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64/128 VIEW

Look for major changes in Gazette, starting with the next issue.

Tom Netsel

This issue marks a turning point in the history of Gazette. This is the last issue that will be printed on paper. Next month, Gazette moves entirely to disk.

While the shift from ink to pixels means a new format for Gazette, its content will reflect little change. The columns and features that you've come to expect in the magazine will now be on disk. Jim Butterfield, Fred D'Ignazio, Larry Cotton, and Steve Vander Ark will continue to share their ideas, comments, and expertise in their usual columns.

Look for feature articles, reviews of software and hardware, and "Feedback," too. All the text that was in the magazine will be on the new double-sided Gazette Disk. You'll be able to read these articles onscreen or send them to your printer.

Those of you already familiar with Gazette Disk know how convenient it is to have all the monthly programs ready to load and run. There's nothing to type in. Until now, there was no documentation on disk; you needed the magazine to make full use of the programs. Now, each disk will include full documentation. As with the articles and columns, you'll have the option either to read the instructions onscreen or to print out a hard copy.

For some time now, we've added bonus programs on disk that were not listed in the magazine. These programs were often too large to offer as type-ins. In our new format, we can now provide you with more programs and larger ones. With no more tedious type-

ins, we don't have to worry about the size of the program listings.

Our programs may be larger, but don't expect quality to suffer. We'll keep our high software standards. We have some exciting programs coming up. On the disk next month, look for a SpeedScript patch from Frank Gordon that combines a RAM disk/dual drive option with a word-count feature. Frank's original program let SpeedScript users access two drives, but it wasn't compatible with an earlier word-count program. Now you can have both great features in one.

I want to encourage programmers to keep submitting games, utilities, and productivity and educational programs. Gazette is still in the market to purchase outstanding software.

The price of the new double-sided Gazette Disk will be \$49.95 for 12 monthly issues. Those of you who already subscribe to the disk will receive the new Gazette, commencing with the January disk. We think you'll be pleased with the extra value that you'll be getting.

If you subscribe to the Gazette edition of COMPUTE, you'll have this one-time opportunity to convert your subscription for only \$29.95. Look for a pull-out card in this section for full details. If you decide not to convert, then you'll continue to receive COMPUTE for the balance of your subscription.

I know this is a major change for Gazette, but I hope you'll take advantage of the upgraded Gazette Disk with its new look, fresh format, and added features. □

GAZETTE

64/128 VIEW

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The 64 Go

**WRITTEN BY
HAROLD STEVENS JR.**

People are always amazed when I tell them about the things that my Commodore 64 can do. They are usually blown away when I tell them how I use the 8-bit computer in a professional environment as part of my job as a journalist.

I edit a suburban weekly newspaper in Columbus, Ohio. My 64 played a major role in helping me redesign and create a whole new set of graphic devices that we in the newspaper industry call standing headlines—or standing heds for short. Standing heds are the visual elements that identify special areas of newspaper copy, such as

personal opinion columns, letters to the editor, community news and events, obituaries, weddings and engagements notices, and business news.

My 64 was the answer to a problem we had a few years ago when we decided to streamline our standing heds. Our mainframe typesetting computer, a Compugraphic MCS-100, was unable to do so without our having to shell out hundreds of dollars for software to help us get what we wanted.

We were looking for ways to spice up the standing heds of our newspapers in a way that would set us apart from our competition in the Colum-

bus area. We wanted something to indicate that the five editions of the Columbus Messenger Newspapers were on the move and were progressive enough to take advantage of contemporary newspaper design, while being cost effective at the same time. Like many small businesses, we don't have a whole lot of money to spend in our pursuit of innovation unless it returns a profit.

business briefs

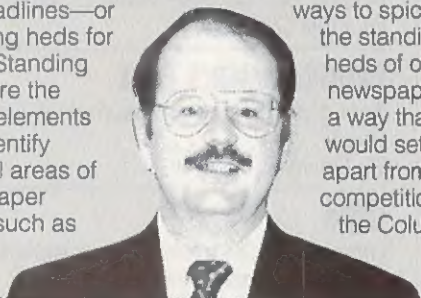
A New Look

We wanted to create new and radically designed standing heds that would be streamlined and would utilize a dot-screen background with white, or reverse, lettering. Since we were unable to do this with the Compugraphic MCS-100 without the expensive special software, we thought we would try to create these headlines with the

equipment we already had. We tried printing them in black with white, or reverse, type facings and then shooting them with a gray screen on the PMT camera in our production department. This didn't work. The results were muddy, and we didn't get the nice clean copy that we wanted.

My publisher was toying with the idea of buying the software for the Compugraphic when I hit upon the idea of using my 64 to do the task. If it worked, it would cost us nothing. About that time, our company bought an Apple LaserWriter II-NX laser printer for use by our classified advertising department to go with its new IBM clone. That computer was purchased to print our classified ads and to keep accounting records for that department.

Since the PC didn't have any desktop publishing software with it and the LaserWriter was a PostScript-driven printer, I was sure I could publish what we



It's my turn...
by Harold Stevens, Jr.

es to Press

needed on the printer with the 64 and PostScript-compatible geoPublish. I volunteered to do a couple of samples to see how they would fly.

stores that I could purchase an interface to hook up the laser printer to my modem port for about \$100. "No thanks," I said. That's when I turned to the

set up shop not too far from the laser printer. When I hooked up my spare amber monitor, geoRAM expansion unit, and 1541 and 1581 disk drives to the computer, I was ready to go. All I had to do now was plug in the interface to the 64's user port and run the RS-232 cable between it and the laser printer. I then booted GEOS to print the samples that I had created earlier and printed on my 9-pin dot-matrix printer.

Once in GEOS, I moved the cursor to the geoPublaser icon and double-clicked it. The screen went blank, and a menu then dropped down on the screen asking me to choose the RS-232 serial transfer rate of either 9600 bps or 1200 bps to print the geoPublish files. Since I knew 9600 was eight times faster than 1200, I naturally clicked on it. Now I was becoming excited. I was taking the first steps toward using my Commodore for what I really wanted it to do—desktop publishing.

After setting the bps rate, the file dialog menu dropped down for me to select the file that I wanted to print. I moved the pointer to the name of the standing heds sample that I had previously created and clicked it to open the file. Next came the print option menu asking me the number of pages and copies that I wanted to print and which smoothing setting to use for the graphics. Since nothing needed to be changed, I clicked and sent the file to the printer.

I held my breath as the monitor went blank and the print indicator light on the LaserWriter started blinking. A few minutes later the file dialog menu reapp-

On the home front



GEOS to the Rescue

The first thing I did was to go home to boot up GEOS. I created samples of the standing heds with geoPublish and printed out a rough draft of what these special graphics would look like on my Star NX-1000C dot-matrix printer. This was enough proof to management that my 64 could do the work. I was asked to start working on the standing heds as soon as possible. All that I required now was an RS-232 interface to connect to the printer.

Finding such an interface in the Columbus area was almost impossible, and the ones I located were expensive. I was told by a couple of computer

Tenex catalog for help.

What I did find was an Arotek Universal RS-232 Expansion Interface for about \$40. Immediately I ordered the interface and received it a couple of weeks later. The Arotek interface was exactly what I was looking for. It's designed so I can connect between a printer with an RS-232 port and a Commodore-style modem.

The second thing I bought was a six-foot RS-232 extension cord from Radio Shack. This let me set up my computer near the newspaper's laser printer.

Trial Run

On the following day, I hauled my computer and peripherals to work and

**South-Western
City Schools**

Going for broke

**business
briefs**

*business
briefs*

letters to the editor

letters to the editor

These are the before and after illustrations of what the standing headlines looked like then and now. Before we changed the standing headlines using the Commodore 64C and geoPublish, they were just boxes with rounded corners with the type centered inside the boxes. The top left standing hed was how our boxes were before we changed to the current appearance of the one on the top right. As you can see the newer headlines created on the Commodore look more streamlined in the new format when we changed from the round boxes to the screened bars.

italic style to give it the feeling of being in a forward motion. Once this was done, I printed new samples and showed them to the publisher and managing editor. We all agreed that this was how it was to be done.

I then sent out a memo to the other editors on the staff asking them to list the names of all the columns and features that appeared in their respective newspapers. Since all five of us share common standing heds for local events, military news, school news, and so on, we created these first.

Next came the standing heds that were customized for each individually zoned paper. For example, I run columns submitted by the high schools in my area while another editor runs a feature on saving money with coupons, and a third editor has a poetry column.

Days at the Keyboard

For the next few days, including the weekend, most of my spare time was spent creating headlines in various sizes to fit in the editorial copy section of the paper. First, I set the headlines to go across the entire width of the newspaper page. An 11-x17-inch page consists of eight columns that are each 7 picas (1.25 inches) wide. This meant that the heds had to be 63 picas or about 10.5 inches long, which is the length of a geoPublish page.

The headline bars had to be one-half inch tall with the type set in 24-point GEOS font LW Cal. This type style is also known as Helvetica to the rest of the printing industry. The text was also set up at one-eighth inch from the left edge of the screen bars. Previously, the standing hed bars were one-inch boxes with rounded corners and type set in upright Helvetica of 30 points.

peared, and the laser printer started whirring. Out came a printed page. I was excited as I picked up the first print-quality document created by my very own 64. At last, my dream of being able to print professional-quality documents on it had come true.

When my wife gave me the 64 for Christmas in 1987, never did I think that I would be able to do professional-quality desktop publishing on it. She had purchased the computer for me to use as a word processor. I would write stories on it and then store them to floppy disks to eliminate the piles of paper that accumulated around my old electric typewriter.

Dreams to Reality

When I discovered geoPublish, I learned that I could publish professional-quality printed documents on a PostScript laser printer. All I needed was access to such a printer. Buying one was out of the question because I didn't have the money to pay for one on my salary as a weekly newspaper editor. All I could do was to dream that someday I would be able to print professional-looking documents on my 8-bit Commodore. Once the laser samples were printed, the dream had become a reality.

Once we saw the samples, we started refining the standing heds. We had a few technical problems to work out. First, we had to decide the best percentage that the dot screen for the

bars and boxes should be. Since 50 percent and above printed too dark, we settled on a 25-percent screen. We had to make the dot screen as light as possible to keep the printing process from blotting out the white type facing and muddling the dot screen. Ink has a tendency to bleed into the fibers of newsprint paper.

I began to play around with the design of the type facing so that we could produce white lettering with black shadows behind it. We felt that the shadow effect would allow the white type to stand out more clearly against the 25-percent dot screen background. Then I put the type in



Using my personal opinion column as an example, you can see how we improved the looks of our editorial page by going from a rounded corner box to a screened one. Also, changing the type style to italics with white lettering and "shadows" makes the standing hed appear more exciting than before.

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To determine what kind of screened background we wanted for the standing headlines, I tried white type against different percentages of the screen. On top is 90 percent screen, followed by 85 percent, then 75 percent, 50 percent and finally 25 percent, which was what we settled on. We decided to add the "shadows" to highlight the white type facing to give it a more fuller look.

I created these standing heds so that they could be trimmed down to six, five, four, three, and two columns in width. For the personal opinion columns, such as those written by the editors to appear on the opinion-editorial page, I created screened boxes that were three quarters of an inch tall and two columns wide with the name of the column in 18- or 24-point size and the author's name in 15 points. The only difference between these standing heds and the others was that the author's name was set in black type.

The personal opinion columns weren't the only items set in the two-column screened boxes. There were some standing heds whose words were too long to fit into the half-inch by two-column format. For these headlines I had to create a two-column by three-quarter-inch screened box and place the names of the feature in two lines of type, with the words printed in 18-point type. Creating these thicker two-column headlines also gave us a variety of designs to choose from when we laid out the pages.

After creating the screen bars, I placed the black type, which was to become the shadow of the words, about one-eighth of an inch from the top and left edge. Setting the white type over the black one-eighth of an

inch from the top and left edge of the half-inch screened bars in opaque mode produced the shadow effect that I wanted. In the two-column boxes, I placed the shadows and white type the same distance from the top and left edge. Both the shadows and overlaying white type were set in italics.

After I corrected small placement errors and ran out the headlines on the laser printer, we had them shot on the PMT camera. This converted them to photographic paper and made them more durable so that they could be reused every week. Shooting the headlines on photo paper also sharpened the resolution of the dot screen, the white letters, and the black shadows. The final results looked as though we had used the Compugraphic typesetter to create them. This process took the 300-dots-per-inch resolution of the laser printer and enhanced it to make the heds appear as if they were 600 dpi or greater.

Start the Presses

Production day rolled around. The standing heds were shot on paper and waxed to be pasted onto the page with the stories, photographs, and other copy. The pasted-up pages were then shipped to the printer. Two days later, our sample copies of the papers came back. We turned to the pages that had

the standing heds, and they looked great. To tell you the truth, looking at the resolution on the newsprint page, we couldn't tell the difference between them and anything printed by the typesetting machine.

Later, I purchased a second computer and a 1581 drive to keep at work so that I wouldn't have to lug my 64 back and forth when it was needed. I also added an amber monitor for better onscreen resolution.

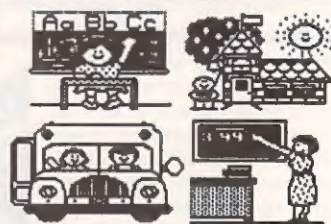
The 64 with a 1764 RAM Expansion Unit and a second 1581 sits on a desk of its own in the office. Since I installed the computer and created the standing heds, I have used this system to create other graphics to be used with stories in our newspaper. I am most proud of the one created during the Persian Gulf War that signified stories about local people who supported the troops overseas.

As an added bonus, I was able to use the system at work to publish an eight-page newsletter for my user group, the Central Ohio Commodore Users Group. For three years now I've been able to use my 64 in a professional manner. The icing on the cake came the following year when the company gave me a nice pay raise for doing the impossible on the 64. □

On the
home front



South-Western
City Schools



Going for broke

Above are samples of other graphics and art work that was produced on the Commodore 64C using geoPublish. The bottom graphic was used as line art to draw peoples's attention to a story on a school district's financial woes, while the one on the top was used to signify stories about local people involved in the Persian Gulf War in 1991-1992. The stars in the flag are the letter "H" in LW_Shattuck font.



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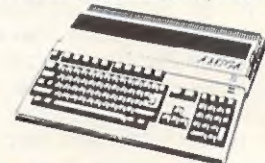
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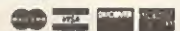
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WRATH OF THE DEMON

Are you bored with the games that are available for the Commodore? Do you get discouraged by programs that promise a lot but deliver little? Do you think you'll have to upgrade to a PC in order to get full screen graphics and true multilevel action? Then Wrath of the Demon by ReadySoft has some delightful surprises in store for you.

The creative wizards of the Abstrax research team have come up with a phenomenal program in Wrath of the Demon. This game offers the scope, graphics, multilevel scrolling, and sound track that previously had been available only to PC owners.

The game itself is a challenging quest that pits a demon and his host of minions against our hero, an unassuming stranger who happens to be in the wrong place at the right time. The hero (you) is entrusted with the mission of finding and saving the princess and riding the kingdom of the evil demon. If he succeeds, the king has promised the hand of the princess. If he fails; all is lost.

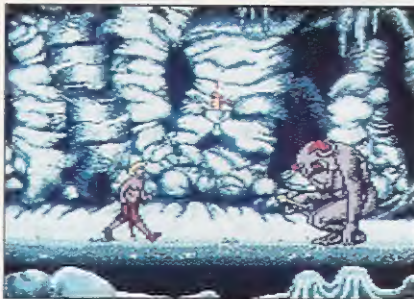
The game opens with an impressive musical score. It's just one of nine musical selections you'll hear throughout the game. The title graphic tells the story. It shows a bullish demon holding a sphere with the lovely princess imprisoned inside. Off to one side, our handsome Conan-like hero rushes to the rescue, brandishing his sword.

Sure, a lot of games have impressive title graphics, but then the games don't live up to the promise. The graphics in those games end up being either too small or uninspiring. You know the kind I mean—the ones where a character who looks like a minuscule stick man moves along the bottom inch of the screen and the rest of the screen is a solid blue that I can only assume is supposed to represent the sky. If that's what you've been seeing, you aren't going to believe your eyes when you load Wrath of the Demon!

The Abstrax team originally designed Wrath of the Demon to take advantage of the sophisticated hardware in the Amiga computer system. When they converted the program for the Commodore, they were determined to push that hardware to its limits. They

succeeded admirably. The game has over 600 screens of action; smooth, high-tech parallax scrolling; and richly detailed graphics that utilize more than 100 colors.

The animation is superb. There are over 1400 frames in the game. The frames scroll smoothly across the screen without jumpiness or distortion. For example, the opening level fea-



The animation in Wrath of the Demon is superb, with more than 1400 frames.

tures our hero riding a galloping white charger. The mountains, shrubs, and clouds scroll by flawlessly. In addition, there are rocks to be hurdled, skeletons to be avoided, and small bottles (potions) to be collected for later use.

The characters have a wide range of movement. They jump, walk, roll, duck, and fight. In the opening scene, the hero must lean down from his saddle and scoop up items while his steed thunders forward at full speed. He must also hurdle rocks and other obstacles that get in his way. In fact, the horse will balk rather comically and refuse to go further if the hero doesn't guide him over an obstacle.

Meanwhile, the hero also has to watch what he is scooping up. Small bottles represent potions, but skulls, rocks, and other items will drain the hero's energy if he touches them. Don't be fooled into thinking it would be easier to just gallop forward without attempting to gather objects. He'll need the potions later if he hopes to have success against the various monsters he'll meet along the way.

The game's monsters are large, intelligent, and deadly—120 different varieties in all. Low-flying birds try to knock you from your horse. Gnomelike creatures attack you with pickaxes and throw rocks at you. (Their aim is dead-

ly.) Dragons breathe fire at you. As for the demon himself, well, suffice it to say he is an awesome creature more than half a screen tall.

In order to defeat the monsters, you'll have to develop a different strategy for dealing with each one. Whatever approach you adopt, try to keep your hero as far away from the monsters as possible. Never let them back him into a corner. In fact, sometimes, it's better to try to avoid a monster rather than attack it. However, killing the monsters has some advantages—sometimes they carry potions that your hero can collect for later use.

The three potions that are most helpful are Shield potions, Zap potions, and Heal potions. The Shield potion makes the hero immortal, but only for three seconds. Zap potions will kill the monsters around the hero or at least take away some of their power. Because of their constitution, some monsters have some immunity to the Zap potion. It's interesting trying to figure out which monsters are which.

The Healing potion is the most helpful. It will cure all your hero's wounds and restore his energy to the maximum. He'll need it. There are more monsters waiting on the next level.

Onscreen graphics help you keep track of the hero's energy level and the number and type of potions he has remaining. Unfortunately, there is no indicator for the monsters' strength, so you're never sure how close to death they are. You'll have to keep hitting, jumping, running, and punching until you defeat them. This is made more difficult by the fact that the monsters seldom attack alone. Sometimes your hero will be outnumbered two or three to one. So use those potions carefully! The game will really put your joystick skills to the test.

You'll need more than just dexterity to master this one. The exploration levels of the game will take the hero through murky caves, pagan temples, and elaborate castles. You'll need to make good maps of some of these levels, or you'll never get our hero out of the labyrinth of passages.

The game isn't perfect; there are some flaws in it. One is the lack of a feature to save your game or position. This feature is available for other sys-

tems but not for the Commodore version. Another drawback is the manual. It's sketchy at best and was written to encompass all versions of the game. The manual tells you more of what the Commodore version can't do than what it can.

The biggest drawback I found was the loading time both to start the game and between scenes. Even using my Epyx FastLoad cartridge, the loading time ran anywhere from 30 seconds to a minute. At the rate I was playing and having to restart the game, I wished it would reload faster.

However, I have never seen a Commodore game that has offered such superb graphics, intricate plotting, and fast action. It shows what the 64 can do with the right programming. Let's hope more such games are headed our way.

MART. PALLIN

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FEEDBACK

Bug-Swatter

TurboDOS (June 1993) doesn't work on 1541-II drives. Author Hong Pham offers the following suggestion to fix the problem. First, load and run TurboDOS. Then after the startup message appears, enter the following line in immediate mode.

**POKE 4508, 234: POKE 4509, 234:
POKE 4510, 234**

To save this modified version of the program, type *BSAVE "TURBODOS.MOD",8,2049,10493*.

In Scarce Supply

What's the word on the 64? Does Commodore still support it or not?

RAYMOND MAY
PALATKA FL

Commodore still supports the 64 in Europe, but not in the U.S., according to Fred Bowen, a senior engineer at Commodore. The company has entered into an agreement with Software Hut (800-932-6442) to sell new and refurbished 64s, drives, and other equipment, and The Software Management Group (410-992-9975) will offer post-sale support to Commodore resellers, various dealers, and end users. Service centers will work with SMG for all warranty-related activities. SMG has its headquarters in Columbia, Maryland, but plans to open offices in West Chester, Pennsylvania, and Memphis, Tennessee.

Appending Programs

I have a couple of financial programs that I have created over the years that I would like to combine into one larger program. I'd like to use a menu subroutine to run whichever program I desire. A couple of these programs are fairly long, and I'd rather not

have to type them in again. Isn't there some way I can merge these without having to retype them?

DARRELL HUNLEY
WACO TX

The easiest way to combine several programs is to append one to the other. This means that you'll have to change the line numbers of the second program so that its lowest number is higher than the highest number of the first program. This simply means that the programs with high line numbers are tacked onto the end of programs with low line numbers. If the line numbers overlap, you'll have a problem.

The easiest way to append programs is to load the first program and then in direct mode type POKE 43, PEEK (45)-2: POKE 44, PEEK (46) and press Return. Then load the second program and type POKE 43, 1: POKE 44, 8 and press Return.

List the program, and you should see that the second program has been appended to the first. Save this new program. If you wish to append another, repeat the process.

If PEEK(45) should happen to be a 0 or 1, you'll get an error message. If this happens, you have to change your instructions by typing POKE 43, PEEK(45)+256-2: POKE 44, PEEK(46)-1 and then continuing as before.

Merging two programs into a single program with lines sorted correctly requires something else. This is different from appending one program onto another. You might have a subroutine that you've written, and you'd like to enter it without having to rewrite it. You can use the following program to merge two programs. Just make sure that neither program contains the same line number as the other.

```
SC 59000 FOR J=40960 TO 49151:
POKE J,PEEK(J):NEXT
AQ 59010 POKE 42231,56:POKE 4228
8,96:POKE 42585,96
BK 59020 FOR J=830 TO 909:READ
V:POKE J,V:NEXT
MJ 60000 DATA 162,8,32,198,255
,32,207,255,32,207,25
5,165
GM 60010 DATA 1,41,254,133,1,1
60,0,32,207,255,32,20
7
AP 60020 DATA 255,240,32,32,20
7,255,133,20,32,207,2
55,133
PS 60030 DATA 21,32,207,255,15
3,0,2,240,3,200,208,2
45
XQ 60040 DATA 152,24,105,5,168
,32,162,164,76,79,3,1
65
BF 60050 DATA 1,9,1,133,1,32,8
9,166,76,128,164
```

To use this merge routine, load it, run it, and then type NEW. Be patient; it will take almost a minute after you type RUN before the computer will be ready again.

Then type in or load a BASIC program. Merge additional programs on disk by typing OPEN 8,8,8,"FILENAME"; SYS 830. Filename is whatever program you have on disk that you want merged with the one already in memory. Be sure to save the newly merged program. You can turn off the blinking light on the disk drive by typing OPEN 15,8,15,"I": CLOSE 15.

Author Information

You should publish the addresses of your authors so we can write to them. Also, you should include more biographical information such as age, sex, hobbies, and nationality.

Also, are you guys going to sell any more disk products? I notice that you have a few different disk indexes. Why don't you combine them into one?

If you have public domain programs on your disk but don't pay the authors, then your corporation is freeloading off of them. Is your disk still going to publish bonus programs that are too large to type? What about graphics? Do you still want them?

HENRY WILLIAMS
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Like many other companies that offer Commodore products, we too have noticed sluggish sales. That is one reason that there are no plans to update the Gazette Index. The Index was a cumulative one, however. That is, we updated it each year, adding on to the previous contents. The Index includes programs and articles from 1991 back to 1983. At this time, there are no plans to update it again.

While SpeedScript itself hasn't changed since its last disk, we have published a number of enhancement programs. We have thought of offering a disk of those products. We have also thought of offering a two-disk set of Larry Cotton's "Beginner BASIC" columns and programs. At this time, we doubt if there is enough interest in these products to make them economically feasible. If we're wrong, we welcome your comments.

If you've read Tom Netsel's comments in this issue's "64/128 View," you know that there are major changes coming to Gazette. The decision to go to an all-disk product means several benefits to our readers. Since you no longer have to type in our programs, we don't have the same limits on program size. We also won't have the 16-page restriction that we've had in print. We can now offer more programs as well as larger ones.

Steve Vander Ark has found some very good public domain and shareware programs for our disk. We plan to continue with his "PD Picks." As for ripping off those authors, we do our best to contact them before publication. We offer a contract that grants us the one-time use of their programs, and we also pay an honorarium for that use. Whenever we include a shareware program, we hope that you'll do your part by sending the authors a few dollars for the programs that you find useful.

While we still receive a large number of program submissions, we get almost no graphics these days. We can only assume the number of active Commodore artists has declined. Also, since we received no feedback about our dropping "Gazette Gallery" from the disk, we assumed that you readers didn't miss that feature either.

Directory Lister

Here is a directory lister for the 64 that I use all the time in my programs, and I find it quite helpful. Other readers who program may find it useful as well. This program will read the directory of drive 8, 9, or whichever one you specify without interrupting or losing the program that currently is in memory.

```
10 PRINTCHR$(147):
  INPUT"DRIVE 8 OR 9";DN
20 PRINTCHR$(147):
  PRINTTAB(6)"DISK
  DIRECTORY";DN
30 SYS57812 "$",DN: POKE 43,1:
  POKE44, 192: POKE768, 174:
  POKE 769, 167: SYS47003,1
40 POKE782,192: SYS65493:
  SYS42291:LIST:POKE 44,
  8: POKE 768, 139: POKE 769,
  227
50 PRINT: PRINTTAB(6)" HIT ANY
  KEY"
60 GETA$: IF A$="" THEN 60
```

70 RETURN

Remember the routine to fit anywhere within your program, and be aware that line 70 will need a GOSUB in order to work properly.

DAVE WASENDORF
DENVER, CO

Where's SpeedCalc?

I the June issue there's a notice about a bonus template for use with SpeedCalc for tracking stock holdings. Before I ordered the disk, I checked to see if I had SpeedCalc. When I couldn't find it, I booted the Gazette Index to see when the program was published. I didn't find any mention of it. I could use this template if I had SpeedCalc. When was it published?

RAY MJSICK
OKLAHOMA CITY, OK

The reason you couldn't find SpeedCalc on the Gazette Index disk is because SpeedCalc was never published in Gazette. It appeared in the January 1986 edition of COMPUTE. (Remember the good old days when COMPUTE published type-in programs for the Commodore, Apple, IBM, and Atari?) It was also available on disk.

A few years later, we issued the Gazette Productivity Manager disk (\$14.95). In addition to a financial planner, and data base, this disk contained GemCalc, a spreadsheet based on SpeedCalc but much larger and powerful. Files and templates for these two programs are compatible, however. If you don't already have a spreadsheet, you might want to consider GemCalc. It's a great buy, and the disk is still available.

Since SpeedCalc was never published in Gazette, maybe it's time to correct that oversight. Look for it in an upcoming issue of Gazette. □

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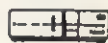
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PD PICKS

Steve Vander Ark

SLEEP STEALERS

I'm still on a games kick this month. As you might recall, last month I was trying to beat Super Rockfall and Zix. Now, I've added two more great new games to my "sleep-stealer" disk. Both of these games are excellent. They're the kind that keep me staring at the monitor until my eyes start to creak. These aren't joystick breakers; they're strategy games. They're the kind that keep you up until 3:00 a.m.

Now, here's this month's pair of winning programs. For those of you on CompuServe, I'll include the game's filename whenever I can find it. Whether you get these games on Q-Link, GENie, CompuServe, or Gazette Disk, don't count on getting too much sleep once you start to play.

Rebellion V2.

Q-Link filename: REBELLION V2. Uploaded by Ravenweird. GENie file number: 12546.

This game bears a passing resemblance to Risk, the board game in which you try to conquer the world using little colored markers for armies. You are given a random map made up of hexagonal territories which come with villages and a contingent of soldiers loyal to the king. Of course, as you might guess from the name of the program, you aren't loyal to the king at all. In fact, your goal is to wipe out the royal troops entirely and proclaim yourself king.

The game consists of your maneuvering your armies, challenging neighboring territories, and trying to hoist your own flag over the territories. In the process, you can hire more soldiers and build towers and villages to extend your influence.

That by itself would make for a pretty neat game. But Rebellion also offers tidbits of color and style that make all this

simulated mayhem a lot of fun. Every time there's a battle, for example, a window appears showing two or more little guys armed with swords who proceed to duke it out. This action is accompanied by thunks and clangs and martial music. There are no blood or explosions (this is a strategy game, remember?), and you really can't do anything to help your side win. But these kinds of frills add a lot to the overall enjoyment of Rebellion.

There are other nifty touches. You can customize the game extensively at the start. You can edit the map and select your own color and coat of arms, and they then appear on your battle flags and in your conquered territories.

You can permit random events to occur, such as fire destroying one of your villages or your troops capturing some outlaws and gaining some extra gold. You can also (and I need options like this) make the king's men into real wimps or give the king extra advantages such as a brother to charge to his rescue. Rebellion will suit just about any kind of challenge you want to set up, and it'll keep you busy a long, long time.

If you do happen to tire of treachery and bloodshed, you might want to load the other program for this month, a wonderful re-creation of an ancient but still popular game.

Mah-Jongg by Kurt Tappe. Q-Link filename: MAH.JONGG V2.SDA. Uploaded by KurtTappe. GENie file number: 7584. CompuServe filename: MAHJON.BIN. Contributed by user #73040,504.

According to the nice bit of historical background Kurt Tappe has included with this game, people have been addicted to mah-jongg for thousands of years. Now in the computer age, the deceptively simple game is still keeping peo-

ple like me from getting any work done. This version, for the 128 in 40-column mode, is a masterpiece.

In case you're not familiar with the original board game, here's a brief idea of what it's like. You are presented with a number of little tiles with pictures on them, stacked up in a random arrangement, with extra pieces in the middle. Your job is to remove matching tiles from those that are visible. The trick is that you can take only tiles that have a free edge. In other words, you can't remove those that have other tiles touching all four sides. Computer versions of mah-jongg automatically set up the tiles in a random arrangement to start you off and then let you select matching pairs with a pointer.

Kurt has gone out of his way to make his mah-jongg the best around. He has included a mouse driver. Since you have to move the cursor all over the screen, the game benefits from the mouse's quick pointer control. Kurt has also provided an option that makes guys like me happy: the chance to take back moves and try another tack. You can even ask the computer to suggest moves for you.

One feature that I don't dare use is the autoboot creator, included as a separate utility program. I play mah-jongg too often as it is without having it there every time I start my system!

You probably won't really need the documentation which is available from within the program, but read it over anyway to get the historical goodies on mah-jongg. That's just one more example of the level of user friendliness that you'll find in this game. Kurt has gone the extra mile to ensure that this program becomes one of your favorites; it definitely is one of mine. ☐

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BEGINNER BASIC

Larry Cotton

THREE CHALLENGES

Merry Christmas, happy Chanukah, or season's greetings. Here are a few BASIC programming challenges that I'd like for you to consider while Gazette makes the change from paper to disk. Give them some thought and see if you can program a solution of two. Last weekend my seven-year-old second cousin Hunter showed me a game which I had never seen before. It's called Sets. In case you're not familiar with this game, I'll tell you about it. It's a fiendishly simple game in which a deck of special cards is shuffled, and 12 cards are displayed face up in a 3 by 4 grid. Each player takes turns identifying and collecting sets of three cards. More cards are added to the grid to replace the sets as they're removed.

A set is defined as any three cards which share certain characteristics. For instance, one solid red diamond, one solid blue diamond, and one solid green diamond would qualify as a set. Similarly, one shaded green oval, two shaded green ovals, and three shaded green ovals would make a set. Less easy to spot are sets which might consist of one solid red diamond, two green shaded diamonds, and three blue open diamonds.

If only two cards in a group share a certain characteristic, the group isn't a set. This isn't a set: two shaded green ovals, two solid green diamonds, and two open red squiggles. (One way to legalize that set would be for the green diamonds to be blue.) The variables in a set are color (red, green, or blue), quantity (one, two, or three shapes), fill (open, shaded, or solid), and the shape itself (squiggly,

oval, or diamond).

Needless to say, Hunter beat me soundly most of the time. So what's the programming challenge that I mentioned earlier?

As you sit around the house on these long cool nights, see if you can write a computer program that plays a Sets-like game. (Is there already one out there?) Ideally, the computer would randomly present the 12 cards, the player would attempt to identify a set, and the computer would decide whether or not the set is legal.

An alternative could be that the computer presents groups of three cards, the player decides whether the group is a legal set or not, and the computer checks the answer. Either way, I would like to see how you would begin programming a game such as this in BASIC.

Feel free to come up with your own variation. Send me the game (finished or not) in care of COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. I'll try to decipher your programming and present some of your best techniques in a future column. Meanwhile, I'll attempt to come up with a version of my own, and we can compare programming strategies later.

Here's another challenge for you: Write a short BASIC program that will play the Westminster chimes. These are the familiar chimes heard in large clocks that ring on the quarter-hour. It's not sufficient to let the SID chip just play the notes; rather, SID should really chime! In other words, this program should use the ring mode feature of the SID chip to add the harmonics necessary to sound like real bells. Even better would be a clock which chimes four notes on the quarter-hour, eight on the

half-hour, and so on until the hour. (Hint: try poking a 21 to one of SID's control registers.)

Incidentally, some other well-known chimes are Winchester (not actually played in that city), Canterbury (not actually played at Canterbury Cathedral), Trinity, Guildford, St. Michaels, Cairo, and Notre Dame. As a bonus, you could include them all with a menu screen. Hit T for Trinity, G for Guildford, and so on!

OK, here's the third challenge, one which fits the real spirit of "Beginner BASIC." Send me a short BASIC program that rounds numbers. One might let a user enter any number that included unlimited decimal places. The user could then choose the number of decimal places to round off to.

I would also like to see any programs which round money calculations to two places, preferably with the ability to line up decimals vertically. I'll look at any program that computes averages, golf scores, lottery winnings, calories, grades, or whatever else you want to count!

Way back in the August 1988 issue of COMPUTE's Gazette, I showed how to use the following general formula to round numbers.

$$R = \text{INT}(N * 10 \uparrow D + .5) / 10 \uparrow D$$

R is the rounded number that you seek, N is the number to round, and D is the number of decimal places you'd like to round off to. The up-arrow key (next to Restore) raises a number to a power.

If D were 2, 10 would be raised to the second power, or squared. Feel free to adapt this formula to any new program you're inspired to write. And keep those cards and letters (and programs) coming. Be sure to include your name and address with all submissions. □

Here are three programming challenges to keep you busy during the holiday season.

D'IVERSIONS

Fred D'Ignazio

I DON'T THINK THIS IS CLEVELAND EITHER, TOTO!

In *Rising Sun*, the movie based on Michael Crichton's best-selling novel, actor Wesley Snipes, playing a police detective, watches a computer screen in wonder. He sees his head and the head of his partner (played by Sean Connery) cut from their own bodies and pasted onto each other's shoulders. Following this demonstration, Snipes is cautioned by a computer technician not to trust videotaped events as evidence of something that has actually taken place in the real world.

Moviemakers have used special effects for years to make us believe the events that we see on the silver screen, or at least to make them seem believable. Of course, it usually takes a hefty budget and a team of artists to create this video magic.

This kind of virtual reality—the appearance of being real without being an accurate reflection of physical reality—is rapidly becoming easier and less expensive to create. This is because all media, including television, photography, music, and telephony, are swiftly being converted to a digital format. With simple media manipulation programs, any artist, production editor, musician—or kid!—can alter a digitally recorded event into something fictional which nevertheless looks and sounds as real as the original. With the digital format there is no "generation loss" that makes copies look inferior or doctored.

Many of us, outfitted with power gloves, stereo computer goggles, bodysuits, and ultra-high-speed computers, eagerly await the dawn of virtual reality. But a simpler form of vir-

tual reality has already dawned, and you are liable to stumble across it in the checkout lines of your local supermarket or convenience store.

"WORLD RECORD: MOTHER GIVES BIRTH TO 15 BABIES AT SAME TIME!"

"CLINTON MEETS JFK—FORMER PRESIDENT ADVISES CLINTON ON HOW TO SAVE HIS PRESIDENCY"

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"MAN-EATING SHARK DEVOURS OIL TANKER—4000 SAILORS LOST IN SINGLE BITE"

"MAN MARRIES THREE-INCH-TALL BRIDE: 'SHE'S THE WOMAN OF MY DREAMS'"

"TREE GROWS FROM BOY'S MOUTH—LAD REMEMBERS SWALLOWING ACORN ON FOURTH BIRTHDAY"

Thousands of stories similar to these appear each week in America's supermarket tabloids. Many of them are accompanied by photographs depicting the event they describe. You might see the groom holding his diminutive bride in the palm of his hand or an oak tree growing out of a boy's mouth. The photographs are used to "prove" that the fantastic events did occur and were not concocted by an editor with a bizarre imagination.

Don't count on it. These photos can be quickly and easily created by digitally manipulating the original photographs on computer workstations.

For three years I worked with Sharon Goth-Tew in the Teacher Explorer Center, a multimedia demonstration center sponsored by the State of Michigan to show educators some

of the exciting advances in instructional technology. Sharon and I delighted in showing the headlines from grocery story newspapers to educators and then demonstrating how the pictures could be digitally created.

For example, Sharon had a digitized image of her son Tyler which she called up on the big four-foot Sony monitor at the front of the room. She loaded Tyler's image into a paint program and proceeded to shrink him, stretch him, invert him, rotate him, and colorize him. She showed how she could digitally add an earring on Tyler's left ear, give him a case of the measles, or change the color of his hair or his eyes. She also showed how she could shrink his entire face and place it inside his mouth or stretch his mouth so that it could cover the TV screen. Since Tyler would not be pleased with the things his mom was doing to his face, Sharon always asked the teachers to keep her tricks secret.

Each morning we greeted a fresh crop of educators from Michigan and around the country. Our first warm-up activity was to divide the educators into five teams and to capture their images digitally on their workstation computer. We used a video camera connected to a computer frame-grabber board. Since we were on a network, as soon as the images were captured, we displayed them in an instant computerized slide show on the classroom TV.

Then the fun began! The class giggled, shrieked, and roared as we took men's heads and placed them on female bodies and as we added clip art backgrounds and placed teachers on the moon, at the bottom of the ocean, or in a fifteenth-century castle.

We changed hairstyles, added hair to bald heads, and

With simple media manipulation programs, anyone can alter a digitally recorded event into a work of fiction.

drew clown hats. When we replicated arms, legs, and other body parts, we attached them to people's bodies like cut-out paper dolls. We then added mock headlines and published the text and pictures on the classroom printer to create our own imitation tabloids.

One morning, Deb Small, the number two technology official in the Michigan Department of Education, came to the center to see what we were up to. We told Deb we were digital magicians who had the ability to transport her to star in her favorite movie. After looking through our collection of laser discs, Deb decided that she wanted to swap places with Judy Garland and become Dorothy in

The Wizard of Oz

Sharon did all the digital surgery while Deb selected images. First they captured keyframes from the laser disc. These formed a storyboard of the movie. Next, they digitized a picture of Deb as she sat in front of one of the video cameras in our laboratory.

Sharon cut the head off Deb's picture and pasted it onto Dorothy's shoulders in *The Wizard of Oz*. By just cutting the oval of Deb's face and scaling it appropriately for each picture, Sharon was able to fit Deb's face onto Dorothy's without mussing a single one of Dorothy's hairs. Then Sharon went into fat bits mode and smoothed the pixels around the oval to

make the transition from Deb's face to Dorothy's face subtle and natural.

To complete the effect, Sharon and Deb composed a digital slide show that included all the photographs from the storyboard. They added the song "Somewhere Over the Rainbow" from the movie as background music and dialogue such as "Totò! I don't think we're in Cleveland anymore!" (Deb and her family come from Cleveland.)

They copied the computer slide show onto videotape and created a customized label. Deb carried the finished product out of the center after only a morning's worth of work. Deb was so pleased with the video that she sent

it to her mom and dad back in Ohio!

So, the next time you hear a sound, see a photograph, watch a news documentary, or listen to someone's voice, ask yourself, Is it real or is it virtual reality? We live in a society saturated by electronic media.

In the past this media accurately reflected the real world—or at least we could tell when it didn't. But the digital revolution is changing that. Almost everything visible through media windows may soon be something pasted together with digital smoke and mirrors. What effect will this have on the facts? What effect will it have on our perception of reality? Most important, will we care? □

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PROGRAMMER'S PAGE

David Pankhurst

FAB FOUR

All the tips this month come from the computer of David Pankhurst. Look for more information about him at the end of this article.

Line Delete

In October's "Feedback" column, Roger Howard of Los Angeles asked about a program to delete a number of lines from a program. Here's a program to delete a number of lines from a BASIC program just by typing in five lines. It's handy when you want to erase lines but don't want to load in a complete system (like MetaBASIC). Feel free to use different line numbers. Just be sure to change the references in line 3 and line 4.

```
1 INPUT "WHAT ARE LOW, HIGH LINE NOS. "; A, B:
  Y=PEEK(43)+256*PEEK(44)
2 X=PEEK(Y)+256*PEEK(Y+1): L=PEEK(Y+2)+256*PEEK(Y+3): IFX=0 THEN END
3 IFL<ATHENY=X:GOTO2
4 IFL<=BTHEN PRINT "[CLR][3 DOWN]"L "[DOWN]Y="Y": B="B": GOTO2:[HOME]"
5 POKE198,2:POKE631,13:POKE632,13:END
```

Run Counter

This trick is a one-liner to embed a counter in a program. I find this line is useful to note the version of programs I'm developing. Every time I run the program, it passes this line, incrementing the counter. Later versions will have higher numbers.

The first line shows how it looks in BASIC; the second shows how you can type it so it will fit on one line. The second version uses the Commodore technique of two-letter abbreviations. This consists of entering the first letter and

holding down the Shift key while entering the second.

```
1 R$="0000":FORI=7TO10
10:POKEI+PEEK(61)+256*PEEK(62)-20,ASC(MID$(STR$(VAL(R$))+1+1E8),I,1)):NEXT
```

```
1 r$="0000":f0i=7to10:
p0i+pE(61)+256*pE(62)-20,
aS(ml(stR(vA(r$))+1+1e8),
i,1)):nE
```

It's a Call 4 U

This routine takes a telephone number and gives letter combinations that can be used for it (such as 555-JOJO instead of 555-5656). What makes this one worth typing in is that it does all combinations, not just a random sampling. Also, it's only five lines, which is enough for something as trivial as this. You can enter any nonnumeric characters you want, and they will be included in the output. Note that line 50 has all the letters in the alphabet except Q and Z.

```
10 INPUT "NUMBER":A$:B=LEN(A$):DIM C(B):FORD=1TOB:C(D)=0:NEXT: C(B)=1:PRINT,,,
20 E=B:PRINT,
30 C(E)=C(E)+1:IF C(E)>2 THEN C(E)=0: E=E-1: ON SGN(E) GOTO 30:END
40 FORD=1TOB:F$=MID$(A$,D,1):G=3*VAL(F$)-5:IF G<1 THEN PRINT F$: C(D)=5:NEXT: GOTO 20
50 G=G+C(D):PRINT MID$("ABCDEFGHIJKLMNPRSTUVWXY",G,1):NEXT:GOTO 20
```

Master This

This little program provides a quick version of the popular guessing game called Mastermind. Here, you guess at the digits in a four-digit number (digits 1-6), and the results are displayed with B (black) for the number of digits that are correct and in the correct

position and W (white) for digits that are correct but in the wrong position.

If you want to try different variations, adjust line 10. L is the number of digits in the puzzle (4), and R is the range (from 1 to 6 in this case).

```
10 L=4:R=6:FOR I=1TOL:
D(I)=INT(RND(0)*R+1):
D=D*10+D(I): NEXT:Z=1:
GOTO30
20 Z=Z+1: PRINT "B="B"W="W
30 PRINT "GUESS="Z:INPUT X:
PRINT "[UP]";: FOR I=LTO1
STEP-1: Y=INT(X/10): G(I)=X-Y*10:X=Y
40 NEXT:W=0:B=0: FOR I=1TOL:
F(I)=D(I): IF G(I)=F(I)THEN
F(I)=0: G(I)--1: B=B+1
50 NEXT: FOR J=1TOL: FOR
I=1TOL: IF F(J)=G(I)THEN
F(J)=0:G(I)--1: W=W+1
60 NEXT:NEXT:IF B<L THEN 20
70 PRINT "CORRECT!":END
```

Editor's note: For many years Randy Thompson has compiled the material for "Programmer's Page," and he's done an outstanding job. His work load as a programmer for a major software firm, however, has forced him to give up this column. We wish Randy well and want to convey to him our thanks for his many great programming tips and ideas.

Although Gazette is changing, "Programmer's Page" will continue to be a vital part of it. David Pankhurst, a talented programmer from Montreal, Canada, provided the tips for this issue, and he will be compiling the column from now on. Look for more information about David next month.

Remember, Gazette still wants your programming tips and hints. We pay \$25-\$50 for each tip that we publish. Send your tips to Programmer's Page, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. □

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GEOS

Steve Vander Ark

ULTIMATE GEOS ON A BUDGET

About a year ago in this column, I described what I considered to be the ultimate GEOS setup. The total price was several thousand dollars. Later, I received letters from people who asked about a system for regular folks. Fancy equipment is wonderful, but is it necessary? So here's another, more realistic, list of what I consider to be the best choices for a GEOS system.

Computer and monitor. I recommend a 128 for its 80-column screen. The ease of use in 80 columns, especially with geoWrite, is well worth the extra money. That means you need an 80-column monitor, too, but you can get by with monochrome. I'd also recommend a small color TV to display your 40-column screen. I speak from experience here; I have that exact setup.

Drives. To really use GEOS effectively, you need at least two drives. I'm going to go the extra mile and say that you have to have a RAM expansion unit for one of them. I'll talk a bit more about RAM in a moment. For now, let's assume at least a 512K REU along with your 1541 or 1571 real drive.

Many users also add a 1581 drive. Since I've never owned one, I can't say much about it except that it would be nice. Some other users have a hard drive on their systems. If you can afford one, go for it! I can't afford one of those, either, but from everything I've heard and read, the hard drive of choice is one from Creative Micro Designs (CMD). If it comes down to a choice, though, definitely get a RAM device before a hard drive.

RAM devices. As I have often said, I consider a RAM de-

vice to be essential to running GEOS. It is the single most important piece of hardware you can buy. A RAM device is more important than a second disk drive, a hard drive, a fancy monitor, or anything else.

I wouldn't hesitate to say that it's better to run GEOS on a 64 with a RAM device than on a 128 without. And while a 1750 or geoRAM may be considered a minimum level of RAM, I highly recommend getting RAMLink from CMD. Order it packed with as much RAM as you can afford, a battery backup, and (if you feel like splurging) a Real-Time Clock. While you're at it, order a copy of Gateway, even if you don't plan to run your system under it. I'll explain more about that later.

Input devices. A mouse—period.

Software. For a file manager, you'll do fine with the deskTop that comes with GEOS, but I recommend Gateway. I wouldn't want you to be stuck with RAMLink without Gateway to make full use of it. You'll want Gateway if you plan to use DualTop or geoSHELL, too.

By starting with Gateway, you allow DualTop and geoSHELL to access native mode partitions on RAMLink. What that means is that you can create a RAM disk without having to match the size and structure of another drive type, such as a 1571 or 1581. If you stay in Gateway, you can even use subdirectories, which are a very convenient way to organize your files.

You can usually fill your application needs with actual GEOS products: geoPublish, geoFile, and so on. All GEOS software is now available through CMD. There is a multitude of essential public domain or shareware programs, so a subscription to Quantum-Link or GEnie is also a good

idea. This gives you access to those file libraries. If you want suggestions on which public domain files are good, check out some of my columns over the past few years. I'll put a new list of the best GEOS downloads in an upcoming column as well.

There are a number of third-party products which you should consider, although the ones you buy depend on how you plan to use GEOS. If you want great printouts from geoWrite, for example, you need Perfect Print. Perfect Print won't help you a whole lot for desktop publishing with geoPublish, though.

No matter how you spend your GEOS time, you'll want geoWizard and the other utilities on the Collette Utilities Disk. All of these programs are available through CMD, which is now the source for all the official GEOS products.

Printer. Get an Epson-compatible, and make it a 24-pin. Oh, I know that you can make do perfectly well with a 9-pin printer, but the better printouts with the 24-pin model make it worth the extra dollars. Remember, a lot of your work in GEOS will be geared toward some kind of printed document. I like the Epson LQ series myself, but I've heard a lot of great things about the Panasonic line as well.

Extras. Do you have any money left? Besides the Real-Time Clock I mentioned for your RAMLink, there are plenty of other ways to spend your GEOS dollars. If you're a graphics fan, you'll want to purchase geoCanvas (CMD) and Dave Ferguson's Dweezil Disks (Quincy Softworks, 9479 East Whitmore Avenue, Hughson, California 95326-9745). The games and utilities on the *RUN* magazine GEOS Companion and Power Pack disks are wonderful, and CMD now sells them as well. □

An ultimate GEOS system is great if you can afford it. Here's what you really need.

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MACHINE LANGUAGE

Jim Butterfield

BRANCHES AND JUMPS

A machine language program executes instructions sequentially. Three ways to change this flow are branches, jumps, and subroutine calls.

Branch instructions have a limited reach, jumping forward or backward up to 128 bytes or so. Branch instructions are conditional, which means the branch takes place only when certain conditions are met.

The jump instruction (JMP) can take you to any address in memory (absolute addressing). It's unconditional; the jump always takes you there.

The jump-subroutine instruction (JSR) also uses absolute addressing. A link address will be left on the stack. When the subroutine has done its job, it can come back with a Return (RTS) command.

The eight branch instructions can be classified by what they test. Branch instructions test flags left when previous instructions were executed. There are four flags.

The Z (zero) flag is affected whenever a register (A, X, or Y) has been modified or after comparisons have been made. If a register ends with 0 as its contents, the Z flag switches on; with something other than 0, the Z flag is cleared. After a comparison, the Z flag is turned on if an equality is found. Branch-equal (BEQ) will make the branch if the Z flag is on. Branch-not-equal (BNE) will branch if the Z flag is off.

The N (negative) flag is affected whenever a register (A, X, or Y) has been modified or after comparisons have been made. The N flag will match the highest bit of the modified register. After a comparison instruction, the N flag is affected, but its meaning is complex. So it is seldom used in

this way. Branch-minus (BMI) will make the branch if the Z flag is found to be on. Branch-plus (BPL) will branch if the Z flag is found to be off. Keep in mind that the highest bit of a byte is sometimes thought of as the sign bit. When the bit is on, the byte is negative.

The C (carry) flag is affected by arithmetic or shift instructions and after comparisons. The arithmetic and shift operations use this flag in its usual carry sense, meaning a bit has flowed out of the byte that's being manipulated. After a comparison instruction, the C flag is turned on if the register contains an equal or greater unsigned value. Branch-carry-set (BCS) branches if the C flag is on. Branch-carry-clear (BCC) branches if it is off.

The V (overflow) flag is affected by arithmetic instructions, add-with-carry (ADC), and subtract (SBC). Branch-overflow-set (BVS) and branch-overflow-clear (BVC) are the related instructions.

Let's write a short program to print X a number of times on a screen row. BASIC will poke the desired number into address \$2100 (decimal 8448), and then put it into the X register, our counter. Here's the code, starting at address hexadecimal 2000.

2000 LDX \$2100

The load X instruction changes a register; so the Z and N flags will be affected. We don't care, however, so we'll ignore the flags for the moment. Next, load A with hexadecimal 58, the ASCII value for X.

2003 LDA #\$58

Again, Z and N are affected. Z will be off (nonzero value), and flag N will be off (high bit of A is off). Instructions BEQ and BMI wouldn't branch if we used them at this point.

BNE or BPL would branch, but we don't use them yet.

2005 CPX #\$00

2007 BEQ \$200F

The compare X instruction will set up the Z flag. If the value in X is equal to 0, BEQ will cause the program to hop ahead. Why? Because no X's are to be printed.

The code for the above BEQ instruction will be two bytes \$F0 and 06. F0 means BEQ, and 06 means skip six bytes if the branch is taken.

2009 JSR \$FFD2

200C DEX

200D BNE \$2009

Our loop jumps to the print subroutine at \$FFD2 and decrements the X value by 1. The DEX instruction modifies the Z flag according to whether the result in X is 0 or not. If not, BNE takes us back around the loop. If X is 0, we've finished printing this line.

200F LDA #\$0D

2011 JMP \$FFD2

We end the line of X's by printing a Return character (\$0D). This time we jump (JMP) to the printing subroutine, rather than using JSR. When printing ends, we return to whatever called our ML program—in this case, it was BASIC.

Here's the code in BASIC. It draws a graph of $Y=X^2$.

```
100 DATA 174,0,33,169,88,
    224,0,240,6,32,210
110 DATA 255,202,208,250
120 DATA 169,13,76,210,255
200 FOR J=8192 TO 8211
210 READ X:T=T+X
220 POKE J,X
230 NEXT J
240 IF T<>2814 THEN STOP
300 FOR J=-6 TO 6
310 POKE 8448,J*J
320 SYS 8192
330 NEXT J
```

Three ways to change the flow of a machine language program are through branches, jumps, and subroutine calls.

PROGRAMS

CHAIN REACTION

By Graham Fyffe

You're in charge of a nuclear reactor, and it's malfunctioning. It's up to you to prevent a meltdown. The radioactive atoms keep spewing out of the reactor, but you can contain them in a lead-lined vessel. But watch out! If the vessel overflows, it'll destroy the reactor!

Getting Started

Chain Reaction is made up of four programs: a BASIC boot program or loader, a machine language program, graphics, and the main BASIC program. To help avoid typing errors, use The Automatic Proofreader to enter the BASIC programs; see "Typing Aids" elsewhere in this section. Be sure to save the programs on the same disk and with the proper filenames because the boot program loads those programs automatically. Also, you may want to use BASIC abbreviations for some of the commands when you enter lines 80, 140, and 150 of the main program. These lines fill two entire screen lines.

CHAIN.ML and CHAIN.CHARS are written in machine language. To enter these programs, use MLX, COMPUTE's machine language entry program; again, see "Typing Aids." Enter the following addresses for CHAIN.ML when MLX prompts.

Starting address: C000

Ending address: C1FF

Enter the following addresses for CHAIN.CHARS when MLX prompts.

Starting address: 8200

Ending address: 84F7

Be sure to save these programs before you exit MLX.

Playing the Game

To start Chain Reaction, load and run CHAIN.BOOT. After a few seconds, the screen should turn black, and then you should see the message *LOADING CHAIN REACTION*. You'll then see the title screen, the level of gameplay, and a bunch of colorful dancing atoms.

To change the level of gameplay,

press f1. To start the game, press Return. To pause the game at any time except during a reaction, press the up-arrow key that's next to the Restore key. Press this key again to resume play. To quit during a game, hold down the Shift key and press Clr/Home.

At the start of the game, a colored atom will wobble out of the reactor onto a bar that extends over the containment vessel. You have a limited time to move the atom left or right with the joystick before the atom drops into the vessel. You can press the joystick button to make the atom drop ahead of time. Any atoms touching atoms of their own color will explode, making additional room in the vessel. If an atom explodes beneath another, the top atom will drop down. If you plan out a careful strategy, you may get dozens of atoms to explode with a single drop. The object of the game is to prevent the vessel from overflowing.

The Levels

On the practice level, there are no obstacles in your way. On the easy level, a green accelerator beam streaks across the vessel after each drop. If it comes in contact with anything, it will change whatever it hits into an atom of a random color.

On the moderate level, a blue block appears in the vessel after each drop, but the green beam will sometimes clear them out of the way. The beam never clears out the second row from the top, so it can fill up with blocks.

On the hard level, there are no green beams, only blue blocks. The vessel fills up fast, but you'll always have the top row to work with because blocks never land on it.

Scoring

When an atom explodes, your score increases by the number of atoms in a row that have exploded so far. Scoring also depends on the level of play. You get no points for practice rounds. Easy rounds earn you regular points. Moderate rounds earn you three times as many points as easy, and hard rounds earn you five times as many points as easy rounds.

The game keeps track of your score, how many atoms have exploded,

and the high score of the day. These scores are kept to the right of the containment vessel.

CHAIN.BOOT

```
PK 5 REM COPYRIGHT 1993 - COMP
UTE PUBLICATIONS INTL LTD
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RX 10 B=B+1
EK 20 IFB=1THENFORT=0TO7:POKE3
2768+T,0
DX 30 IFB=1THENLOAD"CHAIN.CHAR
S",8,1
DR 40 IFB=2THENLOAD"CHAIN.ML",
8,1
JX 50 POKE53281,0:POKE53280,15
:PRINT"{BLK}{CLR}";
DD 60 POKE52,128:POKE56,128:CL
R
KF 70 POKE56576,(PEEK(56576) A
ND 252) OR 1
DP 80 POKE53272,32
XC 90 POKE648,136
PE 100 POKE56334,PEEK(56334) A
ND 254
RB 110 POKE1,PEEK(1) AND 251
QS 120 FORT=8TO512:POKE32768+T
,PEEK(53248+T):NEXTT
DS 130 POKE1,PEEK(1) OR 4
BR 140 POKE56334,PEEK(56334) O
R 1
AM 150 POKE53270,PEEK(53270)OR
16
DM 160 PRINT"{CLR}{WHT}LOADING
{CYN}CHAIN REACTION"
KB 170 A$=CHR$(34):PRINT"{BLK}
NEW"
KX 180 A$=CHR$(34):PRINT"
{DOWN}LOAD";A$;"CHAIN.B
AS";A$;"",8"
PS 190 PRINT"{4 DOWN}RUN{7 UP}
";:POKE198,0
EJ 200 FORT=631TO633:POKET,13:
NEXTT
FH 210 POKE198,3
```

CHAIN.BAS

```
PK 5 REM COPYRIGHT 1993 - COMP
UTE PUBLICATIONS INTL LTD
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JM 10 REM SETUP
QR 20 POKE53281,0:POKE53280,0:
POKE53282,11:POKE53283,1
:GETAS:GETAS
XP 30 DIMAG(8,9):PRINTCHR$(8)
QB 40 S=54272:FORT=STOS+24:POK
ET,,:NEXTT:POKES+5,9
ES 50 ZA$="CCCCCCCCCCCC":ZB$=
"{HOME}{5 DOWN}":ZC$="
{DOWN}{5 LEFT}":ZD$="
{6 RIGHT}":ZE$="
{7 SPACES}"
GA 60 ZF$="000000":ZG$="
{5 SPACES}{4}A*****
****A":AT$="NO{DOWN}
{2 LEFT}PO{OFF}{WHT}{UP}
```

PROGRAMS

```

":BL$="{7}{N}{Q}{DOWN}
{2 LEFT}{D}{Z}{UP}"
GE 70 CO$(1)="{2}":CO$(2)="{3}
":CO$(3)="{4}":CO$(4)="{
5}":CO$(5)="{6}":CO$(6)
="{8}"
EP 80 SC=0:AT=0:FORT=1TO7:FORI
=1TO8:AG(T,I)=.:NEXTI:NE
XTT:DI=1:DS=0:BA$="{OFF}
{2 SPACES}{DOWN}{2 LEFT}
{2 SPACES}{UP}"
KK 90 DI$(1)="PRACTICE":DI$(2)
="EASY":DI$(3)="MODERATE
":DI$(4)="HARD"
DH 100 R=0:V=0:C=2:DES="N":XPS
="{RVS}{4}LM{DOWN}
{2 LEFT}NO"
QJ 110 REM DRAW SCREEN
KM 120 PRINT{CLR}{4}{OFF}
{3 DOWN}"SPC(22)"IJK"Z
C$"FLMMH"ZC$G{3}NO{4}
H"ZC$G{3}PQ{4}H"
GD 130 PRINTZGSZAS"CCCCC";
XJ 140 FORT=1TO16:PRINT"
{5 SPACES}B"SPC(14)"B":
NEXTT:PRINT"{5 SPACES}D
"ZAS"E{HOME}"SPC(30)"
{4}{OFF}RTV";
KS 150 PRINT"XZ"ZC$SUWY+"ZC$
{2 LEFT}{-}{*}
{SHIFT-SPACE}{K}{I}{T}
{E}{DOWN}"ZC$"{2 LEFT}
{E}E{DOWN}{G}{+}{M}
{5 DOWN}":PRINTSPC(22)"
{F}{C}{X}{V}{2 DOWN}";
KQ 160 PRINT{DOWN}{4 LEFT}{E}
{R}{U}{H}{J}{2 DOWN}"ZC
$"{L}{Y}{U}{O}{E}"ZB$
{7 DOWN}ZDS;:FORT=1TO6
:FORI=1TO7
XS 170 PRINTCOS(INT(RND(0)*6)+
1)AT$;:NEXTI:PRINT:PRIN
TZDS"{DOWN}";:NEXTT
GE 180 REM START
EQ 190 POKES3247,0:SYS49323:PO
KES+24,15
BC 200 PRINTZB$"{6 DOWN}"SPC(2
8)"{WHT}"ZF$"{2 DOWN}"Z
C$"{LEFT}"ZF$"{2 DOWN}"
ZC$"{LEFT}"ZF$:GOSUB280
GJ 210 PRINTZB$"{3 DOWN}"ZD$
{CYN}F1-{WHT}GAMEPLAY:"
:PRINTZDSZESZES;"{UP}"
RF 220 PRINTZD$SPC(7-LEN(DI$(D
I))/2)DI$(DI):IFDI=1THE
NDS=0
MS 230 PRINTZD$"{CYN} PRESS RE
TURN":PRINTZD$
{3 SPACES}TO START"
XE 240 IFAS$=""THENGOSUB960:GOT
O240
EG 250 IFAS$="{F1}"THENDI=DI+1:
IFDI=5THENDI=1
CB 260 IFAS$=CHR$(13)THEN310
GC 270 AS$=""DS=2*DI-3:GOTO210
EE 280 REM PRINT SCORE
FP 290 PRINTZB$"{2 DOWN}":JJ=H
S:GOSUB300:JJ=SC*DS:GOS
UB300:JJ=AT:GOSUB300:RE
TURN
HB 300 PRINT"{2 DOWN}{WHT}"SPC
(35-LEN(STRS(JJ)))MID$(
STRS(JJ),2,10):RETURN
FG 310 REM CLEAR AREA
KA 320 PRINTZB$"{3 DOWN}";:FOR
T=1TO16:PRINTZDS"{OFF}"
ZESZES:NEXTT
FS 330 REM NEW ATOM
XD 340 PRINTZB$"{2 DOWN}"ZGS:C
O=C:DS="N"
QH 350 FORT=22TO18STEP-1:PRINT
ZB$SPC(T)CO$(CO)AT$;:IF
T=19THENPRINTG{DOWN}
{LEFT}G":GOTO370
MK 360 PRINT{DOWN}{LEFT}"G
OSUB960:V=0:R=7:TM=10:R
E=0
HP 370 GOSUB960:NEXTT:C=INT(RN
D(0)*6)+1:PRINTZB$SPC(2
3)CO$(C)"PQ{DOWN}
{2 LEFT}{2 SPACES}":GOS
UB960
MP 380 PRINTZB$SPC(23)CO$(C);A
T$:GOSUB960
AM 390 REM INPUT FROM JOYSTICK
KX 400 JV=PEEK(56320):FR=JVAND
16:JV=15-(JVAND15):A=R:
V=0:B=V
KD 410 IFJV=4THENR=R-1:IFR=0TH
ENR=1
HK 420 IFJV=4THEN460
HR 430 IFJV=8THENR=R+1:IFR=8TH
ENR=7
DR 440 IFJV=8THEN460
QR 450 IFFR<16THEN490
PH 460 IFA<>RTHENGOSUB1090
AG 470 TM=TM-1:IFTM=0THEN490
PX 480 GOSUB1120:GOSUB960:GOTO
400
GX 490 REM DROP ATOM
ER 500 PRINTZB$"{2 DOWN}
{5 SPACES}{4}A"ZESZES
HS 510 A=R:B=V:V=V+1:IFAG(R,V)
<>0ORV=9THENV=V-1:GOTO5
40
SK 520 GOSUB1090:GOSUB1120:GOS
UB960
KE 530 GOTO510
XK 540 AG(R,V)=CO:IFV=0THEN101
0
AE 550 REM REACTION
BA 560 FS="N":FORT=1TO8:FORI=1
TO7:IFAG(I,T)=0ORAG(I,T)
)=10THEN610
HB 570 IFAG(I,T+1)=0ANDT<8THEN
AG(I,T+1)=AG(I,T):AG(I,
T)=0:FS="1":GOSUB630:GO
TO610
QR 580 IFAG(I,T+1)=AG(I,T)ANDT
<8THENA=I:B=T+1:FS="2":
GOSUB890
PG 590 IFAG(I-1,T)=AG(I,T)ANDI
>1THENA=I-1:B=T:FS="2":
GOSUB890
QK 600 IFFS="2"THENA=I:B=T:FS=
"1":GOSUB890:FS="1"
BG 610 NEXTI:NEXTT:IFFS="N"THE
N660
QQ 620 GOTO550
FJ 630 REM PULL ATOM DOWN
HF 640 PRINTZB$"{DOWN}"SPC(I*2
+4);:FORJ=1TOT:PRINT"
{2 DOWN}";:NEXTJ:PRINTB
AS:PRINTZB$"{DOWN}";
GJ 650 PRINTSPC(I*2+4);:FORJ=1
TOT+1:PRINT"{2 DOWN}";:
NEXTJ:PRINTCOS(AG(I,T+1
))AT$:RETURN
JJ 660 REM DIFFICULTY CHECK
QH 670 IFDI=2ANDDS="N"THEN750
BB 680 IFDI=3ANDDS="N"THEN750
QA 690 IFDI>2THEN710
BS 700 GOTO330
FR 710 REM DRAW BLOCK
HD 720 I=INT(RND(0)*7)+1:T=INT
(RND(0)*7)+2:AG(I,T)=10
:PRINTZB$"{DOWN}"SPC(4+
I*2);
RB 730 FORZ=1TOT:PRINT"
{2 DOWN}";:NEXTZ:PRINTB
LS
CM 740 FORZ=10TO1STEP-.5:POKES
+4,32:POKES+1,Z:POKES,1
0:POKES+4,33:NEXTZ:GOTO
330
FA 750 REM DRAW ZAPPER
SJ 760 A=INT(RND(0)*8)+1:IFA=2
THEN760
FD 770 IFDI=2THENA=INT(RND(0)*
5)+4
DE 780 PRINTZB$"{DOWN}"SPC(6);
:FORT=1TOA:PRINT"
{2 DOWN}";:NEXTT:FORT=1
TOT:PRINT"{6}{S}{P}";
HG 790 FORZ=1TO100STEP50:POKES
+4,33:POKES+1,Z:POKES,1
0:POKES+4,32:NEXTZ
RF 800 IFAG(T,A)>0THENAG(T,A)
=INT(RND(0)*6)+1
DX 810 NEXTT:DS="Y":GOSUB820:G
OTO550
KP 820 REM REDRAW AREA
BD 830 PRINTZB$"{3 DOWN}"SPC(6
);:FORT=1TO8:FORI=1TO7
JR 840 IFAG(I,T)=0THENPRINTBAS
;:GOTO870
GJ 850 IFAG(I,T)=10THENPRINTBL
S;:GOTO870
DH 860 PRINTCOS(AG(I,T))AT$;
XS 870 NEXTI:PRINT:PRINTSPC(6)
"{DOWN}";:NEXTT:RETURN
RQ 880 POKES+4,128:POKES+1,10:
POKES,10:POKES+4,129
XB 890 IFA=I AND B=T AND AG(I,
T+1)=AG(I,T)THENRETURN
QF 900 IFA=I AND B=T AND AG(I+
1,T)=AG(I,T)THENRETURN
JM 910 REM DRAW EXPLOSION
MB 920 PRINTZB$"{DOWN}";:FORZ=
1TOB:PRINT"{2 DOWN}";:N
EXTZ:PRINTSPC(4+A*2)XPS

```

DG 930 FORZ=10T020:POKES+4,33: POKES+1,Z:POKES,10:POKE S+4,32:NEXTZ
 QK 940 PRINTZBS"{DOWN}";:FORZ= 1TOB:PRINT"{2 DOWN}";:N EXTZ:PRINTSPC(4+A*2)BAS
 EQ 950 AG(A,B)=0:RE=RE+1:AT=AT +1:SC=SC+RE:GOSUB280:RE TURN
 JD 960 GETBS:IFBS=CHRS(147)THE N1140
 FS 970 IFBS<>"<"THENAS=B\$:RETRN
 SP 980 PRINT"{HOME}{WHT}{OFF}" SPC(10)"PAUSED"
 FF 990 GETBS:IFBS<>"<"THENPRINT "{HOME}{WHT}{OFF}"SPC(1 0)ZES:RETURN
 BA 1000 GOTO990
 RB 1010 REM NUCLEAR MELTDOWN
 SG 1020 PRINTZBS"{3 DOWN}"SPC(6);:FORT=1TO8:FORI=1TO 7:PRINTXPS"{UP}";
 FC 1030 POKES+4,129:POKES+1,T* 10+I*10:POKES,50:POKES +4,128
 JG 1040 NEXTI:PRINT:PRINTSPC(6)"{DOWN}";:NEXTT
 XS 1050 FORT=1TO50:POKES3281,0 :POKES3281,1
 KF 1060 POKES+4,129:POKES+1,T: POKES,50:POKES+4,128:N EXT:POKES3281,0:POKES +24,0
 MC 1070 FORT=1TO1000:NEXTT:IFS C*DS>HSTHENHS=SC*DS
 HE 1080 GOTO1140
 MJ 1090 REM REDRAW ATOM
 AC 1100 PRINT"{HOME}{4 DOWN}": IFB=0THENPRINTSPC(4+A* 2)BAS:RETURN
 GX 1110 PRINT"{DOWN}";:FORT=1T OB:PRINT"{2 DOWN}";:NE XTT:PRINTSPC(4+A*2)BAS :RETURN
 DK 1120 PRINT"{HOME}{4 DOWN}": IFV=0THENPRINTSPC(4+R* 2)COS(CO)ATS:RETURN
 KA 1130 PRINT"{DOWN}";:FORT=1T OV:PRINT"{2 DOWN}";:NE XTT:PRINTSPC(4+R*2)COS (CO)ATS:RETURN
 CQ 1140 REM RESET
 BG 1150 POKE36866,HS/256:POKE3 6867,HS-INT(HS/256)*25 6:POKES+24,0:CLR
 AG 1160 HS=PEEK(36866)*256+PEE K(36867):S=54272:GOTO2 0

C038:4C 2F C0 60 AE FF CF A9 88
 C040:20 8D 04 D4 BD C8 C0 8D 23
 C048:01 D4 BD 08 C1 4C A2 C0 FC
 C050:02 21 8D 04 D4 60 20 3C B1
 C058:C0 E8 E0 40 D0 02 A2 00 68
 C060:8E FF CF AE FE CF 18 CA 40
 C068:F0 0F CA F0 13 CA F0 17 4B
 C070:20 0F C0 A2 01 8E FE CF 18
 C078:60 20 00 C0 EE FE CF 60 B1
 C080:20 0F C0 EE FE CF 60 20 F4
 C088:1E C0 EE FE CF 60 18 CE 16
 C090:FD CF F0 01 4C 31 EA A9 D9
 C098:0A 8D FD CF 20 56 C0 4C 67
 C0A0:31 EA 8D 00 D4 A9 21 8D 44
 C0A8:04 D4 60 58 A9 8E 8D 14 A9
 C0B0:03 58 A9 C0 8D 15 03 58 2A
 C0B8:A9 00 8D FF CF A9 01 8D 75
 C0C0:FE CF A9 05 8D FD CF 60 9F
 C0C8:19 1C 19 19 19 1C 20 19 25
 C0D0:1C 13 13 13 15 18 19 18 0C
 C0D8:19 1C 19 19 19 1C 20 19 35
 C0E0:1C 13 13 13 15 18 19 00 04
 C0E8:1C 1C 20 19 1C 1C 20 19 BF
 C0F0:1C 13 13 13 15 18 19 00 14
 C0F8:1C 1C 20 19 1C 1C 20 19 CF
 C100:1C 13 13 13 15 18 19 00 25
 C108:B1 D6 B1 B1 B1 D6 5E B1 C2
 C110:D6 3F 3F 3F 9A 3F B1 3F 1F
 C118:B1 D6 B1 B1 B1 D6 5E B1 02
 C120:D6 3F 3F 3F 9A 3F B1 00 EF
 C128:D6 D6 5E B1 D6 D6 5E B1 34
 C130:D6 3F 3F 3F 9A 3F B1 00 FF
 C138:D6 D6 5E B1 D6 D6 5E B1 44
 C140:D6 D6 3F 3F 9A 3F B1 00 10
 C148:0D 0D 0D 0D 0D 0D 0D 0D CB
 C150:0D 0D 0D 0D 0D 0D 0D 0D D3
 C158:0D 0D 0D 0D 0D 0D 0D 0D DB
 C160:0D 0D 0D 0D 0D 0D 0D 0D E3
 C168:0D 0D 0D 0D 0D 0D 0D 0D EB
 C170:0D 0D 0D 0D 0D 0D 0D 0D F3
 C178:0D 0D 0D 0D 0D 0D 0D 0D FB
 C180:0D 0D 0D 0D 0D 0D 0D 0D 04
 C188:0D 0D 0D 0D 0D 0D 0D 0D 0C
 C190:0D 0D 0D 0D 0D 0D 0D 0D 14
 C198:0D 0D 0D 0D 0D 0D 0D 0D 1C
 C1A0:0D 0D 0D 0D 0D 0D 0D 0D 24
 C1A8:0D 0D 0D 0D 0D 0D 0D 0D 2C
 C1B0:0D 0D 0D 0D 0D 0D 0D 0D 34
 C1B8:0D 0D 0D 0D 0D 0D 0D 0D 3C
 C1C0:0D 0D 0D 0D 0D 0D 0D 0D 44
 C1C8:0D 0D 0D 0D 0D 0D 0D 0D 4C
 C1D0:0D 0D 0D 0D 0D 0D 0D 0D 54
 C1D8:0D 0D 0D 0D 0D 0D 0D 0D 5C
 C1E0:0D 0D 0D 0D 0D 0D 0D 0D 64
 C1E8:0D 0D 0D 0D 0D 0D 0D 0D 6C
 C1F0:0D 0D 0D 0D 0D 0D 0D 0D 74
 C1F8:0D 0D 00 00 00 00 00 00 46

CHAIN.CHARS

8200:00 55 FF AA AA FF 55 00 05
 8208:AA BD BD BD BD BD BD BD 83
 8210:BD BD BD BD BD BD BD 15
 8218:AA FF FF FF FF FF FF 55 C7
 8220:BE BF BF BF BF BF BF 95 7A
 8228:BD FD FD FD FD FD FD 55 64
 8230:00 00 14 69 56 41 40 DD
 8238:40 40 40 40 40 40 40 3D
 8240:D0 D0 D0 D0 D0 D0 D0 45
 8248:05 1F 1E 1E 7B 7B 7B 7B 79
 8250:55 FF AF FF FF FF FF FF F5

8258:00 40 40 40 D0 D0 D0 D0 B5
 8260:7B 7B 7B 7B 7F BF 7F 15 38
 8268:FF FF FF FF FF FF FF 55 C2
 8270:00 00 00 00 01 07 1F 3F 17
 8278:00 00 00 00 40 D0 F4 FC A9
 8280:73 F3 FF FF FF FF 7F 1F 5A
 8288:CD CF FF FF FF FF FD F4 59
 8290:55 68 D0 80 80 80 80 00 04
 8298:80 HH 80 80 80 D0 68 55 83
 82A0:55 C3 82 82 82 82 AA 82 AF
 82A8:82 82 82 82 82 C3 55 03
 82B0:55 0F 1A 35 20 20 2A 20 B0
 82B8:20 20 20 20 20 20 30 55 13
 82C0:55 0C 48 C8 88 88 88 88 09
 82C8:88 88 88 88 88 88 88 55 23
 82D0:55 C3 82 92 92 B2 B6 B6 6E
 82D8:9E 9E 8E 8E 8E 8E C3 55 2A
 82E0:3D 33 33 7F 7D C7 C3 41 83
 82E8:07 0D 0C 1F 1C 34 3F 15 6D
 82F0:C7 0D 0C 1F 1C 34 34 10 BA
 82F8:41 C3 C7 C7 CD CD C7 41 7B
 8300:F3 40 00 01 01 03 C3 41 FD
 8308:FC D0 D0 C1 C1 43 0F 05 36
 8310:FD 77 D3 C7 CD 4C C7 41 5B
 8318:F0 5C 0C 1D 35 33 D3 41 61
 8320:73 73 F7 DF DD 4D 0C 04 FA
 8328:00 54 C0 80 88 CC 54 00 06
 8330:00 40 C0 80 88 C0 54 00 17
 8338:00 54 C0 A0 80 C0 40 00 FD
 8340:0C 1C 3D 73 03 FD 00 00 C9
 8348:00 00 33 73 37 1D 4C F4 A8
 8350:15 7A 7B 6F 6F 6F 6F 6F 6E
 8358:54 AD FD FD FD FD FD 7F 76
 8360:6F 6F 7F 6F 7F 7F 15 EF
 8368:FD 6F FD FD FD FD 54 C5
 8370:1C 78 1D 37 22 91 D0 40 F3
 8378:00 00 00 19 F7 63 11 00 80
 8380:40 D0 90 C0 50 B0 D0 40 21
 8388:00 00 1F 34 3C 1C F4 00 F2
 8390:00 00 3C 70 D1 C3 F3 00 AB
 8398:00 00 74 DC DD 77 D3 00 70
 83A0:00 00 F4 DC DD 73 33 00 37
 83A8:00 00 FC D0 F0 40 F0 00 C6
 83B0:00 00 3C 7C FC CC CC 00 BB
 83B8:00 00 FC 70 71 D3 C3 00 C8
 83C0:00 00 74 DC DD 77 D3 00 98
 83C8:00 00 CC DC FC 4C 0F 00 6E
 83D0:00 00 7C D0 F0 70 D0 00 5F
 83D8:00 00 33 33 7D CC CC 00 32
 83E0:00 00 3D 1C 34 30 F4 00 9D
 83E8:00 00 3C 70 D0 CC C4 00 22
 83F0:00 00 33 33 7D CC CC 00 4A
 83F8:00 00 00 00 00 00 00 00 FF
 8400:00 00 00 01 03 07 0C 1C 81
 8408:00 00 50 F4 FD FD FF CF 22
 8410:1F 3F 3F 1F 1F 0F 07 01 96
 8418:CF FF FF FF FF FF FD F4 F9
 8420:00 00 00 00 01 07 1F 3F CA
 8428:00 00 00 00 40 D0 F4 FC 5D
 8430:73 F3 FF FF FF FF 7F 1F 0E
 8438:CD CF FF FF FF FF FD F4 0D
 8440:00 00 05 1F 7F 7F FF F3 C9
 8448:00 00 00 40 C0 D0 30 34 33
 8450:F3 FF FF FF FF FF 7F 1F 71
 8458:F4 FC FC F4 F4 F0 D0 40 57
 8460:00 00 00 00 00 01 01 7A E9
 8468:40 C0 C0 80 80 80 90 90 99
 8470:06 06 02 02 02 03 03 01 81
 8478:AD 40 40 00 00 00 00 00 70
 8480:0D 0D 0D 0D 0D 0D 0D 89

CHAIN.ML

C000:A0 E0 B9 20 83 99 90 81 68
 C008:C8 F0 03 4C 02 C0 60 A0 C3
 C010:E0 B9 40 83 99 90 81 C8 8B
 C018:F0 03 4C 11 C0 60 A0 E0 17
 C020:B9 60 83 99 90 81 C8 F0 AD
 C028:03 4C 20 C0 60 A0 E0 B9 4F
 C030:80 83 99 90 81 C8 F0 03 23

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8488:0D 0D 0D 0D 0D 0D 0D 0D 91
8490:0D 0D 0D 0D 0D 0D 0D 0D 99
8498:0D 0D 0D 0D 0D 0D 0D 0D A1
84A0:0D 0D 0D 0D 0D 0D 0D 0D A9
84A8:0D 0D 0D 0D 0D 0D 0D 0D B1
84B0:0D 0D 0D 0D 0D 0D 0D 0D B9
84B8:0D 0D 0D 0D 0D 0D 0D 0D C1
84C0:0D 0D 0D 0D 0D 0D 0D 0D C9
84C8:0D 0D 0D 0D 0D 0D 0D 0D D1
84D0:0D 0D 0D 0D 0D 0D 0D 0D D9
84D8:0D 0D 0D 0D 0D 0D 0D 0D E1
84E0:0D 0D 0D 0D 0D 0D 0D 0D E9
84E8:0D 0D 0D 0D 0D 0D 0D 0D F1
84F0:0D 0D 0D 0D 0D 0D 0D 0D F9
```

Graham Fyffe, 15, has been programming in BASIC for eight years. He enjoys comics and graphics and likes drawing and painting. He lives in Fredericton, New Brunswick, Canada.

CUSTOM CHARACTER SCREEN DESIGNER

By Daniel English

Advanced programmers commonly work with custom characters on the 64. With a tool such as Ultrafont + (July 1984 and September 1986 issues and on The 1992 Best of Gazette Utilities Disk), you can easily transform characters into your own custom graphics. Using these graphics in your own programs was not so easy—until now. Custom Character Screen Designer allows you to create multiple character screens easily and save them on disk for use in your own programs. A BASIC display program is included in the package. You may want to keep CCSD on a disk with Ultrafont +.

Getting Started

The CCSD package consists of three programs. The main program is the screen editor. When MLX prompts, respond with the following addresses.

Starting address: C000

Ending address: C0FF

Be sure to save a copy of the program before exiting MLX.

The next two programs are used for displaying your screens from within your own BASIC programs. The main CCSD program does not require these two display files, however.

To help avoid typing errors, enter Display.BASIC with The Automatic Proofreader. See "Typing Aids" elsewhere in

this section. Remember to save the program before you attempt to run it.

Enter DISPLAY.ML with MLX, our machine language entry program. Again, see "Typing Aids." When MLX prompts, respond with the following addresses.

Starting address: CF00

Ending address: CF77

Be sure to save these two display programs on the same disk for later use.

Functions

To begin, load CCSD with the ,8,1 extension and type NEW and then SYS 49152. A menu screen will appear. The upper portion of the screen is the menu of commands, and the lower portion displays your character set. You may use the default ROM character set if you do not want to create your own. To load a character set, press F. The character set will always load into 12288 (\$3000 hex). If you wish to save your character set at this location for use in your own programs, press N.

When a character set is loaded, you are ready to choose colors. If your character set was created in multicolor mode, press M. Pressing keys 1 through 4 will change the four colors. These keys correspond to the same color keys used in Ultrafont +. If your character set is not in multicolor mode, only keys 1 and 4 will apply.

The current color you are changing will be indicated by the arrow below the color palette. Notice that when you're in multicolor mode, color 4 must be set on the right side of the palette. If you want color memory stored with your screen data, press C.

Next, you must choose an address for your screen. The default address is 32768. To change this, press A. You will be prompted to enter a new address. You can have up to 24 screens in memory (12 with color) at one time. Remember that each screen uses 1000 bytes (2000 if color is saved). If you stored one screen at 32768, then the next one could start at 33768 (35768 if color is saved).

Copying Characters

The lower section of the screen contains your character set. A flashing rec-

tangle encloses the character(s) you have selected to use while drawing your screen. Position the cursor with your joystick in port 2, and use the cursor keys to change the size of the cursor into a window that can copy up to six characters at a time. Press the button to choose the character(s) you wish to copy onto your screen. Press f7 to switch between the editor and drawing screen.

In the drawing screen, the window will appear in the upper left corner of the screen. Use the cursor keys or joystick to move the window. Press the fire button to copy the characters onto the screen. CCSD lets you type data onto the screen also.

All colors and screen functions are available to you while you're in the editor. For example, pressing Shift-Clr/Home will clear the screen, and Ctrl-2 will turn the character color to white. Notice the window doesn't advance automatically when you type. The cursor keys are the easiest way to move the window if you wish to type in text.

A copy feature is built into the drawing screen mode. To copy characters already on the screen, simply move the window over the character(s) you wish to copy and press f1. Now when you draw with the joystick, the copied character(s) will appear. This eliminates frequent screen swapping.

To store the screen and return to the Editor menu, press f7. If you do not want to store the changes, press f8. Pressing f8 can be used as an undo feature.

Screens on Disk

When your screen design is complete, press S from the Editor menu to save it. You'll be asked for a filename, and your screen will be saved to disk.

If you want to load a previously saved screen, press L. A screen is always loaded into the address specified at the top of the screen, regardless of its saved address.

When your character set and screen(s) have been saved to disk, you are ready to use them in your own program. The BASIC display program was designed to be a subroutine. First, have your BASIC program load the DISPLAY.ML file, your saved screen(s), and your saved character

set. Next, alter the values in the BASIC display program to match those chosen in CCSD. Remember to change the value of AD in line 63050 to the address of the screen you wish to display.

Machine language programmers will have no problem using CCSD screens. You may use the code in the DISPLAY.ML file or use your own screen copier routine.

CCSD can create many commercial quality effects quickly and efficiently. From a BASIC menu to a complex game background, CCSD will make the task enjoyable.

CCSD

```

C000:4C 84 C1 FF 00 00 81 00 04
C008:00 81 00 00 81 00 00 81 77
C010:00 00 81 00 00 81 00 00 C7
C018:FF 00 00 00 00 00 00 00 99
C020:00 00 00 00 00 00 00 00 A1
C028:00 00 00 00 00 00 00 00 A9
C030:00 00 00 00 00 00 00 00 B1
C038:00 00 00 00 00 00 00 00 B9
C040:00 00 84 FF FF 00 80 01 54
C048:00 80 01 00 80 01 00 80 92
C050:01 00 80 01 00 80 01 00 76
C058:FF FF 00 00 00 00 00 00 D9
C060:00 00 00 00 00 00 00 00 E1
C068:00 00 00 00 00 00 00 00 E9
C070:00 00 00 00 00 00 00 00 F1
C078:00 00 00 00 00 00 00 00 F9
C080:00 00 84 FF FF 80 00 93
C088:01 80 00 01 80 00 01 80 41
C090:00 01 80 00 01 80 00 01 6D
C098:FF FF FF 00 00 00 00 00 1A
C0A0:00 00 00 00 00 00 00 00 22
C0A8:00 00 00 00 00 00 00 00 2A
C0B0:00 00 00 00 00 00 00 00 32
C0B8:00 00 00 00 00 00 00 00 3A
C0C0:00 00 84 FF 00 00 81 00 D5
C0C8:00 81 00 00 81 00 00 81 38
C0D0:00 00 81 00 00 81 00 00 88
C0D8:81 00 00 81 00 00 81 00 36
C0E0:00 81 00 00 81 00 00 81 50
C0E8:00 00 81 00 00 81 00 00 A0
C0F0:FF 00 00 00 00 00 00 00 72
C0F8:00 00 00 00 00 00 00 00 7A
C100:00 00 84 FF FF 00 80 01 16
C108:00 80 01 00 80 01 00 80 54
C110:01 00 80 01 00 80 01 00 38
C118:80 01 00 80 01 00 80 01 2E
C120:00 80 01 00 80 01 00 80 6C
C128:01 00 80 01 00 80 01 00 50
C130:FF FF 00 00 00 00 00 00 B3
C138:00 00 00 00 00 00 00 00 BB
C140:00 00 84 FF FF 00 80 00 55
C148:01 80 00 01 80 00 01 80 03
C150:00 01 80 00 01 80 00 01 2F
C158:80 00 01 80 00 01 80 00 49
C160:01 80 00 01 80 00 01 80 1B
C168:00 01 80 00 01 80 00 01 47
C170:FF FF FF 00 00 00 00 00 F3
C178:00 00 84 FF 00 00 00 00 FB
C180:00 00 84 FF 4C 19 CA 2A 1B

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C188:2A 2A 2A 2A 2A 2A 2A 0C
C190:2A 2A 2A 2A 2A 2A 00 E9
C198:A9 01 8D 19 D0 AD 18 D0 B2
C1A0:C9 15 F0 1A A9 AC 8D 12 3B
C1A8:D0 A9 15 8D 18 D0 A9 C8 9A
C1B0:8D 16 D0 A9 0B 8D 20 D0 D4
C1B8:8D 21 D0 4C E3 C1 A9 0A AD
C1C0:8D 12 D0 A9 1D 8D 18 D0 64
C1C8:AD 64 C6 8D 20 D0 8D 21 6E
C1D0:D0 AD 65 C6 8D 22 D0 AD 85
C1D8:66 C6 8D 23 D0 AD 67 C6 F7
C1E0:8D 16 D0 AD 0D DC 29 01 D4
C1E8:F0 03 4C 31 EA 4C BC FE 43
C1F0:78 A9 1B 8D 11 D0 A9 F1 68
C1F8:8D 1A D0 A9 98 8D 14 03 A4
C200:A9 C1 8D 15 03 A9 7F 8D 19
C208:0D DC 58 60 A9 00 8D 1A DE
C210:D0 A9 31 8D 14 03 A9 EA 52
C218:8D 15 03 A9 81 8D 0D DC DD
C220:58 A9 15 8D 18 D0 A9 C8 D7
C228:8D 16 D0 A9 0B 8D 20 D0 4E
C230:A9 00 8D 21 D0 60 A0 04 9B
C238:A2 00 86 FA 84 FB AE 59 5A
C240:C6 AC 5A C6 86 FC 84 FD 3B
C248:20 A3 C2 AD 68 C6 C9 01 EC
C250:F0 01 60 A0 8D A2 00 86 7C
C258:FA 84 FB AE 5B C6 AC 5C 92
C260:C6 86 FC 84 FD 4C A3 C2 FD
C268:A9 36 85 01 A0 04 A2 00 6B
C270:86 FC 84 FD AE 59 C6 AC FD
C278:5A C6 86 FA 84 FB 20 A3 55
C280:C2 AD 68 C6 C9 01 F0 01 81
C288:60 A0 D8 A2 00 86 FC 84 44
C290:FD AE 5B C6 AC 5C C6 86 83
C298:FA 84 FB 20 A3 C2 A9 37 F0
C2A0:85 01 60 A9 00 85 FE 85 69
C2A8:FF A0 00 B1 FA 91 FC A5 2F
C2B0:FC 18 69 01 85 FC A5 FD 61
C2B8:69 00 85 FD A5 FA 18 69 36
C2C0:01 85 FA A5 FB 69 00 85 EC
C2C8:FB A5 FE 18 69 01 85 FE 70
C2D0:A5 FF 69 00 85 FF A5 FE CD
C2D8:C9 03 D0 CF A5 FE C9 E8 C0
C2E0:D0 C9 60 8D FF CF A2 00 AA
C2E8:CA D0 FD CE FF CF D0 F8 8E
C2F0:60 00 00 A9 00 8D F1 C2 1E
C2F8:8D F2 C2 20 51 C3 20 E4 1B
C300:FF C9 00 F0 F6 C9 14 F0 01
C308:2B C9 0D F0 59 C9 1F B0 29
C310:03 4C FB C2 C9 5B 90 03 B7
C318:4C FB C2 AE F1 C2 E0 10 74
C320:90 03 4C FB C2 AC F1 C2 69
C328:99 87 C1 20 D2 EF EE F1 FE
C330:C2 4C FB C2 AD F1 C2 C9 5C
C338:00 D0 03 4C FB C2 A9 20 77
C340:AC F1 C2 99 A0 04 CE F1 7C
C348:C2 A9 14 20 D2 FF 4C FB 4B
C350:C2 A9 12 20 D2 FF A9 20 F1
C358:28 D2 FF A9 92 20 D2 FF F9
C360:A9 9D 20 D2 FF 60 AD F1 24
C368:C2 C9 00 F0 10 AD F1 C2 B0
C370:8D 97 C1 A9 20 20 D2 FF 9E
C378:A9 0D 4C D2 FF A9 01 8D 05
C380:F2 C2 A9 20 20 D2 FF A9 5F
C388:0D 4C D2 FF 93 11 92 9F A9
C390:20 20 20 20 43 55 53 54 A0
C398:4F 4D 20 43 48 41 52 2E 6D
C3A0:20 53 43 52 45 45 4E 20 96
C3A8:44 45 53 49 47 4E 45 52 F2
C3B0:20 56 31 2E 30 0D 1F 20 FA

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C3B8:20 20 20 A3 A3 A3 A3 A3 2D
C3C0:A3 20 A3 A3 A3 A3 20 20 DC
C3C8:A3 A3 A3 A3 A3 A3 20 A3 49
C3D0:A3 A3 A3 A3 A3 A3 0D C1
C3D8:9E 20 20 20 20 20 43 55 1B
C3E0:52 52 45 4E 54 20 41 44 9D
C3E8:44 52 45 53 53 3A 20 05 CD
C3F0:33 32 37 36 38 20 20 98 04
C3F8:43 4F 4C 4F 52 3A 4F 46 D4
C400:46 0D 11 20 20 20 05 53 F2
C408:1E 20 53 41 56 45 20 53 82
C410:43 52 45 45 4E 20 20 20 20
C418:05 4C 1E 20 4C 4F 41 44 63
C420:20 53 43 52 45 45 4E 0D 05
C428:20 20 20 05 46 1E 20 4C 55
C430:4F 41 44 20 43 48 41 52 4C
C438:53 45 54 20 20 05 4E 1E 19
C440:20 53 41 56 45 20 43 48 B5
C448:41 52 53 45 54 20 24 33 64
C450:30 30 0D 20 20 20 05 9B
C458:31 2D 34 1E 20 43 48 41 0E
C460:4E 47 45 20 43 4F 4C 4F CC
C468:52 53 20 28 05 34 1E 3D E8
C470:44 52 41 57 43 4F 4C 4F 8D
C478:52 29 0D 00 20 20 05 DD
C480:41 1E 20 43 48 41 4E 47 95
C488:45 20 41 44 44 52 20 20 F4
C490:20 05 43 1E 20 43 4F 4C AE
C498:4F 52 20 44 41 54 41 20 A4
C4A0:4F 46 46 2F 4F 4E 0D 20 0D
C4A8:20 20 05 46 37 2F 46 38 8A
C4B0:1E 20 53 57 41 50 4F 55 30
C4B8:4E 44 4F 20 05 51 1E 20 30
C4C0:01 55 49 54 0D 20 20 20 FF
C4C8:05 4D 1E 20 4D 55 4C 54 9A
C4D0:49 43 4F 4C 4F 52 20 20 A2
C4D8:20 20 12 90 20 05 20 CE
C4E0:1C 20 9F 20 9C 20 1E 20 38
C4E8:1F 20 9E 20 92 20 90 28 3E
C4F0:4D 2F 43 20 44 52 41 57 9C
C4F8:29 0D 20 20 20 20 20 20 42
C500:20 20 20 20 20 20 12 90 DF
C508:20 05 20 1C 20 9F 20 9C 07
C510:20 1E 20 1F 20 9E 20 81 66
C518:20 95 20 96 20 97 20 98 BE
C520:20 99 20 9A 20 9B 20 92 12
C528:0D 11 20 20 20 20 99 55 8E
C530:53 45 20 4A 4F 59 53 54 3A
C538:49 43 4B 20 54 4F 20 43 08
C540:48 4F 4F 53 45 20 43 48 5C
C548:41 52 41 43 54 45 52 53 15
C550:0D 20 20 20 05 28 43 55 15
C558:52 53 4F 52 20 4B 45 59 03
C560:53 20 43 48 41 4E 47 45 A1
C568:20 53 49 5A 45 20 4F 46 37
C570:20 57 49 4E 44 4F 57 29 27
C578:0D 00 93 11 11 9F 56 41 03
C580:4C 49 44 20 53 43 52 45 A0
C588:45 4E 20 41 44 44 52 45 7F
C590:53 53 3A 20 31 36 33 38 E4
C598:34 2D 34 37 31 35 30 0D 4F
C5A0:11 9A 45 4E 54 45 52 20 65
C5A8:41 44 44 52 45 53 53 3A EB
C5B0:20 05 00 93 11 11 9F 43 16
C5B8:48 41 52 53 45 54 20 46 3A
C5C0:49 4C 45 4E 41 4D 45 3A 95
C5C8:20 05 00 93 11 11 9F 53 3E
C5D0:43 52 45 45 4E 20 46 49 58
C5D8:4C 45 4E 41 4D 45 3A 20 CD
C5E0:05 00 A2 00 A0 00 8A 99 F6

```

PROGRAMS

C5E8:84	06	C8	E8	C0	20	D0	F6	FE	C818:A4	69	00	85	A4	60	AD	55	06	CA48:E3	C2	00	20	0C	C2	AD	67	B0
C5F0:A0	00	8A	99	AC	06	C8	E8	AF	C820:C6	C9	27	D0	01	60	EE	55	36	CA50:C6	8D	16	D0	A9	1D	8D	18	71
C5F8:C0	20	D0	F6	A0	00	8A	99	2A	C828:C6	20	FC	C6	A5	A3	18	69	86	CA58:D0	AD	64	C6	8D	21	D0	20	6D
C600:D4	06	C8	E8	C0	20	D0	F6	40	C830:01	85	A3	A5	A4	69	00	85	C2	CA60:0E	C9	A9	04	85	A4	A9	00	F6
C608:A0	00	8A	99	FC	06	C8	E8	4B	C838:A4	60	AD	55	C6	C9	00	D0	6D	CA68:85	A3	A9	00	8D	55	C6	8D	BB
C610:C0	20	D0	F6	A0	00	8A	99	43	C840:01	60	CE	55	C6	20	11	C7	3A	CA70:56	C6	A9	00	8D	10	D0	A9	10
C618:24	07	C8	E8	C0	20	D0	F6	40	C848:A5	A3	38	E9	01	85	A3	A5	46	CA78:18	8D	00	D0	A9	32	8D	01	BC
C620:A0	00	8A	99	4C	07	C8	E8	E1	C850:A4	E9	00	85	A4	60	AD	F8	02	CA80:D0	AD	63	C6	8D	86	02	A9	F6
C628:C0	20	D0	F6	A0	00	8A	99	5B	C858:07	C9	FA	F0	15	C9	FB	F0	07	CA88:93	20	D2	FF	20	68	C2	A9	1C
C630:74	07	C8	E8	C0	20	D0	F6	80	C860:1B	C9	FC	F0	24	C9	FD	F0	D5	CA90:C8	20	E3	C2	A9	00	85	C6	5A
C638:A0	00	8A	99	9C	07	C8	E8	7C	C868:2D	C9	FE	F0	36	C9	FF	F0	BB	CA98:A9	28	20	E3	C2	20	B5	C7	19
C640:C0	20	D0	F6	A0	00	8A	99	E8	C870:42	60	A0	00	AD	5D	C6	91	51	CAA0:EE	27	D0	20	D7	C8	A5	C5	86
C648:00	99	84	DA	99	E8	DA	C8	69	C878:A3	4C	C3	C8	A0	01	AD	5E	86	CAAB:C9	03	F0	18	C9	04	F0	24	E7
C650:C0	FF	D0	F5	60	00	00	00	BA	C880:C6	91	A3	20	C3	C8	4C	72	9C	CAB0:AD	00	DC	29	10	C9	00	D0	C3
C658:00	00	80	E8	83	00	00	00	A0	C888:C8	A0	02	AD	5F	C6	91	A3	9E	CAB8:DF	F0	03	4C	98	CA	20	56	26
C660:00	00	00	0D	00	01	02	C8	8F	C890:20	C3	C8	4C	7C	C8	A0	28	71	CAC0:C8	4C	98	CA	AD	8D	02	C9	FE
C668:00	00	AD	00	DC	29	0F	C9	1F	C898:AD	60	C6	91	A3	20	C3	C8	F8	CAC8:01	F0	03	20	36	C2	20	B1	2C
C670:0E	F0	0D	C9	0D	F0	2B	C9	CB	C8A0:4C	72	C8	A0	29	AD	61	C6	A1	CAD0:C9	4C	1F	CA	20	0E	C9	A9	65
C678:0B	F0	65	C9	07	F0	45	60	F7	C8A8:91	A3	20	C3	C8	20	96	C8	E8	CAD8:63	20	E3	C2	4C	98	CA	A5	D0
C680:AD	56	C6	C9	00	D0	01	60	95	C8B0:4C	7C	C8	A0	2A	AD	62	C6	3E	CAE0:C5	C9	38	F0	48	C9	3B	F0	B2
C688:CE	56	C6	AD	01	D0	38	E9	6C	C8B8:91	A3	20	C3	C8	20	A3	C8	13	CAE8:5E	C9	08	F0	74	C9	0B	F0	02
C690:08	8D	01	D0	A5	A3	38	E9	C8	C8C0:4C	89	C8	A5	A4	18	69	D4	7B	CAF0:21	C9	24	F0	2C	C9	14	F0	BE
C698:28	85	A3	A5	A4	E9	00	85	BC	C8C8:85	A4	AD	86	02	91	A3	A5	A7	CAF8:2B	C9	0A	F0	1B	C9	03	F0	DD
C6A0:A4	60	AD	56	C6	C9	07	D0	EF	C8D0:A4	38	E9	D4	85	A4	60	20	EC	CB00:1A	C9	15	F0	19	C9	0D	F0	C3
C6A8:01	60	EE	56	C6	AD	01	D0	D1	C8D8:E4	FF	C9	00	D0	01	60	8D	EE	CB08:1E	C9	2A	F0	1D	C9	27	F0	C4
C6B0:18	69	08	8D	01	D0	A5	A3	B8	C8E0:FF	CF	C9	11	F0	1F	C9	1D	65	CB10:04	60	4C	7B	CB	4C	4E	CD	FC
C6B8:18	69	28	85	A3	A5	A4	69	70	C8E8:F0	21	C9	91	F0	14	C9	9D	96	CB18:4C	03	CC	4C	4B	CA	4C	6C	7F
C6C0:00	85	A4	60	AD	55	C6	C9	64	C8F0:F0	16	AE	56	C6	AC	55	C6	16	CB20:CC	4C	9B	CB	4C	B4	CB	4C	7A
C6C8:1F	D0	01	60	EE	55	C6	20	BA	C8F8:18	20	F0	FF	AD	FF	CF	4C	16	CB28:E9	CC	4C	AB	CC	A9	63	20	20
C6D0:FC	C6	A5	A3	18	69	01	85	6B	C900:D2	FF	4C	CB	C7	4C	ED	C7	56	CB30:E3	C2	EE	64	C6	AD	64	C6	0B
C6D8:A3	A5	A4	69	00	85	A4	60	8C	C908:4C	3A	C8	4C	1E	C8	A0	00	83	CB38:C9	10	F0	03	4C	CB	C8	A9	D9
C6E0:AD	55	C6	C9	00	D0	01	60	B5	C910:B1	A3	8D	5D	C6	A0	01	B1	59	CB40:00	8D	64	C6	4C	CB	CB	A9	07
C6E8:CE	55	C6	20	11	C7	A5	A3	A4	C918:A3	8D	5E	C6	A0	02	B1	A3	2D	CB48:63	20	E3	C2	EE	65	C6	AD	8A
C6F0:38	E9	01	85	A3	A5	A4	E9	74	C920:8D	5F	C6	A0	28	B1	A3	8D	12	CB50:65	C6	C9	10	F0	03	4C	CB	7E
C6F8:00	85	A4	60	AD	00	D0	18	A9	C928:60	C6	A0	29	B1	A3	8D	61	DC	CB58:CB	A9	00	8D	65	C6	4C	CB	C3
C700:69	08	8D	00	D0	AD	00	D0	06	C930:C6	A0	2A	B1	A3	8D	62	C6	8E	CB60:C8	A9	63	20	E3	C2	EE	66	25
C708:C9	08	90	01	60	EE	10	D0	50	C938:60	AD	69	C6	C9	01	D0	01	F5	CB68:C6	AD	66	C6	C9	10	F0	03	7B
C710:6D	AD	00	D0	38	E9	08	3D	4F	C940:60	A9	01	8D	69	C6	AD	0E	37	CB70:4C	CB	CB	A9	00	8D	66	C6	FE
C718:00	D0	AD	00	D0	C9	F7	B0	DF	C948:DC	29	FE	8D	0E	DC	A5	01	7D	CB78:4C	CB	CB	A9	63	20	E3	C2	63
C720:01	60	EE	10	D0	60	A5	C5	40	C950:29	FB	85	01	A0	D0	A2	00	C5	CB80:EE	63	C6	AD	63	C6	C9	10	F5
C728:C9	07	F0	05	C9	02	F0	10	15	C958:86	FA	84	FB	A0	30	A2	00	49	CB88:F0	06	20	CB	CB	4C	E2	C5	F5
C730:63	A9	32	20	E3	C2	AD	8D	B5	C960:86	FC	84	FD	A0	00	B1	FA	4A	CB90:A9	00	8D	63	C6	20	CB	CB	FE
C738:02	C9	01	F0	56	4C	71	C7	F8	C968:91	FC	A5	FA	18	69	01	85	56	CB98:4C	E2	C5	AD	67	C6	C9	D8	65
C740:A9	32	20	E3	C2	AD	8D	02	5D	C970:FA	A5	FB	69	00	85	FB	A5	B4	CBA0:F0	08	A9	D8	07	67	C6	4C	59
C748:C9	01	F0	14	4C	4F	C7	AD	39	C978:FC	18	69	01	85	FC	A5	FD	37	CBA8:AF	CB	A9	C8	8D	67	C6	A9	0E
C750:F8	07	C9	FC	D0	01	60	C9	3C	C980:69	00	85	FD	A5	FD	C9	38	4A	CBB0:63	4C	E3	C2	AD	68	C6	C9	1C
C758:FF	D0	01	60	EE	F8	07	60	0C	C988:D0	DA	A5	01	09	04	85	01	64	CBB8:01	F0	08	A9	01	8D	60	C6	7E
C760:AD	F8	07	C9	FA	D0	01	60	FF	C990:AD	0E	DC	09	01	8D	0E	DC	E1	CBC0:4C	AF	CB	A9	00	8D	68	C6	4C
C768:C9	FD	D0	01	60	CE	F8	07	BD	C998:A9	FA	8D	F8	07	A0	00	B9	75	CBC8:4C	AF	CB	AA	A9	20	A0	00	A5
C770:60	AD	F8	07	C9	FA	F0	09	50	C9A0:03	C0	99	80	3E	B9	C3	C0	42	CBD0:99	E0	05	C8	C0	27	D0	F8	D7
C778:C9	FB	F0	0B	C9	FC	F0	0D	EB	C9A8:99	40	3F	C8	C0	C0	D0	EF	28	CBD8:A9	1E	9D	EC	05	A9	01	9D	BD
C780:60	A9	FD	8D	F8	07	60	A9	91	C9B0:60	A9	93	20	D2	FF	20	F0	1B	CBE0:EC	D9	60	AD	68	C6	C9	00	3E
C788:FE	8D	F8	07	60	A9	FF	8D	C1	C9B8:C1	A9	00	9D	15	D0	A9	08	B7	CBE8:F0	0B	A9	0E	8D	9C	04	A9	62
C790:F8	07	60	AD	F8	07	C9	ED	BA	C9C0:20	D2	FF	A9	1D	8D	18	D0	D3	CBF0:20	8D	9D	04	60	A9	0F	8D	45
C798:F0	09	C9	FE	F0	0B	C9	FF	53	C9C8:A0	00	B9	8C	C3	C9	00	F0	E2	CBF8:9B	04	A9	06	8D	9C	04	8D	69
C7A0:F0	0D	60	A9	FA	8D	F8	07	99	C9D0:07	20	D2	FF	C8	4C	CA	C9	21	CC00:9D	04	60	20	0C	C2	A0	00	24
C7A8:60	A9	FB	8D	F8	07	60	A9	79	C9D8:A0	00	B9	7C	4C	C9	00	F0	F9	CC08:B9	7A	C5	C8	20	D2	FF	C9	78
C7B0:FC	8D	F8	07	60	AD	00	DC	48	C9E0:07	20	D2	FF	C8	4C	DA	C9	51	CC10:00	D0	F5	A9	00	85	C6	8D	68
C7B8:29	F0	C9	0E	F0	0D	C9	0D	17	C9E8:20	E2	C5	A9	01	8D	15	D0	D1	CC18:15	D0	A9	64	20	E3	C2	20	22
C7C0:F0	2B	C9	0B	F0	74	C9	07	71	C9F0:8D	27	D0	A0	30	8D	10	D0	F0	CC20:60	A5	86	7A	84	7B	20	73	91
C7C8:F0	54	60	AD	56	C6	C9	00	2E	C9F8:A9	38	8D	00	D0	A9	B2	8D	41	CC28:00	B0	3B	20	6B	A9	A6	14	BA
C7D0:D0	01	60	CE	56	C6	AD	01	2C	CA00:01	D0	AD	63	C6	20	CB	CB	50	CC30:A4	15	8E	59	C6	8C	5A	C6	AC
C7D8:D0	38	E9	38	8D	01	D0	A5	54	CA08:A9	00	8D	55	C6	8D	56	C6	59	CC38:A5	15	18	69	03	85	15	A5	81
C7E0:A3	38	E9	28	85	A3	A5	A4	BA	CA10:A9	06	85	A4	A9	84	85	A3	05	CC40:14	18	69	E8	85	14	A5	15	82

```

CC78:C9 00 D0 F5 A9 00 85 C6 8F
CC80:8D 15 D0 A9 64 20 E3 C2 09
CC88:20 F3 C2 AD F1 C2 C9 00 90
CC90:F0 13 AD F1 C2 8D AD CD B1
CC98:A0 30 A2 00 8E AB CD 8C 2E
CCA0:AC CD 20 AE CD 20 B1 C9 0F
CCA8:4C 1F CA 20 0C C2 A0 00 38
CCB0:B9 CB C5 C8 20 D2 FF C9 75
CCB8:00 D0 F5 A9 00 85 C6 8D 11
CCC0:15 D0 A9 64 20 E3 C2 20 CA
CCC8:F3 C2 AD F1 C2 C9 00 F0 10
CCD0:12 8D AD CD AC 5A C6 AE 74
CCD8:59 C6 8E AB CD 8C AC CD 25
CCF0:20 AE CD 20 B1 C9 4C 1F 5E
CCF8:CA 20 0C C2 A0 00 B9 CB E1
CCF0:C5 C8 20 D2 FF C9 00 D0 C8
CCF8:F5 A9 00 85 C6 8D 15 D0 B7
CD00:A9 64 20 E3 C2 20 F3 C2 0D
CD08:AD F1 C2 C9 00 F0 39 AD CF
CD10:F1 C2 8D AD CD AC 5C C6 82
CD18:AE 5B C6 8E AB CD 8C AC FD
CD20:CD AD 68 C6 C9 01 F0 03 BE
CD28:4C 45 CD AD AC CD 18 69 06
CD30:03 8D AC CD AD AB CD 18 F2
CD38:69 E8 8D AB CD AD AC CD 7B
CD40:69 00 8D AC CD 20 CE CD 67
CD48:20 B1 C9 4C 1F CA 20 0C CE
CD50:C2 A0 00 B9 B3 C5 C8 20 77
CD58:D2 FF C9 00 D0 F5 A9 00 48
CD60:85 C6 8D 15 D0 A9 64 20 89
CD68:E3 C2 20 F3 C2 AD F1 C2 5D
CD70:C9 00 F0 31 AD F1 C2 8D 6A
CD78:AD CD A0 37 A2 FF 8E AB C3
CD80:CD 8C AC CD AD 59 C6 85 7E
CD88:FE AD 5A C6 85 FF A9 00 46
CD90:8D 59 C6 A9 30 8D 5A C6 EF
CD98:20 CE CD A5 FE 8D 59 C6 B3
CDA0:A5 FF 8D 5A C6 20 B1 C9 4A
CDA8:4C 1F CA 00 30 00 AD AD 16
CDB0:CD A2 87 A0 C1 20 BD FF E0
CDB8:A9 00 A2 08 A0 01 20 BA 02
CDC0:FF AE AB CD AC AC CD A9 B7
CDC8:00 85 B9 4C D5 FF A9 36 F9
CDD0:85 01 AD AD CD A2 87 A0 A8
CDD8:C1 20 BD FF A9 00 A2 08 AF
CDE0:A0 01 20 BA FF AE 59 C6 F0
CDE8:AC 5A C6 86 FA 84 FB AE 43
CDF0:AB CD AC AC CD A9 FA 20 61
CDF8:D8 FF A9 37 85 01 60 37 D1

```

DISPLAY.BASIC

```

JR 63000 REM **** CCSD SCREEN
      {SPACE}DISPLAY ****
QD 63010 REM * DISPLAY ML & SC
      REENS MUST *
DA 63020 REM * CHARSET @ 12288
      MUST ALL{2 SPACES}*
JE 63030 REM *{6 SPACES}BE IN
      {SPACE}MEMORY!
      {8 SPACES}*
RP 63040 REM *****
      *****
EK 63050 AD=32768:REM *SCREEN
      {SPACE}ADDRESS
CF 63060 C=0:REM *1 FOR COLOR
      {SPACE}SCREENS
HE 63070 POKE53272,29:REM *21=
      ROM CHARSET
AD 63080 POKE53270,216:REM *20

```

```

      0=NON-MCOLOR
XP 63090 POKE53281,0:REM *BACK
      GROUND
SC 63100 POKE53282,1:REM *COLO
      R 2
HK 63110 POKE53283,2:REM *COLO
      R 3
KJ 63120 POKE646,13:REM *COLOR
      4
PD 63130 PRINT CHR$(147)
GJ 63140 H=INT(AD/256):L=AD-25
      6*H:POKE53104,C:POKE5
      3105,L:POKE53106,H
PQ 63150 SYS 52992:REM *DISPLA
      Y SCREEN
AM 63160 RETURN

```

DISPLAY.ML

```

CF00:A9 36 85 01 A0 04 A2 00 1D
CF08:86 FC 84 FD AE 71 CF AC 22
CF10:72 CF 86 FA 84 FB 20 30 E1
CF18:CF AD 70 CF C9 01 D0 0B 15
CF20:A0 D8 A2 00 86 FC 84 FD C9
CF28:20 30 CF A9 37 85 01 60 AA
CF30:A9 00 85 FE 85 FF A0 00 B2
CF38:B1 FA 91 FC A5 FC 18 69 2C
CF40:01 85 FC A5 FD 69 00 85 D6
CF48:FD A5 FA 18 69 01 85 FA 86
CF50:A5 FB 69 00 85 FB A5 FE 55
CF58:18 69 01 85 FE A5 FF 69 CE
CF60:00 85 FF A5 FF C9 03 D0 B9
CF68:CF A5 FE C9 E8 D0 C9 60 54
CF70:00 00 80 E8 83 00 00 00 CA

```

Daniel English says he got bored using FOR-NEXT loops to save character screens, so he wrote this utility. He lives in Moreno Valley, California.

RIGHT/SIDE II

By Edward A. Gase

Right/Side II is an enhanced version of the original Right/Side program written by Robert B. Cook and published in the November 1990 issue of COMPUTE. It lets you print documents down fanfold paper rather than printing across it.

This version works with Epson-compatible printers in either single- or double-density modes with your interface in transparent mode. More significantly, you can now use a variety of screen character sets as custom fonts for printing. You'll even be able to see what the character set looks like onscreen.

Right/Side II is ideal for those times when you need to print something wider than 80 columns on an 80-column printer and you don't want to switch to condensed type. It's also terrific for making keyboard overlays.

Although Right/Side II was originally

written with SpeedScript in mind, it works well with any word processor that handles PETSCII sequential files. SpeedScript, EasyScript, and The Write Stuff are particularly well suited for use with Right/Side II because they allow you to include the graphics characters accessible with the Commodore logo key.

Right/Side II consists of two programs, one in BASIC and one in machine language. To help avoid typing errors, enter the BASIC program with The Automatic Proofreader. See "Typing Aids" elsewhere in this section. When you've finished, be sure to save a copy to disk. The second program is written in machine language. To enter it, you'll need to use MLX, COMPUTE's machine language entry program; see "Typing Aids" again. When MLX prompts, enter the following values.

Starting address: C000

Ending address: C4E7

When you've finished typing, be sure to save a copy of the program with the filename RIGHT/SIDE.ML before you leave MLX. When you're ready to use Right/Side II, simply load and run the BASIC portion. It will automatically load the machine language file.

Printing Sideways

When creating a sequential file for Right/Side II, remember that the right margin of the text will be printed at what's normally the top of the paper. Set your right margin for any width up to 255 characters and your left margin to 0. If you are using EasyScript, specify the column width at the startup screen. If you have chosen a length that is longer than your longest line, spaces will be added to the top of the page.

Right/Side would print 80 lines per page according to the original article. With my system, I can get only about 60 lines with 9 10 characters per inch. That would produce a maximum length of 25.5-28.3 inches. The results you get will depend on your printer/interface combination and whether you choose Epson or Commodore mode. The Epson printouts will be longer, but there will be more separation between characters.

Your original file must be a PETSCII

PROGRAMS

sequential file. Some word processors can save in that format. If you're using SpeedScript, the easiest way to create such a file is to press Shift-Ctrl-P and then press D to print your document to disk as a sequential file. Then you're ready to run Right/Side II. If you produce a file that is too long, Right/Side II will print the excess over the top of the text on the left side of the paper. If the printout looks strange, reduce the length of your file.

Menu Options

When you run Right/Side II and the menu appears, press f1 to select Create Right/Side File. This option converts the sequential file into a Right/Side II file. Enter the name of your sequential file and then the name of the file you'll be creating. The letters R/S are added automatically as a prefix to indicate to the program that this is a Right/Side II document. Press Return on a blank line to return to the main menu.

To print your file sideways, simply press f3 and then enter the name of the newly created Right/Side II file. You don't have to include the R/S prefix; it's added automatically. Next, choose between Commodore or Epson. If you choose Epson, you'll be given the choice of printing in single or double density. Then press any key to start printing. To stop printing, press and hold the space bar.

Press f2 to load a custom character set that you may wish to use. You'll be asked the name of the character set. The onscreen display will change to reflect the new characters. If you don't like what you see on the screen, you can change the character set before you print your file.

Any nine-block character set, such as those created with Ultrafont+, should work just fine. I have also used three-block character sets successfully. Normally, you will use Right/Side II with uppercase and lowercase characters, including the graphics characters accessed with the Commodore logo key. You could, of course, use an uppercase/graphics set. As there are dozens of character sets that have been created for the Commodore 64, you should be able to get just the look you want for your printouts.

RIGHT/SIDE II

```

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ERVED
BC 110 GOSUB1310:REM INITIALIZ
E
HD 120 GOSUB990:REM MAIN SCREE
N
RG 130 POKE198,0:WAIT198,1:GET
G$:G=ASC(G$)-132:IFG<10
RG>5THEN130
EK 140 ONGGOSUB180,400,700,150
,1180:GOTO120
GD 150 POKE53280,14:POKE53281,
6:POKE53272,(PEEK(53272
)AND240)OR4
BS 160 PRINT"{7}{CLR}":END
MS 170 REM{2 SPACES}CREATE FIL
E
PB 180 PS=1:GOSUB1000:PS=0
JQ 190 PRINTTAB(7)"{2 DOWN}
{RVS}{RED}'#####
#####"
FM 200 PRINTTAB(7)"{RVS}'{OFF}
{GRN}CREATE {RVS}{BLK}
R{OFF}IGHT/{RVS}S{OFF}ID
E {GRN}FILE {RVS}{RED}
{BLK}"
PH 210 PRINTTAB(7)"{RVS}{RED}'
$$$$$$$$$$$$$$$$$$$$
${BLK}"
JS 220 PRINTTAB(9)"{RVS}{BLK}
{24 SPACES}"
XC 230 POKE214,10:PRINT"{DOWN}
{2 SPACES}{RVS}{BLU}F
{OFF}ILE TO BE READ?
{GRN}"BF$;
RG 240 LN=16:GOSUB760:F1$=IN$:
IFF1$=""THENRETURN
EJ 250 DE=63:GOSUB830:IFEN<>63
THEN230
XS 260 DE=0:GOSUB840:IFEN>19TH
EN230
GR 270 POKE214,13:PRINT"{DOWN}
{2 SPACES}{RVS}{BLU}F
{OFF}ILE TO BE CREATED?
{GRN}R/S."MID$(BF$,5,2
4);
DP 280 LN=12:GOSUB760:IN$="R/S
."+IN$:F2$=IN$:IFF2$="R
/S."THENRETURN
CJ 290 DE=62:GOSUB830:IFF2$=F1
$THEN270
QX 300 IFDE=ENTHEN340
SH 310 PRINT"{UP}{2 SPACES}
{RVS}{RED}O{OFF}VERWRIT
E FILE? [{GRN}Y/N{RED}]
{GRN} ";:IN=1:GOSUB760
HG 320 IFIN$<>"Y"THENPRINT"
{UP}"BL$:GOTO270
AG 330 OPEN15,8,15,"S0:"+F2$:C
LOSE15
HC 340 POKE214,19:PRINTTAB(7)"
{DOWN}{PUR}{5 Q} CREATI
NG{2 SPACES}FILE {5 Q}
{HOME}"

```

```

RS 350 SA=49152:FORL=1TO2
JQ 360 OPEN8,8,8,F1$+"S,R":SY
S SA:SA=49194:CLOSE8:NE
XT:REM READ & CONVERT
DP 370 OPEN8,8,8,F2$+"S,W":SY
S49285:CLOSE8:REM WRITE
TO DISK
HS 380 RETURN
HH 390 REM PRINT FILE
ER 400 PS=1:GOSUB1000:PS=0:NP=
0
SE 410 PRINTTAB(7)"{2 DOWN}
{RVS}{RED}'#####
#####"
DG 420 PRINTTAB(7)"{RVS}'{OFF}
{GRN}PRINT {RVS}{BLK}R
{OFF}IGHT/{RVS}S{OFF}ID
E {GRN}FILE {RVS}{RED}
{BLK}"
KF 430 PRINTTAB(7)"{RVS}{RED}'
$$$$$$$$$$$$$$$$$$$$
{BLK}"
QJ 440 PRINTTAB(9)"{RVS}{BLK}
{23 SPACES}"
MB 450 POKE214,10:PRINT"{DOWN}
{2 SPACES}{RVS}{BLU}F
{OFF}ILE TO BE PRINTED?
{GRN}R/S."MID$(BF$,5,2
4);
BF 460 LN=12:GOSUB760:IN$="R/S
."+IN$:F1$=IN$:IFF1$="R
/S."THENRETURN
FS 470 DE=63:GOSUB830:IFEN<>63
THEN450
GK 480 DE=0:GOSUB840:IFEN>19TH
EN450
QD 490 POKE214,13:PRINT"{DOWN}
{2 SPACES}{RVS}{BLU}E
{OFF}PERSON OR {RVS}C
{OFF}OMMODORE ? [{GRN}E
/C{BLU}]{GRN} ";
QX 500 IN=1:LN=1:GOSUB760:MO$=
IN$:POKE49499,1
MH 510 IFIN$=""THENRETURN
KH 520 IFMO$="E"THENPRINT"
{DOWN}{2 SPACES}{RVS}
{BLU}N{OFF}ORMAL OR
{RVS}H{OFF}I {RVS}D
{OFF}ENSITY ? [{GRN}N/H
{BLU}]{GRN} ";
EF 530 IFMO$="E"THENGOSUB760:D
E$=IN$:IFDE$="H"THENPOK
E49499,2
SB 540 IFIN$=""THENRETURN
QB 550 OPEN15,4,15:CLOSE15:ON-
(ST=0)GOTO590:IFNP=1THE
NRETURN
AB 560 OPEN15,4,15:CLOSE15:ON-
(ST=0)GOTO590:IFNP=1THE
NRETURN
MC 570 POKE214,16:PRINT"{DOWN}
{2 SPACES}{RVS}{RED}C
{OFF}ONNECT PRINTER THE
N PRESS A KEY":GOSUB960
:NP=1
AP 580 POKE198,0:WAIT198,1:GET
Q$:GOTO550

```


PROGRAMS

```

HARACTER SET TO LOAD?
{GRN} "BFS;:LN=16:GOSU
B760
QX 1240 IFIN$=""THENRETURN
XX 1250 IN$=LEFTS(IN$,16):GOSU
      B850:IFEN>19THEN1230
EH 1260 POKE780,0:POKE781,8:PO
      KE782,0:SYS65466
FE 1270 FORL=1TOLEN(IN$):POKE8
      49+L,ASC(MID$(IN$,L,1)
      ):NEXT
BP 1280 POKE780,LEN(IN$):POKE7
      81,850AND255:POKE782,8
      50/256:SYS65469
AK 1290 POKE780,0:POKE781,0:PO
      KE782,40:SYS65493:SYS4
      9677:RETURN
GB 1300 REM INITIALIZE
KE 1310 IFB=0THENB=1:DIMK(168)
PP 1320 IFPEEK(10240)+PEEK(491
      52)=222THEN1390
HF 1330 IFA=0THENA=1:LOAD"RIGH
      T/SIDE.ML",8,1
BA 1340 PRINT{CLR}{2 DOWN}SET
      TING UP...."
KM 1350 POKE56334,0:POKE1,51
XX 1360 POKE781,9:POKE782,1:PO
      KE88,0:POKE89,48:POKE9
      0,0:POKE91,224
BR 1370 SYS41964:POKE1,55:POKE
      56334,1
DB 1380 SYS 49677
CJ 1390 LF=54272:HF=54273:WV=5
      4276:AT=54277:SR=54278
      :VL=54296:POKEVL,15
FR 1400 BL$="{38 SPACES}"
BQ 1410 BFS$="{16 SPACES}
      {16 LEFT}"
AJ 1420 RETURN

```

RIGHT/SIDE.ML

```

C000:A2 00 A0 00 84 FC A2 08 4C
C008:20 C6 FF 00 B7 FF D0 67 14
C010:C8 20 CF FF C9 0D D0 0A 26
C018:C4 FC 90 02 84 FC A0 00 C6
C020:A2 00 20 E1 FF D0 E4 4C 6E
C028:77 C0 A2 08 20 C6 FF A9 30
C030:00 85 F7 A9 30 85 F8 A2 D8
C038:00 A0 00 84 FD 20 B7 FF 0A
C040:D0 35 E8 20 CF FF C9 D0 B5
C048:D0 1A E4 FC F0 09 A9 20 44
C050:20 6F C0 E8 4C 4A C0 A2 14
C058:00 E6 FD A5 FD C9 50 90 F5
C060:DC 4C 77 C0 20 6F C0 20 BE
C068:E1 FF D0 D1 4C 77 C0 91 65
C070:F7 C8 D0 02 E6 F8 60 20 56
C078:CC FF A9 08 20 C3 FF A9 CF
C080:04 20 C3 FF 60 A2 08 20 42
C088:C9 FF 20 B7 FF D0 E8 C6 4A
C090:FC A5 FC 85 FE 18 A9 FF 9D
C098:65 FC 85 F7 A9 2F 69 00 19
C0A0:85 F8 A6 FD A0 00 B1 F7 38
C0A8:20 D2 FF 18 A5 F7 65 FE 47
C0B0:85 F7 A5 F8 69 00 85 F8 96
C0B8:CA D0 EB A9 0D 20 D2 FF 7A
C0C0:C6 FC F0 B3 20 E1 FF D0 97
C0C8:CC 4C 77 C0 A9 00 85 F0 13
C0D0:85 02 A2 08 20 C6 FF 20 A6

```

```

C0D8:E4 FF AA 20 B7 FF D0 0E 91
C0E0:8A C9 0D F0 0D A4 FB 99 57
C0E8:00 30 E6 FB D0 E9 A9 02 96
C0F0:85 02 A0 00 88 D0 FD 20 6D
C0F8:CC FF 88 D0 FD A2 04 20 A1
C100:C9 FF A9 00 85 FC A2 08 0B
C108:A4 FC B9 00 30 85 FD A9 91
C110:00 85 F7 A9 20 85 F8 18 EF
C118:A5 F7 65 FD 85 F7 A5 F8 49
C120:69 00 85 F8 CA D0 F0 A0 B4
C128:00 B1 F7 30 03 18 69 80 E5
C130:20 D2 FF C8 C0 08 D0 F1 BE
C138:E6 FC A5 FC C5 FB D0 C6 79
C140:A9 0D 20 D2 FF 20 CC FF 27
C148:A5 02 D0 09 A5 C5 C9 3C DD
C150:F0 03 4C CC C0 4C 77 C0 4A
C158:1B 4B 4C 02 00 A9 00 85 12
C160:FB 85 02 A2 08 20 C6 FF FB
C168:20 E4 FF AA 20 B7 FF D0 90
C170:0E 8A C9 0D F0 0D A4 FB A8
C178:99 00 30 E6 FB D0 E9 A9 DD
C180:02 85 02 A0 00 88 D0 FD 72
C188:20 CC FF 88 D0 FD A2 04 9F
C190:20 C9 FF A9 00 85 FC A2 E3
C198:38 A4 FC B9 00 30 85 FD 4E
C1A0:A9 00 85 F7 A9 28 85 F8 1B
C1A8:18 A5 F7 65 FD 85 F7 A5 92
C1B0:F8 69 00 85 F8 CA D0 F0 E8
C1B8:A0 00 B1 F7 AA BD 3C C2 C9
C1C0:48 AD 58 C1 20 D2 FF AE F5
C1C8:5B C1 BD 58 C1 20 D2 FF DB
C1D0:AD 5B C1 20 D2 FF A9 00 26
C1D8:20 D2 FF 68 AE 5B C1 CA D8
C1E0:F0 03 20 D2 FF 20 D2 FF F4
C1E8:C8 C0 08 D0 CD E6 FC A5 B8
C1F0:FC C5 FB D0 A2 A9 3D 20 E6
C1F8:D2 FF 20 CC FF A5 02 D0 22
C200:09 A5 C5 C9 3C F0 03 4C C0
C208:5D C1 4C 77 C0 A2 00 BD FB
C210:00 2A 9D 00 2E E8 E0 00 AA
C218:D0 F5 BD 00 28 9D 00 2A 1D
C220:E8 E0 00 D0 F5 BD E4 C3 93
C228:9D 00 2D E8 D0 00 D0 F5 4F
C230:BD 3C C3 9D 00 2B E8 E0 55
C238:A7 D0 F5 60 00 80 40 C0 CD
C240:20 A0 60 E0 10 90 50 D0 4C
C248:30 B0 70 F0 08 88 48 C8 EA
C250:28 A8 68 E8 18 98 58 D8 5C
C258:38 B8 78 F8 04 84 44 C4 46
C260:24 A4 64 E4 14 94 54 D4 6C
C268:34 B4 74 F4 0C 8C 4C CC 0B
C270:2C AC 6C EC 1C 9C 5C DC 7C
C278:3C BC 7C FC 02 82 42 C2 0C
C280:22 A2 62 E2 12 92 52 D2 8C
C288:32 B2 72 F2 0A 8A 4A CA 2B
C290:2A AA 6A EA 1A 9A 5A DA 9C
C298:3A BA 7A FA 06 86 46 C6 86
C2A0:26 A6 66 E6 16 96 56 D6 AC
C2A8:36 B6 76 F6 0E 8E 4E CE 4B
C2B0:2E AE 6E EE 1E 9E 5E DE BC
C2B8:3E BE 7E FE 01 81 41 C1 1F
C2C0:2E A1 61 E1 11 91 51 D1 CC
C2C8:31 B1 71 F1 09 89 49 C9 6B
C2D0:29 A9 69 F9 19 99 59 D9 DC
C2D8:39 B9 79 F9 05 85 45 C5 6C
C2E0:25 A5 65 E5 15 95 55 D5 EC
C2E8:35 B5 75 F5 0D 8D 4D CD 8B
C2F0:2D AD 6D ED 1D 9D 5D DD FC
C2F8:3D BD 7D FD 03 83 43 C3 8C
C300:23 A3 63 E3 13 93 53 D3 0E

```

```

C308:33 B3 73 F3 0B 8B 4B CB AC
C310:2B AB 6B EB 1B 9B 5B DB 1E
C318:3B BB 7B FB 07 87 47 C7 08
C320:27 A7 67 E7 17 97 57 D7 2E
C328:37 B7 77 F7 0F 8F 4F CF CC
C330:2F AF 6F EF 1F 9F 5F DF 3E
C338:3F BF 7F FF 03 07 07 07 88
C340:03 00 00 00 C0 E0 E0 E0 75
C348:C0 00 00 00 00 00 00 03 33
C350:07 07 07 03 00 00 00 C0 EE
C358:E0 E0 E0 C0 00 00 00 00 B0
C360:7E 00 00 00 AA AA AA AA 27
C368:AA AA AA AA 55 55 55 55 EF
C370:55 55 55 55 FF 80 BF A0 1A
C378:AF A8 AB AA FF 00 FF 00 22
C380:FF 00 FF 00 FF 01 FD 05 0D
C388:F5 15 D5 55 AA AB A8 AF 65
C390:A0 BF 80 FF 00 FF 00 FF 68
C398:00 FF 00 FF 55 D5 15 F5 42
C3A0:05 FD 01 FF 00 00 00 0F 59
C3A8:18 14 13 13 00 00 00 FF D4
C3B0:00 00 FF 00 00 00 00 F0 29
C3B8:18 38 F8 F8 12 12 12 12 18
C3C0:12 12 12 12 78 78 78 78 48
C3C8:78 78 78 78 13 13 17 1F 73
C3D0:0F 00 00 00 00 FF FF FF DF
C3D8:FF 00 00 00 F8 B8 D8 F8 B5
C3E0:F0 00 00 00 FF FF FF FF E0
C3E8:FF 00 FF FF FF F0 F0 F0 8E
C3F0:F0 F0 F0 F0 00 00 00 00 5A
C3F8:FF FF FF FF FF 00 00 00 80
C400:00 00 00 00 00 00 00 00 89
C408:00 00 00 FF C0 C0 C0 C0 DC
C410:CC C0 C0 C0 CC CC 33 33 81
C418:CC CC 33 33 03 03 03 03 02
C420:03 03 03 03 00 00 00 00 7C
C428:CC CC 33 33 CC 99 33 66 7E
C430:CC 99 33 66 03 03 03 03 80
C438:03 03 03 03 18 18 1F 05
C440:1F 18 18 18 00 00 00 00 E3
C448:0F 0F 0F 0F 18 18 1F 60
C450:1F 00 00 00 00 00 00 F8 62
C458:F8 18 18 18 00 00 00 00 E8
C460:00 00 FF FF 00 00 00 1F 09
C468:1F 18 18 18 18 18 FF 5D
C470:FF 00 00 00 00 00 00 FF F9
C478:FF 18 18 18 18 18 F8 D6
C480:F8 18 18 C0 C0 C0 C0 5C
C488:C0 C0 C0 E0 E0 E0 E0 F3
C490:E0 E0 E0 07 07 07 07 56
C498:07 07 07 07 FF FF 00 00 B8
C4A0:00 00 00 00 FF FF FF 00 2A
C4A8:00 00 00 00 00 00 00 00 32
C4B0:00 FF FF FF 01 03 06 6C C6
C4B8:78 70 60 00 00 00 00 00 A6
C4C0:F0 F0 F0 F0 0F 0F 0F 0F 0E
C4C8:00 00 00 00 18 18 18 F8 9C
C4D0:F8 00 00 00 F0 F0 F0 F0 F4
C4D8:00 00 00 00 F0 F0 F0 F0 80
C4E0:0F 0F 0F 0F 00 00 C0 FF 0A

```

Edward A. Gase of Fairfield, Ohio, is an earth science teacher and president of the Cincinnati Commodore Computer Club. He is married and has four children between the ages of 4 and 20. He uses R/S II to design keyboard overlays similar to Leroy's Cheatsheets

JIGSAW 128

By Emil Heyrovsky

Jigsaw 128 is a 50-piece jigsaw puzzle game for the 128 in 40-column mode. With it you can scramble and reassemble any Koala- or Doodle-format picture. Unlike the traditional game, Jigsaw 128 uses nice rectangular pieces.

Typing It In

Jigsaw 128 is written entirely in machine language but loads and runs like a BASIC program. To enter it, use the 128 version of MLX. See "Typing Aids" elsewhere in this section if you need a copy of this program. When MLX prompts, respond with the following values.

Starting address: 1C01

Ending address: 2D08

Be sure to save a copy of the program before exiting MLX.

Playing the Pieces

To start the game, load it using the DLOAD command and type RUN. A menu screen will appear, and you'll be asked to insert a disk. This means a disk that contains pictures saved in Doodle or Koala format. (These files have DD or a reverse space and PIC at the beginning of their filenames.) If any pictures are found, a list of their names will be displayed.

You can cycle through the list using the cursor keys. If you want to load another picture disk, press D, and you'll be asked to insert a disk. The Stop key gets you back to the current list. Press Q to quit the program.

Once you've selected the picture you want, press Return to load it. A Doodle graphic will load almost instantly. It takes about 24 seconds, however, to set up a Koala picture. The screen will be blank during this time.

Once the picture loads, you'll have a couple of seconds to look at it, and then the screen will scramble. If you need another look at the unscrambled picture, press the 128's Help key.

The object of Jigsaw 128 is to move rectangular portions of the scrambled picture about the screen to reconstruct the original image. To move your rectangular cursor to the desired piece,

use the J, I, K, and L keys to move left, up, down, and right, respectively. To exchange two pieces, mark the first one with the space bar. Move the cursor to the desired location and press the space bar again. If you change your mind about the marked block, cancel your selection by pressing the left-arrow key (the one at the top left corner of your keyboard).

When you think you have all the pieces in their correct location, press C. You'll hear an unpleasant sound if you're wrong or a slightly more pleasant one if your image is correct. If the sound is the better of the two, the cursor frame will disappear. Then, press any key, and you'll have the choice of using the same picture again or trying another.

While playing the game, press Stop to return to the text screen and the picture list. You'll be asked to confirm this choice. All of these commands are listed on the main screen.

A Few Notes

In a multicolor (Koala) picture, two areas may appear identical, but the bytes that represent them may differ. This fact is important if you want to compare the appearance of the active screen with the one in memory. The routine that standardizes the pictures causes the 24-second delay when setting up a Koala picture. With the Doodle or high-resolution files, this routine is much simpler, and the delay is hardly noticeable.

It is sometimes difficult to complete a picture with many intricate or blank areas. It sometimes helps to look for "dust" or single dots in an area. If you get stuck, just press the Stop key at any time and load another graphic.

If you select Q to quit from the text screen, the function key definitions will be restored, but you'll have to load the program to play again.

Finally, I would like to thank my brother Albert for writing the Koala help routine and for his advice.

JIGSAW 128

1C01:0F 1C 0A 00 DE 9C 3A 9E 85
1C09:31 30 38 37 30 00 00 00 E1
1C11:A9 20 85 FB A9 1C 85 FD 5D
1C19:A0 00 84 FA 84 FC A0 00 3B
1C21:B1 FC 29 0F 85 FE B1 FC 10
1C29:4A 4A 4A 4A 85 FF B1 FA 91

1C31:C9 FF D0 1E C8 C0 08 D0 74
1C39:F5 A0 00 A5 FF 0A 0A 0A 35
1C41:0A 05 FF 91 FC 98 91 FA 41
1C49:C8 C0 08 D0 F9 38 B0 49 7F
1C51:90 CC A0 00 B1 FA D0 13 47
1C59:C8 C0 08 D0 F7 A8 A5 FE E0
1C61:0A 0A 0A 0A 05 FE 91 FC 47
1C69:38 B0 2E A0 00 A5 FE C5 14
1C71:FF 90 04 F0 1C D0 22 B1 77
1C79:FA 49 FF 91 FA C8 C0 08 1F
1C81:D0 F5 A5 FE 0A 0A 0A DA
1C89:05 FF A0 00 91 FC 38 B0 F9
1C91:08 98 91 FA C8 C0 08 D0 FF
1C99:F9 A5 FA 18 69 08 85 FA 8A
1CA1:90 02 E6 FB E6 FC D0 02 0E
1CA9:E6 FD A5 FD C9 1F 90 A0 F5
1CB1:A5 FC C9 E8 90 9A 60 8D 01
1CB9:B3 08 8D BB 08 A0 00 BD BB
1CC1:68 0B 99 00 D4 E8 C8 BD BD
1CC9:68 0B 99 00 D4 93 18 69 CE
1CD1:06 A8 E8 C0 15 90 E8 60 7D
1CD9:8D 04 D4 8D 0B D4 8D 12 26
1CE1:D4 60 08 A0 00 98 99 00 3D
1CE9:D4 C8 C0 18 D0 F8 A9 0F 25
1CF1:8D 18 D4 28 08 90 05 A9 4A
1CF9:00 8D 15 D0 A9 05 A2 00 EB
1D01:20 A7 08 A9 00 28 08 B0 32
1D09:02 A2 0C 20 A7 08 A9 11 32
1D11:20 C8 08 85 A2 A5 A2 C9 A1
1D19:30 90 FA A9 10 20 C8 08 24
1D21:28 B0 03 4C 8D 1A A5 D4 B5
1D29:C9 58 F0 FA A9 73 85 01 53
1D31:A9 00 85 D8 8D 20 D0 8D 9A
1D39:21 D0 20 0A 19 A0 12 B9 06
1D41:44 0B 99 79 07 88 10 F7 9D
1D49:84 A2 A5 A2 C9 16 D0 FA 90
1D51:20 8A 0B C9 19 F0 03 4C 1B
1D59:2F 1B A9 72 85 01 A0 20 DF
1D61:A5 C4 C9 1C F0 0A A5 C8 5E
1D69:8D 20 D0 8D 21 D0 A0 A0 93
1D71:84 D8 4C 28 1A 49 4E 53 16
1D79:45 52 54 20 44 49 53 4B B0
1D81:13 03 17 26 4E 4F 20 4B 86
1D89:4F 41 4C 41 20 4F 52 20 5C
1D91:44 4F 4F 44 4C 45 20 46 ED
1D99:49 4C 45 53 51 55 49 54 30
1DA1:20 28 59 2F 4E 29 51 55 23
1DA9:49 54 20 54 48 49 53 20 15
1DB1:50 49 43 20 28 59 2F 4E 24
1DB9:29 53 48 55 46 46 4C 45 E4
1DC1:20 41 47 41 49 4E 20 28 45
1DC9:59 2F 4E 29 09 A9 0E 85 21
1DD1:9D 8D 00 FF A9 C0 8D 04 AD
1DD9:0A 4C 16 19 00 28 84 28 52
1DE1:84 28 84 D1 12 31 1C A2 46
1DE9:25 68 09 F7 09 E1 08 01 52
1DF1:03 0E 06 06 0E 03 01 0F DF
1DF9:0C 0B 0B 0C 0F 01 03 A5 47
1E01:D4 C9 58 F0 FA C9 3F F0 A2
1E09:F6 A0 00 84 D0 84 D1 C5 33
1E11:D4 F0 FC 60 00 A2 02 A0 C8
1E19:1E 20 A7 16 A9 FD 8D 30 53
1E21:D0 AD 11 D0 29 EF 8D 11 95
1E29:D0 A2 00 B5 A7 48 E8 E0 E2
1E31:04 D0 F8 20 00 0C A9 A0 E8
1E39:85 D8 A9 FC 8D 30 D0 A2 E4
1E41:03 68 95 A7 CA 10 FA A2 75
1E49:03 A0 28 20 A7 16 60 20 AC
1E51:00 08 A2 02 A0 2D 60 A0 1F
1E59:00 8C 00 FF B9 80 09 99 34

PROGRAMS

1E61:00	10	C8	C0	0A	D0	F5	A9	EF	2091:80	01	00	80	01	00	80	01	64	22C1:33	C0	33	E0	33	00	39	20	70
1E69:0D	8D	20	D0	A9	0B	8D	21	56	2099:00	80	01	00	80	01	00	80	A2	22C9:39	40	39	60	39	80	39	A0	C6
1E71:D0	4C	59	FA	00	A9	20	85	70	20A1:01	00	80	01	00	80	01	00	86	22D1:39	C0	39	E0	39	00	3A	20	76
1E79:FB	A9	D8	85	FF	A9	1C	85	F5	20A9:80	01	00	80	01	00	FF	FF	7A	22D9:3A	24	3A	3F	50	49	43	2A	D7
1E81:FD	A9	00	85	FA	85	FC	85	EC	20B1:00	00	00	00	00	F8	1F	00	14	22E1:2C	44	44	2A	00	1C	00	60	49
1E89:FE	85	A6	20	81	0C	A5	B0	B5	20B9:80	01	00	80	01	00	80	01	8C	22E9:04	00	D8	00	64	04	00	88	07
1E91:0A	0A	0A	0A	05	B1	A0	00	67	20C1:00	00	00	00	00	00	00	00	02	22F1:00	1C	04	00	8C	00	D8	04	D7
1E99:91	FC	A5	B2	91	FE	B1	FA	A4	20C9:00	00	00	00	00	00	00	00	0A	22F9:00	60	00	1C	04	00	64	00	01
1EA1:85	AA	A9	04	85	AB	A9	00	EE	20D1:01	80	00	01	80	00	00	00	C6	2301:D8	04	40	3F	00	1C	04	28	51
1EA9:06	AA	2A	06	AA	2A	AA	B5	42	20D9:00	00	00	00	00	00	00	00	1A	2309:43	00	D8	04	00	D8	00	8C	3C
1EB1:A6	05	AA	85	AA	C6	AB	D0	C8	20E1:00	00	00	00	00	80	01	00	26	2311:04	00	1C	00	88	04	00	20	51
1EB9:ED	A5	AA	91	FA	C8	C0	00	49	20E9:80	01	00	80	01	00	F8	1F	CB	2319:00	68	20	00	20	00	68	A0	EF
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2681:20	61	18	A9	00	4C	60	15	DA	28B1:04	D4	A9	8F	8D	18	D4	20	FD	2AE1:91	FA	88	10	FB	C8	68	18	BB	
2689:A5	FB	A8	A5	FA	38	E9	28	BF	28B9:00	19	20	C8	13	20	C8	13	9E	2AE9:65	FA	85	FA	90	0C	E6	FB	8E	
2691:B0	02	C6	FB	C5	FC	D0	06	19	28C1:F0	09	AD	1B	D4	8D	01	D4	E7	2AF1:D0	08	91	FA	E6	FA	D0	02	59	
2699:A5	FD	C5	FB	F0	07	A9	02	A9	28C9:4C	8E	15	A9	10	8D	04	D4	B4	2AF9:E6	FB	E6	FC	D0	CF	E6	FD	FE	
26A1:20	60	15	F0	2D	A5	A9	38	53	28D1:A9	38	8D	F8	1F	A9	39	8D	E5	2B01:D0	CB	A9	D8	85	FB	A0	00	D2	
26A9:E5	A7	85	B0	A5	AA	E5	A8	DA	28D9:F9	1F	A9	18	8D	00	D0	8D	41	2B09:84	FA	B9	BF	2C	84	FE	A0	A5	
26B1:85	B1	A0	04	46	B1	66	B0	F7	28E1:02	D0	A9	32	8D	01	D0	8D	5F	2B11:00	91	FA	48	A4	FE	B9	C0	05	
26B9:88	D0	F9	E4	B0	F0	13	A5	21	28E9:03	D0	A9	00	8D	10	D0	A9	1D	2B19:2C	85	FF	A8	68	88	FE	F0	05	BD
26C1:A7	18	69	10	85	A7	90	02	04	28F1:01	8D	15	D0	A9	03	8D	17	61	2B21:91	FA	38	B0	F8	A5	FF	18	87	
26C9:E6	A8	20	61	18	A9	00	20	55	28F9:D0	8D	1D	D0	A9	00	85	CB	EA	2B29:65	FA	85	FA	90	02	E6	FB	A7	
26D1:60	15	68	85	FB	60	20	11	AB	2901:85	CA	E6	CB	A5	CB	C9	33	85	2B31:A4	FE	C8	C8	C0	42	90	D2	42	
26D9:15	A5	A8	C9	90	D0	10	A5	59	2909:90	1B	A9	00	85	CB	A4	CA	0F	2B39:A9	08	85	FB	A9	1C	85	FD	9D	
26E1:A7	D0	0C	A9	40	A0	10	99	90	2911:B9	7A	0B	8D	27	D0	B9	7C	85	2B41:A9	11	85	FC	A0	00	84	FA		

PROGRAMS

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2B81:A9 13 85 FB B1 FC 91 FA 81
2B89:E6 FC D0 02 E6 FD E6 FA C4
2B91:D0 02 E6 FB A5 FB C9 1C 3A
2B99:90 EA A9 65 8D 14 03 A9 EA
2BA1:FA 8D 15 03 58 20 7D FF E9
2BA9:0E 0B 00 A9 00 85 D0 85 A1
2BB1:D1 4C 58 0B 00 0D 4A 49 D1
2BB9:47 53 41 57 20 20 02 19 C4
2BC1:20 45 0D 09 0C 20 48 05 22
2BC9:19 12 0F 16 13 0B 19 00 6B
2BD1:0F 63 63 63 63 63 63 00 9A
2BD9:15 49 0E 20 14 08 09 13 B6
2BE1:20 13 03 12 05 05 0E 3A 21
2BE9:00 19 03 15 12 13 0F 12 45
2BF1:20 0B 05 19 13 20 01 0E 76
2BF9:04 00 19 D2 C5 D4 D5 D2 A2
2C01:CE 20 14 0F 20 13 05 0C 9F
2C09:05 03 14 2E 00 17 C4 20 10
2C11:0E 05 17 20 04 09 13 0B 0C
2C19:2E 00 1D D1 20 11 15 09 C1
2C21:14 2E 00 21 49 0E 20 4A 2E
2C29:49 47 53 41 57 20 13 03 DA
2C31:12 05 05 0E 3A 00 17 C9 1F
2C39:2C CA 2C CB 2C CC 20 0D 7E
2C41:0F 16 05 0B 1C 06 12 01 65
2C49:0D 05 2E 00 22 D3 D0 C1 F2
2C51:C3 C5 20 0D 01 12 0B 20 58
2C59:26 20 13 17 01 10 00 17 FF
2C61:14 17 0F 20 10 09 05 03 1F
2C69:05 13 2E 00 1D 9F 20 15 8B
2C71:0E 0D 01 12 0B 20 01 20 50
2C79:13 05 0C 05 03 14 05 04 E4
2C81:00 15 10 09 05 03 05 2E 1E
2C89:00 22 C8 C5 CC D0 20 08 D1
2C91:05 0C 10 2E 00 1E C3 20 74
2C99:03 0F 0E 06 09 12 0D 2E 32
2CA1:00 1E D3 D4 CF D0 20 02 4D
2CA9:01 03 0B 20 14 0F 20 14 D7
2CB1:08 09 13 00 17 13 03 12 CF
2CB9:05 05 0E 2E 00 00 0E 0D A3
2CC1:07 06 0E 3D 07 0F 0E 41 86
2CC9:03 06 0E 22 03 01 0E 27 68
2CD1:03 01 0E 27 07 11 0E 17 CF
2CD9:03 01 0E 01 03 01 0E 01 FE
2CE1:03 01 0E 01 03 01 0E 49 4F
2CE9:03 05 0E 4B 03 01 0E 4F 03
2CF1:03 04 0E 24 03 01 0E 27 30
2CF9:03 04 0E EC 0D 27 0E 51 D7
2D01:00 00 00 00 00 00 00 5B

```

Emil Heyrovsky, 19, is a mathematical engineering student at Prague Polytechnic in the Czech Republic.

SPLAST

By William F. Snow

Splast is an enjoyable way to practice spelling words. There are a lot of spelling programs around, but Splast has some advantages. It's both fun to play and challenging. Because Splast presents the words in the same format used by some popular standardized tests, it's also great practice for taking tests!

Splast is written in BASIC. To help avoid typing errors, enter the program

with The Automatic Proofreader. See "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before you attempt to run it.

How to Use the Program

To play Splast, simply load the program and type *RUN*. The first screen gives instructions for playing the game. The player is then asked to give his or her initials and to choose a level of play.

After a level of play is chosen, the game begins. The Splaster, located at the bottom of the screen, is controlled by a joystick in port 2. Three words are flashed on the screen. Two of them are spelled correctly, and one is misspelled. The player must position the Splaster beneath the misspelled word and hit the fire button. Move fast because the words don't stay on the screen for long. The Splaster launches an arrow at the selected word, so be sure your aim is as accurate as your spelling.

The skill levels are 1-3, with 1 being the easiest. As the levels increase, the time given to find and splast the incorrect word decreases, but the points awarded for each Splasted word increase. The program keeps track of the high score achieved during each session so that players can compete with each other.

After all the words have been presented, you get a screen that gives your score and lists both the words you spelled correctly and the ones you missed. You then have the opportunity to play again or quit.

Because Splast is written in BASIC, it's easy to modify. The words used are in data statements in lines 1340-1360. The program is set to use 25 words. If you use a different number of words, you'll have to make a few changes to the program. You'll need to change the dimension statements and the FOR-NEXT loop in line 20, the FOR-NEXT loops in lines 290 and 310, the CT value in lines 350 and 470, the random number generator in lines 370 and 380, the divisor in line 920, and the FOR-NEXT loops in lines 1090 and 1140.

If all the words in a given list are long, there may be a problem with the right-hand word wrapping around the

screen. This shouldn't happen often, however.

In my fifth-grade classroom, I have a disk with 36 versions of Splast, one for each weekly spelling unit. The children really enjoy using it to study the words. After the program itself is typed in, it really doesn't take long to change word lists. A parent or teacher might even have the child or children type in the words.

SPLAST

```

BM 0 REM COPYRIGHT 1993 - COMP
    UTE PUBLICATIONS INTL LTD
    -ALL RIGHTS RESERVED
RF 10 REM SPLAST BY WILLIAM F.
    SNOW
HD 20 DIMWDS(25),Y(25),RS(25),
    WWS(25),RWS(25):FOR I=1
    {SPACE}TO 25:READ WDS(I)
    :NEXT
GC 30 AS=CHR$(65):ES=CHR$(69):
    IS=CHR$(73):OS=CHR$(79):
    US=CHR$(85):V=53248:SL=5
    4272
MJ 40 FORS=12288 TO 12351:READ
    SP:POKE S,SP:NEXT
PQ 50 FORS=12352 TO 12415:READ
    SP:POKE S,SP:NEXT
EK 60 POKE53280,1:POKE53281,13
    :PRINT"{BLK}{CLR}
    {3 DOWN}"SPC(17)"{RED}SP
    LAST{BLK}"
EM 70 PRINT:PRINT"{4 RIGHT}THE
    OBJECT OF {RED}SPLAST
    {BLK} IS TO FIND THE MIS
    PELLERD WORD";
FQ 80 PRINT" AND '{RED}SPLAST
    {BLK}' IT OFF THE
    {2 SPACES}SCREEN.";
DF 90 PRINT" YOU ARE GIVEN THR
    EE WORDS AT A{2 SPACES}T
    IME.";
BF 100 PRINT" TWO OF THEM ARE
    {SPACE}SPELLERD CORRECTL
    Y AND ONE IS WRONG.";
KS 110 PRINT" YOU MUST POSITIO
    N";
FA 120 PRINT" YOUR'{RED}SPLAST
    ER{BLK}' UNDER THE MISPE
    LLED WORD{5 SPACES}{US
    ING A JOYSTICK ";
BG 130 PRINT"IN PORT TWO) AND
    {SPACE}HIT{2 SPACES}THE
    FIRE BUTON.";
CR 140 PRINT:PRINT"{4 RIGHT}TH
    ERE ARE THREE LEVELS.";
KC 150 PRINT"AS THE LEVELSINCR
    EASE YOU ARE GIVEN";
AQ 160 PRINT" LESS TIME TO
    {5 SPACES}FINDERD INCO
    RRECT WORD.
GD 170 PRINTSPC(9)"{4 DOWN}HIT
    ANY KEY TO BEGIN

```

```

CS 180 GET WWS:IF WWS=""THEN18
      N
AS 190 RC=1:INPUT"{CLR}
      {2 DOWN}{3 RIGHT}PLEASE
      ENTER YOUR INITIALS";I
      N$
XJ 200 RC=1:PRINT"{2 DOWN}
      {3 RIGHT}WHAT SKILL LEV
      EL?"
SH 210 PRINT:PRINTSPC(10)"1) B
      EGINNER":PRINT:PRINTSPC
      (10)"2) AVERAGE
EJ 220 PRINT:PRINTSPC(10)"3) E
      XPERT
AS 230 GET PLS:IFPLS="1"ORPLS=
      "2"ORPLS="3"THEN250
DB 240 GOTO230
MB 250 PL=VAL(PLS)
GQ 260 PRINT"{CLR}{5 DOWN}"SPC
      (14)"PLEASE{2 SPACES}WA
      IT":PRINT:PRINTSPC(12)"
      SCRAMBLING WORDS"
JF 270 POKE2040,192:POKEV+21,1
      :POKEV+39,6
GQ 280 POKEV,130:POKEV+1,220
DC 290 FORI=1 TO 25
JP 300 X=INT(RND(.)*25)+1
JC 310 FORCK=1 TO 25:IFX=Y(CK)
      THEN300
KC 320 NEXT CK:Y(I)=X
QF 330 RS(X)=WDS(I):NEXTI
DX 340 CT=1
CJ 350 POKEV+31,0:IF CT>25 THE
      N920
JB 360 ES=0:XA=130:POKEV,XA:GO
      SUB520
QR 370 WG=INT(RND(.)*25)+1:WGS
      =RS(WG):IFWGS=RS(CT)THE
      N370
GM 380 WH=INT(RND(.)*25)+1:WH$
      =RS(WH):IFWH$=WGSORWH$=
      RS(CT)THEN380
QE 390 C=INT(RND(.)*3)+1:ON C
      {SPACE}GOSUB770,780,790
GA 400 IF PL=1 THEN FOR FL=1TO
      25:IF ES=1 THEN460
FM 410 IF PL=2 THEN FOR FL=1TO
      20:IF ES=1 THEN460
PB 420 IF PL=3 THEN FOR FL=1TO
      15:IFES=1 THEN460
EQ 430 CK=0:PRINT"{CLR}
      {7 DOWN}{3 RIGHT}"WOS(1
      )SPC(4)WOS(2)SPC(4)WOS(
      3)
BK 440 CL=0:GOSUB680
FK 450 IF CL=1 THEN GOSUB870
PQ 460 NEXTFL
GA 470 POKEV+31,0:IF CT>25 THE
      N920
JC 480 IF ES=1 THENRW=RW+1:RW$
      (RW)=RS(CT):WWS(CT)=""
KS 490 IF ES<1 THEN GOSUB1330
      :WW=WW+1:WWS(WW)=RS(CT)
      :RN=0
GB 500 CT=CT+1
RE 510 GOTO350
RF 520 WL=LEN(RS(CT)):L=INT(RN
      D(.)*WL+1):LES=MID$(RS(
      CT),L,1):LE=ASC(LE$)
AQ 530 LT$=CHR$(LE)
GH 540 IFLT$=A$ OR LT$=E$ OR L
      T$=I$ OR LT$=O$ OR LT$=
      U$ THEN560
JG 550 GOTO520
KJ 560 RV=INT(RND(.)*5)+1:ONRV
      GOTOS70,580,590,600,61
      0
MX 570 V$=A$:GOTO620
DC 580 V$=E$:GOTO620
PA 590 V$=I$:GOTO620
JG 600 V$=O$:GOTO620
RH 610 V$=U$
MK 620 IF V$=LT$ THEN560
AA 630 RW$=LEFT$(RS(CT),L-1)
EG 640 RM=WL-(L):IFRM<1THEN520
DB 650 LW$=RIGHT$(RS(CT),RM)
EP 660 NWS=RW$+V$+LW$
QB 670 RETURN
JQ 680 JY=PEEK(56320)AND15:FB=
      PEEK(56320)AND16
FX 690 IF JY=7THEN XA=XA+10:IF
      XA>250THEN XA=250
FH 700 IF JY=11 THEN XA=XA-10:
      IF XA<30 THEN XA=30
PF 710 POKEV,XA:IF FB=0 THEN G
      OSUB730:RETURN
FC 720 RETURN
FC 730 POKEV+31,0:POKE2041,193
      :POKEV+21,3:POKEV+2,XA:
      POKEV+40,2
GG 740 FOR Y=220 TO 50 STEP-1:
      POKEV+3,Y
HJ 750 IF PEEK(V+31)AND2=2THEN
      CL=1:RETURN
KG 760 NEXT:RC=0:POKEV+21,PEEK
      (V+21)AND(255-2):GOSUB1
      300:RETURN
QF 770 WOS(1)=NWS:WOS(2)=WGS:W
      OS(3)=WHS:CW=1:RETURN
PR 780 WOS(1)=WGS:WOS(2)=NWS:W
      OS(3)=WHS:CW=2:RETURN
MB 790 WOS(1)=WGS:WOS(2)=WHS:W
      OS(3)=NWS:CW=3:RETURN
PX 800 PRINT"{CLR}{12 DOWN}
      {4 RIGHT}YOU SPLASTED T
      HREE IN A ROW"
SC 810 PRINT:PRINT"{8 RIGHT}WI
      THOUT A MISTAKE !!!":FO
      R RC=1 TO 2500:NEXT
HD 820 RC=0:PRINT"{CLR}":POKE5
      3281,1:POKEV+40,0:FORWA
      =1 TO 500:NEXT
KM 830 FORI=1TO15:PW=INT(RND(.
      )*50):PRINTSPC(PW)"
      {BLK}NICE GOING!":NEXT
HE 840 FOR WA=1 TO 2000:NEXT:P
      OKE53281,13
BS 850 POKEV+21,PEEK(V+21)AND(
      255-2):POKEV+29,0:POKEV
      +23,0:CW=0:POKEV+3,0
BM 860 GOSUB1330
PB 870 IFXA<109 AND CW=1 THEN
      {SPACE}GOSUB1170:ES=1:R
      ETURN
PQ 880 IFXA<205ANDXA>109ANDCW=
      2THENGOSUB1170:ES=1:RET
      URN
HP 890 IF XA>189 AND CW=3 THEN
      GOSUB1170:ES=1:RETURN
EM 900 IF ES=0 THEN GOSUB1300
BD 910 POKEV+21,PEEK(V+21)AND(
      255-2):POKEV+3,0:RC=0:R
      ETURN
BS 920 RP=INT((RW/25)*100):POK
      EV+21,0
SS 930 PRINT"{CLR}{2 DOWN}YOU
      {SPACE}SPLASTED "RP"% O
      F THE WORDS"
HB 940 PRINT"{DOWN}{2 RIGHT}TH
      E WORDS YOU GOT CORRECT
      ARE":PRINT
SK 950 FORI=1 TO RW:PRINTRW$(I
      ),:NEXT
SE 960 PRINT"{HOME}{15 DOWN}
      {2 RIGHT}THE WORDS YOU
      {SPACE}GOT WRONG ARE":P
      RINT
GE 970 FORI=1 TO WW:PRINTWWS(I
      ),:NEXT
KR 980 PRINT:PRINTSPC(8)"{WHT}
      HIT ANY KEY TO CONTINUE
      {BLK}"
QK 990 GET WWS:IF WWS=""THEN99
      0
CF 1000 PRINT"{CLR}{5 DOWN}"SP
      C(13)INS"'S SCORE WAS
      {SPACE}"SC
ES 1010 PRINT:PRINT"{3 SPACES}
      THE BEST SCORE FOR THI
      S SESSION IS"
HR 1020 IFINS=HNS$THEN1040
DC 1030 IFSC=HSTHENPRINT"
      {4 SPACES}A TIE BETWEE
      N "INS" AND "HNS" WITH
      "SC:GOTO1060
HB 1040 IFSC>HSTHEN HS=SC:HNS=
      INS
PR 1050 PRINT:PRINTSPC(15)HNS"
      'S{2 SPACES}"HS
GE 1060 PRINT"{5 DOWN}
      {3 SPACES}WOULD YOU LI
      KE TO TRY AGAIN (Y/N)"
EF 1070 GET PA$:IF PA$="Y"OR P
      A$="N"THEN1090
SH 1080 GOTO1070
JE 1090 IF PA$="Y"THENFORER=1T
      O25:Y(ER)=0:RW$(ER)=""
      :WWS(ER)="" :NEXT
XM 1100 IFPA$="Y" THEN RW=0:WW
      =0:SC=0:GOTO200
BE 1110 PRINT"{CLR}{6 DOWN}IS
      {SPACE}THERE ANYONE EL
      SE WHO WANTS TO PLAY?"
      :PRINTSPC(15)"(Y,N)"
JG 1120 GET PB$:IF PB$="Y"OR P
      B$="N"THEN1140
GH 1130 GOTO1120
PD 1140 IF PB$="Y"THENFORER=1T
      O25:Y(ER)=0:RW$(ER)=""
      :WWS(ER)="" :NEXT
EB 1150 IFPB$="Y"THENRW=0:WW=0

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PROGRAMS

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:SC=0:GOTO190
RJ 1160 END
BC 1170 IF PL=1 THEN SC=SC+10
QS 1180 IF PL=2 THEN SC=SC+12
EE 1190 IF PL=3 THEN SC=SC+15
JQ 1200 RN=RN+1:FOR LL=SL TO S
L+24:POKE LL,0:NEXT:PO
KE SL+24,15
XK 1210 POKE SL+5,64:POKE SL+6
,136
RP 1220 POKESL+1,28:POKE SL,49
:POKE SL+4,33:FOR SN=1
TO 750:NEXT
FP 1230 POKESL+1,38:POKESL,38:
POKESL+4,33:FORSN=1TO7
00:NEXT
FM 1240 POKE SL+4,32:FOR T=1 T
O 50:NEXT
EH 1250 POKE SL+1,56:POKE SL,9
9:POKE SL+4,33:FOR SN=
1 TO 700:NEXT
SF 1260 POKE SL+4,32:FOR T=1 T
O 500:NEXT
CB 1270 POKEV+21,PEEK(V+21)AND
(255-2):POKEV+3,0
FD 1280 IF RN=3 THEN GOSUB800:
RN=0
BD 1290 RETURN
AQ 1300 FORLL=SLTOSL+24:POKELL
,0:NEXT:POKESL+24,15:P
OKESL+5,34:POKESL+6,20
0
XD 1310 POKESL+1,8:POKESL,97:P
OKESL+4,33:FORSN=1TO17
00:NEXT:POKESL+4,32
EM 1320 FOR SN=1 TO 50:NEXT:RN
=0:RETURN
MC 1330 PRINT"[CLR]":FORRC=1 T
O 1000:NEXT:ES=1:RETUR
N
DP 1340 DATAGRACE, GRAZE, WHALE,
BRAKE, OPERATE, MISTAKE,
ESCAPE, GRAPES, SAFELY
FR 1350 DATACRAZY, BREAK, GREATE
ST, FARE, SCARE, SQUARE, C
OMPARE, PREPARING, SCARC
E
KM 1360 DATACANARY, RARELY, RELA
TED, RELAXATION, REPUTAT
ION, BARE, RARE
DX 1370 DATA000,000,000,000,00
0,000,000,000
BP 1380 DATA000,000,000,000,00
0,024,000,000
XJ 1390 DATA024,000,000,024,00
0,000,024,000
HJ 1400 DATA000,024,000,062,02
4,124,002,024
HJ 1410 DATA064,002,024,064,00
2,024,064,127
AQ 1420 DATA255,254,064,060,00
2,064,060,002
CB 1430 DATA066,060,066,064,06
0,002,067,255
QB 1440 DATA194,071,255,226,07
9,255,242,000
HC 1450 DATA000,000,000,000,00

```

```

0,000,000,000
MC 1460 DATA000,000,000,000,00
0,000,000,000
HE 1470 DATA000,000,000,008,00
0,000,028,000
KC 1480 DATA000,042,000,000,07
3,000,000,073
MA 1490 DATA000,000,073,000,00
0,008,000,000
EG 1500 DATA008,000,000,008,00
0,000,008,000
AX 1510 DATA008,008,000,000,00
8,000,000,008
GS 1520 DATA000,000,008,000,00
0,008,000,000

```

William Snow, the author of Scud, is a teacher. He lives in McHenry, Illinois. □

ONLY ON DISK

In addition to the type-in programs found in each issue of the magazine, Gazette Disk offers bonus programs. Here's a special program that you'll find only on this month's disk.

Brush Strokes

By Maurice Yanney
Lebanon, PA

The object of this arcade-style game for the 64 is to guide a number of randomly moving paint brushes over empty boxes that need painting. With a joystick in port 2 you control a pencil that draws or erases lines on the screen. Since the brushes can't cross a line, you can maneuver them toward the boxes.

Of course, it's not as easy as it sounds. If a brush touches a pencil, the pencil is ruined. You have only so many pencils during a game. Boxes must be painted within a time limit, too, so keep an eye on the clock. When you finish painting one level, you move on to another with an extra brush and set of boxes added each time you advance.

You can have this program, our PD picks, and all the others that appear in this issue by ordering the October Gazette Disk. The U.S. price is \$9.95 plus \$2.00 shipping and handling. Send your order to Gazette Disk, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

TYPING AIDS

MLX, our machine language entry program for the 64 and 128, and The Automatic Proofreader are utilities that help you type in Gazette programs without making mistakes. To make room for more programs, we no longer include these labor-saving utilities in every issue, but they can be found on each Gazette Disk and are printed in all issues of Gazette through June 1990.

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

Write to Typing Aids, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

ATTENTION WRITERS PROGRAMMERS

Gazette wants to purchase and publish your utilities, applications, games, educational programs, and tutorial articles. If you've created a program that you think other readers might enjoy or find useful, send it and the documentation on disk to the following address.

Gazette Submissions Reviewer
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919-275-9809
Please enclose an SASE if you want to have your material returned.