB 610 GET A$:IF A$=RT$ THEN P
       RINT BE$:GOTO 220
QK 620 IF A$=SP$ THEN F=F+1:PR
       INT BE$;
XS 630 ON F GOTO 570,610,570
RF 640 PRINT BE$"{DOWN}{RVS} L
       OAD DATA ":OP=1:GOTO 66
       0
BP 650 PRINT BE$"{DOWN}{RVS} S
       AVE FILE ":OP=0
DM 660 F=0:F$=NL$:INPUT"FILENA
       ME{4}";F$:IF F$=NL$ THE
       N 220
PF 665 IF LEN(F$)>14 THEN 660
RF 670 PRINT"{DOWN}{BLK}{RVS}T
       {OFF}APE OR {RVS}D{OFF}
       ISK: {4}";
SQ 680 GETKEY A$:IF A$="T" THE
       N 850:ELSE IF A$<>"D" T
       HEN 680
SP 690 PRINT"DISK{DOWN}":IF OP
        THEN 760
EH 700 DOPEN#1,(F$+",P"),W:IF
       {SPACE}DS THEN A$=D$:GO
       TO 740
JH 710 BANK 0:POKE BS-2,FNLB(S
       A):POKE BS-1,FNHB(SA):P
       RINT"SAVING ";F$:PRINT
MC 720 FOR A=BS-2 TO BS+EA-SA:
       PRINT#1,CHR$(PEEK(A));:
       IF ST THEN A$="DISK WRI
       TE ERROR":GOTO 750
GC 730 NEXT A:CLOSE 1:PRINT"
       {BLU}** SAVE COMPLETED
       {SPACE}WITHOUT ERRORS *
       *":GOTO 220
RA 740 IF DS=63 THEN BEGIN:CLO
       SE 1:INPUT"{BLK}REPLACE
        EXISTING FILE [Y/N]{4}
       ";A$:IF A$="Y" THEN SCR
       ATCH(F$):PRINT:GOTO 700
       :ELSE PRINT"{BLK}":GOTO
        660:BEND
GA 750 CLOSE 1:GOSUB 950:PRINT
       "{BLK}{RVS} ERROR DURIN
       G SAVE: {4}":PRINT A$:G
       OTO 220
FD 760 DOPEN#1,(F$+",P"):IF DS
        THEN A$=DS$:F=4:CLOSE
       {SPACE}1:GOTO 790
```

```
PX 770 GET#1,A$,B$:CLOSE 1:AD=
       ASC(A$)+256*ASC(B$):IF
       {SPACE}AD<>SA THEN F=1:
       GOTO 790
KB 780 PRINT"LOADING ";F$:PRIN
       T:BLOAD(F$),B0,P(BS):AD
       =SA+FNAD(174)-BS-1:F=-2
       *(AD<EA)-3*(AD>EA)
RQ 790 IF F THEN 800:ELSE PRIN
       T"{BLU}** LOAD COMPLETE
       D WITHOUT ERRORS **":GO
       TO 220
ER 800 GOSUB 950:PRINT"{BLK}
       {RVS} ERROR DURING LOAD
       : {4}":ON F GOSUB 810,8
       20,830,840:GOTO220
QJ 810 PRINT"INCORRECT STARTIN
       G ADDRESS (";HEX$(AD);"
       )":RETURN
DP 820 PRINT"LOAD ENDED AT ";H
       EX$(AD):RETURN
EB 830 PRINT"TRUNCATED AT ENDI
       NG ADDRESS ("HEX$(EA)")
       ":RETURN
FP 840 PRINT"DISK ERROR ";A$:R
       ETURN
KS 850 PRINT"TAPE":AD=POINTER(
       F$):BANK 1:A=PEEK(AD):A
       L=PEEK(AD+1):AH=PEEK(AD
       +2)
XX 860 BANK 15:SYS DEC("FF68")
       ,0,1:SYS DEC("FFBA"),1,
       1,0:SYS DEC("FFBD"),A,A
       L,AH:SYS DEC("FF90"),12
       8:IF OP THEN 890
FG 870 PRINT:A=SA:B=EA+1:GOSUB
        920:SYS DEC("E919"),3:
       PRINT"SAVING ";F$
AB 880 A=BS:B=BS+(EA-SA)+1:GOS
       UB 920:SYS DEC("EA18"):
       PRINT"{DOWN}{BLU}** TAP
       E SAVE COMPLETED **":GO
       TO 220
CP 890 SYS DEC("E99A"):PRINT:I
       F PEEK(2816)=5 THEN GOS
       UB 950:PRINT"{DOWN}
       {BLK}{RVS} FILE NOT FOU
       ND ":GOTO 220
GQ 900 PRINT"LOADING ...{DOWN}
       ":AD=FNAD(2817):IF AD<>
       SA THEN F=1:GOTO 800:EL
       SE AD=FNAD(2819)-1:F=-2
       *(AD<EA)-3*(AD>EA)
JD 910 A=BS:B=BS+(EA-SA)+1:GOS
       UB 920:SYS DEC("E9FB"):
       IF ST>0 THEN 800:ELSE 7
       90
XB 920 POKE193,FNLB(A):POKE194
       ,FNHB(A):POKE 174,FNLB(
       B):POKE 175,FNHB(B):RET
       URN
CP 930 CATALOG:PRINT"{DOWN}
       {BLU}** PRESS ANY KEY F
       OR MENU **":GETKEY A$:G
       OTO 220
MM 940 PRINT BE$"{RVS} QUIT
       {4}";RT$;"ARE YOU SURE
       {SPACE}[Y/N]?":GETKEY A
       $:IF A$<>"Y" THEN 220:E
       LSE PRINT"{CLR}":BANK 1
       5:END
JE 950 SOUND 1,500,10:RETURN
AF 960 IF ER=14 AND EL=260 THE
       N RESUME 300
MK 970 IF ER=14 AND EL=500 THE
       N RESUME NEXT
KJ 980 IF ER=4 AND EL=780 THEN
        F=4:A$=DS$:RESUME 800
DQ 990 IF ER=30 THEN RESUME:EL
       SE PRINT ERR$(ER);" ERR
       OR IN LINE";EL
```

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The Automatic Proofreader

Philip I. Nelson

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

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

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

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

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

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

The Proofreader does *not* accept keyword abbreviations (for example, ? instead of PRINT). If you prefer to use abbreviations, you can still check the line by LISTing it after typing it in, moving the cursor back to the line, and pressing RETURN. LISTing the line substitutes the full keyword for the abbreviation and allows the Proofreader to work properly. The same technique works for rechecking programs you've already typed in.

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

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

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

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

The New Automatic Proofreader

```
10 VEC=PEEK(772)+256*PEEK(773)
   :LO=43:HI=44
20 PRINT "AUTOMATIC PROOFREADE
   R FOR ";:IF VEC=42364 THEN
   {SPACE}PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VI
   C-20"
40 IF VEC=35158 THEN GRAPHIC C
   LR:PRINT "PLUS/4 & 16"
50 IF VEC=17165 THEN LO=45:HI=
   46:GRAPHIC CLR:PRINT"128"
60 SA=(PEEK(LO)+256*PEEK(HI))+
   6:ADR=SA
70 FOR J=0 TO 166:READ BYT:POK
   E ADR,BYT:ADR=ADR+1:CHK=CHK
   +BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*
   ERROR* CHECK TYPING IN DATA
    STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+L
   F,LB:POKE SA+HF,HB:NEXT
110 IF CHK<>22054 THEN PRINT "
   *ERROR* RELOAD PROGRAM AND
   {SPACE}CHECK FINAL LINE":EN
   D
120 POKE SA+149,PEEK(772):POKE
    SA+150,PEEK(773)
130 IF VEC=17165 THEN POKE SA+
   14,22:POKE SA+18,23:POKESA+
   29,224:POKESA+139,224
140 PRINT CHR$(147);CHR$(17);"
   PROOFREADER ACTIVE":SYS SA
150 POKE HI,PEEK(HI)+1:POKE (P
   EEK(LO)+256*PEEK(HI))-1,0:N
   EW
160 DATA 120,169,73,141,4,3,16
   9,3,141,5,3
170 DATA 88,96,165,20,133,167,
   165,21,133,168,169
180 DATA 0,141,0,255,162,31,18
   1,199,157,227,3
190 DATA 202,16,248,169,19,32,
   210,255,169,18,32
200 DATA 210,255,160,0,132,180
   ,132,176,136,230,180
210 DATA 200,185,0,2,240,46,20
   1,34,208,8,72
220 DATA 165,176,73,255,133,17
   6,104,72,201,32,208
230 DATA 7,165,176,208,3,104,2
   08,226,104,166,180
240 DATA 24,165,167,121,0,2,13
   3,167,165,168,105
250 DATA 0,133,168,202,208,239
   ,240,202,165,167,69
260 DATA 168,72,41,15,168,185,
   211,3,32,210,255
270 DATA 104,74,74,74,74,168,1
   85,211,3,32,210
280 DATA 255,162,31,189,227,3,
   149,199,202,16,248
290 DATA 169,146,32,210,255,76
   ,86,137,65,66,67
300 DATA 68,69,70,71,72,74,75,
   77,80,81,82,83,88
310 DATA 13,2,7,167,31,32,151,
   116,117,151,128,129,167,136
   ,137
```

G

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

Text Screen Editor

See instructions in article on page 35 before typing in.

Program 1: Text Screen Editor

```
C000:A9 80 8D 8A 02 A5 C6 85 8A
C008:CC F0 FA 78 A5 CF F0 0C 6D
C010:A9 00 85 CF A5 CE AE 87 61
C018:02 20 13 EA 20 B4 E5 A2 F5
C020:00 86 D4 86 D8 A6 91 30 FA
C028:01 60 20 AC C0 AA 29 7F 93
C030:C9 20 8A 90 38 C9 40 90 F2
C038:26 C9 60 B0 05 E9 3F 4C F0
C040:5F C0 C9 80 B0 05 E9 1F 6F
C048:4C 5F C0 C9 C0 B0 05 E9 39
C050:3F 4C 5F C0 C9 FF B0 05 31
C058:E9 7F 4C 5F C0 A9 5E A6 3E
C060:C7 F0 02 09 80 AE 86 02 A0
C068:20 13 EA A9 1D A6 D6 E0 C8
C070:18 D0 1F C9 0D D0 0A A9 1C
C078:91 20 16 E7 A9 0D 4C A6 CC
C080:C0 C9 1D D0 09 A6 D3 E0 F0
C088:27 D0 1B 4C 05 C0 C9 11 C9
C090:F0 17 C9 94 D0 10 A5 D3 B8
C098:C9 27 F0 0D A0 27 B1 D1 8E
C0A0:C9 20 D0 05 A9 94 20 16 6F
C0A8:E7 4C 05 C0 C9 85 D0 04 E7
C0B0:EE 20 D0 60 C9 89 D0 04 EB
C0B8:EE 21 D0 60 C9 86 D0 40 64
C0C0:A6 D6 E0 18 F0 2C A5 D1 3E
C0C8:85 FB A5 D2 85 FC A5 F3 4D
C0D0:85 FD A5 F4 85 FE E8 20 B2
C0D8:F0 E9 20 24 EA A0 00 B1 1F
C0E0:D1 91 FB B1 F3 91 FD C8 F4
C0E8:C0 28 D0 F3 E0 18 90 D6 8D
C0F0:A2 18 20 FF E9 A6 D6 20 85
C0F8:F0 E9 20 24 EA A9 86 60 1F
C100:C9 8A D0 3E A2 18 20 F0 AF
C108:E9 20 24 EA A5 D1 85 FB 37
C110:A5 D2 85 FC A5 F3 85 FD A1
C118:A5 F4 85 FE CA 20 F0 E9 EE
C120:20 24 EA A0 00 B1 D1 91 20
C128:FB B1 F3 91 FD C8 C0 28 6A
C130:D0 F3 E0 00 F0 04 E4 D6 6D
C138:B0 D2 A6 D6 20 FF E9 A9 89
C140:8A 60 C9 87 D0 14 A0 00 EA
C148:B1 D1 99 7A C2 B1 F3 99 52
C150:A2 C2 C8 C0 28 D0 F1 A9 0D
C158:87 60 C9 8B D0 14 A0 00 C1
C160:B9 7A C2 91 D1 B9 A2 C2 4E
C168:91 F3 C8 C0 28 D0 F1 A9 E8
C170:8B 60 C9 88 F0 05 C9 8C 4F
C178:F0 01 60 48 A9 00 20 18 EA
C180:FE A5 D3 48 A5 D6 48 18 1D
C188:A2 18 A0 00 20 0A E5 20 8C
C190:24 EA B1 D1 99 CA C2 B1 63
C198:F3 99 F2 C2 C8 C0 28 D0 71
C1A0:F1 20 FF E9 A9 00 8D 1A 46
C1A8:C3 58 A5 C6 85 CC F0 FA 81
C1B0:78 A9 00 85 CF 20 B4 E5 81
C1B8:C9 22 F0 EE C9 14 F0 1F 56
C1C0:C9 0D F0 29 AA 29 7F C9 DF
C1C8:20 90 DF 8A AE 1A C3 E0 6B
C1D0:0F F0 D7 9D 1B C3 EE 1A CC
C1D8:C3 20 16 E7 4C AA C1 AE C6
C1E0:1A C3 F0 C6 CE 1A C3 20 73
C1E8:16 E7 4C AA C1 A0 00 B9 EF
C1F0:CA C2 91 D1 B9 F2 C2 91 8A
C1F8:F3 C8 C0 28 D0 F1 18 68 2A
C200:AA 68 A8 20 0A E5 20 24 58
C208:EA AE 1A C3 F0 65 A9 53 F1
C210:9D 1B C3 EE 1A C3 A9 00 C5
C218:A2 08 A0 01 20 00 FE AD C1
C220:1A C3 A2 1B A0 C3 20 F9 F7
C228:FD 68 48 C9 88 D0 08 A9 AD
C230:00 20 9E F4 4C 48 C2 A9 93
C238:00 85 FB A9 04 85 FC A9 13
C240:FB A2 E8 A0 07 20 DD F5 FD
C248:AE 1A C3 CA A9 43 9D 1B 81
C250:C3 68 48 C9 88 D0 08 A9 B8
C258:00 20 9E F4 4C 70 C2 A9 5C
C260:00 85 FB A9 D8 85 FC A9 E1
C268:FB A2 E8 A0 DB 20 DD F5 CC
C270:20 2F F3 A9 40 20 18 FE 9C
C278:68 60 20 20 20 20 20 20 32
C280:20 20 20 20 20 20 20 20 06
C288:20 20 20 20 20 20 20 20 0E
C290:20 20 20 20 20 20 20 20 16
C298:20 20 20 20 20 20 20 20 1E
C2A0:20 20 00 00 00 00 00 00 3E
```

Program 2: EXS

```
0400:D5 F2 F2 F2 F2 F2 F2 F2 79
0408:F2 F2 F2 F2 F2 F2 F2 F2 10
0410:F2 F2 F2 F2 F2 F2 F2 F2 18
0418:F2 F2 F2 F2 F2 F2 F2 F2 20
0420:F2 F2 F2 F2 F2 F2 F2 C9 FE
0428:EB DB DB DB DB DB DB DB 38
0430:DB DB DB DB DB DB DB DB 38
0438:DB DB DB DB DB DB DB DB 40
0440:DB DB DB DB DB DB DB DB 48
0448:DB DB DB DB DB DB DB F3 68
0450:EB DB CB CA CB CA CB CA 57
0458:CB CA CB CA CB CA CB CA 0B
0460:CB CA CB CA CB CA CB CA 13
0468:CB CA CB CA CB CA CB CA 1B
0470:CB CA CB CA CB CA DB F3 6C
0478:EB DB C9 D5 C9 D5 C9 D5 13
0480:C9 D5 C9 D5 C9 D5 C9 D5 88
0488:C9 D5 C9 D5 C9 D5 C9 D5 90
0490:C9 D5 C9 D5 C9 D5 C9 D5 98
0498:C9 D5 C9 D5 C9 D5 DB F3 E2
04A0:EB DB CB CA CB CA CB CA A7
04A8:CB CA CB CA CB CA CB CA 5B
04B0:CB CA CB CA CB CA CB CA 63
04B8:CB CA CB CA CB CA CB CA 6B
04C0:CB CA CB CA CB CA DB F3 BC
04C8:EB DB C9 D5 C9 D5 C9 D5 63
04D0:C9 D5 C9 D5 C9 D5 C9 D5 D8
04D8:C9 D5 C9 D5 C9 D5 C9 D5 E0
04E0:C9 D5 C9 D5 C9 D5 C9 D5 E8
04E8:C9 D5 C9 D5 C9 D5 DB F3 33
04F0:EB DB CB CA CB CA CB CA F7
04F8:CB CA CB CA CB CA CB CA AB
0500:CB CA CB CA CB CA CB CA B4
0508:CB CA CB CA CB CA CB CA BC
0510:CB CA CB CA CB CA DB F3 0E
0518:EB DB C9 D5 C9 D5 C9 A0 7F
0520:A0 A0 A0 A0 A0 A0 A0 A0 2A
0528:A0 A0 A0 A0 A0 A0 A0 A0 32
0530:A0 A0 A0 A0 A0 A0 A0 A0 3A
0538:A0 D5 C9 D5 C9 D5 DB F3 EF
0540:EB DB CB CA CB CA CB E0 5F
0548:A0 A0 A0 A0 A0 A0 A0 A0 52
0550:A0 A0 A0 A0 A0 A0 A0 A0 5A
0558:A0 E0 E0 A0 E0 A0 A0 A0 7C
0560:E0 CA CB CA CB CA DB F3 E8
0568:EB DB C9 D5 C9 D5 C9 E0 10
0570:A0 A0 A0 A0 A0 A0 A0 A0 7A
0578:A0 A0 A0 A0 A0 A0 A0 A0 82
0580:A0 A0 E0 A0 A0 A0 E0 A0 13
0588:A0 D5 C9 D5 C9 D5 DB F3 40
0590:EB DB CB CA CB CA CB E0 AF
0598:A0 A0 A0 A0 A0 A0 A0 A0 A2
05A0:A0 A0 A0 A0 A0 A0 A0 A0 AA
05A8:A0 A0 E0 A0 A0 A0 E0 A0 3B
05B0:A0 CA CB CA CB CA DB F3 19
05B8:EB DB C9 D5 C9 D5 C9 A0 20
05C0:A0 A0 A0 A0 A0 A0 A0 A0 CA
05C8:A0 A0 94 85 98 94 A0 A0 2F
05D0:A0 A0 E0 E0 A0 A0 E0 A0 67
05D8:A0 D5 C9 D5 C9 D5 DB F3 90
05E0:EB DB CB CA CB CA CB E0 FF
05E8:A0 A0 A0 A0 A0 A0 A0 A0 F2
05F0:A0 93 83 92 85 85 8E A0 C9
05F8:A0 A0 E0 A0 A0 A0 A0 A0 0B
0600:A0 CA CB CA CB CA DB F3 6A
0608:EB DB C9 D5 C9 D5 C9 A0 71
0610:A0 A0 A0 A0 A0 A0 A0 A0 1C
0618:A0 85 84 89 94 8F 92 A0 A7
0620:A0 E0 A0 A0 A0 A0 A0 A0 3C
0628:A0 D5 C9 D5 C9 D5 DB F3 E1
0630:EB DB CB CA CB CA CB A0 11
0638:A0 A0 A0 A0 A0 A0 A0 A0 44
0640:A0 A0 A0 A0 A0 A0 A0 A0 4C
0648:A0 E0 A0 A0 A0 A0 A0 A0 64
0650:A0 CA CB CA CB CA DB F3 BA
0658:EB DB C9 D5 C9 D5 C9 A0 C1
0660:A0 A0 A0 A0 A0 A0 A0 A0 6C
0668:A0 A0 A0 A0 A0 A0 A0 A0 74
0670:A0 A0 A0 A0 A0 A0 A0 A0 7C
0678:A0 D5 C9 D5 C9 D5 DB F3 32
0680:EB DB CB CA CB CA CB A0 61
0688:A0 A0 A0 A0 A0 A0 A0 A0 94
0690:A0 A0 A0 A0 A0 A0 A0 A0 9C
0698:A0 A0 A0 A0 A0 A0 A0 A0 A4
06A0:A0 CA CB CA CB CA DB F3 0B
06A8:EB DB C9 D5 C9 D5 C9 D5 47
06B0:C9 D5 C9 D5 C9 D5 C9 D5 BC
06B8:C9 D5 C9 D5 C9 D5 C9 D5 C4
06C0:C9 D5 C9 D5 C9 D5 C9 D5 CC
06C8:C9 D5 C9 D5 C9 D5 DB F3 17
06D0:EB DB CB CA CB CA CB CA DB
06D8:CB CA CB CA CB CA CB CA 8F
06E0:CB CA CB CA CB CA CB CA 97
06E8:CB CA CB CA CB CA CB CA 9F
06F0:CB CA CB CA CB CA DB F3 F0
06F8:EB DB C9 D5 C9 D5 C9 D5 97
0700:C9 D5 C9 D5 C9 D5 C9 D5 0E
0708:C9 D5 C9 D5 C9 D5 C9 D5 16
0710:C9 D5 C9 D5 C9 D5 C9 D5 1E
0718:C9 D5 C9 D5 C9 D5 DB F3 68
0720:EB DB CB CA CB CA CB CA 2D
0728:CB CA CB CA CB CA CB CA E0
0730:CB CA CB CA CB CA CB CA E8
0738:CB CA CB CA CB CA CB CA F0
0740:CB CA CB CA CB CA DB F3 42
0748:EB DB C9 D5 C9 D5 C9 D5 E8
0750:C9 D5 C9 D5 C9 D5 C9 D5 5E
0758:C9 D5 C9 D5 C9 D5 C9 D5 66
0760:C9 D5 C9 D5 C9 D5 C9 D5 6E
0768:C9 D5 C9 D5 C9 D5 DB F3 B8
0770:EB DB DB DB DB DB DB DB 86
0778:DB DB DB DB DB DB DB DB 86
0780:DB DB DB DB DB DB DB DB 8E
0788:DB DB DB DB DB DB DB DB 96
0790:DB DB DB DB DB DB DB F3 B6
0798:CA F1 F1 F1 F1 F1 F1 F1 13
07A0:F1 F1 F1 F1 F1 F1 F1 F1 AE
07A8:F1 F1 F1 F1 F1 F1 F1 F1 B6
07B0:F1 F1 F1 F1 F1 F1 F1 F1 BE
07B8:F1 F1 F1 F1 F1 F1 F1 CB A0
07C0:A0 A0 83 8F 90 99 92 89 4A
07C8:87 88 94 A0 B1 B9 B8 B9 F8
07D0:A0 83 8F 8D 90 95 94 85 64
07D8:A1 A0 90 95 82 8C 89 83 28
07E0:81 94 89 8F 8E 93 A0 A0 A3
```

Program 3: EXC

```
D800:FB FB 0B EB 9B FB FB FB 8F
D808:FB EB 0B FB FB FB 0B EB A5
D810:FB EB FB FB FB FB 0B FB DB
D818:FB FB FB FB FB FB FB FB C9
D820:FB FB FB FB FB EB FB FB 91
D828:FB 0B EB 0B FB 0B FB FB C8
D830:0B EB 0B FB CB 0B 1B FB 40
D838:0B EB 0B FB FB FB FB EB 3F
D840:FB FB 0B 0B FB FB FB FB C4
D848:FB 0B FB FB CB FB 0B FB 5A
D850:FB FB FB CB 0B 9B FB FB F5
D858:FB EB EB EB FB FB FB FB 03
D860:FB FB FB FB FB FB FB FB 12
D868:FB FB FB FB 0B FB CB EB 22
D870:FB FB FB FB EB EB 0B FB 7F
D878:FB FB FB FC CC FC FC FC C7
D880:FC EC FC 0C 0C 0C FC EC C3
D888:FC FC EC FC FC 0C FC EC 64
D890:FC 0C 0C FC FC FC CC EC 77
D898:9C FC FC FC EC CB EB FB B1
D8A0:FB FB FB FC 0C 0C FC FC 26
```

```
D8A8:FC FC EC FC EC FC FC FC D7
D8B0:FC FC 0C FC 0C FC FC EC AC
D8B8:FC FC FC FC FC FC FC EC 5A
D8C0:EC FC FC FC EC FB EB FB C2
D8C8:FB FB FB EC 0C 0C FC FC 4D
D8D0:FC FC EC FC FC FC FC 0C 8F
D8D8:FC CC FC 0C FC FC FC EC 5F
D8E0:0C FC FC FC CC FC 0C FC B6
D8E8:FC 0C FC FC FC FB FB FB 57
D8F0:FB FB FB 0C EC EC FC FC F1
D8F8:0C FC 0C FC 0C FC FC 0C 9B
D900:EC 0C 0C FC FC EC EC EC E0
D908:EC 0C FC EC FC FC CC FC 16
D910:FC FC FC FC EC 2B EB CB A8
D918:FB FB FB EC FC FC FC F0 DD
D920:90 F0 F0 F0 FF FF FF FF 85
D928:FF FF 0F FF CF FF FF FF 3C
D930:FF FF FF FF 00 F0 E0 F0 5A
D938:F0 FC FC FC FC FB 0B CB CC
D940:FB FB FB EC FC CC 0C 00 72
D948:FF FF FF 00 FF F0 F0 F0 92
D950:F0 E0 F0 F0 F0 F0 E0 E0 CF
D958:00 F0 F0 FF F0 FF FF FF ED
D960:00 FC FC 0C FC 0B 0B 0B E8
D968:FB FB FB FC FC FC FC 00 3E
D970:FF E0 F0 00 FF 00 FF FF 7A
D978:FF FF FF FF 1F EF FF FF E4
D980:FF FF F0 FF F0 00 C0 9F FA
D988:F0 FC FC FC FC FB FB FB 2F
D990:FB EB FB FC FC 0C FC 00 9E
D998:9F F0 FF FF FF F0 EF F0 EC
D9A0:F0 F0 C0 F0 F0 00 F0 F0 8A
D9A8:00 EF 00 FF FF FF 10 EF 68
D9B0:C0 FC 0C FC FC FB FB EB 11
D9B8:FB FB FB FC FC 0C 0C E0 C9
D9C0:EF F0 FF 0F EF E0 EF F0 6D
D9C8:F0 F0 F0 F0 00 00 F0 F0 31
D9D0:F0 FF F0 FF 0F FF F0 FF 75
D9D8:E0 EC 0C FC FC FB FB 0B 64
D9E0:FB FB FB 0C FC FC FC E0 88
D9E8:CF F0 FF FF FF F0 FF F0 75
D9F0:00 F0 F0 E0 F0 F0 F0 F0 2B
D9F8:F0 FF E0 FF 0F EF 00 FF 79
DA00:00 FC 1C FC FC EB EB 0B C2
DA08:FB FB FB 0C FC EC FC 00 90
DA10:FF F0 FF 0F 9F F0 FF 10 C3
DA18:F0 00 F0 F0 E0 F0 00 F0 2F
DA20:F0 FF F0 0F FF FF F0 FF 3F
DA28:F0 FC FC FC FC FB EB EB A0
DA30:FB FB 0B FC CC 0C FC F0 95
DA38:FF F0 F0 00 EF F0 FF F0 7C
DA40:F0 F0 F0 F0 F0 E0 F0 E0 A5
DA48:E0 EF F0 FF F0 F0 E0 EF 85
DA50:F0 FC FC FC FC FB FB FB F8
DA58:FB FB FB FC EC FC FC F0 A0
DA60:FF FF EF 00 FF F0 0F FF F5
DA68:EF FF FF FF EF FF FF FF 95
DA70:EF 0F 00 FF F0 0F FF EF 95
DA78:F0 0C 9C FC EC FB 0B FB 76
DA80:FB FB FB EC 1C FC EC E0 11
DA88:F0 F0 10 E0 FF F0 F0 00 A8
DA90:00 00 F0 F0 90 E0 F0 F0 4E
DA98:F0 F0 F0 FF F0 F0 F0 F0 3F
DAA0:F0 0C FC FC 0C FB EB 2B 94
DAA8:FB FB FB 0C CC FC FC FC EC
DAB0:FC FC FC CC FC FC FC FC 63
DAB8:EC FC FC FC 0C FC FC FC DE
DAC0:FC FC FC FC FC FC EC FC 56
DAC8:0C FC FC FC FC CB FB FB 3E
DAD0:FB FB FB FC FC EC FC FC 65
DAD8:FC FC FC FC FC FC 0C FC AC
DAE0:0C FC 0C EC FC FC FC EC EE
DAE8:FC FC FC 0C FC FC EC CC 3F
DAF0:FC FC FC FC FC FB 0B 0B CC
DAF8:FB FB 0B FC FC FC FC FC AF
DB00:FC FC FC 0C FC FC 0C FC C6
DB08:1C FC FC FC FC FC EC FC 2F
DB10:FC 0C 0C FC 0C FC EC FC C5
DB18:FC FC FC FC FC FB FB FB C8
DB20:0B EB 0B EC FC FC FC EC 4B
DB28:FC 0C FC FC FC FC FC 1C C2
DB30:EC FC FC FC FC FC FC FC DF
DB38:FC FC FC FC FC EC FC FC AF
DB40:FC FC EC 0C CC FB FB 9B FD
DB48:FB FB FB EB FB FB FB FB FE
DB50:FB FB FB 0B 9B FB FB EB E5
DB58:0B 9B FB FB FB EB EB EB 0F
DB60:FB FB FB CB FB FB FB FB 15
DB68:FB FB EB FB EB 0B 0B 9B 97
DB70:FB FB FB FB 0B FB FB FB A0
DB78:CB FB FB EB 9B FB EB FB F3
DB80:FB CB FB FB FB 0B EB FB 48
DB88:FB FB EB FB EB FB FB FB BD
DB90:FB FB FB EB FB CB 0B FB A4
DB98:FB 0B 0B EB FB FB FB FB F4
DBA0:EB EB FB EB FB FB EB FB 2B
DBA8:FB 0B FB FB FB FB 0B EB 32
DBB0:0B FB EB FB EB EB EB FB 0D
DBB8:FB FB 0B FB FB EB FB 9B B1
DBC0:FF FF FF FF FF FF FF FF 78
DBC8:FF FF FF EF FF FF FF FF 7F
DBD0:FF EF FF FF 0F FF FF FF FC
DBD8:FF 0F FF FF FF FF FF 9F F3
DBE0:FF FF FF 0F FF EF FF EF 39
```

Program 4: Demo

```
SM 10 IFA=1THEN50
EX 20 IFA=2THEN70
SF 30 A=1
AR 40 LOAD"EXS",8,1
PH 50 A=2
MF 60 LOAD"EXC",8,1
FM 70 POKE53281,0
RR 80 POKE53281,1
MJ 90 GOTO70
```

BEFORE TYPING . . .

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

128 Graphics Compactor

See instructions in article on page 44 before typing in.

Program 1: 128 Graphics Compactor

```
1300:A9 4C 8D 89 03 A9 10 8D C4
1308:8A 03 A9 13 8D 8B 03 60 9B
1310:8E 88 17 08 68 8D 89 17 A6
1318:68 8D 81 17 68 8D 82 17 0D
1320:C9 4A D0 0D AD 81 17 C9 14
1328:F2 D0 06 20 73 13 4C 4B 8A
1330:13 AD 81 17 C9 DE D0 0D 65
1338:AD 82 17 C9 4D D0 06 20 2F
1340:73 13 4C 4B 13 20 73 13 36
1348:4C 53 13 A0 00 B1 3D C9 E0
1350:50 F0 0F AE 88 17 AD 89 2D
1358:17 48 28 A0 00 B1 3D 4C B8
1360:8D 03 C8 B1 3D C9 94 F0 6D
1368:07 C9 93 D0 E6 4C EA 15 57
1370:4C 1B 14 68 A8 68 AA AD 76
1378:82 17 48 AD 81 17 48 8A 0D
1380:48 98 48 60 20 DA 16 20 B8
1388:80 03 20 80 03 20 E4 03 21
1390:29 0F 8D 6C 17 A0 00 A2 65
1398:01 A9 24 20 74 FF 99 4E 55
13A0:17 C8 CC 6C 17 90 F0 C8 8A
13A8:8C 6C 17 A9 30 8D 4C 17 15
13B0:A9 08 8D 6E 17 A9 00 8D 33
13B8:87 17 20 86 03 F0 45 C9 05
13C0:2C F0 05 A2 0B 4C 3C 4D 53
13C8:20 80 03 C9 4D D0 0F 20 08
13D0:08 14 C9 02 90 02 A9 03 3C
13D8:8D 87 17 4C BA 13 C9 44 49
13E0:D0 0C 20 80 03 8D 4C 17 7C
13E8:20 80 03 4C BA 13 C9 55 6F
13F0:D0 10 20 08 14 C9 04 90 68
13F8:CA C9 1E B0 C6 8D 6E 17 26
1400:90 B8 D0 BF 20 E7 03 60 BB
1408:20 80 03 A9 12 8D E5 03 F0
1410:A9 88 8D E6 03 20 E4 03 B4
1418:A5 16 60 A9 00 8D 8A 17 A1
1420:20 D1 15 20 84 13 AC 6C A7
1428:17 A2 00 BD 62 17 F0 07 B8
1430:99 4D 17 E8 C8 D0 F4 8C E9
1438:6C 17 A9 01 8D 6F 17 20 1A
1440:F1 16 AE 6D 17 20 C9 FF 60
1448:90 0C 8E 82 17 20 2E 17 62
1450:AE 82 17 4C 3C 4D AD 87 12
1458:17 20 3E 15 AD 20 D0 20 DC
1460:3E 15 AD 21 D0 20 3E 15 4D
1468:A9 FF 8D 85 17 AD 87 17 05
1470:D0 1B A0 00 20 BA 14 20 10
1478:C8 14 20 C3 15 A9 0F 8D 45
1480:85 17 A0 04 20 BA 14 20 B9
1488:C8 14 4C 17 17 C9 01 D0 C7
1490:13 A0 0C 20 BA 14 20 C8 1D
1498:14 A0 08 20 BA 14 20 C8 25
14A0:14 4C 17 17 A0 0C 20 BA 6A
14A8:14 20 C8 14 A0 08 20 BA 5D
14B0:14 20 C8 14 20 CA 15 4C E7
14B8:7D 14 A2 00 B9 70 17 95 4C
14C0:FA C8 E8 E0 04 D0 F5 60 73
14C8:A9 00 8D 80 17 20 59 15 80
14D0:90 09 AC 80 17 F0 03 20 C3
14D8:81 15 60 A0 00 20 2C 15 0B
14E0:F0 18 20 52 15 EE 80 17 2D
14E8:AD 80 17 C9 FF D0 DE A9 32
14F0:01 20 3E 15 20 8C 15 4C 64
14F8:C8 14 A0 01 20 64 15 B0 1C
1500:24 AD 86 17 20 35 15 D0 BA
1508:1C C8 C0 FF D0 EE AD 80 A8
1510:17 F0 09 8C 81 17 20 81 16
1518:15 AC 81 17 20 AB 15 20 93
1520:B6 15 4C C8 14 C0 03 B0 5B
1528:E5 4C E2 14 B1 FA 2D 85 4F
1530:17 8D 86 17 C8 B1 FA 2D BB
1538:85 17 CD 86 17 60 20 D2 5A
1540:FF A5 90 30 04 C9 01 D0 03
1548:05 A2 05 4C 4A 14 20 42 28
1550:17 60 E6 FA D0 02 E6 FB 03
1558:60 A5 FB C5 FD D0 04 A5 D8
1560:FA C5 FC 60 85 24 98 18 25
1568:65 FA 85 16 A5 FB 69 00 06
1570:85 17 A5 17 C5 FD D0 04 15
1578:A5 16 C5 FC 08 A5 24 28 CA
1580:60 A9 00 20 3E 15 AD 80 69
1588:17 20 3E 15 38 A5 FA ED 9B
1590:80 17 85 16 A5 FB E9 00 C3
1598:85 17 A0 00 B1 16 2D 85 25
15A0:17 20 3E 15 C8 CC 80 17 09
15A8:D0 F2 60 98 20 3E 15 AD 5F
15B0:86 17 20 3E 15 60 18 98 BE
15B8:65 FA 85 FA A5 FB 69 00 A4
15C0:85 FB 60 A5 01 09 01 85 C6
15C8:01 60 A5 01 29 FE 85 01 A1
15D0:60 A2 28 A0 00 88 D0 FD A4
15D8:CA D0 FA A5 01 8D 83 17 B2
15E0:A5 D8 8D 84 17 A9 FF 85 F2
15E8:D8 60 A9 FF 8D 8A 17 20 B1
15F0:D1 15 20 84 13 AC 6C 17 D0
15F8:A2 00 BD 67 17 F0 07 99 C6
1600:4D 17 C8 E8 D0 F4 8C 6C 20
1608:17 A9 03 8D 6F 17 20 F1 6D
1610:16 AE 6D 17 20 C6 FF 90 BE
1618:04 AA 4C 4A 14 20 C8 16 E7
1620:8D 87 17 F0 0B A5 76 C9 8C
1628:FF F0 05 A2 23 4C 4A 14 4E
1630:20 C8 16 8D FE 03 20 C8 47
1638:16 8D FF 03 AD 87 17 D0 8D
1640:16 A0 00 20 BA 14 20 84 8C
1648:16 20 C3 15 A0 04 20 BA 61
1650:14 20 84 16 4C 17 17 C9 37
1658:01 D0 13 A0 0C 20 BA 14 10
1660:20 84 16 A0 08 20 BA 14 D4
1668:20 84 16 4C 17 17 A0 0C AF
1670:20 BA 14 20 84 16 A0 08 A5
1678:20 BA 14 20 84 16 20 CA 6F
1680:15 4C 4C 16 A0 00 20 59 D3
1688:15 90 01 60 20 C8 16 F0 CA
1690:06 C9 01 F0 1A D0 1C 20 CD
1698:C8 16 8D 80 17 A2 00 20 CB
```

```
16A0:C8 16 91 FA 20 52 15 E8 F5
16A8:EC 80 17 D0 F2 F0 D5 A9 0C
16B0:FF D0 E7 8D 80 17 20 C8 50
16B8:16 A2 00 91 FA 20 52 15 C3
16C0:E8 EC 80 17 D0 F5 F0 BC 1B
16C8:20 42 17 A5 90 F0 05 A2 C7
16D0:04 4C 4A 14 20 CF FF B0 8D
16D8:F6 60 A0 00 B9 E8 16 99 E3
16E0:E4 03 C8 C0 09 D0 F5 60 3D
16E8:20 7B 87 A0 00 8C 00 FF 31
16F0:60 AD 6C 17 A2 4C A0 17 56
16F8:20 BD FF A9 00 AA 20 68 92
1700:FF AD 6D 17 AE 6E 17 AC C2
1708:6F 17 20 BA FF 20 C0 FF 65
1710:90 04 AA 4C 4A 14 60 AD B2
1718:8A 17 10 0C AD FE 03 8D 11
1720:20 D0 AD FF 03 8D 21 D0 A9
1728:20 2E 17 4C 86 03 AD 6D A2
1730:17 20 C3 FF 20 CC FF AD 4C
1738:83 17 85 01 AD 84 17 85 E1
1740:D8 60 A5 91 30 05 A2 1E B9
1748:4C 4A 14 60 30 3A 00 00 22
1750:00 00 00 00 00 00 00 00 7E
1758:00 00 00 00 00 00 00 00 86
1760:00 00 2C 50 2C 57 00 2C 04
1768:50 2C 52 00 00 03 00 01 21
1770:00 04 E8 07 00 D8 E8 DB 3E
1778:00 20 40 3F 00 1C E8 1F 0C
1780:00 00 00 00 00 00 00 00 AE
1788:00 00 00 00 00 00 00 00 B6
```

Program 2: Demo

```
GK 10 REM COPYRIGHT 1989 COMPU
      TE! PUBLICATIONS, INC. A
      LL RIGHTS RESERVED
DP 20 GRAPHIC1:SCNCLR
FS 30 BLOAD "GR.COMPACTOR"
GX 40 SYS4864
PR 50 CIRCLE 1,150,100,75,60
SJ 60 PAINT 1,150,100
BQ 70 CIRCLE 0,115,85,15,10:CI
      RCLE 0,185,85,15,10
SJ 80 CIRCLE 0,150,100,60,50,1
      00,260
EG 90 CIRCLE 0,150,100,63,30,1
      10,250
HD 100 BSAVE "PIC",P8192 TO P1
       6193
RC 110 PSAVE "COMPRESSED PIC",
       M1
KK 120 GRAPHIC0
```

The GEOS Column

See instructions in article on page 66 before typing in.

Program 1: Disk Usage

```
1503:BF 02 18 40 E0 18 07 80 8A
150B:00 64 C0 00 C6 80 01 84 25
1513:80 03 07 00 06 00 00 1C 6B
151B:00 00 3C 00 00 00 00 FF CC
1523:CF FF CF 68 01 CD 78 03 E8
152B:CF 78 61 FF F8 F1 80 18 30
1533:61 80 18 01 80 18 61 80 E8
153B:18 61 C0 18 01 FF FF FF 6B
1543:83 05 00 00 10 4C 26 00 6E
154B:10 44 69 73 6B 55 73 61 EB
1553:67 65 20 20 20 56 31 2E 7B
155B:30 00 00 00 00 44 6F 75 03
1563:67 6C 61 73 20 53 2E 20 8A
156B:43 75 72 74 69 73 20 20 A3
1573:00 00 00 00 00 00 00 00 9D
157B:00 00 00 00 00 00 00 00 A5
1583:00 00 00 00 00 00 00 00 AD
158B:00 00 00 00 00 00 00 00 B5
1593:00 00 00 00 00 00 00 00 BD
159B:00 00 00 00 54 68 69 73 50
15A3:20 70 72 6F 67 72 61 6D 74
15AB:20 64 69 73 70 6C 61 79 D4
15B3:73 20 74 68 65 20 73 79 C0
15BB:73 74 65 6D 20 64 69 73 19
15C3:6B 20 75 73 61 67 65 00 05
15CB:00 00 00 00 00 00 00 00 F5
15D3:00 00 00 00 00 00 00 00 FD
15DB:00 00 00 00 00 00 00 00 06
15E3:00 00 00 00 00 00 00 00 0E
15EB:00 00 00 00 00 00 00 00 16
15F3:00 00 00 00 00 00 00 00 1E
15FB:00 00 00 00 A5 16 8D AF 76
1603:17 20 AC 16 20 32 17 A9 5B
160B:C0 85 2F 20 63 15 20 2C BC
1613:11 20 41 10 20 AB 15 20 F2
161B:8A C1 60 00 00 00 00 00 09
1623:00 00 00 00 00 00 4E 55 41
162B:4C 4C 31 35 34 31 31 35 08
1633:37 31 31 35 38 31 89 00 5A
163B:00 00 00 00 00 A5 BA 8D 01
1643:1F 10 AD 8E 84 29 0F 8D 16
164B:40 10 0A 0A A8 A2 00 B9 07
1653:2A 10 9D B5 15 C8 E8 E0 26
165B:04 D0 F4 AD 40 10 C9 00 0D
1663:F0 41 A9 08 20 17 11 E0 6E
166B:00 F0 10 A9 00 8E 3C 10 33
1673:8D 3D 10 A9 45 8D FC 15 C1
167B:B8 50 28 A5 0B 8D 25 10 60
1683:A5 0A 8D 24 10 AD 40 10 C0
168B:20 80 14 AD 27 10 8D 3D 17
1693:10 AD 26 10 8D 3C 10 AD 24
169B:29 10 8D DD 15 AD 28 10 AF
16A3:8D DC 15 AD 8F 84 29 0F 3B
16AB:8D 40 10 0A 0A A8 A2 00 89
16B3:B9 2A 10 9D C4 15 C8 E8 18
16BB:E0 04 D0 F4 AD 40 10 C9 1B
16C3:00 F0 41 A9 09 20 17 11 F6
16CB:E0 00 F0 10 A9 00 8E 3E 30
16D3:10 8D 3F 10 A9 45 8D 2A FB
16DB:16 B8 50 28 A5 0B 8D 25 67
16E3:10 A5 0A 8D 24 10 AD 40 98
16EB:10 20 80 14 AD 27 10 8D 31
16F3:3F 10 AD 26 10 8D 3E 10 1F
16FB:AD 29 10 8D 0B 16 AD 28 58
1703:10 8D 0A 16 AD 1F 10 85 CE
170B:BA 20 B0 C2 20 A1 C2 20 0E
1713:32 C2 60 20 B0 C2 20 A1 8B
171B:C2 A9 82 85 0D A9 00 85 52
1723:0C 20 32 C2 20 DB C1 60 26
172B:A9 11 85 03 A9 38 85 02 8E
1733:20 5A C1 60 02 C0 00 78 D1
173B:4C 11 15 70 06 10 A2 11 44
1743:AB 11 09 70 06 10 01 12 38
174B:05 FF 82 FE 80 04 00 82 D2
1753:03 80 04 00 B8 03 80 00 76
175B:F8 C6 00 03 80 01 8C CC D5
1763:00 03 80 01 8C D8 00 03 3D
176B:80 01 8C F0 00 03 80 01 C8
1773:8C E0 00 03 80 01 8C F0 62
177B:00 03 80 01 8C D8 00 03 55
1783:80 01 8C CC 00 03 80 00 9D
178B:F8 C6 00 03 80 04 00 82 AE
1793:03 80 04 00 81 03 06 FF 08
179B:81 7F 05 FF 0C BF 20 67 12
17A3:17 20 EF 16 4C 3E C2 05 AA
17AB:FF 82 FE 80 04 00 82 03 8A
17B3:80 04 00 B8 03 80 1E 00 05
17BB:1C 00 03 80 0C 00 32 00 25
17C3:03 80 0C 00 30 00 03 80 1D
17CB:0C 00 30 00 03 80 0C 7C B4
17D3:78 F0 03 80 0C 66 31 98 D7
17DB:03 80 0C 66 31 98 03 80 06
17E3:0C 66 31 98 03 80 1E 66 1E
17EB:30 F0 03 80 04 00 82 03 FE
17F3:80 04 00 81 03 06 FF 81 2D
17FB:7F 05 FF 0C BF 20 AB C1 83
1803:0B 12 09 38 12 30 60 12 06
180B:FF 81 80 10 00 82 01 80 39
1813:10 00 82 01 80 10 00 82 72
181B:01 80 05 00 84 F3 03 0D 93
1823:80 07 00 82 01 80 05 00 91
182B:84 D8 03 0D 80 07 00 82 A7
1833:01 80 05 00 86 DB 3B 6D 2C
183B:9C F3 CE 05 00 82 01 80 6D
1843:05 00 86 DB 63 CD B1 B6 F0
184B:DB 05 00 94 01 80 00 00 FD
1853:00 0F 80 DB 33 8D 99 B6 CE
185B:DF 01 F0 00 00 00 01 80 5C
1863:05 00 86 DB 1B CD 8D B6 86
186B:D8 05 00 82 01 80 05 00 85
1873:86 F3 73 67 B8 F3 CF 05 03
187B:00 82 01 80 0A 00 81 C0 88
1883:05 00 82 01 80 09 00 82 41
188B:01 80 05 00 82 01 80 10 26
1893:00 82 01 80 10 00 DB 01 C5
189B:80 00 00 04 00 01 C0 00 D1
18A3:08 00 07 00 60 00 80 00 BC
18AB:00 01 80 00 00 04 00 01 3D
18B3:20 00 08 00 08 00 90 04 5A
18BB:00 00 00 01 80 00 00 07 07
18C3:24 01 27 24 E9 CC 04 00 F7
18CB:84 96 98 00 00 01 80 00 FB
18D3:00 04 A4 01 28 A5 2A 50 26
18DB:02 00 84 A4 A0 00 00 01 ED
18E3:80 00 00 04 A4 01 28 A5 B3
18EB:2A 48 01 00 84 A4 90 00 3B
18F3:00 01 AD 80 00 00 04 A4 CE
18FB:01 28 A5 2A 44 01 00 84 B8
1903:A4 88 00 00 01 80 00 00 B3
190B:07 1C 01 C7 1C E9 58 0E AB
1913:40 73 A2 B0 00 00 01 80 24
191B:00 00 00 04 00 00 00 20 AD
1923:08 00 8A 01 80 00 00 00 BE
192B:08 00 00 00 40 08 00 82 06
1933:01 80 10 00 82 01 80 08 29
193B:00 82 01 F8 06 00 DB 01 A6
1943:80 00 00 00 60 00 00 81 3A
194B:00 02 04 01 31 8C 00 00 4A
1953:00 01 80 00 00 00 90 00 F6
195B:00 01 08 04 F2 03 4A 52 99
1963:00 00 00 01 80 00 00 00 A9
196B:83 9C 92 9D CC 09 09 01 50
1973:4A 52 00 00 00 01 80 00 64
197B:00 00 84 52 94 A5 28 09 F7
1983:01 01 39 8E 00 00 00 01 87
198B:80 00 00 00 84 52 94 A5 3A
1993:28 09 09 01 0A 42 00 00 A6
199B:00 01 A5 80 00 00 00 84 4F
19A3:52 94 A5 28 04 F2 01 12 5B
19AB:44 00 00 00 01 80 00 00 0A
19B3:00 73 9C 74 9D 24 02 04 23
19BB:01 21 88 00 00 00 01 80 4A
19C3:04 00 86 10 10 04 00 01 5B
19CB:F8 06 00 82 01 80 04 00 36
19D3:83 10 20 08 09 00 82 01 9E
19DB:80 10 00 82 01 80 10 00 A4
19E3:DB 01 87 83 C6 0D F3 37 F6
19EB:EF B3 00 0F C1 C1 FE 7F 86
19F3:3F 9F C7 F1 8F C7 E7 1D 4E
19FB:9B 37 EF B3 38 11 62 63 31
1A03:02 41 A0 D0 64 19 9C EE 59
1A0B:77 1D 9B 31 8C 36 64 27 F5
1A13:65 63 66 6F AA D5 66 F9 0A
1A1B:98 0C 37 BD F3 31 8F B0 95
1A23:78 2C E4 31 9C 46 1B 8D 10
1A2B:C4 61 9C EE 76 ED 83 31 40
1A33:8C 30 1C 2E CB B3 36 DE 98
1A3B:1B 1D 8D E1 A5 8F C7 E6 F5
1A43:ED 83 F1 8F 80 4C 20 D1 CD
1A4B:1A 06 83 21 90 C8 31 87 22
1A53:83 C6 4D 81 E1 8F B0 38 A3
1A5B:1F DF FB FE FF 3F 9F CF 92
1A63:F1 80 08 00 8A 0F 8F F9 5B
1A6B:FE 7F 1F 8F C7 F1 80 10 F2
1A73:00 82 01 80 10 00 81 01 F4
1A7B:12 FF 6C BF C9 01 F0 09 7F
1A83:C9 02 F0 08 C9 03 F0 07 FE
1A8B:60 4C 96 14 4C B5 14 4C C4
1A93:D4 14 A9 02 8D 27 10 A9 5F
1A9B:97 8D 26 10 20 17 15 A9 F5
1AA3:00 85 07 A9 10 85 06 20 77
1AAB:69 C1 20 45 15 20 F3 14 82
1AB3:60 A9 05 8D 27 10 A9 2F F7
1ABB:8D 26 10 20 17 15 A9 00 A4
1AC3:85 07 A9 20 85 06 20 69 A1
1ACB:C1 20 45 15 20 F3 14 60 3C
1AD3:A9 0C 8D 27 10 A9 58 8D 69
1ADB:26 10 20 17 15 A9 00 85 71
1AE3:07 A9 4C 85 06 20 69 C1 2D
1AEB:20 45 15 20 F3 14 60 A2 79
1AF3:04 A0 06 AD 27 10 85 05 77
1AFB:AD 26 10 85 04 A9 00 85 37
```

```
1B03:07 A9 04 85 06 20 69 C1 45
1B0B:A5 05 8D 27 10 A5 04 8D 26
1B13:26 10 60 AD 26 10 38 ED 17
1B1B:24 10 8D 26 10 AD 27 10 11
1B23:ED 25 10 8D 27 10 AD 27 70
1B2B:10 8D 29 10 AD 26 10 8D A6
1B33:28 10 A2 04 A0 06 AD 29 B7
1B3B:10 85 05 AD 28 10 85 04 E6
1B43:60 A5 05 8D 29 10 A5 04 65
1B4B:8D 28 10 AD 3A 10 18 6D DE
1B53:28 10 8D 28 10 AD 3B 10 93
1B5B:6D 29 10 8D 29 10 60 20 D7
1B63:A8 C1 05 07 01 40 00 30 A8
1B6B:03 DF 00 87 05 01 07 40 0E
1B73:00 30 05 00 01 48 00 38 B7
1B7B:03 D7 00 67 05 01 07 48 22
1B83:00 38 00 20 AE C1 4D 00 E0
1B8B:43 44 72 69 76 65 20 20 03
1B93:54 79 70 65 20 20 20 47 BF
1B9B:72 61 70 68 20 20 20 20 D9
1BA3:55 73 61 67 65 00 60 20 10
1BAB:AE C1 57 00 50 41 20 20 7C
1BB3:20 45 72 72 2E 00 20 AE 21
1BBB:C1 58 00 60 42 20 20 20 E1
1BC3:45 72 72 2E 00 20 AB C1 04
1BCB:2F 16 11 49 06 18 20 A8 4F
1BD3:C1 05 01 01 89 00 4A 03 40
1BDB:89 00 4F 00 AD 3D 10 85 C8
1BE3:03 AD 3C 10 85 02 A9 50 67
1BEB:85 05 A9 00 85 19 A9 B9 F8
1BF3:85 18 A9 52 20 84 C1 A9 8D
1BFB:4B 20 45 C1 20 A8 C1 05 D0
1C03:01 01 89 00 5A 03 89 00 1F
1C0B:5F 00 AD 3F 10 85 03 AD E6
1C13:3E 10 85 02 A9 60 85 05 1E
1C1B:A9 00 85 19 A9 B9 85 18 C1
1C23:A9 52 20 84 C1 A9 4B 20 7C
1C2B:45 C1 60 81 7F 04 FF 82 29
1C33:F0 40 04 00 82 10 40 04 4D
1C3B:00 82 10 40 04 00 82 10 4F
1C43:40 04 00 82 10 40 04 00 4E
1C4B:82 10 40 04 00 82 10 7F BA
1C53:04 FF 87 F0 40 10 04 01 D8
1C5B:00 10 06 00 98 40 6C 19 10
1C63:06 C1 22 A0 28 12 82 81 6D
1C6B:55 A0 44 0A 84 41 55 40 B3
1C73:68 11 04 81 22 06 00 87 6D
1C7B:40 10 04 01 00 10 7F 04 AB
1C83:FF 82 F0 40 04 00 82 10 B3
1C8B:40 04 00 82 10 40 04 00 96
1C93:82 10 40 04 00 82 10 40 C3
1C9B:04 00 82 10 40 04 00 82 BB
1CA3:10 7F 04 FF 81 F0 12 BF F7
1CAB:A9 17 85 03 A9 B0 85 02 7C
1CB3:A2 30 20 3C C1 18 A9 40 13
1CBB:65 0C 85 0C 90 02 E6 0D 82
1CC3:18 A9 40 65 0E 85 0E 90 04
1CCB:02 E6 0F A0 9F B1 0E 20 AA
1CD3:97 17 2C AF 17 10 05 B1 D2
1CDB:0C 20 97 17 88 C0 FF D0 9E
1CE3:EC 8A 18 69 08 AA E0 88 04
1CEB:90 C8 60 A9 17 85 03 A9 C3
1CF3:B0 85 02 A2 30 20 3C C1 8C
1CFB:18 A9 40 65 0C 85 0C 90 28
1D03:02 E6 0D 18 A9 40 65 0E 42
1D0B:85 0E 90 02 E6 0F A0 9F 12
1D13:20 A0 17 91 0E 2C AF 17 19
1D1B:10 05 20 A0 17 91 0C 88 4C
1D23:C0 FF D0 EC 8A 18 69 08 36
1D2B:AA E0 88 90 C8 60 A9 25 4D
1D33:85 03 A9 70 85 02 A9 8C 41
1D3B:85 07 A9 F8 85 06 A2 0B 53
1D43:A0 13 2C AF 17 50 05 B1 C8
1D4B:06 20 97 17 AD 27 8C 91 A9
1D53:06 88 10 EE 18 A9 28 65 C0
1D5B:06 85 06 90 02 E6 07 CA 48
1D63:D0 DE 60 2C AF 17 50 2A 31
1D6B:A9 25 85 03 A9 70 85 02 C0
1D73:A9 8C 85 07 A9 F8 85 06 09
1D7B:A2 0B A0 13 20 A0 17 91 52
1D83:06 88 10 F8 18 A9 28 65 91
1D8B:06 85 06 90 02 E6 07 CA 78
1D93:D0 E8 60 84 04 A0 00 91 F8
1D9B:02 B8 50 06 84 04 A0 00 E4
1DA3:B1 02 E6 02 D0 02 E6 03 93
1DAB:A4 04 60 00 00 00 00 00 45
```

Program 2: GeoConverter

```
FH 10 REM COPYRIGHT 1989 COMPU
      TE! PUBLICATIONS, INC. -
       ALL RIGHTS RESERVED
XG 20 REM THIS IS THE UPDATED
      {SPACE}GEOCONVERTER
      {8 SPACES}REVISED MAY IS
      SUE 1988 GAZETTE
AC 30 POKE 53280,0:POKE 53281,
      0:POKE 646,5:PRINTCHR$(1
      42);CHR$(147)
PS 40 FORI=1TO10:PRINT"{DOWN}"
      :NEXT
ER 50 PRINTTAB(5)"{4}UDI COPYR
      IGHT 1989"
SP 60 PRINTTAB(5)"GCH COMPUTE!
       PUBLICATIONS INC."
SP 70 PRINTTAB(5)"JFK ALL RIGH
      TS RESERVED{HOME}"
EP 80 PRINT"{DOWN}{RVS}{8}GEOC
      ONVERTER 1.1{OFF}{DOWN}
      {GRN}"
AP 90 INPUT"FILE TO CONVERT";G
      F$
CX 100 PRINT"{DOWN}SEARCHING F
       OR "GF$
PA 110 HD$="":FOR I=1 TO 4:REA
       D HE:HD$=HD$+CHR$(HE):N
       EXT
FK 120 FOR I=1TO5:READIE:ID$=I
       D$+CHR$(IE):NEXT
GD 130 NL$="":T$=CHR$(18):S$=C
       HR$(1):OPEN 15,8,15,"I0
       :":OPEN 2,8,2,"#"
JX 140 GOSUB370:GET #2,NT$,NS$
KB 150 FOR E=0 TO 7
KQ 160 D$=NL$:GET#2,B$:I=1:IFB
       $=NL$ THEN220
AX 170 IF ASC(B$)<>130 THEN220
HM 180 GET#2,HT$,HS$:I=3:IF HS
       $="" THEN HS$=CHR$(0)
FH 190 GET#2,B$:I=I+1:IF B$=""
        THEN B$=CHR$(0)
FA 200 IF ASC(B$)=160 THEN220
GD 210 D$=D$+B$:GOTO190
RK 220 FOR I=I TO 31:GET#2,B$:
       NEXT
AX 230 IF D$=GF$ THEN260
EC 240 NEXT E:IF NT$=NL$ THEN2
       60
FX 250 T$=NT$:S$=NS$:GOTO140
CR 260 IF D$=NL$ THENPRINT"
       {DOWN}{RVS}FILE NOT FOU
       ND{OFF}":GOTO360
CP 270 PRINT"{DOWN}CONVERTING
       {SPACE}"GF$
MJ 280 DT$=T$:DS$=S$:T$=HT$:S$
       =HS$:GOSUB370
MB 290 GET#2,MT$,MS$:IF MS$=""
        THEN MS$=CHR$(0)
BM 300 FOR I=0 TO 65:GET #2,B$
       :NEXT
HG 310 GET#2,CT$,GT$:GOSUB370:
       PRINT#2,HD$;:GOSUB380:T
       $=DT$:S$=DS$:GOSUB370
FP 320 FOR I=0 TO 32*E+2:GET#2
       ,B$:NEXT
FQ 330 PRINT#2,MT$;MS$;:FORI=0
        TO 15:GET#2,B$:NEXT
GP 340 PRINT#2,HT$;HS$;CHR$(0)
       ;GT$;
KM 350 PRINT#2,ID$;:GOSUB380:P
       RINT:PRINTGF$" CONVERTE
       D"
ER 360 CLOSE2:CLOSE15:END
KA 370 U$="U1":GOTO390
RR 380 U$="U2"
KP 390 PRINT#15,U$;2;0;ASC(T$+
       "0");ASC(S$+"0")
AS 400 RETURN
FM 410 DATA 0,255,3,21,87,10,1
       ,0,0
```

BEFORE TYPING . . .

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

Diamonds

See instructions in article on page 32 before typing in.

Program 1: Diamonds

```
0801:0B 08 00 00 9E 32 30 36 EC
0809:31 00 00 00 A0 00 98 20 08
0811:4A 08 98 20 46 08 C8 D0 12
0819:F5 A2 03 BD 70 08 95 02 D9
0821:CA 10 F8 A2 01 A0 00 B9 28
0829:74 08 99 00 40 C8 D0 F7 67
0831:EE 2A 08 EE 2D 08 CA F0 43
0839:EE 84 37 A9 38 85 38 20 CB
0841:44 A6 4C 86 E3 4A 4A 4A 36
0849:4A AA 29 03 85 60 8A 0A 4B
0851:0A 29 3C 05 60 85 60 0A 6C
0859:0A 29 C0 05 60 20 61 08 6F
0861:20 64 08 8D 00 38 EE 65 98
0869:08 D0 03 EE 66 08 60 00 15
0871:02 06 07 AD 18 D0 C9 1F 76
0879:F0 45 A2 03 B5 01 9D 20 E4
0881:D0 CA D0 F8 A2 00 A5 05 BB
0889:09 08 9D 00 D8 9D 00 D9 EA
0891:9D 00 DA 9D 00 DB E8 D0 B7
0899:F1 A9 E8 8D 02 03 A9 40 B2
08A1:8D 03 03 A2 00 8A 9D 00 29
08A9:04 9D 00 05 9D 00 06 9D 0A
08B1:00 07 E8 D0 F1 A9 D8 8D 23
08B9:16 D0 A9 1F 8D 18 D0 A5 44
08C1:FB 85 60 A9 00 85 61 A5 56
08C9:FC 18 65 FD 85 62 A9 00 F3
08D1:69 00 85 63 A2 03 A5 FD E7
08D9:85 64 8E 6E 40 20 A2 40 86
08E1:A2 00 C6 64 30 21 A5 60 14
08E9:18 7D 99 40 85 60 A5 61 F6
08F1:7D 9E 40 85 61 A5 62 18 47
08F9:7D 98 40 85 62 A5 63 7D 3D
0901:9D 40 85 63 4C 67 40 CA 24
0909:10 CC 60 01 01 FF FF 01 7B
0911:00 00 FF FF 00 A5 61 D0 4D
0919:39 A5 63 D0 35 A9 00 85 80
0921:65 A5 62 C9 32 B0 2B 4A 2D
0929:AA 26 65 A5 60 C9 50 B0 9C
0931:21 4A A8 26 65 BD F0 EC CE
0939:85 66 B5 D9 29 7F 85 67 B5
0941:A6 65 B1 66 3D E0 40 85 10
0949:65 BD E4 40 25 FE 05 65 B2
0951:91 66 60 F3 FC 3F CF 0C A1
0959:03 C0 30 AD 18 D0 C9 1F B4
0961:D0 12 20 A0 E5 A9 C8 8D 63
0969:16 D0 A9 15 8D 18 D0 A9 59
0971:0E 8D 86 02 4C 83 A4 00 98
```

Program 2: Demo

```
CR 100 REM COPYRIGHT 1989 COMP
       UTE! PUBLICATIONS, INC.
        - ALL RIGHTS RESERVED
RQ 110 PRINT"{CLR}{3 SPACES}CO
       PYRIGHT 1989 COMPUTE! P
       UB., INC."
KK 120 PRINTTAB(11)"ALL RIGHTS
        RESERVED"
DK 130 POKE2,0:POKE3,2:POKE4,6
       :POKE5,7
GX 140 J=251:K=252:L=253:M=254
       :D=16384
JS 150 POKEJ,40:POKEK,25:R=1:G
       OSUB440
FR 160 FORX=0TOQ:POKEL,X:SYSD:
       NEXT
```

```
JM 170 Q=Q+R:IFQ=16THENR=-1
BM 180 POKEM,RND(0)*256:IFQ>0T
       HEN160
PP 190 GETK$:IFK$=""THEN150
DX 200 E=16:GOSUB410
AH 210 FORX=24TO0STEP-1
DJ 220 IFXAND4THENPOKEM,RND(0)
       *256
AK 230 POKEL,X:SYSD:NEXT:GETK$
FS 240 IFK$=""THENGOSUB440:GOT
       O210
EC 250 E=24:GOSUB410
QB 260 POKEM,RND(0)*256:FORX=0
       TO65
BJ 270 IFRND(0)>.8THENPOKEM,RN
       D(0)*256
RH 280 POKEL,X:SYSD:NEXT
QA 290 GOSUB440:GETK$:IFK$=""T
       HEN260
QG 300 E=65:GOSUB410
SJ 310 Q=2+((Q+1)AND15):POKEM,
       RND(0)*256
XS 320 FORX=0TO64STEPQ:POKEL,X
       :SYSD:NEXT
CG 330 GOSUB450:GETK$:IFK$=""T
       HEN310
MX 340 GOSUB410:FORX=0TO4:A(X)
       =2↑X:NEXT
JS 350 POKEJ,80*RND(0):POKEK,5
       0*RND(0)
HH 360 FORX=110TO0STEP-1:POKEL
       ,X:SYSD
GR 370 IFXANDA(N)THENPOKEM,256
       *RND(0)
FB 380 NEXT:N=N+1:IFN=5THENN=1
CS 390 GETK$:IFK$=""THENGOSUB4
       40:GOTO350
JX 400 PRINT"{HOME}":END
BH 410 POKEJ,40:POKEK,25:POKEM
       ,0
PF 420 FORX=ETO0STEP-1:POKEL,X
       :SYSD:NEXT
FA 430 POKE254,256*RND(0):POKE
       198,0:RETURN
BQ 440 FORT=1TO1000:NEXT
JK 450 IFPEEK(653)THEN450
KD 460 RETURN
```

RGB Kit

See instructions in article on page 40 before typing in.

Program 1: RGB Kit

```
CB20:4C C6 CB 4C E3 CC 4C 93 4C
CB28:CD 4C A2 CD 4C FD CC 4C 2B
CB30:AC CD 4C 34 CE 4C 41 CD 56
CB38:4C 51 CD 4C 5E CD 4C 7A 06
CB40:CD 08 48 8A 48 98 48 CE 76
CB48:47 CF F0 06 20 C1 CC 4C E3
CB50:A1 CB AD 48 CF 8D 47 CF F8
CB58:A2 12 A9 04 8D 4B CF AD 22
CB60:49 CF 8D 91 CB AD 4A CF D4
CB68:8D 92 CB AD 18 D0 29 02 18
CB70:F0 0A A9 0C A2 14 20 AC 4B
CB78:CB 4C 83 CB A9 08 A2 14 FC
CB80:20 AC CB A2 12 A9 00 20 4E
CB88:AC CB E8 20 AC CB A0 00 5E
CB90:B9 00 00 20 AA CB C8 D0 ED
CB98:F7 EE 92 CB CE 4B CF D0 0B
CBA0:EF 68 A8 68 AA 68 28 4C 79
CBA8:00 00 A2 1F 8E 00 D6 2C D4
CBB0:00 D6 10 FB 8D 01 D6 60 3E
CBB8:A2 1F 8E 00 D6 2C 00 D6 79
CBC0:10 FB AD 01 D6 60 A9 CB 7C
CBC8:CD 15 03 D0 01 60 A9 00 D6
CBD0:8D 49 CF A9 04 8D 4A CF D0
CBD8:20 9B CC 78 20 E7 CB 20 E0
CBE0:2B CC 20 48 CC 58 60 A9 FB
CBE8:00 A0 D0 85 FD 84 FE A2 BD
CBF0:12 A9 20 20 AC CB E8 A9 12
CBF8:00 20 AC CB A0 00 A5 01 3C
CC00:AA 29 FB 85 01 B1 FD 86 62
CC08:01 20 AA CB C8 C0 08 90 26
CC10:ED A9 00 20 AA CB 88 D0 73
CC18:FA 18 A5 FD 69 08 85 FD 3E
CC20:90 DC E6 FE A5 FE C9 E0 A3
CC28:90 D4 60 AD 14 03 8D A8 96
CC30:CB AD 15 03 8D A9 CB A9 42
CC38:41 8D 14 03 A9 CB 8D 15 35
CC40:03 AD 48 CF 8D 47 CF 60 56
CC48:AD 45 CF 29 0F 8D 45 CF 9F
CC50:A8 B9 4C CF 0A 0A 0A 0A C9
CC58:19 4C CF A2 1A 20 AC CB 2C
CC60:AD 46 CF 29 0F 8D 46 CF F9
CC68:A2 12 A9 08 20 AC CB E8 C1
CC70:A9 00 20 AC CB A9 04 85 40
CC78:FE 85 FF AD 46 CF A8 B9 4A
CC80:4C CF A0 00 20 AA CB C8 54
CC88:D0 FA C6 FF D0 F6 09 80 17
CC90:20 AA CB C8 D0 FA C6 FE E9
CC98:D0 F6 60 A2 00 20 AD CC 37
CCA0:AD 00 D6 29 07 F0 05 A2 27
CCA8:3B 20 AD CC 60 BC 5C CF E8
CCB0:30 0D E8 BD 5C CF E8 8C 1F
CCB8:00 D6 8D 01 D6 10 EE E8 87
CCC0:60 A5 01 29 40 D0 0E AD B5
CCC8:11 D0 29 6F A2 01 8E 30 A1
CCD0:D0 8D 11 D0 60 AD 11 D0 12
CCD8:09 10 A2 00 8E 30 D0 8D B3
CCE0:11 D0 60 A9 CB CD 15 03 A0
CCE8:F0 01 60 78 AD A8 CB 8D 04
CCF0:14 03 AD A9 CB 8D 15 03 67
CCF8:58 20 D5 CC 60 20 17 CD CD
CD00:AD 9A CF 8D 49 CF AD 9B 6C
CD08:CF 8D 4A CF 60 20 FD AE 63
CD10:20 8A AD 20 F7 B7 60 20 95
CD18:0D CD A5 14 8D 9A CF A5 BF
CD20:15 8D 9B CF 60 20 0D CD 85
CD28:A5 14 8D 9C CF A5 15 8D E3
CD30:9D CF 60 20 0D CD A5 14 9B
CD38:8D 9E CF A5 15 8D 9F CF 84
CD40:60 20 17 CD 20 25 CD AE B3
CD48:9A CF AD 9C CF 20 AC CB C8
CD50:60 20 17 CD AE 9A CF AD 11
CD58:9C CF 20 BA CB 60 20 17 1D
CD60:CD 20 25 CD A2 12 AD 9B C0
CD68:CF 20 AC CB E8 AD 9A CF 49
CD70:20 AC CB AD 9C CF 20 AA AA
CD78:CB 60 20 17 CD A2 12 AD 52
CD80:9B CF 20 AC CB E8 AD 9A A4
CD88:CF 20 AC CB AD 9C CF 20 06
CD90:B8 CB 60 20 17 CD AD 9A 6F
CD98:CF 8D 46 CF 78 20 48 CC E6
CDA0:58 60 20 17 CD AD 9A CF 20
CDA8:8D 48 CF 60 20 17 CD 20 36
CDB0:25 CD 78 A5 01 48 AD 9A DA
CDB8:CF 8D E5 CD AD 9B CF 8D 42
CDC0:E6 CD A9 00 85 FD 85 FE A6
CDC8:A2 12 A9 20 AC 9C CF F0 D9
CDD0:02 A9 30 20 AC CB E8 A9 EF
CDD8:00 20 AC CB A0 00 A9 34 5B
CDE0:85 01 A2 37 AD FF FF 86 3B
CDE8:01 20 AA CB EE E5 CD D0 9A
CDF0:03 EE E6 CD C8 C0 08 90 6D
CDF8:E5 A9 00 20 AA CB 88 D0 5A
CE00:FA 18 A5 FD 69 08 85 FD 2A
CE08:90 D4 E6 FE A5 FE C9 08 B4
CE10:90 CC 68 85 01 58 60 A9 62
CE18:3F 85 FD A9 00 85 FC A2 C3
CE20:12 20 AC CB E8 20 AC CB 0E
CE28:20 AA CB C6 FC D0 F9 C6 4C
CE30:FD D0 F5 60 20 E3 CC 20 10
CE38:17 CD 20 25 CD 20 9B CC 1E
CE40:20 17 CE 20 4A CE 20 F9 57
CE48:CE 60 A2 19 20 BA CB 09 D7
CE50:C0 20 AC CB A9 20 A2 14 CF
CE58:20 AC CB A9 00 E8 20 AC D5
CE60:CB AD 9A CF 85 FB AD 9B B2
CE68:CF 85 FC A2 12 A9 00 20 70
CE70:AC CB E8 20 AC CB 85 B1 C7
CE78:A9 19 85 9B A9 07 85 9C AC
CE80:A9 27 85 FE A2 00 20 E2 95
CE88:CE 20 AA CB 20 C1 CE C6 14
CE90:FE D0 F1 A5 B1 D0 16 A2 1A
CE98:00 20 E2 CE 20 AA CB 20 EA
CEA0:CD CE C6 9C D0 DA A9 01 C1
CEA8:85 B1 4C 80 CE A9 00 85 A9
CEB0:B1 A2 00 20 E2 CE 20 AA 0F
CEB8:CB 20 DB CE C6 9B D0 BC AF
CEC0:60 18 A5 FB 69 08 85 FB 7B
CEC8:90 02 E6 FC 60 38 A5 FC 08
CED0:E9 01 85 FC A5 FB E9 37 4C
CED8:85 FB 60 E6 FB D0 02 E6 C0
CEE0:FC 60 98 48 A5 01 48 78 E6
CEE8:A9 34 85 01 A2 00 A1 FB 7D
CEF0:AA 68 85 01 68 A8 8A 58 12
CEF8:60 AD 9C CF 85 FB AD 9D D7
CF00:CF 85 FC A9 20 A2 12 20 F2
CF08:AC CB E8 A9 00 20 AC CB 4E
CF10:A9 E8 85 FD A9 04 85 FE B6
CF18:20 E2 CE AA 29 0F A8 B9 95
CF20:4C CF 0A 0A 0A 0A 85 9B DA
CF28:8A 4A 4A 4A 4A A8 B9 4C 42
CF30:CF 05 9B 20 AA CB E6 FB BC
CF38:D0 02 E6 FC C6 FD D0 D8 16
CF40:C6 FE D0 D4 60 00 03 14 87
CF48:14 00 04 00 00 0F 08 07 C5
CF50:0B 04 02 0D 0A 0C 09 06 20
CF58:01 05 03 0E 00 3F 01 28 22
CF60:02 38 03 14 04 20 05 00 5B
CF68:06 19 07 1D 08 00 09 07 5D
CF70:0A 20 0B 07 0C 00 0D 00 69
CF78:0E 00 0F 00 14 08 15 00 EB
CF80:17 08 18 20 19 50 1A F0 E1
CF88:1B 00 1C 20 1D 07 22 3F C3
CF90:23 37 24 05 16 89 FF 19 54
CF98:57 FF 00 00 00 00 00 00 E3
```

Program 2: RGB Demo

```
FG 10 REM COPYRIGHT 1989 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
FR 20 IFOK=0THENPOKE55,0:POKE5
      6,80:CLR
XQ 30 IFOK=3THEN700
MA 40 IFPEEK(52033)=8THENOK=1
KB 50 IFOK=0THENOK=1:LOAD"RGB
      {SPACE}KIT",8,1
FD 60 IFOK=1THENOK=2:SYS52000
JD 70 GOTO180
AD 80 P=S+INT(Y/8)*320+INT(X/8
      )*8+(YAND7):POKEP,PEEK(P
      )OR2↑(7-(XAND7)):RETURN
KP 90 IFABS(X2-X1)>ABS(Y2-Y1)T
      HEN120
RQ 100 M=(X2-X1)/(Y2-Y1):GOSUB
       140:SP=(Y1>Y2OR1):X=X1
CG 110 FORY=Y1TOY2STEPSP:GOSUB
       80:X=X+M:NEXTY:RETURN
BC 120 M=(Y2-Y1)/(X2-X1):GOSUB
       140:SP=(X1>X2OR1):Y=Y1
BH 130 FORX=X1TOX2STEPSP:GOSUB
       80:Y=Y+M:NEXTX:RETURN
GH 140 IFNOT(((ABS(M)<1)AND(X1
       >X2))OR((ABS(M)>1)AND(Y
       1>Y2)))THENRETURN
BJ 150 X=X1:X1=X2:X2=X:Y=Y1:Y1
       =Y2:Y2=Y:RETURN
PF 160 U=1/(↑*RX):R1=RY*.72
JS 170 FORT=BTOESTEPU:X=RX*COS
       (T)+X1:Y=R1*SIN(T)+Y1:G
       OSUB80:NEXTT:RETURN
MQ 180 PRINT"{CLR}{4 DOWN}"TAB
       (13)"RGB KIT DEMO"
QB 190 PRINT"{2 DOWN}THE {RVS}
        CAPS LOCK {OFF} KEY NO
       W TOGGLES BETWEEN"
MR 200 PRINT"THE FAST AND SLOW
        MODES. IN THE FAST"
MR 210 PRINT"MODE, THE COMPOSI
       TE SCREEN IS BLANKED."
SJ 220 PRINT"YOU MUST SWITCH Y
       OUR MONITOR TO RGB TO"
EJ 230 PRINT"SEE THE SCREEN. T
       HE {RVS}COMMODORE{OFF}+
       {RVS}SHIFT{OFF}"
```

```
HG 240 PRINT"KEY COMBINATION I
       S STILL ACTIVE IN RGB"
MF 250 PRINT"MODE."
AX 260 PRINT"{2 DOWN}SWITCH YO
       UR MONITOR TO RGB MODE
       {SPACE}AND"
FH 270 PRINT"THEN PRESS {RVS}S
       PACE{OFF} TO CYCLE THE
       {SPACE}CHARACTER"
BF 280 PRINT"COLORS. PRESS
       {RVS}RETURN{OFF} TO CON
       TINUE":C=1
PF 290 GETK$:IFK$<>" "ANDK$<>C
       HR$(13)THEN290
KX 300 IFK$=" "THENSYS52006,C:
       C=(C+1)AND15:GOTO290
RS 310 PRINT"{CLR}{9 DOWN}LET'
       S DO A SPEED TEST. DURI
       NG THE TEST,"
MF 320 PRINT"THE SCREEN FILLS
       {SPACE}WITH RANDOM CHAR
       ACTERS."
SC 330 PRINT"USE THE {RVS}CAPS
        LOCK{OFF} KEY TO TOGGL
       E"
AK 340 PRINT"BETWEEN FAST AND
       {SPACE}SLOW MODES. THER
       E IS"
PB 350 PRINT"A MARKED DIFFEREN
       CE IN SPEED BETWEEN"
CC 360 PRINT"THE TWO MODES. TO
        EXIT THE TEST PRESS
       {3 SPACES}{RVS}RETURN
       {OFF}."
BE 370 GETK$:IFK$=""THEN370
EG 380 SYS52009,5
HQ 390 PRINT"{CLR}":Z=1024
JH 400 C=INT(RND(0)*256):POKEZ
       ,C
AA 410 GETK$:IFK$=CHR$(13)THEN
       440
PK 420 Z=Z+1:IFZ<2024THEN400
GB 430 GOTO390
HA 440 SYS52009,20
DG 450 PRINT"{CLR}NORMALLY, TH
       E RGB SCREEN DISPLAYS T
       HE"
BE 460 PRINT"SAME THING AS THE
        COMPOSITE SCREEN."
QA 470 PRINT"IT CAN DISPLAY TH
       E CONTENTS OF MEMORY"
EP 480 PRINT"ANYWHERE IN THE 6
       4'S ADDRESS SPACE."
JE 490 PRINT"JUST FOR FUN, LET
       'S LOOK AT PART OF THE"
EK 500 PRINT"RAM USED BY THE B
       ASIC INTERPRETER."
PD 510 PRINT"{DOWN}PRESS {RVS}
       RETURN{OFF} TO CONTINUE
       ."
XA 520 GETK$:IFK$=""THEN520
QQ 530 SYS52012,0:SYS52009,5
CH 540 GETK$:IFK$<>CHR$(13)THE
       N540
CG 550 SYS52012,1024:SYS52009,
       20
CM 560 PRINT"{CLR}THE 64 HAS T
       WO CHARACTER SETS WHICH
        CAN"
FB 570 PRINT"BE TOGGLED IN AND
        OUT BY PRESSING THE"
EM 580 PRINT"{RVS}COMMODORE
       {OFF}+{RVS}SHIFT{OFF} K
       EYS. RGB KIT ALSO"
AS 590 PRINT"HAS TWO CHARACTER
        SETS. UNLIKE THE"
DC 600 PRINT"NORMAL 64 CHARACT
       ER SETS, RGB KIT'S SETS
       "
ER 610 PRINT"CAN BE CHANGED VE
       RY EASILY. THIS PART"
JM 620 PRINT"OF THE DEMO LOADS
        A NEW CHARACTER SET"
ES 630 PRINT"WHICH REPLACES TH
       E UPPERCASE/LOWERCASE"
FA 640 PRINT"SET IN RGB MODE.
       {SPACE}PRESS {RVS}COMMO
       DORE{OFF}+{RVS}SHIFT
       {OFF}";
BC 650 PRINT"TO TOGGLE BETWEEN
        THE NEW SET AND THE"
DQ 660 PRINT"STANDARD SET. PRE
       SS {RVS}RETURN{OFF} TO
       {SPACE}CONTINUE."
CD 670 GETK$:IFK$=""THEN670
KA 680 PRINT"{CLR}LOADING CHAR
       ACTER SET"
QX 690 PRINT"PLEASE WAIT...":O
       K=3:SYS52003:LOAD"CHRSE
       T",8,1
HP 700 SYS52000:SYS52015,40960
       ,1:PRINT"{CLR}
       {11 SPACES}CHARACTER SE
       T DEMO"
GJ 710 FORZ=0TO255:POKE1104+Z,
       Z:NEXT
XP 720 PRINT"{10 DOWN}THE QUIC
       K BROWN FOX JUMPED OVER
       ":PRINT"THE LAZY DOG."
KK 730 GETK$:IFK$<>CHR$(13)THE
       N730
RX 740 SYS52003:SYS52000
FD 750 PRINT"{CLR}RGB KIT'S MO
       ST SPECTACULAR ABILITY
       {SPACE}IS"
QF 760 PRINT"ITS ABILITY TO DI
       SPLAY HI-RES SCREENS."
PH 770 PRINT"A HI-RES SCREEN C
       AN BE TAKEN FROM ANY"
XJ 780 PRINT"LOCATION IN THE 6
       4'S RAM, INCLUDING THE"
FQ 790 PRINT"RAM UNDER THE BAS
       IC ROM, KERNAL ROM AND"
QB 800 PRINT"I/O SPACE. PRESS
       {SPACE}{RVS}SPACE{OFF}
       {SPACE}TO GENERATE AND"
GF 810 PRINT"DISPLAY A BITMAP
       {SPACE}SCREEN. PRESS
       {RVS}RETURN{OFF}"
JS 820 PRINT"TO EXIT THE DEMO.
       "
KE 830 GETK$:IFK$<>" "ANDK$<>C
       HR$(13)THEN830
GE 840 IFK$=CHR$(13)THEN990
FC 850 PRINT"{CLR}PLEASE WAIT.
       ..DRAWING"
HE 860 FORI=0TO35:READA:POKE49
       152+I,A:NEXTI:SYS49152:
       S=32768:C=31744
EJ 870 X1=150:Y1=85:RX=75:RY=R
       X:B=0:E=2*↑:GOSUB160
PR 880 X1=115:Y1=70:RX=15:RY=R
       X:B=0:E=2*↑:GOSUB160
JB 890 X1=185:Y1=70:RX=15:RY=R
       X:B=0:E=2*↑:GOSUB160
EQ 900 X1=150:Y1=90:RX=60:RY=5
       0:B=10*↑/180:E=170*↑/18
       0:GOSUB160
KQ 910 X1=150:Y1=90:RX=63:RY=3
       0:B=20*↑/180:E=160*↑/18
       0:GOSUB160
SQ 920 X1=75:Y1=150:X2=140:Y2=
       162:GOSUB90:X1=140:Y1=1
       62:X2=160:Y2=162:GOSUB9
       0
JQ 930 X1=160:Y1=162:X2=225:Y2
       =150:GOSUB90:X1=225:Y1=
       150:X2=225:Y2=190:GOSUB
       90
JF 940 X1=225:Y1=190:X2=160:Y2
       =178:GOSUB90:X1=160:Y1=
       178:X2=140:Y2=178:GOSUB
       90
BH 950 X1=140:Y1=178:X2=75:Y2=
       190:GOSUB90:X1=75:Y1=19
       0:X2=75:Y2=150:GOSUB90
FB 960 X1=140:Y1=162:X2=140:Y2
       =178:GOSUB90:X1=160:Y1=
       162:X2=160:Y2=178:GOSUB
       90
CA 970 SYS52000:SYS52018,S,C
EP 980 GETK$:IFK$<>CHR$(13)THE
       N980
XG 990 SYS52000:PRINT"{CLR}END
       OF DEMO.":SYS52003:END
RX 1000 DATA 169,0,168,162,32,
        153
CM 1010 DATA 0,128,200,208,250
        ,238
ME 1020 DATA 7,192,202,208,244
        ,169
SQ 1030 DATA 48,160,0,162,4,15
        3
HP 1040 DATA 0,124,200,208,250
        ,238
EH 1050 DATA 25,192,202,208,24
        4,96
```

Program 3: RGB Char Set

```
A000:00 3C 66 6E 6E 60 3E 00 75
A008:00 18 3C 66 66 7E 66 00 37
A010:00 7C 66 7C 66 66 7C 00 CA
A018:00 3C 66 60 60 66 3C 00 50
A020:00 78 6C 66 66 6C 78 00 49
A028:00 7E 60 7C 60 60 7E 00 5E
A030:00 7E 60 7C 60 60 60 00 2A
A038:00 3E 60 60 6E 66 3E 00 A4
A040:00 66 66 7E 66 66 66 00 69
A048:00 7E 18 18 18 18 7E 00 CB
A050:00 06 06 06 06 66 3C 00 76
A058:00 66 6C 78 78 6C 66 00 8A
A060:00 60 60 60 60 60 7E 00 4D
A068:00 63 77 7F 6B 63 63 00 19
A070:00 66 76 7E 7E 6E 66 00 7C
A078:00 3C 66 66 66 66 3C 00 41
A080:00 7C 66 66 7C 60 60 00 3A
A088:00 3C 66 66 66 6C 36 00 5D
A090:00 7C 66 66 7C 6C 66 00 86
A098:00 3C 60 3C 06 06 3C 00 79
A0A0:00 7E 18 18 18 18 18 00 57
A0A8:00 66 66 66 66 66 7E 00 80
A0B0:00 66 66 66 66 3C 18 00 13
A0B8:00 63 63 6B 7F 77 63 00 96
A0C0:00 66 66 3C 3C 66 66 00 74
A0C8:00 66 66 3C 18 18 18 00 85
A0D0:00 7E 0C 18 30 60 7E 00 B4
A0D8:00 3C 30 30 30 30 3C 00 EC
A0E0:00 3C 60 F0 60 66 FC 00 E2
A0E8:00 3C 0C 0C 0C 0C 3C 00 84
A0F0:00 18 3C 7E 18 18 18 00 F8
A0F8:00 18 30 7E 30 18 00 00 10
A100:00 00 00 00 00 00 00 00 43
A108:00 18 18 18 18 00 18 00 C6
A110:00 6C 6C 6C 00 00 00 00 C2
A118:00 66 FF 66 66 FF 66 00 5B
A120:18 3E 60 3C 06 7C 18 00 21
A128:00 66 6C 18 30 66 46 00 BB
A130:1C 36 1C 38 6F 66 3B 00 A1
A138:00 18 18 18 00 00 00 00 06
A140:00 1C 38 30 30 38 1C 00 2F
A148:00 38 1C 0C 0C 1C 38 00 1F
A150:00 66 3C FF 3C 66 00 00 30
A158:00 18 18 7E 18 18 00 00 AD
A160:00 00 00 00 00 18 18 38 6C
A168:00 00 00 3C 00 00 00 00 6F
A170:00 00 00 00 00 38 38 00 05
A178:00 06 0C 18 30 60 00 00 43
A180:00 3C 66 6E 76 66 3C 00 4C
A188:00 18 38 18 18 18 7E 00 78
A190:00 3C 66 0C 18 30 7E 00 EE
A198:00 7E 0C 18 0C 66 3C 00 F0
A1A0:00 0C 1C 3C 6C 7E 0C 00 A3
A1A8:00 7E 60 7C 06 66 3C 00 A1
A1B0:00 3C 60 7C 66 66 3C 00 1C
A1B8:00 7E 06 0C 18 30 30 00 FE
A1C0:00 3C 66 3C 66 66 3C 00 E8
A1C8:00 3C 66 3E 06 0C 38 00 9C
A1D0:00 00 18 18 00 18 18 00 29
```

```
A1D8:00 00 18 18 00 18 18 30 61
A1E0:06 0C 18 30 18 0C 06 00 2D
A1E8:00 00 7E 00 00 7E 00 00 F5
A1F0:60 30 18 0C 18 30 60 00 76
A1F8:00 3C 66 0C 18 00 18 00 C9
A200:00 00 00 FF FF 00 00 00 45
A208:08 1C 3E 7F 7F 1C 3E 00 01
A210:18 18 18 18 18 18 18 18 55
A218:00 00 00 FF FF 00 00 00 5D
A220:00 00 FF FF 00 00 00 00 65
A228:00 FF FF 00 00 00 00 00 6D
A230:00 00 00 00 FF FF 00 00 75
A238:30 30 30 30 30 30 30 30 7D
A240:0C 0C 0C 0C 0C 0C 0C 0C 85
A248:00 00 00 E0 F0 38 18 18 4C
A250:18 18 1C 0F 07 00 00 00 54
A258:18 18 38 F0 E0 00 00 00 CC
A260:C0 C0 C0 C0 C0 C0 FF FF 63
A268:C0 E0 70 38 1C 0E 07 03 02
A270:03 07 0E 1C 38 70 E0 C0 82
A278:FF FF C0 C0 C0 C0 C0 C0 2D
A280:FF FF 03 03 03 03 03 03 83
A288:00 3C 7E 7E 7E 7E 3C 00 FA
A290:00 00 00 00 00 FF FF 00 D5
A298:36 7F 7F 7F 3E 1C 08 00 33
A2A0:60 60 60 60 60 60 60 60 E5
A2A8:00 00 00 07 0F 1C 18 18 8F
A2B0:C3 E7 7E 3C 3C 7E E7 C3 D4
A2B8:00 3C 7E 66 66 7E 3C 00 E8
A2C0:18 18 66 66 18 18 3C 00 E4
A2C8:06 06 06 06 06 06 06 06 0E
A2D0:08 1C 3E 7F 3E 1C 08 00 53
A2D8:18 18 18 FF FF 18 18 18 DB
A2E0:C0 C0 30 30 C0 C0 30 30 59
A2E8:18 18 18 18 18 18 18 18 2E
A2F0:00 00 03 3E 76 36 36 00 73
A2F8:FF 7F 3F 1F 0F 07 03 01 93
A300:00 00 00 00 00 00 00 00 47
A308:F0 F0 F0 F0 F0 F0 F0 F0 4F
A310:00 00 00 00 FF FF FF FF 57
A318:FF 00 00 00 00 00 00 00 5F
A320:00 00 00 00 00 00 00 FF 67
A328:C0 C0 C0 C0 C0 C0 C0 C0 6F
A330:CC CC 33 33 CC CC 33 33 DD
A338:03 03 03 03 03 03 03 03 7F
A340:00 00 00 00 CC CC 33 33 BA
A348:FF FE FC F8 F0 E0 C0 80 8B
A350:03 03 03 03 03 03 03 03 97
A358:18 18 18 1F 1F 18 18 18 48
A360:00 00 00 00 0F 0F 0F 0F 89
A368:18 18 18 1F 1F 00 00 00 AF
A370:00 00 00 F8 F8 18 18 18 B7
A378:00 00 00 00 00 00 FF FF BF
A380:00 00 00 1F 1F 18 18 18 5B
A388:18 18 18 FF FF 00 00 00 E4
A390:00 00 00 FF FF 18 18 18 80
A398:18 18 18 F8 F8 18 18 18 F4
A3A0:C0 C0 C0 C0 C0 C0 C0 C0 E7
A3A8:E0 E0 E0 E0 E0 E0 E0 E0 EF
A3B0:07 07 07 07 07 07 07 07 F7
A3B8:FF FF 00 00 00 00 00 00 FF
A3C0:FF FF FF 00 00 00 00 00 08
A3C8:00 00 00 00 00 FF FF FF 10
A3D0:03 03 03 03 03 03 FF FF 0F
A3D8:00 00 00 00 F0 F0 F0 F0 3E
A3E0:0F 0F 0F 0F 00 00 00 00 46
A3E8:18 18 18 F8 F8 00 00 00 9C
A3F0:F0 F0 F0 F0 00 00 00 00 1A
A3F8:F0 F0 F0 F0 0F 0F 0F 0F 04
A400:FF C3 99 91 91 9F C1 FF 15
A408:FF E7 C3 99 99 81 99 FF 63
A410:FF 83 99 83 99 99 83 FF DF
A418:FF C3 99 9F 9F 99 C3 FF 6A
A420:FF 87 93 99 99 93 87 FF 81
A428:FF 81 9F 83 9F 9F 81 FF 7C
A430:FF 81 9F 83 9F 9F 9F FF C0
A438:FF C1 9F 9F 91 99 C1 FF 56
A440:FF 99 99 81 99 99 99 FF A1
A448:FF 81 E7 E7 E7 E7 81 FF 4F
A450:FF F9 F9 F9 F9 99 C3 FF B4
A458:FF 99 93 87 87 93 99 FF B0
A460:FF 9F 9F 9F 9F 9F 81 FF FD
A468:FF 9C 88 80 94 9C 9C FF 42
A470:FF 99 89 81 81 91 99 FF EE
A478:FF C3 99 99 99 99 C3 FF 3A
A480:FF 83 99 99 83 9F 9F FF 51
A488:FF C3 99 99 99 93 C9 FF 3E
A490:FF 83 99 99 83 93 99 FF 25
A498:FF C3 9F C3 F9 F9 C3 FF 42
A4A0:FF 81 E7 E7 E7 E7 E7 FF 74
A4A8:FF 99 99 99 99 99 81 FF 5B
A4B0:FF 99 99 99 99 C3 E7 FF D8
A4B8:FF 9C 9C 94 80 88 9C FF 65
A4C0:FF 99 99 C3 C3 99 99 FF 97
A4C8:FF 99 99 C3 E7 E7 E7 FF 96
A4D0:FF 81 F3 E7 CF 9F 81 FF 77
A4D8:FF C3 CF CF CF CF C3 FF 4F
A4E0:FF C3 9F 0F 9F 99 03 FF 69
A4E8:FF C3 F3 F3 F3 F3 C3 FF D7
A4F0:FF E7 C3 81 E7 E7 E7 FF 73
A4F8:FF E7 CF 81 CF E7 FF FF 6C
A500:FF FF FF FF FF FF FF FF 4B
A508:FF E7 E7 E7 E7 FF E7 FF D7
A510:FF 93 93 93 FF FF FF FF EB
A518:FF 99 00 99 99 00 99 FF 63
A520:E7 C1 9F C3 F9 83 E7 FF AD
A528:FF 99 93 E7 CF 99 B9 FF 23
A530:E3 C9 E3 C7 90 99 C4 FF 4D
A538:FF E7 E7 E7 FF FF FF FF F8
A540:FF E3 C7 CF CF C7 E3 FF DF
A548:FF C7 E3 F3 F3 E3 C7 FF FF
A550:FF 99 C3 00 C3 99 FF FF FE
A558:FF E7 E7 81 E7 E7 FF FF 91
A560:FF FF FF FF FF E7 E7 C7 E2
A568:FF FF FF C3 FF FF FF FF EF
A570:FF FF FF FF FF C7 C7 FF 6A
A578:FF F9 F3 E7 CF 9F FF FF 3C
A580:FF C3 99 91 89 99 C3 FF 43
A588:FF E7 C7 E7 E7 E7 81 FF 27
A590:FF C3 99 F3 E7 CF 81 FF C0
A598:FF 81 F3 E7 F3 99 C3 FF CE
A5A0:FF F3 E3 C3 93 81 F3 FF 2C
A5A8:FF 81 9F 83 F9 99 C3 FF 3E
A5B0:FF C3 9F 83 99 99 C3 FF D3
A5B8:FF 81 F9 F3 E7 CF CF FF 01
A5C0:FF C3 99 C3 99 99 C3 FF 27
A5C8:FF C3 99 C1 F9 F3 C7 FF 83
A5D0:FF FF E7 E7 FF E7 E7 FF 07
A5D8:FF FF E7 E7 FF E7 E7 CF DE
A5E0:F9 F3 E7 CF E7 F3 F9 FF 23
A5E8:FF FF 81 FF FF 81 FF FF 6A
A5F0:9F CF E7 F3 E7 CF 9F FF F9
A5F8:FF FF C3 99 F3 E7 FF E7 FF B6
A600:FF FF FF 00 00 FF FF FF 4D
A608:F7 E3 C1 80 80 E3 C1 FF A1
A610:E7 E7 E7 E7 E7 E7 E7 E7 5D
A618:FF FF FF 00 00 FF FF FF 65
A620:FF FF 00 00 FF FF FF FF 6D
A628:FF 00 00 FF FF FF FF FF 75
A630:FF FF FF FF 00 00 FF FF 7D
A638:CF CF CF CF CF CF CF CF 85
A640:F3 F3 F3 F3 F3 F3 F3 F3 8D
A648:FF FF FF 1F 0F C7 E7 E7 D6
A650:E7 E7 E3 F0 F8 FF FF FF DE
A658:E7 E7 C7 0F 1F FF FF FF 76
A660:3F 3F 3F 3F 3F 3F 00 00 EF
A668:3F 1F 8F C7 E3 F1 F8 FC 61
A670:FC F8 F1 E3 C7 8F 1F 3F F0
A678:00 00 3F 3F 3F 3F 3F 3F 56
A680:00 00 FC FC FC FC FC FC 10
A688:FF C3 81 81 81 81 C3 FF A8
A690:FF FF FF FF FF 00 00 FF DD
A698:C9 80 80 80 C1 E3 F7 FF 90
A6A0:9F 9F 9F 9F 9F 9F 9F 9F ED
A6A8:FF FF FF F8 F0 E3 E7 E7 54
A6B0:3C 18 81 C3 C3 81 18 3C 1F
A6B8:FF C3 81 99 99 81 C3 FF 1B
A6C0:E7 E7 99 99 E7 E7 C3 FF 2F
A6C8:F9 F9 F9 F9 F9 F9 F9 F9 16
A6D0:F7 E3 C1 80 C1 E3 F7 FF E0
A6D8:E7 E7 E7 00 00 E7 E7 E7 68
A6E0:3F 3F CF CF 3F 3F CF CF FA
A6E8:E7 E7 E7 E7 E7 E7 E7 E7 36
A6F0:FF FF FC C1 89 C9 C9 FF 01
A6F8:00 80 C0 E0 F0 F8 FC FE F0
A700:FF FF FF FF FF FF FF FF 4F
A708:0F 0F 0F 0F 0F 0F 0F 0F 57
A710:FF FF FF FF 00 00 00 00 5F
A718:00 FF FF FF FF FF FF FF 67
A720:FF FF FF FF FF FF FF 00 6F
A728:3F 3F 3F 3F 3F 3F 3F 3F 77
A730:33 33 CC CC 33 33 CC CC 19
A738:FC FC FC FC FC FC FC FC 87
A740:FF FF FF FF 33 33 CC CC 5C
A748:00 01 03 07 0F 1F 3F 7F 9B
A750:FC FC FC FC FC FC FC FC 9F
A758:E7 E7 E7 E0 E0 E7 E7 E7 FE
A760:FF FF FF FF F0 F0 F0 F0 CD
A768:E7 E7 E7 E0 E0 FF FF FF B7
A770:FF FF FF 07 07 E7 E7 E7 BF
A778:FF FF FF FF FF FF 00 00 C7
A780:FF FF FF E0 E0 E7 E7 E7 3C
A788:E7 E7 E7 00 00 FF FF FF C2
A790:FF FF FF 00 00 E7 E7 E7 37
A798:E7 E7 E7 07 07 E7 E7 E7 D2
A7A0:3F 3F 3F 3F 3F 3F 3F 3F EF
A7A8:1F 1F 1F 1F 1F 1F 1F 1F F7
A7B0:F8 F8 F8 F8 F8 F8 F8 F8 FF
A7B8:00 00 FF FF FF FF FF FF 08
A7C0:00 00 00 FF FF FF FF FF 10
A7C8:FF FF FF FF FF 00 00 00 18
A7D0:FC FC FC FC FC FC 00 00 29
A7D8:FF FF FF FF 0F 0F 0F 0F 0A
A7E0:F0 F0 F0 F0 FF FF FF FF 12
A7E8:E7 E7 E7 07 07 FF FF FF CB
A7F0:0F 0F 0F 0F FF FF FF FF 5E
A7F8:0F 0F 0F 0F F0 F0 F0 F0 84
```

BEFORE TYPING . . .

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

Boot Maker

Article on page 31.

```
PB 100 REM COPYRIGHT 1989 COMP
       UTE! PUBLICATIONS, INC.
       {2 SPACES}ALL RIGHTS RE
       SERVED
QR 110 PRINT"{CLR}"TAB(12)"COP
       YRIGHT 1989":PRINTTAB(6
       )"COMPUTE! PUBLICATIONS
       , INC."
MA 120 PRINTTAB(9)"ALL RIGHTS
       {SPACE}RESERVED."
JE 130 FORJ=4000TO4113:READX
MS 140 T=T+X:POKEJ,X
EX 150 NEXTJ
EQ 160 IFT<>13861THENPRINT"ERR
       OR IN DATA":STOP
FF 170 PRINT"{2 DOWN}"
JK 180 PRINTTAB(14)"64 BOOTER"
FG 190 SYS 4000
AF 200 INPUT"{2 DOWN}FILENAME
       {SPACE}OF PROGRAM TO BO
       OT";A$
EH 210 N=872:GOSUB390:POKE833,
       M
SX 220 INPUT"IS IT BASIC (Y/N)
       ";A$
PJ 230 IF A$="N"THEN250
JE 240 POKE850,234:POKE828,0:G
       OTO350
HD 250 INPUT"ENTER SYS ADDRESS
       ";A
PG 260 FORI=1TO4
JB 270 A=A/16:X=INT(A):Y=A-X
MG 280 IFY>0THENY=Y*16:A=X
FH 290 IFI=1THENV1=Y
BG 300 IFI=2THENV1=V1+16*Y
AF 310 IFI=3THENV2=Y
MK 320 IFI=4THENV2=V2+16*Y
KG 330 NEXT
CF 340 POKE 851,V1:POKE852,V2
QM 350 INPUT"NAME OF THE NEW B
       OOT PROGRAM";A$
```

```
CG 360 N=4113:GOSUB390:POKE4085,M
FJ 370 SYS 4075
HS 380 END
HP 390 M=LEN(A$)
PD 400 FORI=1TOM
QS 410 Y$=LEFT$(A$,I)
DH 420 X$=RIGHT$(Y$,1)
HF 430 B=ASC(X$)
JA 440 POKEN+I,B
ER 450 NEXT
KD 460 RETURN
EJ 470 DATA 169,52,141,44,3,169,3,141,45,3,160,54,185,181,15,153,51,3,136,208
EC 480 DATA 247,96,32,138,255,169,2,162,8,160,255,32,186,255,169,0,160,3,162
ES 490 DATA 105,32,189,255,169,0,162,1,160,8,32,213,255,76,162,0,189,101,3,157
XH 500 DATA 119,2,232,224,4,208,245,169,4,133,198,96,82,85,78,13,169,2,162,8
AJ 510 DATA 160,255,32,186,255,169,3,160,16,162,18,32,189,255,169,44,133,254,169
DS 520 DATA 3,133,255,169,254,162,128,160,3,32,216,255,32,138,255,96
```

Screen Play

Article on page 54.

Program 1: Bounce

```
SA 900 REM COPYRIGHT 1989 COMPUTE! PUBLICATIONS, INC. - ALL RIGHTS RESERVED
QP 910 REM ** BOUNCE **
PQ 920 FORA=49617TO49809:READA:POKEA,AA:NEXT
RP 930 DATA120,169,246,141,20,3,169,193
DS 940 DATA141,21,3,173,17,208,41,127,141
FF 950 DATA17,208,173,116,194,141,18,208
SP 960 DATA169,1,141,26,208,169,127,141
RF 970 DATA13,220,88,96,162,1,224,8,240
CQ 980 DATA32,189,119,194,141,22,208,238
RJ 990 DATA247,193,24,160,0,185,116,194
XQ 1000 DATA125,128,194,141,18,208,169,1
RM 1010 DATA141,25,208,104,168,104,170,104
KK 1020 DATA64,173,119,194,141,22,208,169
AA 1030 DATA1,141,247,193,238,7,194,173,7
PE 1040 DATA194,201,3,208,5,169,0,141,7
CH 1050 DATA194,170,189,136,194,208,23,24
QH 1060 DATA254,116,194,189,116,194,141,18
MM 1070 DATA208,221,139,194,208,28,169,1
DC 1080 DATA157,136,194,76,103,194,24,222
XH 1090 DATA116,194,189,116,194,141,18,208
HD 1100 DATA221,142,194,208,5,169,0,157
AJ 1110 DATA136,194,169,1,141,25,208,173,7
PG 1120 DATA194,208,165,76,49,234,99,117
HH 1130 DATA233,200,202,204,206,207,206
QE 1140 DATA204,202,200,0,2,4,6,8,10,12,14
MF 1150 DATA1,0,1,99,166,233,50,117,184,0
FX 1160 SYS 49617
```

Program 2: Waves

```
EA 1060 REM COPYRIGHT 1989 COMPUTE! PUBLICATIONS, INC. - ALL RIGHTS RESERVED
FP 1070 REM WAVES
PQ 1080 FORA=49810TO49973:READAA:POKEA,AA:NEXT
BF 1090 DATA120,169,183,141,20,3,169,194
RA 1100 DATA141,21,3,173,17,208,41,127,141
RG 1110 DATA17,208,173,35,195,141,18,208
PB 1120 DATA169,1,141,26,208,169,127,141
SH 1130 DATA13,220,88,96,162,1,224,8,240
DQ 1140 DATA34,189,36,195,141,22,208,238
GA 1150 DATA184,194,24,173,35,195,125,45
BD 1160 DATA195,201,252,176,43,141,18,208
AK 1170 DATA169,1,141,25,208,104,168,104
XS 1180 DATA170,104,64,173,36,195,141,22
CB 1190 DATA208,169,1,141,184,194,173,35
XG 1200 DATA195,201,210,176,22,105,40,141
FB 1210 DATA35,195,141,18,208,76,212,194
JF 1220 DATA173,36,195,141,22,208,169,1
FD 1230 DATA141,184,194,238,11,195,169,35
GB 1240 DATA201,75,208,5,169,35,141,11,195
MP 1250 DATA141,35,195,141,18,208,169,1
XD 1260 DATA141,25,208,76,49,234,35,200
MH 1270 DATA201,202,203,204,203,202,201
PC 1280 DATA200,0,3,6,9,12,15,19,22,0
HC 1290 SYS 49810
```

Program 3: Off

```
EK 2000 REM COPYRIGHT 1989 COMPUTE! PUBLICATIONS, INC. - ALL RIGHTS RESERVED
MM 2010 REM OFF
GA 2020 FORA=49974TO50007:READAA:POKEA,AA:NEXT
SH 2030 DATA120,169,49,141,20,3,169,234
JX 2040 DATA141,21,3,169,8,141,22,208,169
KX 2050 DATA0:REM COLOR
RB 2060 DATA141
GR 2070 DATA32:REM SCREEN
JJ 2080 DATA208,169,0,141,26,208
AQ 2090 DATA169,129,141,13,220,88,96,0
AM 2100 SYS 49974
```

Slap Shot

See instructions in article on page 14 before typing in.

```
0801:0B 08 C5 07 9E 32 30 36 16
0809:32 00 00 00 00 A9 05 8D 70
0811:50 03 A9 10 8D 51 03 A9 A1
0819:00 8D 3C 03 8D 3D 03 A9 55
0821:06 8D 63 03 AD 00 DC 29 84
0829:10 F0 F9 AD 01 DC 29 10 75
0831:F0 F2 20 8E 08 A9 00 8D D7
0839:3C 03 8D 3D 03 20 F3 0A 38
0841:20 75 0A 20 C5 09 20 5C F0
0849:10 20 D3 0C 20 AB 10 AD 22
0851:41 03 C9 02 D0 18 AD 3C 9A
0859:03 CD 3D 03 D0 10 AD 3E 96
0861:03 D0 0B AD 3F 03 D0 06 11
0869:20 B6 15 4C 3E 08 AD 40 4C
0871:03 CD 3C 03 F0 AE CD 3D 49
0879:03 F0 A9 AD 3E 03 D0 BD B4
0881:AD 3F 03 D0 B8 AD 41 03 A7
0889:F0 B3 4C 25 08 A2 00 8E 34
0891:20 D0 8E 21 D0 8E 15 D0 85
0899:BD 02 16 20 D2 FF E8 E0 17
08A1:A2 D0 F5 A9 00 85 02 AD 58
08A9:3C 03 4A 4A 4A 4A 09 30 44
08B1:8D A7 05 AD 3C 03 29 0F 3D
08B9:09 30 8D A8 05 AD 3D 03 F2
08C1:4A 4A 4A 4A 09 30 8D B0 4C
08C9:05 AD 3D 03 29 0F 09 30 67
08D1:8D B1 05 AD 50 03 4A 4A FD
08D9:4A 4A 09 30 8D DC 04 AD 5B
08E1:50 03 29 0F 09 30 8D DD F2
08E9:04 AD 51 03 4A 4A 4A 4A 1C
08F1:09 30 8D 2F 05 AD 51 03 BB
08F9:29 0F 09 30 8D 30 05 20 DD
0901:A9 09 AD 00 DC 29 1F 49 F2
0909:1F 85 FB AD 01 DC 29 1F 53
0911:49 1F 05 FB 85 FB A6 02 5B
0919:29 04 F0 14 78 F8 38 BD F5
0921:50 03 E9 01 9D 50 03 D8 76
0929:58 D0 05 A9 01 9D 50 03 F8
0931:A5 FB 29 08 F0 14 78 F8 7C
0939:18 BD 50 03 69 01 9D 50 DB
0941:03 D8 58 90 05 A9 99 9D BE
0949:50 03 A5 FB 29 03 F0 24 14
0951:A5 02 49 01 85 02 A2 00 69
0959:BD D7 04 49 80 9D D7 04 83
0961:E8 E0 04 D0 F3 A2 00 BD 95
0969:27 05 49 80 9D 27 05 E8 FD
0971:E0 05 D0 F3 A5 FB 29 10 0E
0979:D0 03 4C D4 08 A6 02 D0 3B
0981:1B A9 02 8D 41 03 A9 99 A7
0989:8D 40 03 A9 00 8D 3F 03 25
0991:AD 50 03 8D 3E 03 A9 3C 55
0999:8D 52 03 60 A9 00 8D 41 17
09A1:03 AD 51 03 8D 40 03 60 CE
09A9:A2 40 A0 00 88 D0 FD CA 7F
09B1:D0 FA 60 A0 10 88 D0 FD 43
09B9:60 A2 80 A0 00 88 D0 FD 80
09C1:CA D0 FA 60 AD 41 03 F0 3C
09C9:05 A9 02 8D 41 03 A9 0B 56
09D1:8D 42 03 8D 43 03 8D 55 0B
09D9:03 8D 56 03 A9 0F 8D 44 B4
09E1:03 8D 45 03 8D 46 03 8D CA
09E9:47 03 8D 48 03 8D 49 03 7A
09F1:8D 57 03 8D 4A 03 8D 4B 9E
09F9:03 A9 00 8D 4E 03 8D 4F B9
0A01:03 8D 58 03 8D 59 03 8D 9A
0A09:53 03 8D 54 03 8D 5A 03 84
0A11:A9 05 8D 4C 03 A9 0A 8D 12
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0AB9:2A D0 8C 29 D0 8C 2B D0 1B
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0B59:E8 E0 0C D0 F5 A2 00 A9 8E
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0B69:07 A9 00 9D 78 D8 9D C0 6A
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0B81:A9 D8 85 FE A2 00 86 02 67
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0FC9:CE 0F 8C 07 D0 60 A9 80 F0
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17D9:00 00 C0 00 00 C0 00 00 23
17E1:C0 00 00 C0 00 00 00 00 C0 3D
17E9:00 00 C0 00 00 C0 00 00 33
17F1:C0 00 00 E8 00 00 E8 00 E0
17F9:00 EA 00 00 AA C0 00 AA E5
1801:C0 00 A5 00 00 A5 00 00 DC
1809:A5 00 03 AA 00 03 AA 00 78
1811:00 2A 00 00 28 00 00 28 35
1819:00 00 00 00 00 00 00 00 49
1821:00 00 00 00 00 00 00 C0 12
1829:00 00 C0 00 00 C0 00 00 74
1831:C0 00 00 E8 00 00 E8 00 22
1839:00 EA 00 00 AA 00 00 AA 24
1841:00 00 A5 00 00 A5 00 00 BC
1849:A5 00 00 AA 00 00 AA 00 4C
1851:00 2A 00 00 28 00 00 28 75
1859:00 00 00 00 00 00 00 00 89
1861:00 00 00 00 00 00 00 C0 52
1869:00 00 C0 00 00 C0 00 00 B4
1871:C0 00 00 E8 00 00 E8 00 62
1879:00 EA 00 03 AA 00 03 AA 9A
1881:00 00 A5 00 00 A5 00 00 FC
1889:A5 00 00 AA C0 00 AA C0 53
1891:00 2A 00 00 28 00 00 28 B5
1899:00 00 00 00 00 00 00 00 C9
18A1:00 00 00 00 00 00 00 00 D1
18A9:00 00 00 00 00 00 00 00 D9
18B1:00 00 00 28 00 00 28 00 B4
18B9:00 A8 00 03 AA 00 03 AA 4A
18C1:00 00 5A 00 00 5A 00 00 A6
18C9:5A 00 00 AA C0 00 AA C0 ED
18D1:00 AB 00 00 2B 00 00 2B 71
18D9:00 00 03 00 00 03 00 00 76
18E1:03 00 00 03 00 00 00 00 C3
18E9:00 00 00 00 00 00 00 00 1A
18F1:00 00 00 28 00 00 28 00 F4
18F9:00 A8 00 00 AA 00 00 AA 54
1901:00 00 5A 00 00 5A 00 00 E7
1909:5A 00 00 AA 00 00 AA 00 68
1911:00 AB 00 00 2B 00 00 2B B2
1919:00 00 03 00 00 03 00 00 B7
1921:03 00 00 03 00 00 00 00 05
1929:00 00 00 00 00 00 00 00 5B
1931:00 00 00 28 00 00 28 00 36
1939:00 A8 00 00 AA C0 00 AA 98
1941:C0 00 5A 00 00 5A 00 00 88
1949:5A 00 03 AA 00 03 AA 00 15
1951:00 AB 00 00 2B 00 00 2B F2
1959:00 00 03 00 00 03 00 00 F7
1961:03 00 00 03 00 00 00 03 48
1969:00 00 03 00 00 03 00 00 08
1971:03 00 00 2B 00 00 2B 00 2E
1979:00 AB 00 03 AA 00 03 AA CC
1981:00 00 5A 00 00 5A 00 00 68
1989:5A 00 00 AA C0 00 AA C0 AF
1991:00 A8 00 00 28 00 00 28 57
1999:00 00 00 00 00 00 00 00 CB
19A1:00 00 00 00 00 00 00 03 D6
19A9:00 00 03 00 00 03 00 00 48
19B1:03 00 00 2B 00 00 2B 00 6E
19B9:00 AB 00 00 AA 00 00 AA D6
19C1:00 00 5A 00 00 5A 00 00 A8
19C9:5A 00 00 AA 00 00 AA 00 29
19D1:00 A8 00 00 28 00 00 28 97
19D9:00 00 00 00 00 00 00 00 0C
19E1:00 00 00 00 00 00 00 03 17
19E9:00 00 03 00 00 03 00 00 88
19F1:03 00 00 2B 00 00 2B 00 AE
19F9:00 AB 00 00 AA C0 00 AA 1A
1A01:C0 00 5A 00 00 5A 00 00 4A
1A09:5A 00 03 AA 00 03 AA 00 D6
1A11:00 A8 00 00 28 00 00 28 D8
1A19:00 00 00 00 00 00 00 00 4D
1A21:00 00 00 00 00 00 00 00 55
1A29:00 00 00 00 00 00 00 00 5D
1A31:00 00 00 00 00 00 00 00 65
1A39:00 00 00 00 00 00 00 00 6D
```

```
1A41:00 00 3C 00 00 3C 00 00 ED
1A49:3C 00 00 00 00 00 00 00 9B
1A51:00 00 00 00 00 00 00 00 85
1A59:00 00 00 00 00 00 00 00 8D
1A61:00 00 00 00 00 00 00 00 95
1A69:00 00 00 00 00 00 00 00 9D
1A71:00 00 00 28 00 00 2A 00 7C
1A79:00 AA 00 00 AB 00 00 AB 61
1A81:00 00 5B 00 00 5B 00 00 8E
1A89:5B 00 00 AB 00 00 AB 00 7D
1A91:00 AA 00 00 2A 00 00 28 E9
1A99:00 00 00 00 00 00 00 00 CD
1AA1:00 00 00 00 00 00 00 00 D5
1AA9:00 00 00 00 00 00 00 00 DD
1AB1:00 00 00 28 00 00 A8 00 B9
1AB9:00 AA 00 00 EA 00 00 EA DA
1AC1:00 00 E5 00 00 E5 00 00 4A
1AC9:E5 00 00 EA 00 00 EA 00 75
1AD1:00 AA 00 00 A8 00 00 28 1E
1AD9:00 00 00 00 00 00 00 00 0E
1AE1:00 00 00 00 00 00 05 06 26
1AE9:09 0A F3 F4 F5 F4 F0 F1 4A
1AF1:F2 F1 F9 FA FB FA F6 F7 BC
1AF9:F8 F7 00 00 00 00 00 00 A8
```

Backdrops

Article on page 16.

```
FH 10 REM COPYRIGHT 1989 COMPU
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GK 20 A$="":PRINT"{CLR}":GOSUB
      1010:SYS49152:REM INSTAL
      L BACKDROPS AND TURN ON
EM 30 SYS49185:GOSUB1130:PRINT
      "{CLR}{8 DOWN}{BLK}":X=1
      :GOSUB90:PRINT"{HOME}
      {6 DOWN}{YEL}"
BB 40 X=0:GOSUB90:GOSUB210
RG 50 SYS49185:GOSUB1240:PRINT
      "{CLR}{8 DOWN}{BLU}":X=1
      :GOSUB90:PRINT"{HOME}
      {6 DOWN}{CYN}"
HC 60 X=0:GOSUB90:GOSUB210
DX 70 SYS49185:GOSUB1290:PRINT
      "{CLR}{8 DOWN}{BLK}":X=1
      :GOSUB90:PRINT"{HOME}
      {6 DOWN}{YEL}"
QK 80 X=0:GOSUB90:GOSUB210:GOT
      O30
QQ 90 PRINTTAB(X)"{RVS}
      {7 SPACES}{OFF}{2 RIGHT}
      {RVS}{5 SPACES}{OFF}
      {2 RIGHT}{RVS}{7 SPACES}
      {OFF}{2 RIGHT}{RVS}
      {2 SPACES}{OFF}{6 RIGHT}
      {RVS}{5 SPACES}{OFF}"
XC 100 PRINTTAB(X)"{RVS}
       {7 SPACES}{OFF}
       {2 RIGHT}{RVS}
       {5 SPACES}{OFF}
       {2 RIGHT}{RVS}
       {7 SPACES}{OFF}
       {2 RIGHT}{RVS}
       {2 SPACES}{OFF}
       {6 RIGHT}{RVS}
       {5 SPACES}{OFF}"
MB 110 PRINTTAB(X)"{2 RIGHT}
       {RVS}{3 SPACES}{OFF}
       {5 RIGHT}{RVS}
       {3 SPACES}{OFF}
       {5 RIGHT}{RVS}
       {3 SPACES}{OFF}
       {4 RIGHT}{RVS}
       {2 SPACES}{OFF}
       {6 RIGHT}{RVS}
       {2 SPACES}{OFF}"
SP 120 PRINTTAB(X)"{2 RIGHT}
       {RVS}{3 SPACES}{OFF}
       {5 RIGHT}{RVS}
       {3 SPACES}{OFF}
       {5 RIGHT}{RVS}
       {3 SPACES}{OFF}
       {4 RIGHT}{RVS}
       {2 SPACES}{OFF}
       {6 RIGHT}{RVS}
       {4 SPACES}{OFF}"
MM 130 PRINTTAB(X)"{2 RIGHT}
       {RVS}{3 SPACES}{OFF}
       {5 RIGHT}{RVS}
       {3 SPACES}{OFF}
       {5 RIGHT}{RVS}
       {3 SPACES}{OFF}
       {4 RIGHT}{RVS}
       {2 SPACES}{OFF}
       {6 RIGHT}{RVS}
       {4 SPACES}{OFF}"
SD 140 PRINTTAB(X)"{2 RIGHT}
       {RVS}{3 SPACES}{OFF}
       {5 RIGHT}{RVS}
       {3 SPACES}{OFF}
       {5 RIGHT}{RVS}
       {3 SPACES}{OFF}
       {4 RIGHT}{RVS}
       {2 SPACES}{OFF}
       {6 RIGHT}{RVS}
       {2 SPACES}{OFF}"
GK 150 PRINTTAB(X)"{2 RIGHT}
       {RVS}{3 SPACES}{OFF}
       {4 RIGHT}{RVS}
       {5 SPACES}{OFF}
       {4 RIGHT}{RVS}
       {3 SPACES}{OFF}
       {4 RIGHT}{RVS}
       {6 SPACES}{OFF}
       {2 RIGHT}{RVS}
       {5 SPACES}{OFF}"
BG 160 PRINTTAB(X)"{2 RIGHT}
       {RVS}{3 SPACES}{OFF}
       {4 RIGHT}{RVS}
       {5 SPACES}{OFF}
       {4 RIGHT}{RVS}
       {3 SPACES}{OFF}
       {4 RIGHT}{RVS}
       {6 SPACES}{OFF}
       {2 RIGHT}{RVS}
       {5 SPACES}{OFF}"
DK 170 PRINT"{HOME}"TAB(13)"
       {WHT}COPYRIGHT 1989":PR
       INTTAB(7)"COMPUTE! PUBL
       ICATIONS, INC."
BR 180 PRINTTAB(11)"ALL RIGHTS
        RESERVED"
JE 190 PRINT"{20 DOWN}"TAB(7)"
       HIT A KEY TO CONTINUE D
       EMO{HOME}"
MC 200 RETURN
BB 210 SYS49185:POKE198,0:WAIT
       198,1:GETA$
CD 220 RETURN
JH 1000 REM BACKDROPS ML
BQ 1010 FORU=49152TO49272:READ
        Q:POKEU,Q:CK=CK+Q:NEXT
CK 1020 IFCK<>14738THENPRINT"E
        RROR IN DATA":END
HR 1030 FORT=50000TO50000+254S
        TEP2:POKET,0:NEXT
BH 1040 DATA120,169,127,141,13
        ,220,169,1,141,26,208,
        169,40,141,18,208,169,
        27
BM 1050 DATA141,17,208,169,81,
        141,20,3,169,192,141,2
        1,3,88,96,173,18,208
QG 1060 DATA201,38,208,249,173
        ,17,208,73,16,141,17,2
        08,96,120,169,49,141,2
        0
HM 1070 DATA3,169,234,141,21,3
        ,169,240,141,26,208,16
        9,129,141,13,220,173,1
        20
SF 1080 DATA195,141,32,208,141
        ,33,208,88,96,169,1,14
        1,25,208,174,18,208,22
        4
DH 1090 DATA0,240,20,189,80,19
        5,141,33,208,141,32,20
        8,232,232,142,18,208,1
        04
HR 1100 DATA168,104,170,104,64
        ,169,40,141,18,208,76,
        49,234
CE 1110 RETURN
QH 1120 REM LASER BACKDROP
BH 1130 FORT=50000TO50000+254S
        TEP2:POKET,0:NEXT
QJ 1140 FORT=50000+40TO50000+4
        0+214STEP2
EX 1150 FORD=0TO7:POKET,6:T=T+
        2:NEXT
BC 1160 POKET,14:T=T+2
QG 1170 POKET,3:T=T+2
HB 1180 POKET,1:T=T+2
ME 1190 POKET,3:T=T+2
QH 1200 POKET,14
AQ 1210 NEXT
RR 1220 RETURN
RK 1230 REM LINE BACKDROP
JE 1240 X=0:FORT=50000TO50000+
        254STEP2:POKET,0:NEXT
BB 1250 FORT=50000+40TO50000+4
        0+214STEP2
KX 1260 POKET,5:T=T+X:X=X+2:NE
        XT
XB 1270 RETURN
SJ 1280 REM PLANK BACKDROP
QQ 1290 FORT=50000TO50000+254S
        TEP2:POKET,0:NEXT
ED 1300 FORT=50000+40TO50000+4
        0+214STEP2
AA 1310 FORD=0TO4:POKET,11:T=T
        +2:NEXT
MK 1320 POKET,0:T=T+2
CP 1330 POKET,12:T=T+2
KA 1340 POKET,15
HG 1350 NEXT
GH 1360 RETURN
```

Triple Search

Article on page 28.

```
SE 10 REM COPYRIGHT 1989 COMPU
      TE! PUBLICATIONS INC., A
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CS 20 DATA169,160,133,252,169,
      222,133,254,169,0,133,25
      1,133,253,160,0,177
JJ 30 DATA251,145,251,177,253,
      145,253,136,208,245,230,
      252,230,254,208,237,96
MR 40 FORT=49152TO49185:READA:
      POKET,A:NEXT
SS 50 SYS49152:POKE59639,7:POK
      E1,PEEK(1)AND253
QP 60 POKE53280,11:POKE53281,0
      :POKE646,3:PRINT"{CLR}"T
      AB(9)"N{20 Y}M"
RK 70 PRINTTAB(6)"*****O{16 Y}
      P*****"
RS 80 PRINTTAB(3)"********{G}
      {2 SPACES}TRIPLESEARCH
      {2 SPACES}{M}********"
AD 90 PRINTTAB(6)"*****L{16 P}
      @*****"
MM 100 PRINTTAB(9)"M{20 P}N"
PE 110 PRINT"{DOWN}"TAB(3)"COP
       YRIGHT 1989 COMPUTE! PU
       BL., INC."
KK 120 PRINTTAB(11)"ALL RIGHTS
        RESERVED"
AD 130 PRINT"{2 DOWN}WHAT KIND
        OF SEARCH DO YOU WISH
       {SPACE}TO{6 SPACES}CREA
       TE?"
```

```
KX 140 PRINT"{DOWN}1) WORD-SEA
       RCH":PRINT"2) NUMBER-SE
       ARCH":PRINT"3) PICTOGRA
       M-SEARCH"
MK 150 PRINT"{DOWN}CHOICE: ";
XJ 160 GETK$:IFK$<"1"ORK$>"3"T
       HEN160
SS 170 PRINTK$"{HOME}{2 DOWN}"
       TAB(12)"{16 SPACES}":C=
       VAL(K$)
FE 180 IFC=1THENK1$="WORD-SEAR
       CH":K2$="WORDS"
GK 190 IFC=2THENK1$="NUMBER-SE
       ARCH":K2$="NUMBERS"
RQ 200 IFC=3THENK1$="PICTOGRAM
       -SEARCH":K2$="PICTOGRAM
       S"
BB 210 PRINT"{HOME}{2 DOWN}"TA
       B(20-LEN(K1$)/2)K1$"
       {15 DOWN}"
KK 220 WD=80:LN=66:PRINT"
       {DOWN}HOW LARGE IS YOUR
        PUZZLE (10 -"INT(WD/2)
       "{LEFT})";:INPUTS
JH 230 IFS<10ORS>INT(WD/2)THEN
       220
XX 240 PRINT"{DOWN}HOW MANY "K
       2$" WOULD YOU LIKE TO":
       INPUT"ENTER";NW:IFNW>2*
       STHEN240
PG 250 DIML$(NW):IFC=1THEN290
BK 260 PRINT"{DOWN}WOULD YOU L
       IKE ME TO GENERATE YOUR
       {6 SPACES}"K2$" RANDOML
       Y? ";
PK 270 GETK$:IFK$<>"Y"ANDK$<>"
       N"THEN270
FA 280 PRINTK$:IFK$="Y"THEN340
CM 290 PRINT"{DOWN}ENTER YOUR
       {SPACE}"K2$" ONE AT A T
       IME.":PRINT"THEY MUST B
       E LESS THAN"S;
SQ 300 PRINT"CHARACTERS":PRINT
       "LONG."
BJ 310 FORZ=1TONW:POKE631,157:
       POKE632,157:POKE633,32:
       POKE634,34:POKE198,4
FG 320 PRINTZ;:INPUTL$(Z):L=LE
       N(L$(Z)):IFL>=STHEN310
FC 330 NEXTZ:GOTO400
FJ 340 PRINT"{DOWN}HOW MANY CH
       ARACTERS DO YOU WANT IN
        EACH "K2$"{LEFT} (1 -"
       S-1"{LEFT})";:INPUTL
QC 350 IFL<1ORL>=STHEN340
FK 360 PRINT"{DOWN}MAKING LIST
       . PLEASE WAIT..."
CH 370 IFC=2THENDD=10:D=48
PH 380 IFC=3THENDD=63:D=192
MC 390 FORI=1TONW:FORX=1TOL:L$
       (I)=L$(I)+CHR$(INT(DD*R
       ND(1))+D):NEXTX,I
RP 400 PRINT"{DOWN}WOULD YOU L
       IKE THE "K2$" PRINTED":
       PRINT"BELOW THE PUZZLE?
        ";
DK 410 GETK$:IFK$<>"Y"ANDK$<>"
       N"THEN410
EC 420 PRINTK$:IFK$="Y"THENLY=
       1
CF 430 PRINT"{DOWN}WOULD YOU L
       IKE THEM TO BE SORTED?
       {SPACE}";
KB 440 GETK$:IFK$<>"Y"ANDK$<>"
       N"THEN440
RB 450 PRINTK$:IFK$="Y"THENA=1
EG 460 PRINT"{2 DOWN}HOW DO YO
       U WANT YOUR "K2$:PRINT"
       PLACED IN THE PUZZLE?"
AR 470 PRINT"{DOWN}1) VERTICAL
       LY":PRINT"2) HORIZONTAL
       LY"
PK 480 PRINT"3) DIAGONALLY":PR
       INT"4) HORIZONTALLY & V
       ERTICALLY"
JK 490 PRINT"5) ALL DIRECTIONS
       ":PRINT"{DOWN}YOUR CHOI
       CE: ";
PE 500 GETK$:IFK$<"1"ORK$>"5"T
       HEN500
PG 510 PRINTK$:D=VAL(K$):IFD=1
       THENDD=2:GOTO560
MM 520 IFD=2THENDD=2:D=3:GOTO5
       60
BE 530 IFD=3THENDD=4:D=5:GOTO5
       60
MJ 540 IFD=4THENDD=4:D=1:GOTO5
       60
BH 550 DD=8:D=1
EK 560 PRINT"{DOWN}ENTER THE T
       ITLE FOR YOUR PUZZLE":P
       OKE631,34:POKE198,1:INP
       UTTL$
XS 570 IFLEN(TL$)>WDTHEN560
DB 580 PRINT"{DOWN}ENTER THE M
       ESSAGE TO PRINT BELOW T
       HE{4 SPACES}PUZZLE."
AG 590 POKE631,34:POKE198,1:IN
       PUTM$:IFLEN(M$)>WDTHEN5
       80
MK 600 DIMWF$(S,S):PRINT"PLEAS
       E WAIT...":GP=NW
XH 610 GP=INT(GP/2):IFGP=0THEN
       670
KX 620 F=0
RP 630 FORM=1TO(NW-GP):IFLEN(L
       $(M))>=LEN(L$(M+GP))THE
       N650
RM 640 SW$=L$(M):L$(M)=L$(M+GP
       ):L$(M+GP)=SW$:F=1
CD 650 NEXTM:IFFTHEN620
JR 660 GOTO610
XQ 670 PRINT"{2 DOWN}PLACING:
       {DOWN}"
QH 680 FORI=1TONW:PRINTL$(I):P
       L=INT(DD*RND(1))+D
HX 690 IFPL=1THENO2=-1:GOSUB79
       0
CF 700 IFPL=2THENO2=1:GOSUB790
QC 710 IFPL=3THENO1=-1:GOSUB85
       0
CJ 720 IFPL=4THENO1=1:GOSUB850
JD 730 IFPL=5THENO1=-1ANDO2=-1
       :GOSUB910
XB 740 IFPL=6THENO1=1ANDO2=1:G
       OSUB910
JX 750 IFPL=7THENO1=1ANDO2=-1:
       GOSUB910
EG 760 IFPL=8THENO1=-1ANDO2=1:
       GOSUB910
HP 770 IFI=NWTHEN980
FH 780 NEXTI
RS 790 L=LEN(L$(I))
QF 800 P1=INT(S*RND(1))+1:P2=I
       NT(S*RND(1))+1:IFP2+L*O
       2<0ORP2+L*O2>STHEN800
KA 810 FORX=0TOL-1
DC 820 T$=MID$(L$(I),X+1,1):IF
       WF$(P1,P2+X*O2)<>""ANDT
       $<>WF$(P1,P2+X*O2)THEN8
       00
AM 830 NEXTX:FORX=0TOL-1:IFMID
       $(L$(I),X+1,1)=" "THENN
       EXTX
PK 840 WF$(P1,P2+X*O2)=MID$(L$
       (I),X+1,1):NEXTX:RETURN
PD 850 L=LEN(L$(I))
FE 860 P1=INT(S*RND(1))+1:P2=I
       NT(S*RND(1))+1:IFP1+L*O
       1<0ORP1+L*O1>STHEN860
BE 870 FORX=0TOL-1
QH 880 T$=MID$(L$(I),X+1,1):IF
       WF$(P1+X*O1,P2)<>""ANDT
       $<>WF$(P1+X*O1,P2)THEN8
       60
KG 890 NEXTX:FORX=0TOL-1:IFMID
       $(L$(I),X+1,1)=" "THENN
       EXTX
QK 900 WF$(P1+X*O1,P2)=MID$(L$
       (I),X+1,1):NEXTX:RETURN
GE 910 L=LEN(L$(I))
KX 920 P1=INT(S*RND(1))+1:P2=I
       NT(S*RND(1))+1
CA 930 IFP1+L*O1<0ORP1+L*O1>SO
       RP2+L*O2<0ORP2+L*O2>STH
       EN920
QH 940 FORX=0TOL-1:T$=MID$(L$(
       I),X+1,1)
PX 950 IFWF$(P1+X*O1,P2+X*O2)<
       >""ANDT$<>WF$(P1+X*O1,P
       2+X*O2)THEN920
JC 960 NEXTX:FORX=0TOL-1:IFMID
       $(L$(I),X+1,1)=" "THENN
       EXTX
AG 970 WF$(P1+X*O1,P2+X*O2)=MI
       D$(L$(I),X+1,1):NEXTX:R
       ETURN
JG 980 PRINT"{DOWN}PRINTING TH
       E ANSWER KEY...":OPEN1,
       4:TA=INT((WD-2*S)/2)
BH 990 PRINT#1,SPC(INT((WD-LEN
       (TL$)-2)/2))TL$" KEY"CH
       R$(13)
RR 1000 FORP2=1TOS:PRINT#1,SPC
       (TA);:FORP1=1TOS
JE 1010 IFWF$(P1,P2)=""THENPRI
       NT#1,"*";CHR$(32);:GOT
       O1030
PF 1020 PRINT#1,WF$(P1,P2);CHR
       $(32);
QD 1030 NEXTP1:PRINT#1:NEXTP2
RE 1040 FORX=1TOLN-S:PRINT#1:N
       EXT:IFA<>1THEN1120
RG 1050 PRINT"{DOWN}SORTING. P
       LEASE WAIT...":GP=NW
RG 1060 GP=INT(GP/2):IFGP=0THE
       N1120
ME 1070 F=0
FE 1080 FORM=1TO(NW-GP):IFL$(M
       )<=L$(M+GP)THEN1100
JP 1090 SW$=L$(M):L$(M)=L$(M+G
       P):L$(M+GP)=SW$:F=1
HS 1100 NEXTM:IFFTHEN1070
SH 1110 GOTO1060
JM 1120 PRINT"{DOWN}PRINTING Y
       OUR "K1$"..."
AF 1130 IFC=1THENDD=26:D=65
XJ 1140 IFC=2THENDD=10:D=48
EM 1150 IFC=3THENDD=63:D=192
CP 1160 PRINT#1,SPC(INT((WD-LE
       N(TL$))/2))TL$CHR$(13)
CA 1170 FORP2=1TOS:PRINT#1,SPC
       (TA);:FORP1=1TOS
BK 1180 IFWF$(P1,P2)=""THENPRI
       NT#1,CHR$(INT(DD*RND(1
       ))+D)CHR$(32);:GOTO120
       0
ER 1190 PRINT#1,WF$(P1,P2)CHR$
       (32);
JF 1200 NEXTP1:PRINT#1:NEXTP2
CF 1210 PRINT#1,CHR$(13)SPC(IN
       T((WD-LEN(M$))/2))M$CH
       R$(13):IFLY<>1THEN1260
SC 1220 X=0
XP 1230 X=X+1:PRINT#1,SPC(INT(
       TA/2))L$(X)SPC(INT(WD/
       2)-LEN(L$(X))+INT(TA/2
       ));
QS 1240 IFX=NWTHENPRINT#1:GOTO
       1260
GX 1250 X=X+1:PRINT#1,L$(X):IF
       X<>NWTHEN1230
JC 1260 CLOSE1:PRINT"{DOWN}CRE
       ATE ANOTHER PUZZLE? ";
HC 1270 GETK$:IFK$<>"Y"ANDK$<>
       "N"THEN1270
QE 1280 IFK$="Y"THENRUN
MK 1290 PRINT"{CLR}":END
```

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BACK ISSUES

Note: Only selected titles are listed in contents for each issue

1986

February—Lexitron, Snapshot, 128 Memory Map, Disk Editor, Custom Labels
April—Turbo Copy, CP/M on the 128, Directory Filer, 128 Windows, Input Windows
June—Solarpix, Quick Key, Fontmaker, Help Screens, 64 AutoBoot Maker
July—Saloon Shootout, Budget Planner, Math Worksheet, Sound Designer 128, CP/M Public Domain Software
September—Ultrafont +, Video Jigsaw, Window Wizard, Fast File Copier, 80-Column Character Editor, DOS Window
October—Pig$ for Buck$, Ringside Karate, Menu System, 128 Sound & Music (Pt. 1)
November—Fill-64, 128 Keywords, 1526 Underliner, Turbo Format, 128 Sound & Music (Pt. 2)

1987

January—Keyword Construction Set, One-Touch Function Key, GEOS Icon Changer, CP/M: Surviving with 40 Columns
February—Collision Course, Division Worksheet, MetaBASIC 64, MetaBASIC 128, 128 DOS Wedge, 128 Sound & Music (Pt. 4)
March—Ringside Boxing, Color Craft, 128 RAM Expansion, CP/M RAM Expansion, Sprite Manager
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1988

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1989

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July—Speakers, Stereo, and MIDI Solutions; Mine Sweeper, Monster Bar-B-Q (128), Math Magic, CHR$ Graphics, Financial Planner, 1581 Directory Sorter, GEOS File Retriever

FOR ORDER INFORMATION AND FORM, SEE PAGE 73.

Corresponding monthly disks are available only for issues from January 1986 forward.

How To Type In *COMPUTE!'s Gazette* Programs

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

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

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

Special Characters

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

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

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

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

Rarely, you'll see a single letter of the alphabet enclosed in braces. This can be entered on the Commodore 64 by pressing the CTRL key while typing the letter in braces. For example, {A} means to press CTRL-A.

The Quote Mode

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

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

When You Read:	Press:	See:
{CLR}	SHIFT + CLR/HOME	
{HOME}	CLR/HOME	
{UP}	SHIFT + ↑ CRSR ↓	
{DOWN}	↑ CRSR ↓	
{LEFT}	SHIFT + ←CRSR→	
{RIGHT}	←CRSR→	
{RVS}	CTRL 9	
{OFF}	CTRL 0	
{BLK}	CTRL 1	
{WHT}	CTRL 2	
{RED}	CTRL 3	
{CYN}	CTRL 4	

When You Read:	Press:	See:
{PUR}	CTRL 5	
{GRN}	CTRL 6	
{BLU}	CTRL 7	
{YEL}	CTRL 8	
{ F1 }	f1	
{ F2 }	SHIFT f1	
{ F3 }	f3	
{ F4 }	SHIFT f3	
{ F5 }	f5	
{ F6 }	SHIFT f5	
{ F7 }	f7	
{ F8 }	SHIFT f7	

When You Read:	Press:	See:
←	←	
↑	SHIFT ↑	

For Commodore 64 Only

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

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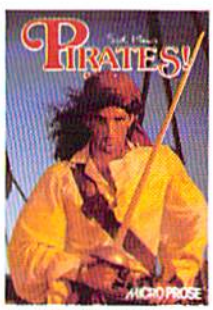

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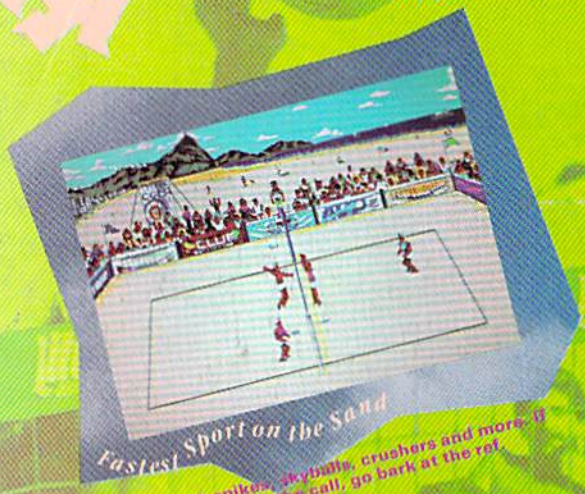

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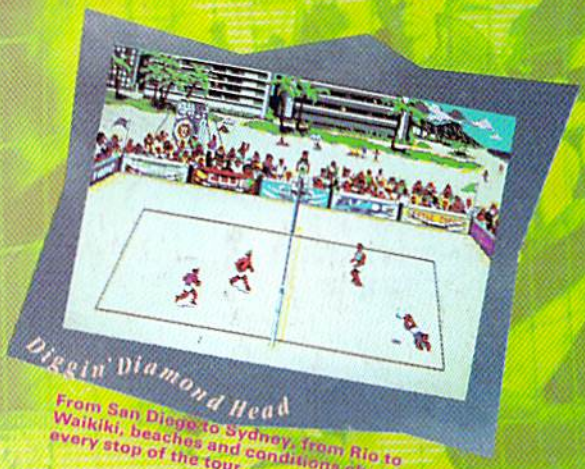

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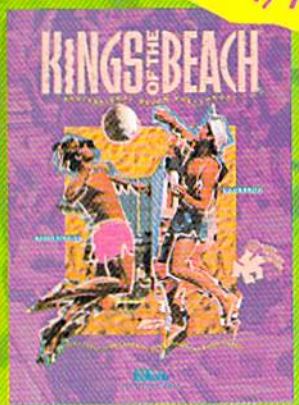

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