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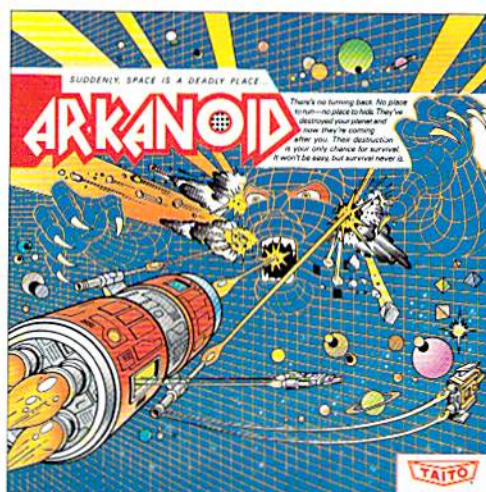
over the years, Taito has created more than 1,000 other great action games for arcade and home play.

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Taito is the arcade industry leader for a very good reason. We consistently make great video games that bring more action, thrills and value to the people who play our games. And literally millions of people play our games in arcades and homes all over the world.

Our strength comes from the massive development effort we put into creating the kind of games that satisfy the ever-growing arcade appetite and the research gathered from the more than 100,000 arcade machines Taito operates in Japan. (The money in the coin boxes at the end of the day tells you quickly if you've got



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a good game or not.) And Taito is always working hard to develop the most exciting new video games that push the technology to its limits.* We don't rest on our laurels.

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When you buy Taito games you're getting more than just fun. We bring you games that test your nerve, your skill and your strategy. Games that make you laugh and put you on the edge of your seat, games of adventure and excitement. Taito takes you on incredible mind voyages to places you've never been before—to brave new worlds of imagination and fantasy. And after all, isn't that what great video games are all about?

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editor's notes

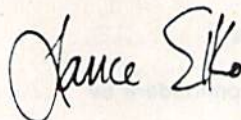
We recently returned from the Summer Consumer Electronics Show (CES), a biannual event that's billed as the world's largest trade show. Traditionally, we've run fairly extensive stories on CES, listing the dozens and dozens of new products announced at the show. This time, however, we decided to cover the new software products—there was little if anything new in the way of hardware—by reviewing some of these products in the remaining three 1988 issues, and by including others in the "News & Products" section of the magazine. (Several of the products are highlighted in this month's "News & Products," on page 68.)

In contrast with the CES shows we've covered in the past five years, this year's event was less frantic. In the computer section of the show, much of the hype was generated by videogame-machine products from Nintendo, Sega, Atari, Taito, and others. Their booths were enormous, and they drew constant attention by hosting special autograph sessions with celebrities such as Andre the Giant, Reggie Jackson, and Doug Williams. Commodore, again this year, did not appear. (The company has been focusing of late on COMDEX, a biannual business-oriented show, where its emphasis is on the Amiga line.)

However, there were dozens of 64s and 128s in most of the software publishers' booths—and each one, in quiet contrast to the hoopla surrounding the videogame machines, was demonstrating a new product.

One of these new products was GEOS 2.0. Berkeley Softworks' upgraded operating system for the 64 now combines GEOS, geoWrite, and geoSpell, and adds an upgraded deskTop and geoPaint 2.0. It includes many other new features and enhancements to version 1.3. GEOS 2.0 appears to be a major upgrade, and a thoughtful one. The demo we saw was very impressive. The result of user research and customer-service feedback, GEOS 2.0 also offers support for the 1764 and 1750 RAM Expansion units. (Look for a full review in an upcoming issue.) Its price is set at \$59.95, but the package will be available for \$29.95 to current (1.3) GEOS owners.

Speaking of GEOS, don't forget the \$25,000 GEOS Programming Contest sponsored by Berkeley Softworks and GAZETTE. We've run ads containing contest details and an entry blank in the April–August issues. The deadline for entries is August 31, so if you use GEOS and know how to program, get on your horse. We've received only a couple of entries thus far, and there are 24 prizes to be given away—cash, software, peripherals, and subscriptions to Q-Link and GAZETTE. We'll be looking for your program.



Lance Elko
Senior Editor

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ELECTRONIC ARTS®

letters to the editor

More on 128D Woes

I have a comment in response to Donald Weaver's letter in this column (July).

Last December, I purchased my first computer, a 128D, at the local Sears store. Fortunately, I also purchased an extended warranty/maintenance agreement. From December through May, I've had seven defective 128Ds, six of which had defective drives. At first, the Sears salespeople denied knowledge of any problem with any 128s that had been sold. In time, I talked to the manager of Sears customer service and got a completely different story.

I love my 128D when it works. The last one has a low serial number (000 series) and has been working like a charm for four weeks, but as every day passes, I live in fear that it will break down, too.

Commodore Customer Service representatives were less than helpful and treated me with gross indifference. Until they work out the problems, I wouldn't recommend the 128D to anyone.

P.S. The serial numbers of the bad 128Ds were 004093 and higher.

Charles E. Cross, Jr.
Flushing, MI

This is in response to Donald Weaver's letter in the July issue. It would seem unusual for Commodore to say they were not aware of problems with the 128D's internal drive. I purchased a 128D last November. When it arrived, it was impossible to load any programs. A local service dealer tested it and concluded it had a bad head.

In any event, I decided to exchange the computer for another. This one I still have. It does not work consistently either, but it gets by. I simply do not wish to give it up because I use it daily, and another service man indicated it would be at least three weeks to service, assuming Commodore would supply

the parts promptly, which he indicated they are not noted for. I wrote a detailed letter to Commodore. The only response I received was that that was too bad, but they couldn't help me.

I've heard of a fix to the head where a spring from an IBM disk drive is substituted for the spring on the read head, but as long as the computer doesn't fold completely, I just grumble to my wife and keep assuring myself that I will never buy another Commodore computer.

R. H. Schuette
Blaine, MN

We've received a large number of letters lately complaining about Commodore's customer service. For years, their track record in this area has been spotty at best. As a result, it's certain that they lose repeat customers, not to mention potential sales from disgruntled owners who discourage others from considering a Commodore machine. We hope that some of the folks at Commodore are reading this.

Commodore's PC Compatible

Last Christmas, I purchased a Commodore PC10-1 computer. COMPUTE!'s Gazette contains the names and addresses of many dealers distributing printers, software, and modems for Commodore 64s and 128s; however, I am unable to find any information regarding the availability of supporting accessories for the PC10-1.

Robert J. Zeph
Commack, NY

The PC10-1 is an IBM PC-compatible computer that Commodore distributed for several years in Europe. In 1985-1987, interest in PC compatibles as home machines swelled in the U.S. as prices dropped and more and more nonbusiness software became available. IBM PC compatibles—almost all of which use the MS-DOS operating system—abounded and are

still selling like hot cakes.

Commodore's PC10-1, introduced to the U.S. market in 1985, is one of hundreds of compatibles now on the market. What you need, then, are peripherals and software for PC compatibles (or MS-DOS machines, the term many software publishers use on packages to indicate machine compatibility). If you're looking to find mail-order products for the PC10-1, you need to pick up a magazine for the PC/compatible owner, of which there are dozens. Our sister publication—COMPUTE!'s PC Magazine—is dedicated to exclusive coverage of the PC/compatible market and includes many reviews and ads for products that support this market. Our flagship magazine, COMPUTE!, also features some PC coverage and PC mail-order ads.

Page Polemics

May I take this opportunity to tell you of something about GAZETTE that's been bugging me for a long time? It's the numbering of pages, or rather, the absence thereof. In the May issue, there are 116 pages, of which only 66 are numbered; the table of contents on page 3 (not numbered) gives the page numbers of articles, but three of the pages referred to have no numbers. Pages 19 and 21 are identical (part article, part ad), yet 19 is numbered and 21 isn't. Please number every page.

Syd Hislam
Los Altos, CA

Never say readers don't notice everything. You make some good points and certainly caught a few inconsistencies. The general rule is that all pages should have numbers except for those with full-page ads or those with fractional ads positioned on the outside bottom edge of the page. We can't make room on someone's ad for our page number, and we can't put it below the ad because it might get trimmed off at the bindery. We'll try to be more consistent in the future.

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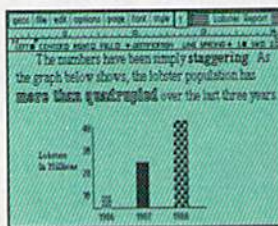
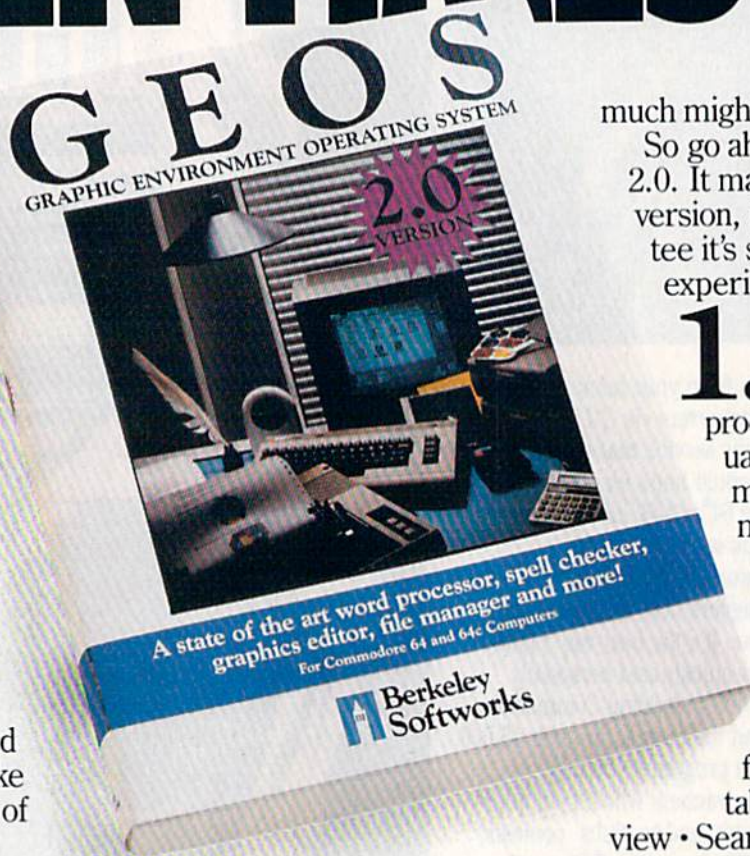
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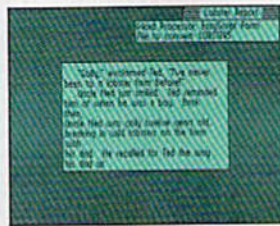
Not the kind that sends a small surge through your creativity. We're talking about major productivity power.

GEOS 2.0 is supercharged with new strengths that make it the most powerful source of integrated software your Commodore 64's ever seen. And what isn't completely new has been radically improved. In fact, we actually included other applications—products we used to sell separately—right into this package.

For example, the entire contents of geoWrite Workshop, including geoWrite 2.1™ (the full-featured word processor) have been added along with geoSpell™. And a new feature lets you mix graphics with text around any number of



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geoSpell

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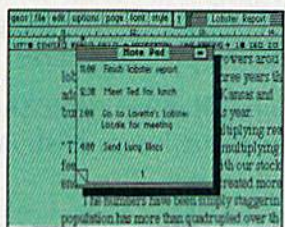
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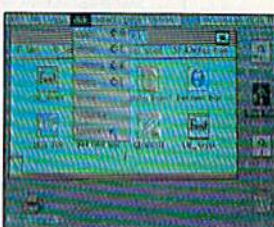


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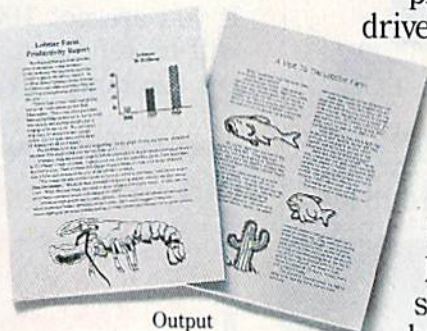


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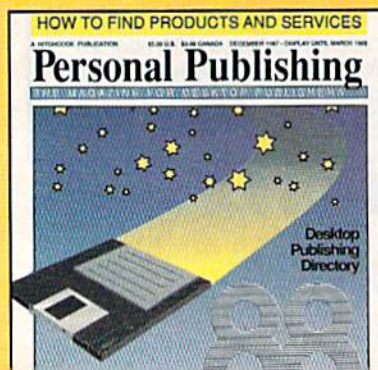
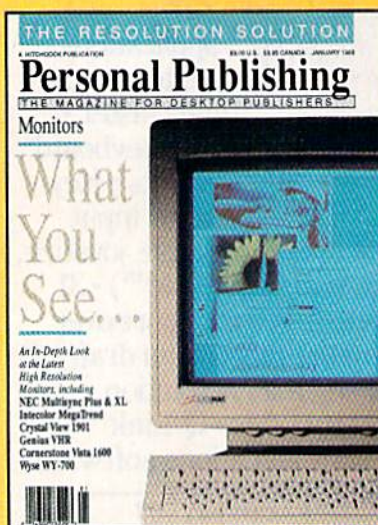
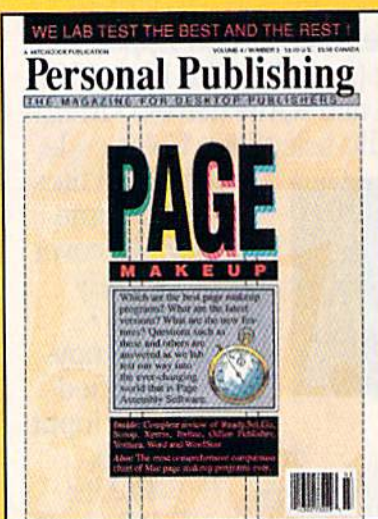
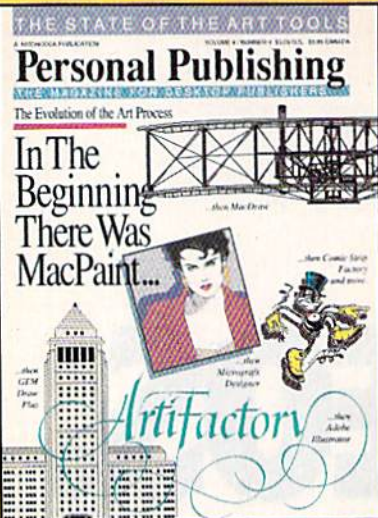
(California residents add 7% sales tax)
\$59.95 plus \$4.50 for shipping and handling.

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GEOS 2.0



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EXTRA! EXTRA!

Desktop
Publishing

Does printer's ink run in your veins? Do you have visions of becoming the next William Randolph Hearst, heading up your own publishing empire? Maybe your printing ambitions are more modest, and you'd just like to turn out a monthly newsletter to keep members of your user group up-to-date on the latest happenings. Whatever your journalistic ambitions, you may want to consider desktop publishing on your 64 or 128—at least until you buy your first newspaper.

WRITE ALL ABOUT IT!



Desktop publishing on an eight-bit computer? Better leave that to the big boys. It takes at least a Mac or a PC with a couple of gigabytes of memory. Right?

Wrong. The 64 and the 128 are like the bumblebee that doesn't know it can't fly; nobody told them that they couldn't be used for desktop publishing.

Until recently, Commodore owners could print greeting cards, banners, and simple flyers with such programs as Brøderbund's *Print Shop*, Cardinal's *Banner Machine*, and Springboard's *Certificate Maker*, but if your publishing needs were more complex, you usually had to resort to using conventional printing techniques or buying something a lot more expensive than a 64 or 128. Now, though, several full-blown desktop publishing programs are on the Commodore market, and they contain some very sophisticated features.

Conventional Printing Techniques

Before examining desktop publishing, let's take a look at some of the steps required to publish a newsletter by conventional methods. Desktop publishing can be better appreciated if you understand the mechanical process it partially eliminates.

To create a professional-looking newsletter by conventional methods takes time, a little talent, and a few dollars. Once you've decided on your newsletter's content, you have to write the copy on a typewriter or word processor and then take it to a typesetter, who will convert it into the desired type style, size, and column widths of your publication.

Before you get this far, however, you'll need a layout. You have to know what your newsletter is going to look like if you're to tell the typesetter how wide to make the columns and what fonts to use for the text and headlines. Since there are hundreds of fonts available, type styles and sizes have to be specified exactly. If you have a special requirement, such as having the text wrap around a graphic, that has to be carefully measured and specified in your layout.

Once the typesetter returns your formatted text on long strips of paper, each column has to be cut and pasted onto a board that matches your layout. Headlines, text, and captions must be carefully aligned and smoothed into place. If a story is too long or too short to fit its allotted space, you have to either change the layout, cut the text, or send additions to the typesetter.

■ Tom Netsel, Assistant Features Editor ■

Typesetters usually don't charge to correct typos or mistakes they introduce, but waiting for a correction can delay publication. If you change your mind about your layout or make a mistake with your specifications, don't expect the typesetter to do the job again at no extra charge. If you specified 48-point headlines but only have room for 36-point type, or if you suddenly decide you don't like Bodoni Book and want your article set in Garamond Roman, expect extra expense and delay.

Graphics introduce additional problems. If you want to include a photograph, it has to be sized and screened—converted to tiny dots so it can be printed. Screening requires a separate process. A simple line drawing may be pasted in place if it's the correct size, but it has to go through another process if it has texture or shades of gray or if it needs sizing.

When this *mechanical art* has been pasted in place, all the decorative lines, borders, and boxes have been added, and everything has been proofed a final time, the board

then goes to a printer for the actual printing process.

Desktop Publishing Power

Desktop publishing puts you in control of all these steps, but you don't have to be a professional printer to get good results. However, you'll still need a layout before you use any publishing program.

Most newsletters have a name that appears at the top of the front page. This banner usually stays the same issue after issue, and the number of columns in your publication usually remains constant as well. This basic layout gives you the framework on which to build each edition.

It's always a good idea to make a sketch of each page. Decide where stories begin, how much room to leave for headlines, and where you want to place any graphics. From that point, all the work is done on the computer screen.

Text is usually written on a word processor and then saved to disk. Most publishing programs let you import these text files to the

pages and columns you specify. You also can enter text directly for editing purposes and for writing captions and headlines. With some simpler programs, this is the only way to enter text into your document. Publishing programs don't work with all 64 and 128 word processors, so make sure the program you're considering supports your favorite word processor.

Importing text is easy. In most cases, you simply define a box and specify the file you want printed there. Define another box and write a headline. If you don't like a particular font, hit a few keys, and it's quickly changed. Most publishing programs offer a variety of typefaces in sizes suitable for text and headlines. Try one font, and if you don't like it, switch to another. You're never charged for overtime.

Pictures spice up any publication, and your newsletter is no exception. Popular publishing programs include an editor that lets you create your own graphics, edit commercial clip art imported from other programs, or use drawing programs such as *DOODLE!*.

Putting It to Work

Mickey McLean

Desktop publishing is making a difference in the way user-group newsletter editors communicate with their readers.

The editors are using several programs, including *The Newsroom* from Springboard, *geoPublish* from Berkeley Software, and Electronic Arts' *PaperClip Publisher*. The success of these products ensures that Commodore owners can look forward to more desktop publishing programs being released in the near future.

Straight from The Newsroom

The Milwaukee Area Commodore Enthusiasts (MACE) user group publishes a monthly newsletter for its members. Club vice president Dan Heaney uses *The Newsroom* on a Commodore 128 to produce the publication.

"Our club needed a newsletter last year, and we looked for something to do it with," Heaney says. "It [*Newsroom*] was about the only program available."

Heaney's options included printing the text from a word processor and then pasting up each page.

"Paste-up, even the little I do now, is a pain in the neck," says Heaney, who still has to paste up several advertisements to please certain clients. "Half the time, I don't feel like I'm getting it straight. Besides, I'd rather let the computer do it."

Milwaukee Area Commodore Enthusiasts THE milwaukee computer club Newsletter MARCH, 1988



MILWAUKEE AREA COMMODORE ENTHUSIASTS
P.O. BOX 26226
MILWAUKEE, WI 53226

Meetings are held on the 2nd and 4th Mondays of the month at 7:00 pm. Meetings are held at the Milwaukee Public Library, 2nd Floor, 2nd Floor, 2nd Floor.

THE OFFICERS ARE:
President: Dan Heaney (414) 445-0249
Vice Pres.: Dan Heaney (414) 445-0249
Secretary: Dan Heaney (414) 445-0249
Treasurer: Dan Heaney (414) 445-0249
At-Large: Dan Heaney (414) 445-0249

Membership dues of \$20.00 per family are payable every 12 months.

New Home for M.A.C.E. —
APRIL is the month the move to our new home is complete. We are now located at 2500 N. Lincoln Ave., 2nd Floor, 2nd Floor, 2nd Floor.

The next meetings are:
March 14 at Petroff
March 28 at Petroff

April 11 at Petroff
April 25 at Petroff

MACE is a non-profit user group with an all-volunteer staff.

CLIP OUT THE SECTION BELOW and use it to apply for new membership, offer suggestions, register complaints, submit ideas for demonstrations at meetings, special interest groups, committees, activities, nominations for officers, proxy voting, questions, or anything else you like. Send it to the address below to meet a meeting or drop it in the mailbox at the next meeting. If it is not completely or incompletely as you want — it's OK to let any item or anything you see, even anonymous submissions are better than none at all.

1. MACE, all purpose clip out form

Name _____
Address _____
Phone _____

Computer type: _____
Mail Device: _____
Printer: _____
Can save my computer? _____
I wish I could get my computer to _____
Other comments: _____

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March '83 - '88

annual elections MARCH 14

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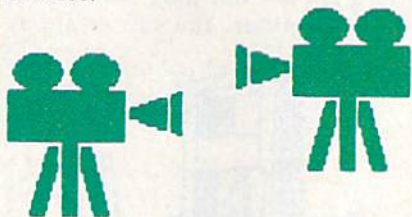
Since graphics and text can be combined so easily, place a picture almost anywhere in your layout, and the text automatically wraps around it. It's no problem if you change your mind and want to move the artwork later. Try making similar changes with conventional printing techniques, and you'll find it expensive and time-consuming.

The Newsroom

Springboard created *The Newsroom* (\$49.95) for journalists of all ages who want to create newsletters, flyers, brochures, and forms on either letter-size or legal-size paper. It's the veteran of the Commodore desktop publishing entries. While it may not have all the latest features, it's probably the easiest to use.

Each letter-size page is divided into two columns of equal size. Each column is made up of three or four panels. If you plan to print your newsletter's name, logo, or slogan across the top of the front page, this banner occupies the space of two panels. The program also prints legal-size pages.

Enter *The Newsroom* at the Picture Menu, and use a joystick to select any of six departments: the Banner, the Photo Lab, the Copy Desk, Layout, the Press, or the Wire Service.



Photos are created in the Photo Lab and then are combined with text written at the Copy Desk to make a panel. As with most desktop publishers, once you've placed a graphic on a panel, the text you add automatically wraps around it. If you later decide to move the picture, just drag it to a new position, and the text still flows around it.

The Newsroom provides five fonts in small and large sizes. Select the size and style you want, move to a panel, and begin typing. You enter headlines and text directly rather than from a word processor. The work area on the screen repre-

sents one panel. If a panel fills, save it and continue writing on another. When you have enough panels to fill a page, send them to Layout and arrange them in order; then it's off to the Press—your dot-matrix printer.

By selecting the Wire Service, you can send or receive panels, photos, banners, or complete publications via telephone and your computer's modem. Newsletter reporters and artists can upload finished panels to their editor as deadlines approach. Every contributor doesn't have to use the same type of computer as long as each person has a copy of *The Newsroom*—for example, the reporter could use an IBM, the artist could work on an Apple, and the editor could lay out and print the finished product on a 64 or 128.

The Newsroom comes with a disk filled with more than 600 pieces of clip art that are quick and easy to use. If you need more, Springboard offers two additional volumes of clip art. The ease with which *The Newsroom* handles graphics is a key ingredient to making this program a pleasure to use.

He added that a pasted-up page could easily be lost or damaged, making reprints difficult. Desktop publishing allows Heaney to access a disk and print back issues of the newsletter at any time.

The Newsroom also saves the MACE editor's time. Heaney creates a format for each page and only changes the contents each month. "I don't see the need to get too fancy with it," he notes.

For GEOS Users

Another desktop publishing program gaining in popularity is *geoPublish* from Berkeley Softworks, designed to operate with *GEOS*.

"I don't see how I did without it," says Rodney Gill, *geoPublish* user and editor of "The Interface," a newsletter for the Montgomery Area Commodore Komputer Society in Montgomery, Alabama. "I like the way *GEOS* operates."

Gill uses *geoPublish* to convert the club members' articles from several different word processing and graphics formats. After conversion, he creates a template and moves the articles into it.

Before *geoPublish*, Gill usually had to wait until all of the articles for the newsletter were submitted before he could begin to paste up the pages. This sometimes required working late into the night in order to get the newsletter to the printer on time.

"I can now do the newsletter as the articles come in and print it out a page at a time," he says. "Now the complete newsletter is finished just a couple of days after deadline."

Calendar Of Events June 1988

SUN	MON	TUE	WED	THU	FRI	SAT
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

DATES OF INTEREST

MAY 26 — TELECOM SIG - 7:00 p.m. - Held at Ron Walker's residence at 2730 B.R. Avenue. Call Roy Smith at 355-555 for more info.

MAY 31 — MACKS' Main Meeting - 7:00 p.m. Held at The Learning Arts Center on Madison Avenue next to Crapton Blvd.

JUNE 7 — MACKS' Educational Meeting - 7:00 p.m. - Same place. Ongoing classes in subjects of interest to everyone are conducted here at this time. If you want to learn about something, come and ask questions.

JUNE 7 — BASH SIG Meeting - 7:00 p.m. - Same place as Ed. Meeting. Call Edgar Wilson, SIG Leader, at 265-6720 for more info.

JUNE 8 — MACKS' Board of Directors Meeting - 7:00 p.m. - Shoney's Restaurant - Alleva Hwy. near Dandridge Shopping Ctr. This meeting is for all officers of MACKS to discuss topics of interest and concerns to the club as a whole. All members are invited to attend.

JUNE 14 — Hardware/Software Problem Solvers SIG Meeting - 7:00 p.m. - Held at various locations. Call T.J. Nelson, SIG Leader, at 351-8765 for more info.

JUNE 16 — HAM SIG - 7:00 p.m. at Dept. of Public Safety (State Troopers) Headquarters on corner of Federal Drive (AIA 21) and Coliseum Blvd. Call Al Erdman, SIG Leader, W4CNO, 272-9130 for further details.

JUNE 20 — ARMA SIG - 6:30 - 9:30 p.m. at Bldg. 823 (Pondy Simonson Quarter) AFS. Call Dave Deibel, SIG Leader, 271-4835 for further details.

JUNE 28 — MACKS' Main Meeting - 7:00 p.m. - Held at The Learning Arts Center on Madison Avenue, next to Crapton Blvd. All members are urged to attend (and bring a letter to the meeting).

JUNE 30 — TELECOM SIG - 7:00 p.m. - Meeting place to be announced later. Call Roy Smith at 355-5555 for more info.

MACHINE LANGUAGE SIG -
C128 SIG -
LACES -

MAY 1988

LOCAL BULLETIN BOARDS

Board Walk (PC Board) (3-12, 24-7) 281-9323
Hanger One (Commodore) (3-12, 24-7) 288-7284
Hot DOS & Beer (PC) (3-12, 24-7) 244-7852
Ideas Board II (IBBS) (3-12, 24-7) 277-3882
Lafayette (Commodore) (3-12, 24-7) 288-0255
Manna's Memories (Opus) (3-12, 24-7) 381-0243
Montg. PCUG (IBBS) (3-12, 24-7) 244-8969
Orient Express (Atari) (3-12, 24-7) 277-6552
Park Town (Commodore) (3-12, 24-7) 272-4077
The Queue (Wash) (3-12, 24-7) 277-6323
Smitty's Place (Wash) (3-12, 24-7) 264-0513
StarScan (sm) (Opus) (3-12, 24-7) 279-7313
Tally-Phone (Atari) (3-12, 24-7) 244-1981
The Zoo (Commodore) (3-12, 24-7) 272-4077

These are the Bulletin Board Systems in our local area. MACKS or MACKS' "The Interface" assumes no liability for the accuracy of these numbers, or whether or not they are, in fact, valid bulletin board numbers. If any of these numbers have terminated, the only way we will know it is if someone tells us so that we can strike it from the list.

THE FACES OF Q-LINK

Here are some of the Q-Link and other bulletin board symbols used on Q-Link and other bulletin boards:

() smile :• kiss
:) hug :c pout
:) wink : (frown
:(crying :D big smile

BRB Be right back
bak Back at the keys
LOL Laughing out loud!
X Not saying a word!
:P Sticking out tongue
:~ Mischiefvous smile
afk Away from the keys
OTF On the floor, laughing!

Date Fun??

MACKS' The Interface 3

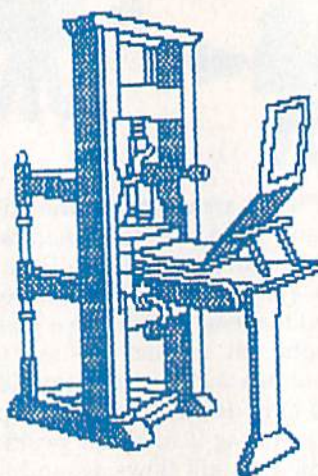
geoPublish

Berkeley Software offers *geoPublish* (\$49.95), a full-featured desktop publishing program that operates with GEOS. As with most GEOS applications, be prepared to spend some time transferring files—making work disks and backup copies before you actually start to work. A second disk drive or a RAM-expansion unit makes copying files easier and greatly increases the operating speed of *geoPublish*.

The first step in creating a document with *geoPublish* is building the master page. This is where you establish your publication's basic look. If you're putting together a newsletter, the master front page might include a banner across the top, the issue number, and perhaps the date. Inside master pages might have a line across the top and bottom, the newsletter's name in a smaller font, and page numbers. Saving master pages will speed the layout of future editions of your newsletter.

A master-page work screen has rulers across the top and side to help you position the program's

guidelines. Guidelines are dashed horizontal and vertical lines that delineate columns. These lines appear on the screen as guides for exact placement of text, headlines, and graphics, but they don't show on the printout. You can create as



many as 16 master pages, ranging in width from one to four columns. The *geoPublish* disk contains a library of sample master pages to get you started.

Once you've created a master page, it's time to start laying out

text and graphics. *geoPublish* takes files written with *geoWrite* and converts them into the fonts you want and sets the type in the column widths you specify.

If your text isn't written with *geoWrite*, the Text Grabber utility converts almost any Commodore word processor file to *geoWrite* format. If you're editing a newsletter, you can use articles from several writers using a variety of word processors without having to retype their submissions. Edit mode then lets you make text changes once you have converted the file to a *geoPublish* document.

To write original headlines or to incorporate graphics, switch to the page graphics mode. A graphic can be centered, stretched, or scaled to fit any region you define on your page. A toolbox lets you add lines, circles, polygons, or other shapes to customize your layout. You can also fill them, move them, and even place one object in front of another. This powerful mode gives you a wide selection of customizing tools and commands to fine-tune your layout.

Geoworld

There's even a magazine being put together with *geoPublish*. Self-proclaimed Commodore fanatic Roger Ledbetter also uses *geoPublish* to put together *Geoworld* (38 Santa Ynez Street, Santa Barbara, California 93103), which bills itself as the definitive magazine about GEOS.

Prior to the availability of *geoPublish*, Ledbetter produced the magazine with the *geoWrite* word processor and *geoPaint*, using overlays to create the page layout. "It took quite a bit of time to do that, along with the paste work," he says. "The overlays also required a lot of experimentation. *geoPublish* saves me about ten hours a month."

The only problem that Ledbetter encounters is the 64's hardware limitation: lack of disk space. "A 128 with RAM expansion allows it [*geoPublish*] to be used to its full potential. I prefer to use *geoPublish* with the 128 because it doesn't cramp you."

Ledbetter goes a step further to improve the look of his magazine. By printing the magazine with a laser printer, he achieves a near-typeset-quality appearance. "Nine out of ten people couldn't tell the difference," he said. "The only major difference is that it doesn't do as well in small typefaces."

Ledbetter adds that laser printing is becoming even more attractive with the release of new font libraries.

(Laser printing is available through online services such as QuantumLink. Newsletters, résumés, manuscripts, and so on can be uploaded to a print-

GEOPUBLISH GRAPHICS newsletter

By Susan Lamb

March 1988

The Paint Drivers With GeoPublish

It has come to my attention that a number of people are under the impression that the paint drivers do not work with *geoPublish*. Fortunately, for my projects, they do. Turning a *geoPublish* page into a *geoPaint* one lets you use all the individual tools of each program. If you are having trouble getting the drivers to work, you might try these two suggestions.

1. Give it time. Depending on the amount of information on the page, creating the *geoPaint* page may take a long time. There is no sound if you are working on a RAM disk and it sometimes seems like a lock-up. The arrow will flicker once in a while, which indicates the process is still working.

2. Give it space. Before you start, make sure there is plenty of space on the real disk or RAM disk. For example, a *geoWrite* page of only 3K can produce a *geoPaint* page of 37K. Obviously, multi-page documents with a large amount of type will really eat up disk space. Experimenting with the programs will let you estimate how much room to allow for.

GeoWrite Workshop Paint Drivers

Last month I touched on how the paint drivers can aid in using large, two-file fonts. *GeoWrite* allows you to alternate between the files within a line, whereas a *geoPaint* text box can only access one file at a time. Once a headline is set to your satisfaction, and one of the paint drivers is selected, a *geoPaint* document will be created. The headline may then be edited with all the *geoPaint* tools and pixel editor or imported as-is to *geoPublish* in a photo scrap.

When using *paint PAGES*, the document created is named *PAGE 1*. If your *geoWrite* document has more pages, *PAGE 2*, and so on will appear on the desktop. Before starting this procedure, make sure you have plenty of free space on the real disk or RAM disk as *geoPaint* pages use much more memory than *geoWrite* pages.

Creating with the *paint PAGES* driver is like producing photo scraps in that the new one replaces the old. To save a page you've made, rename the file before using the driver again. It is not necessary to have *geoPaint* on the disk to use the driver, but you must have *geoWrite* (or *geoPublish*) there. For speed and space, the best way to do this procedure is with a 1571 RAM disk.

Paint OVERLAY can be used several ways. A good example is to print the three-page document, "CAKE". The driver will combine all three pages into one *geoPaint* page. It is apparent

that this would be an easy way to produce a simple newsletter. (*Paint PAGES* creates three *geoPaint* pages from this document.) The *geoPaint* file created is named *OVERLAY*. Another procedure is used for creating flyers, menus or certificates. You can name a full page border "OVERLAY" and then use the driver with a *geoWrite* page. The copy will combine, transparently, with the artwork. It will take some figuring with margins to fit the copy properly, but it's still a simple procedure.

I will continue to experiment with these drivers, as I find them valuable graphics tools. Receiving them with *geoWrite Workshop 128*, took the sting out of the cost of this upgrade.

WARNING:

Since a *geoPublish* page is a little longer than a *geoPaint* one, be careful when you use the paint drivers. The bottom 1/2 inch or so on your *geoPublish* page will be cut off, so allow for the difference ahead of time.

ENTER THE GEOS DESKTOP PUBLISHING CONTEST!

I will be happy to assist you with your entries. Although I am still new using this program I might be able to help with simple problems or direct you to someone who has answers to the more technical questions.

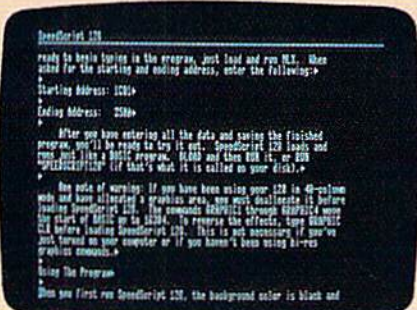
CORRECTION:

It has been brought to my attention by J. Hastings and Paul Hughes that my prior assertion of the 128 photo manager not working in *geoPublish* is wrong. My mistake was due to the frustrating incompatibility of my 64 programs with my GEOS 128. All my programs are compatible now and a full page created in *geoPaint* can be moved to *geoPublish* in five photo scraps. You still must use *geoPaint 128* in 80 columns to create the full-page-wide scraps to store in an album. From within *geoPublish*, you may use either 64 or 128 photo manager to create the bitmaps. Thanks, guys.



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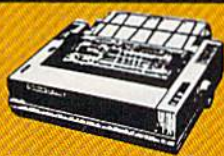


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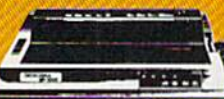
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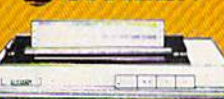
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If you have Berkeley's *Desk Pack 1*, you can use its Graphics Grabber utility to import graphics from *Print Shop*, *Newsroom*, and *PrintMaster*.

Personal Newsletter

Personal Newsletter (\$49.95), from Softsync, comes with two disks: the Master, which contains sample newsletters and 70 pieces of clip art, and a Clip Art Disk filled with an additional 200 business and miscellaneous drawings.

Softsync's *Personal Newsletter* (\$49.95) isn't a stand-alone program, but is designed to be used with GEOS. If you're already familiar with geoPaint and geoWrite, then you should have no trouble learning to use *Personal Newsletter*. You can use a joystick, mouse, graphics pad, or lightpen as an input device, just as you would with other GEOS applications.

After booting with GEOS, you should make several *Personal Newsletter* work disks before you begin your newsletter. When you're ready to start, a basic work screen appears

with rulers across the top and down the left side of the screen. These help you lay out and align the "windows" you create for your text and graphics. As many as 20 windows can be used on a single page.

As with all newsletters, it's best to sketch a basic layout on paper before you sit down at the computer.



Once you've blocked out the number of columns you want and where you want your graphics, define similar windows on the screen. Stretch these windows to any size and move them to duplicate the layout you made on paper.

When you're ready to enter text, you can use any of the fonts offered with geoWrite, or you can import others if you have *Fontpack*. Click on the font window at the top of the screen, and a list of fonts and their point sizes appears. Click on your choices and then move to the desired window and start typing.

Personal Newsletter wraps text automatically to fit your window. It also wraps text around graphics. In addition, it lets you select italics, bold, underlined, or reversed type styles.

The work screen is 80 columns wide, so you'll have to scroll to see your whole page. A handy preview feature shrinks the page so you can see how your layout looks as your work progresses. Once you've created a few windows, it's best to check your design. Windows are easier to change and move before you fill them with text and graphics.

You can design your own graphics with geoPaint, use the clip art that comes with *Personal Newsletter*, or import *Print Shop* graphics. You can even use digitized art if you have a video camera and a digitizer such as *ComputerEyes*. *Personal Newsletter* comes with three utility programs you can use to import and customize existing graphics.

When it comes time to print, click on the print menu and confirm it by clicking on the OK block. Be sure you've installed the GEOS driver for your printer on your work disk.

ing company, printed, and mailed back to you within a few days.)

New Kid on the Block

One of the newest desktop publishing programs on the market is Electronic Arts' *PaperClip Publisher*. FORCE, (the Fundy Organization for Commodore Enjoyment) in Saint John, New Brunswick, Canada, has acquired *PaperClip Publisher* to produce its newsletter, "The Users Port."

"It's very flexible, easy to use, and can handle a wide variety of graphics," says Anne Magee, who publishes the newsletter. She notes that it didn't take her long to do paste-up before using *PaperClip Publisher*, but she never attempted anything fancy.

"It takes longer to do [with *PaperClip Publisher*], but it looks much better," she says. "If I were still pasting it up and tried to make it look like it does now, it would take even longer."

Magee likes the way the program converts files downloaded from bulletin board services or from most word processing programs. While the program can be operated with a joystick, Magee finds smoother control is achieved through the use of a mouse.

Like her colleagues, she has learned to live with the 64's limitations. "It's slow and requires a lot of disk access," she says. Nonetheless, Magee is pleased with the results she achieves. "It is amazing to do this with a 64. A few years ago, it would've seemed impossible."

A New Member by Bill Gaudet

As one of the newer members of your Commodore club, I would like to try to tell you about my first two meetings that I attended, and what help I have been able to obtain from them.

I started work on my computer in December of 1987. The first few times were a disaster, believe me. Of course at that time I only had the keyboard, so I think some of you may be able to relate to that! Shortly after I got my disk drive and printer. It was around this time I was fortunate to meet Bill, Joe & Doug at Astron Software who showed me the basic steps around the wonderful world of computers. I believe it was Joe that first told me about your club. He explained all the good things you do for your members.

Needless to say I didn't heed his advice right away. I stayed home to try and do things for myself and soon found out just how stupid this could be.

It was on the advice of Joe from Astron that I got a modem. There I found a B.B.S. board with your club application on it.

This time I called Roy Greer and said in a calm voice "HELLO". And help was there for a stranger he had never met. Then it was my great pleasure to meet with Linda Friars who volunteered to come to my home to assist me in my endeavor to learn more about computing.

She took of her free time

to come to my home and do this for me. That is when I decided to join your club. I thought if your club members are kind enough to do this for me it must be some kind of friendly club.

Believe me when I say I was not disappointed when I attended my first meeting. I was treated great by everyone. When some found out it was my first time there they went out of their way to make me feel welcome.

My first night was look and listen sort of night for me. Of course it also was time for my first contest session that I won four floppy disks. Of course I cheated a little by listening to three other people give wrong answers and putting it together answered correctly.

I was shown your wonderful library of books and disks that came in real handy on my second visit.

My next meeting I met more of your fine members, and watched your second round contest. It was fun to see so many having such a good time. It was more fun to see Anne Magee teach the guys how to play the game.

In conclusion if all my evenings are spent as good as my first two I would say you should be very proud to have people like Roy Greer, Linda Friars, Gordon Emmerson and the rest of your fine committee run your club. And I would be in error not to mention the three men who started me out -- THANKS Joe, Doug & Bill. I will always remember your kindness.



Important

We have received word from the Aiken Bicentennial Centre that they are going to charge us \$15.00 per meeting starting in July. Please attend the meeting on May 26 to discuss what we are going to do about this.

**PaperClip
Publisher**

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PaperClip Publisher

Outrageous Pages was Electronic Arts' desktop publishing entry, but it was discontinued when *PaperClip Publisher* was released. For the price (\$49.95) and the number of sophisticated features it offers, this publishing program is hard to beat.

Its work screen is similar to that of other publishing programs in that rulers at the top and side of the screen help you accurately position columns, headlines, and graphics.

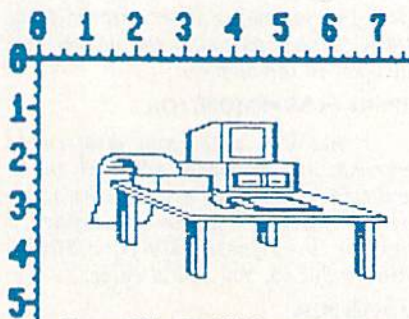
Eighteen icons on the right of the screen represent tools that give you exceptional control of your layout. Simply move the cursor with a joystick or mouse and then click on an icon to activate it. When it comes to designing a layout, you can have as many as 15 columns of text on one page.

Once you've laid out your page, draw a box where you want the copy to appear and "pour" in the text from a number of word processors. Text flows into the box in a process that resembles the way the fill command works on drawing programs. You can link several boxes together on the same or different pages if you need more space for your text. *PaperClip Publisher* accommodates documents ranging in length to a maximum of 50 pages. You can convert word processing files from the *PaperClip* series, *Bank Street Writer*, *Word Writer*, or *Paper-Back Writer*.

A straightforward text editor lets you create text right on the page if you prefer to type text directly. Don't worry about the format as you enter text. If a word breaks at the end of a line, don't change it. It will be formatted properly when you pour the copy into a text box. The editor includes a handy *find* function that will search a document for a specific string. You can embed as many as 13 different style codes in a document to put words in italics, underline them, reverse them, or have them print out in subscript or superscript mode, to name a few options.

When laying out text, you can justify it, center it, or have it printed flush left or flush right. Another sophisticated feature lets you adjust the amount of *leading*, or space between lines. Such fine-tuning isn't normally found on programs in this price range.

PaperClip Publisher comes with its own limited supply of clip art, but you can draw your own or convert graphics files from *Print Shop*, *PrintMaster*, *Outrageous Pages*, and *DOODLE!*. The manual notes that you can use graphics from *The Newsroom*, but the file converter apparently cannot read *The Newsroom* directory. You can change the size of graphics, expanding or shrinking them to fit your layout, and a graphics editor lets you draw your own. You can modify graphics, print in them reverse, or even turn them upside down.



PaperClip Publisher supplies a number of clear, well-defined fonts, including a Greek-symbol font for use with scientific and mathematical expressions. There's even a Sideways font if you want to print text rotated 90 degrees. If you need more fonts, a converter program allows you to import them from GEOS or *Outrageous Pages*. Text can be printed in reverse, italics, bold, and other styles. It can even be printed upside down, which is useful for printing folded greeting cards.

Jazz up your layout with a variety of borders, textured backgrounds, transparent and opaque boxes, and drop-shadow effects. Most of these effects and special tools are available onscreen or from easy-to-use pull-down menus.

Drawbacks

While desktop publishers provide you with a number of powerful printing tools, they do have limitations. Even if your printer has a near-letter-quality mode, text printed on a nine-pin dot-matrix printer can't compete with the quality offered by commercial printers. For truly professional applications, you may hesitate to release work printed on a nine-pin.

A 24-pin printer is better, but none of the programs have drivers to support them. You may find a

printer driver and interface combination that works with a 24-pin printer, but you'll have to experiment. The best results are available to desktop publishers who own or have access to a laser printer. You can use one to print *geoPublish* and *Personal Newsletter* documents since GEOS supports the Hewlett-Packard LaserJet printer. Online services such as QuantumLink can also give you access to laser-printing services.

Printing can also be rather slow, depending on which printer you have. One test page with several graphics took almost half an hour to print on a 1526. If you want to send copies of your newsletter to 100 members of your club, take your master copy to a duplicating machine or commercial printer for the other 99 copies. Actually, duplicating often improves the look of computer-printed documents by rendering the text darker.

As with any new skill, it takes time to master desktop publishing. Until you become completely familiar with each step of your publishing program, you may find it takes longer to create a newsletter on a computer than it does using conventional methods. Be prepared for a lot of disk swapping. This is especially true of the GEOS-based packages, with their numerous file- and graphic-handling utilities.

Finally, desktop publishing on your 64 or 128 may not turn you into a publishing magnate overnight, but these programs can put the power of the press in your hands even if you're on a shoe-string budget. Then, who knows what will happen after your first edition hits the streets? Even Joseph Pulitzer had to start someplace.

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

Television, Computer Style

I have been wondering if there is any way that I can convert my Commodore 1702 monitor into a color TV. I'd still like to be able to use it as a monitor for my 64, too.

Jameson K. Dedon
Westfield, MA

Computer monitors closely resemble televisions, and the relationship between the two is more than skin deep. In fact, composite video monitors are little more than televisions with the television tuner removed.

Over the years, many companies have sold TV tuners specifically designed to turn color monitors into full television sets. The tuner is commonly a small box with a channel-selection dial. Tuners typically cost less than \$100. Look for ads that frequently run in this magazine.

You may already have a tuner: your VCR. A computer monitor and VCR go together like hand and glove. Your VCR has a tuner, but no picture tube. Your monitor has a picture tube, but no tuner. To connect the two, you'll need a cable with two male RCA connectors. Plug one end into the composite output of your VCR, the other into the composite input on the front of your monitor. Change channels with the VCR tuner. If your 64 is hooked up through the rear connections of the monitor, you can easily switch between television and computer with the front/back selection switch on the back of the monitor.

128 ML Printouts

I have been looking for a screen-dump program that will allow me to print out hardcopies of my machine language monitor listings on the 128. Do you know of such a routine?

Jim Muller
Binghamton, NY

You don't need a special routine for this; the capability to redirect output to another device is built into all eight-bit Commodore computers. To disassemble to your printer rather than to the screen, just make the printer the current output device. The following line, entered from BASIC, directs output to the printer and puts you in the monitor:

OPEN4,4:CMD4:MONITOR

Henceforth, when you disassemble your machine language code (with the D command), the output is sent to the printer. For instance, suppose you wanted a copy of the disassembly from \$0C00 through \$0C36. You would enter

D 0C00 0C36

from within the monitor.

When you finished printing, you'd exit the monitor with X and then type

PRINT#4:CLOSE4

to restore output to the screen.

Alphabetizing a SpeedScript Name List

I am a beginning programmer who is having lots of problems. I'm trying to write a program to alphabetize a list of names. The names are kept in a SpeedScript file with their telephone numbers next to them. Can you suggest a way to do this?

Ken Davis
Baltimore, MD

The BASIC program below sorts a list of names stored in a SpeedScript text file. It consists of three subroutines. The first, beginning at line 7000, reads in the SPEEDSCRIPT file. The second, at line 8000, performs a merge sort on the names. And the third, at line 9000, creates a SPEEDSCRIPT file containing the names in alphabetical order.

```
SX 10 REM MX IS MAXIMUM ARRAY
    {SPACE}SIZE
MH 20 MX=15:DIM NS(MX),A(MX),B
    (MX)
CD 30 REM AS() IS ONLY NEEDED
    {SPACE}IF YOU WANT SORTED
    D STRINGS STORED IN AN A
    RRAY
JR 40 DIM AS(MX)
BA 50 GOSUB 7010:GOSUB 8010:GO
    SUB 9010:END
```

```
DQ 6999 REM
PF 7000 REM READ IN NAMES INTO
    NS ARRAY
AF 7010 INPUT"ENTER NAME OF FI
    LE TO SORT";FS
KH 7020 OPEN 2,8,2,FS:NN=0
GK 7030 REM TWO BYTE FILE HEAD
    ER
CE 7040 GET#2,AS:GET#2,AS
JS 7050 GET#2,AS:IF ST<>0 THEN
    7110
DM 7060 REM 31 '4' IS CARRIAGE
    RETURN
XC 7070 T=ASC(AS+"@")
XJ 7080 IF T=31 THEN NA=NN+1:I
    F NN>MX THEN PRINT"ARR
    AY NOT LARGE ENOUGH":G
    OTO7120
GB 7090 NS(NN)=NS(NN)+AS:NN=NA
BR 7100 GOTO7050
RE 7110 NS(NN)=NS(NN)+CHR$(31)
HX 7120 CLOSE2:RETURN
QS 7999 REM
PM 8000 REM DO A MERGE SORT
DA 8001 REM CALL WITH STRINGS
    {SPACE}IN NS()
RR 8002 REM NN IS NUMBER OF ST
    RINGS
BJ 8003 REM SORTED POINTERS ST
    ORED IN B()
GJ 8010 IF NN=<0 THEN PRINT"NO
    NAMES HAVE BEEN LOADE
    D (NN)":RETURN
QE 8020 FOR I=0 TO NN:A(I)=I:N
    EXT
BA 8030 SIZE=1:A=0:PRINT"SORTI
    NG..."
MG 8040 P1=A:P2=A+SIZE:PB=A:MP
    =A+SIZE*2:IF MP>NN THE
    N MP=NN+1
KB 8050 IF P2>=MP THEN FOR I=P
    1 TO A+SIZE-1:B(PB)=A(
    I):PB=PB+1:NEXT:GOTO 8
    120
FM 8060 IF NS(A(P1))<NS(A(P2))
    THEN B(PB)=A(P1):P1=P
    1+1:PB=PB+1:GOTO 8100
AC 8070 B(PB)=A(P2):P2=P2+1:PB
    =PB+1
AC 8080 IF P2>=MP THEN FOR I=P
    1 TO A+SIZE-1:B(PB)=A(
    I):PB=PB+1:NEXT:GOTO 8
    120
MD 8090 GOTO 8060
CB 8100 IF P1>=A+SIZE THEN FOR
    I=P2 TO MP:B(PB)=A(I)
    :PB=PB+1:NEXT:GOTO 812
    0
ED 8110 GOTO 8060
SA 8120 A=A+SIZE*2:IF A>=NN TH
    EN 8140
JD 8130 GOTO 8040
XS 8140 FOR I=0 TO NN:A(I)=B(I)
    :NEXT
MQ 8150 SIZE=SIZE*2:IF SIZE>NN
    THEN 8180
JF 8160 A=0:GOTO 8040
MF 8170 REM REMOVE THE REM IN
    {SPACE}8180 TO PUT SOR
```


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A number of important BASIC routines, including the error handler, vector through a jump table in RAM. Before BASIC prints an error message, it uses location 768 (in both the 64 and the 128) for the address of the error-handler routine. Normally, the two-byte pointer at 768 directs BASIC to the ROM routine that displays the appropriate error message, such as SYNTAX ERROR, ILLEGAL QUANTITY ERROR, and so forth. But since the error vector is in RAM, you can substitute the address of your own error-message routine in place of the standard one.

For example, when you type in BASIC programs having many numeric DATA statements that are POKEd to memory, you'll frequently get an error that's difficult to pin down. If you accidentally include a number higher than 255 and run the program, you'll get the error message ?ILLEGAL QUANTITY IN LINE xx. But the line given as xx is the one containing the READ statement rather than the one with the errant data. The READ works just fine (it's legal to READ numbers greater than 255), but the POKE causes the problem.

The short program below, taken from COMPUTE! Books' Machine Language Routines for the 64 and 128, solves this problem. Ordinarily, the error vector at 768 points to a routine that prints either a BASIC error message or the READY prompt. Using the .X register, this routine locates the error message in a table within BASIC and then prints it. If you're in program mode, the number of the line that's currently being executed is taken from CURLIN (location 57 on the 64; location 59 on the 128) and is printed as well.

```

;Custom error handler
;
DATLIN = 63          ;use DATLIN = 63 on the 128
                     ;current DATA line
CURLIN = 57          ;CURLIN = 59 on the 128
                     ;current BASIC line
ERRNOR = 58251       ;ERRNOR = 19775 on the 128
                     ;normal error-service routine
;
;First, redirect 2-byte error vector at 768 to EWEDGE
ERRRDT LDA #<EWEDGE ;low byte first
        STA 768
        LDA #>EWEDGE ;then high byte
        STA 769
        RTS
;
;Upon entry, .X contains the error
;number. We let the system handle all
;errors except the illegal quantity
;error (error 14).
;Is it an illegal quantity error?
;If not, exit through the normal
;error handler. Otherwise, substitute
;the current data line for the
;current BASIC line.
;low byte first
EWEDGE CPX #14
        BNE EXIT
        LDA DATLIN
        STA CURLIN
        LDA DATLIN+1
        STA CURLIN+1
        JMP ERRNOR ;and execute the normal error handler
EXIT

```

Here, ERRRDT changes the error vector to point to a custom error handler at EWEDGE. If an error other than an illegal quantity error occurs (.X <> 14), normal error handling will result. But if .X contains a 14 upon entry into EWEDGE—meaning an illegal quantity has occurred—the current DATA line number (DATLIN) will be stored into the current BASIC line (CURLIN) before the normal error handler executes. And so, in our example above, instead of telling us that the error occurred in the line with the READ statement, with this routine in place, BASIC reports the actual DATA line containing the typo.

Of course, this routine fails to distinguish among the many possible sources of illegal quantity errors. If your program contains a POKE 251,257, for instance, the error message that results will erroneously point you to the last DATA line that was read. Because of this, you should limit the use of this wedge to BASIC programs that contain many numeric DATA statements—primarily BASIC loaders of machine language object code.

The programs below are BASIC loaders—for the 64 and 128, respectively—containing the above machine language routine in DATA statements. To install the custom error handler in your

computer, just enter the appropriate version and type RUN. Both programs require only 26 bytes. The 64 version resides at location 49152, and the 128 version, at 4864.

64 Version:

```

FH 10 REM 64 VERSION
BF 20 FORI=49152TO49152+25:READA:POKEI,A:X=X+
A:NEXT
QJ 30 IFX<>2660THENPRINT"DATA STATEMENT ERROR
":STOP
ER 40 SYS49152
DE 50 DATA 169,11,141,0,3,169,192,141,1,3
JF 60 DATA 96,224,14,208,8,165,63,133,57,165
EM 70 DATA 64,133,58,76,139,227

```

128 Version:

```

HA 10 REM 128 VERSION
GE 20 BANK15:FORI=4864TO4864+25:READA:POKEI,A
:X=X+A:NEXT
SE 30 IFX<>2269THENPRINT"DATA STATEMENT ERROR
":STOP
GX 40 SYS4864
EP 50 DATA 169,11,141,0,3,169,19,141,1,3
FM 60 DATA 96,224,14,208,8,165,65,133,59,165
HX 70 DATA 66,133,60,76,63,77

```

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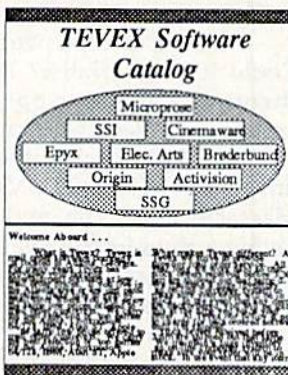
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Fred D'Ignazio
Contributing Editor

I was in Palenque, a mysterious Maya ruin hidden deep inside a steaming tropical rain forest on the Yucatán Peninsula in Central America. I climbed the steep, crumbling stone stairs of Palenque's ancient temple. At the top I paused, panting, sweating, my pulse throbbing in my ears. As I looked out across the undulating jungle canopy, I heard the shrieks of howler monkeys. I longed to throw myself into the cool, bubbling waterfall I heard somewhere near the temple.

But I couldn't stop. My best friend had been brutally murdered. And it was up to me to find the killer. My instincts told me that he (or she?) had fled to the tomb of Pacal, Palenque's greatest ruler. But the tomb lay buried in the ruins, protected by winding mazes, steep cliffs, and creepy, crawly things I couldn't see in the murky jungle twilight.

I heard a clapping sound. Could it be the killer? I squeezed through a narrow passageway around a carved stone, and...

And I was back in the auditorium at Lesley College, in Cambridge, Massachusetts. The audience was giving a thunderous ovation to Dr. Kathleen Wilson, who had just finished her Palenque presentation as part of Lesley College's tenth annual Computers in Education conference.

Into the Jungle

Kathy's demonstration was stupendous, the technology unbelievable. As part of the new "Voyage of the Mimi" TV series and multimedia learning package produced by the Bank Street College in New York, Kathy had taken four film crews into the Yucatán jungle, where they shot enough footage to create an interactive videodisc. Now linked with a computer and a joystick, the

disc has become a magic carpet. A family can sit in its living room in Midland, Michigan, and instantly be transported thousands of miles to Palenque, one of the most remote and mysterious places in the Western Hemisphere.

You land in Palenque as if you were swooping in on a glider from above the ruins. (They used a glider to capture some breathtaking aerial shots of the site.) You navigate your way through the buildings by moving the joystick. Everything is 3-D. You move the joystick forward, and you move forward; right, and you turn right. At selected points you can look up at the sky and down at your feet. The process of 3-D visuals, jungle sound effects, and self-controlled movement convinces your imagination that you are somehow really there.

But as I watched Kathy demonstrate Palenque, I couldn't help thinking that what she was giving us was not the kind of trip a child would love. Something was missing. Kathy took us through the ruins at a slow, leisurely pace, like a good tour guide, stopping frequently to point out things that adults think are educational and that children find boring. I had the sudden urge to wrestle the joystick from her and jam it forward. Instead of walking, I wanted to *run* about 60 miles per hour through Palenque, hopping over huge stones and leaping across pits.

Then I saw the problem. Kathy was presenting Palenque in "browse" mode. We were browsing through Palenque as if it were a huge museum, and we were careful not to upset any of its ancient dust.

What we needed was a good murder. Some drama, excitement. Something to really capture kids' interest. I told Kathy this after her speech. To my surprise, she smiled and told me to come to her Bank Street office to see what she was

currently working on.

Three weeks later I was in New York City at Kathy's office. This time I got a hands-on demonstration. And I was impressed. As part of Kathy's ongoing research using Palenque as a learning tool, she has organized teams of students to do different tasks. All of the teams use the Palenque videodisc as raw material for team productions. A team of Explorers go on expeditions as if they were jungle archaeologists. A team of Treasure Hunters try to find hidden treasure and then write up their experiences as eyewitness reporters would. Members of the third team (my favorite), the Movie Makers, make movies about Palenque using the audio, video, and computer graphics from the videodisc. Their movies, ranging from 2½ to 20 minutes long, are documentaries targeted at other kids their age.

Medium of the Future

After only two hours with Kathy at Bank Street, I came away with more appreciation for the new DVI (Digital Video Interactive) technology invented by GE/RCA's David Sarnoff Research Center. Sarnoff engineers have created a custom (VLSI) chip set that goes into a personal computer. These chips control a CD-ROM player to call up full-motion digitized video, 3-D motion graphics, and hi-fi digitized audio.

I also began to understand the real journey Kathy and her associates are making. It goes far beyond a visit to a Maya ruin. Kathy's work, I now see, is paving the way for us to fully exploit the potential of multimedia computing in the 1990s. At that time, using optical disks, we'll have access to video images, sounds, music, voices, text, animated graphics, and more. Kathy and other multimedia pioneers are showing us how we will someday navigate this medium. ☐

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Deja Vu

The graphics-and-text adventure has been a staple of the computer gaming market practically from the beginning. *Wizardry*, *Bard's Tale*, *Amazon*, *Perry Mason*, *The Pawn*, *Faery Tale Adventure*, *Questron*, and a host of others make up the history, with each game emphasizing something slightly different. Despite this rich history, it is the rare game that merges text and graphics effectively. Most choose to hang a bit of text on a predominantly graphics orientation or to offer pictures that correspond to the situation in the text. Putting the two together has been the hard part.

This is the challenge that ICOM Simulations set for itself in 1985. Its first effort, designed for Apple's then-new Macintosh, was a detective adventure called *Deja Vu*. It was designed to give players a graphics interface to interact with the picture on the screen while a text window explained what was happening and offered descriptions of rooms and items. Partly because good Mac games were rare at the time, and partly because it was simply a very good game, *Deja Vu* became very popular very quickly.

Since then, Mindscape has released two similar products: *The Uninvited* and *Shadowkeep*. Meanwhile, *Deja Vu* has been ported first to the Amiga, then to the Atari ST, and then to the MS-DOS world. The most recent port has been to the Commodore 64.

The challenge in transferring from the 68000 processors of the Mac and Amiga to the eight-bit processor of the 64 was to recreate the smooth interface of the original. The 64 is an excellent machine, but its speed simply isn't up to the standard of the more powerful computers, and it doesn't have a standard mouse interface.

I can report with pleasure that the conversion has been a successful one. A little has been lost in the translation, particularly in the disk speed and the inclusion of a joystick-oriented rather than mouse-based interface, but on the whole *Deja Vu* seems quite at home on the 64. In fact, it's heartily recommended.

A bit of background: As the leading character in *Deja Vu*, you wake up in the toilet stall of a seedy bar. All you have is a trench coat and a failing mem-

ory. Inside the trench coat is a gun, a wallet, and a few other items, while all around you are things you can almost, but not quite, remember.

As you leave the washroom and go through the bar, a few things become evident. First, you're not especially popular. The police will happily arrest you and toss you in jail. Second, there seem to be a number of people lying in wait for you, though there is no initial proof of this. There is proof, though, of a body clutching a telephone, a syringe and some strange medicines, and a trail littered with near-memories.

A number of things stand between you and your recovered memory. The first is time. If you take too long to figure out what's going on, your memory will simply lapse into oblivion. Second, if you spend too long in one place, the po-

*There is real mystery
here, and you will
quickly find yourself
wanting to know just
who you are.*

lice will capture you. Third, you can get killed. Down in the sewer lives a man-eating crocodile, and a nearby car has more wrong with it than simply a noisy muffler. More obstacles await, but you'll have to discover these for yourself.

What sets *Deja Vu* apart from other graphics-and-text adventures is its user interface. Your joystick maneuvers an arrow around the screen. At the top of the screen, a menu bar contains commands such as Examine, Open, Speak, Operate, and Consume. To examine an object, for example, move the arrow into the Examine box, press the fire button, and then point the arrow at the desired object. Press the fire button again, and the text box will tell you what you've found. More impressive is the Operate command. Click on Operate, then on the object you want to Operate, then on the item you want it to act

upon. Firing your gun at the crocodile, for instance, means Operating the Gun on the Crocodile. It all works, and it's all very easy.

A problem with the joystick interface is that the arrow moves much more slowly than it does with a mouse. Knowing this, the programmers eased things somewhat. The number keys on the 64's keyboard operate the menu bar, with 1 activating Examine, 2 activating Open, and so on. This will quickly become your preferred means of issuing commands, since it requires much less joystick maneuvering.

Another option is the default command. If you're facing an unlocked door, for example, you need only double-click the fire button, and the door will open. This replaces the Open command from the menu. Once the door is open, double-clicking again moves you into the next room. A small Location screen on the bottom right makes movement through the bar and around the town easier still.

The 64 version of *Deja Vu* is probably as friendly as it can be, but some things still annoy. Loading the pictures takes, cumulatively at least, a long time. This becomes frustrating after a while. Also, the save-game disk has no menu, so make note of what each save position means. Besides this, the graphics are not as sharp as they are on the Mac or the Amiga (naturally), which makes some of the pictures slightly confusing. Add these up, and you get a game that plays fairly slow.

Deja Vu's strengths, however, outweigh its problems quite easily. The interface is smooth and well-considered, and the whole package is attractively designed. More importantly, it's an interesting situation. There is real mystery here, and you will quickly find yourself wanting to know just who you are. To this extent, *Deja Vu* is quite addictive. Knowing that, it's pleasant to realize that *The Uninvited* and *Shadowgate* are both under development for the 64 environment.

—Neil Randall

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Ticket to Washington, D.C.

When a program is successful, it's apt to spawn a whole school of similar software. Some of these programs may be virtual clones, some may be mere spin-offs, and still others may be cheap imitations that lack the character of the original. Almost inevitably, the original program sets the standard by which all the others are judged. By combining the elements of travel, graphics adventures, trivia games, mysteries, and arcade animation, *Ticket to Washington, D.C.* is bound to be compared to *Where in the World Is Carmen Sandiego?* (and the other programs in that series). So how does *Ticket to Washington, D.C.* measure up to this paragon of software virtue? Quite well, thank you.

More direct in its attempt to educate you, Blue Lion Software's new program has you seeking the identity of a famous American. You earn leads by answering quizlike questions posed by your Washington guide. (We nicknamed her "Teacher" because of her appearance and because she was always asking questions.)

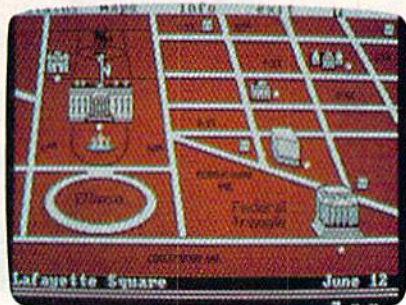
These leads take you all over Washington via seven detailed maps. Track a lead to the right location, and your contact, a somewhat stiff-faced

gentleman, will give you a clue. Compile enough clues, and you can figure out the identity of the famous American. Solve enough of these puzzles, and you'll be admitted to the Hall of Fame of . . . well, that, according to the manual, is a national secret.

The quiz questions in *Ticket to Washington, D.C.* fall into a category most of us would recognize as social studies (history, culture, art, geography, civics, politics), and they're usually related in a general way to the location at

If you liked the combination of entertainment and education in Carmen Sandiego, you'll like Ticket to Washington, D.C.

which you are quizzed. At the National Air and Space Museum building of the Smithsonian, you may be asked when the first walk on the moon took place.



When you visit Mt. Vernon, be prepared for questions about Washington's work as an architect.

The leads are more cryptic than the questions, and each is directly related to one of the 45-plus locations in the game. For instance, the lead "Where diplomats dine" would suggest you go to—oops!—can't give that away! Clues provide biographical data on the famous American whose identity you are seeking. One clue reads: "In his diary he referred to himself as cold and austere."

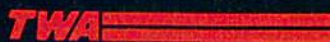
This game is not easy. Our daughter warns you to wear your thinking cap, and she's right. While Blue Lion was thoughtful enough to enclose a note pad for you to use in recording your clues, a reference book of some sort would have proved more helpful. Some of the questions seem obscure,

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1987

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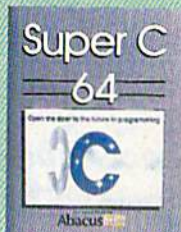
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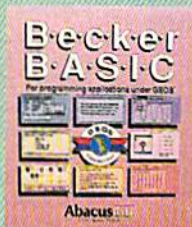
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particularly if you are unfamiliar with the city of Washington. But therein lies some of *Ticket's* charm, for there is much to learn from the program. Repeated exposure to the quiz questions and clues will eventually improve your knowledge of social studies. Astute players will even find the answers to the clues among the questions asked. Tracking down leads is somewhat educational, but even more, it shows you what there is to see and do in Washington and how to get around the city.

This is accomplished by the inclusion of a D.C. Metro System *Pocket Guide* and seven excellent maps. The maps are both artistic and accurate, and

transition between them is as smooth as the closing of one window and the opening of another. When you choose to enter a location, the windows close and open again, this time on a graphics representation of the location. These graphics are beautifully done, apparently based on the actual pictures which adorn the manual.

You can, if you wish, open an Information window about a place before you enter it. The window describes the location briefly. This feature comes in handy, as you must solve your case in two weeks, and each stop advances the clock an hour. Information lets you decide whether entering a

place will really help. We did run into problems at the Sackler Gallery, however. Instead of getting information, we got a disk error. As far as we could tell, the description for the gallery was accidentally left off the disk.

Ticket to Washington, D.C. does not break new ground. As noted earlier, it is one of those programs belonging to the school instituted by *Carmen Sandiego*. It is solidly executed, and because of that it's a lot of fun to play. We—our daughter included—found ourselves returning to it over and over. In the same way that you buy another mystery novel because you liked the first, those of you who like *Carmen Sandiego* will want to check out *Ticket to Washington, D.C.* Those of you who are unfamiliar with either program but like to combine entertainment with education (or vice versa) should try both. Without competing for the same ground, they will please the same groups of people. And who can't use more of a good thing?

—David and Robin Minnick

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X-15 Alpha Mission

Don't pick this one up thinking you are buying a flight simulator. The title is simply an example of using buzzwords to sell a product and has nothing to do with the X-15 research aircraft. However, if you're looking for an arcade target shoot that may be unbeatable, X-15 Alpha Mission could be just what you need.

You begin with a scenario, presented in the form of secret orders, stating that a terrorist group has put an armed space station into orbit; the terrorists are threatening to annihilate American cities unless they're paid a ransom. Obviously, this tactic has certain advantages over kidnapping journalists and diplomats, and an organization known as NSA has selected you to fly the X-15 into space and destroy the extortionists.

Something else is going on, however. Whether it is the work of terrorists or simply a bad day, the skies are filled with hostile helicopters, saucer-shaped objects, and some things that look like boomerangs. Before you can even think about flying to the space station, you'll have to fight your way through these airborne objects. There's just one little hitch: They don't fight fair.

After an introductory display of your orders, you find yourself with a cockpit view of an aircraft. The wind-screen view occupies the central 40 per-

cent of the screen. Ranged around it are displays for thrust, altitude, radar, compass heading, speed, fuel, damage sustained, and number of hits scored against the enemy. It is a busy screen.

Before you can fly the X-15, you must pass a test in which you match the buildup of thrust. A scale appears in your windscreen, and a clock counts down from ten seconds. A bar moves

**X-15 Alpha Mission is
not a flight simulator—
but it is an arcade target
shoot that may be
unbeatable.**

across the scale, and you press the fire button to match your bar to the one controlled by the computer. On the way back, you match your bar by pulling back on the joystick. Failure to keep a close match resets the game by sending you back for training. While this requires some arcade skills, it is an unnecessary exercise and not one for which anyone would purchase the game.

Now you can begin flying, al-

though you never really seem to change altitude. Controls are reversed. A push forward on the joystick sends you up, and a backward pull sends you down—unless you press the SHIFT LOCK key, in which case your joystick acts logically.

At the bottom left of your control panel is a grid showing your position and your destination. During the course of the game, your position will change, but it's dreadfully slow. It may take forever to find the space station.

The enemy aircraft attack almost as soon as you are airborne, and here the sluggish speed of the cursor and the small size of the windscreen are handicaps. A helicopter, nicely done in wire-frame graphics, can move across your narrow field of vision so quickly that you may not have time to bring your sights (a set of crosshairs) to bear. Since it will fling a missile at you, your only choice may be to get out of the way.

Helicopters that attack head on are easier to deal with. You see them first as white specks in the distance, and, as they gradually grow in size, you should have plenty of time to lay your sights and fire off a missile. Hits are impressive, with the screen flashing red and shards of the aircraft fanning out around the explosion. You'll be credited for the hit on the gauge at the lower right, while hits on you appear as a percent of damage on a gauge at the lower left.

While helicopters can be destroyed, I did not find this to be the case with the boomerang-shaped objects. Though they appear in the distance and approach head-on, the combination of their erratic movements and your sluggish joystick makes it difficult to align your sights. Even when you do score a hit, it has no effect and the boomerang crashes into you anyway.

This, or a hit by a missile, causes your view screen to fill with static (I suppose it is a TV monitor rather than a windshield), and the game pauses for several seconds as a result.

As for the saucer-shaped objects, they come in so fast I've never been able to shoot one, but the tradeoff is I don't remember their ever having caused me any damage. Perhaps they're only distractions.

I had to do a lot of "perhaphsing" with X-15, for the documentation doesn't reveal a great deal about the game. If a missile hit won't destroy a boomerang, what will? Multiple hits? We aren't told. How do I know when I've completed any of the three levels necessary before going into orbit? If such information appears in the three-page leaflet, I haven't found it.

Once you reach orbit, you have to negotiate your way through an asteroid belt to land on the space station's surface. Pay no attention to the shaky science

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that places an asteroid belt in Earth orbit. After all, that same science placed guided missiles on a research craft.

When you attain Earth orbit, your control panel changes completely (or so it says in the documentation). You may deploy a fleet of robots and guide each around the station to connect with a weapons system, whereupon the station will self-destruct. I admit I've never been beyond level 1 of this game (shooting at helicopters and boomerangs), though I consider my joystick talents average. But reading the scenario seems to indicate that destroying the space station will also destroy you, your X-15, and all your robots. It seems a long and involved way to commit suicide.

In spite of good graphics and reasonably good sound, I can't put X-15 Alpha Mission very high on my list of good games. Were it not for the sluggish joystick movements and the apparently invulnerable boomerangs, I might have advanced far enough to find more to appreciate. As it is, I left each session feeling that the deck was stacked against me.

On the other hand, if you forget the scenario and the mission—and approach X-15 Alpha Mission on an existential level—you might enjoy it as a target-shoot game with no particular beginning or end.

—Ervin Bobo

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Star Empire

Once upon a time, there was *Elite*, which spawned more than a few children. Those children borrowed from their parent several aspects—a vast galactic milieu, a ship that could be enhanced through trading and purchasing, an economic as well as military playing environment.

Now there is First Row's *Star Empire*, which owes a lot to *Elite*, but which manages to break some (extra-terrestrial) ground of its own.

The setting is, again, the universe, with players starting in a small, simple starship. This universe, as is common in this sort of game, is not the most benign of places; there are aliens, natural hazards, and a dire, contagious plague. Finding the cure for the plague is one of your goals.

Commerce plays its part as well, as you endeavor to collect pods containing valuables which can be traded at space stations. It is at the stations that you add equipment to your starship, making it better able to withstand the challenges that you face. While you're at the station, you also receive mission assignments or save your game to disk.

Space, though, is where the action and challenges await. Those challenges come at you furiously via screens that I found gorgeous and almost hypnotic.

Your ship holds the center of the screen, which rotates under your control. Ancillary gauges help you set course and direction and keep track of temperature, exposure to radiation, and fuel reserves. As you add gear to your craft, you get other controls and indicators.



Naturally in a game of galactic exploration and exploitation, there are subordinate map screens which can be accessed easily. One screen provides you with detailed views of the solar system in which you are located; another gives you the whole galaxy. In galaxy-map mode, you can scroll a cursor over various star systems, with readouts informing you of their political affiliation, the amount of various minerals ripe for collection, and whether or not the system is infected with the plague.



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The main piloting screen contributes a great deal to the feel of the game. Although First Row notes that the ship can be controlled via joystick or keyboard, I found joystick control a little kludgy and quickly shifted to the keyboard, which worked just fine. Unlike *Elite*, which seemed to involve at least half the keys, prompting constant reference to the manual, *Star Empire* places most of its emphasis on a handful of keystrokes, making for an almost effortlessly kinesthetic interface after just a few minutes of play. My fingers quickly learned what to do, leaving my concentration free to focus on the threats I faced.

For a while, though, those threats played second fiddle to the sheer exuberance of flying the starship. The map scrolls and rotates, its starry background contributing to the feel of being in space. Likewise, thrust and attitude respond deftly to keyboard control—not as well to joystick input. Deftness is important: Docking with space stations or maneuvering through a planetary approach requires split-second timing, hair's-breadth positioning.

There are deadlines involved in some of the missions you are assigned, which helps you learn not to waste too much time. As you progress through the game and acquire tools and equipment, you are better able to take advantage

of interstellar shortcuts and time-saving routes, enhancing your chances of completing various missions.

The game's ultimate goal is the creation of a shield to protect the entire frontier from alien invasion.

That goal will take a while to attain. In fact, you may find that even intermediate goals are more easily assigned than achieved. *Star Empire* is a lot of fun, but it's not the simplest game in the world to master, even at the lowest levels.

*Intergalactic challenges
come furiously via
gorgeous and hypnotic
screens.*

In part, the problem stems from the game's documentation, which is enthusiastic in tone but less than successful in execution. First Row has taken a minimalist approach to documenting gameplay: The manual contains a scant 11 pages of instruction, with no illustrations—a serious oversight in a game so dependent upon visual representations of planets, cargo pods, space stations, and so on. Written descriptions, especially those as bare as the ones here, do

little to prepare players for encounters with the game's actual graphics.

I feel obliged to note as well that *Star Empire's* documentation is perhaps as poorly proofread as any I've ever seen. The manual is riddled with typographical errors: *plague* becomes *plauge*, *joystick* becomes *joyrstick*, *which* becomes *whcih*, and so on. The effect, at least for me, was to create some doubt as to the accuracy of the actual instructions.

Which is a shame. *Star Empire* is a rich game, with much to offer in graphics, playability and replayability, challenge, and strategy. That you have to find your way to many of these goals on your own, with little help from the manual, is unfortunate but not, I think, ultimately crippling. I like the universe of *Star Empire*: It's a dangerous and entertaining cosmos in which to knock around. In look and feel, *Star Empire* delivers high-quality play. The game is strong enough to overcome its documentation and is well worth a look for fans of *Elite* and *Elite-type* interstellar entertainment.

—Keith Ferrell

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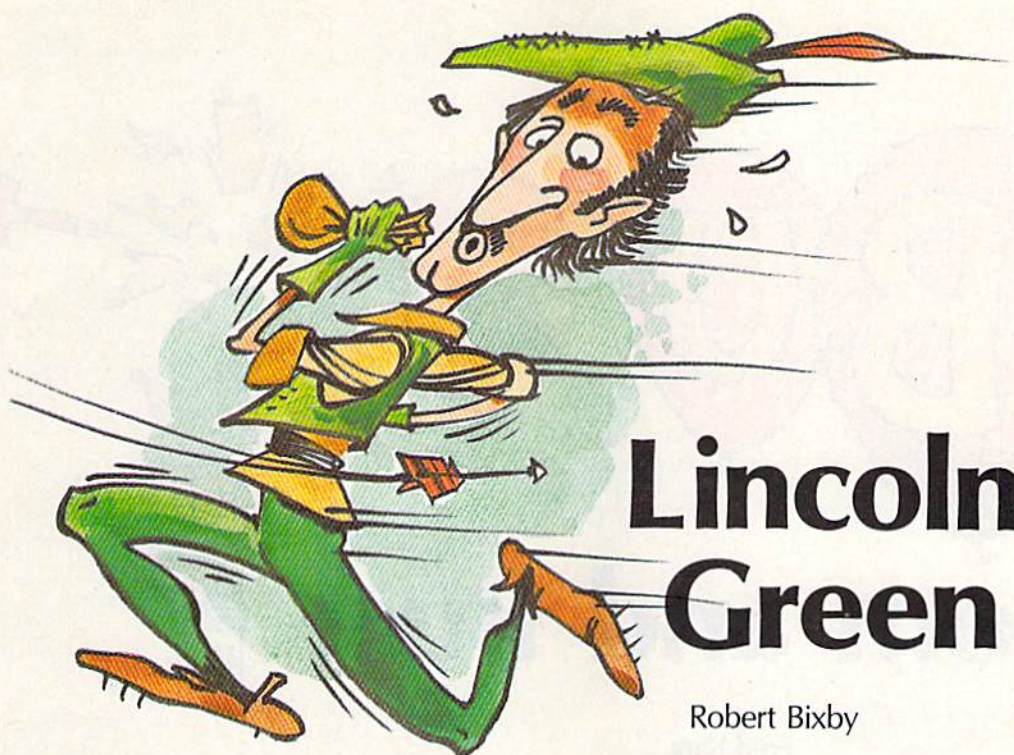
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Lincoln Green

Robert Bixby

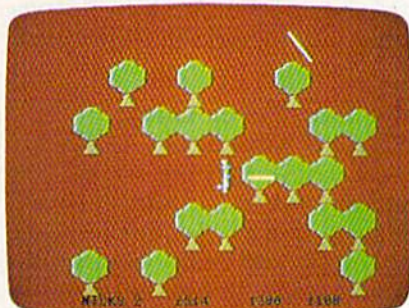
Bob

Dodge the arrows, but keep a close hold on the loot in a mad rush to safety through an enchanted forest. For the 64. Joystick required.

There's nothing more beautiful than an enchanted forest. Unfortunately, there's also nothing more dangerous.

You, Lincoln Green, defender of the poor, are on the run from the sheriff of Nottingham after having stolen £600 of gold dust from a nobleman. In your haste, you have accidentally slipped into Enchanted Forest instead of the nearby Sherwood Forest.

Now that you're in the thick of the woods, you realize that something is dreadfully wrong. Magical trees are blocking your path. The path changes every time you turn around. Worse, every time you bump into a tree, you spill some of the gold dust. You must keep your cool—the sheriff's best archers are all around you. You had better find your way to safety.



Arrows fly in "Lincoln Green," an arcade-style game that takes you back to a not-so-merry England.

guage entry program located elsewhere in this issue. Type in, load, and run MLX. When you are prompted for the starting and ending addresses of the program, respond with these values:

Starting address: 0801
Ending address: 15F0

Type in the data and save the program to tape or disk.

Before loading Lincoln Green, plug a joystick into port 2. Lincoln

Green can be loaded and run just like a BASIC program.

When you run the program, you'll see your alter ego, Lincoln Green, standing in the forest. Push the joystick in the direction you wish to follow. Make haste (but carefully) through the forest paths. Dodge the arrows that are shot by the sheriff's archers.

At the bottom left corner of the screen is a number that shows how many times you have been nicked by arrows. If you are hit by ten arrows, you'll lose the game. To the right is the monetary value of the gold dust you are carrying. If this drops to 0, you lose.

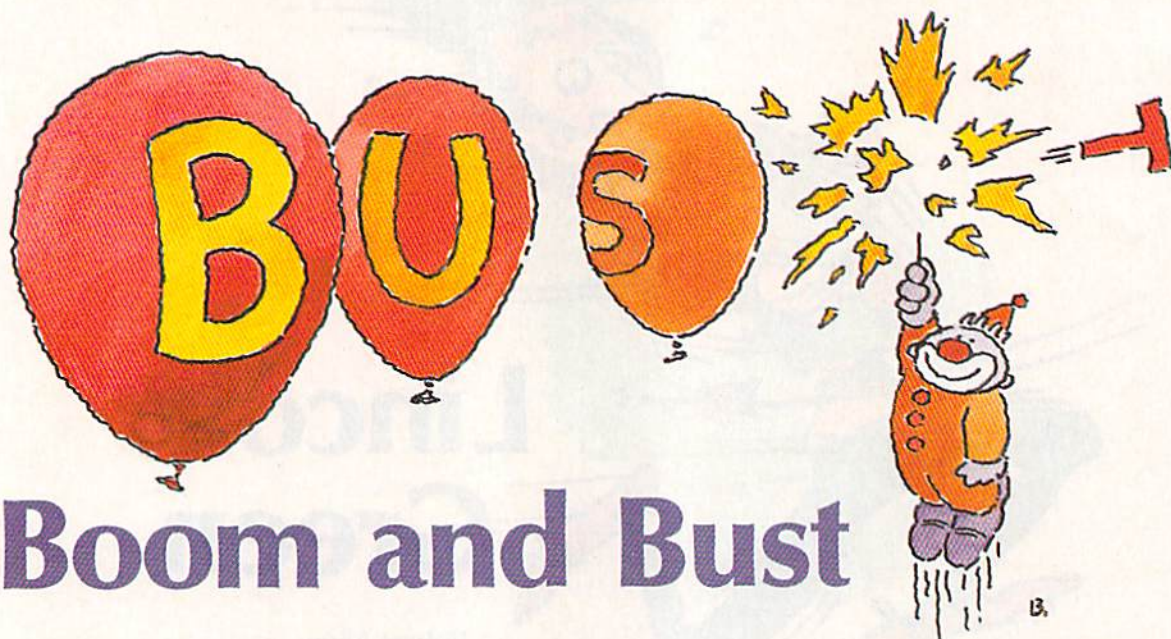
At the bottom right corner of the screen, you'll see counters that show how far away you are from safe haven. Sanctuary is located at longitude 0, latitude 0. Begin your journey by finding the correct direction in which to run (this direction is different each time you play). When you get close to Sanctuary, the archers pull out their crossbows and fire bolts that are faster and heavier than the arrows.

It's going to be a long day.

See program listing on page 76. ■

Typing It In

Since "Lincoln Green" is written in machine language, you must type it in with "MLX," the machine lan-



Fred Karg

An arcade-style word game? That's "Boom and Bust," a clever challenge for one or two players. For the Commodore 64 with a disk drive. Joystick(s) required.

"Boom and Bust" is a word game like Hangman, but with a new twist—instead of typing in the letter you wish to guess, you must launch a clown out of a cannon to pop a balloon that holds the letter you desire. For one or two players, it's fun to play, and it also has some educational value.

Getting Started

Boom and Bust consists of two programs. Program 1 is written in BASIC. Type it in and save it to disk. Program 2 is written in machine language, so it must be entered with "MLX," the machine language entry program found elsewhere in this issue. Run MLX. When it prompts you for a starting and an ending address, respond with the values indicated below.

Starting address: 3EC0
Ending address: 4487

Be sure to save a copy of the data from Program 2 before you exit MLX. Save the data with the name "B&B.ML".

Load and run Program 1. You'll be asked to choose the number of

players. Press 1 or 2. If you choose the one-player game, plug a joystick into port 2. For a two-player game, plug joysticks into both ports.

The Two-Player Game

When the game begins, a category name is given on the screen. The category will be *occupation, phrase, or thing*. Below the category, the pattern for the puzzle appears. As in Hangman, the pattern shows where letters are and where spaces are. For example, CHAIRMAN OF THE BOARD would be represented by

— — — — — — — — — —
— — — — — — — — — —

A flurry of balloons, each with a letter printed on it, floats across the screen. To choose a letter, move underneath the balloon by moving the joystick left or right. Then press the trigger to launch the clown. If the clown hits a balloon, that balloon's letter is your guess. Ten points are awarded for each letter that appears in the puzzle.

Suppose you hit the R balloon. In the example above, you'd see

— — — — R — — — — — — — — — —
— — — — R — — — — — — — — — —
In the two-player game, a missed balloon or a wrong letter causes you to lose your turn. When you lose your turn, your opponent takes control of the cannon.

If you believe you can guess the puzzle, press f1 during your turn. Type in your guess. If you're right, you'll gain 500 points, plus 10 points for each balloon you've popped. If you're wrong, it's your opponent's turn.

The game ends when all the phrases have been exhausted.

The One-Player Game

The one-player game is similar to the two-player game. The difference is that you play for a maximum number of points.

A bonus timer is located on the right side of the screen. The bonus starts at 100 points and counts down by decrements of 10 points. The bonus decreases whenever you miss all the balloons or hit a balloon that has a letter not found in the puzzle.

If you guess the word correctly, you get 500 points for guessing the puzzle, plus 10 points for each correct letter, plus any bonus left on the bonus timer.

See program listings on page 86. ☐

Lava Flow

Forrest Bentley



It's a bricklayer's nightmare. Build walls to protect yourself from the fast-moving and relentless molten rock in "Lava Flow," a two-player arcade-style game for the Commodore 64. Joystick(s) required.

There's no doubt about it—things will get hot tonight. You and a competitor are trapped in a room. There's nothing especially interesting about this room—except the hole in its center, that is. Through this hole, lava flows into the room. Your only defense against the lava is the rudimentary bricklaying equipment you possess. But while the bricks you lay will protect you for a while, the lava is relentless, so your goal is to last longer than your opponent.

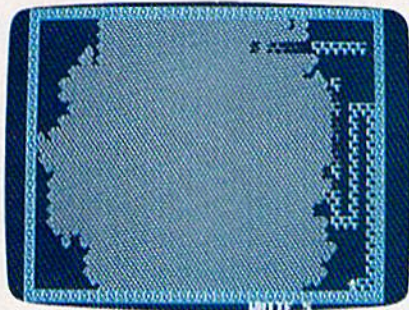
"Lava Flow" is a two-player game that demands savvy and quick reflexes. Hesitate even one moment and your opponent could push the advantage.

Typing It In

Lava Flow is written entirely in machine language, so you must type it in using "MLX," the machine language entry program found elsewhere in this issue. When MLX prompts you for starting and ending addresses, respond with the following values.

Starting address: C000
Ending address: C83F

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



The lava has nearly made history out of this brickwork.

Survival of the Fittest

To play Lava Flow, plug two joysticks into the computer. Now, load the program with a statement of the form LOAD "LAVA",8,1 for disk or LOAD "LAVA",1,1 for tape. To start the program, type SYS 49152.

Move your player with your joystick. The white player uses joystick 1; the black player uses joystick 2. Move your joystick in the direction you want your onscreen alter ego to follow.

Although the lava spreads quickly, you aren't totally defenseless—you can build walls. Press and release the joystick's fire button to leave a trail of bricks behind you. Press and release the button again

to stop laying bricks. Notice that you move much faster when you're not laying bricks. And you can't move through bricks. The lava can, but it slows in the process.

Sooner or later, the lava will touch you or your opponent. When this happens, that player gets a "hot foot" in the truest sense of the phrase, and the other player gains one point. Lava Flow ends when one player has accumulated five points.

After the game, you're asked if you'd like to play again. Answer Y if you would, N if you'd rather not.

Strategy

It's been said for some games that the best offense is a good defense. A good defense certainly helps in Lava Flow. The more bricks you lay, the more slowly the lava will invade your territory. You and your opponent may want to spend a few games building walls in different patterns. That way, you'll see what makes a good wall and what makes a poor one.

Once you've mastered defense, you'll want to work on offense. One solid (and nasty) Lava Flow tactic is to rush to the other side of the room to build a one-layer wall around your opponent. After you've done the dirty deed, build a more secure wall around yourself and wait for the inevitable.

See program listing on page 78.

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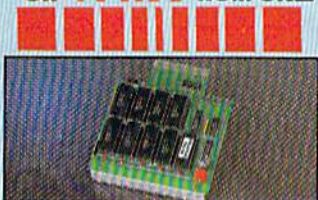
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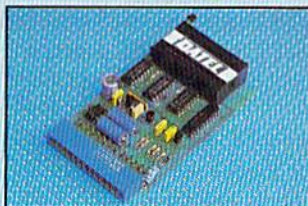


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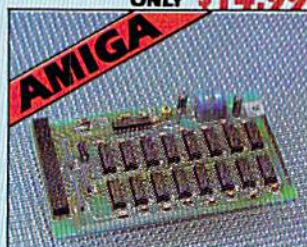
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Larry Cotton

The most misunderstood concept in BASIC is the array. It may also be BASIC's most useful abstraction. An array is a flexible way of expressing and manipulating variables.

In the course of this column, we've studied two types of variables—numeric and string. Let's review them briefly.

Numeric variables, such as X or LO, stand for numbers such as 34 or 5.678 and can be mathematically manipulated—added, subtracted, multiplied, and so forth.

String variables, such as N\$ or AD\$, usually represent words such as SYLVIA or CLEVER. They can also represent symbols and numbers such as \$1,728.00; however, numbers represented as strings cannot be mathematically manipulated.

Both numeric and string variables can be expressed in array format. Arrays are recognized by the parentheses that are an integral part of their syntax. The number between the parentheses is called the *subscript* (hence the other name for arrays—*subscripted variables*).

Three Ways to Skin a Cat

Enter this short program. It does not use arrays. Enter RED, GREEN, and BLUE as responses when you see the prompt.

```
10 INPUT "FIRST COLOR";C1$
20 INPUT "SECOND COLOR";C2$
30 INPUT "THIRD COLOR";C3$
40 PRINT: PRINT "PRESS ANY KEY TO
   SEE COLORS.": PRINT
50 GET A$:IF A$="" THEN 50
60 PRINT C1$
70 PRINT C2$
80 PRINT C3$
```

Run the program and observe the results. Now try the following program.

```
10 INPUT "FIRST COLOR";C$(1)
20 INPUT "SECOND COLOR";C$(2)
30 INPUT "THIRD COLOR";C$(3)
40 PRINT: PRINT "PRESS ANY KEY TO
   SEE COLORS.": PRINT
```

```
50 GET A$:IF A$="" THEN 50
60 PRINT C$(1)
70 PRINT C$(2)
80 PRINT C$(3)
```

What advantage was gained by using an array? None here. But in the following program, we use the array to shorten the program dramatically.

```
10 FOR CO=1 TO 3: PRINT "COLOR
   NO.": INPUT C$(CO): NEXT
20 PRINT: PRINT "PRESS ANY KEY TO
   SEE COLORS.": PRINT
30 GET A$: IF A$="" THEN 30
40 FOR CO=1 TO 3: PRINT C$(CO):
   NEXT
```

Run this one. The results are the same, but the program is much more efficient.

Variables as Birdhouses

Think of the C\$() array as a row of three little boxes, like pigeonholes. Into these pigeonholes, which have the names C\$(1), C\$(2), and C\$(3), we're going to stick three color names.

In line 10, we use a FOR-NEXT loop to load the little boxes. As CO increments from 1 to 3, the boxes are filled with the color names: C\$(1) becomes "RED", C\$(2) becomes "GREEN", and C\$(3) becomes "BLUE". The numeric variable CO is the index to the array.

In line 40, we increment the FOR-NEXT loop again from 1 to 3, and the contents of the little boxes are printed on the screen.

These same principles can be applied to numeric variables.

```
10 FOR T = 1 TO 5: PRINT
   "NUMBER":T;
20 INPUT N(T)
30 J = J + N(T): NEXT
40 PRINT: PRINT "TOTAL IS"J
```

Lines 10-30 contain a FOR-NEXT loop which asks the user to type in numbers and adds them up as they are entered. J begins as 0 when the program is first run, and increments by the amount N(T) five times. Line 40 prints out the total.

Note that in both of our array

examples, the contents of the pigeonholes are not emptied when printed. They still contain the names or numbers as originally entered. Thus, further manipulation is easily accomplished.

Let's draw an analogy between types of variables and geometric figures. Think of a single variable, such as X, as a dot. Now think of our pigeonholes as a row of very closely spaced dots that form a line. Lines are one-dimensional; the type of array we've dealt with so far is one-dimensional.

As you might expect, there are also multidimensional arrays. If you extend our geometric analogy further, an array that correlates to a plane surface (such as a sheet of paper) is two-dimensional.

These are examples of two-dimensional arrays:

```
A$(4,5)
CD(13,52)
TABLE$(30,40)
```

One way to fill a two-dimensional array is with a nested FOR-NEXT loop:

```
10 J=1
20 FOR T=1 TO 10
30 FOR U=1 TO 6
40 X(T,U)=J: J=J+1
50 NEXT U: NEXT T
```

In this very simple example, we have loaded a two-dimensional array with the numbers 1-60. The first pigeonhole is labeled X(1,1) and contains 1; the last is X(10,6), which contains 60. If you type PRINT X(4,6) and press RETURN, you should get 24. What do you think the result of typing PRINT X(6,4) would be?

A Dozen or More

The methods we've seen so far work for arrays which do not exceed 11 elements in any one dimension. But often we need more. Larger arrays must be dimensioned before use. This is done with the DIM statement, which reserves

space in the computer's memory for the array and sets all array values to 0. A typical DIM statement looks like this:

```
10 DIM A$(50)
```

In this case, the computer sets aside space for 51 variables. (Arrays are numbered from 0 to the number in the parentheses.) Once an array is dimensioned, it cannot be redimensioned. If you try that, you'll get a REDIM'D ARRAY error when the program is run. And if you try to use a variable subscript greater than the subscript in the DIM statement, you'll get a BAD SUBSCRIPT error.

Multidimensional arrays are dimensioned in a similar manner:

```
DIM A$(45,34)
```

More than one variable can be dimensioned in the same DIM statement, but note that the following statement does not create a multidimensional array:

```
DIM A$(15),B$(25)
```

Here's an example that uses READ and DATA in association with a two-dimensional array. The

DATA lines contain speed information for a four-car, five-lap race:

```
10 DIM S(4,5):REM 4 X 5 ARRAY
20 FOR C=1TO4:REM C=CAR NO.
30 FOR L=1TO5:REM L=LAP NO.
40 READ S(C,L):REM READ SPEED
50 NEXT L:NEXT C
100 DATA 108,110,122,120,117
110 DATA 118,114,116,114,110
120 DATA 120,123,119,124,125
130 DATA 100,112,115,117,119
140 INPUT "WHICH CAR NO.:";C
150 IF C<1 THEN 140
160 IF C>4 THEN 140
170 INPUT "WHICH LAP NO.:";L
180 IF L<1 THEN 170
190 IF L>5 THEN 170
200 PRINT:PRINT"CAR"C"IN
    LAP"L"WENT"S(C,L)"MPH"
```

In this case, the DIM statement is optional, since the computer will automatically dimension arrays of 11 or fewer elements. Lines 20-50 contain nested FOR-NEXT loops that read 20 speeds from the DATA statements and dutifully tuck them away into our 4 X 5 element array.

In lines 140 and 170, the user is asked for the car and lap number; lines 150, 160, 180, and 190 check for valid input. If the user wanted to know the speed of the second car's third lap (C=2, L=3), the com-

puter would go to pigeonhole S(2,3) to get that information. In this case, the speed is 116, which is printed in line 200.

How would you get the program to calculate the average speed for each car? Would that exercise use arrays? We'll see next month.

One last example: We'll roll one die 15 times and stick the results into a one-dimensional array. You could use this code in a game.

```
10 DIM T(15)
20 FOR J=1 TO 15
30 T(J)=INT(6*RND(1))+1
40 PRINT T(J)
50 NEXT
```

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Rhett Anderson
Assistant Editor

Imagine the largest possible counting jobs. Counting the grains of sand on a beach. Counting the stars in a galaxy. Counting the atoms in a gallon of milk.

It was just such a monumental counting job—tabulating the 1950 U.S. Census—that inspired the first commercial computer. The machine, UNIVAC I, certainly *looked* up to the task. If you ever saw a photo of it, you wouldn't question that for a moment. It was, simply put, huge. Even the bold letters UNIVAC were intimidating.

Although it's about the size of a small typewriter, your Commodore 64 is vastly more powerful than the UNIVAC I.

Today it's easy to take computers for granted. But what would you be doing with your leisure time if there were no personal computers?

Ham Radio

You may be familiar with the *chat* mode available on commercial telecommunications services. No matter what you want to discuss, you can probably find someone online with the same interest.

Chat mode has been called "The Great Equalizer"—you don't know the name, age, sex, race, or religion of the person on the other end of the modem (unless the person is willing to tell you). About all you can safely bet is that he or she is willing to use a computer.

Chat mode was inspired by CB radios, which in turn were inspired by ham radios. Ham radios were the leading edge of technology in the early part of the century.

Like computerists, early ham radio operators had their own heroes. Tesla and Marconi, the inventors of the technology, were revered. In the computer world, it's names such as Boole and Babbage

that we've heard over and over. And others, too. Mauchley and Eckert (makers of the UNIVAC and the earlier ENIAC), and Von Neumann (inventor of the stored-program concept).

Talk Like This

Ham radio users had their own language. To gain a ham radio license, you needed to learn the series of dots and dashes that make up letters, words, and sentences communicated in Morse code. Morse code was borrowed from an older technology, the telegraph. Telegraph operators had originated, relayed, and transmitted Morse code messages at speeds that changed the world. With telegraph and radio, news traveled at the speed of light.

Early computer users learned ASCII, the code that specifies which values in the computer stand for which characters. Most people learned only the most important characters: A space is 32, the alphabet starts with 65 (A), the numerals start with 48 (0).

Morse code and ASCII have much in common. Both are binary (base 2). Morse code uses dots and dashes, while ASCII uses 0s and 1s. In Morse Code, SOS (Save Our Ship—a standard distress call) looks like this:

.....

In ASCII, it's

01010011 10001111 01010011

You'll notice that the ASCII SOS is much longer than the one given in Morse code. That's OK. Morse code was designed to be used by humans, who send one dot (short pulse) or one dash (long pulse) at a time. ASCII was designed for use by computers, which typically access memory eight bits at a time.

Today, people who listen to radio don't have to know Morse code. Likewise, people who use computers don't have to know ASCII.

Making Faces

You may think that chatting over a computer is unnatural, but what if you knew that telecommunicators have begun to make faces at each other? Here's a face.

:)

If you don't see it, give your head a tilt to the left (or the magazine a tilt to the right). It's a smiling face—two eyes and a mouth. How about this one?

;))

That's a wink.

So if you're online and you see apparently random punctuation, someone may be making a face at you:

:(a frown
8-o	a look of astonishment
:*	a kiss
:p	sticking out a tongue
:>	a mischievous grin

If you know more faces, please send them to Horizons, P.O. Box 5406, Greensboro NC 27403.

Personal Computers

As we've seen, computers can count people or help them communicate. The computer has been called a *mind tool*. That's an ambiguous phrase. Does it mean the computer is a mindlike tool? Or does it mean that the computer is a kind of tool for the mind?

It's both. It's certainly the most mindlike of all inventions. It can play chess, follow instructions, and solve logical problems. It also is a tool for the mind. It's so fast and versatile that it can fill in for other tools such as calculators and clocks. Its very existence encourages us to inspect, consider, and change our own ways of thinking.

As we learn to communicate with our computers (and with other humans by means of our computers), we enter a new domain where human and machine enrich each other more than ever before. ■

the programmer's page

Did You Know That . . .

Randy Thompson
Contributing Editor

"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.

Did you know that the 64 doesn't care whether it's a number or a string that's put between the parentheses in a PEEK function? Did you know that GOTO without a line number jumps to program line 0? Did you know that by using CONT within a BASIC program you put the computer in an infinite loop? Did you know that CMD stands for Change Main Device?

In the never-ending quest for complete understanding, I've compiled a list of several interesting, if not useful, pieces of programming trivia. Here are just a few. (Unless otherwise stated, the following examples work on all Commodore eight-bit computers.)

PEEKing Strings

Yes, it's true. You can PRINT PEEK(A\$) on the 64 without invoking a syntax error. In fact, you can PRINT POS(A\$) with the same syntactical immunity.

The number returned by a PEEK(A\$) depends on the last numeric operation performed. For example, the code `X=197:PRINT PEEK(A$)` is equivalent to `PRINT PEEK(197)`.

You can place a string literal inside the parentheses as well—like `PRINT PEEK("HELLO")`—but the value returned is always the contents of memory location 0. When you execute a `PEEK("string literal")` three times in a row, the computer, in a response quite different from its reaction to string

variables, halts with a FORMULA TOO COMPLEX error. But what do you expect when you start putting characters where numbers belong?

The First Dimension

When it comes to Commodore BASIC, 11 elements are standard.

For example, without performing any prior DIM statements, you can enter the following code without receiving a BAD SUBSCRIPT error: `A(10)=64`.

This works because all undimensioned arrays—string or numeric—are automatically initialized to 11 elements (0-10) when accessed for the first time. In fact, after the above code has been executed, DIM A(10) provokes a REDIM'D ARRAY error, even though you never actually dimensioned the array.

Immortalized in Silicon

Painters brush their names on canvas; vandals spray their names on walls; programmers and hardware designers burn their names into ROM chips. To find the names hidden within the 128, try entering this command from 128 mode: `SYS 32800,123,45,6`.

How Much Is a Period Worth?

How much is a period (.) worth? Nothing. Or more accurately, 0. Wherever you use the digit 0 all by itself, you can replace it with a period. BASIC even interprets the period faster than it does the digit 0. In other words, the program

```
10 POKE 53281,.;POKE 53281,1:GOTO 10
```

executes faster than

```
10 POKE 53281,0:POKE 53281,1:GOTO 10
```

Incompatible Twins

All programmers are familiar with BASIC's GOTO command, but did you know that GOTO can be broken into two separate words: GO and TO? The command `GOTO 100` works the same as `GO TO 100`.

Although more grammatically correct, GO TO is almost never used, and for good reason. Not only does GO TO take up two more bytes of memory—one extra space plus the additional token—but it isn't truly compatible with its more compact sibling, GOTO.

For example, while the command `ON X GOTO 100,200,300` is a perfectly legal BASIC instruction, `ON X GO TO 100,200,300` is not.

The same is true of `IF X=0 GOTO 100` and `IF X=0 GO TO 100`. The first example works just fine, while the latter produces an error.

A Missing Parameter

The MID\$ function requires three parameters—or does it? Without the third parameter, MID\$ returns all the characters to the right of, and including, the character specified by the second parameter. In the example `LN$=MID$("WALTER HEGO",7)`, LN\$ is set equal to the last name HEGO.

This shortened version of MID\$ is useful when you want to perform a RIGHT\$ but don't know how many characters you need—just where in the string the characters begin.

Abbreviated BASIC

While this last tip may be fairly well known, it's so useful that it deserves to be mentioned here.

Almost all BASIC commands may be abbreviated. For example, the abbreviation for PRINT is a question mark (?). Command abbreviations can save you a lot of typing. They also allow you to cram more commands on a program line.

To see the complete list of command abbreviations, refer to the Commodore 64 User's Guide, Appendix D; the 128 System Guide, Appendix K; or The Programmer's Reference Guide for the Commodore Plus/4 (from Scott, Foresman and Company), page 11.

Jim Butterfield
Contributing Editor

Few of us write perfect programs. If a program is not perfect, it needs fixing. The process of fixing errors, or *bugs*, in a program is known as *debugging*. Here are some hints on how to debug your machine language programs.

For most beginners, debugging machine language code is harder than debugging BASIC. For one thing, the RUN/STOP key doesn't seem to work with machine language (although you can make it work; more on that in a moment). Some errors make the machine "lock up." It also seems hard to stop a program at a certain point to see how it has behaved so far; this stop-and-check activity is the heart of serious debugging.

Let's write a simple program with an intentional error. The program to be debugged is a classic—it prints *HELLO, WORLD!*.

We'll put our code at address \$2000. That's not the best place to put ML programs for long-term safety, but this address area is available on virtually all eight-bit Commodore machines. We'll use a simple machine language monitor to enter the commands. Some computers have a built-in monitor; with others you'll need to load one in. You may find a monitor hidden away on your assembler disk.

Hello, World!

Here's the plan: We will count the characters as we output them, using the X register. *HELLO, WORLD!* contains 14 characters (including a RETURN character), so at the bottom of the loop we will test for a value of 14 and loop back if X is low. We must put the message somewhere nearby—say, \$2030.

We normally put characters into memory by displaying memory and then typing over the old val-

ues with new ones (just the way we edit a line in BASIC). Type M 2030 203D for a display of memory starting at 2030 (monitors use hexadecimal numbers). Now move the cursor back and type over the two-digit values so that the display looks like this:

```
>2030 48 45 4C 4C 4F 20 57 4F:
>2038 4F 52 4C 44 21 0D 00 00:
```

Be sure to press RETURN after you have filled in each line. Your machine language monitor may also show the characters that make up *HELLO, WORLD!*.

Remember that what we have just done is to supply data to the computer. These are *not* instructions, so we don't need to assemble them. But our next job is to write the program instructions, so use the monitor's A (assemble command) and type

```
A 2000 LDX #0
```

When you press RETURN, the instruction is translated into machine language. Your monitor may assume that you want to assemble more instructions. So it may type in part of the next line for you (A 2002). As for the actual instruction we entered, LDX #0 means load register X with the actual value of 0 (not the contents of memory location 0).

```
A 2002 LDA $2030,X
A 2005 JSR $FFD2
```

These instructions print a character. Now, let's activate the RUN/STOP key. We're inside a loop, so if somehow we get caught inside the loop, at least we'll be able to stop the program. The subroutine at \$FFE1 will do the trick:

```
A 2008 JSR $FFE1
A 200B BEQ $2013
```

When I wrote this program, I first gave a dummy value for the destination of the BEQ instruction. Later, when I knew where I was going to branch, I filled in the correct

value.

Now I'll do something odd. I'll put in an instruction that does nothing. You'll see later how this helps.

```
A 200D NOP
```

A Bad Seed

Next comes our bug. We intended to use X to count the number of characters we sent. The proper command here would be INX, or increment X. We're going to blunder completely and type in an INY command. Since we're counting with the wrong register, X will never reach 14. Here goes:

```
A 200E INY
```

The remaining code tests the count for 14 (hex E) and either loops or exits:

```
A 200F CPX #$0E
A 2011 BNE $2002
A 2013 RTS
```

Leave the monitor with command X, call the machine language program with SYS 8192, and you have... a mess.

The RUN/STOP key works, since we had the foresight to test for it within our loop. It's a good practice; think about it. Press RUN/STOP and the program stops. Now let's see why all those H characters went to the screen.

Back in the monitor, we change that NOP instruction to BRK to stop the program when it reaches here. (Type D 2000 and type over the NOP command with BRK, pressing RETURN.) Try the program again.

Aha! The program prints H and breaks to the monitor. Register X contains 0, as it should. Continue with G 200E (go to the next instruction); the 128 needs G F200E to keep the computer in bank 15.

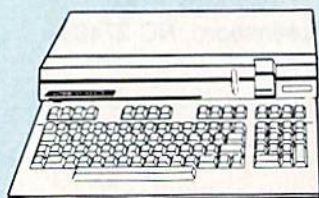
Trouble: The program prints H again, and X still contains 0. How could that be—we're incrementing X, aren't we? No. We see that we incremented Y. Bug caught! ☹



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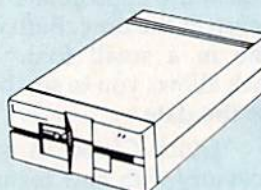
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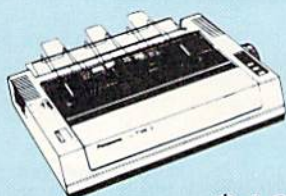
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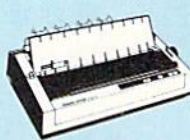


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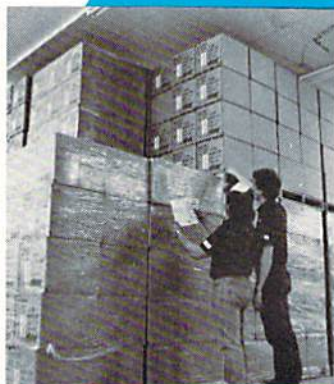
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User Group Update

Mickey McLean

The following list includes updated entries to our annual "Guide to Commodore User Groups," which last appeared in the May and June 1988 issues.

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.

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

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Attn: Commodore User Groups

User Group Notes

The correct address for the **Victor Valley Commodore Interest Association (VVCIA)** is P.O. Box 385, Victorville, California 92393.

The **RAM-ROM 84 Commodore Users Group** address is now P.O. Box 3880, Venice, Florida 34293-3880.

The **Commodore Users Group** of New Hampshire has a new mailing address. All correspondence should be sent to P.O. Box 129, Concord, New Hampshire 03302-0129.

Previous listings for the **Kids Computer News** have contained the wrong address. To contact this user group, write to St. Hilda's and St. Hugh's School, 619 West 114th Street, New York, New York 10025.

New Listings

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South Orange Commodore Klub (SOCK), 24325 Lakeview Ln., El Toro, CA 92630

FLORIDA

Commodore User Group of Pensacola, P.O. Box 36367, Pensacola, FL 32516 (BBS# 904-456-8205)

ILLINOIS

Board Users Syndicate, P.O. Box 1112, South Holland, IL 60473 (BBS# 312-331-4548)

MARYLAND

Gaithersburg Commodore Users Group, P.O. Box 2033, Gaithersburg, MD 20879

MICHIGAN

Traverse Area Commodore Club, 404 Bates St., Fife Lake, MI 49633

NEBRASKA

Lincoln Commodore User's Group, P.O. Box 30655, Lincoln, NE 68503

NEW MEXICO

Deming Commodore User Group (DCUG), 1400 Mallory Dr., Deming, NM 88030

Commodore Users Group of Roswell (CUGOR), 1619 N. Kansas, Roswell, NM 88201

NEW YORK

New York Commodore Interest Group (NYC=ig), 115 Essex St., Box #146, New York, NY 10002

Riverhead Commodore Club, 330 Court St., Riverhead, NY 11901

Oneida Users' Group, Washington Avenue Community Center, Oneida, NY 13421

TENNESSEE

Springfield Commodore Users Group (SCUGS), P.O. Box 62, Springfield, TN 37172-4025

WEST VIRGINIA

Software Engineering Exchange (SEE), Star Rt. 83, Box 49, Ellenboro, WV 26346

WISCONSIN

Milwaukee Area Commodore Enthusiasts (M.A.C.E.), P.O. Box 26216, Milwaukee, WI 53226

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Pattern Fill

Robert Bixby

Hi-res graphics screens become works of art when you use "Pattern Fill," a handy graphics utility that lets you fill areas with any rectangular pattern. Two special effects can be used with the patterns. For the Commodore 64. Joystick required.

Modern paint programs for the 64 include many of the popular tools first used in *MacPaint*, Apple's paint program for the Macintosh. One of the popular Macintosh tools is the Fill tool, which lets you fill any area with an arbitrary pattern.

If your favorite hi-res paint program lacks this tool, try "Pattern Fill." Even if your paint program makes some kind of fill available, you might find that one of Pattern Fill's two special effects is just what you need.

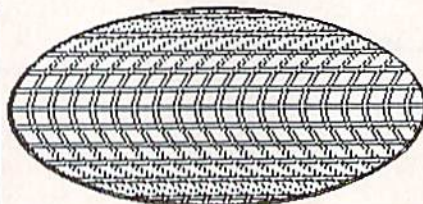
Getting Started

Pattern Fill is written entirely in machine language, so you'll need to type it in with "MLX," the machine language entry program found elsewhere in this issue. When you run MLX, you're prompted for the starting and ending addresses for the data you'll be typing in. Respond with these values:

Starting address: C000
Ending address: C4D7

Type in the data for Pattern Fill. Be sure to save the program before exiting MLX.

When you're ready to use Pattern Fill, load the program into memory with a statement of the form `LOAD "PATTERNFILL",8,1` (`LOAD "PATTERNFILL",1,1` for tape), substituting for PATTERNFILL the name you used when you saved the program. Next, load your hi-res graphics screen. (Pattern Fill uses high-resolution mode only—color is not supported.) For Pattern



"Pattern Fill" lets you easily enhance your hi-res artwork. This oval was filled using the L key option.

Fill to find your picture file, it should be loaded into memory at location 24576. If you're using *DOODLE!* or *Koala Paint*, simply load your picture file directly from BASIC. Start Pattern Fill by typing `SYS 49152`.

A small green arrow will appear at the upper left corner of the screen. To select the area that you wish to use as a fill pattern, use a joystick plugged into port 2. Move the arrow to the upper left corner of the area and press the fire button. Then move to the lower right corner of the area and press the fire button again. You have defined the fill pattern. Note that the pattern can be any size, from 1 pixel \times 1 pixel to the size of the whole screen.

Before you begin to fill an area, be sure that it's completely enclosed. If there are any leaks, Pattern Fill will probably find them. The edges of the screen *do not* count as borders. When you're sure that the area you wish to fill has a secure border, move the cursor to the upper left corner of the area and press the fire button.

Intelligence Not Included

Pattern Fill is written to be compact and quick. As a result, it's not particularly bright. If you are filling a shape much more complex than an oval or a rectangle, Pattern Fill will probably miss filling in some of it. If this happens, wait for the arrow to stop moving and then reposition it at the upper corner of the unfilled area. Repeat this procedure until your whole shape is filled. You'll find that Pattern Fill does an excellent job—there won't be a seam between any of the fills.

You may pick up a new pattern at any time. Press RETURN, and the old pattern will be wiped out. Use the joystick to define a new pattern.

Special Effects

Pattern Fill has three special effects that can help you enhance your fills. First, you can hold down the CTRL key while you fill for a "negative" fill: All the *on* pixels from the original pattern will be considered *off*, and all the *off* pixels will be considered *on*.

Second, Pattern Fill can follow the left or right edge of the filled area as it fills. To follow the left side, hold down the L key as you fill. Likewise, hold down the R key to follow the right edge.

Back to BASIC

When you've finished using Pattern Fill, exit the program by pressing RUN/STOP. Since Pattern Fill exits with a machine language RTS (Return from Subroutine), you can call it from your own programs with a `SYS 49152` (from BASIC) or a `JSR 49152` (from ML).

See program listing on page 70.

• Summer brings vacation days and the Summer CES. Amidst our travels, we suffered a slight communication breakdown. The August GAZETTE Disk contains a program, "SpeedPrint," which was originally slated for the August issue but did not appear in the magazine. The article will appear in the October or November issue, and it will be included on the corresponding monthly disk. Our apologies for any confusion this may have caused.

• The article for "Ramdisk 128" (April 1988) confusingly states that to save a machine language file to the ramdisk, you must include the filename, starting address, ending address, plus one of the saves. The article should read: For machine language files, specify the filename, starting address, and the ending address plus 1.

• The listing for "Square Logix" (June 1988) has some incorrect characters in lines 10, 29, and 64. The correct lines follow:

```
RS 10 WINDOW0,0,39,24,1:PRINTT
AB(9){RVS}{BLU}
{4 SPACES}SQUARE LOGIX
{5 SPACES}{DOWN}"
DX 29 DO:M1=M1+1:J=INT(RND(1)*
ZZ):K=INT(RND(1)*ZZ):GOS
UB33:SOUND2,8000,1:ONG1G
OSUB30,30,31,31:LOOPUNTIL
LM1=LV*3:J=2:K=2:WZ=1:GO
SUB35:TS="000000":GOTO5
0
GE 64 R1=R1+1:U1=-1:L1=-1:D1=-
1:IFR1>0THENJ=J+1+(J=5)
```

• There are a few problems with "Super Printer Driver" from "The GEOS Column" in the July 1988 issue. First, the programs listed in the magazine are mislabeled: Program 1 is "Customizer," and Program 2 is "Driver." We apologize for any confusion this may have caused. Second, GAZETTE Disk users have had trouble running Customizer from the disk menu. The solution to this problem is to load the custom-

izer program from direct mode with the command LOAD"PR CUSTOMIZER",8. Finally, some of our readers have had trouble using Super Printer Driver. Below are step-by-step instructions that should be of help.

1. Copy PR CUSTOMIZER and PR.OBJ to a new disk.
2. Load and run PR CUSTOMIZER.
3. When the menu appears, select the appropriate printer. The customizer will save the printer driver to your disk.
4. Boot GEOS.
5. Insert the new disk, the one containing PR CUSTOMIZER, PR.OBJ, and your printer driver, and open it. (See your GEOS man-

ual for details.) If the new disk is not a GEOS disk, GEOS will ask if you want it converted. Go ahead and convert the disk at this time.

6. Copy the printer driver to your boot disk. (Again, see your GEOS manual for details.)

7. Use the Select Printer desk accessory to select the new printer driver as the current printer. @

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Multicolor Graphics Dump

Hubert Cross

With this excellent printer dump for the Commodore 64, your multicolor graphics masterpieces can be faithfully reproduced in black-and-white on an MPS-801, MPS-803, Commodore 1525, or compatible printer.

With a good paint program, you can draw beautiful pictures on your Commodore 64. Seascapes, teddy bears, fish, and moonscapes take on a new quality when drawn with a computer. However, computer art has a unique problem—it's hard to carry around. Most people bring the audience to the computer instead of bringing the computer to the audience.

It's no surprise, then, that printer dump programs are popular. With a graphics dump utility, you can take your favorite drawing and send it to your printer. The drawback to most printer dumps for the 64 is that they work best in standard hi-res mode, while most drawing programs use multicolor mode. Multicolored images are not rendered properly by such a program. (Multicolor pictures printed by hi-res dumps are characterized by vertical stripes.)

"Multicolor Graphics Dump" takes a different approach to displaying multicolor pictures. With Multicolor Graphics Dump (MCGD), each color is assigned a unique pattern (see Figure 1). This makes for an accurate depiction of your multicolor art.

MCGD works with the odd-numbered Commodore printers and compatibles (the MPS-801, MPS-803, and Commodore 1525).

Getting Started

MCGD is written entirely in machine language. Type in the program with "MLX," the machine language entry program found elsewhere in this issue. When asked for

starting and ending addresses, respond with these values:

Starting address: C3E8
Ending address: C757

When you've finished entering the data for Multicolor Graphics Dump, be sure to save a copy of the program to disk or tape with the name MCGD.

When you're ready to use MCGD, type `LOAD "MCGD",8,1` (for disk) or `LOAD "MCGD",1,1` (for tape). Now load your multicolor graphics screen into memory.

When you're ready to make a screen dump, type `SYS 50152` to activate MCGD. The program will ask for two numbers: the bitmap number and the color number. Use the following formulas to find the correct numbers for your pictures:

Bitmap number =
 $\text{INT}(\text{address of bitmap}/8192)$
Color number =
 $\text{INT}(\text{address of color memory}/1024)$

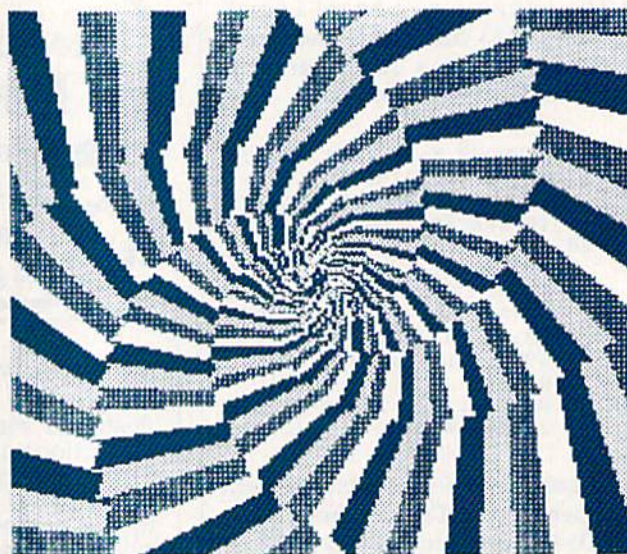
After you've entered the proper numbers, the dump begins.

The background is always white. This should make your ribbon last longer. Remember this when you design your screens. Also, keep in mind that color com-

Figure 1



Figure 2



binations that are objectionable on the screen may look fine on paper.

I've included a multicolor screen dump as an example of what this program can produce. It is found in Figure 2.

See program listing on page 78.

Multicolor Graphics and Video Storage

Dale McBane, Assistant Technical Editor

The VIC-II is the chip responsible for video output on the Commodore 64. The 64's microprocessor, the 6510, simply tells the VIC-II where to find the data to display and how to display it.

The VIC-II supports two graphics display modes on the 64: high resolution (hi res) and multicolor. Hi-res screens, as the name implies, boast higher resolution, but they're limited by the number of colors that can be displayed. Multicolor screens have a lower resolution, but more colors are available for each pixel.

Multicolor screens consist of 160 pixels horizontally by 200 pixels vertically—a total of 32,000 pixels. Multicolor pixels may be rendered in one of three foreground colors or in the background color. To make the extra colors available in multicolor screens, each pixel requires two bits of memory for storage. Storing a multicolor bitmap, then, requires 8000 bytes: 32,000 (pixels) times 2 (bits per pixel)—or 64,000 (bits)—divided by 8 (bits per byte).

The two bits representing each multicolor pixel can have one of four values: 00, 01, 10, or 11. Pixels with bit values of 00 take their color information from the screen background color register at location 53281 (\$D021). Pixels with bit values of 11 take their color information from color memory at locations 55296–56295 (\$D800–\$DBE7).

The VIC-II has a unique way of storing the color information for pixels with bit values of 01 and 10. To determine their colors, the VIC-II divides the bitmap into 1000 eight-by-eight groups of pixels. Each of these groups gets its color information from one byte of screen memory. Pixels with bit values of 01 take their color information from the upper four bits of screen memory, and pixels with bit values of 10 take theirs from the lower four bits. Including screen memory and color memory, it takes 2000 bytes to store the color information for a multicolor screen. You need a total of 10,000 bytes to store a multicolor graphics screen: 8000 for the bit-

map, 1000 for screen memory, and 1000 for color memory.

Bank Selection

Unlike the 6510, which can address 64K of memory, the VIC-II can address only 16K of memory at once. To overcome this limitation, the VIC-II divides the 64's memory into four 16K banks. The complex interface adapter #2 (CIA #2) has a register to tell the VIC-II which bank to get its information from.

Bank 0, located at 0–16383 (\$0000–\$3FFF), is the default video bank. Bank 0 isn't used for bitmapped graphics very often because much of the memory in this bank is used by the system. The BASIC and Kernal ROMs use the first 1024 bytes of bank 0 extensively, and the default position for screen memory is in this bank at 1024–2023 (\$0400–\$07E7). The BASIC text area also normally starts at 2048 (\$0800), right after screen memory.

Another drawback to using bank 0 for bitmapped graphics is the character-generator-ROM image located at 4096–8191 (\$1000–\$1FFF). The 6510 addresses the character-generator ROM at 53248–57343 (\$D000–\$DFFF), but, because of an addressing trick, the VIC-II sees a copy at 4096 (\$1000). If you're writing a BASIC program to manipulate the bitmapped screen, you can use this bank by moving the start of BASIC text to 16384 (\$4000). The problem with this solution is that the pointer to the start of BASIC text must be changed each time the program is to be used.

Bank 1, located at 16384–32767 (\$4000–\$7FFF), is the only video bank comprised totally of free RAM. The only drawback to using bank 1 from machine language is that the VIC-II can't see character-generator ROM here. Since the character-generator ROM can easily be copied to RAM, this isn't really a problem. Using bank 1 from BASIC limits the amount of RAM left for your program text and variables. Most commercial hi-res graphics programs, including *DOO-*

DLE! and *Koala Paint*, use bank 1 to store their bitmapped screens.

Bank 2, located at 32768–49151 (\$8000–\$BFFF), has 8K of its address space—from 40960 to 49151 (\$A000–\$BFFF)—occupied by BASIC ROM. The VIC-II always sees the RAM underneath the BASIC ROM, but if the ROM isn't switched out, the 6510 will see the ROM. This means that your program will be able to write to the screen but won't be able to read from it. It will read the BASIC ROM instead of the RAM underneath. The VIC-II also sees a copy of the character-generator ROM in bank 2, at 36864–40959 (\$9000–\$9FFF). That leaves only a 4K block of memory at 32768 (\$8000) totally free for graphics. If you're writing a machine language program that needs both text and graphics and doesn't need any routines from BASIC ROM, bank 2 may be a good choice.

Bank 3, located at 49152–65535 (\$C000–\$FFFF), has 4K of free RAM, 4K of Input/Output (I/O) registers, and 8K of Kernal ROM. Programming graphics within bank 3 can be difficult at best. Even though the 6510 addresses character ROM within this bank, the VIC-II can't see it here. The character-generator ROM could be copied to RAM, but free RAM is already limited in this bank. The VIC-II can see the RAM underneath the Kernal ROM, but using that RAM for graphics would be messy even from machine language. In general, bank 3 isn't a good choice for bitmapped graphics.

Inner Limits

Remember that the VIC-II can address only 16K of memory at one time. This means that in this 16K address space there are sixteen 1K areas where text screens can be stored and two 8K blocks where bitmapped screens can be located. A bitmap must be located on an even 8K boundary, and screen memory must be located on an even 1K boundary.

There are only eight even 8K boundaries within the 64's address space—therefore, only eight locations where a bitmap can begin: 0 (\$0000), 8192 (\$2000), 16384 (\$4000), 24576 (\$6000), 32768 (\$8000), 40960 (\$A000), 49152



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(\$C000), and 57344 (\$E000). Of these, 16384 (\$4000) and 24576 (\$6000)—both of which are in video bank 1—are the most commonly used. *Koala Paint* and *DOODLE!* both store their bitmaps at 24576.

There are 64 locations within the 64's memory where screen memory can begin. (The default location is 1024.) When screen memory is being used as color memory for bitmapped screens, it usually is placed immediately adjacent to the bitmap to make loading and saving the screens easier. If, for example, the bitmap is located at 24576 (\$6000), the screen memory will most likely be located at 23552 (\$5C00) or 32768 (\$8000). *DOODLE!* stores its screen memory at 23552.

Multicolor graphics screens can be the exception to this rule. Multicolor graphics screens have part of their color information stored in color memory and part in screen memory. Because the color memory is separated from the bitmap and screen memory, the screen can't be saved as a block using the Kernal SAVE routine. This means that screen memory used as color memory for multicolor bitmaps may be located in any of the eight 1K blocks not used by the bitmap itself. For example, if the bitmap is located at 24576 (\$6000), screen memory might be located at any of the following locations: 16384 (\$4000), 17408 (\$4400), 18432 (\$4800), 19456 (\$4C00), 20480 (\$5000), 21504 (\$5400), 22528 (\$5800), or 23552 (\$5C00).

Finding the screen memory in a multicolor graphics file stored on disk can be difficult. Most programs either write screens to disk in sections or move the data into one continuous block before saving. Both techniques are used in order to save disk space. If you load one of these files back into memory with BASIC's LOAD command, the data for the bitmap will most likely be in the correct position, but the data for screen and color memory will be out of position. The only way to correct this problem is to move the data into position yourself.

For example, one of the most popular file formats for storing multicolor graphics screens is the one used by *Koala Paint*. If you were to load a *Koala Paint* file into memo-

ry, you would find the bitmap, screen memory, and color memory arranged as follows:

Bitmap:

24576-32575 (\$6000-\$7F3F)

Screen memory (color information):

32576-33575 (\$7F40-\$8327)

Color memory:

33576-34575 (\$8328-\$870F)

In order to display the screen, you would have to move color memory to 55296 (\$D800) and screen memory to 23552 (\$5C00). The following short program does just that. It loads a *Koala Paint* graphics file and displays it until you press a key. To load a different file, change the filename in the variable NM\$ in line 10.

```
SR 10 NMS="{1}PIC G MONKEY
      {2 SPACES}"
FM 20 IFF=0 THEN F=1:LOADNMS,8,1
CC 30 BANK=1:SCNOFFSET=1:COLOF
      FSET=7
SB 40 POKE56576,(PEEK(56576)AN
      D252)OR(3-BANK):REM SET
      {SPACE}BANK
AM 50 POKE53265,PEEK(53265)OR3
      2:REM TURN ON BITMAP
DA 60 POKE53272,(COLOFFSET*16+
      SCNOFFSET*8):REM POSITIO
      N HI-RES AND COLOR MEMOR
      IES
QK 70 POKE53270,PEEK(53270)OR1
      6:REM SET MULTICOLOR MOD
      E
JE 80 FOR I=23552 TO 24551:POKEI
      ,PEEK(I+9024):NEXT I:REM
      {SPACE}32576-33575
QA 90 FOR I=55296 TO 56295:POKEI
      ,PEEK(I-21720):NEXT I:REM
      33576-34575
HA 100 A=PEEK(34576):POKE53280
      ,A:POKE53281,A
DA 110 GETK$:IF K$="" THEN 110
BB 120 POKE56576,199:POKE53265
      ,27:POKE53270,200:POKE5
      3272,21
KM 130 POKE53280,14:POKE53281,
      6
```

To print a *Koala Paint* file with MCGD, follow this procedure:

- Load MCGD and type NEW.
- Load the display program above.
- Change the filename in line 10 to the name of the file you want to print, and run the program.
- Once the file is displayed, press any key to exit the program.
- Type SYS 50152 to start MCGD.
- Enter 3 for the bitmap number and 23 for the screen memory number.

When you finish, you should have a fairly good representation of your screen.

ML Boot

David Roth

Automate your boot-up time with "ML Boot." It gets every computing session off to a good start by allowing you to load as many as nine utilities at once. For the 64. A disk drive is required.

If you use the same group of programs on a regular basis, you need an autoboot program. Rather than loading programs individually, you just load the autobooter and let it do the work.

Unfortunately, most autoboot programs install no more than two or three routines. And writing one from scratch can leave you wondering whether it's really worth the effort.

But with "ML Boot," you can easily boot as many as nine machine language programs that you've specified in a data file. To create a new data file, you simply run an accompanying BASIC program that requests the name and starting address of each machine language program. Then, with one load command, the system automatically installs each routine in the boot data file. Screen and text colors are also set, and control is returned to you. The routines in the boot file—be they programming utilities, BASIC extensions, or even a word processor—now reside in memory, ready to go.

Getting Started

The autoboot system is comprised of three programs. Programs 1 and 2 perform the actual system boot and are written entirely in machine language. Enter them with "MLX," the machine language entry program found elsewhere in this issue.

When you run MLX, specify the starting and ending addresses indicated below for each program.

Program 1
Starting address: 02A7
Ending address: 0306

Program 2
Starting address: 0801
Ending address: 0A60

Follow the instructions for MLX carefully. Before exiting, be sure to save a copy of each program to the disk containing the files you intend to boot. Use the filename BOOT.EXE for Program 1 and the name GENBOOT.EXE for Program 2.

Program 3 is a BASIC program that creates a boot data file named BOOT.DAT. Type it in and save a copy on the disk containing Programs 1 and 2.

Using the System

To construct the boot data file, load and run Program 3. Now, choose the background, border, and text colors that you want to have appear each time you boot. Enter the values for these at the appropriate prompts. (If necessary, consult the color table in your reference guide.) Press RETURN at each prompt to select the ML Boot default, blue text on a black background.

Next, enter the names and starting addresses for each file that you want booted. The starting address can be in either decimal or

hexadecimal. To indicate a hexadecimal address, precede the number with \$. If there isn't an initialization or startup address for the routine (that is, if you don't need to SYS to an address to install the program), simply enter 0 or \$0000 as the starting address. This will cause the boot routine to load, but not initialize, the corresponding program.

Programs listed in the boot file must use distinct areas of memory—their starting and ending addresses cannot overlap. For instance, for program development, you might use a ramdisk (say at \$C000), the DOS wedge (at \$CC00), "MetaBASIC" (at \$9000), and the LADS assembler (no initialization address). Also, note that ML Boot will not work for BASIC routines that would overwrite it as they load, or any other routines that load from 679 (\$02A7) to 2815 (\$0AFF).

When you've finished entering filenames, the program lets you check your entries. Shown are the three color values, the number of programs to boot, and each program's filename and load address in low-byte/high-byte form. If you haven't made any errors, press RETURN to write the data file to disk.

The system is now ready to boot. Type LOAD "BOOT.EXE",8,1 and then press RETURN. The computer will load "GENBOOT.EXE", which in turn installs each program specified in "BOOT.DAT".

Hint: You can save a bit of typing by making "BOOT.EXE" the first program on your disk. Henceforth, you can autoboot with LOAD ":",8,1.

See program listings on page 73.

SpeedCheck 128

A Spelling Checker for SpeedScript 128

Larry D. Smith

Here's a versatile and easy-to-use spelling checker for SpeedScript 128, our popular 80-column word processor for the Commodore 128. It builds a personalized dictionary of the words you use most frequently—and it works with any SpeedScript file. It's designed to work in either 40- or 80-column mode. A copy of SpeedScript 128 (October 1987) and a disk drive are required.

Since the debut of SpeedScript in January 1984, COMPUTE!'s Gazette has published a number of utilities that support this word processor. "SpeedCheck," published in the December 1985 issue, is a spelling checker designed for use with the 64 version of SpeedScript. Because of the 64's memory limitations and the 1541's sluggishness, SpeedCheck tends to be slow. With the introduction of the 128 and the 1571, we can take advantage of the speedier processing time. "SpeedCheck 128" is designed for use with SpeedScript 128 text files, and it works on files created from any version of SpeedScript. It also works in 40- or 80-column mode. The new program is more than ten times faster than its 64 counterpart.

SpeedCheck 128 examines your documents word by word, comparing your typing with entries in its dictionary. If the program comes across a word it doesn't recognize, it highlights the word on your screen so that you can correct any misspellings immediately. SpeedCheck also highlights correctly spelled words if they aren't already in its dictionary. These new words can then be added to the dictionary

with the touch of a single key.

Commercial spelling checkers come with prepared dictionary disks containing several thousand words. SpeedCheck 128 can't match that—at least not at first. You start with an empty dictionary and add words as you go along. This means that using SpeedCheck 128 may be a bit tedious at first. However, you'll soon build a customized dictionary disk that contains the words you use most often.

Save Your Dictionaries

Let's clear up some common misconceptions about spelling checker programs before you discard your dictionaries and grammar books. Like most such programs, SpeedCheck can be deceived. If you type *form* when you mean *from*, SpeedCheck cannot detect the mistake (assuming both words are in your dictionary). SpeedCheck makes no judgment about context; as far as it's concerned, *form* is a correctly spelled word.

A price had to be paid to keep SpeedCheck short (only 2K) and fast. For one thing, SpeedCheck checks the spelling of only those

words which have five or more characters, but this can easily be changed to any value you desire (more on this later).

Five characters is an arbitrary limit, but it yields a good speed/performance ratio. You could drop the limit to as few as two characters and check nearly every word in the document, but then it would take much longer to check a large file. Unless you're a world-class misspeller, you'll nearly always spell words like *a*, *an*, and *the* correctly. For most people, it's words like *knowledgeable* that cause problems.

When counting characters in words, SpeedCheck 128 recognizes only the letters a-z. The apostrophe and hyphen are not recognized, so a word such as *left-handed* or a contraction such as *aren't* is counted as two words (*left* and *handed*) or as a misspelled word (*aren*). A letter's case (upper- or lowercase) isn't significant; all letters are converted to lowercase when looked up or added to the dictionary. Thus, a single dictionary entry would match *basic*, *BASIC*, and *Basic*.

Words in the SpeedCheck 128 dictionary disk are kept in sequential files, with one file for each of the 26 possible initial letters. If the dictionary files don't exist on the dictionary disk, SpeedCheck 128 creates them automatically. (If the disk-drive error light flashes during checking, don't worry; SpeedCheck 128 will correct the problem.) As a new word is added, it is tacked onto the end of the appropriate file. This

makes adding words to the dictionary fast and simple, but it makes looking up words slower because the words are in random—rather than alphabetical—order. Within the file for *z*, for example, *zebra* might be found between *zymurgy* and *zipper*. The only way to find a particular item in randomly ordered data is to search sequentially from the first item until the desired item is found. Thus, when SpeedCheck looks up a word, it must hunt through all the words with the same initial letter before it can determine that the word is not present.

To help minimize the time needed to search sequentially through the dictionary, SpeedCheck 128 loads each of the 26 files that make up your dictionary into bank 0 of the 128's RAM, one at a time. This allows SpeedCheck 128 to check the entire text file while having to load the dictionary files only once.

With the text file and the dictionary file in memory, SpeedCheck 128 is quite fast. To further enhance its performance, SpeedCheck 128 switches into Fast mode when input from the user isn't needed. Using Fast mode effectively doubles the speed of the 128 and halves the time needed to check documents.

Typing It In

SpeedCheck 128 is written in machine language, so you'll need to enter it with the 128 version of "MLX," the machine language entry program found frequently in this magazine (last month's issue contains the program, as does this month's disk). When you load and run MLX, you'll be prompted for the starting and ending addresses of SpeedCheck 128. Respond with the values indicated below.

Starting address: 1C01
Ending address: 2408

Be sure to save a copy of SpeedCheck 128 before exiting from MLX.

Before you begin to use SpeedCheck 128, you need to prepare a dictionary disk. SpeedCheck 128 can use any blank disk as a dictionary disk since it builds the dictionary automatically as it goes. To format a disk for use as a dictionary disk, type the following commands:

```
OPEN1,8,15,"N0:DICTIONARY.ID"  
:CLOSE1
```

where *ID* is any two characters. (Note that it is a good idea to be sure that the ID of each of your disks is unique.) SpeedCheck 128 builds the dictionary automatically as it works.

Even though SpeedCheck 128 is written in machine language, it can be loaded, run, and saved as if it were a BASIC program. To begin, simply load SpeedCheck 128 and type RUN. You'll see a copyright message and a prompt for a filename. Place the disk containing the text file you wish to check into the disk drive and type the name of the file. SpeedCheck 128 will search the disk for the file and warn you if it is not found. If you forget the name of the file, press RUN/STOP-RESTORE to exit from SpeedCheck 128, type DIRECTORY to list the files on the disk, and type RUN to reenter the spelling checker. Once SpeedCheck 128 has successfully loaded the file to be checked, it prompts you to place the dictionary disk in the drive. After you've done so, press any key to continue.

Add, Edit, or Skip

Once you've pressed a key, SpeedCheck 128 begins checking your document. If you're using a 40-column monitor, the screen goes blank. Don't worry; this is a side effect of Fast mode. The screen returns to normal if SpeedCheck 128 needs input from the user or when it has finished checking the document.

If SpeedCheck 128 finds a word that isn't in its dictionary, it displays the word in reverse field at the top of the screen, along with a few words that follow the text (for context). SpeedCheck 128 then displays the menu of options available to you. You may either add the word to the dictionary, edit the word, or skip over the word.

Pressing the A key lets you add the word to the dictionary. Be sure the word is spelled correctly before you make the addition. When you first use SpeedCheck 128, it stops at nearly every word. As the dictionary grows, SpeedCheck 128 won't stop as often.

Pressing the E key lets you edit the misspelled word. SpeedCheck 128 prompts you for the new spelling of the word and then checks the new spelling against its dictionary. If the word is still not found in the

dictionary, it is displayed at the top of the screen again. Add, edit, or skip it as before.


Press the S key to ignore the misspelled word and continue checking the document. The Skip option is handy when the program encounters a name or address or some other correctly spelled word that you don't want in your dictionary.

Once the document has been checked, the dictionary disk is validated. (Do not store your dictionary on a GEOS disk; the normal Validate command will ruin a GEOS disk.) Also, if any of the words in the text file have been edited, SpeedCheck 128 asks if you want to resave the text file. If you answer yes, SpeedCheck 128 prompts you for a filename. If you wish to replace the existing file, simply use the Save with Replace command (@0:) in front of the name of the file. Don't worry about the Save with Replace bug; SpeedCheck 128 gets around the bug by scratching the file and saving it normally.

Customizing SpeedCheck

It's easy to change the value that represents the minimum number of characters for words you plan to add or look up. Just load SpeedCheck 128 and POKE the desired value into location 9167. PRINT PEEK(9167) will show that the current value is 5. To change the program so that it checks words with four letters or more, type POKE 9167,4. If you save a copy of SpeedCheck 128 after you've changed the value in 9167, your new value will be incorporated into SpeedCheck 128. Don't decrease the limit to less than two characters.

You can use one minimum-length value for a while and then change to another without having to create a new dictionary disk. But consider that if you use a four-character limit extensively and then switch to a five-character limit, you'll have many four-character words in the dictionary that the new version will never use. Likewise, if you use a five-character limit extensively, then switch to a four-character limit, searching will be slowed because all four-character words will be found near the end of the dictionary.

See program listing on page 69. 

Disk Package

Barry Camp

You may never need the DOS Wedge again if you use this power-packed utility. It offers the standard Wedge commands and then some—and it includes a complete disk editor. The 1764 RAM Expansion Module is also supported. For the 64 with a 1541, 1571, or 1581 disk drive.

The DOS Wedge (called "DOS 5.1" on the test/demo disk which accompanies the 1541 and 1571 drives) has long been a mainstay for 64 users who want quick, easy, and painless communication with their 1541 disk drives. However, the Wedge does have limitations. If you want to lock or unlock files, change the name on a disk's header, find out the starting and ending addresses of a program, or rescue an unclosed (splat) file, the DOS Wedge is of little help.

"Disk Package" is a replacement for the DOS Wedge that can do all these things and more. Aptly named, it's a complete DOS support package. It even features a built-in disk sector editor that allows you to alter individual bytes on a disk. Many other features are available, including a command that lets you change a disk drive's internal device (or unit) number, verify your programs, and retrieve

the starting and ending addresses of any BASIC or machine language program. Disk Package also works with Commodore's 1764 RAM Expansion Module (in its RAMDOS configuration) and the 1571 and 1581 disk drives.

Getting Started

Disk Package (Program 1) is written entirely in machine language. Type it in using "MLX," the machine language entry program found elsewhere in this issue. When MLX prompts you for the starting and ending addresses, respond with the following values:

Starting Address: 0801
Ending Address: 1218

After you've finished entering the program, save a copy to disk before exiting MLX. Since it's possible to erase a disk while using Disk Package, you should save a backup copy or two to other disks from within MLX.

If you plan to use a 1764 RAM Expander with Disk Package, type in Program 2, "1764 Interface." Like Program 1, this program is written in machine language and also requires MLX for entry. Here are the starting and ending addresses for Program 2:

Starting Address: 0801
Ending Address: 0B60

Again, when you've finished entering the data, be sure to save at least one extra copy of the program to a backup disk.

The DOS Wedge Revisited

Program 1, Disk Package, loads and runs like a normal BASIC program. When you run it, it installs itself at locations 49152-51614 (\$C000-\$C99E) and is ready for use.

The Quick Reference Table lists all Disk Package commands. The table includes two sections: the first part on DOS commands; the second, commands for a disk editing system. In general, the commands common to Disk Package and the DOS Wedge work the same, but some of these are enhanced in Disk Package.

- Before the drive status is displayed, Disk Package clears the screen line, making it easier to read

the status on a cluttered screen. As an added convenience, the current device number is also shown.

- When a directory is being displayed, the @ symbol is an optional character—all you need to do is type \$ and press RETURN.

- When you're switching between drives, the @# command accepts only the numbers 4 through 30; any other number causes an ILLEGAL DEVICE NUMBER message to be displayed.

- When you're performing a load or save with Disk Package, it blanks the screen and sends a DOS UI—command to the drive. On a 1541, this can speed up loads and saves by 15 percent. Upon completion, the program restores the screen and sends a UI+ to the drive, resuming its normal operation.

- Disk Package no longer supports the little-used "[volume]" identifier (available in the DOS Wedge).

New Commands

Nine new wedge commands are available in Disk Package. One gives you a quick and easy inventory of available free memory. Type @F and press RETURN to get a true count of the number of bytes available.

To display the starting and ending addresses of a program without disturbing the program currently in memory, type a semicolon followed by a program filename. Both decimal and hexadecimal address values are shown. For example, if you enter

;**SPEEDSCRIPT 3.2**

with the file **SPEEDSCRIPT 3.2** on the disk in your drive, you'll see

START: 2049 (0801) END: 8200 (2008)

The @U0>dv command works like a device number switch, changing the internal unit number of your disk drive. Observant owners of the newer drives (like the 1581) will notice in the user's guide that the dv argument of this command must be a single character code (for example, CHR\$(dv)). Instead of using this method, Disk Package accepts ASCII digits to allow this command to work on any drive (even a 1541). For example, to switch a drive's unit number to 24, enter @U0>24.

Whenever this command is executed, Disk Package automatically follows with the @# command,

Quick Reference Table: Disk Package Commands

Symbols and abbreviations for DOS Commands and Disk Editing System Commands

+ denotes a DOS Wedge command.

* indicates wildcards are not supported with the 1764.

X indicates command not available with the 1764.

means an @#dv is automatically executed following this command.

Parameters or characters enclosed in brackets ([]) are optional.

dr: drive number (0,1)

fn: filename

dv: device number

tr: track number

sc: sector number

sx: starting sector number

ex: ending sector number

DOS Commands

		Description
@		+ Display current device number and status
[@]\$[[dr:fn?][*][=type]]	+*	Display directory (@ is optional)
@command	+	Send standard DOS command
@#dv	+	Communicate with device dv (4-30)
@U0>dv	#	Change drive's device number to dv (4-30)
@E	X	Enter Disk Editing System
@F		Display number of bytes free
@Q	+	Quit (deactivates Disk Package)
@!		Reset computer (cold start)
@WP+	(1541 only) X	Disk soft write-protect on
@WP-	(1541 only) X	Disk soft write-protect off
@/[dr:fn	(1581 only) X	Select partition (cannot be used to create partitions; use OPEN instead)
%[dr:fn?][*]	+*	Nonrelocatable LOAD (ML)
/[dr:fn?][*]	+*	Relocatable LOAD (BASIC)
↑[dr:fn?][*]	+*	Relocatable LOAD/auto-RUN (BASIC)
~[dr:fn	+	SAVE (BASIC)
=[dr:fn?][*]	*	VERIFY (ML and BASIC)
:[dr:fn		Display starting and ending addresses

Disk Editing System Commands

(All arguments must be in hexadecimal)

R[tr,sc]	X	Read track and sector
Wtr,sc	X	Write track and sector
N	X	Read next sector of file
L[sx,ex]	X	Display sector to screen
?	X	Display numbers of last track and sector read
Pdv[sx,ex]	X	List sector to device (3-7)
Pdv?	X	List last track and sector numbers to device (3-7)
Z[sx,ex]	X	Clear all or part of sector
X	X	Exit Disk Editing System (to BASIC)

thereby maintaining communication with that drive. If the number requested falls outside the range of legal numbers (4-30) or was otherwise entered incorrectly, then whatever information you enter is sent directly to the drive, allowing other U0 and U0> commands to function properly.

Another new command allows you to verify your programs, in the rare event that it's necessary (for instance, when you're using a suspected faulty disk or a misaligned drive, or if a power surge occurs during a save). Just type an equal sign followed by the name of the program to be verified and then press RETURN.

Note that the Load, Save, Veri-

fy, and Display Starting/Ending Address commands are designed to operate with or without quotation marks around the filename. As with the DOS Wedge, you can display a directory and then load a program using its directory entry by typing %, /, or ↑ over the first digit in the directory listing and then pressing RETURN. The other commands just mentioned also operate in a similar fashion.

If you own a 1581, you can move into a previously created partition in one of three ways. Either use @/partition name from immediate mode, @"/partition name" from immediate or program mode, or type @/ at the beginning of a directory entry, like this:

Partition entry before:

400 "VIDEO GAMES" CBM

Type @/ and press RETURN:

@/0 "VIDEO GAMES" CBM

Disk status after:

#9: 02, SELECTED PARTITION,01,10

Disk Package ignores the second 0 character in 400 in the sample partition entry. Notice that 0: in front of the partition name is unnecessary. Also, do not attempt to create a partition using @/—use the OPEN and PRINT# statements as stated in the 1581 user's guide instead.

Write Protection

With the @WP+ and @WP- commands, you can switch soft write-protection on or off without ever covering the write-protect notch. With this feature, any attempt to save a program, open a file for writing, scratch a file, or otherwise write to the disk is aborted, and the DOS error 73,CBM DOS V2.6 1541 results. (Note that this message also appears when a @WP+/@WP- command actually executes. This command works on a 1541 only; any attempt to do an @WP+/@WP- on any other drive results in an ILLEGAL DEVICE NUMBER ERROR.)

An additional word of warning: This write-protection method will not prevent the DOS New command (@N:diskname,id) from formatting a disk, so be careful. Check the directory of a used disk and be sure you've backed up those important files before you reformat it.

Warm Stop, Cold Start

The @Q command is the normal method of disconnecting Disk Package (a "warm stop"). Since BASIC can operate as much as 10 percent slower when Disk Package is engaged, you might want to do an @Q in some situations where speed is critical. To reconnect Disk Package, simply type SYS 49152.

The new @! command is a more severe way of disconnecting Disk Package, working like a software reset button. It performs a cold start (similar to the SYS 64738 method), and any program in memory is wiped out.

The Disk Editing System

The most powerful aspect of Disk

Package is the Disk Editing System. It allows you to view, alter, or make printer dumps of individual disk sectors. A word of warning: It's a good idea to have a thorough knowledge of how information is stored on a disk before using the Disk Editing System. *This portion of Disk Package is not for beginners.* Refer to your disk drive manual for details.

The @E command enters the Disk Editing System. While you're in it, BASIC is disabled, and you can't access any program in memory until you exit with the X command. This command doesn't affect either your program or any variables stored in memory. However, the Disk Editing System does require 256 bytes of free memory for its workspace. If that much space is not available, an OUT OF MEMORY ERROR results; however, it would take a very large program to cause that.

The first thing to do when editing a disk sector is to read it into the workspace with the R command. Type R, followed by the desired track and sector values (as two-digit hexadecimal numbers), separated by either a comma or a space. For example,

R12,01 or R12 01

would read track 18, sector 1 into the Disk Editing System's workspace. (This particular sector contains part of the directory on the 1541 and 1571 drives. If you own a 1581, enter R28,03 for a similar display.)

When a sector is read, only the first half (128 bytes) is displayed on the screen. A List command (L) prints at the end of the half-sector data. To examine the last 128 bytes, just press RETURN.

Note the format of each line listed. First there's an index byte, then eight data bytes (all shown as two-digit hexadecimal numbers), and then eight reverse-field ASCII characters corresponding to the eight data bytes. Disk Package prints these characters to give you an idea of what is actually stored on the disk sector. Be aware, though, that not all data bytes are displayable (for instance, the control characters, \$00-\$1F).

The List command does much more than just list half of a sector. You can list one line, two, or the entire sector, if you like. For one line

(eight bytes), type L, followed by the index of the first data byte (in hexadecimal) that you want to view. To list more than one line, follow that first byte with a comma (or space) and then type the ending index (also in hexadecimal). For a quick scan of the entire sector, just type L and press RETURN. As the data scrolls by, hold the CTRL key to slow it down or press RUN/STOP to stop it.

Here are some examples of how to use the L command:

L List entire sector.
L38 List one line (eight bytes, 38-3F).
L65,7D List part of sector (bytes 65-84).

If you are either looking at the directory (track 18 on the 1541 and 1571, track 40 on the 1581) or scanning consecutive sectors of a file, the Next Sector command can help. Just type N, and Disk Package automatically executes a Read command, using the first two bytes of the current sector for the read (those first two bytes point to the next track and sector of the file). When the last sector of the file is read in, the program disables the N command until a different sector is read in. (You may type an N over the L on the L80,FF line when scanning a file—the N command will ignore any characters following it.)

Making Changes

Now comes the fun part—actually editing a disk sector. The Disk Editing System makes full use of the 64's built-in screen editor, so changing sector information is easy. Just use the L command to display whatever portion of the sector you want to change. Now use the cursor keys (but not the INST/DEL key) to move to the appropriate line. Make the necessary changes.

Let's say, for instance, you have this information on a disk, which you've listed to the screen:

.28: 57 45 52 20 31 4E 39 20 VER 1.9

If you want to change the 1.9 to 2.0, you need to look up the ASCII codes for the new characters, convert them to hexadecimal, and then place the new values over the old ones, like this:

Position cursor:

.28: 57 45 52 20 31 4E 39 20 VER 1.9

Type code for 2:

.28: 57 45 52 20 32 4E 39 20 VER 1.9

Reposition cursor:

.28: 57 45 52 20 32 4E 3 9 20 VER 1.9

Type code for 0:

.28: 57 45 52 20 32 4E 30 20 VER 1.9

Now press RETURN. The resulting changes appear in the reverse field characters on that line:

.28: 57 45 52 20 32 4E 30 20 VER 2.0

If you make a typing error or you change the wrong values, don't worry—you're only altering the editor's workspace, not the actual sector itself. Just change the values back and keep going until you're satisfied with your work. If you can't remember what you've changed, you can reread the sector with the R command and start over. (Typing R alone will recall the most recent sector read from disk and store it in the workspace.)

When you've made all the changes you want, write the contents of the workspace back onto the disk with the W (Write) command. The syntax for the Write command is the same as that of the Read command. If you happen to forget which sector you were editing, type a question mark followed by RETURN, and the track and sector values used by the most recent Read, Write, or Next Sector commands are displayed. That way, you can be sure of writing back to the same sector you read from.

If you wish to change a major portion of the sector (or all of it), the Z command can help. It will clear the workspace, filling it with zeros. You can clear one byte, eight bytes, or a whole sector. The syntax for the Z command is exactly the same as that of the L command. When entered properly, the Z command will list the bytes zeroed out when finished.

Printouts

Not only can you view sector information on the screen; you can also make a printout for later reference with the P command. To print, type P, followed by the device number (a single digit between 3 and 7), and either a question mark to display the current track and sector values or the optional index values used in displaying part of a sector. Here are some examples of the P command:

P4? Send track and sector information to device 4.
P6 Print entire sector to device 6.
P7,23 Print one line to device 7.
P5,E0,FF Print part of sector to device 5.

Compatibility

Software compatibility is always a problem for 64 users who do a lot of involved programming. Disk Package is designed to function as closely as possible to the DOS Wedge, so you should find that it's highly compatible with many programs. Since it isn't interrupt-driven, it should not interfere with utilities which are. Although Disk Package uses several memory locations throughout zero page and the BASIC/Kernal system variable area, most are used for temporary storage only while a command is executing, so there is little or no chance of conflict here as well.

Disk Package works well with BASIC programs. In fact, some Disk Package commands can work inside a BASIC program, with a slightly different syntax. For example, a BASIC program written to scratch a file, get the status, and offer to display a directory afterward looks like:

```
100 @ "S0:filename":@ ""  
110 PRINT:INPUT "VIEW DIRECTORY";RS  
120 IF LEFT$(RS,1) <> "Y" THEN END  
130 @ "$"
```

When using DOS commands inside a BASIC program, you must use quotation marks, even when requesting the drive status (note line 100). Disk Editing System commands are not allowed in a program, but you can enter the Editor from BASIC with the @ "E" command. Note that some commands, like the soft write-protect and device-number change commands, will halt program execution immediately, so you might want to do a little experimenting. Despite these minor limitations, Disk Package and BASIC coexist peacefully most of the time.

Machine language programs are a different story. Obviously a program can't occupy the same memory locations Disk Package does, nor should it write to that area. Probably the best way to find out if Disk Package works with other utilities is to go ahead and install them—the worst that could happen is a lockup.

Disk Package has been tested with a number of utilities. Commodore's *Assembler Development System*, which was used to put Disk Package together, works very well.

"64+", which appeared in the September 1987 issue of *COMPUTE!*, also works with Disk Package, as long as you install 64+ first. Make the following POKES when using SHIFT-RUN/STOP with 64+ and Disk Package in tandem:

POKE60647,37:POKE60648,48:
POKE60649,58

Some ML programs, such as "Supermon 64," are loaded as BASIC programs (starting at 2049/\$0801). Most of these will not work with Disk Package, but once you exit that utility, Disk Package will still be there, ready to continue. *SpeedScript*, "Directory Magic" (October 1987), and many others also fall into this category. Unfortunately, Disk Package will not work with the Fastload cartridge, so it should be disabled before using the program. Other programs that won't work with Disk Package include "MetaBASIC" (February 1987) and almost all commercial software.

Other Drives

Disk Package is designed to work specifically with the 1541 disk drive, although it has been tested with the 1571 and 1581 and runs just as well (with the exception of @WP+ and @WP-). The standard DOS commands (Copy, Scratch, Validate, and so on) will still work on other drives, as should the Disk Editing System commands, but it's a good idea to experiment using a scratch disk to be certain.

Most of the features of Disk Package are also available on the 1764 RAM Expander, with the help of Program 2. This program acts as a go-between for the 1764 (with RAM-DOS installed) and Disk Package.

Program 2, although written in machine language, also loads and runs like a BASIC program. When you run it, it installs itself at location 52224 (\$CC00). Once in place, the program intercepts most of the commands entered via Disk Package and either executes special routines for the 1764 or aborts with an error message. For example, the 1764 does not support direct track and sector access, so an ILLEGAL DEVICE NUMBER error occurs whenever an @E command is attempted. For more information, refer to the Quick Reference Table above or the manual for the 1764. Note: The 1764 Interface resides

where the DOS Wedge (DOS 5.1) normally sits. If you need that area, you can disable 1764 Interface by SYSing to 49152.

System Hangups

On the rare side of occasionally, you'll find that the system will appear to lock up while trying to access a drive. The computer hasn't crashed—it's hung in a loop trying to access a device that for some reason isn't responding. The most common causes of a hangup include:

- Device number mismatch. The unit number was changed via software; then the drive was later reset, restoring its default setting. At this point, the user's software selection doesn't match the actual device number.
- Mismatch via @WP+/@WP-. These commands reset the drive before attempting to operate, causing the same mismatch problem mentioned above.
- Two or more drives have the same unit number. All devices must have their own unique device number.
- Drive lockup. To correct, reset the drive.
- In the case of the 1764 RAM Expander, improper installation of either RAMDOS or the 1764 Interface program. Disk Package must be in place before you install 1764 Interface. And when installing RAMDOS, be sure to select 207 as the interface block.

If any of these problems ever occur, press RUN/STOP-RESTORE, correct the situation, and try again.

A Powerful Tool

With or without the 1764 RAM Expansion Module, Disk Package is indeed a very powerful tool. With extra wedge commands and the added capabilities that Disk Package's Disk Editing System offers, you can do almost anything to a disk. You can lock files simply by changing their file-type bytes. You can rename a disk or change its ID. A "splat" file can be at least partially rescued by restoring the file-type byte, scanning the file, setting the last ungarbled sector so that it's the final sector, and then validating the disk. Your disk drive manual can be an invaluable reference tool for performing these types of operations.

See program listings on page 70. ■

MultiSort 128

James E. Borden

"MultiSort 128" allows your BASIC programs to sort both one- and two-dimensional string arrays at machine language speed—just what you need for custom-designed databases. For the Commodore 128 with disk drive.

Sorting string arrays from BASIC can be a trying experience; when you start shuffling around thousands—or even hundreds—of strings, BASIC slows to a crawl. You can use any of several good machine language sort routines to speed up the process, but most are limited to sorting one-dimensional arrays. "MultiSort 128" is more powerful; it can sort both simple one-dimensional arrays (lists) and two-dimensional arrays (matrices).

Suppose you have written a simple BASIC program to store the address file for your local user group. The program stores the names, addresses, and phone numbers of the group's members in a two-dimensional array (we'll use X\$ in our example) as follows:

Column	Contents
0	name
1	address
2	city
3	state
4	zip code
5	phone number

To find the name of the third member, you would reference the first column of the third row, X\$(2,0). (Remember to start counting from 0.) To find the zip code of the forty-third member, use X\$(42,4).

This method of storing the address file works well until you need to alphabetize the file. Sorting the

file from BASIC would be fairly simple, but it would also be slow. You could use a machine language routine, but most common ML routines sort only one-dimensional arrays or only one column of two-dimensional arrays. Such a routine would destroy your address file. With MultiSort, one SYS is all it takes to sort your address file on any column you like.

Typing It In

The program code for MultiSort is located in two banks for maximum speed. The routine in RAM 0 (the first 64K of memory in the 128) checks the variable name and value. If these are valid, the ML code in RAM 1 (the second 64K of memory in the 128) is called to do the actual work of comparing strings, swapping pointers, and fixing links. If an error occurs at any time, the code in RAM 0 also prints an ARRAY ERROR IN ## message.

Program 1, "Sort Maker," is a BASIC program that creates two machine language files on your disk. One file contains the code that resides in RAM 0; the other, the code in RAM 1. The DATA statements in Program 1 contain machine language instructions. If you make one error while typing them in, the sort routine could lock up

your machine or scramble your array instead of sorting it. To prevent typing errors, use "The Automatic Proofreader," found elsewhere in this issue.

Program 2, "Sort Demo," is a short BASIC program that demonstrates how MultiSort can be used to sort both one- and two-dimensional arrays. The first part of the demonstration fills a ten-row, four-column array and then sorts it according to the column you choose. Column 0 is filled with constant strings, column 1 is filled with numerical data, column 2 contains random characters, and column 3 contains only null strings. (We'll discuss MultiSort's treatment of null strings and numerical data in a moment.)

The second part of the demonstration allows you to check the time required to sort a 1000-element array. The program first creates 1000 random strings; then it sorts them. In Slow mode, it takes approximately 14 seconds to sort an array of 1000 strings. You can nearly double the speed of the sort by switching to Fast mode before sorting. To go to Fast mode, remove the REM in line 210. To return to Slow mode after the sort, remove the REM in front of the SLOW statement in line 250.

Sorting Syntax

The syntax for calling MultiSort is very simple. First make sure your program is in a bank that allows access to RAM 0 (bank 0, 14, or 15). Next, call MultiSort with the SYS command. Finally, specify the name of the array to sort and which column to sort on if it's a two-dimensional array. Here's an example of how to sort a one-dimensional array named XY\$:

```
BANK15:SYS6912:XY$(0):REM SORT
THE LIST XY$
```

The SYS must be followed by a colon, the name of the array, and a value in parentheses. For one-dimensional arrays, any number or variable in the range 0-255 can be used. (In simple lists, the value is only a dummy.) If any of these are missing or invalid, a syntax error results. After the SYS command has executed, array XY\$ is sorted in ascending order.

Sorting a two-dimensional array is a little more complicated. For matrices, the number within parentheses refers to the column by

which you wish to sort. For example, you could use DIM A\$(99,4) to create a 100-line \times 5-column array named A\$. The second number in the DIM statement is the maximum value allowed in the sort call. Assume that in this array, column 0 is not used (all null strings), column 1 contains the name, column 2 holds the address, column 3 contains the city, and column 4 holds the state. To sort the array by name, use

```
BANK15:SYS6912:A$(1):REM SORT BY
NAME COLUMN
```

Or, to sort the array by state, use

```
BANK15:SYS6912:A$(4):REM SORT BY
STATE COLUMN
```

Keep in mind that you are sorting strings, not numbers. If you have strings of numbers, you must pad them with leading spaces so that the ones column lines up. If you sort "5," "10," and "2," they come out in the order "10," "2," and "5." To sort these numbers correctly, you must enter them as " 5," "10," and " 2."

Many programmers do not use element 0 of an array. Therefore, if element 0 of the sort column contains a null string, it is left there after the sort. A null string in any other position is moved to the end of the array. If this is a problem, use a space to represent empty strings.

If you pass invalid data after the SYS command (an undimensioned array or illegal column, for example), the program will print **ARRAY ERROR IN ##** and ring the bell. A little care should prevent this from happening. Also, although it should not be a problem, arrays or columns containing all null strings will return an **EMPTY ARRAY ERROR IN ##** message. (See the first part of the demonstration.) Having fewer than three valid strings also produces the **EMPTY ARRAY ERROR** message. (If you have that few items to sort, you can sort them with a simple IF-THEN statement.)

After you've sorted the array, check location 6. If the value stored there is not 0, an error has occurred. (See lines 160 and 240 of the demonstration program.) If an error has occurred, MultiSort will have printed an error message, and either your program can go back, modify the array, and sort again, or it can end.

One final caution about sorting two-dimensional arrays: Although all data will be swapped correctly, if


there are two related fields, such as last and first names, the sort might appear to be incorrect. A section of such an array might look like this after a sort by last name:

(X)	A\$(X,1)	A\$(X,2)
50	SLIP	JAMES
51	SMITH	ROBERT
52	SMITH	MIKE
53	SPOT	BOB

Notice that the sort column (column 1) is in order, but the first-name column (column 2) is not (*Mike* should precede *Robert*). There is no way to sort by two fields at the same time, but an easy way to work around this is to sort by the first-name field and then by the last name.

A Note to Programmers

The sort program uses 146 bytes in RAM 0 (\$1B00-\$1B91) and 1048 bytes in RAM 1 (\$0400-\$0817). It also uses several zero-page locations (\$05-\$08 and \$64-\$6F) but should not interfere with any other ML routines you are using. Locations \$FB-\$FE are not used by MultiSort.

See program listings on page 82. 

The Write Stuff

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news & products

New Products from Epyx

Home Video Producer, a new release from Epyx, lets 64 and 128 owners put their systems to work enhancing home videos with graphics, borders and typefaces, wipes, and scrolls. The package is due out in the second half of the year and is priced at \$49.95.

Two new products announced for the company's U.S. Gold line are *Tower Toppler*, filled with monsters from alien oceans, and *Technocop*, with futuristic police action; each is priced at \$39.95.

Battleship is Epyx's computer translation of the classic board game; suggested retail is \$29.95. *Final Assault* (\$39.95) is a mountain-climbing challenge complete with pitons. *Street Sports Football* moves the pigskin from astroturf to asphalt; it carries a price of \$39.95. The latest in Epyx's Masters Collection is *The Legend of Blacksilver*, a fantasy priced at \$39.95. *Mind-Roll* is a 3-D strategy game priced at \$39.95. Seoul is the setting for *The Games—Summer Edition*, a \$39.95 package whose design includes input from athletes themselves. Epyx, 600 Galveston Dr., Redwood City, CA 94063

Circle Reader Service Number 201.

New Name, New Games

Activision has changed its name to Mediagenic while retaining the Activision moniker for a particular line of games. Several

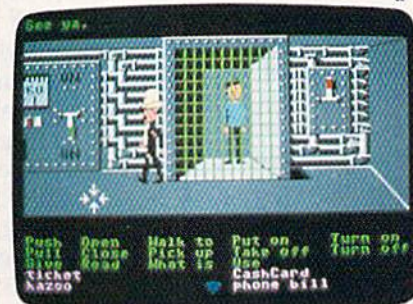
new Commodore 64 titles from this veteran software-publishing house have been announced. Charlie Hustle makes the transition from home plate to home computer in *Pete Rose Pennant Fever*, due in November for the Commodore 64 at \$34.95, from Mediagenic's Gamestar line. The program simulates baseball play, with an added opportunity for the player to assume the role of a general manager who must build

a pennant-worthy team

without spending himself bankrupt. Activision's U.S.S.

Ocean Ranger gives players the next generation in guided-missile technology, and it challenges them to face the next generation of risks

in global hot spots



Zak McKracken and the Alien Mindbenders

including the Persian Gulf and Southeast Asia; suggested retail is \$34.95. Warriors weary of the sea can press into the jungle in Activision's software version of *Predator*, the Schwarzenegger hit that pitted Arnold against the alien. *Predator* is set for release in September at \$29.95.

Ever read those tabloids at grocery-store checkout counters? So do the programmers at Lucasfilm Games. *Zak McKracken and the Alien Mindbenders*, coming in July at \$34.95, puts the player in the role of a tabloid reporter in hot pursuit of a stunning scoop. The game extends the interface made popular in last year's *Maniac Mansion*.

Interplay announced *Neuromancer*, a game based on William Gibson's award-winning science-fiction novel. *Neuromancer* combines adventure, role-playing, and simulation, and features a soundtrack by Devo. The game should be available by the time you read this, at a suggested retail price of \$39.95.

Mediagenic, P.O. Box 7286, Mountain View, CA 94039

Circle Reader Service Number 203.

The SID chip just met



Forget about cute little bleeps and squonks, we're talking 9-voice Yamaha FM music synthesizer with optional real 5-octave piano keyboard and a composer & voice editor program that Beethoven would have traded the Fifth for!

If you're talking music on the C64/C128 you're talking

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9 independently programmable voices and MIDI capability. And if that's not enough there's our **SFX SOUND SAMPLER** complete with microphone and software, also MIDI capable.

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New Titles for Sports Lovers

Accolade has announced several new titles for the 64. *Serve and Volley*, a tennis simulation priced at \$29.95, combines tennis action with strategic decisions such as ball placement, serve selection, and a variety of hitting styles.

T.K.O. gives players boxing matches complete with black eyes, cuts, and bruises. Priced at \$29.95, *T.K.O.* uses split screens to enhance the player's sense of the boxing experience.

Fast Break is Accolade's basketball game. Designed by Steve Cartwright, the \$29.95 game can be played solitaire or with two players, and it uses an interface similar to the one in *Hardball* and *4th and Inches*.

Rack 'Em a \$29.95 billiard/pool simulation, includes snooker, bumper pool, eightball, nineball, and straight pool. Accolade, 550 S. Winchester Blvd., Suite 200, San Jose, CA 95128.

Circle Reader Service Number 205.

BEFORE TYPING . . .

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

SpeedCheck 128

See instructions in article on page 60 before typing in.

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Pattern Fill

See instructions in article on page 54 before typing in.

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C360:8D 20 C0 AD 12 C0 29 07 96
C368:8D 1C C0 AE 20 C0 A9 00 18
C370:8D 21 C0 8D 22 C0 E0 00 CD
C378:F0 15 AD 21 C0 18 69 40 FE
C380:8D 21 C0 90 03 EE 22 C0 11
C388:EE 22 C0 CA 4C 76 C3 8E 27
C390:1E C0 8E 1F C0 AD 19 C0 CA
C398:18 0A 0A 0A 90 03 EE 1F 1E
C3A0:C0 18 6D 1C C0 8D 1E C0 37
C3A8:90 03 EE 1F C0 AD 21 C0 C8
C3B0:18 6D 1E C0 8D 1E C0 90 66
C3B8:03 EE 1F C0 AD 22 C0 18 FC
C3C0:6D 1F C0 8D 1F C0 A9 60 67
C3C8:18 6D 1F C0 8D 1F C0 AD BF
C3D0:10 C0 29 07 8D 1B C0 A9 2A
C3D8:07 38 ED 1B C0 8D 1B C0 94
C3E0:AE 1B C0 BD 02 C4 8D 09 C1
C3E8:C0 AD 1F C0 85 22 AD 1E 5A
C3F0:C0 85 21 A0 00 AD 1A C0 14
C3F8:F0 10 B1 21 0D 09 C0 91 E4
C400:21 60 01 02 04 08 10 20 F2
C408:40 80 A9 00 8D 1D C0 85 EE
C410:02 B1 21 2D 00 C0 8D 1D 81
C418:C0 85 02 60 A9 00 8D 1A 2C
C420:C0 4C 4D C3 A9 01 8D 1A 89
C428:C0 D0 F6 EE 0D C0 D0 05 26
C430:A9 01 8D 0E C0 AD 0D C0 F8
C438:C0 16 C0 90 16 F0 14 AD 99
C440:0E C0 CD 17 C0 D0 0C AD 3B
C448:13 C0 8D 0D C0 AD 14 C0 B3
C450:8D 0E C0 60 AD 0A C0 C9 23
C458:FF D0 15 AD 0B C0 C9 FF 82
C460:D0 0E A9 00 8D 0A C0 8D AE
C468:0B C0 20 2B C4 A9 FF 60 8B
C470:A9 00 F0 FB AD 0A C0 C9 8D
C478:40 D0 F5 AD 0B C0 C9 01 DF

```

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C480:D0 EE A9 FF 60 AD 02 DD FE
C488:09 03 8D 02 DD AD 00 DD AC
C490:29 FC 09 03 8D 00 DD A9 11
C498:15 8D 18 D0 A9 1B 8D 11 06
C4A0:D0 A9 00 85 C6 A9 00 8D BF
C4A8:15 D0 60 AD 02 DD 09 03 74
C4B0:8D 02 DD AD 00 DD 29 FC DE
C4B8:09 02 8D 00 DD AD 18 D0 9F
C4C0:29 0F 09 78 8D 18 D0 AD 67
C4C8:11 D0 09 20 8D 11 D0 A9 2E
C4D0:5B 85 38 60 00 00 00 00 76

```

Disk Package

See instructions in article on page 62 before typing in.

Program 1: Disk Package

```

0801:1E 08 00 FA 8F 20 20 20 2F
0809:20 44 49 53 4B 20 50 41 55
0811:43 4B 41 47 45 20 20 20 3D
0819:20 20 20 20 00 3B 08 40 84
0821:FA 8F 20 20 28 43 29 20 59
0829:31 39 38 38 20 43 4F 4D A4
0831:50 55 54 45 21 20 20 20 87
0839:20 00 53 08 80 FA 9E C2 34
0841:28 34 33 29 AA C2 28 34 50
0849:34 29 AC 32 35 36 AA 38 86
0851:34 00 00 00 18 A5 2B 69 92
0859:79 85 5A A5 2C 69 09 85 CB
0861:5B A9 00 85 58 A9 C9 85 64
0869:59 A2 0A A0 9F 20 EC A3 15
0871:20 44 A6 20 00 C0 4C 86 9B
0879:E3 A2 02 BD 29 C0 95 7C 34
0881:CA 10 F8 A9 01 8D 56 02 A1
0889:A5 BA 8D 57 02 A9 2C A0 F1
0891:C0 85 A5 84 A6 A0 FF C8 E0
0899:B1 A5 20 16 E7 C9 00 D0 88
08A1:F6 60 4C 20 C1 0D 20 20 73
08A9:20 44 49 53 4B 20 50 41 F5
08B1:43 4B 41 47 45 3A 20 41 67
08B9:44 56 41 4E 43 45 44 20 66
08C1:44 4F 53 20 53 55 50 50 15
08C9:4F 52 54 20 0D 20 20 20 EB
08D1:20 20 20 20 20 20 20 20 E1
08D9:20 20 20 20 20 20 20 20 E9
08E1:20 20 20 20 20 20 20 20 F1
08E9:20 20 20 20 20 20 20 20 87
08F1:20 28 43 29 31 39 38 38 2E
08F9:20 43 4F 4D 50 55 54 45 6F
0901:21 20 50 55 42 4C 49 43 24
0909:41 54 49 4F 4E 53 2C 20 27
0911:49 4E 43 2E 0D 0D 00 20 63
0919:1E AB A9 3A 20 D2 FF A9 F3
0921:20 4C AE D2 FF 3D B2 25 2F DE
0929:AD 5E AE 5F 3B 2E 52 57 04
0931:4C 50 4E 3F 5A 58 40 3E 2E
0939:B1 24 23 55 45 51 46 57 3A
0941:21 00 D0 C3 D0 C3 D0 C3 35
0949:D0 C3 D0 C3 D0 C3 D0 C3 06
0951:43 C4 C0 C3 91 C8 54 C7 9A
0959:54 C7 C3 C6 5B C6 45 C7 B4
0961:45 C8 C3 C6 A6 C5 EF C1 1B
0969:EF C1 EF C1 84 C2 88 C4 03
0971:A9 C4 A6 C5 E9 C4 F6 C4 CF
0979:0D C5 E1 FC 01 01 01 01 9E
0981:01 01 01 01 80 00 00 00 88
0989:00 00 00 00 00 00 80 00 1D
0991:80 80 80 80 01 01 80 80 A9
0999:80 85 A5 86 A6 BA BD 01 07
09A1:01 C9 E6 F0 04 C9 8C D0 C3
09A9:17 BD 02 01 C9 A7 F0 04 D9
09B1:C9 A4 D0 0C A5 A5 A2 15 CA
09B9:DD AB C0 F0 11 CA 10 F8 99
09C1:A5 A5 A6 A6 C9 3A B0 03 EA
09C9:4C 80 00 4C 8A 00 BD 03 B9
09D1:C1 30 05 CD 56 02 D0 E8 93
09D9:86 9B A5 A5 A5 85 A5 82 C2
09E1:C1 A9 00 85 BB A9 02 85 A5
09E9:BC AD 57 02 85 BA A5 9B CE
09F1:0A AA BD CA C0 48 BD C9 84
09F9:C0 48 60 A0 00 20 73 00 FB

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0A01:AA D0 03 4C DF C1 A9 60 7D
0A09:85 7C A5 7A 48 A5 7B 48 73
0A11:A5 AB C9 40 D0 09 8A C9 A9
0A19:2F D0 04 8D 00 02 C8 8A 76
0A21:C9 22 F0 1C 20 73 00 D0 22
0A29:F7 A0 00 68 85 7B 68 85 58
0A31:7A 20 79 00 C9 22 F0 0A 7C
0A39:A6 7B E0 02 D0 13 F0 07 77
0A41:68 68 20 73 00 F0 11 C9 8E
0A49:22 F0 0D 99 00 02 C8 10 8F
0A51:F1 A2 4C 86 7C 4C 23 C3 18
0A59:84 B7 A2 4C 86 7C 20 79 96
0A61:00 F0 05 20 73 00 D0 FB 8D
0A69:60 98 F0 67 A2 15 BD AB F8
0A71:C0 F0 1F CD 00 02 F0 03 CF
0A79:E8 10 F3 85 AB D0 03 C1 F8
0A81:30 05 CD 56 02 D0 0B 86 FD
0A89:9B C6 B7 A9 01 85 BB 4C 90
0A91:75 C1 20 4A C2 A9 00 85 BB
0A99:BB A9 02 85 BC 20 FC F3 E2
0AA1:AD 00 02 C9 2F F0 2C 4C 4B
0AA9:79 00 A9 60 85 B9 20 D5 DE
0AB1:F3 A5 BA 20 B4 FF A5 B9 2D
0AB9:20 96 FF A9 00 85 90 60 B5
0AC1:A4 64 2C A0 6F A5 BA 20 76
0AC9:B1 FF 98 85 B9 20 93 FF 97
0AD1:A0 00 60 A6 D6 20 FF E9 CD
0AD9:A9 23 20 16 E7 A6 BA A9 E9
0AE1:00 20 CD BD 20 A1 C0 A9 46
0AE9:6F 85 B9 20 38 C2 20 A5 03
0AF1:FF 20 16 E7 C9 0D D0 F6 6A
0AF9:20 AB FF 4C 79 00 E6 7A E1
0B01:D0 07 E6 7B A9 00 8D 51 8F
0B09:02 E6 B7 A0 4F B9 00 02 3E
0B11:99 01 02 88 10 F7 A9 24 D4
0B19:8D 00 02 20 D7 AA 20 31 13
0B21:C2 20 E2 C2 20 E2 C2 D0 0C
0B29:29 20 E2 C2 20 90 C3 20 4F
0B31:A5 FF A6 90 D0 1C 20 16 45
0B39:E7 C9 00 D0 F2 20 D7 AA 35
0B41:20 E1 FF F0 0D 20 E4 FF A1
0B49:C9 20 D0 D8 20 E4 FF C4 D4
0B51:D1 C2 20 42 F6 20 D7 AA BB
0B59:4C 79 00 20 A5 FF 85 A7 D5
0B61:20 A5 FF 85 A8 A6 90 60 AA
0B69:20 11 C3 30 1C 85 A9 20 B9
0B71:11 C3 10 A0 C9 23 F0 04 64
0B79:C9 3E D0 1D A9 00 0A 85 D6
0B81:AA 0A 0A 65 AA 65 A9 85 CA
0B89:A9 60 88 B9 00 02 C9 30 05
0B91:90 07 C9 3A B0 03 29 0F 81
0B99:2C A2 80 60 A2 0B 2C A2 C0
0BA1:04 2C A2 05 2C A2 08 2C 91
0BA9:A2 09 AD 56 02 D0 03 4C 14
0BB1:29 C7 A9 FF 85 3A 8A 4C F9
0BB9:FB E0 20 4B C3 A5 90 30 C4
0BC1:E1 4C 79 00 A4 B7 F0 DD CE
0BC9:20 31 C2 20 E2 C2 D0 CF 2A
0BD1:A9 83 A0 C3 20 9E C0 20 0B
0BD9:9A C3 E6 A7 D0 02 E6 A8 8A
0BE1:20 A5 FF A4 90 F0 F3 A9 95
0BE9:89 A0 C3 20 9E C0 A5 A7 52
0BF1:D0 02 C6 A8 C6 A7 20 9A 04
0BF9:C3 4C D9 C2 53 54 41 52 2D
0C01:54 00 20 20 20 45 4E 44 40
0C09:00 A6 A7 A5 A8 20 CD BD 39
0C11:4C A6 C0 20 90 C3 A9 28 22
0C19:20 16 E7 A5 A8 20 B1 C3 0B
0C21:A5 A7 20 B1 C3 A9 29 4C 78
0C29:16 E7 48 4A 4A 4A 20 24
0C31:BA C3 68 29 0F C9 0A 90 7R
0C39:03 69 36 2C 09 30 4C D2 2B
0C41:FF A5 AB C9 3D F0 02 C9 50
0C49:B2 60 20 53 C4 A6 2B A4 C7
0C51:2C 20 C8 C3 F0 07 C9 25 39
0C59:F0 03 A9 00 2C A9 01 85 6F
0C61:B9 20 C8 C3 D0 03 A9 01 9A
0C69:2C A9 00 20 D5 FF 08 AA 6D
0C71:20 50 C4 8A 28 B0 2C 20 6B
0C79:C8 C3 F0 32 C9 25 F0 3A 27
0C81:A5 AE 85 2D A5 AF 85 2E C0
0C89:20 59 A6 20 33 A5 A5 AB 06
0C91:C9 5E F0 04 C9 AE D0 22 51
0C99:A9 00 20 90 FF 20 8E A6 D7
0CA1:4C AE A7 20 C8 C3 D0 03 7C

0CA9:2C A2 1C 4C 39 C3 20 50 32
0CB1:C4 A5 90 29 10 D0 F2 20 04
0CB9:8D E1 4C 86 E3 20 53 C4 0E
0CC1:20 59 E1 20 D7 AA 20 5A 82
0CC9:C2 A9 2B 2C A9 2D 2C A9 D9
0CD1:00 85 A9 C9 2D D0 0A AD 8B
0CD9:11 D0 85 AA 29 EF 8D 11 3F
0CE1:D0 20 4A C2 A9 55 20 A8 6B
0CE9:FF A9 49 20 A8 FF A5 A9 D1
0CF1:20 A8 FF 20 AE FF A5 A9 B0
0CF9:C9 2B D0 05 A5 AA 8D 11 30
0D01:D0 60 A4 B7 C8 20 EF C2 15
0D09:30 10 A5 A9 C9 04 90 0A 18
0D11:C9 1F B0 06 8D 57 02 4C 68
0D19:79 00 A5 AB C9 23 D0 34 10
0D21:4C 2F C3 AD 01 02 C9 30 54
0D29:D0 2A AD 02 02 C9 3E D0 90
0D31:23 20 89 C4 AE 57 02 A0 D9
0D39:08 84 B7 88 8A 09 40 99 8A
0D41:00 02 88 8A 09 20 D0 03 03
0D49:B9 E4 C4 99 00 02 88 10 D4
0D51:F7 4C 66 C5 A9 00 85 BB B7
0D59:E6 B7 4C 19 C2 4D 2D 57 EC
0D61:77 00 02 A2 02 BD AB E3 E3
0D69:95 7C CA 10 F8 4C 86 E3 B1
0D71:38 A5 33 E5 31 AA A5 34 89
0D79:E5 32 20 CD BD A9 60 A0 E9
0D81:E4 20 18 C0 4C 79 00 AD 1B
0D89:01 02 C9 50 D0 51 AD 02 0C
0D91:02 C9 2B F0 04 C9 2D D0 06
0D99:46 85 AB 20 56 C4 A9 6F 38
0DA1:85 B9 20 38 C2 A8 20 A5 13
0DA9:FF 24 90 D0 38 D9 7A C5 CF
0DB1:D0 33 C8 C0 14 D0 EF 20 0A
0DB9:AB FF A0 19 84 B7 88 B9 1D
0DC1:8E C5 99 00 02 88 10 F7 12
0DC9:A5 AB C9 2D F0 05 A9 FF 9C
0DD1:8D A0 02 20 19 C2 A9 45 E3
0DD9:8D 02 02 A0 05 84 B7 20 4F
0DE1:19 C2 6C 02 03 20 AB FF D6
0DE9:AD 11 D0 85 AA 20 50 C4 CC
0DF1:4C 2F C3 37 33 2C 43 42 FC
0DF9:4D 20 44 4F 53 20 56 32 3A
0E01:2E 36 20 31 35 34 31 4D 03
0E09:2D 57 06 02 13 20 42 D0 E0
0E11:A9 41 8D 02 07 A9 41 8D 13
0E19:01 01 20 07 EF 6C 65 00 66
0E21:AD 56 02 D0 1E EE 56 02 52
0E29:AD 54 02 8D 02 03 AD 55 17
0E31:02 8D 03 03 AD 52 02 80 8A
0E39:00 03 AD 53 02 8D 01 03 4C
0E41:4C 86 E3 A5 31 A4 32 C8 45
0E49:20 08 A4 A9 00 8D 56 02 8B
0E51:AD 02 03 8D 54 02 AD 03 07
0E59:03 8D 55 02 A9 16 8D 02 E7
0E61:03 A9 C6 8D 03 03 AD 00 9A
0E69:03 8D 52 02 AD 01 03 8D D9
0E71:53 02 A9 08 8D 00 03 A9 89
0E79:C6 8D 01 03 A9 00 8D 95 AA
0E81:02 A9 35 A0 C6 20 18 C0 61
0E89:A9 53 A0 C0 20 18 C0 20 72
0E91:60 A5 86 7A 84 7B 20 73 85
0E99:00 F0 F4 20 3B C1 24 BE 7A
0EA1:10 09 A9 07 20 16 E7 A9 80
0EA9:00 85 BE 6C 02 03 8D 20 1C
0EB1:20 44 49 53 4B 20 50 41 0A
0EB9:43 4B 41 47 45 20 2D 2D 19
0EC1:20 44 49 53 4B 20 45 44 07
0EC9:49 54 49 4E 47 20 53 59 68
0ED1:53 54 45 4D 00 A4 B7 C0 EC
0ED9:04 F0 0F C0 07 F0 0B C0 F4
0EE1:02 F0 07 C0 01 F0 04 4C 48
0EE9:23 C3 88 88 84 9B F0 06 9C
0EF1:AD 01 02 20 1E C7 20 CC 84
0EF9:FF A9 00 20 BD FF AD 00 CB
0F01:02 C9 33 90 E2 C9 38 B0 61
0F09:DE 29 F0 A9 A9 0E A0 00 34
0F11:20 BA FF 20 C0 FF A2 0E 49
0F19:20 C9 FF B0 10 A4 9B 84 93
0F21:B7 D0 0D AD 01 02 C9 3F AE
0F29:D0 44 4C 46 C8 4C 29 C7 40
0F31:A0 00 B9 02 02 99 00 02 6F
0F39:C8 C4 B7 90 F5 A4 B7 F0 8F
0F41:2D C0 05 F0 04 C0 02 D0 CD
0F49:9E 20 35 C7 85 A8 C0 03 35

0F51:F0 0C A5 A8 85 A7 18 69 8E
0F59:07 85 A8 4C DC C8 20 1A 9A
0F61:C7 20 35 C7 85 A7 A5 A8 4D
0F69:C5 A7 90 33 B0 08 A9 00 92
0F71:85 A7 A9 FF 85 A8 4C DC B5
0F79:C8 88 B9 00 02 C9 30 90 7D
0F81:1E C9 47 B0 1A C9 3A 90 12
0F89:07 C9 41 90 12 18 69 09 9B
0F91:29 0F 60 88 B9 00 02 C9 38
0F99:2C F0 F7 C9 20 F0 F3 4C 9E
0FA1:23 C3 A9 80 85 BE A9 0E 08
0FA9:20 C3 FF 4C CC FF 20 00 34
0FB1:C7 85 AA 20 00 C7 0A A0 A9
0FB9:0A 0A 05 AA 85 AA 60 A0 E2
0FC1:00 84 B7 B1 31 8D 95 02 FF
0FC9:C8 B1 31 8D 96 02 A4 B7 75
0FD1:D0 12 A5 AB C9 57 F0 C7 A1
0FD9:AD 96 02 85 A8 AD 95 02 36
0FE1:85 A7 D0 11 C0 05 D0 B7 4B
0FE9:20 35 C7 85 A8 20 1A C7 78
0FF1:20 35 C7 85 A7 A5 A7 F0 D2
0FF9:A6 8D 95 02 A5 A8 8D 96 23
1001:02 A0 0C 84 B7 A0 0A B9 22
1009:34 C8 99 00 02 88 10 F7 F2
1011:38 A5 A8 EE 0A 02 E9 0A F0
1019:10 F9 69 0A 09 30 8D 0B BC
1021:02 CE 0A 02 38 A5 A7 EE ED
1029:07 02 E9 0A 10 F9 69 0A 70
1031:09 30 8D 08 02 CE 07 02 6F
1039:A9 C1 85 BB A9 C0 85 BC 23
1041:A9 01 85 B7 A9 64 85 B9 46
1049:20 D5 F3 A0 0C 84 B7 A5 FE
1051:AB C9 57 D0 2C 20 A4 C2 EA
1059:B9 3F C8 20 A8 FF C8 C0 D8
1061:07 D0 F5 20 AE FF EE 01 4E
1069:02 20 47 C2 B1 31 20 8E E2
1071:FF C8 D0 F8 20 19 C2 A9 02
1079:64 85 B9 20 42 F6 4C 5A 47
1081:C2 20 19 C2 A9 64 85 B9 FD
1089:20 38 C2 A8 20 A5 FF 91 D3
1091:31 C8 D0 F8 20 42 F6 AD CB
1099:56 02 09 40 8D 56 02 A9 FD
10A1:00 85 A7 A9 7F 85 A8 20 36
10A9:D7 AA 4C DC C8 55 31 20 D5
10B1:34 20 30 20 30 30 20 30 AE
10B9:42 2D 50 20 34 20 30 AD 82
10C1:95 02 F0 20 A9 75 A0 C8 7A
10C9:20 9E C0 AD 95 02 20 B1 3B
10D1:C3 A9 7B A0 C8 20 9E C0 7C
10D9:AD 96 02 20 B1 C3 20 D7 6D
10E1:AA 4C 7F C9 A9 84 A0 C8 60
10E9:20 18 C0 4C 2D C7 54 52 80
10F1:41 43 4B 00 20 20 53 45 5A
10F9:43 54 4F 52 00 4E 4F AE 06
1101:45 20 52 45 41 44 0D 00 A1
1109:4C 23 C3 A4 B7 C0 1B 90 64
1111:F7 A0 02 B9 00 02 C9 3A 09
1119:F0 03 20 1E C7 20 35 C7 4B
1121:85 A9 A2 23 A0 1B 20 35 0D
1129:C7 9D 00 02 CA 20 1A C7 89
1131:C0 03 D0 F2 A4 A9 E8 BD 19
1139:00 02 91 31 C8 E0 23 D0 02
1141:F5 A9 91 20 16 E7 A6 D5 70
1149:E0 4F D0 03 20 16 E7 A5 C8
1151:A9 85 A7 85 A8 A9 2E 20 5F
1159:D2 FF A5 A7 A8 18 69 08 94
1161:85 A6 98 20 B1 C3 20 A1 83
1169:C0 A5 AB C9 5A D0 13 C4 68
1171:A8 F0 02 B0 0D A5 A6 C9 85
1179:08 B0 03 98 10 04 A9 00 99
1181:91 31 B1 31 20 B1 C3 20 71
1189:A6 C0 C8 C4 A6 D0 DA 20 E2
1191:A6 C0 A4 A7 E6 C7 B1 31 31
1199:F0 0B C9 20 B0 0C C9 0D 88
11A1:D0 06 A9 5F 2C A9 40 2C 8D
11A9:A9 2E C9 22 D0 02 A9 27 90
11B1:C9 80 90 14 C9 A0 90 0E 2C
11B9:C9 C0 90 0C A2 00 86 C7 AD
11C1:C9 E0 B0 04 29 BF 49 C0 F2
11C9:20 D2 FF C8 C4 A6 D0 C4 64
11D1:20 D7 AA 20 E1 FF F0 20 62
11D9:A5 A6 C9 08 90 1A 85 A7 D1
11E1:C5 A8 90 28 F0 26 2C 56 74
11E9:02 50 15 A5 9A C9 03 D0 F0
11F1:07 A9 96 A0 C9 20 18 C0 9E


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11F9:AD 56 02 29 BF 8D 56 02 3E
1201:A5 9A C9 03 F0 03 2D D7 B3
1209:AA 4C 2D C7 4C DC C8 4C 6B
1211:38 30 2C 46 46 91 0D 00 D9

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Program 2: 1764 Interface

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0801:1E 08 00 FA 8F 20 20 31 40
0809:37 36 34 20 49 4E 54 45 3C
0811:52 46 41 43 45 20 20 20 43
0819:20 20 20 20 00 3B 08 40 84
0821:FA 8F 20 28 43 29 20 31 49
0829:39 38 38 20 43 4F 4D 50 2F
0831:55 54 45 21 20 20 20 20 9D
0839:20 00 53 08 80 FA 9E C2 34
0841:28 34 33 29 AA C2 28 34 50
0849:34 29 AC 32 35 36 AA 38 86
0851:34 00 00 00 18 A5 2B 69 92
0859:7C 85 5A A5 2C 69 02 85 3F
0861:5B A9 00 85 58 A9 CE 85 6E
0869:59 A2 03 A0 E1 20 EC A3 46
0871:20 D7 AA 20 00 CC C0 44 96
0879:A6 4C 86 E3 A5 7E C9 C1 7B
0881:F0 20 C9 97 F0 19 A9 14 18
0889:A0 CC 20 1E AB 4C 65 A4 01
0891:0D 3F 49 4E 53 54 41 4C C0
0899:4C 41 54 49 4F 4E 00 A9 9C
08A1:00 2C A9 80 8D 85 02 A9 2A
08A9:99 85 7D A9 CC 85 7E A9 55
08B1:3A A0 CC 4C 1E AB 0D 20 3F
08B9:20 20 20 20 2A 2A 2A 20 56
08C1:31 37 36 34 20 4D 4F 44 5B
08C9:55 4C 45 20 49 4E 53 54 C0
08D1:41 4C 4C 45 44 20 2A 2A 94
08D9:2A 0D 00 3B 5F 40 3E B1 20
08E1:24 46 23 51 45 55 57 21 5E
08E9:00 36 CE 8E CD 50 CD 50 E5
08F1:CD 50 CD D4 CD 43 CD D5 F0
08F9:CE 43 CD 93 CE A0 CE 93 5F
0901:CE E2 FC 80 01 80 80 80 66
0909:80 80 80 01 01 80 80 80 27
0911:A9 20 4C D2 FF 85 A5 86 9E
0919:A6 BA BD 01 01 C9 E6 F0 E2
0921:04 C9 8C D0 29 BD 02 01 8B
0929:C9 A7 F0 04 C9 A4 D0 1E 09
0931:20 0D CD B0 0B 2C 85 02 71
0939:30 03 4C 3B 97 4C 3B C1 87
0941:A5 A5 A2 05 DD 5F CC F0 2B
0949:13 CA 10 F8 30 E7 A5 A5 3B
0951:A6 A6 C9 3A B0 03 4C 80 E7
0959:00 4C 8A 00 BD 87 CC 30 A5
0961:05 CD 56 02 D0 8E 86 9B 27
0969:A5 A5 85 AB 20 39 CD A9 4E
0971:00 85 BB A9 02 85 BC AD 44
0979:57 02 85 BA A5 9B 0A AA 6E
0981:BD 6E CC 48 BD 6D CC 48 B1
0989:60 A2 02 BD 01 CF DD 26 B9
0991:CD D0 0D CA 10 F5 AD 04 C4
0999:CF CD 57 02 D0 02 38 60 71
09A1:18 60 A5 99 C9 A9 04 AE D1
09A9:57 02 4C BA FF 20 C0 FF 1F
09B1:A2 04 4C C6 FF 2C 85 02 C9
09B9:30 03 4C 82 97 4C 82 C1 0B
09C1:E6 B7 2C 85 02 30 03 4C 36
09C9:F0 97 4C F0 C1 98 F0 46 6B
09D1:A2 05 BD 5F CC F0 1F CD 5A
09D9:00 02 F0 03 E8 10 F3 85 AF
09E1:AB BD 87 CC 30 05 CD 56 7E
09E9:02 D0 BB 86 9B C6 B7 A9 0C
09F1:01 85 BB 4C 00 CD A0 0F A9
09F9:20 29 CD 20 C0 FF 20 CA 33
0A01:CD AD 00 02 C9 2F F0 0E 82
0A09:4C 79 00 A0 01 20 29 CD 54
0A11:20 59 E1 20 D7 AA A6 D6 57
0A19:20 FF E9 A9 23 20 16 E7 C2
0A21:AE 57 02 A9 00 20 CD BD 17
0A29:A9 3A 20 16 E7 20 94 CC BB
0A31:A0 0F 20 29 CD A9 00 85 8A
0A39:B7 20 31 CD 20 31 CE 20 B7
0A41:16 E7 C9 0D D0 F6 20 CC D3
0A49:FF A9 04 20 C3 FF 4C 79 7A
0A51:00 E6 7A D0 07 E6 7B A9 EF
0A59:00 8D 51 02 E6 B7 A0 4F C1
0A61:B9 00 02 99 01 02 88 10 5D
0A69:F7 A9 24 8D 00 02 A0 00 8A

```

```

0A71:20 29 CD 20 31 CD B0 CE 8C
0A79:20 2B CE D0 C9 20 D7 AA 78
0A81:20 26 CE D0 17 20 CD BD A8
0A89:20 94 CC 20 31 CE D0 0C E0
0A91:20 16 E7 C9 00 D0 F4 20 22
0A99:E1 FF D0 E1 20 D7 AA 4C D8
0AA1:CA CD 20 2B CE D0 0B 20 35
0AA9:31 CE D0 06 AA 20 CF FF F9
0AB1:A4 90 60 A4 B7 F0 56 A0 61
0AB9:00 20 29 CD 20 31 CD 20 59
0AC1:2B CE D0 41 86 A7 85 A8 D3
0AC9:A9 76 A0 CE 20 1E AB A6 C8
0AD1:A7 A5 A8 20 7E CE E6 A7 DE
0AD9:D0 02 E6 A8 20 31 CE F0 92
0AE1:F5 20 6B CE 4C CA CD 2C A8
0AE9:85 02 30 03 4C 6E 99 4C 13
0AF1:6E C3 53 54 41 52 54 3A 14
0AF9:20 00 2C 85 02 30 03 4C 1F
0B01:9A 99 4C 9A C3 A9 04 20 EA
0B09:C3 FF A2 04 2C A2 08 2C BD
0B11:A2 09 2C 85 02 30 03 4C BB
0B19:31 99 4C 31 C3 AD 01 02 A3
0B21:C9 30 D0 25 AD 02 02 C9 D7
0B29:3E D0 1E 20 D6 CE AD 57 FC
0B31:02 8D 03 02 A5 BA 8D 57 B6
0B39:02 A0 03 84 B7 20 CD CE C9
0B41:AD 04 CF 8D 57 02 6C 02 9F
0B49:03 A9 00 85 BB E6 B7 4C D8
0B51:7A CD 2C 85 02 30 03 4C 19
0B59:89 9A 4C 89 C4 00 00 00 23

```

```

5B08:20 86 FE A0 00 B9 6F 5E 7E
5B10:99 06 00 C8 C0 06 D0 F5 57
5B18:20 B3 C2 C9 00 D0 03 4C 56
5B20:35 5B A9 1B 20 45 C1 A2 6B
5B28:00 20 0C C1 20 12 C1 20 71
5B30:3E C2 4C C3 C1 A0 00 B9 C6
5B38:75 5E 99 06 00 C8 C0 06 7F
5B40:D0 F5 20 B3 C2 C9 00 F0 4A
5B48:03 4C 18 5D A0 00 B9 7B 60
5B50:5E 99 06 00 C8 C0 06 D0 83
5B58:F5 20 B3 C2 C9 00 F0 03 E7
5B60:4C DB 5C 60 20 9B 5B 20 0C
5B68:01 5C A2 02 8E 8D 5E A2 35
5B70:5B 8E 8E 5E A2 8D 86 02 8A
5B78:A2 5E 86 03 A9 01 20 03 AD
5B80:C1 A2 00 20 06 C1 A2 00 3F
5B88:20 09 C1 20 8A C1 A2 8C F8
5B90:86 3C A2 32 86 3A A2 01 74
5B98:86 3B 60 20 4B C1 A2 00 16
5BA0:8E AB 84 A2 00 86 33 A2 67
5BA8:C6 86 34 A2 00 86 35 A2 3C
5BB0:00 86 36 A2 3C 86 37 A2 07
5BB8:01 86 38 20 C2 5B 20 DB 3A
5BC0:5B 60 A9 80 85 2F 20 A8 4C
5BC8:C1 05 00 01 B1 00 8E 03 5F
5BD0:3B 01 A3 05 02 07 B1 00 B9
5BD8:8E 00 60 20 A8 C1 05 FF 3B
5BE0:06 B2 00 95 1B 18 C4 41 A4
5BE8:54 45 20 20 20 20 20 03
5BF0:20 D4 49 4D 45 20 20 20 F5
5BF8:12 D1 D5 C9 D4 13 1A 00 AB
5C00:60 A9 80 85 2F A0 A0 84 7D
5C08:05 A0 B2 84 18 A0 00 84 D1
5C10:19 A9 1A 20 45 C1 20 9E 15
5C18:5C AC 17 85 20 A3 5C A9 57
5C20:2F 20 45 C1 20 9E 5C AC 1E
5C28:18 85 20 A3 5C A9 2F 20 94
5C30:45 C1 20 9E 5C AC 16 85 31
5C38:20 A3 5C A9 20 20 45 C1 DD
5C40:A9 20 20 45 C1 AC 19 85 A6
5C48:C0 0A B0 05 A9 30 20 45 DD
5C50:C1 20 9E 5C AC 19 85 20 80
5C58:A3 5C A9 3A 20 45 C1 AC 19
5C60:1A 85 C0 0A B0 05 A9 30 5D
5C68:20 45 C1 20 9E 5C AC 1A 96
5C70:85 20 A3 5C A9 1B 20 45 6D
5C78:C1 A9 18 20 45 C1 A9 3A 40
5C80:20 45 C1 AC 1B 85 C0 0A 18
5C88:B0 05 A9 30 20 45 C1 20 CC
5C90:9E 5C AC 1B 85 20 A3 5C 47
5C98:A9 20 20 45 C1 60 A0 00 57
5CA0:84 03 60 84 02 A9 C0 20 09
5CA8:84 C1 60 A0 00 A9 00 99 6A
5CB0:81 5E C8 C0 08 D0 F6 A2 FA
5CB8:81 86 02 A2 5E 86 03 A2 F3
5CC0:00 86 04 A2 99 86 05 A2 59
5CC8:08 86 06 A2 B2 86 18 A2 94
5CD0:00 86 19 86 0A 86 0B 20 57
5CD8:BA C1 60 A2 00 20 0C C1 EF
5CE0:20 12 C1 20 C2 5B 20 A8 D4
5CE8:C1 05 FF 06 B2 00 95 1B FF
5CF0:18 C5 4E 54 45 52 20 4A 2E
5CF8:41 54 45 20 28 4D 4D 2F 52
5D00:44 44 2F 59 59 29 12 13 10
5D08:1A 00 A2 F5 8E A3 84 A2 32
5D10:5D 8E A4 84 20 AB 5C 60 C2
5D18:A2 00 20 0C C1 20 12 C1 5D
5D20:20 C2 5B 20 A8 C1 05 FF 5F
5D28:06 B2 00 95 1B 18 C5 4E FE
5D30:54 45 52 20 54 49 4D 45 5A
5D38:20 28 48 48 3A 4D 4A 76
5D40:53 53 29 12 13 1A 00 A2 63
5D48:55 8E A3 84 A2 5D 8E A4 5A
5D50:84 20 AB 5C 60 A5 01 48 74
5D58:A9 35 85 01 AD 0F DC 29 82
5D60:7F 8D 0F DC A0 00 8C 62 6E
5D68:5E B9 81 5E AA C9 30 F0 A4
5D70:32 C9 32 D0 19 A0 01 B9 11
5D78:81 5E 38 E9 30 A8 B9 65 2E
5D80:5E AA B9 6A 5E A8 A9 01 DC
5D88:8D 62 5E 4C A9 5D A0 01 38
5D90:B9 81 5E A8 C9 32 90 11 28
5D98:A9 01 8D 62 5E CA 88 88 F7
5DA0:4C A9 5D A0 01 B9 81 5E F1
5DA8:A8 20 4F 5E 8D 0B DC AD 8F

```

BEFORE TYPING . . .

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

The GEOS Column

See instructions in article on page 47 before typing in.

Program 1: Quick Clock

```

5A00:BF FF FF FF 80 00 01 98 33
5A08:92 49 A4 92 51 A4 92 61 B9
5A10:AC 92 51 9C F2 49 82 00 75
5A18:01 81 FF 01 82 10 81 84 99
5A20:90 41 88 00 21 92 21 11 25
5A28:90 20 11 96 3D 91 90 00 0A
5A30:11 92 01 11 88 00 21 98 62
5A38:92 31 BC 10 F9 FF FF FF EA
5A40:83 05 00 FC 5A C7 5D FC 71
5A48:5A D1 55 49 43 4B C3 4C F8
5A50:4F 43 4B 20 20 20 20 CA
5A58:20 00 00 00 00 C5 52 4E 27
5A60:45 53 54 20 D2 2E 20 C8 71
5A68:55 4E 54 45 52 00 00 00 CC
5A70:00 00 00 00 00 00 00 25
5A78:00 00 00 00 00 00 00 2D
5A80:00 00 00 00 00 00 00 35
5A88:00 00 00 00 00 00 00 3D
5A90:00 00 00 00 00 00 00 45
5A98:00 00 00 00 00 00 00 4D
5AA0:00 00 00 00 00 00 00 55
5AA8:00 00 00 00 00 00 00 5D
5AB0:00 00 00 00 00 00 00 65
5AB8:00 00 00 00 00 00 00 6D
5AC0:00 00 00 00 00 00 00 75
5AC8:00 00 00 00 00 00 00 7D
5AD0:00 00 00 00 00 00 00 85
5AD8:00 00 00 00 00 00 00 8D
5AE0:00 00 00 00 00 00 00 95
5AE8:00 00 00 00 00 00 00 9D
5AF0:00 00 00 00 00 00 00 A5
5AF8:00 00 00 00 4C 64 5B 4C A4
5B00:02 5B 20 01 5C 20 86 FE 12

```



```

5DB0:62 5E C9 01 D0 08 AD 0B 8A
5DB8:DC 09 80 8D 0B DC A0 03 1D
5DC0:B9 81 5E AA A0 04 B9 81 39
5DC8:5E A8 20 4F 5E 8D A0 DC EF
5DD0:A0 06 B9 81 5E AA A0 07 92
5DD8:B9 81 5E A8 20 4F 5E 8D AF
5DE0:09 DC A9 00 8D 08 DC AD 80
5DE8:0F DC 09 01 8D 0F DC 68 5E
5DF0:85 01 4C 64 5B A0 00 B9 95
5DF8:81 5E AA A0 01 B9 81 5E BB
5E00:A8 20 2E 5E 8D 17 85 A0 39
5E08:03 B9 81 5E AA A0 04 B9 64
5E10:81 5E A8 20 2E 5E 8D 18 5A
5E18:85 A0 06 B9 81 5E AA A0 97
5E20:07 B9 81 5E A8 20 2E 5E 65
5E28:8D 16 85 4C 64 5B 8A 38 84
5E30:E9 30 8D 63 5E A9 00 A2 12
5E38:0A 18 6D 63 5E CA D0 F9 90
5E40:8D 63 5E 98 38 E9 30 18 D3
5E48:6D 63 5E 8D 63 5E 60 8A 19
5E50:38 E9 30 0A 0A 0A 0A 6D 64
5E58:64 5E 98 08 A9 30 0D 64 04
5E60:5E 60 00 00 00 30 30 31 B6
5E68:31 31 38 39 30 31 32 8F DE
5E70:98 18 01 2A 01 8F 98 F1 AB
5E78:00 04 01 8F 98 B2 00 C4 A3
5E80:00 00 00 00 00 00 00 00 3D
5E88:00 00 00 00 00 63 63 1E B7
5E90:00 4C 2C C2 00 00 00 00 12

```

Program 2: GeoConverter

```

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PR 20 POKE 53280,0:POKE 53281,
0:POKE 646,5:PRINTCHR$(1
42);CHR$(147)
SX 30 FOR I=1 TO 10:PRINT "{DOWN}";
:NEXT
JJ 40 PRINTTAB(5)"{4}UDI COPYR
IGHT 1988"
DJ 50 PRINTTAB(5)"GCH COMPUTE!
PUBLICATIONS INC."
FJ 60 PRINTTAB(5)"JEK ALL RIGH
TS RESERVED{HOME}"
XP 70 PRINT "{DOWN}{RVS}{8}GEOC
ONVERTER 1.1{OFF}{DOWN}
{GRN}"
FM 80 INPUT"FILE TO CONVERT";G
F$
PS 90 PRINT "{DOWN}SEARCHING FO
R "GF$
HA 100 HD$="":FOR I=1 TO 4:REA
D HE:HD$=HD$+CHR$(HE):N
EXT
KK 110 FOR I=1 TO 5:READIE:IDS=I
D$+CHR$(IE):NEXT
MD 120 NL$="":TS=CHR$(18):SS=C
HRS(1):OPEN 15,8,15,"I0
":OPEN 2,8,2,"#"
CR 130 GOSUB360:GET #2,NT$,NSS
FB 140 FOR E=0 TO 7
JX 150 DS=NL$:GET#2,B$:I=1:IFB
$=NL$ THEN210
HR 160 IF ASC(B$)<130 THEN210
PM 170 GET#2,HT$,HS$:I=3:IF HS
$="" THEN HS$=CHR$(0)
BG 180 GET#2,B$:I=1:IF B$=""
THEN B$=CHR$(0)
GH 190 IF ASC(B$)=160 THEN210
BR 200 DS=D$+B$:GOTO180
BK 210 FOR I=1 TO 31:GET#2,B$:
NEXT
FK 220 IF DS=GF$ THEN250
AA 230 NEXT E:IF NT$=NL$ THEN2
50
GR 240 TS=NT$:SS=NSS:GOTO130
JS 250 IF DS=NL$ THENPRINT"
{DOWN}{RVS}FILE NOT FOU
ND{OFF}":GOTO350
GJ 260 PRINT "{DOWN}CONVERTING
{SPACE}"GF$
JR 270 DT$=TS:DSS=SS:TS=HT$:SS

```

```

=HSS:GOSUB360
SA 280 GET#2,MT$,MSS:IF MSS=""
THEN MSS=CHR$(0)
JM 290 FOR I=0 TO 65:GET #2,B$
:NEXT
XA 300 GET#2,CTS,GT$:GOSUB360:
PRINT#2,HT$:GOSUB370:T
S=DT$:SS=DSS:GOSUB360
KP 310 FOR I=0 TO 32*E+2:GET#2
,B$:NEXT
KQ 320 PRINT#2,MT$,MSS:FOR I=0
TO 15:GET#2,B$:NEXT
MQ 330 PRINT#2,HT$,HSS:CHR$(0)
:GT$:
QJ 340 PRINT#2,IDS:GOSUB370:P
RINT:PRINTGF$ CONVERTE
D"
AS 350 CLOSE2:CLOSE15:END
QC 360 US="U1":GOTO380
KQ 370 US="U2"
QE 380 PRINT#15,US;2;0:ASC(T$+
"0");ASC(SS+"0")
PX 390 RETURN
BP 400 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.

ML Boot

See instructions in article on page 59 before typing in.

Program 1: ML Boot—Part 1

```

02A7:A9 08 A2 08 A0 FF 20 BA 57
02AF:FF A2 CF A0 02 A9 0B 20 4D
02B7:BD FF A2 01 A0 08 A9 00 77
02BF:20 D5 FF A9 83 8D 02 03 3D
02C7:A9 A4 8D 03 03 4C 01 08 FE
02CF:47 45 4E 42 4F 54 2E 45
02D7:45 58 45 00 00 00 00 3D
02DF:00 00 00 00 00 00 00 E3
02E7:00 00 00 00 00 00 00 EB
02EF:00 00 00 00 00 00 00 F3
02F7:00 00 00 00 00 00 00 FB
02FF:00 8B E3 A7 02 00 00 00 ED

```

Program 2: ML Boot—Part 2

```

0801:20 2D 08 20 6F 08 20 E7 33
0809:08 A9 5F 8D 57 0A A9 0A 8C
0811:8D 58 0A 20 1B 09 CE 54 30
0819:0A D0 F8 A9 5F 85 FB A9 CE
0821:0A 85 FC 20 4C 09 20 6F 6F
0829:09 4C 42 A6 A9 05 8D 86 86
0831:02 8D 21 D0 8D 20 D0 A9 0F
0839:93 20 D2 FF A9 00 20 18 1B
0841:FE A2 00 A9 72 85 FB A9 5F
0849:05 85 FC A9 72 85 FD A9 C6
0851:D9 85 FE A0 00 B9 0E 0A A6
0859:F0 0B 29 BF 91 FB 8A 91 E8
0861:FD C8 4C 56 08 AD 18 D0 89
0869:09 02 8D 18 D0 60 A9 05 12
0871:A2 08 A0 05 20 BA FF A9 CE
0879:08 A2 20 A0 0A 20 BD FF 90
0881:20 C0 FF A2 05 20 C6 FF 32
0889:20 CF FF 8D 5D 0A 20 CF 99
0891:FF 8D 5C 0A 20 CF FF 8D FE
0899:5E 0A 20 CF FF 8D 54 0A 45
08A1:8D 55 0A 60 A9 0F A2 08 EB
08A9:A0 0F 20 BA FF A9 00 20 44
08B1:BD FF 20 C0 FF A2 0F 20 79
08B9:C6 FF 20 CF FF 8D 5B 0A 25

```

```

08C1:AD 5B 0A C9 14 B0 01 60 23
08C9:20 4C 09 A9 50 A0 0A 20 F1
08D1:1E AB AE 5B 0A A9 00 20 7E
08D9:CD BD A9 0D 20 D2 FF 20 B2
08E1:D2 FF 4C D9 09 60 A2 05 96
08E9:20 C6 FF A2 00 20 CF FF 06
08F1:9D 5F 0A E8 20 CF FF 9D 56
08F9:5F 0A A0 00 E8 20 CF FF B7
0901:9D 5F 0A E8 C8 C0 10 90 83
0909:F4 CE 54 0A D0 DF AD 55 2B
0911:0A 8D 54 0A A9 05 20 C3 1C
0919:FF 60 A9 08 A2 08 A0 01 70
0921:20 BA FF 20 9D 09 A9 10 68
0929:20 BD FF A9 00 20 D5 FF 81
0931:A9 12 18 6D 57 0A 90 03 7D
0939:EE 58 0A 8D 57 0A 60 A9 40
0941:12 18 65 FB 90 02 E6 FC 26
0949:85 FB 60 AD 5D 0A 8D 20 52
0951:D0 AD 5E 0A 8D 86 02 AD DB
0959:5C 0A 8D 21 D0 A9 40 20 AD
0961:18 FE 20 E9 09 A9 0F 20 0F
0969:C3 FF 4C 42 A6 60 A2 00 0F
0971:8E 5A 0A AE 5A 0A BD A7 AB
0979:02 8D 92 09 E8 BD A7 02 62
0981:D0 07 E8 8E 5A 0A 4C 94 EB
0989:09 8D 93 09 E8 8E 5A 0A C6
0991:20 00 00 CE 55 0A F0 03 58
0999:4C 74 09 60 AE 57 0A AC A9
09A1:58 0A 86 FB 84 FC A0 00 4C
09A9:B1 FB AE 59 0A 9D A7 02 17
09B1:E8 C8 B1 FB 9D A7 02 E8 D8
09B9:8E 59 0A AE 57 0A AC 58 2A
09C1:0A E8 D0 01 C8 E8 D0 01 C9
09C9:C8 60 A0 10 A9 00 91 FB D9
09D1:A6 FB A4 FC 20 1E AB 60 CB
09D9:A9 29 A0 0A 20 1E AB A5 36
09E1:C6 F0 FC A9 00 85 C6 60 D1
09E9:AE 5C 0A A9 72 85 FB A9 91
09F1:05 85 FC A9 72 85 FD A9 71
09F9:D9 85 FE A0 00 A9 20 91 BC
0A01:FB 8A 91 FD C8 C0 11 F0 24
0A09:03 4C FE 09 60 42 4F 1C
0A11:54 49 4E 47 20 53 59 53 34
0A19:54 45 4D 2E 2E 2E 00 42 A1
0A21:4F 4F 54 2E 44 41 54 00 ED
0A29:11 11 1D 1D 12 1E D0 52 7C
0A31:45 53 53 20 41 4E 59 20 3F
0A39:4B 45 59 20 54 4F 20 43 D4
0A41:4F 4E 54 49 4E 55 45 2E 30
0A49:2E 2E 92 11 11 9A 00 80 D6
0A51:D4 60 00 00 00 00 00 00 E7
0A59:00 00 00 00 00 00 00 00 6D

```

Program 3: ML Boot—BOOT .DAT Creator

```

HE 10 REM COPYRIGHT 1988 COMPU
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RH 20 DIMEDS(9),CVS(15,1)
EG 30 POKE53280,0:POKE53281,0
PR 40 FOR I=0 TO 15:CVS(I,0)=CHR$(
(48+I):CVS(I,1)=STR$(I)
HK 50 IF I>9 THENCVS(I,0)=CHR$(5
5+I)
HH 60 NEXTI
GM 70 CF=0:PRINT "{CLR}"CHR$(14
)CHR$(8)"{3 SPACES}COPYR
IGHT 1988 COMPUTE! PUB.,
INC."
BH 80 PRINTTAB(11)"ALL RIGHTS
{SPACE}RESERVED"
EF 90 PRINT "{2 DOWN}{RED}{RVS}
BUILD DATA FILE FOR MULT
I-BOOT...{OFF}{GRN}"
AE 100 INPUT "{2 DOWN}{RVS}B
{OFF}UILD OR {RVS}V
{OFF}IEW DATA FILE"
{3 RIGHT}{V}{3 LEFT}";AS
AR 110 IF AS<>"B" THEN320
DD 120 INPUT "{2 DOWN}{RVS}BACK
GROUND COLOR:{OFF}
{3 RIGHT}{0}{3 LEFT}";BC:
BC$=CHR$(BC)

```


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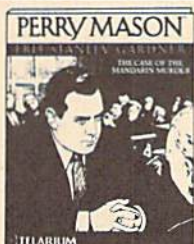
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```

DH 130 INPUT "{2 DOWN}{RVS}BORD
ER COLOR:{OFF}{3 RIGHT}
0{3 LEFT}";B2:B2$=CHRS(
B2)
FB 140 INPUT "{2 DOWN}{RVS}TEXT
COLOR:{OFF}{3 RIGHT}6
{3 LEFT}";T1:T1$=CHRS(T
1)
XH 150 INPUT "{2 DOWN}{RVS}FILE
NAME{OFF}";AS
KJ 160 INPUT "{2 DOWN}{RVS}STAR
T ADDRESS{OFF}";B$=IFLE
FTS(B$,1)="$"THEN GOSUB4
10:GOTO180
FB 170 AD=VAL(B$):HB=INT(AD/25
6):LB=AD-HB*256
PQ 180 FDS(CF)=CHRS(LB):FDS(CF
)=FDS(CF)+CHRS(HB)
XG 190 IFLEN(AS)>=16THEN210
XJ 200 FORI=LEN(AS)TO16:AS=AS+
CHRS(160):NEXTI
ES 210 FDS(CF)=FDS(CF)+LEFTS(A
$,16)
GK 220 INPUT "{2 DOWN}{RVS}ANOT
HER FILE (Y/N){3 RIGHT}
N{3 LEFT}{OFF}";GS
GK 230 IFGS="Y"ANDCF<9THENCFC=
CF+1:GOTO150
BX 240 IFCF=9THENPRINT"
{2 DOWN}{RVS}TOO MANY F
ILES...{OFF}"
FG 250 GOTO530:REM VERIFY DATA
JC 260 OPEN15,8,15,"S0:BOOT.DA
T":CLOSE15:OPEN2,8,2,"0
:BOOT.DAT,S,W"
KP 270 PRINT#2,B$;:PRINT#2,B2
$:PRINT#2,T1$;
XF 280 PRINT#2,CHRS(CF+1);
KR 290 FORI=0TOCF:PRINT#2,FDS(
I);:NEXTI
SC 300 CLOSE2:END
MQ 310 PRINT "{2 DOWN}{RVS}DATA
FILE CONTENTS:{OFF}
{2 DOWN}"
RJ 320 OPEN2,8,2,"0:BOOT.DAT,S
,R"
BP 330 FORFC=1TO3:GET#2,AS:CF=
ASC(AS+CHRS(0)):PRINTCF
,:NEXTFC:PRINT
KQ 340 GET#2,AS:CF=ASC(AS):PRI
NTCF
GR 350 FORI=1TOCF:FORJ=1TO2:GE
T#2,AS:PRINTASC(AS+CHRS
(0));:NEXTJ:REM LOAD AD
DRESS
DE 360 AS="" :FOR J=0TO15:GET#2
,B$;AS=AS+B$:NEXTJ:PRIN
TAS:NEXTI
KD 370 CLOSE2
FA 380 INPUT "{2 DOWN}{RVS}DO Y
OU WISH TO MAKE A CHANG
E{2 RIGHT}{3 LEFT}";AS
XH 390 IFA$="Y"THEN70
AS 400 END
AC 410 L$=RIGHT$(B$,2):H$=MID$(
B$,2,LEN(B$)-3)
AQ 420 N$=L$:GOSUB450:LB=N
MP 430 HB=0:IFLEN(H$)>0THENN$=
H$:GOSUB450:HB=N
BB 440 RETURN
SH 450 EQ=0:REM CONVERT A STRI
NG TO A BYTE
JE 460 LNS=RIGHT$(N$,1)
JD 470 IFLNS=CV$(EQ,0)THENN$=VA
L(CV$(EQ,1)):GOTO490
EH 480 EQ=EQ+1:GOTO470
SA 490 HNS=LEFT$(N$,1):EQ=0
KA 500 IFHNS=CV$(EQ,0)THENN$=N+
16*VAL(CV$(EQ,1)):GOTO5
20
SC 510 EQ=EQ+1:GOTO500
EG 520 RETURN

```

```

XS 530 PRINT "{2 DOWN}{RVS}DATA
FILE CONTENTS:{OFF}
{2 DOWN}"
GF 540 PRINTBC,B2,T1
GX 550 PRINTCF+1
JC 560 FORI=0TOCF:FORJ=1TO2:PR
INTASC(MID$(FDS(I),J,1)
+CHRS(0));:NEXTJ
SX 570 PRINTRIGHTS(FDS(I),16):
NEXTI
QE 580 INPUT "{2 DOWN}{RVS}DO Y
OU WISH TO MAKE A CHANG
E{2 RIGHT}{3 LEFT}";AS
EA 590 IFA$="Y"THEN70
DK 600 GOTO260

```

Lincoln Green

See instructions in article on page 37 before typing in.

```

0801:0B 08 FF FF 9E 32 30 39 EF
0809:39 00 29 08 FF FF 8F 14 8E
0811:14 14 14 14 14 14 14 21
0819:43 2E 20 31 39 38 20 A8
0821:43 4F 4D 50 55 54 45 21 FC
0829:20 50 55 42 4C 2E 20 00 87
0831:00 00 A9 93 20 D2 FF A9 A5
0839:8E 20 D2 FF A9 08 20 D2 73
0841:FF A9 80 8D 0E D4 8D 0F 92
0849:D4 8D 12 D4 20 95 0B 20 44
0851:28 0E 20 B5 0C 20 0E 0D 62
0859:20 DD 0F 20 0A 14 20 31 E6
0861:14 4C 44 13 20 4D 14 A5 4C
0869:C5 C9 21 D0 03 4C 2F 15 BC
0871:AD 00 DC 29 0F C9 0E D0 13
0879:03 4C 92 08 C9 0D 03 18
0881:4C AE 08 C9 07 D0 03 4C CE
0889:CA 08 C9 0B D0 D3 4C E6 40
0891:08 AD 57 05 C9 20 F0 03 FF
0899:4C 9F 13 20 08 0B 20 08 D0
08A1:0B 20 08 0B 20 08 0B 20 48
08A9:D9 0B 4C 9C 14 AD 97 06 49
08B1:C9 20 F0 03 4C 9F 13 20 24
08B9:B3 0A 20 B3 0A 20 B3 0A A7
08C1:20 B3 0A 20 D9 0B 4C AD 53
08C9:14 AD FB 05 C9 20 F0 03 D2
08D1:4C 9F 13 20 02 09 20 02 CA
08D9:09 20 02 09 20 02 09 20 82
08E1:5C 0C 4C 7A 14 AD F3 05 98
08E9:C9 20 F0 03 4C 9F 13 20 5C
08F1:80 0A 20 80 0A 20 80 0A AC
08F9:20 80 0A 20 5C 0C 4C 8B B4
0901:14 20 ED 0E 20 4E 0B 20 34
0909:62 0B 8D 5F 15 20 6D 0B C5
0911:C8 20 73 0B 88 20 76 0B 6B
0919:C8 C0 27 F0 F3 20 79 0B CB
0921:A0 00 20 F0 0A EE 5F 15 76
0929:AD 5F 15 C9 18 90 DE 4C 36
0931:58 0B F0 F2 EF E7 F2 E1 66
0939:ED A0 E2 F9 A0 F2 EF E2 F9
0941:E5 F2 F4 A0 E2 E9 F8 E2 3F
0949:F9 B3 B0 B0 B6 A0 F3 F4 7B
0951:EF EE E5 E3 F5 F4 F4 E5 65
0959:F2 A0 F4 E5 F2 F2 E1 E3 15
0961:E5 E7 F2 E5 E5 EE F3 E2 D2
0969:EF F2 EF AC A0 EE E3 A0 22
0971:B2 B7 B4 B0 B5 00 00 00 1A
0979:00 00 00 00 00 00 00 00 8B
0981:00 00 00 00 00 00 00 00 93
0989:00 00 00 00 00 00 00 00 9B
0991:00 00 00 00 00 00 00 00 A3
0999:00 00 00 00 00 FF FF FF AB
09A1:FF FF FF 00 00 00 00 B3
09A9:00 00 00 00 00 00 00 BB
09B1:00 00 00 00 00 00 00 C3
09B9:00 00 00 00 00 00 00 CB
09C1:30 00 00 30 00 00 30 4F
09C9:00 30 00 00 30 00 30 99
09D1:00 00 30 00 00 30 00 AA
09D9:30 00 00 30 00 30 00 67
09E1:00 30 00 00 30 00 30 B1
09E9:00 00 30 00 00 30 00 C2

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09F1:30 00 00 30 00 00 30 7F
09F9:00 30 00 00 30 00 00 C0 5A
0A01:00 00 00 00 30 00 00 E1
0A09:18 00 00 0C 00 00 06 00 F5
0A11:00 03 00 00 01 80 00 00 EF
0A19:C0 00 00 00 60 00 30 00 F3
0A21:00 18 00 00 0C 00 00 06 A1
0A29:00 00 03 00 00 01 80 00 A2
0A31:00 C0 00 00 60 00 30 00 A8
0A39:00 00 18 00 00 0C 00 00 80
0A41:00 01 00 00 03 00 00 06 B3
0A49:00 00 0C 00 00 18 00 00 3F
0A51:30 00 00 60 00 00 C0 00 05
0A59:01 80 00 03 00 00 06 00 4A
0A61:00 0C 00 00 18 00 00 30 69
0A69:00 00 60 00 00 C0 00 01 8D
0A71:80 00 03 00 00 06 00 00 3E
0A79:0C 00 00 18 00 00 00 20 35
0A81:3D 0F 20 4E 0B 20 62 0B 89
0A89:8D 5F 15 A0 27 20 6D 0B 88
0A91:88 20 73 0B C8 20 76 0B CF
0A99:88 C0 00 D0 F3 20 79 0B 4D
0AA1:A0 27 20 F0 0A EE 5F 15 C2
0AA9:AD 5F 15 C9 18 90 DE 4C B8
0AB1:58 0B 20 8D 0F 20 4E 0B 32
0AB9:20 62 0B 8D 5F 15 20 7F BF
0AC1:0B A0 00 20 F0 0A 20 73 E8
0AC9:0B 8D 5D 15 20 FC 0A AD 7A
0AD1:5D 15 20 76 0B C8 0A 28 6A
0AD9:90 E9 20 F0 0A A0 00 EE 85
0AE1:5F 15 AD 5F 15 C9 17 90 25
0AE9:FA 20 8A 0B 4C 58 0B A5 F4
0AF1:DB 18 69 28 85 FB 90 02 F8
0AF9:E6 FC 60 A5 FB 38 E9 28 E3
0B01:85 FB B0 02 C6 FC 60 20 1A
0B09:B5 0F 20 4E 0B A9 07 85 39
0B11:FC A9 98 85 FB A9 00 8D 8F
0B19:5F 15 A8 AA 20 7F 0B A0 99
0B21:00 20 FC 0A 20 73 0B 8D F1
0B29:5D 15 20 F0 0A AD 5D 15 1D
0B31:20 76 0B C8 C0 28 90 E9 94
0B39:20 FC 0A A0 00 EE 5F 15 79
0B41:AD 5F 15 C9 17 90 DA 20 16
0B49:8A 0B 4C 58 0B 8D 64 15 E2
0B51:8E 65 15 8C 66 15 60 AD 69
0B59:64 15 AE 65 15 AC 66 15 50
0B61:60 A9 04 85 FC A9 00 85 FE
0B69:FB A8 AA 60 B1 FB 8D 5D F8
0B71:15 60 B1 FB 60 91 FB 60 C1
0B79:AD 5D 15 91 FB 60 B1 FB 3A
0B81:99 A7 02 C8 C0 28 90 F6 D9
0B89:60 B9 A7 02 91 FB C8 C0 22
0B91:28 90 F6 60 AD 18 D0 29 5D
0B99:F0 09 0C 8D 18 D0 A9 7F 9B
0BA1:8D 0D DC A9 33 85 01 A9 53
0BA9:30 85 FC A9 00 85 FB 85 07
0BB1:FD A8 A9 D0 85 FE B1 FD BC
0BB9:91 FB C8 C0 F9 E6 FC E6 0A
0BC1:FE A5 FC C9 30 90 EF A9 8A
0BC9:37 85 01 A9 81 8D 0D DC D0
0BD1:60 60 60 60 60 60 60 E7
0BD9:20 A4 0C AD 1B D4 29 04 08
0BE1:AA BD 1C 0C 91 FB A9 28 F8
0BE9:85 FB BD 24 0C 91 FB A9 04
0BF1:50 85 FB BD 2C 0C 91 FB 9D
0BF9:A9 78 85 FB BD 34 0C 91 DB
0C01:FB A9 00 85 FB C8 E8 EE 9D
0C09:67 15 AD 67 15 C9 04 90 AE
0C11:D0 A9 00 8D 67 15 C0 28 0E
0C19:90 C1 60 A0 A1 A2 A3 20 FE
0C21:20 20 20 A4 A5 A6 A7 20 D6
0C29:20 20 20 A8 A9 AA AB 20 57
0C31:20 20 20 AC AD AE AF 20 D7
0C39:20 20 20 A0 A4 A8 AC 20 B8
0C41:20 20 20 A1 A5 A9 AD 20 DE
0C49:20 20 20 A2 A6 AA AE 20 05
0C51:20 20 20 A3 A7 AB AF 20 2B
0C59:20 20 20 A4 A8 AC AD 1B 5B
0C61:D4 29 04 AA BD 3C 0C 91 E1
0C69:FB C8 BD 44 0C 91 FB C8 15
0C71:BD 4C 0C 91 FB C8 BD 54 E8
0C79:0C 91 FB A0 00 A5 FB 18 2C
0C81:69 28 85 FB 90 02 E6 FC 20
0C89:E8 EE 68 15 AD 68 15 C9 33
0C91:04 90 D1 A9 00 8D 68 15 C0

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0C99:EE	67	15	AD	67	15	C9	06	A9	0F41:02	D0	18	69	08	8D	02	D0	79	11E9:00	00	14	00	00	14	00	00	DE	
0CA1:90	BC	60	A9	04	85	FC	A9	B1	0F49:90	08	AD	10	D0	49	02	8D	A5	11F1:14	00	0D	54	00	08	20	00	65	
0CA9:00	85	FB	A8	AA	8D	67	15	9C	0F51:10	D0	AD	04	D0	18	69	08	63	11F9:00	10	00	00	38	00	00	00	E1	
0CB1:8D	68	15	60	AD	36	0E	8D	43	0F59:8D	04	D0	90	08	AD	10	D0	4A	1201:50	00	00	50	00	00	28	00	A2	
0CB9:20	D0	8D	21	D0	A9	D8	85	3E	0F61:49	04	8D	10	D0	AD	06	D0	F1	1209:00	28	00	00	55	00	00	28	00	A0
0CC1:FC	A9	00	85	FB	A8	AA	AD	A0	0F69:18	69	08	8D	06	D0	90	08	64	1211:00	00	28	00	00	28	00	00	DA	
0CC9:36	0E	91	FB	C8	C0	A0	90	8D	0F71:AD	10	D0	49	08	8D	10	D0	80	1219:28	00	00	28	00	00	28	00	24	
0CD1:F6	84	FB	A0	00	AD	36	0E	41	0F79:AD	08	D0	18	69	08	8D	08	9A	1221:00	28	00	00	28	00	00	18	A8	
0CD9:91	FB	C8	C0	04	90	F6	A9	D8	0F81:D0	B0	08	AD	10	D0	49	10	76	1229:00	00	10	00	00	18	00	00	AF	
0CE1:05	91	FB	C8	C0	28	90	F7	AC	0F89:8D	10	D0	60	20	EC	12	AD	19	1231:18	00	00	10	00	00	10	00	82	
0CE9:A0	00	A5	FB	18	69	28	85	03	0F91:03	D0	38	E9	08	8D	03	D0	58	1239:00	10	00	00	38	00	00	00	23	
0CF1:FB	90	02	E6	FC	A5	FC	C9	1D	0F99:AD	05	D0	38	E9	08	8D	05	FC	1241:05	00	00	05	00	00	28	00	88	
0CF9:DB	90	D8	A5	FB	C9	C0	90	B2	0FA1:D0	AD	07	D0	38	E9	08	8D	88	1249:00	28	00	00	55	00	00	28	4A	
0D01:D2	A0	00	A9	01	91	FB	C8	56	0FA9:07	D0	AD	09	D0	38	E9	08	09	1251:00	00	28	00	00	19	00	00	DE	
0D09:C0	28	90	F7	60	A9	0D	8D	70	0FB1:8D	09	D0	60	20	EC	12	AD	7F	1259:18	00	00	18	00	01	58	40	FF	
0D11:F8	07	A9	26	8D	F9	07	A9	0D	0FB9:03	D0	18	69	08	8D	03	D0	74	1261:00	28	00	00	18	00	00	38	88	
0D19:27	8D	FA	07	A9	28	8D	FB	FE	0FC1:AD	05	D0	18	69	08	8D	05	1F	1269:00	00	14	00	00	14	00	00	60	
0D21:07	A9	29	8D	FC	07	A9	05	83	0FC9:D0	AD	07	D0	18	69	08	8D	AD	1271:14	00	15	00	00	00	00	00	01	
0D29:8D	27	D0	A9	01	8D	15	D0	C1	0FD1:07	D0	AD	09	D0	18	69	08	AF	1279:00	04	00	00	2C	00	00	00	FF	
0D31:A9	07	8D	28	D0	8D	29	D0	F5	0FD9:8D	09	D0	60	78	A9	EA	8D	EE	1281:05	00	00	05	00	00	28	00	C8	
0D39:8D	2A	D0	8D	2B	D0	A9	01	88	0FE1:14	03	A9	0F	8D	15	03	58	10	1289:00	28	00	00	55	00	00	28	8A	
0D41:8D	1C	D0	A9	BC	8D	00	D0	CA	0FE9:60	20	01	15	AD	CF	10	C9	48	1291:00	00	28	00	00	25	00	00	4F	
0D49:A9	96	8D	01	D0	A9	00	8D	5A	0FF1:08	D0	1B	AD	1B	D4	29	07	0C	1299:28	00	00	28	00	00	08	00	64	
0D51:10	D0	A9	03	8D	25	D0	A9	59	0FF9:8D	CF	10	20	E8	13	AD	CF	95	12A1:00	28	00	00	18	00	00	38	C8	
0D59:0D	8D	26	D0	A9	00	8D	69	01	1001:10	C9	04	90	06	20	08	11	F6	12A9:00	00	24	00	00	24	00	00	E2	
0D61:15	A9	02	8D	6C	15	A9	58	EC	1009:4C	74	10	20	D0	10	AD	CF	62	12B1:24	00	00	05	00	00	03	28	66	
0D69:8D	6B	15	A9	04	8D	70	15	AE	1011:10	D0	1C	AD	71	15	20	37	23	12B9:00	05	00	00	23	00	00	20	58	
0D71:8D	6E	15	A9	4C	8D	6F	15	B7	1019:0E	AD	02	D0	C9	64	90	50	4A	12C1:C1	13	AD	6A	15	F0	11	A0	17	
0D79:A9	4C	8D	6D	15	A9	01	8D	E2	1021:AD	10	D0	29	02	F0	49	A9	D8	12C9:00	08	6A	15	B9	C0	11	99	3C	
0D81:75	15	AD	1B	D4	29	01	F0	41	1029:08	8D	CF	10	4C	71	10	C9	BD	12D1:40	03	C8	C0	40	90	F5	60	8C	
0D89:08	A9	FF	8D	E2	15	4C	95	84	1031:01	D0	13	AD	72	15	8D	15	5B	12D9:A0	00	A9	01	8D	6A	15	B9	8D	
0D91:0D	8D	E2	15	AD	1B	D4	29	EF	1039:0D	20	37	0E	AD	05	D0	C9	7E	12E1:00	12	99	40	03	C8	C0	40	BE	
0D99:01	F0	08	A9	FF	8D	E3	15	1F	1041:FA	B0	E4	4C	71	10	C9	02	CD	12E9:90	F5	60	20	C1	13	AD	6A	02	
0DA1:4C	A7	0D	8D	E3	15	60	00	7A	1049:D0	11	AD	73	15	8D	15	D0	DC	12F1:15	F0	11	A0	00	8C	6A	15	25	
0DA9:00	00	00	00	0F	3F	FF	00	39	1051:20	37	0E	AD	07	D0	D0	18	21	12F9:B9	40	11	99	40	03	C8	C0	27	
0DB1:0F	3F	FF	FF	FF	FF	FF	00	23	1059:4C	28	10	C9	03	D0	14	AD	79	1301:40	90	F5	60	A0	00	A9	01	89	
0DB9:F0	FC	FF	FF	FF	FF	FF	00	8B	1061:74	15	8D	15	D0	20	37	0E	87	1309:8D	6A	15	B9	80	11	99	40	8A	
0DC1:00	00	00	00	F0	FC	FF	FF	57	1069:AD	09	D0	D0	03	4C	28	10	73	1311:03	C8	C0	40	90	F5	60	20	44	
0DC9:FF	FF	FF	FF	FF	FF	FF	FF	E3	1071:4C	31	EA	C9	04	D0	18	AD	3F	1319:C1	13	AD	6A	15	F0	11	A0	70	
0DD1:FF	FF	FF	FF	FF	FF	FF	FF	EB	1079:71	15	8D	15	D0	20	92	0E	D4	1321:00	8C	6A	15	B9	40	12	99	95	
0DD9:FF	FF	FF	FF	FF	FF	FF	FF	F3	1081:AD	02	D0	D0	EB	AD	10	D0	27	1329:40	03	C8	C0	40	90	F5	60	E5	
0DE1:FF	FF	FF	FF	FF	FF	FF	FF	FB	1089:29	02	D0	E4	4C	28	10	C9	14	1331:A0	00	A9	01	8D	6A	15	B9	E6	
0DE9:3F	0F	00	00	00	00	00	FF	67	1091:05	D0	11	AD	72	15	8D	15	7D	1339:80	12	99	40	03	C8	C0	40	58	
0DF1:FF	FF	FF	FF	3F	0F	00	FF	42	1099:D0	20	92	0E	AD	05	D0	D0	51	1341:90	F5	60	AD	1E	D0	29	01	9B	
0DF9:FF	FF	FF	FF	FC	F0	00	FF	BF	10A1:CF	4C	28	10	C9	06	D0	11	DB	1349:D0	03	4C	65	08	20	D0	10	EA	
0E01:FC	F0	00	00	00	00	00	00	D7	10A9:AD	73	15	8D	15	D0	20	92	B7	1351:20	0A	14	AE	69	15	E0	0A	E2	
0E09:00	00	00	00	00	00	00	01	26	10B1:0E	AD	07	D0	D0	BA	4C	28	64	1359:F0	03	4C	65	08	A2	00	BD	21	
0E11:02	05	02	05	0A	15	2A	40	39	10B9:10	C9	07	D0	B3	AD	74	15	94	1361:7F	13	F0	07	20	D2	FF	E8	FE	
0E19:80	40	A0	50	A8	54	AA	00	8A	10C1:8D	15	D0	20	92	0E	AD	09	3B	1369:4C	60	13	20	E4	15	A5	C5	BE	
0E21:00	00	00	00	00	00	00	A0	DD	10C9:D0	8D	A5	4C	28	10	04	A9	33	1371:C9	19	D0	03	4C	23	08	C9	16	
0E29:00	B9	A8	0D	99	00	35	C8	99	10D1:BC	8D	00	D0	0A	96	8D	01	84	1379:27	00	F3	4C	EC	FC	13	11	EC	
0E31:C0	80	90	F5	60	09	AD	02	C3	10D9:D0	A9	00	8D	02	D0	A9	96	E2	1381:11	11	11	11	05	50	4C	41	EA	
0E39:D0	18	6D	75	15	8D	02	D0	7C	10E1:8D	03	D0	A9	BA	8D	04	D0	23	1389:59	20	41	47	41	49	4E	3F	0E	
0E41:90	08	AD	10	D0	49	02	8D	9B	10E9:A9	00	8D	05	D0	A9	28	8D	EB	1391:20	3C	59	2F	4E	3E	00	4E	AE	
0E49:10	D0	AD	05	D0	18	6D	75	DE	10F1:06	D0	A9	00	8D	07	D0	A9	52	1399:49	43	4B	53	20	00	CE	6B	DD	
0E51:15	8D	05	D0	AD	07	D0	18	4C	10F9:4E	8D	08	D0	A9	FA	8D	09	10	13A1:15	AD	6B	15	C9	FF	D0	03	6F	
0E59:6D	75	15	8D	07	D0	AD	06	E1	1101:D9	AD	A9	00	8D	10	D0	60	A9	FC	13A9:CE	6C	15	20	31	14	AD	6C	98
0E61:D0	18	6D	75	15	8D	06	D0	AC	1109:BC	8D	00	D0	A9	96	8D	01	BD	13B1:15	D0	0A	AD	6B	15	D0	05	09	
0E69:90	08	AD	10	D0	49	08	8D	CF	1111:D0	A9	64	8D	02	D0	A9	96	A8	13B9:A2	00	4C	60	13	4C	62	08	57	
0E71:10	D0	AD	09	D0	38	ED	75	C8	1119:8D	03	D0	A9	00	8D	04	D0	86	13C1:A9	80	8D	12	D4	A9	0F	8D	A8	
0E79:15	8D	09	D0	AD	08	D0	18	F8	1121:A9	C8	8D	05	D0	A9	FF	8D	07	13C9:0E	D4	8D	0F	D4	A9	29	8D	FB	
0E81:6D	75	15	8D	08	D0	90	08	D9	1129:06	D0	A9	DC	8D	07	D0	A9	59	13D1:13	D4	A9	F0	8D	14				


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1491:9D 15 4C 99 14 20 76 15 14
1499:4C BB 14 AD E3 15 F0 06 8F
14A1:20 AC 15 4C AA 14 20 BB 0E
14A9:15 4C BB 14 AD E3 15 F0 40
14B1:06 20 BB 15 4C BB 14 20 47
14B9:AC 15 AD 6F 15 D0 20 AD 04
14C1:70 15 D0 1B AD 6D 15 D0 51
14C9:16 AD 6E 15 D0 11 20 E4 77
14D1:15 A2 00 BD E8 14 F0 0A 8C
14D9:20 D2 FF E8 4C D4 14 4C 7F
14E1:62 08 A2 00 4C 60 13 13 AE
14E9:11 1F 59 4F 55 20 52 45 97
14F1:41 43 48 45 44 20 53 41 73
14F9:4E 43 55 56 45 52 59 00 50
1501:AD 6E 15 18 6D 70 15 A0 B9
1509:00 AA E0 04 B0 05 A9 02 29
1511:8D 75 15 BD 21 15 99 71 DF
1519:15 C8 E8 C0 04 90 F4 60 D5
1521:1F 0F 07 03 1F 17 0F 13 36
1529:0B 07 03 05 09 11 A2 00 1D
1531:BD 42 15 F0 07 20 D2 FF DA
1539:E8 4C 31 15 A2 02 4C 31 49
1541:15 93 05 50 52 4F 47 52 31
1549:41 4D 20 42 59 20 52 4F CE
1551:42 45 52 54 20 42 49 58 72
1559:42 59 20 00 00 00 00 00 FE
1561:00 00 00 00 00 00 00 00 8B
1569:00 00 00 00 00 00 00 00 93
1571:00 00 00 00 00 00 6D 15 42
1579:38 E9 0A 8D 6D 15 B0 1B 90
1581:AD 6E 15 38 E9 01 8D 6E 21
1589:15 B0 10 A9 00 8D 6D 15 2D
1591:8D 6E 15 AD E2 15 49 FF 99
1599:8D E2 15 60 AD 6D 15 18 51
15A1:69 0A 8D 6D 15 90 03 EE 6B
15A9:6E 15 60 AD 6F 15 18 69 A0
15B1:0A 8D 6F 15 90 03 EE 70 62
15B9:15 60 AD 6F 15 38 E9 0A 9A
15C1:8D 6F 15 B0 1B AD 70 15 C1
15C9:38 E9 01 8D 70 15 B0 10 CC
15D1:A9 00 8D 6F 15 8D 70 15 4E
15D9:AD E3 15 49 FF 8D E3 15 1E
15E1:60 00 00 78 A9 31 8D 14 05
15E9:03 A9 EA 8D 15 03 58 60 FB

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BEFORE TYPING . . .

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

Multicolor Graphics Dump

See instructions in article on page 56 before typing in.

```

C3E8:AD 11 D0 29 20 D0 03 4C CE
C3F0:90 C4 AD 00 DD 29 03 49 8A
C3F8:03 4A 6A 6A 85 04 85 05 D4
C400:AD 18 D0 29 08 F0 06 A5 C8
C408:04 09 20 85 04 AD 18 D0 0A
C410:29 F0 4A 4A 65 05 85 05 A7
C418:4C B6 C4 0D 45 4E 54 45 30
C420:52 20 42 49 54 20 4D 41 B6
C428:50 20 42 4C 4F 43 4B 20 2D
C430:4E 55 4D 42 45 52 20 28 DF
C438:30 2D 37 29 20 00 0D 45 FE
C440:4E 54 45 52 20 43 4F 4C CC
C448:4F 52 20 42 4C 4F 43 4B A7
C450:20 4E 55 4D 42 45 52 20 E8
C458:28 30 2D 36 33 29 20 00 89
C460:FF FF 00 40 EB DF 42 1A 6B
C468:BD E5 5A 1A EF BF 10 40 16
C470:B5 E5 FF BF 4A 1A EB D7 B4
C478:5A 5A 14 20 A5 E5 14 28 5F

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C480:4C 48 B2 48 20 CC FF A9 FA
C488:04 20 C3 FF 68 4C 3B A4 24
C490:A9 1B A0 C4 20 1E AB 20 07
C498:9F C6 C9 08 B0 E2 4A 6A 6D
C4A0:6A 6A 85 04 A9 3E A0 C4 37
C4A8:20 1E AB 20 9F C6 C9 40 2D
C4B0:B0 CE 0A 0A 85 05 20 CC 75
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C4E0:85 6A 85 6B A9 00 85 FB 83
C4E8:85 FC 85 66 A9 03 20 E1 07
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C4F8:A5 FB 6A 85 03 A9 C7 38 80
C500:E5 03 85 03 A9 00 85 63 DB
C508:85 69 A5 03 29 F8 85 67 35
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C530:02 E6 69 A5 02 29 FC 0A B6
C538:26 63 65 67 85 FD A5 69 AB
C540:65 63 65 04 85 FE 78 A5 03
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C630:04 20 C3 FF 4C 07 E1 A9 2C
C638:00 85 66 A5 6A A6 6B 85 98
C640:6C 86 6D E6 FB D0 02 E6 CF
C648:FC A5 FB C9 90 D0 06 A5 53
C650:FC C9 01 F0 03 4C EC C4 E5
C658:A9 0D 20 D2 FF 20 8B C6 8D
C660:A5 6A C9 DC F0 16 A5 6A F7
C668:18 69 07 85 6A 90 02 E6 16
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C680:D0 E4 20 CC FF A9 04 20 4F
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C690:A9 10 20 D2 FF A9 00 20 EE
C698:D2 FF A9 1C 4C D2 FF A0 D4
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C6B0:01 A9 0D 20 D2 FF A5 7A 29
C6B8:48 A5 7B 48 A9 00 85 7A 9A
C6C0:A9 02 85 7B 20 79 00 20 13
C6C8:8A AD 20 9B BC A5 62 05 0B
C6D0:63 05 64 F0 03 4C 80 C4 FB
C6D8:68 85 7B 68 85 7A A5 65 B8
C6E0:60 85 6F A9 00 85 6E 85 01
C6E8:FE 85 06 A5 6C 85 69 A5 64
C6F0:6D 85 67 D0 0B A5 69 C5 18
C6F8:6F B0 05 A9 00 85 06 60 28
C700:06 6F 26 6E E6 FE A5 67 FF
C708:C5 6E F0 08 B0 F2 90 0C 33
C710:E6 FE B0 0C A5 69 C5 6F 77
C718:F0 F6 B0 E4 46 6E 66 6F 6A
C720:A5 69 38 E5 6F 85 69 A5 4C

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C728:67 E5 6E 85 67 90 1A 26 E2
C730:06 06 69 26 67 C6 FE D0 F8
C738:E7 60 A5 69 18 65 6F 85 D9
C740:69 A5 67 65 6E 85 67 B0 3A
C748:E6 26 06 06 69 26 67 C6 6F
C750:FE D0 E7 60 00 00 00 96

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Lava Flow

See instructions in article on page 39 before typing in.

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C008:C0 A9 00 8D 5E C7 8D 5F B9
C010:C7 A9 05 8D 61 C7 A9 05 DB
C018:8D 62 C7 A9 00 A2 00 9D B4
C020:00 D4 E8 E0 18 D0 F8 A9 A1
C028:0A 8D BF C7 A9 03 8D C0 BB
C030:C7 A9 06 8D 2D D0 8D 21 1A
C038:D0 A9 08 8D 64 C7 8D 63 27
C040:C7 0A 8D 66 C7 8D 65 C7 47
C048:A9 02 8D 6E C7 8D 6F C7 D2
C050:A9 00 8D 70 C7 8D 71 C7 7E
C058:A9 0B 8D 6D C7 AD 0E DC E7
C060:29 FE 8D 0E DC A5 01 29 71
C068:FB 85 01 A9 00 85 FB A9 BB
C070:D0 85 FC A9 00 85 FD A9 B1
C078:30 85 FE A0 00 B1 FB 91 AD
C080:FD A5 FB 18 69 01 85 FB C1
C088:A5 FC 69 00 85 FC A5 FD B2
C090:18 69 01 85 FD A5 FE 69 DE
C098:00 85 FE C9 38 D0 DC A5 5C
C0A0:FD C9 00 D0 D6 A5 01 09 F8
C0A8:04 85 01 AD 0E DC 09 01 7F
C0B0:8D 0E DC AD 18 D0 29 F0 3A
C0B8:18 69 0C 8D 18 D0 A2 00 44
C0C0:BD C2 C7 9D 18 33 E8 E0 E4
C0C8:7A D0 F5 A2 00 BD C2 C7 E8
C0D0:9D 10 33 E8 E0 08 D0 F5 D8
C0D8:A9 28 D0 60 C7 60 20 3F 30
C0E0:C1 20 5D C2 A0 00 AD 62 E5
C0E8:C7 F0 0A AD 61 C7 D0 EE 61
C0F0:A2 05 4C F7 C0 A2 00 BD 5C
C0F8:89 C7 99 94 C7 C8 E8 C0 A1
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C110:9F 20 D2 FF A2 00 BD 94 EA
C118:C7 CD 93 C7 D0 02 A9 20 E3
C120:29 7F 20 D2 FF E8 E0 27 D5
C128:D0 EC A9 00 85 C6 A5 C6 D0
C130:F0 FC 20 E4 FF C9 59 F0 88
C138:05 C9 4E D0 ED 00 60 A9 61
C140:93 20 D2 FF A9 9F 20 D2 CE
C148:FF A9 27 8D 72 C7 A9 A3 9D
C150:20 D2 FF CE 72 C7 D0 F6 D0
C158:A9 16 8D 72 C7 A9 A2 20 59
C160:D2 FF 20 D2 FF A9 11 20 67
C168:D2 FF A9 9D 20 D2 FF 20 D0
C170:D2 FF CE 72 C7 D0 E6 A9 57
C178:29 8D 72 C7 A9 A3 20 D2 AD
C180:FF CE 72 C7 D0 F6 A9 20 58
C188:A2 07 20 D2 FF CA D0 FA 18
C190:A9 90 20 D2 FF A2 00 BD 86
C198:89 C7 29 7F 20 D2 FF E8 25
C1A0:E0 05 D0 F3 A9 20 20 D2 10
C1A8:FF AD 61 C7 18 69 30 20 27
C1B0:D2 FF A2 0B A9 20 20 D2 83
C1B8:FF CA D0 F8 A9 05 20 D2 0D
C1C0:FF A2 05 BD 89 C7 29 7F A6
C1C8:20 D2 FF E8 E0 E4 D0 F3 64
C1D0:A9 20 20 D2 FF AD 62 C7 A5
C1D8:18 69 30 20 D2 FF A0 00 A2
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C1E8:05 8D BC C7 85 FC AD BB 9D
C1F0:C7 18 69 15 8D BD C7 AD 7D
C1F8:BC C7 69 00 8D BE C7 A9 9A
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C208:FB A0 15 A9 6D 91 FB A0 3B
C210:00 A9 E9 85 FB A9 D9 85 55
C218:FC A9 00 91 FB A0 0A 91 BF
C220:0A 91 FB A0 15 A9 01 91 7B
C228:FB A0 00 A9 00 8D 5E C7 29
C230:8D 86 C7 A9 00 8D 78 C7 A0

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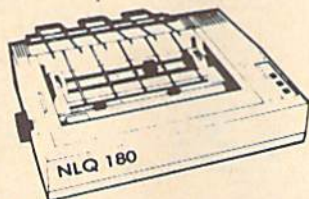
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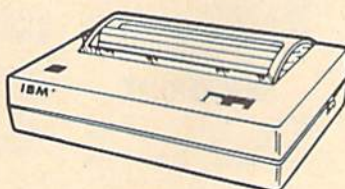
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ALL NEW

ATTENTION C-128 OWNERS

Now that Commodore has released the C-128D with 64K of video RAM, we should be seeing 128 programs address this fantastic new feature soon.

BASIC 8 already has the capability of using all 64K of video RAM. If you own the C-128 in stock condition, you own all 16K of video RAM that Commodore felt was necessary. Using Basic 8 format and the full 64K of video RAM provides you with the ability to scroll through video memory as well as enhanced color resolution.

Up until now, to upgrade the C-128 to 64K of video RAM you would have to first search out the components, then find a competent repair outfit to desolder and install the parts. **What a hassle!**

SOLUTION — We have developed a module that simply plugs in to the mother board of your C-128. **No splattered solder — No heat damage — No hassle.**

This package includes full easy to follow installation instructions, a test program to validate proper installation and the plug-in upgrade module.

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Project Phoenix. We assembled a team of the hottest archival programmers in the industry and gave them the challenge of their careers: create a professional utility system that would set the tone for the future of Commodore personal computing - a system for the next decade and beyond.

Hundreds of expert-hours later, that team delivered to us a utility package of sobering power and scope. A package that could turn an average hacker into a superstar. A package created at the very boundary between what is and is not possible. A package called Renegade.

Renegade takes the very best ideas from the past and re-creates them, combining state of the art techniques with a conceptual grasp of the future of computing. The result is dynamic - classic utilities are transformed into muscular components of a system designed for speed, power, and flexibility.

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- * Geos™: Modular: PARAMETERS and TOOLS
- * 200 Params: For those tough to backup disks
- * New Parameter updates only \$9.95 each
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- * Track & Sector Editor: Allows check for altered densities track by track!
- * Error Scanner: Full featured error scanner with on-screen display!
- * Density Scanner: Allows check for altered densities track by track!
- * Directory Editor: Reorganize the directories on your 5.25" disks!
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Introducing the 1541 RAMBOard

Copy protection's "worst nightmare"

The dream has been there for years now: an inexpensive piece of hardware that, when added to your system, would allow you to backup almost every single piece of software ever released for the C64.

Software Support has just made the dream a reality!

We're proud to introduce the 1541 RAMBOard, a small card that can easily be installed into your 1541/1541C disk drive in 5 minutes using just a screwdriver. With this powerful card in place, backup hassles are a thing of the past! Working with special software, the RAMBOard will backup software that other utilities can't even scratch the surface of. And as new protection schemes arrive, we'll create new parameters to keep your RAMBOard operating behind enemy lines.

RAMBOard also comes bundled with a fast copier that can archive an unprotected data disk in under 50 seconds!

The concepts behind "card" systems are public domain. So why should you have to pay \$44.95 or more for someone else's "card"? Software Support will sell you the hardware* for just \$26.95!!! So if you don't have an unlimited income, don't worry. Just order your new RAMBOard from Software Support — the company that's declared war on high prices.

RAMBOard — Our Price: \$26.95

Other companies "card" boards: \$44.95 or more.

*The 1541 RAMBOard requires software to operate. This software can be either RAMBOard parameters, soon to be found on our Renegade program disk, or any of the other "card" software already on the market.

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FLASH! Kracker Jax

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In INFO's May-June '88 Issue

Kracker Jax is the powerful parameter based copying system that has taken the country by storm! What IS a parameter? It's a custom program that allows your 1541 or 1571 disk drive to strip ALL copy protection from your expensive software, leaving you with UNPROTECTED, TOTALLY BROKEN BACKUPS that can even be copied with a simple fast copier!

We declare Kracker Jax to be the best system of its kind on the market today! A bold claim? Maybe.

But don't take our word for it—if you want the REAL story on how good Kracker Jax is just ask one of our customers. Don't worry. You won't have any problem finding one.

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C238:A9 04 8D 79 C7 A9 00 8D 4F
C240:7A C7 8D 70 C7 8D 71 C7 CC
C248:A9 06 8D 69 C7 8D 67 C7 77
C250:8D 68 C7 8D 6A C7 8D 6B 81
C258:C7 8D 6C C7 60 CE 67 C7 04
C260:D0 09 AD 6A C7 8D 67 C7 F7
C268:20 B6 C2 CE 68 C7 D0 09 FD
C270:AD 6B C7 8D 68 C7 20 E0 FC
C278:C2 AD 5E C7 F0 03 4C 8F CE
C280:C2 20 0A C3 20 0D C7 20 D1
C288:51 C7 AD 5E C7 F0 CE 20 04
C290:7C C6 A9 FF 85 FB C6 FC E1
C298:D0 FC 20 7C C6 20 7C C6 08
C2A0:C6 FB D0 E2 20 51 C7 20 C7
C2A8:51 C7 20 51 C7 20 51 C7 0B
C2B0:A9 00 8D 04 D4 60 AD 00 80
C2B8:DC 8D 73 C7 AD BB C7 8D 74
C2C0:74 C7 AD BC C7 8D 75 C7 1B
C2C8:A9 00 8D 7E C7 8D 81 C7 FB
C2D0:20 C0 C4 AD 74 C7 8D BB A3
C2D8:C7 AD 75 C7 8D BC C7 60 28
C2E8:AD 01 DC 8D 73 C7 AD BD C5
C2E8:C7 8D 74 C7 AD BE C7 8D 46
C2F0:75 C7 A9 01 8D 7E C7 8D EB
C2F8:81 C7 20 C0 C4 AD 74 C7 CE
C300:8D BD C7 AD 75 C7 8D BE 36
C308:C7 60 A9 0F 8D 7B C7 A0 3C
C310:00 AD BF C7 8D 7E C7 AD 1B
C318:78 C7 85 FB 18 69 D0 85 CB
C320:FD AD 79 C7 85 FC 69 07 B7
C328:85 FE B1 FB C9 65 F0 0D FA
C330:18 C9 6E F0 05 B0 03 4C 50
C338:E2 C3 4C 84 C3 CE 6F C7 F3
C340:F0 03 4C E2 C3 AD 6E C7 32
C348:8D 6F C7 A5 FB 18 69 00 D8
C350:85 FD A5 FC 69 D4 85 FE 47
C358:B1 FD 29 0F CD C0 C7 D0 20
C360:03 4C E2 C3 C9 02 F0 0B 58
C368:C9 08 F0 0C C9 09 F0 0D 17
C370:4C AB C3 A9 08 4C 7F C3 50
C378:A9 0A 4C 7F C3 A9 02 91 33
C380:FD 4C E2 C3 B1 FD F0 02 1C
C388:A9 01 CD 7A C7 F0 03 4C DA
C390:E2 C3 AD 7A C7 F0 05 A9 8D
C398:00 4C 9E C3 A9 01 91 FD B5
C3A0:CE 6F C7 D0 EA AD 6E C7 24
C3A8:8D 6F C7 A9 64 91 FB AD 75
C3B0:BF C7 20 97 C4 A5 FB 38 74
C3B8:E9 28 85 FB A5 FC E9 00 A4
C3C0:85 FC A9 6D 8D 7E C7 20 6C
C3C8:2A C4 A9 27 20 B4 C4 20 BB
C3D0:2A C4 A9 02 20 B4 C4 20 71
C3D8:2A C4 A9 27 20 B4 C4 20 CB
C3E0:2A C4 CE 7B C7 D0 01 60 24
C3E8:AD 78 C7 18 69 01 8D 78 C2
C3F0:C7 AD 79 C7 69 00 8D 79 53
C3F8:C7 C9 07 D0 2A AD 78 C7 85
C400:C9 E8 D0 23 A9 00 8D 78 D5
C408:C7 A9 04 8D 79 C7 CE 6E 30
C410:C7 D0 05 A9 03 8D 6E C7 DF
C418:EE 7A C7 AD 7A C7 C9 02 14
C420:D0 05 A9 00 8D 7A C7 4C BA
C428:0F C3 EE 7E C7 B1 FB C9 B6
C430:20 F0 16 C9 65 F0 15 18 96
C438:C9 64 F0 0C 90 0A 18 C9 45
C440:6E F0 05 B0 03 4C 4F C4 95
C448:60 4C 6B C4 4C 91 C4 AD AE
C450:BF C7 20 97 C4 AD 80 C7 CE
C458:C9 01 F0 06 CE 61 C7 4C 5D
C460:65 C4 CE 62 C7 A9 01 8D 42
C468:5E C7 60 AD 7E C7 91 FD 2C
C470:A9 0A 20 97 C4 A5 FB 18 9B
C478:69 D0 85 FD A5 FC 69 07 76
C480:85 FE AD 7A C7 F0 05 A9 9F
C488:00 4C 8E C4 A9 01 91 FD B5
C490:60 A9 09 20 97 C4 60 8D F5
C498:7F C7 A5 FB 18 69 00 85 34
C4A0:FD A5 FC 69 D4 85 FE B1 35
C4A8:FD 29 0F 8D 80 C7 AD 7F 34
C4B0:C7 91 FD 60 18 65 FB 85 1C
C4B8:FB A5 FC 69 00 85 FC 60 50
C4C0:AD 74 C7 85 FB AD 75 C7 D8
C4C8:85 FC A0 00 B1 FB 38 E9 40
C4D0:65 8D 83 C7 A9 00 8D 85 4B
C4D8:C7 AD 73 C7 29 01 D0 05 90

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C4E0:A9 02 4C 09 C5 AD 73 C7 6D
C4E8:29 08 D0 05 A9 04 4C 09 72
C4F0:C5 AD 73 C7 29 02 D0 05 AB
C4F8:A9 06 4C 09 C5 AD 73 C7 86
C500:29 04 D0 5B A9 08 4C 09 FF
C508:C5 8D 83 C7 A9 00 8D 85 B4
C510:C7 20 BE C5 C9 00 D0 1D C8
C518:AD 84 C7 8D 85 C7 A5 FB FF
C520:8D 74 C7 A5 FC 8D 75 C7 B3
C528:A0 00 A9 65 18 6D 83 C7 D4
C530:91 FB 4C 5F C5 C9 01 D0 2B
C538:26 A9 01 8D 5E C7 A5 FB 93
C540:18 69 00 85 FD A5 FC 69 74
C548:D4 85 FE A0 00 AD BF C7 87
C550:91 FD AD 7E C7 F0 04 CE 9A
C558:62 C7 60 CE 61 C7 60 AD 98
C560:73 C7 29 10 F0 01 60 AD B7
C568:7E C7 F0 29 20 E9 C6 AD B9
C570:71 C7 F0 10 AD 6C C7 8D 02
C578:6B C7 A9 14 8D 68 C7 A9 69
C580:00 4C 91 C5 AD 6D C7 8D ED
C588:6B C7 A9 14 8D 68 C7 A9 79
C590:01 8D 71 C7 60 20 C5 C6 80
C598:AD 70 C7 F0 10 AD 6C C7 F6
C5A0:8D 6A C7 A9 14 8D 67 C7 8E
C5A8:A9 00 4C BA C5 AD 6D C7 C5
C5B0:8D 6A C7 A9 14 8D 67 C7 9E
C5B8:A9 01 8D 70 C7 60 A9 00 25
C5C0:8D 84 C7 F0 AD 83 C7 C9 02 D8
C5C8:F0 0B C9 04 F0 0F C9 06 66
C5D0:F0 13 4C ED C5 A9 28 20 47
C5D8:6A C6 4C F5 C5 A9 01 20 2B
C5E0:58 C6 4C F5 C5 A9 28 20 78
C5E8:58 C6 4C F5 C5 A9 01 20 32
C5F0:6A C6 4C F5 C5 A0 00 B1 AE
C5F8:FD C9 20 F0 11 C9 64 F0 72
C600:0A 18 C9 6E F0 05 B0 03 B8
C608:A9 02 60 A9 01 60 B1 FB 7A
C610:91 FD AD 7E C7 F0 06 AD 3F
C618:71 C7 4C 20 C6 AD 70 C7 71
C620:C9 00 F0 05 A9 65 4C 2B A7
C628:C6 A9 20 91 FB A5 FB 18 27
C630:69 00 85 FB A5 FC 69 D4 AB
C638:85 FC AD C0 C7 91 FB A5 AB
C640:FD 85 FB 18 69 00 85 FD 83
C648:A5 FE 85 FC 69 D4 85 FE 91
C650:AD 7E C7 91 FD A9 00 60 5D
C658:8D 72 C7 A5 FB 18 6D 72 2A
C660:C7 85 FD A5 FC 69 00 85 60
C668:FE 60 8D 72 C7 A5 FB 38 6B
C670:ED 72 C7 85 FD A5 FC E9 4D
C678:00 85 FE 60 A9 00 8D 04 B9
C680:D4 A9 76 8D 05 D4 A9 28 81
C688:8D 06 D4 A9 64 8D 00 D4 C1
C690:A9 8E 8D 01 D4 A9 0F 8D 51
C698:18 D4 A9 81 8D 04 D4 60 3B
C6A0:A9 00 8D 12 D4 A9 26 8D FC
C6A8:13 D4 A9 06 8D 14 D4 A9 9A
C6B0:12 8D 0E D4 AD 88 C7 8D 66
C6B8:0F D4 A9 05 8D 18 D4 A9 A8
C6C0:21 8D 12 D4 60 A9 00 8D 09
C6C8:0B D4 A9 76 8D 0C D4 A9 9D
C6D0:0F 8D 0D D4 A9 0E 8D 07 DF
C6D8:D4 A9 0B 8D 08 D4 A9 0F 6B
C6E0:8D 18 D4 A9 81 8D 0B D4 9D
C6E8:60 A9 00 8D 0B D4 A9 76 5F
C6F0:8D 0C D4 A9 0F 8D 0D D4 1B
C6F8:A9 0E 8D 07 D4 A9 0D 8D F5
C700:08 D4 A9 0F 8D 18 D4 A9 0F
C708:81 8D 0B D4 60 CE 63 C7 37
C710:F0 01 60 AD 64 C7 8D 63 FF
C718:C7 AD 20 33 C9 33 F0 0C 37
C720:A9 04 8D 88 C7 A2 CC A9 CB
C728:33 4C 35 C7 A9 02 8D 88 80
C730:C7 A2 33 A9 CC 8D 20 33 5D
C738:8D 21 33 8E 22 33 8E 23 44
C740:33 8D 24 33 8D 25 33 8E 7A
C748:26 33 8E 27 33 20 A0 C6 1E
C750:60 AE 60 C7 AC 60 C7 88 43
C758:00 FD CA D0 E7 60 00 00 77
C760:00 00 00 00 00 00 00 00 EF
C768:00 00 00 00 00 00 00 00 F7
C770:00 00 00 00 00 00 00 00 FF
C778:00 00 00 00 00 00 00 00 08
C780:00 00 00 00 00 00 00 00 10

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C788:00 C2 CC C1 C3 CB D7 C8 44
C790:C9 D4 C5 BA BF BF BF BF DA
C798:BF BA D0 CC C1 D9 C5 D2 71
C7A0:BA D7 CF CE A1 BA BA BA 92
C7A8:BA BA D0 CC C1 D9 BA C1 D7
C7B0:C7 C1 C9 CE BA A8 D9 AD 94
C7B8:CE A9 BF 00 00 00 00 00 12
C7C0:00 00 FF C3 A5 99 99 A5 F8
C7C8:C3 FF FF FF FF FF FF FF 3A
C7D0:FF FF FF C0 C0 C0 FF 0C 81
C7D8:0C 0C 80 98 58 3C 1A 28 1B
C7E0:44 22 42 5A 5A 3C 18 18 15
C7E8:24 24 01 19 1A 3C 58 14 CB
C7F0:22 44 00 18 18 3F 58 18 AA
C7F8:24 48 00 18 18 3C 5A 19 AD
C800:24 48 00 18 18 3C 5A 3C D9
C808:18 3C 00 18 18 3C 5A 98 35
C810:24 12 00 18 18 FC 1A 28 CA
C818:24 12 00 00 00 18 28 56 47
C820:6A B5 01 07 0B 15 1B 05 CC
C828:07 01 80 E0 D0 A8 B0 D0 F6
C830:E0 80 AB 56 6A 2C 10 00 51
C838:00 00 00 00 00 00 00 00 C9

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MultiSort

Article on page 66.

Program 1: Sort Maker

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YRIGHT 1988 COMPUTE! PUB
., INC.":PRINTTAB(11)"AL
L RIGHTS RESERVED"
FF 30 POKE48,9:POKE50,9:CLR:RE
M MUST MOVE VARIABLES UP
GM 40 BANK0:FORX=6912TO7057:RE
ADZ:T=T+Z:POKEX,Z:NEXT:I
FT<>14749THEN110
RM 50 BANK1:FORX=1024TO2036:RE
ADZ:T=T+Z:POKEX,Z:NEXT:I
FT<>113337THEN110
FM 60 BSAVE"%SORT0",B0,P6912 T
O P7058:PRINT"SORT0: "DS
$
PD 70 BSAVE"%SORT1",B1,P1024 T
O P2037:PRINT"SORT1: "DS
$
MA 80 INPUT"SAVE TO ANOTHER DI
SK (Y/N)":A$
GE 90 IF LEFT$(A$,1)<>"Y"THEN
{SPACE}END
KX 100 PRINT"INSERT DISK AND P
RESS ANY KEY":GETKEYA$:
GOTO60
CJ 110 PRINT"ERROR IN DATA STA
TEMENTS..."
GC 120 DATA 32,134,3,201,58,24
0,3,76,108,121,32,128,3
,32,60,123,144,245
BC 130 DATA 133,5,32,128,3,144
,15,201,36,208,6,169,12
8,133,6,208,23,32
PH 140 DATA 60,123,144,223,9,1
28,133,6,32,128,3,144,2
51,32,60,123,176
QF 150 DATA 246,201,36,208,205
,32,128,3,201,40,208,19
8,32,215,119,32
XK 160 DATA 199,140,240,4,201,
58,208,186,162,10,189,1
36,27,157,128,2
GA 170 DATA 202,16,247,32,128,
2,176,3,169,0,96,169,0,
141,0,255,138,208
PE 180 DATA 10,32,125,255,69,7
7,80,84,89,32,0,32,125,

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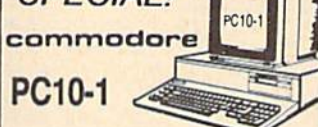
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```

255,65,82,82,65,89
SE 190 DATA 32,69,82,82,79,82,
7,0,32,38,142,169,1,96,
141,2,255,32,0,4
JX 200 DATA 141,3,255,96
JJ 210 DATA 165,49,133,7,166,5
0,134,8,197,51,208,4,22
8,52,240,76,165
CC 220 DATA 100,5,101,5,102,20
8,68,160,0,165,5,209,7,
208,7,200,165,6
AC 230 DATA 209,7,240,27,160,2
,24,177,7,101,7,170,200
,177,7,101,8,133,8
QQ 240 DATA 134,7,197,52,208,2
20,228,51,240,28,208,21
4,160,4,177,7,170
MD 250 DATA 202,240,22,224,1,2
08,14,200,177,7,208,9,2
00,177,7,170,202
SH 260 DATA 228,103,176,4,162,
1,56,96,160,4,177,7,141
,247,7,201,1,240
QE 270 DATA 31,200,177,7,141,2
49,7,200,177,7,141,248,
7,200,177,7,141
CK 280 DATA 251,7,200,177,7,14
1,250,7,169,2,141,245,7
,208,27,160,0,132
QA 290 DATA 103,140,245,7,140,
249,7,200,140,248,7,160
,5,177,7,141,251,7
QM 300 DATA 200,177,7,141,250,
7,24,169,7,109,245,7,10
1,7,141,245,7,165
GC 310 DATA 8,105,0,141,246,7,
173,250,7,174,251,7,32,
164,7,141,2,8,142
MR 320 DATA 3,8,162,0,142,4,8,
142,5,8,166,103,240,22,
24,173,2,8,109,4,8
HA 330 DATA 141,4,8,173,3,8,10
9,5,8,141,5,8,202,208,2
34,56,173,250,7
RB 340 DATA 233,1,141,254,7,17
3,251,7,233,0,141,255,7
,173,254,7,174,255
MD 350 DATA 7,32,188,7,133,5,1
34,6,160,0,177,5,208,23
,173,254,7,208,3
SX 360 DATA 206,255,7,206,254,
7,173,255,7,13,254,7,20
8,218,162,0,56,96
MD 370 DATA 173,254,7,141,252,
7,173,255,7,141,253,7,1
73,252,7,174,253,7
CE 380 DATA 32,188,7,133,5,134
,6,160,0,177,5,208,27,1
73,254,7,174,255,7
MK 390 DATA 32,188,7,133,7,134
,8,32,7,7,173,254,7,208
,3,206,255,7,206
MB 400 DATA 254,7,173,252,7,20
8,3,206,253,7,206,252,7
,173,253,7,13,252
MG 410 DATA 7,208,191,173,254,
7,141,0,8,141,16,8,173,
255,7,141,1,8,141
SE 420 DATA 17,8,56,173,16,8,2
33,3,173,17,8,233,0,176
,4,162,0,56,96,173
PR 430 DATA 16,8,41,254,141,20
,8,173,17,8,141,21,8,78
,17,8,110,16,8,173
RH 440 DATA 16,8,141,18,8,173,
17,8,141,19,8,173,18,8,
141,22,8,173,19,8
XC 450 DATA 141,23,8,173,22,8,
141,252,7,173,23,8,141,
253,7,56,173,252,7
BC 460 DATA 237,16,8,141,254,7
,173,253,7,237,17,8,141
,255,7,173,252,7
FK 470 DATA 174,253,7,32,188,7
,133,7,134,8,173,254,7,
174,255,7,32,188,7
KE 480 DATA 133,5,134,6,32,134
,6,144,49,32,7,7,173,25
4,7,141,252,7,173
MF 490 DATA 255,7,141,253,7,56
,173,252,7,237,16,8,141
,254,7,173,253,7
QQ 500 DATA 237,17,8,141,255,7
,56,173,252,7,237,16,8,
173,253,7,237,17,8
XH 510 DATA 176,176,24,173,22,
8,109,16,8,141,22,8,173
,23,8,109,17,8,141
EH 520 DATA 23,8,56,173,0,8,23
7,22,8,173,1,8,237,23,8
,144,3,76,191,5
PJ 530 DATA 238,18,8,208,3,238
,19,8,173,18,8,205,20,8
,208,8,173,19,8
RX 540 DATA 205,21,8,240,3,76,
179,5,56,169,1,237,16,8
,169,0,237,17,8
MB 550 DATA 176,3,76,147,5,173
,0,8,174,1,8,24,96,32,2
29,7,162,1,165,107
DJ 560 DATA 197,104,144,3,165,
104,202,133,111,134,110
,201,0,240,21,160
RJ 570 DATA 0,177,105,209,108,
240,4,144,11,176,11,200
,196,111,208,241
DA 580 DATA 165,110,208,2,24,9
6,56,96,32,229,7,160,2,
177,5,72,177,7,145
BS 590 DATA 5,104,145,7,136,16
,243,200,177,5,240,26,2
00,24,113,5,141
KA 600 DATA 225,6,200,169,0,11
3,5,141,226,6,160,1,185
,5,0,153,244,254
PK 610 DATA 136,16,247,160,0,1
77,7,240,26,200,24,113,
7,141,1,7,200,169
FR 620 DATA 0,113,7,141,2,7,16
0,1,185,7,0,153,227,254
,136,16,247,96,160
GM 630 DATA 3,185,5,0,153,10,8
,136,16,247,200,140,8,8
,140,9,8,140,6,8
AA 640 DATA 140,7,8,24,173,245
,7,109,8,8,133,5,173,24
6,7,109,9,8,133,6
EP 650 DATA 173,252,7,174,253,
7,32,164,7,24,101,5,133
,5,138,101,6,133,6
SP 660 DATA 24,173,245,7,109,8
,8,133,7,173,246,7,109,
9,8,133,8,173,254
XP 670 DATA 7,174,255,7,32,164
,7,24,101,7,133,7,138,1
01,8,133,8,32,181
DQ 680 DATA 6,24,173,2,8,109,8
,8,141,8,8,173,3,8,109,
9,8,141,9,8,238,6
BH 690 DATA 8,208,3,238,7,8,17
3,248,7,205,6,8,208,8,1
73,249,7,205,7,8
QP 700 DATA 240,3,76,31,7,160,
3,185,10,8,153,5,0,136,
16,247,96,141,14,8
XC 710 DATA 142,15,8,14,14,8,4
6,15,8,24,109,14,8,72,1
38,109,15,8,170
BR 720 DATA 104,96,32,164,7,24
,109,245,7,141,14,8,138
,109,246,7,141,15
EC 730 DATA 8,24,173,14,8,109,
4,8,141,14,8,173,15,8,1
09,5,8,141,15,8
XP 740 DATA 170,7,173,14,8,96,16
0,2,177,5,153,104,0,177
,7,153,107,0,136
MP 750 DATA 16,243,96

```

Program 2: Sort Demo

```

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TE! PUBLICATIONS, INC. -
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ED 20 IFRGR(0)THEN TB=23:ELSETB
=3
MK 30 COLOR0,1:COLOR4,1:COLOR5
,12:PRINT"CLR"TAB(TB)
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{SPACE}PUB., INC.:PRINT
TAB(TB+8)"ALL RIGHTS RES
ERVED"
QM 40 POKE48,9:POKE50,9:CLR:RE
M MOVE BANK1 UP FOR ML C
ODE
DB 50 BLOAD"%SORT0",B0:BLOAD"%
SORT1",B1
GD 60 PRINT"CLR"
JA 70 DIMA,B,T,A$(5),Q$(9,3),A
Y$(2)
MR 80 Q$(7,0)="A1B2":Q$(8,0)="
1Z RQ":Q$(4,0)="
{3 SPACES}86":Q$(1,0)="
{2 SPACES}123":Q$(2,0)="
Z"
AH 90 FORX=0TO9:Q$(X,1)=STR$(1
5-X):NEXT
BS 100 FORX=0TO9:Q$(X,2)=CHR$(
INT(65+RND(1)*26)):NEXT
:Q$(RND(1)*10,2)="
GP 110 PRINT"5$ SORT BY COLUMN
(0-3, 4 TO CONT): ";
RS 120 GETAS:IF (AS<"0")OR (AS>"
4")THEN120
HS 130 PRINTAS:IFAS="4"THEN200
GQ 140 PRINT"CLR"5$TAB(16)
ORIGINAL:PRINT # COL
{SPACE}0," COL 1","COL
2","COL 3"
XJ 150 FORB=0TO9:PRINT"5$B"
{CYN}Q$(B,0),"2$Q$(B
,1),"6$Q$(B,2):NEXT
QH 160 BANK14:SYS6912:Q$(VAL(A
$)):IFPEEK(6)THENEND:RE
M DUMMY VARIABLE REQUIR
ED
RR 170 IFRGR(0)THENPRINT"
{HOME}5$TAB(52)"SORTE
D ON COL "AS:T=40:ELSEP
RINT"5$TAB(12)"SORTED
ON COL "AS
HJ 180 PRINTTAB(T) # COL 0,"
COL 1","COL 2","COL 3"
FD 190 FORB=0TO9:PRINTTAB(T)
5$B{CYN}Q$(B,0),"
2$Q$(B,1),"6$Q$(B,2
):NEXT:CLR:GOTO70
GP 200 CLR:DM=1000:PRINT"LONG
{SPACE}LIST SORT DEMO..
.:PRINT"SORT LIST OF"D
M"STRINGS..."
JK 210 PRINT"CREATING LIST NOW
...":DIMAS(DM):REM FAST
PC 220 FORX=1TODM:FORY=1TO INT
(RND(1)*8+1):AS(X)=AS(X
)+CHR$(INT(RND(1)*26+65
)):NEXTY,X
MM 230 PRINT"ELL"SORING NOW
...:BANK15:TIS="000000
":SYS6912:AS(1)
HA 240 IFPEEK(6)THENEND
SP 250 PRINTTI/60"SECONDS TO S
ORT"DM"STRINGS":REM SLO
W
ES 260 PRINT"DO YOU WANT TO SE
E THE SORTED LIST? ";

```


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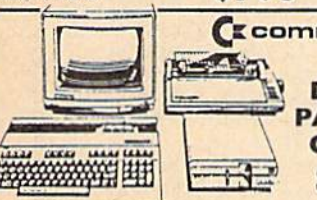
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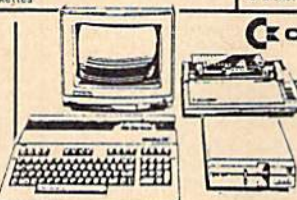
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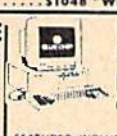
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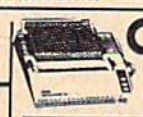
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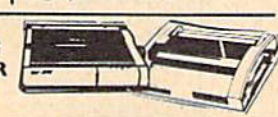
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```

QE 270 GETAS:IF (A$<>"Y")AND (A$
<>"N")THEN270
MQ 280 PRINTAS:IFA$="Y"THENFOR
X=1TODM:PRINTAS(X):NEXT

```

Boom and Bust

Article on page 38.

Program 1: Boom and Bust Main Program

```

HE 10 REM COPYRIGHT 1988 COMPU
TE! PUBLICATIONS, INC. -
ALL RIGHTS RESERVED
BX 20 IFA=1THEN80
MG 30 PRINT"{CLR}{9 DOWN}
{7 RIGHT}{RVS}{6 SPACES}
COPYRIGHT 1988{7 SPACES}
{OFF}"
JS 40 PRINT"{7 RIGHT}{RVS}COMP
UTE! PUBLICATIONS, INC.
{OFF}"
XS 50 PRINT "{7 RIGHT}{RVS}
{3 SPACES}ALL RIGHTS RES
ERVED{5 SPACES}{OFF}":FO
RI=1TOL500:NEXT
ER 70 A=1:LOAD"B&B.ML",8,1
JX 80 FORSD=0TO5:READSD(SD):PO
KE52580+SD*2,SD(SD):NEXT
QQ 90 FORN=1TO8:READFH(N),FL(N
):NEXT:SID=54272
RD 100 DIMAS(50)
HX 110 READAS(T):IFA$(T)<>"END
"THENT=T+1:GOTO110
SE 120 T=T-1:SYS16385:POKE845,
0:POKE844,0
GR 130 FORN=0TO2*T:R1=INT(RND(
0)*T):R2=INT(RND(0)*T)+
1:T$=A$(R1):A$(R1)=A$(R
2)
JP 140 A$(R2)=T$:NEXT
ME 150 K=0:P=1:SC(0)=0:SC(1)=0
:SF(0)=0:SF(1)=0:FL=0:R
G=0:FF=0
BQ 160 PRINT"{CLR}":POKE214,11
:POKE211,14:PRINTCHR$(1
42)"{CYN}BOOM AND BUST"
:GOSUB880
QX 170 PRINT"{WHT}{8 DOWN}
{10 RIGHT}PRESS {RVS}1
{OFF} FOR 1 PLAYER"
DB 180 PRINT"{DOWN}{10 RIGHT}P
RESS {RVS}2{OFF} FOR 2
{SPACE}PLAYERS ";
CB 190 GETK$:IFK$=""THEN190
XE 200 IFK$<>"1"ANDK$<>"2"THEN
190
JJ 210 PRINTK$;:D$(1)="PHRASE"
:D$(2)="THING":D$(3)="O
CCUPATION"
DE 220 P$(0)="{RVS}{RED} PLAYE
R 1 {OFF}":P$(1)="{RVS}
{YEL} PLAYER 2 {OFF}":E
$="{11 SPACES}"
AB 230 IFK$="1"THENK=1:P=0:P$(
1)="{2 SPACES}{RVS}
{YEL} BONUS {OFF}"
CR 240 FORT1=0TOT:FORSD=0TO5:P
OKE52580+SD*2,SD(SD):NE
XT
FH 250 POKE845,0:POKE53269,PEE
K(53269)OR1
CQ 260 Q=0
MR 270 D$=LEFT$(A$(T1),1):A$=R
IGHT$(A$(T1),LEN(A$(T1)
)-1)
HJ 280 D=VAL(D$):D$=D$(D):SC(0
)=0:SC(1)=0:RG=0
MX 290 IFK=1THENSNC(1)=100
JP 300 F=(40-LEN(A$))/2

```

```

XX 310 POKE857,30:POKE845,0:GO
SUB1110
BM 320 SP=0:FORN=1TOLEN(A$):M$
=MID$(A$,N,1):IFM$="" "T
HENS=SP+1:GOTO340
PQ 330 POKE1703+N+F,83:POKE559
75+N+F,1
FG 340 NEXT
PD 350 IFK=0THENP=ABS(P-1)
EP 360 TM=125:POKE844,P
QQ 370 GOSUB1170
AA 380 FR=FRE(0):POKE845,1
RD 390 WR=0:IFPEEK(197)=4THENP
OKE845,0:GOSUB660:IFWR=
2THENNEXTT1:GOTO1040
CJ 400 IFWR=1THENPOKE53269,PEE
K(53269)OR1:GOTO350
KJ 410 TM=TM-1:IFTM<10THENGOSU
B970
CB 420 IFTM<1ANDPEEK(833)<>2AN
DPEEK(857)=QTHENPOKE845
,0:D=30:GOSUB840:GOTO35
0
BG 430 IFPEEK(845)=1THEN390
HG 440 TM=100:FORN=1TO500:NEXT
N:IFPEEK(857)=QTHEND=20
:GOSUB840:GOTO350
MM 450 Q=PEEK(857):R=PEEK(837)
:S=PEEK(838)/2:L=94-(R*
6)-(6-S)
BE 460 IN=0:IFL>90THENL=L-56:I
N=64
SM 470 M=0:FORN=1TOLEN(A$)
PS 480 IFMID$(A$,N,1)<>CHR$(L)
THEN570
DA 490 RG=RG+1:M=1:POKE54283,3
3:POKE1703+N+F,L-64+IN:
POKE55975+N+F,7
JG 500 A1$=LEFT$(A$,N-1)+" "+
MID$(A$,N+1,LEN(A1$)):
POKE54283,32
RX 510 SC(P)=SC(P)+10:GOSUB610
RP 520 MA=1:FM=0:FORN=1TOLEN(
A$):M$=MID$(A$,N,1):I
FM$="" THEN550
QF 530 IFFM=0THENM1$=M$:FM=1
DP 540 IFM$<>M1$THENMA=0
JE 550 NEXT
RQ 560 IFLEN(A$)-RG-SP=1ORMA=1
THENGOSUB660:GOTO1010
AF 570 NEXT
KQ 580 IFM=1THEN380
CE 590 D=20:GOSUB840:GOTO350
MS 600 REM
SD 610 FORC=0TO1:SC$(C)=STR$(S
C(C)):SC$(C)=SC$(C)+LEF
T$(E$,7-LEN(SC$(C))):NE
XT
ME 620 FORC=0TO1:SC$(C)=STR$(S
C(C)):SC$(C)=SC$(C)+LEF
T$(E$,7-LEN(SC$(C))):NE
XT
QC 630 PRINT"{GRN}";:POKE214,2
1:PRINT:POKE211,1:PRINT
"$SC$(0)TAB(31)$SC$(
1)";
HS 640 RETURN
BC 650 REM
SP 660 POKE53269,PEEK(53269)AN
D254:POKE198,0:POKE214,
22:PRINT:POKE211,0:W=0:
G$=""
GF 670 PRINT"{CYN}GUESS? ";:FO
RN=1TOLEN(A$):PRINT"
{WHT}{0}";:NEXT:PRINT"
{UP}":PRINT"{7 RIGHT}";
JR 680 GETG1$:IFG1$=""THEN680
FR 690 G1=ASC(G1$):IFG1=13THEN
770
PQ 700 IFG1=20ANDG$<>"THENG$=
LEFT$(G$,LEN(G$)-1):FL=
1

```

```

DP 710 IFFL=1AND(LEN(G$)<LEN(A
$))THENPRINT"{LEFT}{0}
{LEFT}";
SK 720 IFFL=1AND(LEN(G$)>LEN(A
$)-1)THENPRINTG1$;
XS 730 IFFL=1THENFL=0:GOTO680
FG 740 IFG1>90ORG1<32THEN680
MS 750 IFLEN(G$)<33THENPRINTG1
$:G$=G$+G1$
PG 760 GOTO680
XP 770 IFG$<>ASTHEN810
KS 780 WR=2:SF(P)=SF(P)+SC(P)+
500+SC(1)*K:SC(1)=0
XD 790 POKE781,23:SYS59903:PRI
NT"RIGHT!";:POKE53269,P
EEK(53269)OR1:GOSUB610
XA 800 GOSUB1110:GOSUB880:RETU
RN
MD 810 IFK=1THENSNC(1)=0
KA 820 POKE781,23:SYS59903:PRI
NT"WRONG!";:D=50:GOSUB8
40:POKE781,23:SYS59903
FR 830 WR=1:GOSUB610:RETURN
BS 840 POKESID+4,17:FORW=DT05
{SPACE}STEP-1:POKESID+1
,W:FORN=1TOD:NEXT:NEXT:
POKESID+4,16
MM 850 IFK=1THENSNC(1)=SC(1)-10
:IFSC(1)<0THENSNC(1)=0
RA 860 GOSUB610:RETURN
CA 870 REM
QA 880 POKESID+5,15:POKESID+6,
252:POKESID+12,15:POKES
ID+13,252:WF=64
MH 890 FORL=1TO30:N=INT(RND(0)
*6)+3
CP 900 IFN=9THENFORW=1TO60:NEX
T:GOTO950
QK 910 POKESID,FL(N):POKESID+1
,FH(N):POKE53248,FL(N)
HP 920 POKESID+7,FL(N)+10:POKE
SID+8,FH(N)
EH 930 IFWF=64THENPOKESID+3,7:
POKESID+2,150:POKESID+1
0,7:POKESID+9,150
QC 940 POKESID+4,WF+1:POKESID+
11,17:FORW=1TO80:NEXT:P
OKESID+4,WF:POKESID+11,
16
PC 950 NEXT:POKE53248,28:RETUR
N
RG 960 REM
CD 970 POKESID+6,242:POKESID+1
,80:POKESID+4,17:POKESI
D+4,16
BQ 980 FORN=1TOTM+80:NEXTN:POK
ESID+1,60:POKESID+4,17
EA 990 POKESID+4,16:FORN=1TOTM
+50:NEXTN:RETURN
HB 1000 REM
QG 1010 IFWR=2THENNEXTT1:GOTO1
040
KG 1020 IFK=0THENP=ABS(P-1):GO
SUB1170:GOSUB660:IFWR=
2THENNEXTT1:GOTO1040
JJ 1030 PRINT:PRINTAS:FORN=1TO
1500:NEXT:NEXTT1
XE 1040 POKE53269,1
EE 1050 IFSF(0)>SF(1)THENP$=P$
(0)
FF 1060 IFSF(0)<SF(1)THENP$=P$
(1)
SG 1070 IFSF(0)=SF(1)THENPRINT
SPC(15);:PRINT"
{3 DOWN}{PUR}TIE GAME!
!":GOTO1100
CQ 1080 PRINT:PRINT"{5 DOWN}
{2 UP}{3 RIGHT}{PUR}CO
NGRATULATIONS TO "P$
PRINT:PRINT"{3 RIGHT}B
OOM AND BUST CHAMPION!
!"

```



```

ME 1100 GOSUB880:GOTO130
HM 1110 FORC=0T01:SF$(C)=STR$(
SF(C)):SF$(C)=SF$(C)+L
EFT$(ES,7-LEN(SF$(C)))
:NEXT
JD 1120 PRINT{"RED"}:GOSUB610:
POKE214,19:PRINT:POKE2
11,1
KP 1130 IFK=0THENPRINT{"RED"}$
SF$(0)SPC(22){"YEL"}$S
F$(1)
QB 1140 IFK=1THENPRINT{"RED"}$
SF$(0)
KX 1150 PRINTP$(0)SPC(19)P$(1)
:GOSUB610:AL$=A$
DJ 1160 RETURN
AQ 1170 POKE53280,9-P*2:POKE21
4,11:PRINT:POKE211,10:
PRINTP$(P)" "D$:RETURN
BS 1180 REM
JP 1190 DATA 153,154,163,164,1
65,166
XS 1200 DATA28,49,31,165,33,13
5,37,62,42,62,44,193,5
0,60,25,30
PJ 1210 DATA"1A STITCH IN TIME
SAVES NINE"
DJ 1220 DATA"1VIOLETS ARE BLUE
"
FS 1230 DATA"1LOVE CONQUERS AL
L"
JX 1240 DATA"1WHERE IS THE FIR
E"
MP 1250 DATA"1LET CALL HOME"
GF 1260 DATA"1ALONG CAME A SPI
DER"
CJ 1270 DATA"3POLICE OFFICER"
HJ 1280 DATA"1PLEASE KEEP OFF
{SPACE}THE GRASS"
RS 1290 DATA"1LITTLE RED RIDIN
G HOOD"
JP 1300 DATA"1THE RIGHT STUFF"
RB 1310 DATA"1A PENNY FOR YOUR
THOUGHTS"
MX 1320 DATA"3SCHOOL TEACHER"
JX 1330 DATA"3TAXI DRIVER"
XQ 1340 DATA"2BOOK MARKER"
SK 1350 DATA"2CAR"
FE 1360 DATA"2SHOPPING CART"
JR 1370 DATA"2A GLASS OF MILK"
AA 1380 DATA"3COMPUTER PROGRAM
MER"
QF 1390 DATA"3COOK"
DR 1400 DATA"3NURSE"
SC 1410 DATA"3INVENTOR"
BA 1420 DATA"1SILENCE IS GOLDE
N"
PD 1430 DATA"1SUGAR AND SPICE"
RF 1440 DATA"1THE THREE LITTLE
PIGS"
CS 1450 DATA"END"
EP 1460 END
3F38:8C C2 AA 0C C0 00 0C FF E1
3F40:A0 00 A0 28 02 80 2A 5A 66
3F48:80 A9 56 A0 A6 59 A0 26 48
3F50:59 80 25 A5 00 C6 59 30 98
3F58:FD 57 F0 0F EF C0 03 EF 33
3F60:00 05 55 40 15 65 50 55 03
3F68:55 54 51 65 05 51 55 0A 49
3F70:A1 65 00 01 55 3C F1 45 ED
3F78:50 15 45 40 05 45 00 00 4E
3F80:00 00 08 28 00 10 18 00 F2
3F88:00 01 0A 00 00 0E 00 00 C0
3F90:0C 00 00 00 00 00 00 40 55
3F98:05 80 00 03 00 00 06 01 F6
3FA0:00 00 07 80 00 03 00 01 15
3FA8:02 00 03 80 00 01 80 00 95
3FB0:20 04 00 60 00 00 00 00 46
3FB8:08 01 00 18 00 00 08 03 10
3FC0:00 7E 00 01 FF 80 07 FF FE
3FC8:E0 1F FF F8 3F FF FC 7F 82
3FD0:FF FE 7F FF FE FF FF FF F6
3FD8:FF FF FF FF FF FF FF FF 57
3FE0:FF FF FF FF FF FF FF 3F 98
3FE8:FF FC 1F FF F8 0F FF F0 7F
3FF0:03 FF C0 00 FF 00 00 3C 45
3FF8:40 01 FF 80 02 7E 00 FF E9
4000:38 20 EF 43 A9 00 8D 21 60
4008:D0 A9 0A 8D 20 D0 A9 8C 99
4010:8D 01 C0 A9 84 8D 02 C0 69
4018:A9 C4 8D 03 C0 A9 C4 8D 44
4020:04 C0 A9 E0 8D 05 C0 A9 C1
4028:FC 8D 1B D0 A9 FD 8D F9 55
4030:07 A9 03 8D 1C D0 A9 07 56
4038:8D 26 D0 A9 01 8D 25 D0 17
4040:A0 00 A0 00 99 00 D4 C8 85
4048:C0 19 D0 F8 A9 02 8D 27 B0
4050:D0 8D 28 D0 A0 01 98 99 82
4058:28 D0 C8 C0 09 D0 F7 A9 6B
4060:35 8D 05 D4 A9 63 8D 06 C8
4068:D4 A9 18 8D 01 D4 A9 50 98
4070:8D 00 D4 A9 3A 8D 0C D4 E1
4078:A9 0B 8D 0D D4 A9 0C 8D 06
4080:18 D4 A0 00 A9 18 99 7A B1
4088:CD C8 C8 18 69 50 C0 3E 09
4090:D0 F4 A9 FF 8D 3C 03 A9 F8
4098:B4 8D 3D 03 A9 90 8D 3E 97
40A0:03 A9 6C 8D 3F 03 A9 48 15
40A8:8D 40 03 A9 C3 8D 47 03 E0
40B0:A9 9F 8D 48 03 A9 7B 8D 67
40B8:49 03 A9 57 8D 4A 03 A9 8E
40C0:33 8D 4B 03 20 91 43 78 1E
40C8:A9 7F 8D 0D DC A9 01 8D 9D
40D0:1A D0 A9 05 8D A7 02 AD D4
40D8:3C 03 8D 12 D0 A9 1B 8D FB
40E0:11 D0 A9 02 8D 14 03 A9 DF
40E8:41 8D 15 03 A9 32 85 FB 5D
40F0:A9 78 85 FD A9 00 85 C3 11
40F8:A9 CD 85 C4 85 FC 85 FE E8
4100:58 60 AD 19 D0 8D 19 D0 CD
4108:C9 04 D0 03 4C 30 42 CE 31
4110:A7 02 10 05 A9 04 8D A7 59
4118:02 AE A7 02 AC 4E 03 A9 AA
4120:00 9D 51 03 B1 FD 18 69 83
4128:01 91 FD 99 02 D0 D0 0C E9
4130:20 DC 43 BD 01 C0 4D 43 27
4138:03 9D 01 C0 BD 01 C0 8D D0
4140:10 D0 B1 FB C9 FE D0 08 E8
4148:A9 00 99 03 D0 4C 56 41 A8
4150:BD 47 03 99 03 D0 AD 41 75
4158:03 C9 02 D0 5C B1 FB C9 87
4160:FE F0 56 AD 00 D0 C9 F6 12
4168:90 06 B1 FD C9 28 90 49 24
4170:BD 47 03 38 ED 03 D0 C9 6E
4178:07 B0 3E B1 FD ED 02 D0 0A
4180:C9 0A B0 35 AD 1E D0 29 84
4188:02 C9 02 D0 2C 20 FC 43 AA
4190:BD 01 C0 2D 43 03 D0 0A 2F
4198:AD 01 C0 29 01 D0 0A 4C 88
41A0:B9 41 AD 01 C0 29 01 D0 93
41A8:10 A9 FE 91 FB 8E 45 03 3E
41B0:8C 46 03 EE 59 03 20 31 A2
41B8:43 B1 FB 8D 44 03 8C 43 2C
41C0:03 98 4A 8A AD 44 03 99 DC
41C8:F9 07 AC 43 03 88 88 F0 10
41D0:03 4C 24 41 18 A5 C3 69 C8
41D8:0C 85 C3 18 A5 FB 69 0C B8
41E0:85 FB 18 A5 FD 69 0C 85 B5
41E8:FD C9 B4 F0 03 4C 27 42 5C
41F0:A9 78 85 FD A9 00 85 C3 13
41F8:A9 32 85 FB 8E 42 03 8C 5D
4200:43 03 20 39 42 AE 43 03 D2
4208:AC 43 03 AD 41 03 C9 02 9A
4210:D0 15 AD 03 D0 38 E9 03 66
4218:8D 03 D0 4A 8D 08 D4 0A 23
4220:C9 26 B0 03 20 31 43 BD 63
4228:3C 03 8D 12 D0 8A F0 06 F6
4230:68 A8 68 A4 68 40 4C 31 D8
4238:EA AD 4C 03 D0 06 AD 00 51
4240:DC 4C 47 42 AD 01 DC A0 1F
4248:00 A2 00 4A B0 01 88 4A FE
4250:B0 01 C8 4A B0 02 CA CA 19
4258:4A B0 02 E8 E8 4A B0 3F 0E
4260:AD 4D 03 F0 3A AD 41 03 8C
4268:C9 02 F0 33 A9 0F 8D 0F 57
4270:D4 A9 0A 8D 13 D4 8D 14 FE
4278:D4 A9 81 8D 12 D4 A9 21 33
4280:8D 0B D4 AD 15 D0 09 02 04
4288:8D 15 D0 A9 FB 8D F8 07 DC
4290:A9 0F 8D 18 D4 A9 02 8D BF
4298:41 03 A9 00 8D 4D 03 8A E5
42A0:18 6D 00 8D 8D 00 D0 AD 55
42A8:01 C0 29 01 F0 0F AD 00 32
42B0:D0 C9 42 90 16 A9 42 8D CA
42B8:00 D0 4C 0F 43 AD 00 8D 8D
42C0:F0 09 C9 17 B0 05 A9 18 AF
42C8:8D 00 D0 AD 00 D0 0D 3F 2D
42D0:AD 01 C0 49 01 8D 01 C0 1A
42D8:8A 18 6D 00 D0 8D 00 D0 E3
42E0:AD 41 03 C9 02 F0 28 AD 5B
42E8:01 C0 49 02 8D 01 C0 AD 07
42F0:05 C0 49 02 8D 05 C0 AD 21
42F8:02 C0 49 02 8D 02 C0 AD 9B
4300:03 C0 49 02 8D 03 C0 AD 29
4308:04 C0 49 02 8D 04 C0 AD B5
4310:41 03 C9 02 F0 10 AD 00 74
4318:D0 8D 02 D0 AD 59 03 C9 5A
4320:1E D0 03 20 91 43 A9 80 B9
4328:8D 12 D4 A9 0A 8D 18 D4 BA
4330:60 A9 FC 8D F8 07 A9 20 21
4338:8D 0B D4 AD 15 D0 29 FD F9
4340:8D 15 D0 A9 80 8D 12 D4 BA
4348:A9 01 8D 41 03 A9 D2 8D 9B
4350:03 D0 AD 00 D0 8D 02 D0 D3
4358:AD 01 C0 29 03 C9 01 F0 D2
4360:07 C9 02 F0 03 4C 90 43 D9
4368:AD 01 C0 49 02 8D 01 C0 BB
4370:AD 05 C0 49 02 8D 05 C0 CC
4378:AD 02 C0 49 02 8D 02 C0 0E
4380:AD 03 C0 49 02 8D 03 C0 58
4388:AD 04 C0 49 02 8D 04 C0 A2
4390:60 A9 93 20 D2 FF A0 00 FD
4398:8C 10 D0 8C 59 03 A9 81 F7
43A0:99 34 CD C8 C8 18 69 01 C1
43A8:C0 30 D0 F4 A9 01 8D 4D BE
43B0:03 A9 E5 8D 03 D0 8D 01 30
43B8:D0 A9 FC 8D F8 07 A9 96 58
43C0:8D 00 D0 8D 02 D0 A9 0C B3
43C8:8D 4E 03 8D 57 03 A9 00 FC
43D0:8D 17 D0 8D 1D D0 A9 FD 54
43D8:8D 15 D0 8C 8C 43 03 98 9B
43E0:4A A8 A9 02 0A 88 D0 FC 1D
43E8:AC 43 03 8D 43 03 60 A9 60
43F0:00 85 FB A9 20 85 FC A9 AD
43F8:C0 85 FD A9 3F 85 FE 78 22
4400:AD 0E DC 29 FE 8D 0E DC 38
4408:A5 01 29 FB 85 01 A0 00 F9
4410:B1 FD 91 FB C8 C0 40 D0 7D
4418:F7 A5 FB 18 69 40 85 FB 5A
4420:A5 FC 69 00 85 FC C9 3E D9
4428:D0 E4 A9 0D 85 FB A9 20 E7
4430:85 FC A9 00 85 FD A9 D0 38
4438:85 FE A9 00 8D 20 CB A0 9D
4440:00 B1 FD 91 FB E6 FB E6 68
4448:FB C8 C0 8D D0 F3 A9 30 73
4450:18 65 FB 85 FB A9 00 65 02
4458:FC 85 FC A9 08 18 65 FD 64
4460:85 FD A9 00 65 FE 85 FE 91
4468:EE 20 CB AD 20 CB C9 7A 03
4470:D0 CD A5 01 09 04 85 01 FD
4478:AD 0E DC 09 01 8D 0E DC BE
4480:58 60 FD 00 00 00 00 00 0D

```

Program 2: Boom and Bust ML

See instructions in article on page 38 before typing in.

```

3EC0:00 00 00 00 02 00 0C 40 A5
3EC8:00 00 04 00 03 00 C0 00 5F
3ED0:10 00 00 C3 00 00 24 00 D9
3ED8:00 4C 00 00 00 00 00 A8 11
3EE0:00 02 FE 00 02 AA 00 02 7A
3EE8:AA 00 C2 AA 0C C2 AA 0C 8A
3EF0:CA AA 8C EA AA AC CA AA 06
3EF8:8C C2 AA 0C C0 00 0C FF A0
3F00:2A 5A 80 A9 56 A0 A6 59 B0
3F08:A0 25 55 80 26 59 00 05 6E
3F10:A5 00 3D 57 F0 3F EF F0 D3
3F18:03 EF 00 01 55 00 01 55 26
3F20:00 02 AA 00 02 AA 00 02 31
3F28:AA 00 C2 AA 0C C2 AA 0C CB
3F30:CA AA 8C EA AA AC CA AA 47

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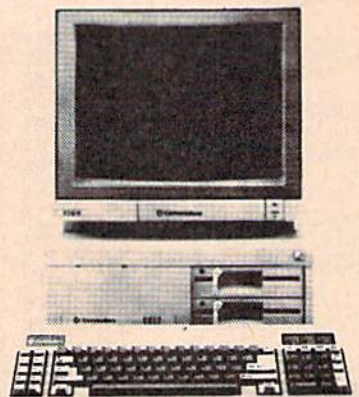
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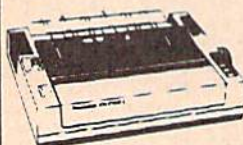
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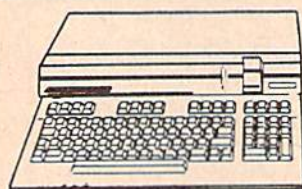
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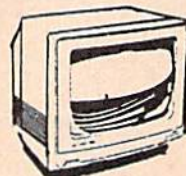


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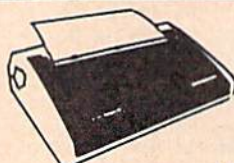
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How To Type In COMPUTE!'s Gazette Programs

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

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

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

Special Characters

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

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

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

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

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

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

The Quote Mode

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

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

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

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

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

For Commodore 64 Only

[1]	COMMODORE 1	
[2]	COMMODORE 2	
[3]	COMMODORE 3	
[4]	COMMODORE 4	
[5]	COMMODORE 5	
[6]	COMMODORE 6	
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The Automatic Proofreader

Philip I. Nelson

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

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

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

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

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

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

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

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

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

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

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

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

The New Automatic Proofreader

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

```
20 PRINT "AUTOMATIC PROOFREADER FOR ";:IF VEC=42364 THEN
[SPACE]PRINT "C-64"
30 IF VEC=50556 THEN PRINT "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:POKE
ADR, BYT:ADR=ADR+1:CHK=CHK
+BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*
ERROR* CHECK TYPING IN DATA
STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:
RS=SA+RF:HB=INT(RS/256):LB=
RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+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:POKE SA+
29,224:POKE SA+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
```


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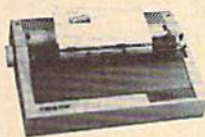
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MLX Machine Language Entry Program For Commodore 64

Ottis Cowper

"MLX" is a labor-saving utility that allows almost fail-safe entry of Commodore 64 machine language programs.

Type in and save some copies of MLX—you'll want to use it to enter future ML programs from COMPUTE!'s GAZETTE. 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.

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, the numeric keypad modification from the March 1986 "Bug-Swatter" column is now incorporated in the listing. The keypad is active only while entering data. Addresses must be entered with the normal letter and number keys. The figure below shows the keypad configuration:

7	8	9	0
4 U	5 I	6 O	F P
1 J	2 K	3 L	E :
A M	B ,	C .	D /
0 Space			

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.

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 redis-

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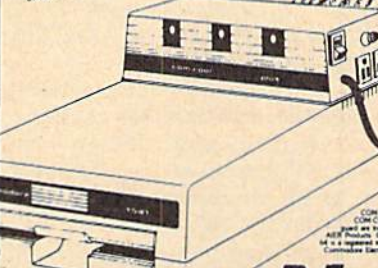
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played. You can pause the display by pressing the space bar. (MLX finishes printing the current line before halting.) Press space again to restart the display. To break out of the display and get back to the menu before the ending address is reached, 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. 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. Disk users should also note that the drive prefix 0: is automatically added to the filename (line 750), 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.

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 QUIT menu option has the obvious effect—it stops MLX and enters BASIC. The RUN/STOP key is disabled, so the Q option lets you exit the

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

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. Some ML programs are designed to be loaded and run like BASIC programs, so all you need to type is LOAD "filename", 8 for disk or LOAD "filename" for tape, and then RUN. Such programs will usually have a starting address of 0801 for the 64. Other programs must be reloaded to specific addresses with a command such as LOAD "filename", 8, 1 for disk or LOAD "filename", 1, 1 for tape, and 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, and 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 insure 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.

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}LOAD 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
    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$)<>4 THENRETURN
KF 310 B$=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
[43]";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$:PRINT"
[UP]{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:B$
=SS:FOR J=1 TO 2:IF F T
HEN B$=MID$(IN$,I+J,1)
HA 460 PRINT"[RVS]"B$;:IF I<
24THEN PRINT"[OFF]";
HD 470 GET A$:IF A$=N$ THEN470
FK 480 IF(A$>"/"AND A$<"")OR(A
$>"@"AND A$<"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")AND F TH
ENPRINT B$;:GOTO540
GK 520 IF A$<>L$ AND A$<>D$ OR
((I=0)AND(J=1))THEN GOS
UB1060:GOTO470
HG 530 A=L$+S$+L$:PRINT B$;:
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$,I):GOSUB320:IF
I<25 THEN GOSUB380:A(I
/3)=A
PK 570 NEXT I:IF A<>CK THEN GOSU
B1060:PRINT"[BLK]{RVS}
[SPACE]ERROR: REENTER L
INE [43]";F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FO
R I=0 TO 7:POKE B+I,A(I
):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN C
LOSE3:PRINT"[DOWN]{BLU}
** END OF ENTRY **[BLK]
{2 DOWN}";GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"[CLR]{DOWN}{RVS}
[SPACE]DISPLAY DATA ";G
OSUB400:IF IN$=N$ THEN2
20
RJ 620 PRINT"[DOWN]{BLU}PRESS:
[RVS]SPACE[OFF] TO PAU
SE, [RVS]RETURN[OFF] TO
BREAK[43]{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[43]";IN$:IF IN$=N$
[SPACE]THEN220
PR 720 F=0:PRINT"[DOWN]{BLK}
[RVS]T[OFF]APE OR [RVS]
D[OFF]ISK: [43]";
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$(PEEK(BS+I));:IF ST T
HEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOT
O940
GS 800 GOSUB1060:PRINT"[DOWN]
[BLK]ERROR DURING SAVE:
[43]";GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+"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 I: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][43]";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

```

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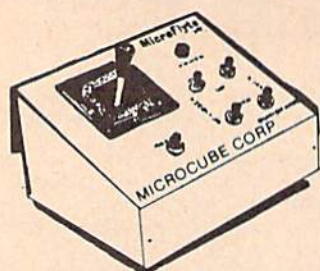
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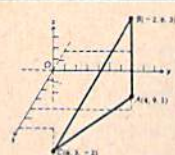
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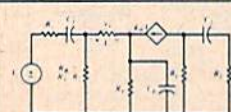
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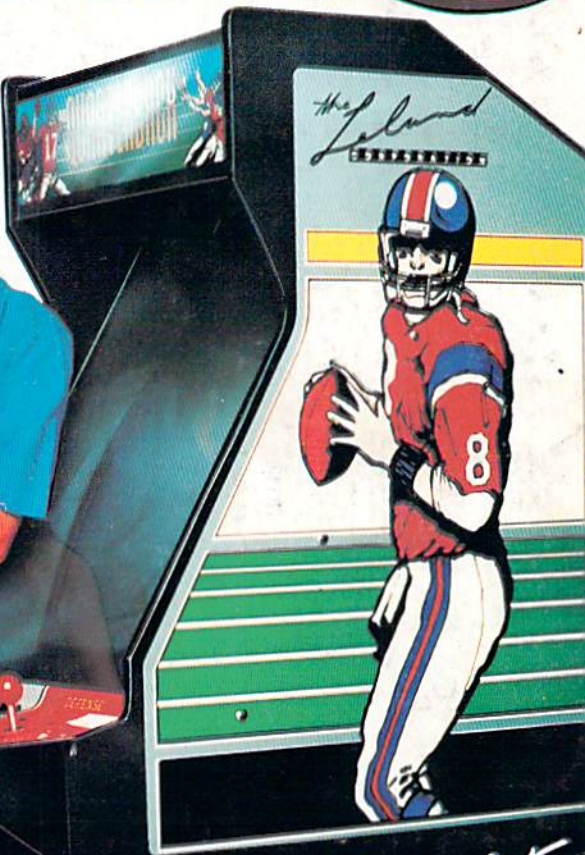
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