The Summer Consumer Electronics Show

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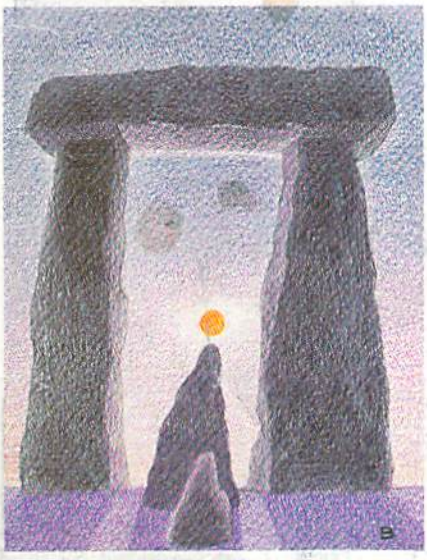

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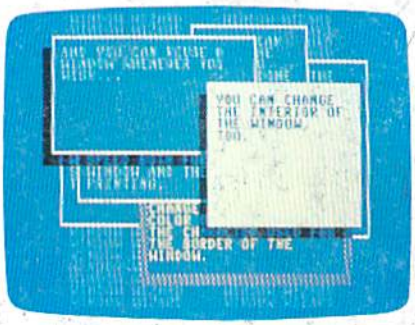

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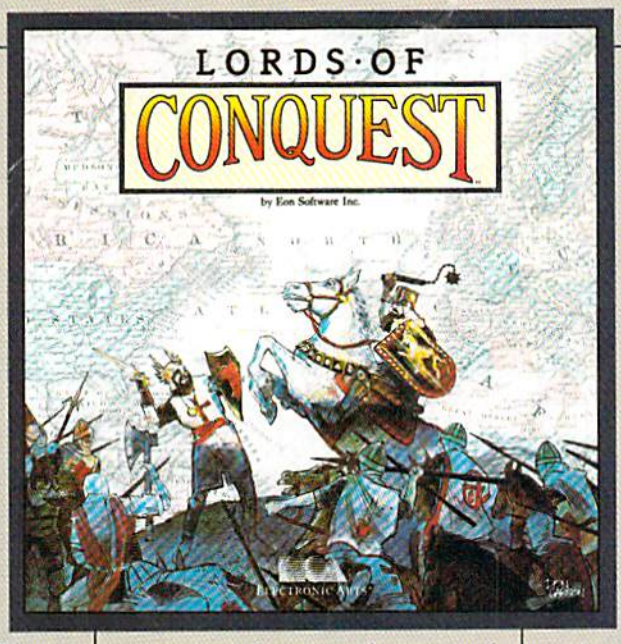

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If you own a C-64, you

The one you purchased. And the

GEOS realizes the technical potential that has been in the C-64 all along. Speed. Power. Ease of use. Sophistication. Elegant, practical applications you might expect of a high-end personal computer, all made possible with GEOS. It's so simple—but then, so was fire. Once it caught on.

To begin at the beginning. **GEOS** stands for **GRAPHIC ENVIRONMENT OPERATING SYSTEM.** Why?

GRAPHIC: Because menus and icons replace long, typed command lines. Point and click, that's it.

ENVIRONMENT: Because GEOS provides a consistent, powerful way to use your computer. Learning new applications is a snap (or should we say click).

OPERATING SYSTEM: Because GEOS orchestrates every function so that they all work together systematically, even symphonically.

Some basics. Icons are graphic images which represent files or utilities. Each is different, and all are easy to recognize and easy to use.

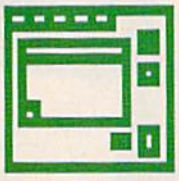
A menu is just that: a list of functions available for selection. When a menu appears, move the pointer to any item you wish. Click. Click. You're on your way.

A pointer is used to select and activate items. To move the pointer, roll the mouse or trackball or rotate the joystick. Once on target, click once to select; click a second time to activate.

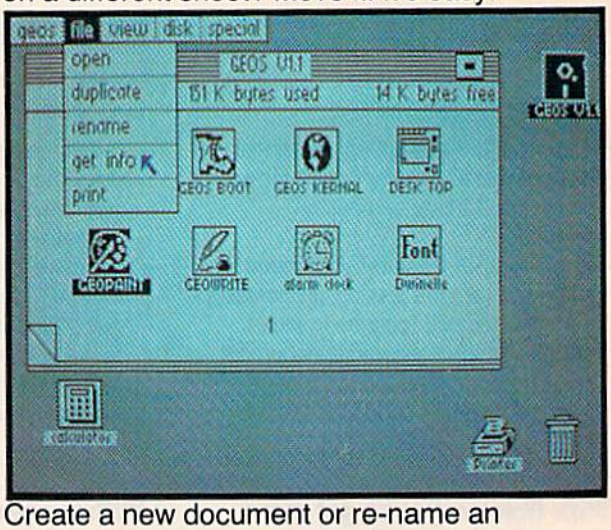
Fonts are a new way of looking at text. Choose from 5 different fonts (with more on the way). Try Dwinelle, or Roma, **bold,** or *italics,* even underline and outline. Need to fit more words on a line? Pick a smaller point size, like University 6 point, and get over one hundred characters per line.

All this and fast too. Because the integrated diskTurbo software improves 1541 disk drive performance 5 to 7 times. That's right. On both reads and writes.

GEOS can be divided into 4 areas: two functional aspects (deskTop and Desk Accessories), and two major applications (geoPaint and geoWrite).



deskTop. deskTop is a graphic interface, making file organization and management easy. As always, you call the shots. Load a disk. Files appear as icons on the disk notepad; to flip through, point at the folded corner and click. Prefer a file appear on a different sheet? Move it. It's easy.

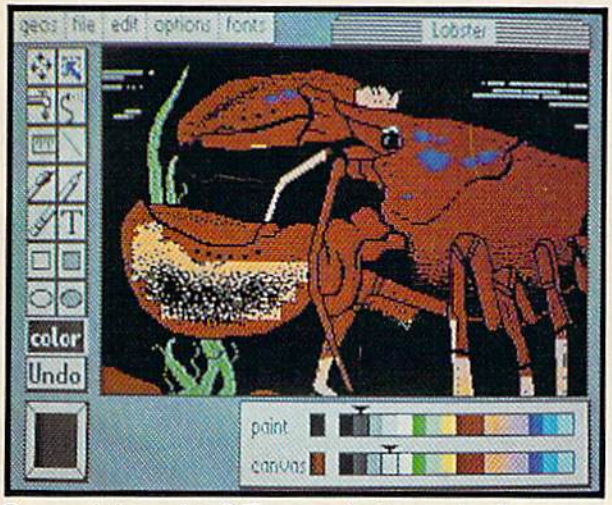


Create a new document or re-name an existing one. Want to copy a file onto the same or a different disk? Fine. Forgotten what a file contains? Select "get info" from the file menu. A description of that file's contents appears. Finished with a file? Print it. Save it. Or drop it in the trash and have done with it. Your call.

geoPaint. A full-featured, color graphics workshop at your fingertips. The pointer operates any one of the fourteen graphic tools and shapes in the drawing menu. Create masterpieces on the Drawing Window. By turns, use a pencil, an airbrush or a paint brush, each with a character all its own. Draw straight lines, squares, rectangles or circles. Fill in with any of the 32 patterns. Switch to pixel-mode, where each dot in a selected section is magnified many times its size for easy manipulation.

own two Machines.

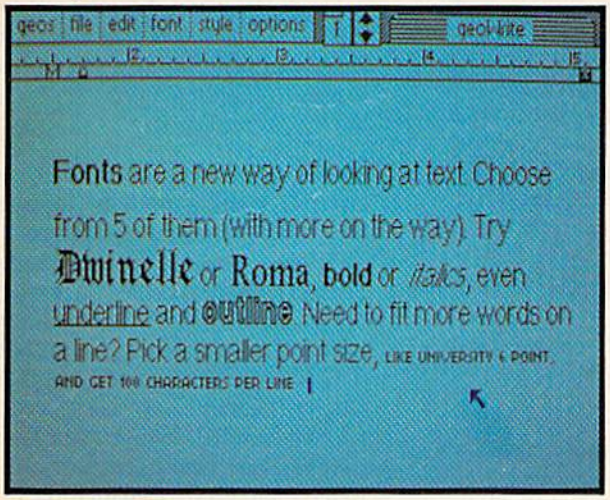
personal computer GEOS™ unlocks.



Second thoughts? Erase what you don't want. Or "UNDO" your last act. (If only life could imitate art!)

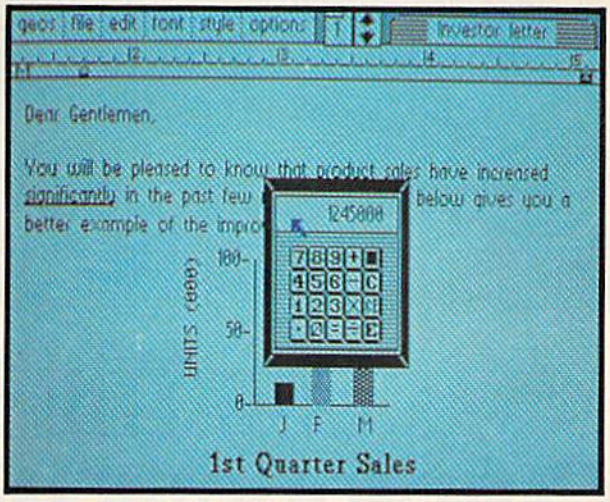
Add text if you like, in different fonts, styles or point sizes. Even change its position or layout at will.

Move or copy any part of your creation. Once done, you can include your artwork in another document—a letter home perhaps. (Won't Mother be pleased?) GEOS makes it easy.



geoWrite. An easy to use, "what you see is what you get" word processor. Create documents. Insert, copy, move or delete text as you wish. Choose from 5 different fonts in many different styles and point sizes. Preview your page exactly as it will appear off the printer. Typists will appreciate tabs, word-wrap and page breaks.

Documents may contain up to 64 pages. What's more, you can move to any page instantly. If you like, you can cut selected text from one section and move or copy it to another. Add graphics from geoPaint. It's a cinch.



Desk Accessories. Handy programs you can use while in any GEOS application. These include an alarm clock, a notepad for reminders, a four-function calculator, and photo and text albums which store pictures and phrases you may then paste into applications. The Preference Manager even lets you establish parameters for everything from mouse speed to the date and time—even background color. Civilized options, every one.

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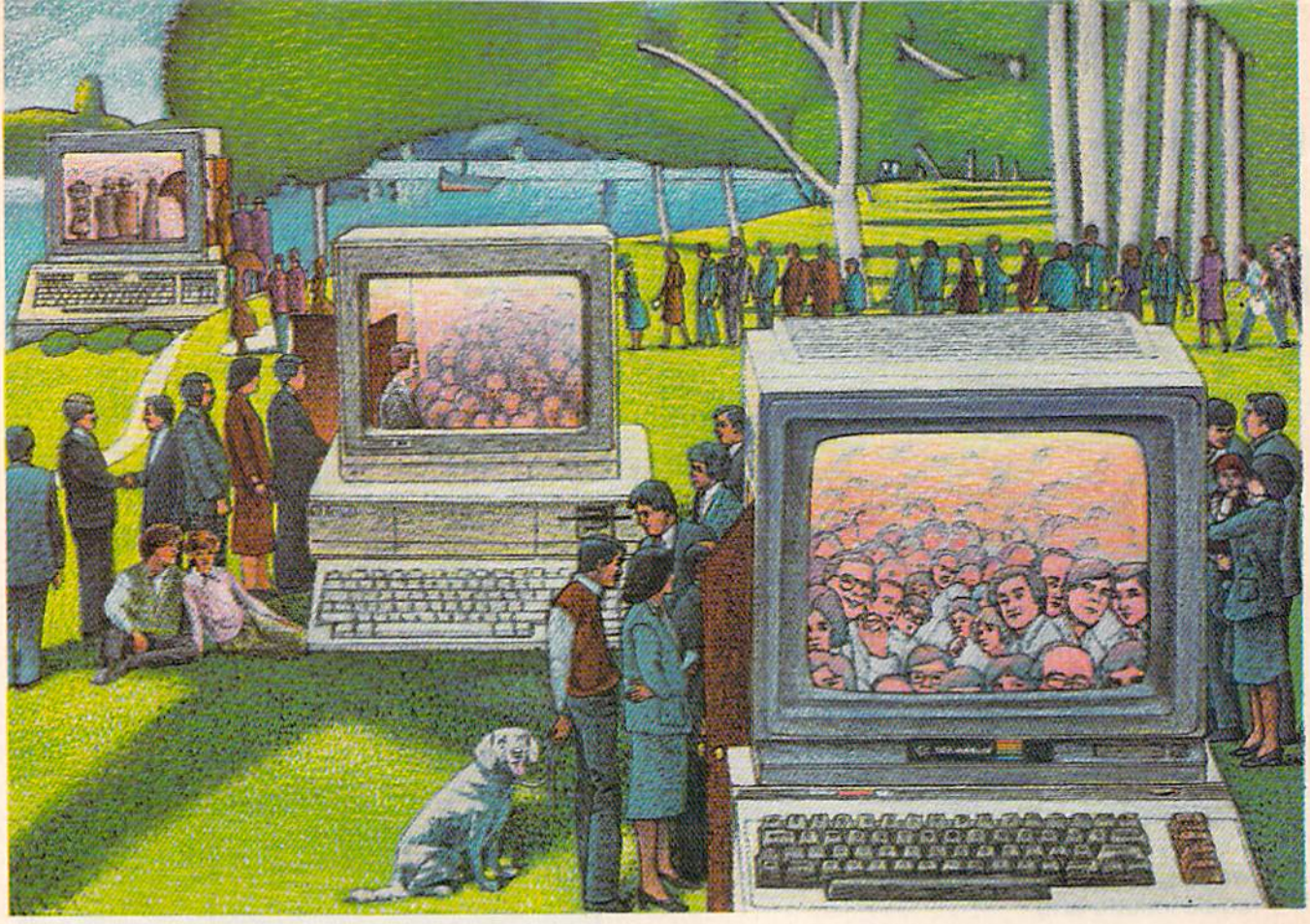

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*=General, **V**=VIC-20, **64**=Commodore 64, **+4**=Plus/4, **16**=Commodore 16, **128**=Commodore 128

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editor's notes

The recent Summer Consumer Electronics Show was both interesting and disappointing. Last year at this time, the industry was reeling from a tremendous downturn in sales growth, and the resulting shakeout had otherwise stable vendors describing those times as the end of the entire personal computer industry. A year later, we're still here, and the doom and gloom forecasters have retrenched. We're a wiser, more mature, and perhaps more stable industry, and the attitude among the exhibitors at the show was much more upbeat. We heard talk of steadily improving sales, enthusiasm for new products, and a better holiday season on the horizon. We also heard a general level of enthusiasm for the hard-charging Atari Corporation, and a more specific level of disappointment at the Commodore showing. Atari had a large and impressive booth, impressive in that it contained dozens of smaller exhibits where independent vendors demonstrated software for the ST series. Visitors thus immediately encountered a tremendous amount of activity encompassed in a group of highly supportive people.

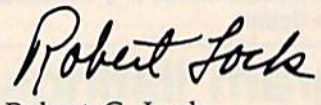
The Commodore appearance evoked a mixture of concern and amazement. Remember, we're talking about a company here with an active, enthusiastic installed base of literally millions of computers. We're talking about a computer series called the 64 that just keeps going, the 128 with a success record that we suspect even impresses Commodore, and the Amiga. One of the most technologically superior computers on the market, the Amiga continues to suffer at the hands of the superior marketing attack of the Atari-led Tramiels.

Commodore continues to insist that the Amiga is a business machine. One must assume that this is the reason none was present at CES. In the Commodore suite, only 64s and 128s were visible. It was simply amazing. And very quiet when we were there. The seeming lethargy in market positioning that has stricken Commodore since the introduction of the Amiga is one of the most shocking turnabouts we've witnessed in the modern history of this industry. One wonders whether the bankers have begun to call the strategic shots at Commodore.

We think that it is important to this industry as a whole that Commodore is, and continues to be, a viable player. Do not misunderstand. We saw nothing at CES that says it is not a viable company. We simply question the wisdom of its continued refusal to open up the Amiga market. Obviously such a decision is Commodore's, not ours, and obviously we're on the outside, but one can only marvel at the continued growth and success of Atari and the relative demise of the Amiga.

Last summer this time, both the ST and the Amiga were launched from an installed base of zero. Now, as we conclude the first year of product delivery, we find the ST with an installed base of roughly ten times that of the Amiga. Not a very stirring record. During this one-year period, the ST has grown, evolved, expanded to include the 1040, undergone in Tramiel-like fashion a predictable series of aggressive price cuts, expanded marketing outlets, etc. We've seen it all happen before with the VIC and the 64, but it's still quite impressive when it works.

Contrast with this the concurrent introduction of the Amiga. It was categorized, or defined, as a business machine. Its prices have changed only minimally. It has, to put it politely, withered. As we said, we think this industry needs Commodore, and it needs the vision and direction that a Commodore can help provide. We do not want it to be too late. Maybe if you gentlemen and ladies would just nudge the Amiga a little bit toward the consumer market, you'd be pleasantly surprised. Perhaps a price cut here, a market incursion there. You get the picture. You've got millions of users out here looking to you for technological leadership. Thanks. ©



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

Names And Values

Can you describe the BASIC words LET and GET?

Mark Reynolds

A variable has two parts: a name and a value. After assigning a value to a variable, you can use the variable name within a BASIC program and the computer will automatically substitute the value. Both LET and GET assign values. Here are some typical LET statements:

```
LET A = 5
LET B = INT(E+F/H)
LET TV = TV + 8
LET A$ = "THIS IS A STRING."
LET GQ$ = MID$(PB$,3,2)
LET YM$ = YM$ + CHR$(13)
```

The first example assigns a numeric value to a numeric variable called A. From this point on, A represents the number 5. The second shows the function INT, which rounds down to the nearest whole number, operating on a calculation. The variables E, F, and H would have been given values earlier in the program. The third example shows how to modify an existing variable. In this case, we're adding eight to the value in TV and putting the new number back into TV.

The final three examples illustrate some ways to use LET with string variables, which are always marked by a dollar sign after the variable name. A string variable holds a series of characters—words, letters, numbers, and so forth.

You don't see LET very often in BASIC programs because it's always optional, at least on Commodore computers. LET A = 5 does exactly the same thing as the shorter expression A = 5.

GET also puts a value into a variable, but it gets the value (a single letter or number) from the person using the program. Within a program you might print a list of options, tell the user to pick number 1, 2, or 3, and then use GET to find out which key was pressed. GET is always followed by a variable name:

```
10 GET A$
50 GET B$: IF B$ = "" THEN GOTO 50
```

GET does not wait for a key to be pressed, so in line 10 the GET will probably assign a null string to variable A$. A null string is an "empty string" which has a length of zero. Line 50 checks to see if B$ is null and keeps looping back to line 50 again and again until the user presses a key. Then the program continues.

Abbreviations

It seems to me that most BASIC commands are either full English words or the shortened form of a word: OPEN opens a file, CLR clears memory, and ABS finds the absolute value. But I can't figure out what SYS and CMD represent.

Jimmy Wong

SYS calls a machine language program and exits the BASIC interpreter. This means you've gone to the machine (or SYStem) level.

CMD redirects output, allowing you to LIST a program or send other information to a printer or disk drive. We've heard it pronounced "command," but that doesn't describe its function very well. Unless a reader can come up with a plausible suggestion, we can assume CMD has no corresponding long form.

Quote Mode

Why is it that when I'm programming in quote mode, when I use RVS ON and RVS OFF, I sometimes get a reversed *R* and other times everything I type is reversed?

Wesley H. Ferrell

Typing quotation marks (SHIFT-2) toggles quote mode on and off. Inside quote mode, RVS ON and RVS OFF show up as reversed characters; this can be very useful in PRINT statements or when you're assigning values to strings. When you're not in quote mode, RVS ON and RVS OFF perform their normal function.

The first time you type quotation marks, quote mode is turned on. The second quotation marks will turn it off, and so on. In general, if you've typed an odd number of quotation marks, quote mode will be on. If you've typed an even number (including zero), it will be off. Pressing RETURN or SHIFT-RETURN puts the cursor at the beginning of the next line, with quote mode turned off.

The key thing to remember is that it's how many quotation marks you have typed, not how many appear on the line. If you press SHIFT-2 twice, quote mode will be off, because you've typed an even number of quotation marks. If you now press the delete key, one of the quotation marks will be erased. Even though there's only one quotation mark appearing on that line, quote mode is off because you've typed two quotation marks.

After pressing RETURN, you may want to change a line. If you move the cursor to the middle of a string enclosed by quotation marks, the computer won't be in quote mode, because you haven't typed any quotation marks yet. To edit such a line, you may want to hold down the SHIFT key and press the INST/DEL key. This inserts some spaces and puts you in insert mode, which acts almost exactly like quote mode.

Unexpanded Printing

On my 1526 printer I have tried this program:

```
10 OPEN 4,4
20 PRINT#4, CHR$(14); "TEST1";
   CHR$(129); "TEST2"
30 PRINT#4: CLOSE4
```

According to the manual, I should see TEST1 in expanded (enhanced) print and TEST2 in regular print. But both are expanded. Am I using the proper syntax or is my printer malfunctioning?

David K. Sisson

The 1526 manual contains a misprint. Although it says CHR$(129) turns off enhanced mode, it's actually CHR$(15) that sets the printer back to normal. Change the 129 to a 15 in line 20 and the program should work properly.

TRAPping Disk Errors

The 128's TRAP statement doesn't seem to pick up DOS error messages, only BASIC errors. In some of my programs, I want to make sure the program doesn't crash because the user removed the disk from the drive. Any ideas?

Gregory Inns

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You're right. TRAP catches errors only within a BASIC program; it can't tell if something has gone wrong in the disk drive. There are a couple of reserved variables you can use on the 128, though, DS and DS$ (an abbreviation of Disk Status). DS will contain a 0 if everything is OK; otherwise it will hold the number of the error message. When you first turn on the disk drive, DS may be 73. The other variable, DS$, contains the text of the disk error message.

To check for the presence of a disk, use the following subroutine (for the 128 only):

```
800 DCLEAR
810 IF (DS=0) OR (DS=73) THEN
    RETURN
820 PRINT DS$: END
```

Instead of ending the program in line 820, you could print a message, depending on which error occurred. See Appendix B in the 128 System Guide *for a complete list of disk errors.*

Graphics Compatibility

Commodore 64 owners should be aware that the graphics commands for the Super Expander cartridge are nearly identical to those of BASIC 7.0 in the 128. Don't skip over graphics articles such as "Artimation" in the July GAZETTE just because the programs are for the 128. The GRAPHIC and COLOR commands seem to work a little differently (see your manual for acceptable values). And the SLEEP command in line 50 of Program 3 has to be replaced with a FOR-NEXT loop. All other commands in that article work exactly as written.

Russell K. Prater

Thanks for the information. Plus/4 and 16 owners should note that they too can use most graphics programs for the 128, although the COLOR command needs an additional number to indicate luminance level.

Load And Run

I'm puzzled by why you can't do this in a program:

```
10 LOAD "MLPROGRAM",1,1
20 REM PROGRAM CONTINUES...
```

Line 10 won't work unless it looks like this:

```
10 IF A=0 THEN A=1:
   LOAD"MLPROGRAM",1,1.
```

A is apparently a dummy variable; other variable names work. Also, the IF-THEN must be on the same line as the LOAD. Why is the silly IF A=0 statement necessary? And why does it have to be on the line containing the LOAD?

Meyer Gottesman

The following explanation applies to both tape and disk drives. LOAD "PROGRAM",1 loads a BASIC program from tape into memory. For disk drives, you'd LOAD "PROGRAM",8. In machine language (ML), it's often necessary to put a program in a specific section of memory, so you must type LOAD "ML",1,1 or LOAD "ML",8,1. The extra number 1 puts the ML program into the correct spot in memory.

So from immediate mode (typed without a line number), LOAD fetches a program from tape or disk. In the process it also erases all variables. It's up to you to type RUN or SYS.

The LOAD command doesn't act the same way if you include it in a program. Let's say you have a BASIC program called "LION" and it contains the following line:

```
590 LOAD "ZEBRA",8
```

When the first program gets to this line, the LOAD causes the BASIC program ZEBRA to be loaded from disk, but the computer also runs this program. Furthermore, the computer keeps all the variables from LION.

This leads to a couple of potential problems. If the second program is longer than the first, variables are likely to scramble the last part of the program. Say the first program ends at memory location 5010 and the second ends at 6300. Variables from the first program start just past the last byte of the program, at 5010. When the second program is loaded, BASIC wants to keep the variables at 5010, so the next time a variable is defined or changed, the computer writes a value to memory somewhere past 5010. But this is the middle of program two, and the variable may end up overwriting part of the second program. This problem can be solved by POKEing to 45 and 46 at the beginning of the first (shorter) program. (Note that the 128 keeps variables in a completely separate section of memory, so this problem doesn't exist in 128 mode.)

Recall that LOAD from within a program loads and runs the second program. If you load an ML program from inside a BASIC program, a strange thing happens. The second (ML) program loads OK, but when the computer tries to run it, it ends up running the BASIC program that's still in memory. If the first line contains the LOAD, the program loads the ML (again) and runs the BASIC program (again). Then it loads again, runs again, loads again, runs again, and so on, caught in an endless loop.

That's the reason for the IF A=0 THEN A=1 statement. When you first run the BASIC program, A is 0 and the rest of the line is executed (including the LOAD). The computer then runs the program again, with variables intact. This time, A equals 1, so it skips the LOAD and continues with the next line.

The IF-THEN and LOAD must be on the same line because when an IF condition fails, the computer proceeds to the next line (not to the next command). When several statements follow an IF, those statements will execute only if the condition is true.

More About Plus/4 Joystick Adapters

The joystick ports on the Plus/4 and 16 are not the same as the ones on other Commodores, Ataris, and other microcomputers. And Plus/4 joysticks are often difficult to find. After the June "Simple Answers to Common Questions" column appeared, we received information from readers Eyvind Nielsen and Paul E. Gleason that the following companies sell adapter plugs to convert the usual Commodore/Atari joysticks to the Plus/4 plug:

Data+
P.O. Box 17
DK 8970 Havndal
Denmark
($8 U.S., plus $2 for overseas airmail)

Dataline
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Faster VIC Programs

I would like to know if there is a program to translate BASIC programs to machine language on a VIC with a tape drive. If it cannot be done, please explain why.

Denis Lamothe

A compiler *takes a BASIC program and translates it to machine language. The compiled program usually runs much faster than the original program. It's not usually as fast as an ML program written from scratch, however. The compiled program is usually longer than the original BASIC program, also.*

It's certainly possible to write a compiler for the VIC, although we don't know of any that are currently available. If you check with a local user group you might be able to find a public domain VIC compiler. Most likely it would require maximum memory expansion and a disk drive.

There are several compilers available for the 64 and 128 (see the next letter). The compiled programs they generate would not be compatible with the VIC, however.

Faster 64 Programs

I typed in the "Budget Planner" program from the July issue. It works as advertised. But I found it to be slow, especially in listing the budget items and calculations. After using the Blitz

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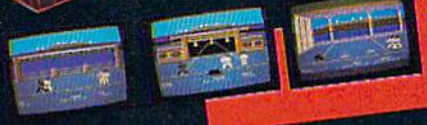

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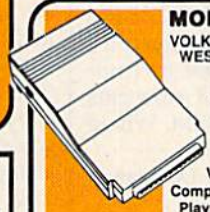

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compiler, it works amazingly fast. You should make your readers aware that compiling really improves this program.

Allan MacDonald, Jr.

Thanks for your comment.

Reinking Ribbons

As an owner of the MPS-801, I am aware that Radio Shack has a compatible ribbon for their DMP-110, item #26-1283, at approximately half the price of the Commodore ribbon. But I find myself unwilling to throw the old ribbons away, as they seem to be perfectly OK (except for ink). Is there some way of reinking the ribbon? What kind of ink would be best?

Bill Palmer

Here's a technique that seems to work well. First, remove the ribbon from the printer and spread some newspaper on the table; this may be a little messy. Spray a small amount of WD-40 (a lubricant/solvent available in most hardware stores) on the ribbon and turn the knob to advance it. Spray some more WD-40, advance the ribbon, and so on. The WD-40 spreads the ink around, moving it from the top and bottom of the ribbon to the middle where the printhead hits it. This only works on cloth-type ribbons. It won't work with film ribbons, which are found on printers such as the 1526 and MPS-802.

Lost Sprite Collisions

When I use the sprite collision locations 53278–53279, the computer sometimes doesn't detect the sprite hitting something the first time. I'm making a game where you try to shoot targets. I have to shoot them twice for the computer to know I shot them. How do you fix this?

David Whipple

The sprite collision locations have a couple of quirks you should know about. PEEKing 53278 or 53279 clears that location to zero. It will be updated again, to show where collisions are occurring, the next time the screen is redrawn (every one-sixtieth second). This doesn't usually adversely affect BASIC programs, but it can be a source of trouble in machine language routines, especially if you have to check for multiple collisions. A way to work around this feature is to PEEK the register and save it in a variable (or POKE it to a memory location).

If you're using sprites that have only one color, the foreground of one sprite must collide with the foreground of another sprite or character for a collision to be triggered. If part of the sprite is invisible (displayed in the background color), that part of the sprite can't collide with anything.

The same rules apply to multicolor sprites, but there's a twist. Colors 00 (background) and 01 (multicolor 0 from location 53285) can't be involved in collisions, because they both count as background colors. Even though you can see multicolor 0 on the screen, it will never trigger a collision.

BOOTing In 128 Mode

I buy your COMPUTE!'s GAZETTE DISK and I have a problem. When I load the disk on my 128 I see a lot of garbage on the screen and have trouble loading the program. In 64 mode I get a good menu. What's wrong?

Boyd C. Yaden

In 64 mode, type **LOAD"MENU",8,1** *to load and run the GAZETTE DISK's menu program. This program is written for the VIC and 64; it won't work in 128 mode.*

For 128 users, the GAZETTE DISK contains a boot sector which loads and runs the program called "128 MENU". Insert the disk into your 1541 or 1571 and press the reset button. Or type **BOOT**. *Or, to bypass the boot sector,* **RUN "128 MENU"**. *The 128 menu program is written for the 40-column screen; it won't work correctly with 80 columns.*

80-Column RGB Cables

I have a Commodore 128 and a Sony monitor. I'd like to be able to use its RGB display but haven't been able to locate an adaptor for the 128. I have found an IBM cable made by Sony; if I were to rewire it, could I use it? I noticed the 128 has a couple of extra pins which are not used on the IBM. Where would I connect these pins?

Don Deverman

The IBM cable should work as is; no modifications are necessary. Commodore wisely chose the IBM pin configuration when the 128's 80-column RGB output was designed. Users of the 128 should note that this answer applies to almost any RGB monitor. If you can find an IBM-compatible cable for your RGB monitor, just plug one end into the 128 and the other into your monitor.

The one additional pin in the 128 connector is an 80-column monochrome output, for use with green or amber monitors. The monochrome display can also be sent to a composite monitor (the Commodore 1701 or 1702, for example), where it will appear as 80 columns in black and white. Since you have an RGB color monitor, you can ignore the monochrome pin.

Random Access

Could you explain relative files to me? I'm having some trouble understanding how they work and how to put them to use.

Steven Fischer

When you're storing information on disk, you can choose between sequential disk files (labeled SEQ in the directory) and relative (REL) files.

The advantage of sequential files is their simplicity. You OPEN the file for reading, INPUT# or GET# the data, and when you're done, CLOSE the file. Sequential files store information in sequence, which can be inefficient in some cases.

Let's say you have 100 names and addresses stored in a sequential file and you want to print two mailing labels, one for name 88 and one for 51. To get to the eighty-eighth record, you'd have to read through the 87 addresses preceding it, which takes time. Next, you'd close the file, open it again, and read through 50 names to find the fifty-first.

With a relative file, you would set the record pointer to 88 and read only the information you needed. You'd then set the pointer to 51 and read the data from that record. Relative files separate information into records you can read and write individually. This makes them more flexible than sequential files, although they're somewhat more difficult to use.

Autoboot For Plus/4

I would like information on how to get an autoboot program for the Plus/4.

R. Gagneron

The following program, for the Plus/4 and 16 only, will create a boot file named "AUTO". When you enter **LOAD "AUTO",8,1** *it will load and automatically run a program called "TEST". If you'd prefer a filename other than AUTO, change the string variable F$ in line 20. Line 10 determines which file is loaded and executed. Certain typing conventions must be followed: To enclose a filename in quotation marks, use apostrophes (' instead of "). Separate the commands with a slash (/). And the final character should be a left arrow (hold down the SHIFT key and press the equal sign (=) key).*

```
ER 10 A$="DLOAD'TEST'/RUN←"
PX 20 F$="AUTO"
FJ 30 R=2:B$="{CLR}":FOR A=1 T
      O LEN(A$)
HP 40 C$=MID$(A$,A,1)
MD 50 IFC$="'"THENB$=B$+CHR$(3
      4):GOTO90
JF 60 IFC$="/"THENFORD=1TO5:B$
      =B$+CHR$(13):NEXT:R=R+1:
      GOTO90
DX 70 IFC$="←"THENB$=B$+CHR$(1
      3):GOTO90
KB 80 B$=B$+C$
BG 90 NEXT A:B$=B$+CHR$(0)
PD 100 OPEN 2,8,2,"AUTO,P,W":P
       RINT#2,CHR$(2);CHR$(3);
       CHR$(52);CHR$(3);
XS 110 FORA=772TO819:PRINT#2,C
       HR$(PEEK(A));:NEXTA
PF 120 FORA=1TO24:READB:PRINT#
       2,CHR$(B);:NEXT:PRINT#2
       ,CHR$(R);
```

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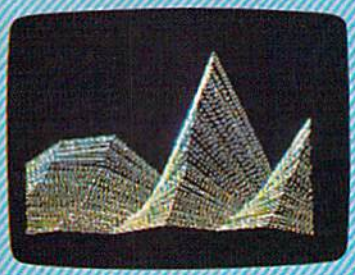

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```
FX 130 FORA=1TO20:READB:PRINT#
       2,CHR$(B);:NEXT
JR 140 FORA=1TOLEN(B$):PRINT#2
       ,MID$(B$,A,1);:NEXT
BP 150 CLOSE2:END
HR 160 DATA 169,18,141,2,3,169
       ,135,141,3,3,160,0,185,
       97,3,240 6,32,210,255,2
       00,208
DM 170 DATA 245,160,132,239,16
       9,13,153,39,5,136,208,2
       50,169,19,141,39,5,162
MB 180 DATA 128,108,0,3
```

Adding Zero

I disassembled one of your machine language programs and found the following series of commands:

```
LDA $05
ADC #$00
STA $05
```

These commands don't seem to do anything. What is the point of adding zero to a number? Would you please explain?

Scott Palmer

Those three instructions load the accumulator with the value in memory location 5, add zero to the number, and store the result back to location 5.

It seems rather pointless to add zero, unless you remember that ADC means "ADd with Carry." ADC adds two numbers and includes the carry flag. If a previous operation left the carry set, adding zero would really add the two numbers plus a one, so the operation would really add one to the number in location 5.

A single byte of memory can hold only the numbers 0–255, so two or more bytes are often used to take care of larger numbers. After adding a number to the low byte, the carry may or may not be set, depending on whether the result is bigger than 255. Adding zero to the high byte takes care of the problem. If the carry is set, the high byte is incremented by one. For example, the fragment of code in your letter might have been part of a longer routine that went something like:

```
CLC
LDA $04
ADC #$0A
STA $04
LDA $05
ADC #$00
STA $05
```

If the result of the first addition (adding 10 to the contents of location 4) exceeds 255, the carry bit will be set when the second addition is performed, so that location 5 will be properly incremented.

Foreign Hardware

I bought a 128 and 1570 a few months ago. Can you tell me what I should get in order to enjoy the 128's 80-column screen in 64 mode? Also, what is the difference between the 1570 and 1571?

Tuli Herscovici

It is possible to write to the 80-column screen while you're in 64 mode, but you'd have to write your own machine language routines to do so (see "SpeedScript-80" in the June issue for a brief explanation). But you should remember that no commercial programs for 64 mode support the 128's 80-column chip, so there wouldn't be much point to using an 80-column driver with commercial software. And if you're writing your own programs, you might as well write them in 128 mode, where 80 columns and FAST mode are easily accessible from BASIC.

The 1570 is a single-sided version of the 1571. Commodore seems to be selling it only in foreign countries; it's not available in the U.S. Like the 1571, it supports burst mode and can read CP/M formats. Disks formatted on the 1570 have 664 blocks free, while 1571 disks have 1328 blocks free.

Do Modems Increase The Phone Bill?

I would like to know how a modem works as far as being billed on your telephone bill.

Rich Ross

Your local telephone company and your long distance service won't add any additional charges if you own a modem. The usual long distance rates apply whether you're calling by voice or calling by modem. Of course, if you use your modem to make a lot of long distance calls, your phone bill will go up as it would if you made a lot of long distance voice calls.

If you join a national service such as CompuServe or QuantumLink, your phone bill probably won't be affected. These services have hundreds of local "nodes," telephone numbers in medium and large cities. You're connected to the service through the local number. You won't pay extra on your phone bill, but you'll have to pay the telecommunications service for connect-time; the rates vary according to the time of day and the speed of your modem, but they're generally in the range of $4–$10 per hour. Many services ask for a credit card number; your charges will show up on your monthly bill.

Another answer is to join a local bulletin board system (BBS). If it's inside your calling area and it's a free board, you won't have to pay anything. Some system operators (sysops) charge a flat fee to join, perhaps $10–$25 per year. Most BBSs don't charge by the hour; once you've joined, you can call whenever you want. Some systems limit you to 30 minutes or 60 minutes per day to prevent members from tying up the line. To find out about BBSs in your area, check with a local user group or call a few computer stores.

A Better Calculated GOTO

I was impressed by the ML program you published in July "Gazette Feedback" that performed a GOTO to a variable. Here's another technique. A friend of mine once lent me his programming notebook where he'd scratched notes when he came across something interesting. One listing caught my eye:

```
60 LN = 500: REM LINE NUMBER
61 POKE 785,188: POKE 786,168
62 POKE LN, PEEK(LN)
63 A = USR(0)
64 END
500 PRINT "LINE 500"
```

My friend said this was a formula for a calculated GOTO on the 64. I tried it out, using all sorts of values for LN in line 60 and it works! The address POKEd in line 61 is right in the middle of the GOTO routine, which makes sense. But I can't figure out the reason for line 62. It seems to be essential to the routine. If you could provide an explanation, I would be grateful. I also hope this program fragment will benefit programmers looking for a simpler calculated GOTO.

Ryan Johnson

The key to this routine is memory locations 20–21 (hex $14–$15), which are used by several ROM routines as temporary storage. The 64 stores both line numbers and memory addresses in low-byte/high-byte format.

When you tell the computer to POKE a number into an address, it converts the address to low/high format and stores the two numbers in locations 20–21. The GOTO routine also makes use of locations 20–21, storing the line number there. By entering the ROM routine in the middle, you fool BASIC into thinking it's already figured out the line number. What's really in locations 20–21 is the memory address leftover from the POKE, which is now treated as a line number for the GOTO.

So why USR instead of SYS? It turns out that SYS needs to be followed by an address, and BASIC stores that address in low/high format in locations 20–21. So if you tried to SYS to the BASIC GOTO routine, the line number in locations 20–21 would be replaced by the memory address you SYSed to. USR, like SYS, starts a machine language program running, but you put the address into locations 785–786 before calling USR. The numbers in locations 20–21 are preserved.

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THE SUMMER CONSUMER

Lance Elko, Editor

After a shaky 1985, the home computer industry appears to have reached a healthy plateau—and a slower, but steadier growth. As you'll see, Commodore 64 and 128 users can choose from an array of exciting new products.

A sure way to check the state of health of the microcomputer market—more specifically the home computer segment—is to attend the Consumer Electronics Show (CES). Held twice a year, January in Las Vegas and June in Chicago, CES is *the* major event of the industry. It's also the largest trade show in the world. It's here that you get a clearer picture of what's happened in the past six months and what to expect in the months ahead.

If you graphed the first four years of growth and activity in the home computer industry, you would see something like that first big hill on an amusement park roller coaster: a sudden 100+ percent annual growth rate in 1982–84 and a quick descent in 1985. In 1986, all signs from the Summer CES point toward stability. As one marketing representative of a major software firm noted, we're now in a period of 10 to 25 percent annual growth, and the industry is likely to continue at this rate into the foreseeable future. While there are significantly fewer software developers than two years ago, those remaining are strong and stable.

Following the 1985 shakeout, the software industry has mirrored the recent increased activity of acquisition and consolidation on the American business scene. For example, Activision is now funding, marketing, and distributing GameStar, Creative Software, and most recently, Infocom. Spinnaker announced that it has acquired the Hayden Software line. And many other companies now have common marketing and distribution.

While many new software packages were introduced at CES, there was not much new hardware. In the weeks preceding the show, Commodore flip-flopped on deciding whether they would be present. Originally, they announced they would be displaying some new products (see the July GAZETTE "Editor's Notes"), then word came that they would not attend, then they would, then they wouldn't, and so on.

As it turned out, Commodore *did* appear, but certainly did not have a dominant presence as in past shows. Rather than having a large booth—the size of a small house at past shows—on the main floor, Commodore opted for a room on the top floor, where they displayed the 128 and the new 64C. The Amiga was nowhere to be found. One source noted that Commodore does not wish to position the Amiga as a home consumer product and so did not consider CES an appropriate show for this machine.

The Amiga's perceived competitor, the Atari ST, was at CES in a big way. Atari had a large booth which was packed throughout the show. ST sales have been quite strong. By May, Atari claimed over 600,000 sales worldwide. And ST software abounded at CES, with dozens of new products announced. (In support of the ST, COMPUTE! Publications announced a new magazine at the show: *COMPUTE!'s Atari ST Disk & Magazine*, which will debut this fall as a bimonthly. It will include a disk

The 64 is still regarded as the machine of choice in the low-end market, and Commodore is betting that the 64C will extend the life of this four-year-old machine several more years.

ELECTRONICS SHOW

bound with the magazine and will sell for $12.95 per issue.)

While Atari is popping the corks, Commodore appears to be huddled in the corner. But perhaps not for long. Shortly before the show, Commodore announced 140 layoffs (a 50 percent payroll deduction) from West Chester headquarters—a move that, to many industry observers, was a signal that the end is in sight. But the mood among Commodore staff members is not so dark. Some noted that the move was a wise one, a trimming back and consolidation that's bound to help the company in the long run.

Despite slow Amiga sales, Commodore has to be happy with the performance of the 128 and 64. Both machines continue to sell well. Nigel Shepherd, general manager of Commodore North America, called the 128 a "sleeper," with over 600,000 worldwide sales in less than a year. The 64 is still regarded as the machine of choice in the low-end market, and Commodore is betting that the 64C will extend the life of this four-year-old machine several more years.

The 64C is internally identical to the 64. The case has been redesigned to look much like the 128: sleek and attractive. A cosmetic change does not make a new computer, but the machine is bundled with what *is* essentially a new computer. *GEOS (Graphic Environment Operating System)*, the disk-based software to be packaged with the 64C, reconfigures the 64's operating system to provide a fast and powerful Macintosh-like environment with icons, pull-down menus, windows, and bitmapped graphics. Originally released for the 64 about five months ago, the *GEOS* version to be included with the 64C has been enhanced and improved. Among other things, color has been added, and a new, more complete manual is included. (For a detailed look at *GEOS*, see "GEOS: The Quiet Revolution" in the June issue, and "The 64C: A New Look For An Old Friend" in last month's issue.)

Also bundled with the 64C is disk-based terminal software for QuantumLink, a telecommunications network for Commodore users only. Access time is very reasonably priced—$9.95 per month for unlimited use of most services. At CES, Commodore and QuantumLink announced four new services for subscribers: American Airlines travel reservations; Reuters NewsView, a national, international, weather, and business news information service which is updated every ten minutes; the Resource Center, an education forum for teachers, parents, administrators, and community groups; and "Habitat," a graphics-oriented, multiplayer "realtime" game.

Produced by Lucasfilms, "Habitat" is an evolving world in which subscribers participate and interact with other users through animated characters, each one unique. At the preview screening presented to the press by Commodore and QuantumLink, a character named Phred, a member of the Avatar race (Avatar is a Hindu term describing the projection of one's spirit or soul into another world), traveled from his house to another, then to the beach, and so on, while encountering other Avatars (other users). In effect, interaction is in realtime with other "real" people in the guise of onscreen characters. As more subscribers join this service, the Habitat world grows, offering more places to visit and more people to meet. (When a user is logged

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The newest members of the Commodore family: the 64C, 1541C disk drive, and 1802 color monitor.

off, his or her character appears as a pillar of stone.) It's a unique concept in telecommunications entertainment—and it's scheduled to debut in late summer.

Commodore also announced a new disk drive and monitor, cosmetically matched (beige casing) to the 64C. The 1541C disk drive is internally identical to its predecessor, the 1541. The 1802 monitor contains features identical to the 1702 with one bonus: 80-column monochrome mode. Prices and availability will be announced.

As expected, there were far more new software titles announced for the 64 than for the 128. However, there were a number of significant packages introduced for the 128. Activision announced the Personal Choice Software line (developed by Creative Software) for the 128. This integrated package includes *Writer's Choice*, *Filer's Choice*, and *Planner's Choice*. Each program is available separately or as a package. Designed to take advantage of the 128's extra features and memory, each of these programs was written to appeal to both the novice and experienced user. Activision representatives claim that brand-new users can begin productive work with these programs in a matter of minutes.

Writer's Choice is a word processor that includes a 50,000-word spelling checker, help screens, and an onscreen preview option so that you can see exactly what a document will look like before it's printed out. *Filer's Choice* is a file manager/recordkeeping system that lets you design onscreen "index cards" and set up a filing system the way you want. Other features include a report writer—from which you can take information from multiple fields—alphabetic and numeric sorts, and various context-sensitive help screens. *Planner's Choice* is a flexible spreadsheet that lets you choose column widths, and offers horizontal and vertical windowing to view various sections of the spreadsheet simultaneously. Available now, each program retails for $39.95. As a three-in-one package, the price is $99.95.

Also available from Activision (and also in the Personal Choice Software line) is *I Am the C-128*. Many Commodore 64 owners will remember *I Am the C-64*, a tutorial program that introduced various features of the computer and some BASIC programming. *I Am the C-128* is an extension of this program, an easy-to-use tutorial for new 128 owners. Available now, it sells for $39.95.

Batteries Included launched two new 128 titles: *PaperClip II* and *HomePak 128*. Each of these, immensely popular in previous 64 formats, takes advantage of the 128's features and memory. *PaperClip II* is a word processor that includes a 20,000-word spelling checker, a built-in telecommunications module to access online services, multiple columns, reverse-video scroll, word-wrap, chaptering, and more. Also, it's completely compatible with 64 *PaperClip* text files. Available now, the suggested retail price is $79.95. *HomePak 128* is three integrated programs on a single disk: a word processor, data manager, and telecommunications module. It's available at $49.95.

Infocom, recently acquired by Activision, introduced its first interactive fiction adventure for the Commodore 128. *Trinity* is an odyssey into a realm where natural physics and magic coexist. Your job is to shape the course—and fate—of human history by arriving minutes before the first nuclear atomic explosion (1945) in the New Mexico desert. It will be available in October at a suggested retail price of $39.95.

Another integrated productivity package announced for the 128 is *TRIO* from SoftSync. *TRIO* is a word processor, database, and spreadsheet. Included are help screens, mail-merge capability, and a 134-page manual. It's currently available for $69.95. Two other 128 packages introduced by SoftSync are *Personal Accountant* and *Accountant, Inc. Personal Accountant* is a package designed for household and small-business use. It uses the traditional double entry bookkeeping method and may be used for checkbook balancing, tracking loans, credit-card purchases, expenses, and IRAs. Included are an amortization table and a database for names, addresses, and other information. It's designed for ease of use—no previous knowledge of accounting is required. Suggested retail price is $34.95. Upscale from *Personal Accountant* is *Accountant, Inc.* Designed for small-business use,

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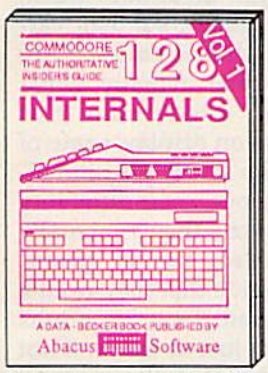

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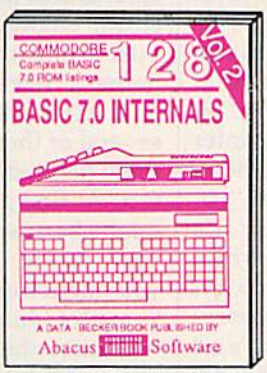

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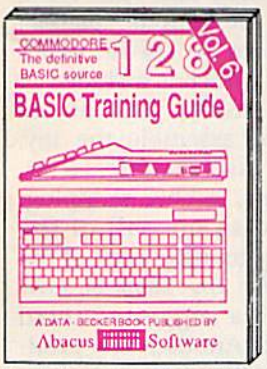

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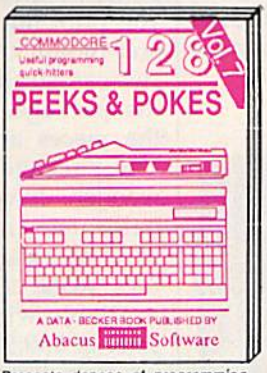

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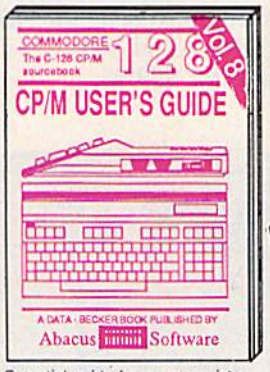

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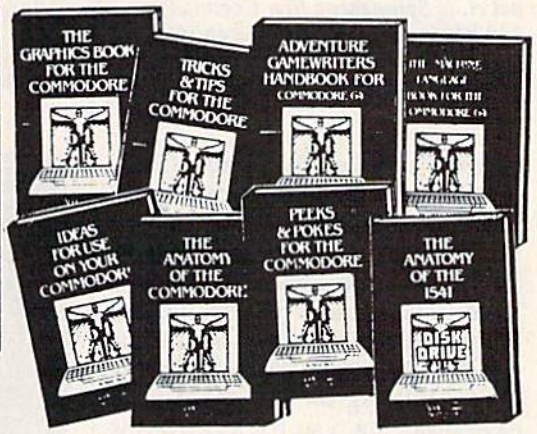

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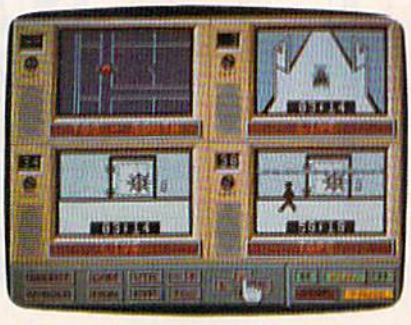
Spinnaker announced its first Commodore 128 adventure game, *The Scoop*. The text-and-graphics adventure, from Spinnaker's Telarium

The Scoop, *based on an Agatha Christie novel, is Spinnaker's first Commodore 128 adventure game. It uses animation and a text menu—both controlled by a joystick.*

series, is based on the Agatha Christie novel of the same name, and it employs animation and a text menu—both of which are controlled by joystick. The scenario places you as an investigative reporter for the London-based *Daily Courier* on the trail of a series of murders. By finding clues, talking to witnesses, and eavesdropping, you try to solve the mystery. The game is *not* available for the 64—it requires the extra memory available with the 128. Suggested retail price is $32.95.

Also new for the 128 is Timeworks' *Your Personal Investment Manager*, volume 2 in the Sylvia Porter's Personal Finance Series. It manages investment transactions, tracks portfolios, alerts you to investment deadlines, tracks retirement investments, and monitors investment taxes. Also included is telecommunications access to outside database sources (Dow Jones, CompuServe, The Source, and Warner's Investment Strategies). Securities analysis is also included. Suggested retail price is $69.95.

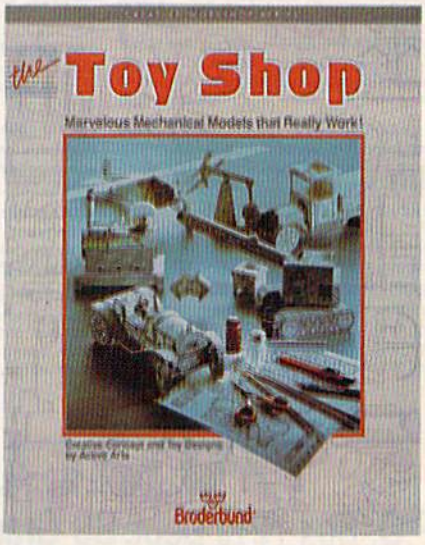
Timeworks also announced enhanced versions of previously released 128 packages. *Word Writer 128* now features a thesaurus, onscreen highlighting, superscript and subscript, headers and footers, and more. *SwiftCalc 128* now includes hi-res 3-D graphics, Swift-Sort, Swift-DOS, and other new features. *Data Manager 128* has added enhanced editing keys, improved record browsing, and more windows. And *Your Personal Financial Planner*, volume 1 in the Sylvia Porter series, now includes improved help screens, automatic check incrementing, and several other enhancements. *Partner 128*, originally announced at the Winter CES, is now available. This unique product is a cartridge-based "coresident" program; that is, it's available—transparently—while other programs are in memory. *Partner 128* includes eight accessories: appointment calendar and date book, memo pad, phone list and auto dialer, name and address list, calculator, typewriter, label maker and envelope addresser, and screen dump. It sells for $69.95. A Commodore 64 version is now available for $59.95.



Activision's Hacker II *is a more difficult mystery than its predecessor.*

Thanks to the continued sales of the Commodore 64 in 1985–86, dozens of new software titles were announced at CES. On the heels of *Hacker*'s success, Activision introduced *Hacker II: The Doomsday Papers*. In this sequel, your job is to uncover a plot to destroy the United States. The challenge in *Hacker II* is more difficult and expansive than that of its predecessor. Suggested retail price is $39.95. Activision also announced add-on library disks for *Garry Kitchen's GameMaker* (see last month's issue for a full review). The first two libraries to be available are modules for designing your own sports and science fiction games. Prices and release dates will be announced.

An exciting and truly innovative new product from Brøderbund software is *The Toy Shop*. With this package, a Commodore 64, and a printer, you can make any of 20 mechanical toys—an antique truck, steam engine, glider, sundial, carousel, and medieval catapult, to name a few—that actually work, and work well. Brøderbund had several of these on display, some of them painted for a very pleasant effect. At first glance, their durability might be suspect—they're actually very sturdy. Also, at first glance, you might imagine that they're cute items for children. True, but adults will enjoy them just as much, if not more. After choosing the toy you want to make from an onscreen menu, you can customize it with patterns, graphics, and text. Next, you print out the various "pieces" and mount them on special adhesive cardstock, which is included in the package. Finally, you cut out the pieces and assemble the toy. The package also includes wire, wooden dowels, rubber stripping, balloons, and so on—all of the parts necessary to make each of the toys work. *The Toy Shop* is now available with a suggested retail price of $59.95. Another new product from Brøderbund is *Breakers*, a



All the material you need to make any of 20 mechanical toys is included in Brøderbund's The Toy Shop.

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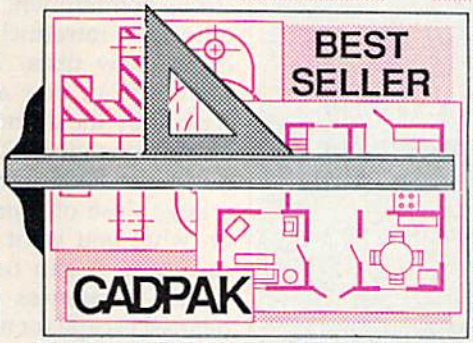
64 Compiler $39.95



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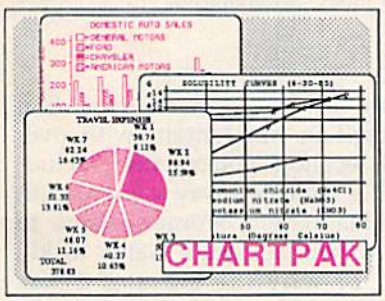

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on products mentioned in this article, please contact the manufacturers.

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Canada L4B 1B5

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17 Paul Dr.
San Rafael, CA 94903

Commodore Business Machines
1200 Wilson Dr.
West Chester, PA 19380

Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404

Firebird Licensees
P. O. Box 49
Ramsey, NJ 07446

Infocom
125 Cambridge Park Dr.
Cambridge, MA 02140

Okidata
532 Fellowship Rd.
Mt. Laurel, NJ 08054

SoftSync
162 Madison Ave.
New York, NY 10016

Spinnaker Software
One Kendall Sq.
Cambridge, MA 02139

Star Micronics America
200 Park Ave., Suite 3510
New York, NY 10166

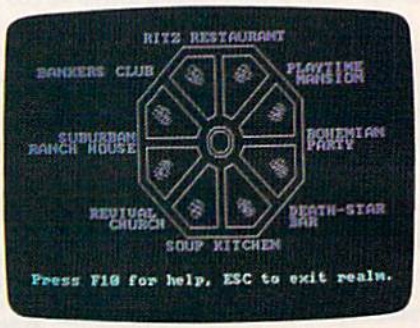
Timeworks
444 Lake Cook Rd.
Deerfield, IL 60015

science fiction text adventure set in a realtime world (the action continues even when you do nothing). It includes a 1500-word vocabulary. Currently available, it sells for $39.95.

Electronic Arts demonstrated a strong commitment to the Commodore 64 by introducing a large number of new titles. *Timothy Leary's Mind Mirror*, now available, is described by the author as a "personality diagnostic tool." It's a tool, but it can also be a game, injected with a large dose of humor. Depending on what you want to do with the program, it can be an evocative mental awareness test or a lighthearted escape for a group or teams of players. Based on Leary's doctoral research and subsequent professional work, *Mind Mirror* is both provocative and gentle. Suggested retail price is $32.95.

Another new product from Electronic Arts is *Chessmaster 2000*, a feature-packed chess program built on the U.S. Chess Federation's award-winning algorithm. It contains more than 71,000 opening moves, and includes 12 play levels, a "teach" mode, "think" mode (so you can watch the program analyze each move and make a decision), and a two- or three-dimensional display. The 3-D board can be rotated to view the game from any angle. And games in progress can be saved to disk or printed out. It's designed for chess players of any skill level—novice to master. Currently available, the suggested retail price is $39.95.

Several other interesting new products were introduced by Electronic Arts: *Bard's Tale II: The Archmage's Tale* (available in the fall, price to be announced), a medieval-flavored adventure and sequel to the popular *Bard's Tale*; *Autoduel* (currently available at $49.95), in which you custom-build armored cars of the future, then do battle in freeway firefights; *Battlefront* (currently available at $39.95), a recreation of four key World War II battles; *Moebius* (currently available at $39.95), a martial arts fantasy role-playing game with animation and 3-D graphics; *Murder Party* (a fall release, price to be announced), a package that includes all the necessary ingredients—invitations, clues, and so on—to host your own murder party (up to seven people may play), with a variety of clues and culprits so that each party is different; *Ogre* (currently available at $39.95), a one- or two-player cybernetics strategy game based on the board game of the same name; *Scavenger Hunt* (available early fall, price to be announced), a humorous half-computer, half-board game for up to four players; and *Ultimate Wizard* (currently available at $29.95), an action D & D–style game with 100 dungeon levels and a construction set for building your own levels. Electronic Arts also noted the release of *Amnesia*, originally announced at the Winter CES. This package is an interactive text adventure written by novelist Thomas



Timothy Leary's Mind Mirror *from Electronic Arts is a "personality diagnostic tool," but it can also be a game with humorous scenarios.*

Disch. In this scenario, you find yourself in Manhattan (with over 4000 locations you can visit, including the entire subway system) with no idea why a woman wants to marry you, someone wants to kill you, or why the state of Texas wants you for murder. It's currently available for $39.95.

A relative newcomer to the U.S. software market is Firebird. Based in Britain, Firebird licensed a U.S. operation and made a big splash with one of its first products, *Elite*, in 1985. (*Elite* has been one of this year's bestselling programs to date.) At CES, Firebird launched *The Pawn*, a fantasy text-and-graphics adventure designed to appeal to both novice and experienced gamers. A few minutes with *The Pawn* at the Firebird booth made it obvious that this program was the product of a major effort.

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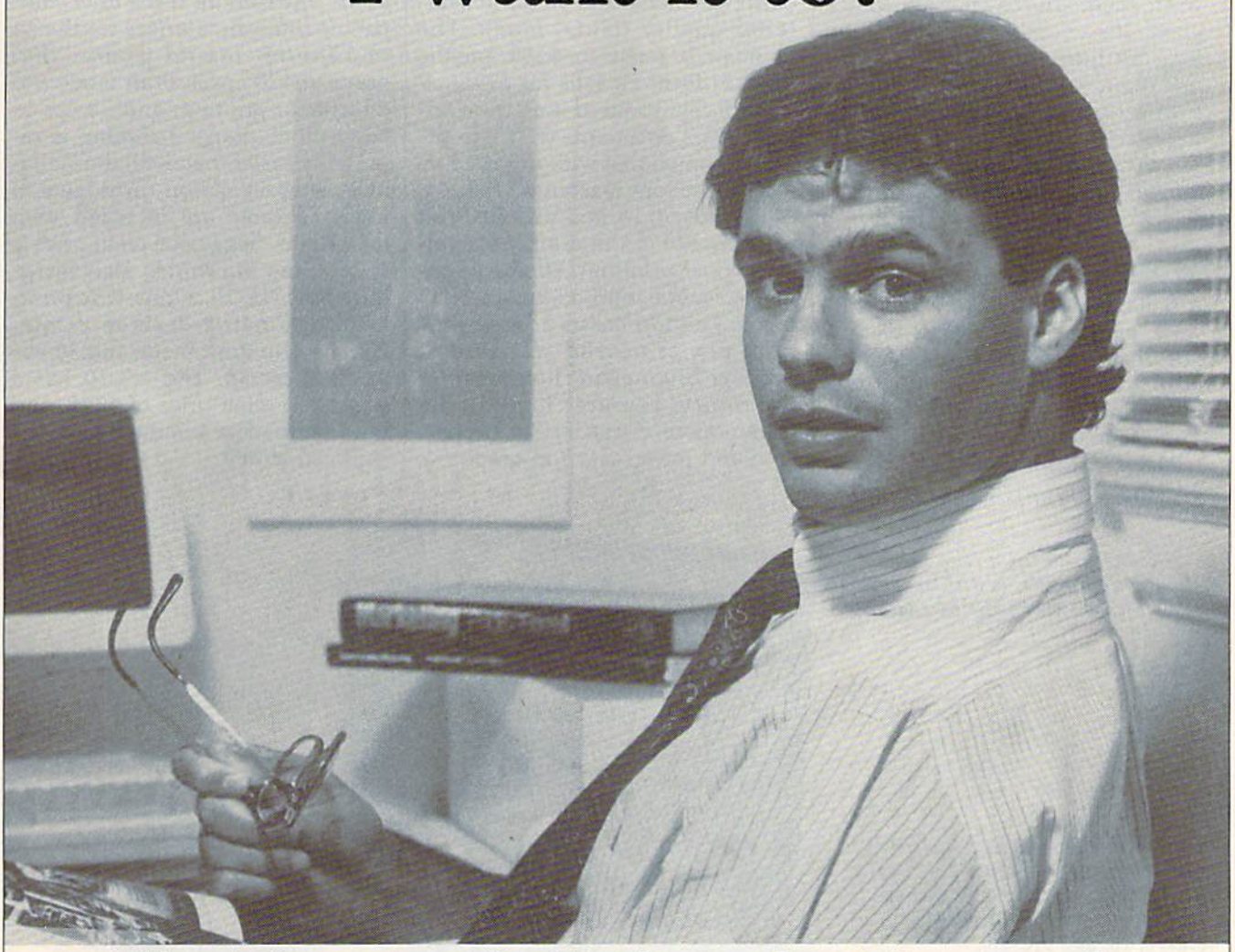

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The parser is extremely intelligent (it understood "Take the shovel and spade but not the scroll or the blue shoes," for example), and the graphics are outstanding. It's currently available for $44.95.

Infocom introduced *Moonmist*, an interactive fiction adventure for the 64. *Moonmist* is an introductory adventure (ages nine and up) set in a gothic castle in England, complete with eccentric characters and a ghost. It's a combined mystery and treasure hunt, and there are four variations to the game, each with its own set of puzzles, treasures, hiding places, and a unique solution. *Moonmist* will be available in September at a suggested retail price of $39.95.

Most of the product announcements at CES were new software packages. But there were a few new printers introduced which bear noting. Okidata debuted two new printers for Commodore users. The Okimate 20, a color thermal-transfer printer previously compatible only with several non-Commodore computers, now works with the 64 and 128 via Okimate's Plug 'N Print kit. The kit contains an interface module, cable, color and black cartridge ribbons, sample paper, and documentation. The Okimate 20 includes several type fonts: wide print, boldface, fine print, italics, superscripts, subscripts, and underlining. It prints 80 cps (characters per second) in standard type mode, and 40 cps in near-letter-quality (NLQ) mode. The Okimate 20 retails for $169, and the Plug 'N Print kit sells for $99.

Also introduced was the Okidata 120, a dot-matrix (NLQ) printer. It's compatible with the full line of Commodore machines: 128, 64, SX64, Plus/4, 16, and VIC-20. Print speed is 120 cps in draft mode (bi-directional printing), 60 cps in enhanced mode, and 30 cps in NLQ mode. The 120 boasts a "long-life" nine-pin printhead (capable of printing 200 million characters) for durability. Features include the Commodore character set (uppercase and lowercase, and graphics), true descenders, double-width characters, condensed characters, and vertical spacing at six and eight lines per inch. A supply of computer paper and interface cable are included with the printer, which retails at $269.

Another printer announced at CES is Star Micronics' Gemini II, a big brother to one of the most popular computers among Commodore users. The Gemini II is a fully compatible (built-in interface for the 64 or 128) dot-matrix printer that prints at 120 cps in draft mode (bi-directional printing) and 30 cps in NLQ mode. Paper handling is reportedly easier than with the Gemini. A snap-in ribbon cartridge and interface cable are included with the printer. Suggested retail price is $239. Star Micronics also introduced the NL-10, a nine-wire printhead dot-matrix desktop printer (120 caps in draft mode and 30 cps in NLQ mode). The NL-10 has a suggested retail price of $379, and the Commodore interface cartridge is priced at $60.

The Okimate 20, a color thermal transfer printer, is now compatible with the Commodore 64 and 128.

The Okidata 120 is a new dot-matrix, near-letter-quality printer designed for compatibility with most Commodore computers (128, 64, SX64, Plus/4, 16, and VIC-20).

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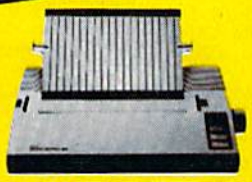

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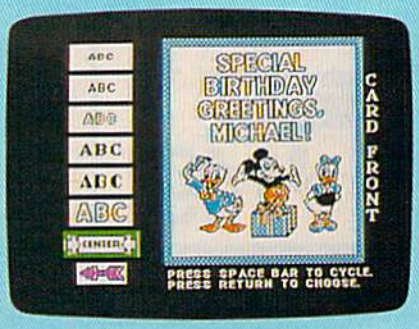
More NEW 64 PRODUCTS At CES

Access Software: Access introduced its second sports simulation game, *Tenth Frame*, a professional bowling simulator. Suggested retail price is $39.95. (Access Software, 2561 S. 1560 W., Woods Cross, UT 84087.)

Bantam Electronic Publishing: Mickey and Minnie Mouse, Donald Duck, Goofy, and other familiar Disney characters are the main characters in two new packages from Bantam. *Walt Disney Comic Strip Maker* lets you design and write your own comic strips. After choosing from 180 high-resolution color representations of Disney characters, as well as assorted objects and backgrounds, you can build a comic strip by filling in the dialogue balloons with either original or prewritten phrases to tell your story. Graphics can be transposed, cropped, and moved around until you get a frame that you like. Each strip can be printed in color or in black-and-white. *Walt Disney Card & Party Shop* contains more than 40 preprogrammed designs as well as the whole cast of Disney characters. You can incorporate them into personalized stationery, greeting cards, and party goods like invitations, place cards, and wrapping paper. You select characters and additional predesigned graphics (birthday cakes, Christmas trees, and hearts, for example); then choose a typeface and print out the finished product in color or in black-and-white.

Walt Disney Comic Strip Maker



Walt Disney Card & Party Shop

Both programs include an easy-to-use art tool box (for sizing, transposing, and cropping characters) as well as a built-in word processor. Each retails for $34.95. (Bantam Electronic Publishing, 666 Fifth Ave., New York, NY 10103.)

BCI Software: BCI, publisher of a line of economically priced software, has introduced *Mind Over Matter*. The program, designed by a psychoanalyst, offers help in four different areas: "Lose Weight," "Stop Smoking," "Be Successful," and "Conquer Stress." The programs use subliminal suggestion; that is, they run concurrently with other computer programs and flash messages across the screen in 1/60 second—too fast to see, but slow enough for the mind to absorb. Suggested retail price is $9.95. (BCI Software, P.O. Box 730, Ringwood, NJ 07456.)

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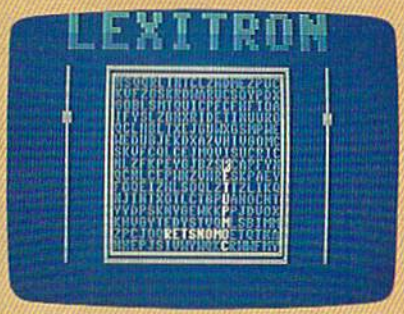

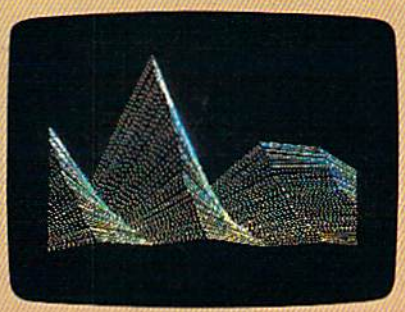

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Individual issues of the *Disk* are available for $12.95 (plus $2.00 shipping and handling) by calling 1-800-346-6767 (in NY 1-212-887-8525).

Bodylog: An interesting application for the Commodore 64 was presented by Bodylog at CES. Bodylink is a concept that involves several different hardware/software configurations designed to monitor body processes, reduce stress, and build muscular strength. In order to make more interesting what can often be rather dull tasks, the designers have built games into many of the packages. For example, one muscle-toning program requires you to maneuver a helicopter over a building by controlling a metal-spring device built for isometric exercise. While you're concentrating on keeping the helicopter from crashing, you may not even notice how much hard work you're doing. Other packages help make you aware of the stress level in your body, and you can learn how to control it.

Once you have bought the basic Bodylink hardware, additional software/hardware packages may be purchased to supplement the system. Prices for the initial package range from $139.95 to $209.95; supplementary packages range from $29.95 to $99.95. (Bodylog, 34 Maple Ave., Armonk, NY 10504.)

Epyx: Prolific software publisher Epyx introduced four new games for the Commodore 64. In *World Games*, players become international athletes and travel to eight different countries to compete in an event specific to each locale—for example, cliff-diving in Mexico or sumo wrestling in Japan. *The Movie Monster Game* lets you star as your favorite movie monster and wreak havoc over many major cities of the world. *Super Cycle* is a fast-action motorcycle racing game with a realistic first-person perspective. And in *Championship Wrestling*, you choose a wrestling personality and climb into the ring with a formidable opponent. (Epyx, 1043 Kiel Ct., Sunnyvale, CA 94089.)

First Star Software: First Star Software rolled out the third in its Spy vs. Spy series. *Spy vs. Spy II: Arctic Antics* is available for the Commodore 64 for $29.95. (First Star Software, 18 E. 41st St., New York, NY 10017.)

Gessler Educational Software: Now foreign language students can sharpen their vocabulary skills while playing an enjoyable detective game. Tom Snyder's best-selling *Snooper Troops* is now available in German and Spanish from Gessler Educational Software. Children develop their foreign language vocabulary and reasoning skills by taking notes, drawing maps, and organizing information. The object of the Spanish and German versions is to determine who committed a crime in the old mansion, and why. Suggested retail price is $39.95. (Gessler Educational Software, 900 Broadway, New York, NY 10003.)

Keypunch Software: Keypunch offers a diverse line of inexpensive software in the areas of entertainment, education, and home productivity. Prices range from $6.99 to $9.99. (Keypunch Software, 1221 Pioneer Bldg., St. Paul, MN 55101.)

Main Street Publishing: Main Street Publishing is now distributing many titles previously sold by other publishers for $4.95 to $9.95. (Main Street Publishing, 611 W. Traveler's Tr., Burnsville, MN 55337.)

Maxell: Maxell announced a price drop for ten-packs of 5¼-inch floppy disks. A package of ten single-sided disks now retails for $7.95, and ten double-sided disks are $10.49. (Maxell Corporation of America, 60 Oxford Dr., Moonachie, NJ 07074.)

Mastertronic: Another budget software publisher, this company introduced *Ninja, Speed King, Elektraglide, Video Poker, Space Hunter,* and *Master of Magic* for $9.99 each. (Mastertronic International, 7311B Grove Rd., Frederick, MD 21701.)

Microprose: Microprose introduced *Destroyer Escort*, a historically authentic recreation of naval warfare during World War II. (Microprose Simulation Software, 120 Lakefront Dr., Hunt Valley, MD 21030.)

ShareData: Several new product lines were announced under the ShareData umbrella at CES. The company has reached an agreement with Walt Disney Educational Media to develop 20 entertainment, educational, and home productivity titles for under $10 each. ShareData's Electronic Book Division introduced the Home Companion Series of affordable, easy-to-use software, offering "how-to" help in many areas of home maintenance. Each program will retail for under $10. And in conjunction with VPL Research, the company announced the Z-Glove, a gestural input device, and Grasp, a visual programming language. The glove fits on the user's hand and is connected to the computer with a cord. It senses the user's hand position, its tilt, and the bend of the fingers to manipulate objects on the screen. Many programs in several different areas of application are expected to be written in Grasp for the Z-Glove. (ShareData, 7122 Shady Oak Rd., Eden Prairie, MN 55344.)

Spinnaker: Spinnaker has licensed *ACE*, a jet combat simulator (see review elsewhere in this issue).

Springboard: On the heels of its success with *The Newsroom*, Springboard has introduced *Certificate Maker*. The program provides more than 200 predesigned certificates, awards, diplomas, and licenses in a variety of categories like sports, academic achievement, families, children, religion, and business. The user selects a certificate, chooses a border to frame it, enters a personalized message using one of a variety of type styles and sizes, fills in the signature and date line, and finally prints it out. Price not announced at press time. (Springboard Software, 7808 Creekridge Cir., Minneapolis, MN 55435.)

For more new products announced at CES, see "News & Products" elsewhere in this issue.

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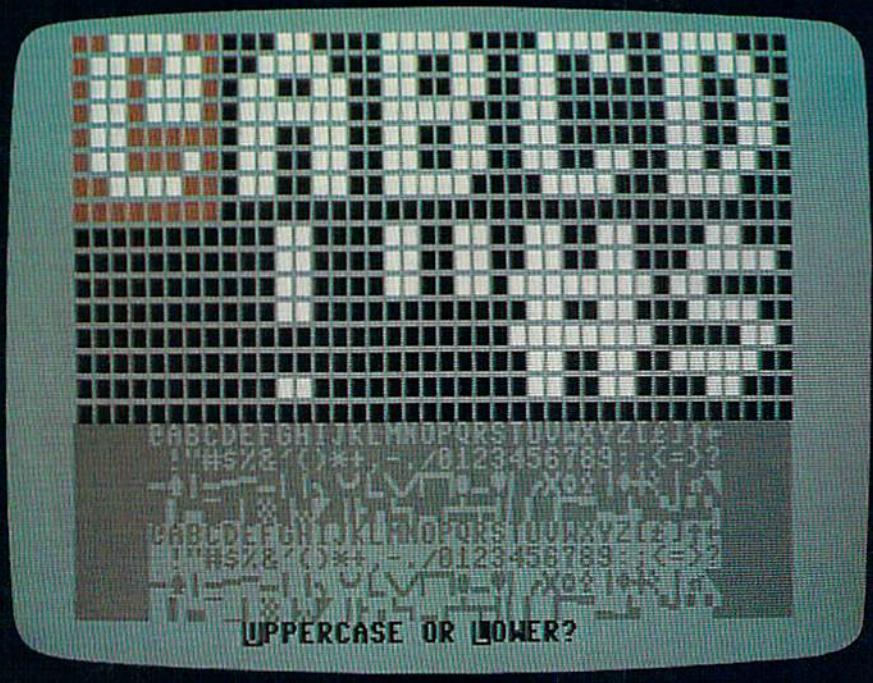

CHARLES BRANNON, PROGRAM EDITOR

This powerful custom character editor for the Commodore 64, which originally appeared in the July 1984 GAZETTE, has been one of our most popular programs. Now it's been enhanced, and a few minor bugs have been removed. We think you'll be surprised at its lightning speed, ease of use, and unique features. It's designed to let you concentrate on your artwork instead of programming details. We've added new instructions for creating shapes that are compatible with "Construction Set" (December 1985) and for using custom characters on the 128.

Anyone who has used graph paper to plot out characters, then tediously converted the rows of dots into numbers can appreciate a character editor. Instead of drawing and erasing on paper, you can draw your characters freehand with a joystick. "Ultrafont+" offers almost every conceivable aid to help you design whole character sets.

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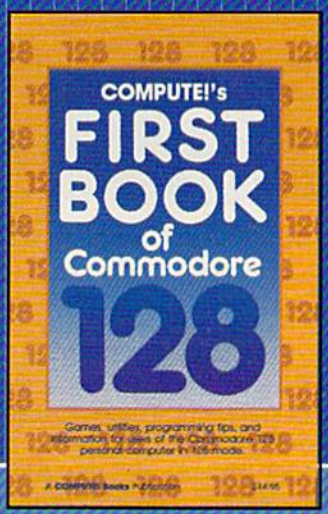

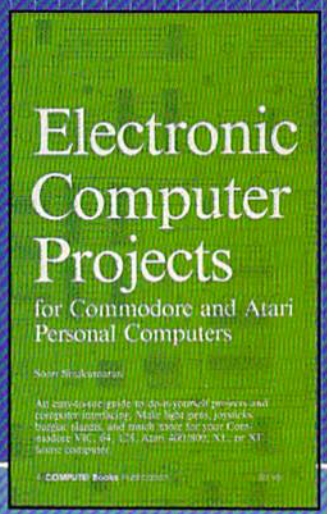

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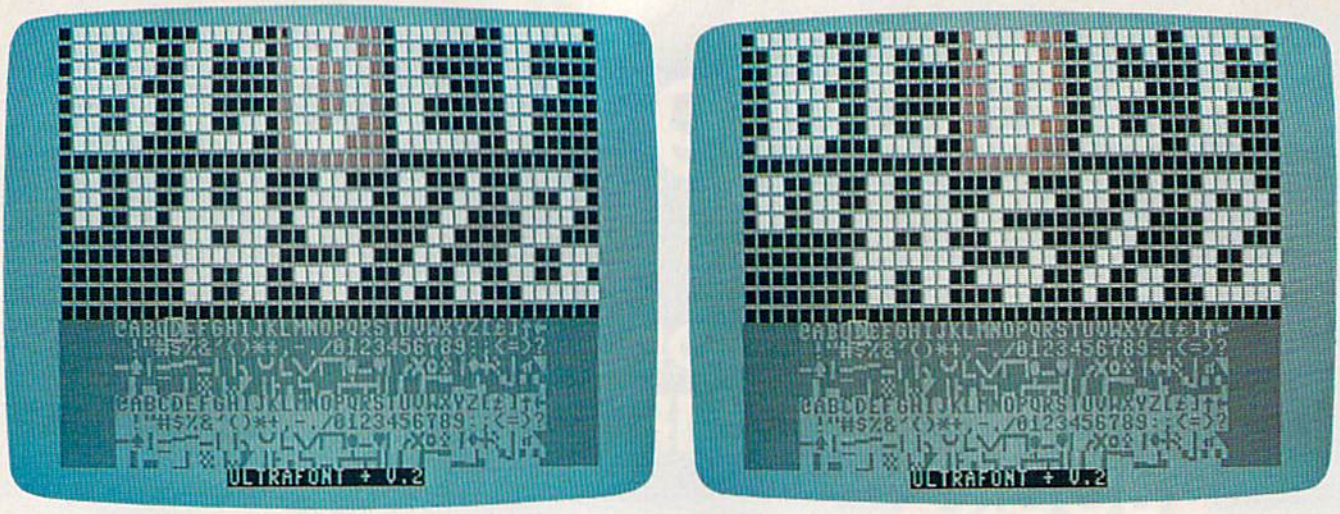

The standard character set is shown at the left. On the right, a new character set, with serifs, is being created. Notice the difference in the B, D, E, and F characters.

Typing It In

Ultrafont+ is written entirely in machine language, giving you speed and efficiency that BASIC can't match. To type it in, you'll need a copy of the "MLX" machine language entry program, found elsewhere in this issue. Be sure you read and understand the instructions for using MLX before you begin entering the data for Ultrafont+. Once you've entered, saved, and run MLX, answer the starting address and ending address prompts as follows:

Starting Address: C000
Ending Address: CD17

After you've finished typing and saved the program with MLX, you can load it with LOAD *"filename"*,8,1 for disk, or LOAD *"filename"*,1,1 for tape. After it's loaded, enter NEW and press RETURN to reset important memory pointers, then start the program by typing SYS 49152 and pressing RETURN.

The Display

At the bottom of the screen you'll see eight lines of characters. These are the 256 characters you can customize, arranged in eight 32-character rows. Note the normal character set in the top half, with reversed images in the bottom half. A flashing square rests on the *at* (@) symbol, the home position of the character set. Above the eight rows is the main grid, a blown-up view of ten characters. The bottom row of the screen is reserved for messages. The first time you SYS to Ultrafont+, you'll be asked whether you want to edit the uppercase/graphics character set or the lowercase set.

About The Grid

The grid is like a large window on the character set. You see the first five characters and the five beneath them. Each character is made up of 64 *pixels* (an abbreviation for "picture elements"), arranged in an 8 × 8 matrix. A large red box shows you which character you're currently editing, and a smaller flashing square is the cursor you use to set and clear pixels while you're drawing a character.

You can use the cursor keys (up, down, left, right) to move the large red cursor to any character you want to edit. If you move to a character not on the large grid (out of the window), the window automatically scrolls to make the character appear. You can also look at the bottom of the screen to move the larger cursor, since the flashing square on the character set moves with the main grid.

The HOME key moves the small cursor to the upper-left corner of the grid. If you press it twice, it takes you back to the top of the character set—to @.

Use a joystick plugged into port 2 to control the small cursor within the grid. If you move the cursor out of the current character, the red cursor jumps to the next character in whatever direction you are moving. The display at the bottom adjusts, and the grid scrolls as necessary. This means that you can ignore the traditional boundaries between characters and draw shapes as big as the entire character set (256 × 64 pixels). There is no wraparound for the cursor in the bottom section of the screen. When it hits an edge, it will go no further in that direction.

The joystick's fire button is used to set and clear points. If you press it when the cursor is resting on a solid square, the pixel is turned off. If the square is currently off, it's turned on. Holding down the button while you move the joystick keeps you in the same drawing mode. If you set a point, you'll continue to draw as you move. If you clear a point, you can move around and erase points all over the screen.

If the drawing cursor is too fast or too slow, just press V to set the cursor velocity. Answer the prompt with a speed from 0 (slow) to 9 (very fast—but too fast for practical use).

Manipulations

There are several functions that affect the current character (where the red box is). You can rotate, shift, mirror, reverse, erase, replace, and copy characters. The best way to learn is to play with the functions. It's really a lot of fun. The following keys control each function.

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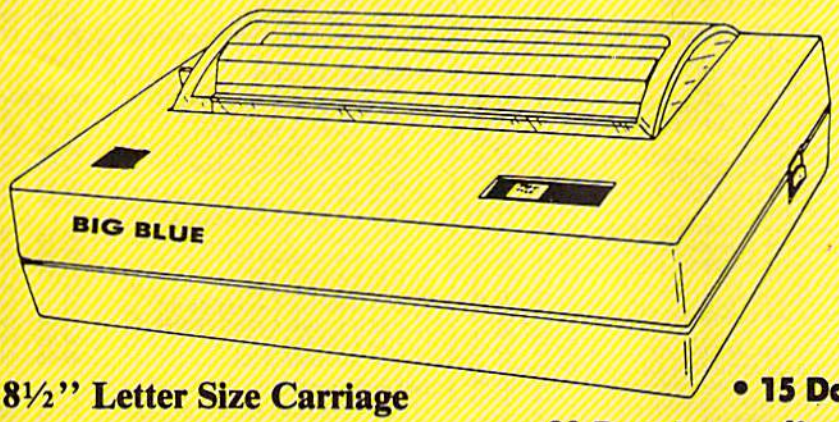

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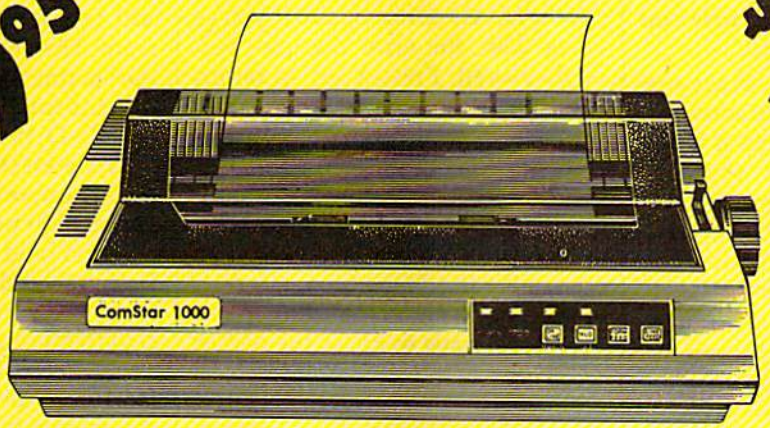

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Function Keys

f1 Scrolls character right. All pixels move right. The rightmost column of pixels wraps around to the left.

f2 Scrolls character left. Wraparound is like f1.

f3 Scrolls character down. All pixels move down. The last row of pixels wraps around to the top.

f4 Scrolls character up. Wraparound is like f3.

R Rotate. Rotates the character 90 degress. Press twice to flip the character upside down.

M Mirror. Creates a mirror image of the character left to right.

CLR (SHIFT-CLR/HOME) Erases the current character.

CTRL-R or **CTRL-9** Reverses the character. All set dots are clear, and all empty dots are set. The bottom half of the character set is the reversed image of the top half.

CTRL-back arrow (←) Copies upper half of the character set, reverses it, and places it in the lower half. This way, you have to redraw only the normal characters, then use CTRL-back arrow to create the reverse character set.

F Fix. Use this if you want to restore the normal pattern for the character. If you've redefined the letter *A* and press F while the red cursor is on the character, the Commodore pattern for *A* will be copied back from ROM.

T Type. This lets you try out your character set. The screen clears, with a copy of the character set provided for reference. You can type and move the cursor around, just as in BASIC. This is handy for envisioning sample screens and fitting together multiple-character shapes. Press the RUN/STOP key to exit from Type and return to Ultrafont+.

Saving And Loading Character Sets

To save your creation to tape or disk, press S, then either T for tape or D for disk. When requested, enter the filename, up to 16 characters. Don't use the 0: prefix if you're using a disk drive; it's automatically added for you. The screen clears, displays the appropriate messages, and then returns to the editing screen if there are no errors. If there *are* errors, such as the disk being full, Ultrafont+ will read the disk error message and display it at the bottom of the screen.

Press a key after you've read the message and try to correct the cause of the error before you save again. (Tape users should remember that the 64 is never able to detect an error during a tape save.)

To load a character set previously saved, press L and answer the TAPE OR DISK prompt. Enter the filename. If you're using tape, be sure the tape is rewound and ready. After the load, you'll be returned to the editing screen; a glance is all it takes to see that the set is loaded. If an error is detected on a tape load, you'll see the message ERROR ON SAVE/LOAD. Once again, if you're using disk, the error message will be displayed. Press a key to return to editing so that you can try again.

If you happened to type in "Construction Set" from the December 1985 issue, you already own some Ultrafont+ character sets. To view them, insert the disk containing the shape files and press L to load one of the fonts into memory. You'll have to know the names of the files in advance. You can then edit them or even create whole new shapes for use with the Construction Set program.

Copying And Moving Characters

You can copy one character to another with function keys 7 and 8. When you press f7, the current character flashes briefly, then is copied into a buffer. Ultrafont+ remembers that character pattern. You can position the cursor where you want to copy the character before pressing f8. The memorized character replaces the character the cursor is resting on. You can also use the buffer as a fail-safe device. Before you begin to edit a character you've already worked on, press f7 to store it safely away. That way, if you accidentally wipe it out or otherwise garble the character, you can press f8 to bring back your earlier version.

Creating DATA Statements

A very useful command, CTRL-D, allows you to create DATA statements for whatever characters you've defined. Ultrafont+ doesn't make DATA statements for all the characters, just the ones you've changed. After you press CTRL-D, Ultrafont+ adds the DATA statements to the end of whatever program you have in BASIC memory. If there is no program, the DATA statements exist alone.

If the screen turns to garbage when you press CTRL-D, then you probably didn't type NEW after loading Ultrafont+. The NEW command resets some important pointers after you've loaded a machine language program from immediate mode.

You can load Ultrafont+, enter NEW to reset the BASIC pointers, load a program you're working on, then SYS 49152 to Ultrafont+ to add DATA to the end of the program. The DATA statements always start at line 63000, so you may want to renumber them. If you press CTRL-D twice, another set of DATA statements will be appended, also numbered from line numbers 63000 and up. Since the keys repeat if held down, just tap CTRL-D. If you hold it down, you may notice that hundreds of DATA statements have been created. See the notes at the end of this article for more details on using DATA statements in your own programs.

Exiting Ultrafont+

After you create the DATA, you'll still be in Ultrafont+. If you want to exit to see the DATA statements or go on to other things, press CTRL-X. The screen will reset to the normal colors and you'll see the READY prompt. If you've made DATA, LIST reveals it. It's best to enter the command CLR to make sure BASIC is initialized properly after creating DATA statements.

One thing to watch out for: Don't use RUN/STOP-RESTORE to exit Ultrafont+. The program moves screen memory from the default area at address 1024, and the RUN/STOP-RESTORE combination does not reset the operating system pointers to screen memory. If you do press it, you won't be able to see what you're typing. To fix it,

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blindly type POKE 648,4 or SYS 49152 to reenter Ultrafont+ so you can exit properly, via CTRL-X.

Reentering Ultrafont+

To restart Ultrafont+ within the program, press SHIFT-RUN/STOP. After you've exited to BASIC, you can rerun Ultrafont+ with SYS 49152. You'll see the character set you were working on previously, along with the message USE ROM SET? (Y/N). Usually, Ultrafont+ will copy the ROM character patterns into RAM where you can change them. If you press N, however, the set you were previously working on is untouched. Press any other key, like RETURN, to reset the characters to the ROM standard. You can copy either the uppercase/graphics set from ROM, or the lowercase set.

A Whole New World Of Multicolor

You're not finished yet. There's yet another mode of operation within Ultrafont+, the multicolor mode. In multicolor mode, any character can contain up to four colors simultaneously. One has to be used for the background, which leaves three for the character itself. Multicolor changes the way the computer interprets character patterns. Instead of a one bit representing a solid pixel and a zero representing a blank, the eight bits are organized as four *pairs* of bits. Each pair can represent four possibilities: 00, 01, 10, and 11. Each pair is also a number in decimal from 0 to 3, and represents one of the four colors.

Ultrafont+ makes multicolor easy. You don't have to keep track of bit pairs any more than you have to convert binary to decimal. Just press the f5 key. Presto—the whole screen changes. The normal characters are rather unrecognizable, and the drawing cursor is twice as wide (since eight bits have been reduced to four pixel-pairs, making each dot twice as wide). You have only four dots horizontally per character, but you can easily combine several characters to form larger shapes.

Multicolor redefines the way the joystick and fire button work. The fire button always lays down a colored rectangle in the color you're currently working with. That color is shown in the center of the drawing cursor. Press the number keys 1, 2, 3, or 4 to choose different colors to draw with. The number of the key is one more than the bit pattern, so color 1 is bit pattern 00, and color 4 is bit pattern 11. When you first SYS to Ultrafont+, the four colors show up distinctly on a color TV or monitor.

You can easily change the colors. Just hold down SHIFT and press the appropriate number key to change that number's color. You will see the message PRESS COLOR KEY. Now press one of the color keys from CTRL-1 to CTRL-8, or from Commodore-1 to Commodore-8. Hold down the CTRL or Commodore key as you do this. Instantly, that color, and everything previously drawn in that color, is changed.

Three of the colors (including 1, the background color) can be any of the 16 colors. But because of the way multicolor works, color 4 (represented by bit pattern 11, or 3 in decimal) can only be one of the 8 CTRL colors. Assigning it one of the Commodore logo colors just picks the color shown on the face of the color key. Incidentally, it's the color of bit pattern 3 (color 4) that changes according to the character color as set in color memory. The other colors are programmed in multicolor registers 1 and 2 (locations 53282 and 53283), so all characters share these two colors. When you want to vary a certain color without affecting the rest of the characters, you'll want to draw it in color 4.

Some of the commands in the multicolor mode aren't as useful as others. You have to press f1 and f2 twice to shift a character, since they only shift one bit, which may cause all the colors to change. You can use CTRL-R or CTRL-9 (Reverse) to reverse all the colors (color 1 becomes color 4, color 2 becomes color 3, color 3 becomes color 2, and color 4 becomes color 1). R (Rotate) changes all the colors and is rather useless unless you press it twice to just turn the characters upside down. M (Mirror) works as it did before except that colors 2 and 3 are switched. And you can still copy characters using f7 and f8 (see above).

Returning To Normal

You can switch instantly back to the normal character mode by pressing f6 (SHIFT-f5). If you were drawing in multicolor, you can see the bit patterns that make up each color. Multicolor characters look just as strange in normal mode as normal characters look in multicolor.

If you changed colors in the multicolor mode, some of the colors in the normal mode may have been altered. You can change these colors just as you did in multicolor mode. Press SHIFT-1 to change the

Quick Reference: Ultrafont+ Commands

Cursor keys	Move to next character
HOME (CLR/HOME)	Moves the cursor to upper-left corner. Press twice to go back to start
V	Cursor velocity; answer from 0 (slow) to 9 (fast)
f1	Scrolls right with wraparound
f2(SHIFT-f1)	Scrolls left
f3	Scrolls down
f4(SHIFT-f3)	Scrolls up
R	Rotates 90 degrees; press twice to invert
M	Mirror image
CLR (SHIFT-CLR/HOME)	Erases current character
CTRL-R, CTRL-9	Reverse pixels
CTRL-back arrow (←)	Copies upper half of character set, reversed, to lower half
CTRL-F	Copies first four rows of characters, reversed, to bottom four
F	Fix characters from ROM pattern
L	Load. Tape or Disk, Filename
S	Save. Tape or Disk, Filename
T	Typing mode: RUN/STOP to exit
f7	Memorizes character (keep)
f8 (SHIFT-f7)	Recalls character (put)
f5	Switches to multicolor character mode
f6 (SHIFT-f5)	Returns to normal character mode
CTRL-D	Makes DATA statements
SHIFT-RUN/STOP	Restarts Ultrafont+
CTRL-X	Exits Ultrafont+ to BASIC

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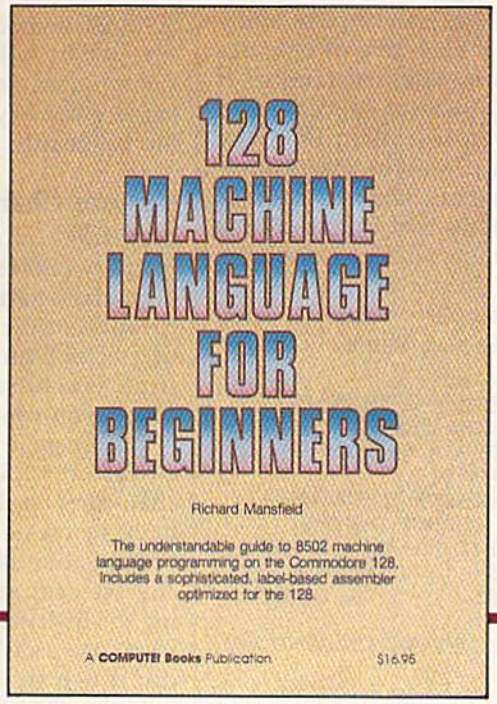

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color of the empty pixels, and SHIFT-2 to change the color of the *on* pixels. Use SHIFT-4 to change the color of the eight rows of characters.

How To Use The DATA Statements

The DATA statements are created from lines 63000 and up, as many as necessary. Each line of data has nine numbers. The first number is the internal code of the character (the code you use when POKEing to the screen). It represents an offset into the table of character patterns. The eight bytes that follow are the decimal numbers for the eight bytes needed to define any character. Here's a sample program to read them and display them:

```
10 POKE 56,48: CLR
50 READ A: IF A=-1 THEN 70
60 FOR I=0 TO 7: READ B
63 POKE 12288 + A * 8 + I, B
66 NEXT: GOTO 50
70 PRINT CHR$(147);"{10 DOWN}":
   REM TEN CURSOR DOWNS
80 FOR I = 0 TO 7: FOR J = 0 TO 31
83 POKE 1028 + J + I * 40, I * 32 + J
86 POKE 55300 + J + I * 40, 1: NEXT:
   NEXT
90 POKE 53272, (PEEK (53272) AND 240)
   OR 12
95 END
```

You'll also need to add the following line to the end of your DATA statements:

```
63999 DATA -1
```

If you want to have your cake and eat it, too—that is, also have the normal ROM patterns—copy them from ROM down to RAM by adding:

```
20 POKE 56334, PEEK (56334) AND 254:
   POKE 1, PEEK (1) AND 251
30 FOR I = 0 TO 2047: POKE 12288 + I,
   PEEK (53248 + I): NEXT
40 POKE 1, PEEK (1) OR 4: POKE 56334,
   PEEK (56334) OR 1
```

To turn on multicolor mode, POKE 53270, PEEK(53270) OR 16. Three color registers are at 53281–53283. The fourth is the individual character color, which is changed by holding down CTRL or Commodore and pressing a numbered color key on the top row of the keyboard.

Custom Characters On The 128

If you're interested in creating your own characters for the 128's 80-column screen, see "80-Column Character Editor" elsewhere in this issue. For 40-column custom characters, you can use Ultrafont+.

First, go into 64 mode and load Ultrafont+. You'll be using the characters in 128 mode, but you have to create them in 64 mode. When you're satisfied with the new character set, save it to disk, following the instructions above. (It's easier to use a disk file on the 128, so don't use the DATA option.) To load the character set into the 128, add these lines at the beginning of your own program:

```
10 GRAPHIC1: GRAPHIC0
20 BLOAD "characterset", B0, P14336
30 POKE 2604,30: POKE 217,4
```

That's all there is to it. Line 10 allocates memory for a hi-res screen by moving up the start of BASIC. This is necessary to protect the character set from interference from your program. Note that while the custom characters are in this memory, you should not use the hi-res screen. Also, if you use the SPRDEF command to create sprites, the hi-res area is cleared and your character set will be erased. After exiting the sprite editor, press RUN/STOP-RESTORE and BLOAD the characters again.

Line 20 loads the character set you created into locations 14336–16383. Substitute the appropriate filename for "*characterset*" in this line. Line 30 then sets a pointer to 14336. To move it to another location in memory, the character set must start at an even multiple of 2048; divide the starting address by 1024 and add 16 (this is the number to POKE into 2604). The POKE to 217 tells the 128 to look for the character in RAM instead of ROM.

For multicolor characters, a couple of additional POKEs are needed:

```
40 POKE 218,255: BANK 15: POKE
   53270,PEEK(53270)OR16
```

The POKE to 218 turns off the split-screen option, which is accessed by the BASIC commands GRAPHIC2 and GRAPHIC4. Split screens use a raster interrupt to switch back and forth; this interrupt interferes with multicolor mode. Once the interrupt is disabled, it's safe to go into multicolor mode with the POKE to 53270. To change the colors in multicolor mode, use the COLOR command.

See program listing on page 111.

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Jujitsu

Rob Landeros

Can you outfox the computer in this game of one-upmanship? The rules are easy enough for a young child to learn, yet they require a depth of strategy all gamers will find challenging. Originally written for the 64, we've included modifications for the 128, Plus/4, and 16.

Sometimes the games with the simplest of rules can provide for some elegant and subtle play. In his book *Games for the Super Intelligent*, Jim Fixx introduced such a game, for two players, which he called "Jujitsu."

Jujitsu uses a standard deck of playing cards. One suit, diamonds, is put aside. Each player starts with one complete suit (think of the cards as spending money), the remaining suit being used for the deck. In this case, you play hearts, the computer plays spades, and clubs are used for the deck.

The deck is shuffled and placed face down in the middle of the table. Then the top card is turned up. Players simultaneously bid for the trick with a card from their hands. The person who lays down the higher card captures the card in the middle. The point value of the card is then added to that player's score (aces are low, counting as 1, and the king is the highest card, worth 13 points). In case of a tie, neither scores the trick. The winner is the player with the higher score when the deck is exhausted or the first player to reach 46 points.

As an example, let's say the first card turned up is a 7. You play an 8, but the computer plays a 9. The computer gains 7 points (the face value of the card in the middle); you get nothing. The next card is a king. You guess that the computer will try to take it with a king (the highest card in the deck), so you play an ace (the lowest card). The computer gains 13 more points, but it spent its king to capture the king, while you spent only 1 point on losing. Now your top two cards are king and queen, and the computer has only a queen and a jack. You have to lose once in a while, and it's better to lose by a wide margin than by 1 or 2 points.

Typing Instructions

The main program is written in BASIC for the 64, with a short machine language routine (for flashing characters) in DATA statements. There are no special instructions to follow; just type it in and save to tape or disk. To play, just type RUN.

If you own a Plus/4 or 16, type the 64 version, *omitting line 140 and lines 1180–1290*. You might want to mark them as unnecessary by putting a checkmark next to them on the page with the listing. In addition, the following line substitutions must be made:

```
PA 120 COLOR0,1:COLOR4,1
MR 130 AA$="A23456789TJQK":Z=R
       ND(-TI)
BJ 260 PRINT"{CLR}{PUR}RRRRRRR
       RRRRRRRRRRRRRRRRRRRRR
       RRRRRRRRRR"
CM 270 PRINT"{6 SPACES}Z
       {3 SPACES}J{2 SPACES}U
       {2 SPACES}J{2 SPACES}I
       {2 SPACES}T{2 SPACES}S
       {2 SPACES}U{3 SPACES}Z
       {7 SPACES}"
MJ 280 PRINT"{40 Y}{2 DOWN}"
GD 460 POKE 239,0
FS 520 IFHU(HB)=1THENVOL8:SOUN
       D1,144,12:PRINT"{2 UP}"
       :GOTO 450
FA 530 VOL8:SOUND1,780,5
HF 1080 PRINT"{CLR}"
BB 1090 IF SS=HS THEN CO=4:PRI
        NT TAB(14)"{8 DOWN}TIE
        GAME":GOTO 1120
RJ 1100 IF SS>HS THEN CO=6:PRI
        NT TAB(13)"{8 DOWN}COM
        PUTER WINS":GOTO 1120
EG 1110 CO=2:PRINT TAB(15)"
        {8 DOWN}YOU WIN"
AP 1130 POKE 239,0
```

This player is about to lose a bid for the king, the most valuable card in the deck. The computer, a worthy opponent in this game, will surely bid the queen.

Commodore 128 owners have two choices. Either type the 64 program for use in 64 mode, or follow the instructions for the Plus/4 and 16 above for a 128-mode program. First, use the DELETE command to get rid of lines 140 and 1180–1290 (or just don't type them in). Then, add the lines listed above. Finally, change lines 460 and 1130 above to **POKE 208,0** (this clears keypresses from the keyboard buffer).

Beating The Computer

This is an excellent game for small children. It does not demand a great deal of brain racking but does require a bit of strategy and a lot of guesswork. Because it is both easy to learn and to play, it will allow children to develop a sense of strategy. And regardless of how loosely they may play, they'll win enough times to be encouraged to continue and gain a sense of accomplishment

without frustration setting in first.

Adults will find a challenge in determining the best strategy for winning consistently, if indeed there is a best strategy to be found.

Although the program seems at times to respond to your bid because you go first, it really chooses its card only with the same information you yourself see on the screen. After all, nobody likes a computer that cheats. Although there is a bit of randomness built into the computer's bidding algorithm, after playing a few times, you'll learn to sense the program's tendencies and will win a greater percentage of the time. For an added challenge—and to even up the odds a bit—try playing blind, depending entirely on your memory to keep track of which cards have been played. To do this, simply delete lines 340–420. This eliminates the screen display of spades and clubs.

A Challenge To Programmers

Jujitsu offers the greatest challenge to programmers, who will find a unique opportunity to create their own intelligence by modifying the program to reflect their own style of play.

To do this, either study the card-selection algorithm in lines 550–920 and improve it, or better yet, delete the section altogether and start from scratch. All you need to do is have the computer come up with a number between 1 and 13 and assign it to variable SB. The decision will be based mostly on the value contained in variable CL(R), but by all means, use whatever other information you think valuable. The only thing you are not allowed to consider is the current value held in variable HB. Your algorithm can be a simple one-liner that will choose a card at random, such as:

```
550 SB=INT(RND(1)*(13)+1:IFSU(SB)
    =1THEN550
```

Or to consistently choose a value *n* numbers higher than the value of the trick card:

```
550 SB=CL(R)+n:IFSB>13THENSB=
    SB-13
```

Make it as simple or as intricate as you wish. It will be up to you to determine how much is enough to allow your program to play successfully and win at such a simple contest. Of course, if the structure is too rigid and predictable, it will be little fun to play against.

However, one interesting idea would be to replace the player's input with a card-selection algorithm instead, assigning a value to variable HB, and have the two algorithms play each other automatically over a number of games to test their efficacy. In this case, rigidity and predictability would hardly matter. Computers don't seem to mind if they're having much fun or not.

If you plan to modify the program, here's a list of variables and their functions:

CT	Total of clubs in deck
CA$	String expression of cards
CH	High club in deck
CU( )	Clubs used
CL( )	Numeric value of clubs
CL$( )	String expression of clubs
HB	Hearts bid
HH	High heart in hand
HU( )	Hearts used
M	Margin of bid
MM	Secondary margin of bid
SB	Spades bid
SH	High spade in hand
SU( )	Spades used

See program listing on page 99.

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John Krutch

Not for the faint of heart or slow of hand, this frantic game puts you smack in the middle of a futuristic nightmare. Your survival depends on speed and concentration. For the Commodore 64. A joystick is required.

For hours you've been exploring the ruins of a subterranean city on a remote planet. You've had your fill of sifting through artifacts, and want to return to the surface. But you discover, much to your horror, that the tunnel you used to descend to the city has collapsed. The only other way to get to the surface is by using the city's mass transit system. Although it's still functional, the transit program center has long been abandoned, and it's been operating in helter-skelter fashion for centuries.

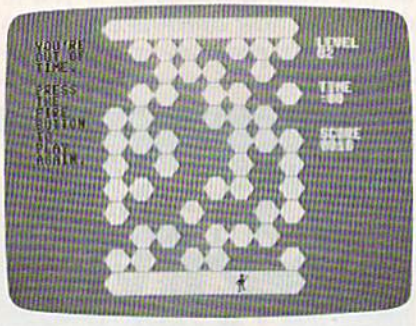
The mass transit system is a shaft containing thousands of small hexagonal chambers, or cells. The shaft has 40 levels. Each level contains dozens of cells which randomly open and close, restricting your movement in certain ways. You must climb through all 40 levels to reach the surface. Unfortunately, you have only 30 seconds to travel through each level. If you haven't made it to the next level within that time, you'll be too exhausted to go any further. And the higher you climb in the shaft, the faster the cells open and close, making it even more difficult to proceed.

Entering Cell Runner

"Cell Runner," for the Commodore 64, is written entirely in machine language, so you must use the "MLX" machine language entry program, elsewhere in this issue, to type it in. Be sure you have read and understood the instructions for using MLX before you begin entering the data for Cell Runner. After loading and running MLX, respond to the prompts with the following:

Starting address: C000
Ending address: C87F

Be sure to save a copy to disk or tape when you've finished typing. To play Cell Runner, type LOAD *"filename"*,8,1 (for disk) or LOAD *"filename"*,1,1 (for tape). When it's finished loading, type SYS 49152 to start the game.



Trying to maneuver up through the ever-changing cell structure is a bona fide challenge.

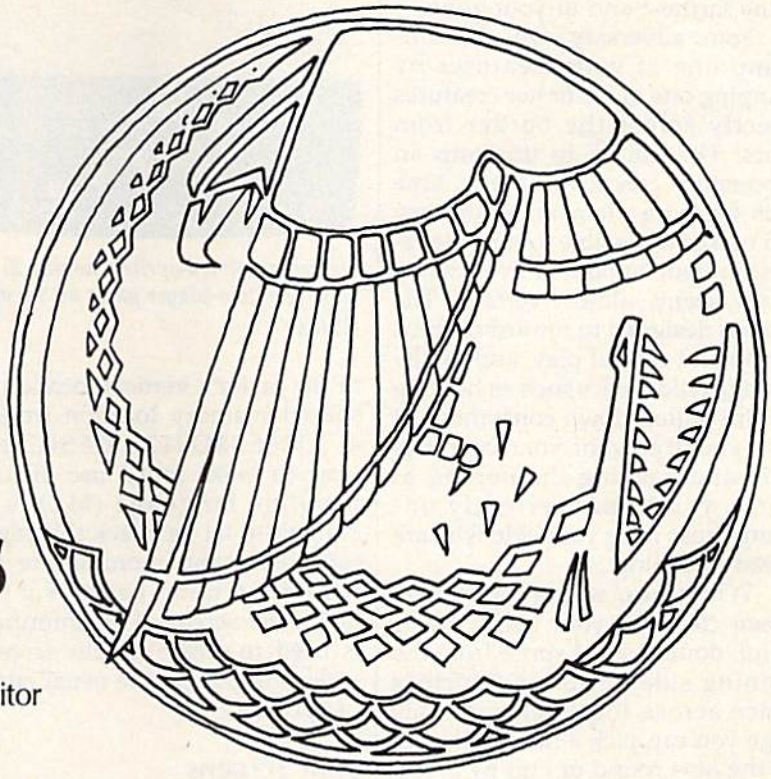
Running The Cells

Plug a joystick into port 2 and you're set to begin. You start on Level 1; as you proceed through the labyrinth, you'll see the level numbers appear on the screen. You have 30 seconds to make it to each subsequent level. An alarm will sound when you're down to your final ten seconds. The cell color will change each time you reach a new level.

At the beginning of each level, you'll find yourself in a blue "safe zone" near the bottom of the screen. The safe zone at the top of the screen marks the beginning of the next level. This is where you want to go, but the cells between the two safe zones, which are constantly opening and closing, present a problem. You can move up, down, right, or left, into any open cell. You can't move into a closed cell. If the cell you occupy closes, you'll be pushed down to the first open cell, or back into the safe zone if there are no open cells. *You'll also be pushed back into the safe zone if you hold the joystick in a forward position for too long.*

You score ten points for each level you travel through, plus one point for each second left on the timer when you reach the next level. So, for instance, if you get through Level 1 in eight seconds, your score at the end of Level 1 will be 10 plus the 22 seconds left over, for a total of 32. The faster you run the cells, the higher your final score. *See program listing on page 104.*

Eagles And Gators



Philip I. Nelson, Assistant Editor

Featuring 16 sprites on a split screen, unique sound effects, and realistic animation, this two-player action game is programmed entirely in machine language. It's written for the Commodore 64, and requires at least one joystick.

In "Eagles and Gators," an intense two-player action game, even the title screen is animated. Though the Commodore 64 is ordinarily limited to 8 sprites, this game displays 16 moving sprites at all times and includes highly realistic animation as well. Since the program is written completely in machine language, you'll need to type it in with the "MLX" machine language entry program listed elsewhere in this issue. Here are the addresses you need to enter the Eagles and Gators data:

Starting address: 0801
Ending address: 1CE3

Follow the MLX instructions carefully, and be sure to save a copy of the data before you leave MLX. To play the game, plug two joysticks into the joystick ports (see instructions below for playing with only one joystick); then simply load and run it as you would any BASIC program.

The game begins with an animated title screen, asking whether you want to read the game instructions. Press Y to view the instruction screen or N to skip it. Next, you're shown the game screen and are prompted to choose one of the nine skill levels. If you've never played the game before, you'll probably want to press 1 to choose the easiest level.

Flyers Against Swimmers

When play begins, the screen is split into upper and lower color zones: sky-blue for the eight high-flying eagles and murky black for the eight gators swimming below. Each player controls a group of eight sprites. The game is written to be played with two joysticks, but you can substitute keypresses to control the gators, normally controlled by joystick 1. Press the CTRL key to move left, the 2 key to move right, and the space bar to fire.

Your sprites are in constant, realistic motion, flying or swimming up and down in their zones, rebounding when they hit the border between the two worlds. The flashing colored sprite in your group is the one controlled by your joystick. To switch control to a different sprite, move left or right.

The goal of the game is to expand your zone and push your opponents off the screen. This is done by convincing your creatures to push against the sky/water border. Press the fire button just as your flashing eagle or gator bumps the border, and it will "clamp" on and start to shove. Whenever you clamp successfully, your opponent's screen flashes red, and all of your creatures thrash momentarily with excitement.

Your zone expands whenever you have more sprites pushing than your opponent, and the game ends when one side or the other takes over the entire screen. That sounds simple, but it takes precise timing to clamp just one sprite. If you press the fire button at the wrong time, your sprite moves away from the border, regardless of its initial direction. If you press the fire button

when your flashing sprite's already stuck to the border, it bounces back to the farthest end of your zone.

Your adversary can also unclamp one of your creatures by clamping one of his or her creatures directly across the border from yours. The ability to unclamp an opponent's creatures at any time adds an extra element of strategy and makes it possible to turn the tables on your opponent even when defeat seems almost certain. The game is designed to reward concentration and careful play, and to discourage wild tactics such as holding the fire button down constantly. At best, you'll prevent your creatures from approaching the border; at worst, you'll inadvertently unclamp those from your side who are already pushing.

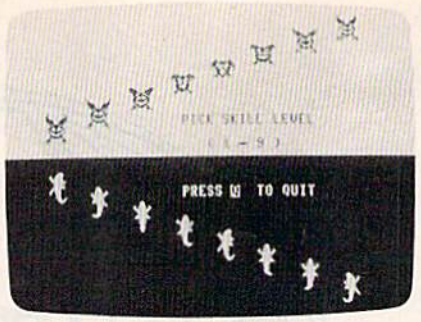
When you win a game, the screen clears to your color, and a joyful, double-sized sprite from the winning side performs a victory dance across the screen. At this stage you can pick a new skill level for the next round or quit by pressing the Q key. After you exit, the game can be restarted by typing SYS 16384 and pressing RETURN. To stop in midplay, press RUN/STOP–RESTORE.

Displaying 16 Sprites

Space doesn't permit a detailed explanation of every routine in this program, but you may be curious about how to display more than eight sprites at a time, something often mentioned, but rarely seen in action. In order to understand how it's done, you'll need to know a little about raster displays.

Your TV or monitor makes a picture by scanning its screen with a moving electron beam called a *raster.* This is done line by line, from top to bottom, 60 times a second. The visible portion of a TV picture is made up of 200 raster lines, numbered from 50 at the top through 249 at the bottom. The same numbering scheme is used for locating sprites vertically on the screen, so raster line 100, for example, matches up with sprite vertical location 100. This correspondence between raster lines and sprite positions greatly simplifies the task of creating more than the usual number of sprites.

The Commodore 64 keeps track



Sixteen animated sprites moving at once make this two-player game an intense struggle.

of the raster's vertical location in a special memory location (register) at 53266 ($D012). BASIC is too slow to make much use of it, but machine language (ML) is fast enough to let us check this register repeatedly and monitor the position of the raster beam as it scans down the screen. This information is used to create a split screen as well as to double the usual number of sprites.

Split Screens

To make the two-color split screen, we first establish an arbitrary "split" point somewhere near the midpoint of the screen (say, at line 100) and then repeatedly compare the raster's location to that value. When the raster value is less, we know it's above the split, so we color the screen cyan to create the sky zone. When the raster value is greater, that means it has dipped below the split point, so we color the screen black for the water zone. Remember, moving downward on the screen increases the raster (or sprite) vertical location value. By changing the border color along with the screen background color, we can make the split extend the full width of the screen for heightened realism.

The same sort of monitoring makes it possible to display 16 sprites. When the raster's above the split, we display all of the 64's 8 sprites at vertical locations in the upper color zone. When it drops below the split, we display the same 8 sprites at locations in the lower zone. The two sets of sprites are never actually displayed at the same time. The program just changes their locations so fast that your eye sees 16 solid figures, without a trace of flicker.

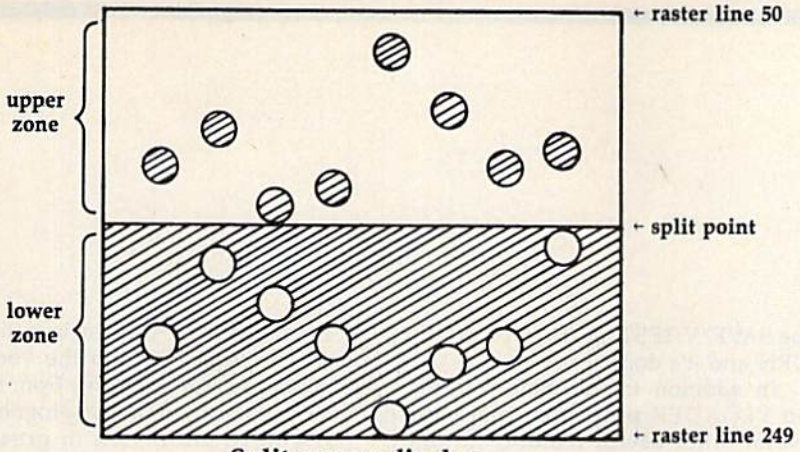
Shadow Registers

If you stopped at this point, you'd have two identical groups of eight sprites—upper and lower—sitting motionless on a split screen. Nice, but boring. To exploit the effect in a game, we want the two sprite groups to look different and move independently. Unfortunately, the Commodore 64 still has only eight sets of sprite control registers for handling the sprites' shapes, colors, and so on. Remember, we're just flipping the same group of eight sprites back and forth at very high speed between different vertical locations. Thus, top sprite 1 doesn't just look the same as bottom sprite 1; it *is* the same sprite. The minute you change the shape or color of any sprite in the upper group, its lower twin immediately follows suit, and vice versa.

What we really need to write this game is 16 sets of sprite control registers. Commodore didn't design 16 sprites for the 64, but you can achieve much the same effect through software. Here's an outline of how it's done in this program. First, we set aside some free memory to use as "shadow" registers in place of the actual sprite control registers. Since none of the eagle or gator sprites move horizontally, we don't need to duplicate the 8 horizontal position registers. However, every sprite must be able to move freely up or down and change its shape and color at any time. Thus, for each group of 8 sprites we need 8 registers for vertical position, 8 for color, and 8 more to hold shape data pointers. Three sets of 8 make 24: double that for the second set of 8 sprites, and you now have 48 shadow registers.

To make each sprite appear in the correct spot, we must transfer the contents of each shadow register into the corresponding control register at precisely the right instant. When the raster beam is in the upper portion of the screen, we'll take data from the eagles' set of shadow registers and store it in the actual sprite control registers. When the raster creeps down below the split, we'll fetch gator data instead and plug that into the control registers.

Of course, it's not necessary to do this on a two-color split screen. This particular program changes



Split-screen display

screen colors at the split point to accentuate the division between sides. But in another application, you might prefer to leave out the color changing code. The split location is just an invisible reference point that tells you when it's time to flip the sprites from one zone into the other.

Coasting On The Interrupt

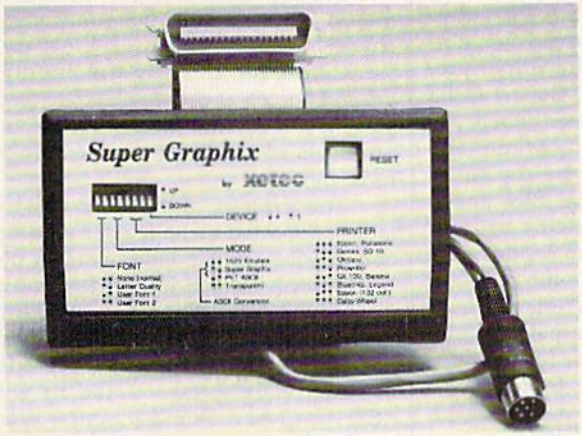
Expressed in this simple, schematic form, the job of displaying 16 sprites sounds quite simple. When the raster beam is above the midpoint, make the sprites appear in the upper area. When it's below the split, move them down into the lower area and give them new shapes and colors. The process is uncomplicated in theory. But don't bother trying to do this in BASIC, which is many times too slow to read the raster's position accurately. This program uses an interrupt-driven routine to manage the 16-sprite effect. Although interrupt handling goes beyond the scope of this article, the technique essentially wedges our custom sprite display routines into the computer's operating system along with its normal hardware-servicing routines, which do background tasks such as scanning the computer's keyboard. Conveniently, the interrupt-driven routine is executed 60 times per second, exactly the same frequency at which the screen is redrawn. As a result, the sprite display and color split are quite stable.

The advantage of driving an ML routine on the hardware interrupt is that it becomes completely automatic. Sixty times every second, the computer executes your custom routine along with its own housekeeping routines. An interrupt-driven routine seems to coast along all by itself, without slowing down other program events. In effect, we've enhanced the 64 by adding the ability to display 16 sprites, with the option of a two-color split screen. Because the custom routines operate in the background, the shadow sprite control registers seem to work exactly like the actual control registers. We can change the color, shape, or position of any of our 16 sprites by plugging different values into their shadow control registers. To move our border up or down, we just change the value for our split point, and everything else follows accordingly.

The price you pay for these new features is that the sprites can't leave their respective zones. If you try to move an eagle sprite down into the gator zone, the custom display routine automatically gives it a gator shape and color, and the sky is minus one eagle. The same thing happens in reverse if you move a gator into the upper zone. If you move any sprite so that it overlaps the border, you get a weird hybrid creature with an eagle-shaped upper body and a gator tail. It's easy to forget because the shapes look so real, but the 64 still has only 8 sprites built into hardware. Using similar techniques, it's possible to display as many as 64 sprites on the screen at once. All you need to do is divide the screen vertically into additional zones, add extra shadow registers, and modify the display routines to handle them. However, the same general rules apply. Each group of sprites is confined to its own vertical zone, and you may not have more than 8 sprites occupying the same screen line.

See program listing on page 108.

Super Graphix



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Vorpal Utility Kit

Just what is Vorpal? It's a disk file format for the Commodore 64, and the major component of the *Vorpal Utility Kit* from Epyx, a utility package with a variety of different features. For instance, files saved in the Vorpal format load very fast indeed. Epyx uses the Vorpal format with some of its other software products. The *Multiplan* spreadsheet program from Epyx, for example, now loads much faster than a previous version which used the conventional Commodore format. With the *Vorpal Utility Kit*, you can use this fast load system for your own BASIC or machine language programs.

Just how fast does a Vorpal file load? Epyx claims speeds up to 25 times faster than normal. I didn't run extensive tests, but I found that a program that occupied 75 blocks on disk and took 54 seconds to load, loaded in less than 4 seconds when saved in the Vorpal format. Remember, though, that it's necessary to load the Vorpal program first—and that adds time to the loading process. But even here, Epyx has added a convenient feature. There is a shortened version of the main Vorpal program, called VLOADER, that is faster loading and is all you need when you want only to load programs. The VLOADER program can be copied on each disk that has Vorpal files and it takes only about 10 seconds to load. Once loaded, the program resides safely protected in memory and does not need to be reloaded each time you load a new program. Both Vorpal files and conventional files can be loaded, though only the files saved in the Vorpal format will load at super fast speed. Vorpal format programs will not load without VLOADER, but since you can copy VLOADER onto each disk, this poses no problem.

Saving programs in the Vorpal format is easily accomplished with the VFILER program. Once loaded, this program is also protected in memory and is used to save either machine language or BASIC programs. Saving a Vorpal file is simplicity itself. Use the regular SAVE format but precede it with "V:". That's all there is to it. To save a program called TEST, simply type SAVE"V:TEST",8. Then press RETURN and it's done.

In addition to the main VFILER and VLOADER programs, there are several other useful features in this package. Utilities are included that allow you to easily rename, format, and validate a disk. You can delete, undelete, change file types, protect and unprotect files, create boot files and convert your current files to the Vorpal format. All these features are easy to use with easily followed prompts to guide you. The package also includes a 1541 disk drive head alignment program.

Epyx has even thrown in a little bonus. The reverse side of the Vorpal disk contains short selections from five of their popular sports action programs.

If you're interested in greatly speeding up the loading process for most of your programs, the *Vorpal Utility Kit* is certainly worth considering. The incredibly fast loading speed of a Vorpal file has spoiled me.

—Howard Parnes

Epyx, Inc.
1043 Kiel Court
Sunnyvale, CA 94089
$24.95–$34.95

ACE: Air Combat Emulator

Your southern shores have been invaded. You're the last fighter pilot, with only three ACE Mark 2.1 combat aircraft to use. Your mission is to attack and destroy the enemy, driving them back from your shores without being destroyed yourself. Be sure to use the advanced avionics systems, which contain the radar and satellite intelligence map. Without them, you won't have a chance.

If you can destroy the enemy's ground forces and defeat its air force, you must then sink the naval fleet as it attempts to evacuate the remaining force by sea.

The ground divisions consist of tanks supported by helicopter gunships and missiles. An air wing of highly mobile, heavily armed jet fighters is also looking for you. When you attack the enemy fleet and fly into the antiaircraft fire, it's like flying into a meat grinder.

Get ready to take to the air with *ACE: Air Combat Emulator*, a new product for the Commodore 64 from Spinnaker's UXB software line. This flight simulator is loaded with all the features necessary for an excellent aerial combat simulation. After loading the program, you soon experience the sensation of actual aerial combat, including the queasy feeling in the pit of your stomach as you struggle to regain control of your plane after some perilous maneuver to gain an advantage over your adversary.

If there's one word to describe *ACE*, it's *fast*. You'll find the high-speed, three-dimensional graphics truly amazing. In fact, there's so much going on at once you'll wonder how the developers managed to do it all without slowing the game to a crawl.

ACE is perhaps the easiest flight simulation I've played—at least it's easy to get started. Just increase your speed to over 150 knots, pull back on the stick, and you're airborne. Staying in the air in this highly maneuverable aircraft is another story. So is the number of enemy planes lying in wait for you.

Your armament of missiles and cannon is not inexhaustible; you'll be using up fuel and suffering damage from enemy missiles and shells. Sometimes it seems that the voice-synthesis circuits are capable only of saying "Missile Warning." Eventually you'll discover that other helpful verbal messages are transmitted.

To replenish your armaments and repair damaged aircraft, land at any of the Allied Bases displayed on your Satellite Intelligence Map. Refueling is accomplished by landing at a friendly airfield or by rendezvousing with one of the tanker planes that appear when your fuel runs low. A word of warning: Landing and hooking up with the tankers for air-to-air refueling isn't easy. You'll need lots of practice.

At times you'll lose some of your aircraft. The computer plays a mean game. If you're lucky, you'll be able to use the ejection seat to escape from

your damaged fighter and fly into combat again.

Select skill levels from 1, a training mission, to 9, if you're a real combat ace. Fly solo or team up with a gunnery officer in a two-seater to test your teamwork against the computer-controlled enemy. Further customize your game by selecting summer or winter and day and night scenarios. You can even select the weapons load you need for your next mission. (Don't be caught with a load of air-to-air missiles while attacking a ground force.)

Don't expect high scores too quickly. Mastering this simulation takes time. The necessary skills are innate to only a few people. Some strategy and planning is also necessary. The skills to survive in *ACE* take time and practice to acquire. With multiple levels and options, you'll find this game consuming many hours without becoming a bore.

Low on fuel again. Better break off and head for the tanker to refuel. Let's see—the Satellite Intelligence Map shows the tanker northwest of here. Just send this missile up that jet's tailpipe...now descend to 20,045 feet and reduce speed to 230 knots to rendezvous with the tanker. There it is now; just have to ease in behind it....

—George Miller

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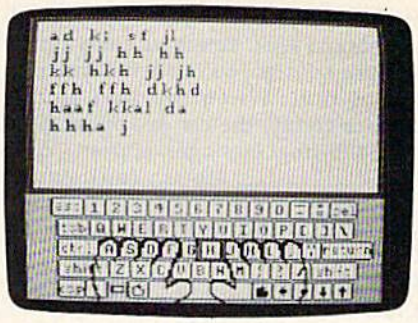

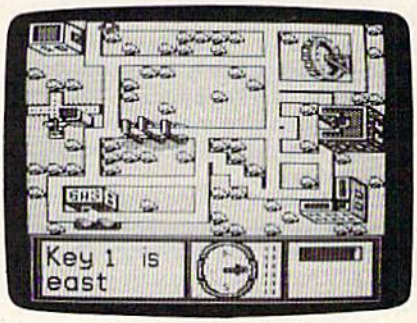

Stickybear Typing Tutor And *Stickybear Town Builder*

I confess: I can't type. Actually I can type—I simply don't do it quite the way my secretary does, and not nearly as fast. I use the proximity method: Whatever finger is nearest the letter I want (I have a general idea where the letters are located) is the one I use.

Secretly I've always wanted to be able to touch type. The ability to read something and miraculously have it appear on a sheet of paper or computer screen has eluded me since high school. *Stickybear Typing Tutor* from Weekly Reader Family Software is a program for anyone whose fingers reach the keys and who desires to type as fast as—as fast as—well, as fast as possible.

The program is composed of three separate games, each designed to help the aspiring typist improve. Each game uses a different method. The first game is called Stickybear Keypress. It's the best of the three for younger players, beginning typists, and those who wish to review the keyboard and improve accuracy. A Commodore keyboard is displayed at the bottom of the screen. As each key is highlighted, you press that key on the real keyboard. Beginning with "home" keys, the game takes you through 30 levels to a mastery of the entire keyboard. The game keeps track of your speed and the level attained.

This game is best at developing accuracy and the "touch" in touch typing. Most of us type words, either from paper or envisioned in our minds, so watching individual keys on a keyboard is unnatural behavior. This slows down even the best typists and means the speed achieved is not an accurate reflection of the player's ability. Still, this is an excellent starter.

The second game is Stickybear Thump, which pits a robot against Bedford Stickybear. The robot provides letter groups for you to type and tosses cubes at Bedford. Whenever the letter group is typed correctly, Stickybear hurls a ball at the robot. The object is to knock out the robot by typing quickly and accurately before Stickybear gets thumped on the head. The letter groups grow more difficult (up to level 30). The scores of the top four players are recorded.

Stickybear Thump is a relaxing and fun way to practice typing, and the challenge of saving Stickybear builds speed. It's got to be the most fun typing lesson going.

The third game is Stickybear Stories. This allows you to practice typing with real text. There are three categories in which you can practice: stories, riddles and jokes, and serious thinking—a collection of facts, figures, and prose. All of these may be practiced in accuracy, typewriter, or word processor modes. Three- and five-minute timings are available in Stickybear Stories, too.

Here we have a chance to work in the "real world." This is the most like regular typing practice, but in Stickybear it's more fun. The stories about the Stickybear family are cute. The riddles and jokes are amusing—and not just old standbys. The serious thinking section has encyclopedia-like entries and includes samples of classic prose. The timers work accurately and provide a standard progress report.

Stickybear Typing Tutor seems to have everything: a game to develop accuracy, one to build speed, and yet another to simulate the typist's real world. Together these can go a long way to building typing skills. It has options that allow timed tests, a display of hands hovering over the home keys, and reports on players' progress. It allows practice in three modes: typewriter, word processor, and accuracy. In addition, it comes with a brightly colored poster of the Stickybear family. It claims to be a typing instructor for everyone, and I couldn't agree more.

Sometimes it's hard to find an effective way to teach a child certain skills. Map-reading can be one of them. Questions like "Which way is north, Daddy?" crop up when Daddy is frantically trying to swing onto the south offramp of a six-lane cloverleaf in a strange city. Daddy shouts a garbled "That way!" and gestures wildly, leading to a hair-raising swerve and far more "education" than the simple question had solicited.

Stickybear Townbuilder offers a less harrowing way to teach children about map reading. Players can build towns, make trips, and hunt for hidden keys while learning some important map skills. Designed for children ages 7–10, this program could be enjoyed by people of many ages.

Build a Town lets you select from a wide variety of buildings, parks, and places to design a town. The initial screen shows an undeveloped piece of land. It also displays symbols across the bottom from which you build the town. Streets are filled in by the computer, and soon you have a fine view of your new town. Up to 20 towns may be saved to disk under names you choose.

With these towns or the ones the program provides, you may Take a Drive. This posts the map at the top of the screen and replaces the symbols below with a fuel gauge and a box for directions. The directions are simple: "Go

to the" followed by the map symbol you should seek. You drive a tiny car to as many sites as you can before you run out of fuel. When the fuel gauge reaches empty, the car disappears and the following messages appear: "You made _____ stops. Your score: _____."

In Find the Keys, the computer hides 12 keys in the town. You try to find them before the car runs out of gas. Clues such as this appear on the lower screen: "Key 1 is east." The message changes as you drive along in search of the key. A compass shows the way by pointing its arrow in the appropriate direction. When a key is found, the message for the next key appears. When the fuel runs out, the computer gives the final score and automatically returns to the main menu.

Menu selections are made by moving the tiny car alongside the desired game segment and pressing a button. The car's movements can be controlled either by keyboard or joystick.

Stickybear Townbuilder has excellent graphics: a bird's-eye view of a variety of buildings and places. Many of these have clever touches, such as the ferris wheel that turns and the airport runway lights that flash. Bridges are drawn so that the car can be seen to pass beneath their upper towers.

An infinite number of maps can be drawn. This makes the game different every time, much more exciting than a more traditional map tutorial. Sounds, though minimal, are used effectively to signal game play. The manual is clear and concise, and there's a cheery poster of the Stickybear family enclosed.

The program draws on a child's creative powers. What child can resist the chance to create his own town, a world all his own? He's more willing to learn—he's had some input into the game. The other parts of the game provide some arcadelike fun. Trying to manipulate the car through the streets is a challenge in itself. And racing against the dropping fuel gauge makes it even more exciting.

Our daughter enjoys it so much, she's already built and saved ten towns. She doesn't drive the car yet, but she cheers us on as we steer through her maze of streets. (She often sees where we're headed before we do.)

We want a children's program to teach, to entertain, and to challenge. We want it to have graphics worthy of a child's imagination. And we want it to be enough fun so that children will ask to play it. *Stickybear Townbuilder* has it all.

—David and Robin Minnick

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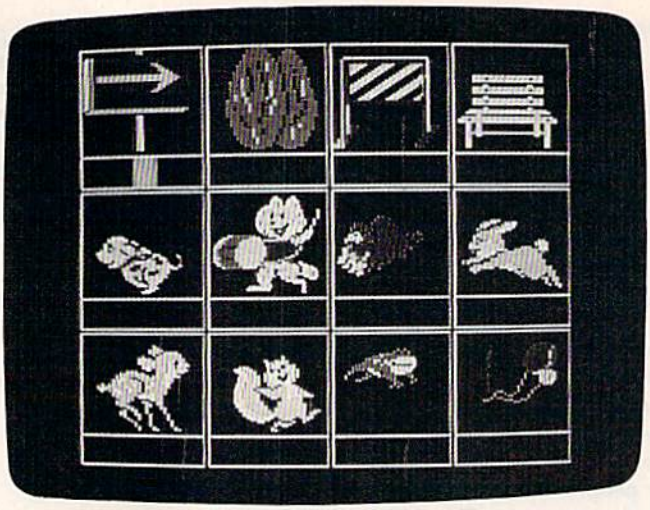


Bike Hike

Bike Hike, Pipeline, And *Math In A Nutshell*

They're bright, cheery, and colorful. They're educational—and fun, too. They're three new programs from Learning Technologies: *Bike Hike*, *Pipeline*, and *Math In A Nutshell*.

Bike Hike, from the Early Learning series, is for ages 4–8, and promotes reading readiness. In this program, youngsters take a bicycle built for two out for a ride. They may choose a short ride or a long one. Along the way, the riders pass by different objects and animals. At the end of the ride, a chart of eight or twelve pictures appears. The youngster must recall how many times each object or character appeared. At the end, a scoreboard displays the player's score.

Pipeline

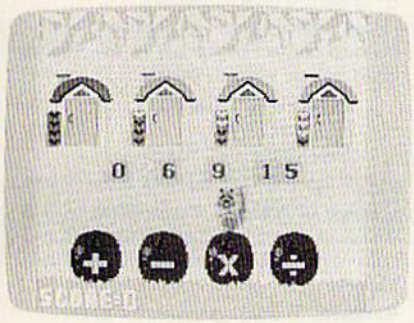
Pipeline, from the Thinking Strategy series, is for children 8 and up, and is designed to develop problem-solving skills. It begins by filling the screen with a number of objects that hold water (for example, a pool, a fish bowl, and a water faucet). The player must choose from eight different pipe shapes displayed at the bottom of the screen to connect the faucet to all the objects. This can be done with or without a time limit, and there are three levels of play. When all the pipe is in place, the player turns on the water. If the pipeline works, the water flows smoothly. If the pipe has been laid incorrectly, the water leaks from the trouble spot and an "X" replaces any objects the water doesn't reach. Also, if the player exceeds a preset time limit, the water is turned on.

Math In A Nutshell, from the Math series, also for children 8 and up, provides practice on the four basic math skills. *Math In A Nutshell* is less gamelike than *Pipeline* or *Bike Hike*, but it provides a real numbers challenge for players in the age group for which it was designed. There are three levels from which to choose, ranging from working with four digits to six. (A mild warning here: This game is supposedly geared for youngsters, but even Mom and Dad had trouble with the top level.) The screen displays four small houses, an equation, and four apples. The equation shows the result, but lacks the mathematical symbols. Each of the four apples contains one math symbol (+, −, *, and /). The player uses a little squirrel from the houses to carry the correct signs from the apples to the equation. If the correct answer isn't found after two tries, the program displays it. A correct answer scores 10 points, and a wrong answer subtracts 10. At 100 points, play is automatically advanced to the next level.

All three programs have fine graphics. *Bike Hike*'s animated characters are especially well done. Each has a sound or no-sound option at game's start—an answer to a mother's prayers. However, the sounds are just right. They're appealing snatches of music that nicely punctuate the games' activities.

The manuals accompanying the programs are accurate and clearly written. Playing instructions may also be viewed onscreen (optional), and they're quite helpful. The menus are clear and well-designed. There's even a "Please Turn Off Your Computer" reminder at each program's end.

These programs could do more to pat the player on the back. *Bike Hike*'s scoreboard and music are enough to satisfy a young player. However, *Math In A Nutshell*, and *Pipeline* in particular, could give the player something extra. For instance, the only reward in *Pipeline* comes when the water is run. A few things, like the pool and the fish bowl, fill with water when it reaches them. It might be more visually appealing if more of the items could become animated. The player might then feel a greater sense of accomplishment.



Math In A Nutshell

Math In A Nutshell's manual could explain one crucial mathematical point more plainly: Multiplication and division have priority over addition and subtraction in long equations. It's essential that the player be aware of this because in *Nutshell*'s equations there are no parentheses. Parentheses, of course, would clue in the answer.

Each of the programs is attractively packaged, and each includes a free poster and learning kit via mailback coupon. These kits, designed to help teachers in the classroom and parents at home, consist of five coordinated teaching aids which complement the computer learning experience.

The concept behind the design of these programs is that all learning is achieved through the use of certain skills, and the more highly developed these skills are, the better at learning a person will be. The Learning Technologies programs strive to develop these learning skills through the use of enjoyable yet challenging games. They succeed. *Bike Hike* and *Pipeline* are subtle educators, games that teach. Youngsters are not likely to notice they're learning. *Math In A Nutshell* is more obviously a learning program, but it's fun and can be competitive with more than one player. Its approach to posing mathematical questions is unique—providing the answer to the equation and asking for the signs. It makes the game far more challenging and intriguing.

The key question asked about programs of this nature is "Are they enough fun to attract youngsters to play them?" The answer here is an absolute yes. We've been pulling them out to play ourselves. Our 4-1/2-year-old often asks for *Bike Hike*. She's even attempted *Pipeline* and *Math In A Nutshell* with a helping hand from Mom and Dad. Conversations with teachers lead us to think these programs would be excellent in a classroom. They're definitely winners at home.

—David and Robin Minnick

Learning Technologies
4255 LBJ, Suite 265
Dallas, TX 75244
$19.95 each

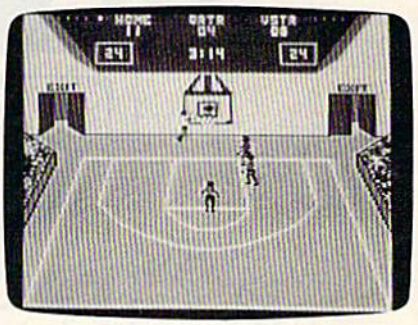
GBA Championship Basketball: Two-On-Two

Sports simulation games for the Commodore 64 have enjoyed tremendous popularity over the last couple of years for a number of reasons, the biggest one probably being the much-improved graphics we've seen in the same period. Strategy games that don't need to show people actually participating in a sport, like chess, don't require superb graphics to still be enjoyable. Physical sports simulations do. And it's easier to program a bishop moving from one chess square to another than a person charging around a basketball court.

The appeal of these games certainly doesn't lie in their imitation of the real experience. Mastering the joystick to move a character around the screen has no relation to the physical finesse needed to play the real game. So, in order to make the players of these games feel like they're really participating, superb graphics and animation are key.

GBA Championship Basketball: Two-On-Two, from Gamestar/Activision, does a good job of creating a believable graphics environment with good fast-action animation. It's a simulation of two-on-two basketball that can be played by one or two players; the computer controls the moves of the opponents (if the one-player option is chosen). And not only are the players themselves well-drawn and animated, but the extraneous graphics were also developed with care. That's a nice thing to see in a computer game, a sign that the program was not just slapped together and rushed out the door. For example, some of the game's early menus are posted on a representation of a stand-up chalkboard like you might find in a locker room, instead of just being thrown up on a background screen.

Your first option is whether to play an actual game or practice. It's advisable to practice first. All player movements are made by moving the joystick around and pressing the fire button, and it takes a little getting used to. The fire button is pressed for both passing a ball and releasing it at the top of a jump



for an attempted shot, and the right timing for either move requires some practice. Once you think you're ready for a game, you can select either league or exhibition play, and use pre-defined teams and players or create your own.

A game's playability, as it has come to be defined, involves a number of elements, many of which are difficult to put into words. The key, though, is how the individual feels as he's playing the game. If he's having a good time and being challenged without being overwhelmed by instructions and unfamiliar commands, the game is considered to have good playability. By this criterion, *Two-On-Two* is quite playable. It's very easy to get caught up in the action. And the computer is a good opponent. Unless you try some razzle-dazzle to get around your guards, they'll be on you all the time. But then, the same is true in a good basketball game.

The outcome of each match is not just left up to your skill with the joystick. You can set skill levels for the players, making them better or worse at dribbling, stealing, quickness, and jumping. Giving a player a high score in one area, though, means another skill area will have to suffer.

Creating a playable, enjoyable game that draws people in, entertains them, and challenges them enough so that they want to play it many times isn't easy these days. Unique game concepts aren't so easy to come by anymore, considering the fact that the

Commodore 64 has been around for almost four years, and hundreds of programs have been developed for it. *Two-On-Two* wasn't built on a particularly unique game concept, nor does it contain a lot of depth or require much thought. But the entertainment needs of home computer owners vary greatly, and *Two-On-Two* offers a great deal of fun to fans of fast-action arcade-style games that simulate real experiences. It's a fine new addition to the diverse, growing line of Activision Software.

—Kathy Yakal

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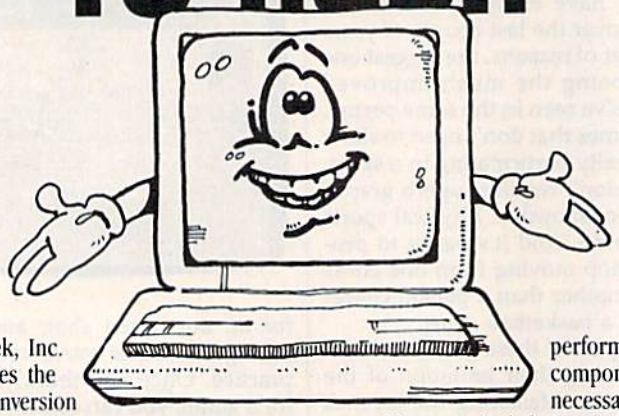

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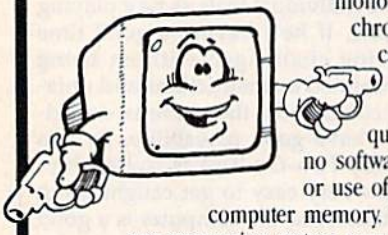

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John Martin

The 64 and VIC are usually accommodating when it comes to alerting you to errors. But when you're working with hi-res screens or custom characters, error messages can be invisible or unreadable. This short machine language program is the answer.

We've all seen error messages on our screens. As unwelcome as they might be, they're helpful in pointing to the type of problem or mistake in the program. In some cases, however, an error message will not appear—for example, when a high-resolution screen is displayed. Or, if you've redefined the character set, the error message will print but won't be readable. Any number of hidden errors can cause a program to stop during set up—with no error message.

"Sound Off" provides a solution. It's a short machine language routine that creates a bell-like tone and prints an error message when an error is encountered. It works in both program and direct mode. And it is not disabled by the RUN/STOP–RESTORE key combination. The only way to disable it is to reset the computer: type SYS 64738 on the 64, SYS 64802 on the VIC, or turn the computer off and then on again. All of these methods erase the program currently in memory, so be sure to save the program before resetting the computer.

Note to 128 and Plus/4 users: To simulate the effects of Sound Off, use the TRAP statement to enable an error-handling routine. Within that routine, you could use GRAPHIC0 to turn off the hi-res screen and SOUND to create a beep. A machine language routine such as Sound Off provides is not necessary on the 128 and Plus/4; you can trap errors with BASIC alone.

Using The Program

After typing in the appropriate version (Program 1 is for the 64, Program 2 is for the VIC), be sure to save a copy. To use Sound Off, just load it and type RUN. The machine language data is POKEd into a safe area of memory and the program is activated. The 64 version uses locations 53047–53171, and the VIC version uses locations 673–719. Note that any programs or cartridges that use these areas of memory will disable Sound Off. Some commands in "MetaBASIC" will do this. However, the 64 Super Expander cartridge will not interfere. VIC owners may use memory expanders without any problem.

Program 1: Sound Off—64 Version

```
GK 10 FORA=53047TO53171:READB:
      C=C+B:POKEA,B:NEXT
CQ 20 IFC<>13412THENPRINT"DATA
      ERR":STOP
FR 30 PRINT"{CLR}{2 DOWN}SYS 5
      3161 TO ACTIVATE"
CK 40 DATA 169,0,162,212,141,2
      53,0,142,254,0,160,0,169
      ,0,145,253
GR 50 DATA 152,201,23,240,7,24
      ,105,1,168,76,67,207,169
      ,15,141,24
DH 60 DATA 212,169,0,141,5,212
      ,169,247,141,6,212,169,1
      7,141,4,212
KE 70 DATA 169,40,141,1,212,16
      9,0,141,0,212,169,0,141,
      160,0,141
CK 80 DATA 161,0,141,162,0,173
      ,162,0,201,10,240,3,76,1
      24,207,169
SX 90 DATA 16,141,4,212,96,141
      ,60,3,142,61,3,140,62,3,
      138,201,31,176,3,32,55
RJ 100 DATA 207,173,60,3,174,6
       1,3,172,62,3,76,139,227
       ,169,140,141
FE 110 DATA 0,3,169,207,141,1,
       3,96
```

Program 2: Sound Off—VIC Version

```
RC 10 FORA=673TO719:READB:POKE
      A,B:C=C+B:NEXT:IFC<>5053
      THENPRINT"{CLR}DATA ERRO
      R":STOP
ED 20 PRINT"{CLR}{2 DOWN}SYS 6
      73 TO ACTIVATE"
DF 30 DATA 173,0,3,141,208,2,1
      69,184,141,0,3,173,1,3,1
      41,209,2,169,2
KX 40 DATA 141,1,3,96,160,15,1
      69,230,141,11,144,140,14
      ,144,169,0,133,162,165
EM 50 DATA 162,201,2,208,250,1
      36,16,240,76
```

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Window Wizard

Ronald Carnell

You'll be amazed at your 64's screen display when you use this truly powerful utility. Loaded with features, "Window Wizard" adds 19 new commands that can give your programs a brand new, professional look. An impressive demo program is included.

You've probably seen windows in action. The Amiga, Atari ST, and Macintosh all make extensive use of them. If you want a menu on one of these machines, just pull it down from the top of the screen. And when you're finished with it, it quietly disappears—leaving the screen exactly as it found it.

A window is basically a miniature screen that overlays the primary screen. You can print anything you like within a window, and when it disappears, the primary screen is restored, undisturbed and unchanged. Ideally, a window can be any size (even as large as the primary screen) and can be placed anywhere. Its principal function is to offer menus or other information while not destroying what's beneath it. It doesn't hurt if it looks good, too.

"Window Wizard" is a machine language program that gives your 64 windowing capability. Now 64 owners can have pull-down menus, magic messages, and professional looking prompts.

Typing It In

Program 1, "Window Wizard", is written entirely in machine language, so you'll need to use the "MLX" machine language entry program, found elsewhere in this issue, to type it in. When you run MLX, you'll be asked for a starting address and an ending address. The proper values for Window Wizard are

Starting address: C000
Ending address: CCC7

After typing in all the data, save a copy to tape or disk before leaving MLX. If you plan to test it with Program 2, "WINDOW DEMO," save the data as "WINDOW WIZARD". To run the program, enter **LOAD "WINDOW WIZARD",8,1** (for disk) or **LOAD "WINDOW WIZARD",1,1** (for tape), then type **NEW**, and **SYS 49152**.

Program 2 is written in BASIC. Type it in and save it to tape or disk. The first thing it does is load Window Wizard, so before running program 2, make sure the disk containing program 1 is in your disk drive. If you're using a Datassette, change the load command in line 10 to **LOAD "WINDOW WIZARD",1,1**.

Windowing is Wizard's primary task, but the 19 new commands it adds to BASIC also cover many other areas of screen manipulation.

Wizard Commands

1. **!DIM(***row, column, width, height***)**

This command tells Wizard where to put your window and how big to make it. *Row* and *column* define the upper left corner of the window. Any Wizard command where the parameters are placed within parentheses, like !DIM, means that all parameters are optional. For example, the command !DIM(10) would tell Wizard you want your next window to be positioned on row 10—but column, width, and height would remain unchanged from the values of the last !DIM command.

2. **!DEFINE(***tone, 3d, hue, bchr, ichr, lrate, brate***)**

!DEFINE is a mouthful, but is one of the most powerful commands in Wizard. The seven parameters (remember, they don't all have to be included each time) represent the options you may select to customize your windows. Let's discuss each separately.

• *tone.* As each letter of your windowed message is printed, Wizard sounds a random tone. It can draw attention to your window. !DEFINE allows you to toggle this option on or off by placing the proper value as the first parameter. A value of 0 turns off the sound and 1 turns it back on.

• *3d.* One of the first things you may notice about Wizard's windows is that they appear to be 3-dimensional. This is accomplished by simulating a shadow effect under the window. A value of 0 turns off the shadow and 1 turns it on.

• *hue.* This parameter controls the color of the window (not the color of the text, though). Place any value from 0 to 15 here.

• *bchr.* This refers to the border character used for the window. Wizard defaults to a 0 value here, which provides a special, thin-lined border. But by supplying a different value, you can request a new character for the border. *Don't use the ASCII code.* ASCII is used for printing, but the screen codes are used for POKEing. Wizard POKEs your window onto the screen. For example, 65 is the ASCII code for the letter *A*. But the screen code for *A* is 1, and that's the value you would use in the !DEFINE command if you wanted to use an *A* for the border.

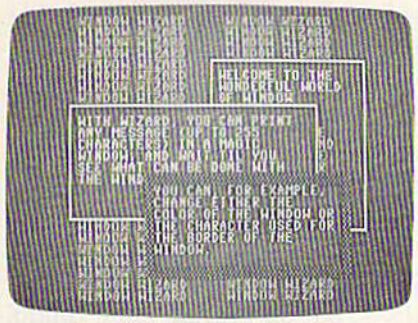
• *ichr.* This is similar to *bchr* and represents the interior character of the window. Normally, this would be the screen code for a space character (32), but you might wish to change it to a reversed space (160) or something else entirely.

• *lrate.* For aesthetic reasons, your message is printed at a controlled rate. The effect is interesting, and it also allows the tone option time to make a sound. You control the speed of printing by supplying a value between 1 (very fast) and 255 (sit back and relax time). Wizard defaults to a value of 50.

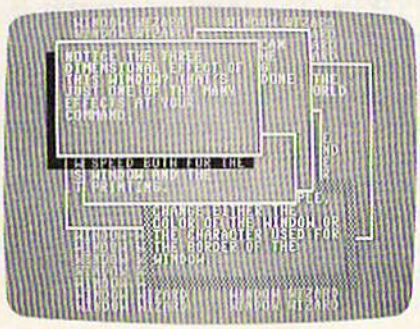
• *brate.* Windows start out on the screen as 1 × 1 boxes and grow to the size you !DIMensioned them to be. You control the rate of growth with this parameter. Like *lrate*, Wizard defaults to a value of 50.

3. !OPEN, *message*

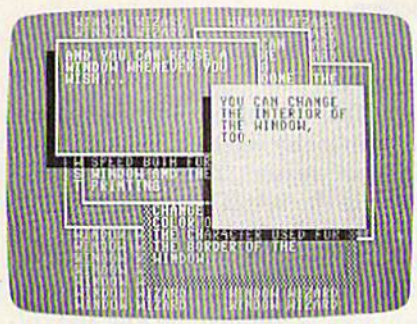
When you !OPEN a window, the obvious thing that happens is a window appears and your message (this can be a literal string in quotes or a variable) is very neatly printed into it using word wrap functions. But !OPEN is actually doing much more. Among other things, it is "memorizing" the current screen. Later, when you !CLOSE the window, Wizard reverses this process by putting back the same screen.



Windows can easily be overlaid—each with its own text color and border.



A three-dimensional effect may be created...



and the interior color of each window can be unique.

Let's look at an example. You have just !OPENed your first window. When you later !CLOSE it, the screen beneath is undisturbed. Such, after all, is the way of windows. But let's say you don't !CLOSE it right away. Instead, you !OPEN another window. And let's suppose this second window overlaps the first. What happens when you !CLOSE the second window? The first window is still there. And of course, beneath that is our original screen. Just how many windows can you have on the screen before you start destroying what's underneath?

Wizard remembers your original screen plus seven windowed screens, for a total of eight. But, when you call that eighth window, only the seventh window is destroyed. The eighth replaces the seventh. The first six windows, along with the original screen of course, are saved forever.

4. !CLOSE

!CLOSE makes a window go away. The previous screen (underneath the window) is restored. See !OPEN above.

5. !RESTORE(*screen*)

When Wizard memorizes a screen, it pushes the screen onto a Last-In–First-Out (LIFO) stack. All this means is that when Wizard replaces a screen it always pulls off the last screen it memorized. As long as all of your !OPEN commands are matched by !CLOSE commands, you can let Wizard manage the details. But there may be instances when you want more direct control, and !RESTORE gives you that control.

!RESTORE by itself resets Wizard's LIFO stack to 0; there will be 0 memorized screens. By following !RESTORE with a parameter from 1 to 8, you can control where Wizard pulls the next screen from the stack. !RESTORE(5), for example, tells Wizard that the next !CLOSE command should pull in the fifth saved screen. PEEK(37635) tells you which screen is currently being pointed to.

6. !SAVE

Wizard's !SAVE and !LOAD commands work with screen memorization more directly. !SAVE instructs Wizard to memorize the current screen without !OPENing a window, and !LOAD tells it to replace a screen.

7. !LOAD

If you wish to restore a !SAVEd screen, use this command. See !SAVE above.

8. !CLR

!CLR erases the contents of the current window.

9. !AGAIN, *message*

This would be the command to use if you wanted to print something into the current window again. This command doesn't memorize the screen, so reusing a window doesn't count as one of the eight screens Wizard can remember. !AGAIN does an automatic !CLR.

Incidentally, whenever Wizard

is handling text, as opposed to borders and shadows, it will print rather than POKE. This means that all of the many options we have with the PRINT command are still open to us. (Of course, printing a CLR/HOME in a window might be a little strange.)

10. **!KINETIC**(*direction, width, height*)

!KINETIC allows you to pass dynamic control of the current window directly to the user. The *direction* parameter tells Wizard to move the window one character in that direction. (This command and the next one use numeric values for directions: 0=do nothing, 1=up, 2=right, 3=down, and 4=left.) *Width* and *height*, if used, replace the old values, and allow changes in the window's size. For technical reasons, !KINETIC temporarily turns off any 3D effect.

11. **!SCROLL**(*direction, amount*)

!SCROLL can be used with or without a window. In either case, the area to be !SCROLLed is determined by the last !DIM command. You can !SCROLL in any of four directions (see the !KINETIC command) and you can !SCROLL any number of lines. If a number isn't specified, the default is one line.

12. **!MENU**, *menu string, return string*

The only difference between !MENU and !OPEN is the return string. Like !OPEN, !MENU draws a window and prints a message (it's up to you to insure that the first parameter holds a meaningful menu). Unlike !OPEN, !MENU doesn't immediately jump back to BASIC, but waits for the user to press a key. And whatever key is pressed is put into the second string. For example, !MENU, M$, K$ would print the menu held in the variable M$, wait for a key press, and put the letter pressed into the variable K$.

13. **!BOX**

This is a pseudo-window command. !BOX draws what looks like a window, based on !DIM and !DEFINE, but it doesn't memorize the screen. A !BOX cannot be !CLOSEd.

14. **!DISPLAY**, *message*

This one is like !BOX (see above), but allows you to add a message. !DISPLAY prints a message, based on !DIM, but again will not memorize the screen.

15. **!TONE**, *duration*

!TONE produces a single random tone. You provide the duration of the sound.

16. **!HUE**(*bkgrnd, border, text*)

This command, and those remaining, have little to do with windows, but do provide more control over the screen. The first two parameters of !HUE replace the POKEs usually necessary to change screen colors, and work identically to those POKEs. The third parameter is slightly different. Changing text color normally changes only future text; what was previously printed on the screen won't change. But if you use the third parameter of !HUE to change text color, everything currently printed on the screen also changes to that color. Use values between 0 and 15 to change the color of background, border, and text.

17. **!ERASE**, *row*

You can !ERASE any row from 0 to 24 with this command. Use it in a loop to clear larger portions of the screen.

18. **!PRINT@**, *row, column, message*

This command (read it as *print at*) is in many versions of BASIC, and for good reason. It's powerful. If you execute the BASIC statement PRINT A$, BASIC prints the string where the cursor was last sitting. !PRINT@, however, positions the cursor where you specify through the row and column setting before printing the string.

19. **!CENTER**, *row, message*

This command prints a message on a specified row, and Wizard will !CENTER the message on the 40-column screen.

If you multiply those 19 new commands by all the options available, you come up with a lot to remember, right? Wrong. Reach up and tap the RESTORE key anytime Wizard is activated, and a full review of all Wizard commands and options appears.

Error Trapping

Wouldn't it be great if we could write a program and never make a mistake? Unfortunately, a lot of time and effort always goes into finding out the many errors that so insidiously creep into our programs. Wizard tries to make that task a little easier.

You will, of course, run across the infamous SYNTAX ERROR if you misspell a Wizard command. You'll see the same error if you leave off a necessary parameter (one following a comma). You might even pull out a STRING TOO LONG ERROR if you try to !CENTER a string over 40 characters. But the most probable danger is trying to use a window too large for the screen.

Consider. If you start your window on row 18 and make the height more than 6, the bottom of your window would go off-screen. Where does it go? Since Wizard POKEs the window border into screen memory, it would POKE the bottom of your window into the memory following screen memory. What normally sits there? Your BASIC program. Disaster ensues.

Of course, we can't let that happen. So, Wizard responds with an ILLEGAL QUANTITY ERROR if your window is too large for the screen. There are three commands in Wizard where this might happen. !DIM and !KINETIC are obvious; change your values and try again. But why does !DEFINE keep causing an error? Check to see if you've asked for a shadow. Then check to see if your window has left room on the screen for a shadow. After all, we can't let a window's shadow bleed offscreen either.

Windows add a significant touch of professionalism to your BASIC programs. There are few things more impressive than quality looking windows appearing and disappearing when you want. And yet, windows wouldn't be making such an impression on the programming scene if their only function was to look good.

I've been using Window Wizard for several months, and am amazed at the freedom that windows can give a programmer. Screen layouts are now a snap, menus are instantly accessible, prompts no longer need to be short and cryptic, and programs are significantly shorter and easier to follow when so much less of the code is devoted to screen manipulation.

See program listings on page 100.

Video Jigsaw

Fred Karg

This innovative program creates an onscreen jigsaw puzzle—your choice of several levels of complexity—from *Doodle* or *Koala* high-resolution picture files. Designed for everyone in the family, "Video Jigsaw" runs on the Commodore 64. A disk drive and joystick are required.

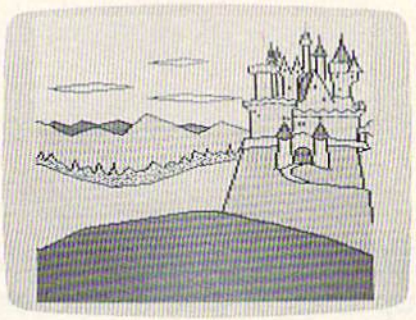
Jigsaw puzzles have always provided a lot of fun for people of all ages. If you have a Commodore 64 and a joystick, you now can try to solve a different kind of jigsaw puzzle. "Video Jigsaw" makes high-resolution color puzzles on the screen from any picture created with either the popular *Doodle* or *Koalapainter* (packaged with KoalaPad) drawing packages. After choosing a picture file, select a difficulty level and try to solve the puzzle by moving pieces on the screen with a joystick.

Getting Started

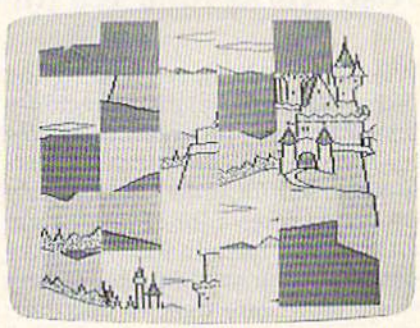
After typing in the program, be sure to save a copy to disk. To get started, load the program and type RUN. You're first asked to insert a disk containing *Doodle* or *Koala* picture files. After the disk is inserted, you're prompted to press a key. The program then locates any *Doodle* or *Koala* files in the directory and lists them on the screen. As instructed, use the cursor up/down key to highlight the name of the file you wish to load, then press RETURN. After the hi-res picture is loaded into memory, you're asked to choose the number of puzzle pieces. First choose the width (2–12), then the length (2–20). This feature makes the puzzle adaptable to any difficulty level from super easy to almost impossible. The larger the numbers in either range, the easier the puzzle will be to solve. A choice of 12 × 20, for example, would give four very large puzzle pieces, suitable for play by preschoolers. A choice of 2 × 2 would give 240 pieces and a very large headache for even the most determined puzzle enthusiast. All combinations between these extremes are possible. After choosing the width and length, you're reminded to plug a joystick into port 2 and press any key to begin puzzle construction.

When the picture appears, you'll see a flashing arrow pointing to the upper left jigsaw piece. Select the piece you want to relocate by moving the arrow to it with the joystick and pressing RETURN. Then move the arrow to the area where you want to place the piece and press RETURN. If you need extra help, press f1, and you'll see the completed picture. Press f1 again to return to the puzzle. When the puzzle is solved correctly, you'll be asked if you wish to load another picture file and play again. Press Y or N, as prompted.

Any *Doodle* or *Koala* picture can be turned into a jigsaw, but those with a lot of detail are best. *Doodle*'s famous "Middle Earth" picture makes an exceptional puzzle. Avoid pictures with large, featureless areas. One patch of clear blue sky looks just like another, but the program requires you to put the piece in exactly the right place. Like a regular jigsaw, it helps to do the border first.



When used with "Video Jigsaw," this castle scene, created with Koalapainter ...



is transformed into a jigsaw puzzle. The program can make puzzles from 2 to 248 pieces.

Video Jigsaw has all the challenge, fun, and frustration of a real jigsaw puzzle with none of the drawbacks. There are no pieces to scatter or pick up—and never a missing piece. Puzzles are always random and as limitless as your video art collection.

See program listing on page 107.

Fast File Copier

Ross Ouwinga

This handy disk utility does more than just back up files; it also scratches, renames, formats, and validates. It's especially helpful when you're reorganizing your disk library. For the 64 and 1541. Also works on a 128 (in 64 mode) and the 1571.

When you find yourself loading and listing 50 (or more) disk directories just to find one program, you know it's time to start putting your disks in some sort of order. But copying programs takes a lot of time, especially if you have to load and save programs one at a time to transfer them from one disk to another. There are much more interesting things to do with your computer than loading and saving. It gets worse if you have sequential files rather than program files. "Fast File Copier" makes it easier to make single or multiple backups, eliminating much of the burden of disk organization.

Fast File Copier displays all the files in the directory; you select any or all of them by merely moving the cursor around the screen. The program loads as many files as possible into memory, prompts you to insert a destination disk, and then saves the programs or files to the backup disk. If all files fit in memory the first time around, you're done. Otherwise, follow the prompts until the entire procedure is completed. There's no need to remember the names of the files or how to spell them, and you don't even have to know what type of file it is or where it's located. Fast File Copier handles everything for you. Fast File Copier does more than just copying. It can also delete selected files, rename files, and validate or format a disk. There are menus and prompts for every function so there is no need to memorize anything to use the program. Just load, run, and follow the menus.

Entering The Program

The program is written entirely in machine language. You'll have to use the "MLX" machine language entry program (published elsewhere in this issue) to type in the program. Be sure you read and understand the instructions for using MLX before you begin entering the data for Fast File Copier. When you run MLX, you'll be asked for a starting address and an ending address for the data you are entering. For Fast File Copier, answer the prompts as follows:

Starting Address: 0801
Ending Address: 14F0

When you finish entering the Fast File Copier data, be sure to save a copy on disk. To run it, type LOAD *"filename"*,8 and RUN, just as you would for a BASIC program. The title screen will appear and prompt you to insert the source disk. Press any key when you're ready to get started. The next thing you should see is the directory, unless there are no files on the disk or the disk is unformatted. In these cases, the type of problem will be displayed, and you'll be allowed to quit, insert another disk, or format the disk.

The Directory

The directory screen makes this program easy to use. At the top of the screen is the menu of the options you can use. Below this menu you'll see the disk directory split into two columns. Up to 32 titles may be displayed on this screen at a time. If there are more than 32 files on the disk, press f7 and the next page of titles will be displayed. To return to the previous page, press f5. There may be several pages since the directory has room for up to 144 files on a disk.

If you look closely at the listing

of titles, you may notice that some of the titles have a comma and the letter *S*, *U*, or *R* after the filename. This indicates that a file is a sequential, user, or relative type. Program files are unmarked. This feature is only for your reference; it does not affect how you use any of the functions in this program. Don't bother trying to copy relative files. They're considerably different from other types of files and cannot be copied with the techniques used by the Fast File Copier.

The only other unusual item that may appear in the directory is a title with a large dot at the end. This indicates that the file is unclosed (a "poison" file, also called a "splat" file) and you will not be allowed to delete or copy it. If an unclosed file appears on a disk, you should eliminate it by validating the disk. If you don't eliminate an unclosed file, serious problems may result in the directory. To validate the disk, press f2.

Copying Files

Before copying a file, you must mark it so the Fast File Copier knows which one to copy. Using the CRSR keys, move the X-shaped cursor in front of the file to be copied. When the cursor is positioned in front of the desired title, press the space bar and the title will be changed to reverse characters. If you change your mind, press the space bar again and the title will return to normal. To copy more than one program, move the cursor to the next desired title and press the space bar. There is no limit on how many titles you may select. You may even switch to other pages if necessary. All titles displayed with reverse characters will be copied. When you've made your selections, press f1 to start the copying procedure.

The copy routine begins with a prompt to make sure you are ready. If you change your mind, press f1 again and you will return to the directory. Press any other key to begin copying. The program will begin with the first title in the directory and check whether you selected it. If it wasn't selected, it will skip to the next one until it finds one to copy. It then checks whether the file will fit into the available memory. If there is sufficient space, the file is loaded.

The program continues to check each of the selected files and loads them as long as there is room in memory. If a file is too big to be loaded, it is skipped until the next pass. After as many files as possible have been loaded into memory, you are prompted to insert the destination disk and press a key when you're ready. Again, if you change your mind, press f1 to abort the backup. If your sound is turned up, you'll hear a chime to let you know that the program is waiting for you to switch disks.

After all the files are saved, the program checks to see whether there were any files that were not loaded on the first pass. If no more files are to be copied, you will be asked if you want to copy the same files again to another disk or begin work on another disk or quit the program altogether.

A maximum of 49664 (about 48K) bytes of RAM is available for copying. This works out to 194 blocks. Files larger than this cannot be copied by this program. The amount of memory available varies slightly depending on how many titles are on the disk. All memory between 2047 ($07FF) and 53248 ($D000) is used for storage of loaded programs.

The disk drive status message is displayed each time after the disk drive has been accessed. This is handy information if there is a problem copying any of the files.

Fast File Copier is written so that fast load cartridges such as *Fast Load* from Epyx may be used while copying. This will speed up the loading of the files, but it will not speed up the saving of the files. (Sorry, "TurboDisk" will not work in conjunction with this program.)

Scratching Files

An important feature that is necessary after copying files is the ability to delete them from the source disk when they're no longer needed. With the Fast File Copier this is just as easy to do as copying files. Merely mark the files you want to delete and press f3.

There are two ways to proceed from this point. If you want all the marked files to be deleted automatically, press the A key. If you're not too sure of yourself, press the V key. This option will stop at each title and ask you if you are sure. If you want the file deleted, press the Y key. If you don't want it deleted, press the N key and it will skip to the next title. When all the selected files are deleted, you will be asked to press any key to continue. You may insert another disk at this time or keep the present disk in the drive. Press a key, and the directory of the disk will be loaded and displayed and you may continue again with any of the options shown on the directory screen.

Renaming Files

It is sometimes desirable to change the names of certain files after transferring them to another disk. This is done much the same way as copying or deleting files. First, mark all the titles you would like to rename and press f4. The old name of each file will be displayed, and you are asked to type in a new name. If you press RETURN without typing anything else, the file will not be renamed. The new name may be only 16 characters long. If more than 16 characters are typed in, only the first 16 will be used.

Formatting And Validating

Formatting and validating a disk is straightforward. You will be asked to type in a disk name and ID before formatting. Remember that formatting erases everything on the disk, so be careful with this function. Validating only requires you to type any key when you're sure you're ready. Both functions will allow you to abort by pressing f1.

When you're through using Fast File Copier, you may return to BASIC by pressing Q. Quitting this way is much the same as pressing RUN/STOP–RESTORE, except the screen is cleared and the colors are changed back to normal.

See program listing on page 96.

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80-Column Character Editor

Harry Rivera

Create a complete custom character set for the 128's 80-column screen with this useful program. When you're satisfied with the new characters, you can save them to disk for use with other programs. Also included is a boot program for loading the custom characters into memory.

The 128's 80-column screen is an enigma. The 80-column chip has its own private 16K of memory for screen memory, color memory, and two character sets. To change the character set, you might think that you could just find the memory and POKE new values to it. But it's not that simple.

The 16K used by the 80-column screen is outside the realm of the normal memory of the 128. The only way to read or write values there is to POKE certain numbers to 80-column chip registers via locations 54784 and 54785 ($D600 and $D601 in hexadecimal). These two locations act as a gateway to 80-column memory.

It's possible to design your own characters for the 80-column screen, but it's a little more difficult than doing it in 40-column mode. "80-Column Character Editor" solves the problem and lets you concentrate on creating a new character set. When you're finished, the character set can be stored on a disk and easily loaded into memory.

A Better-Looking Character Set

If you hook up a 128 to a monochrome or RGBI monitor, its 640 × 200 dot resolution is the same as you'll find on an IBM PC with a color/graphics board (as a matter of fact, you can use an IBM-compatible color monitor with the 128). If you look closely at the characters of an IBM and the Commodore 128, you'll notice that they're not the same. The IBM's characters appear to be more stylish or fancier.

I originally wrote "80-Column Character Editor" to create an IBM-style character set for my 128. It's also good for adding foreign language characters like é or ö, or for creating specialized graphics.

There are two programs accompanying this article, one in BASIC, the other in machine language. Program 1 is the character editor, which allows you to create, edit, and save a custom character set. It's written in BASIC, with a machine language routine contained in DATA statements. There are no special instructions for typing it except that you should be in 128 mode. If you use the "Automatic Proofreader," elsewhere in this issue, you'll be able to avoid typing mistakes.

The second program is a very short machine language program. You may use the "MLX" machine language editor (also in this issue) to enter it. Answer the prompts as follows:

Starting Address: 0C00
Ending Address: 0C77

Because it's so short, you may prefer to type it in with the built-in machine language monitor. If you do this, ignore the final number on each line (the rightmost number is a checksum used by MLX). After entering the numbers, save the routine to disk using the monitor Save command: **S "BOOT80", 8, 00C00, 00C78.**

The Menu Of Commands

The program is very easy to use. All command keys are listed on the screen, so you don't have to go searching in the magazine if you forgot them. After you have entered and saved the program, type RUN to start the editor. The full character set, including uppercase

```
        LDX #$12     ;Tell VDC you are writing
        STX $D600    ; to register 18
WAIT1   BIT $D600    ;Wait until VDC is ready
        BPL WAIT1
        LDA #$20     ;High byte of address ($2000)
        STA $D601    ;Send it to register 18
        INX          ;Now tell the VDC you will
        STX $D600    ; be writing to register 19
WAIT2   BIT $D600    ;Wait again
        BPL $WAIT2
        LDA #$00     ;Low byte of address
        STA $D601    ;Send it to register 19
        LDX #$1F     ;Now set VDC for writing
        STX $D600    ; to register 31
WAIT3   BIT $D600    ;Wait again
        BPL WAIT3
        LDA #byte    ;Load byte to write
        STA $D601    ;Store byte in VDC RAM
```

and lowercase, appears on the screen along with the list of commands and a blank grid.

Just move the cursor to the character you want to change, using the arrow keys. Next, press RETURN (or E for Edit) to place that character on the grid. The cursor moves to the grid. Using the space bar, you can turn any of the dots in the grid on or off. After making the new character, press RETURN again to save that character in the character set.

If you don't like the character you made on the grid and want to start over or move to another character, press ESC and that character is discarded. Pressing the SHIFT–CLR/HOME key clears the grid. The B key puts that character into a memory buffer, and pressing the C key retrieves the character shape you saved to the buffer. This is useful when you want to copy the same character design into two or more characters.

To save the character set, press the @ key. A message appears on the bottom of the screen. Pressing ESC cancels the save; any other key saves the complete character set to disk using the filename CHAR.SET. If you need to load a character set to change or finish, press L. The same message appears and you proceed in the same way.

Once you've made a character set, loading it into memory is a cinch. First, you should have saved the character set on the disk under the name CHAR.SET. You should also have a copy of Program 2 on the same disk, saved with the name BOOT80. To load and initialize the character set, enter **BLOAD-"BOOT80"** followed by **SYS 3072**. An even faster way to load and SYS is simply to type **BOOT "BOOT 80"**. It takes just a second or two to set up the new character set.

How It Works

As mentioned above, the chip that controls the 80-column screen is quite different from the familiar VIC-II chip of the Commodore 64 or 128. The 80-column screen is driven by the 8563 VDC video chip, which offers a number of advanced features. First is its ability to display 80 columns and 16 colors. It's capable of working while the 128 is in FAST mode (2 MHz clock speed), where the VIC-II can work only at 1 MHz. The 8563 also allows you to have characters from both the uppercase/graphics and lower-/uppercase set on the screen at the same time, as well as underlined and flashing characters. One of the 8563's main advantages is that it has its own video RAM and character memory (which is copied from ROM when the computer is turned on). None of the Commodore's 128K of memory is used for the character set. The only drawback is that the 16K of memory from this chip must be addressed indirectly.

Here's a layout of the 80-column internal RAM:

$0000–$07CF: Video RAM
$0800–$0FCF: Attribute RAM
$2000–$3FFF: Character RAM

These addresses are in hexadecimal. We're interested in locations $2000–$3FFF, where the character set definitions are found. There are 16 bytes available for each character, even though only the first 8 are actually used. The question is: How do you transfer the new character definitions into this section of VDC memory?

The operations of the 8563 chip are controlled by the values in the chip's 37 internal registers. However, the chip has only two addresses in the 128's normal memory space: 54784 and 54785 ($D600 and $D601). Remember that the 128 must be set for a bank where the I/O space is visible, such as bank 15. To place a value in a register, you must store the register number (0–36) in $D600, then wait until bit 7 of $D600 is set to 1. Then you store the value you wish to place in the register into $D601. In order to write to or read from any location in the VDC chip's memory, you must first put the address of the desired memory location into registers 18–19 ($12–$13) in high byte/low byte order (just the opposite of what you usually do in machine language, where the low byte comes first). Then read from or write to register 31 ($1F). When you read from this register, the value there is the contents of the memory location addressed in locations 18–19. When you write to register 31, the value you send to the register is forwarded to the memory location addressed in registers 18–19. The program fragment listed at the top of the page shows the proper machine language procedure for writing a byte.

The procedure for reading a location is almost the same. Just replace the last two instructions (LDA *#byte*: STA $D601) with

```
LDA $D601 ;Read that location
```

Note that if you're reading or writing a sequential series of memory locations, you have to set up the address in registers 18–19 only once. Each time a value is written to or read from register 31, the value in 18–19 is automatically incremented, so each successive read or write of register 31 will read or write the next higher memory address.

This same technique could be adapted to POKE values directly to screen or attribute memory (which is similar to the VIC-II's color memory, but also controls flashing, underlining, and other character attributes).

See program listings on page 98.

DOS Window

Bob Kodadek

If you own a Commodore 64 and 1541 disk drive, you won't want to miss this timesaving utility. It displays a window with 11 disk commands—any of which is just a keypress away—without affecting your current screen or BASIC program.

Have you ever wished for a better and easier way to perform disk operations? I'm not talking about the "DOS Wedge" that you probably already have. I mean something even better than that.

Imagine a menu screen that would provide a single keystroke command to perform a particular disk operation. The program could prompt at the appropriate time for user input such as new filename, old filename, disk ID, and so on. It would no longer be necessary to remember or enter lengthy command strings. The directory could be read without the nuisance of screen scrolling. The error channel would be displayed automatically after every operation. And, by using a windowing technique, we could do all this and more without affecting our present screen. While we're at it, let's imagine that this command menu could be accessed, viewed, and used at any time, even while another program is running. A pretty tall order, you say?

The accompanying program, "DOS Window," is just what we described—a menu-driven, interrupt-based, DOS support window. It is RAM-resident and transparent to your other programs. It can be called at the touch of a key to perform disk operations instantly, even while other programs are running. Included in the display is a digital clock for accurate timekeeping. The following commands are available from the menu:

D: Directory
I: Initialize
V: Validate
R: Rename
N: Format
←: Save
C: Copy
S: Scratch
L: Load,8
↑: Load,8,1
U: Reset

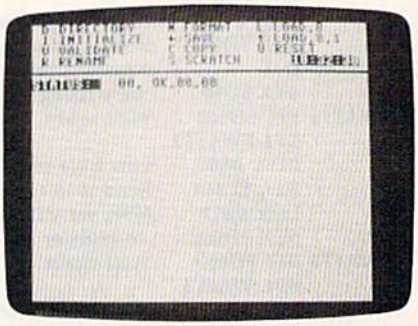
Using DOS Window

DOS Window consists of two programs. Program 1, "DOS Window Object File," is written in machine language. "MLX," found elsewhere in this issue, is required to type it in. After loading MLX, respond to the prompts with the following:

Starting address: CA60
Ending address: CFFF

Be sure to save a copy of Program 1 to disk after you've typed in all the data. *(Note: Program 2 attempts to load this file as "DOS-WINDOW.OBJ". If you save Program 1 under any other name, be sure to change the filename which is loaded in line 10 of Program 2.)* Program 2, "DOS Window Boot," is written in BASIC. Be sure to save a copy before you run the program—it erases itself when it's performed all its duties—and be sure to save it on the same disk on which Program 1 was saved.

To use DOS Window, just load and run DOS Window Boot, Program 2. (It automatically loads the machine language in Program 1.) When the program is finished loading, you may elect to set the time on the digital clock. If the current time is not set, the clock will function as a timer. To open the window, press CTRL-D. Then simply select from the menu. When you're through, press RETURN to close the window. To disable the utility, press RUN/STOP–RESTORE. To reactivate it, type SYS 51808.



From within most any program, press CTRL-D and have instant access to 11 disk commands.

How It Works

The IRQ vector is altered to point to a routine which scans the keyboard for the current key being pressed. If the CTRL and D keys are pressed simultaneously, a flag is set to divert subsequent interrupts. Then screen memory, color memory, and zero page are quickly copied to the normally unused RAM under the BASIC ROM. Next, the menu screen is displayed and the program enters an input loop. If the input is valid, it is matched to a corresponding command routine and executed. Following the completion of each operation, the error channel is read and displayed at a status line. When the menu screen is exited, all stored memory is returned to its original location, the flag is cleared, and control is returned to the current program running in memory or BASIC, whichever applies.

To avoid conflicts between programs, some restrictions must be observed. Your program may not use the RAM located under the BASIC ROM or locations 51808–53247. Also, the DOS Window program assumes that you're in the standard character mode with the screen at its default location of 1024.

See program listings on page 103.

DATA Transformer For LADS

Robert E. Cox

This handy utility converts BASIC DATA statements into a format usable by the LADS assembler from COMPUTE!'s *The Second Book of Machine Language*. "Data Transformer" can be useful with "Ultrafont +," found elsewhere in this issue. For the Commodore 64.

When converting a program from BASIC to machine language, it's frustrating to have to manually translate all the supporting data as well. For example, you may have carefully designed a new character set (perhaps using "Ultrafont +," published elsewhere in this issue). Or you may have painstakingly created a collection of sprite images (perhaps using the "Sprite Magic" program from the August 1984 issue). In either case, the data is probably stored in the BASIC program in the form of DATA statements, with each item separated by a comma. Unfortunately, that format isn't usable by most machine language assembler programs. For example, LADS, the Label Assembler Development System from COMPUTE!'s *The Second Book of Machine Language*, uses the .BYTE pseudo-op to hold data, with individual data items separated by spaces rather than commas.

If you're a LADS user, "DATA Transformer" frees you from the tedium of translating DATA statements into .BYTE lines by performing that function automatically. Since the Transformer program is written in machine language, it must be entered with the "MLX" machine language editor, found elsewhere in this issue. When you run MLX, you'll be asked for starting and ending addresses. The correct values for DATA Transformer are

Starting address: 8000
Ending address: 8157

When you finish entering the data, be sure to save a copy before leaving MLX.

To use DATA Transformer, load the program using a command of the format **LOAD *"filename"*,8,1** (for disk) or **LOAD *"filename"*,1,1** (for tape). Then type **POKE 56,128: NEW** and press RETURN. Next, load the prepared BASIC DATA lines you wish to convert to LADS .BYTE lines. Or load a program like Ultrafont + or Sprite Magic, and create a set of DATA lines containing character set or sprite image data. When you're ready to perform the translation to .BYTE lines, simply type SYS 32768 and press RETURN. In an instant, all the DATA statements will be replaced with .BYTE pseudo-ops, and all commas between numbers will be replaced with spaces (existing line numbers will be unchanged). The one restriction is that only BASIC lines that begin with the DATA statement can be in memory when the Transformer is activated. If any program lines beginning with a statement other than DATA are encountered, you'll see the message ERROR ERROR ERROR, and the translation will be halted (the program in memory will still be intact, however).

Once the .BYTE lines have been created, you can add labels to the lines or add other LADS lines to create a new source file. If you want, you can simply add an .END pseudo-op at the end and save the data in a separate file to be linked to the main file during assembly. It's also possible to append the data lines created by DATA Transformer to an existing LADS source file. The easiest way is to use a programming aid such as "MetaBASIC" (from the April 1985 issue), which offers a MERGE command. If you don't have such a utility, you can append the data manually by following these steps:

1. Save a copy of the .BYTE lines created by DATA Transformer.

2. Load the existing LADS source code file into memory; then type **PRINT PEEK(43), PEEK(44)**, press RETURN, and write down the two numbers. (Most likely, you'll see 1 and 8.)

3. Enter the following line in direct mode (without a line number); then press RETURN:

```
EA=PEEK(45)+PEEK(46)*256-2: POKE
44,EA/256: POKE 43,EA-PEEK(44)*256
```

4. Reload the .BYTE file. When the load is complete, enter the following line in direct mode and press RETURN (substitute for *n1* and *n2* the two numbers you recorded in step 2):

```
POKE 43,n1: POKE 44,n2
```

5. The data lines are now appended to the source code. Be sure to save a copy of the combined file.

See program listing on page 99.

Auto Run

Kevin Mykytyn, Editorial Programmer

This short utility for the 64 and 128 makes loading and running programs a snap. List the disk directory, move to the program you want to load, and press RETURN. After the program is loaded, just press RETURN again to run it.

You'll find "Auto Run" quite simple to use. Once it has been installed, you can load any program by listing the directory, cursoring to the program, and pressing RETURN. If you've chosen a BASIC program, RUN appears on the screen after the program is loaded. If you've selected a machine language program, it loads, and then SYS and the appropriate starting address are printed on the screen. Either way, you just press RETURN to start up the program.

There are two versions of Auto Run: one for the 64 (Program 1) and one for the 128 (Program 2). The Auto Run routine is written entirely in machine language, but a BASIC loader program is used to place the machine language into memory.

The Commodore 64 version is written to load at location 49152; the 128 version loads at 3072. These areas of memory are popular for machine language routines. If you own another utility program that needs the same section of memory, you can move Auto Run to a new location by changing the value of SA in line 100 (64 version) or line 10 (128 version). The program requires 256 bytes of memory and must begin on an even page boundary (a memory location evenly divisible by 256).

Good places to locate it on the Commodore 128 are the RS-232 buffers (at 3072 or 3328), or in memory between 4864 and 7167.

On the Commodore 64, almost any section of memory can be used as long as it is protected. To locate Auto Run at the top of the BASIC memory area in the Commodore 64, replace line 100 with the following:

```
100 POKE 56,PEEK(56)-1: CLR:
    SA=PEEK(56)*256: HB=INT
    (SA/256): LB=SA-256*HB
```

Running It

Once you've decided on a good place in memory and have set the value of SA accordingly, run the program. There will be a short delay while the machine language is POKEd into memory. If you're using the 128 version of Auto Run, the 40-column screen will go blank for a moment while the program puts the 128 into FAST mode. (This speeds up the POKEing to memory.) The 128 version also asks if you want to load only BASIC programs or if you might be loading BASIC and machine language programs. BASIC programs start at different addresses on the Commodore 128, depending on whether or not a hires graphics area has been allocated. Since the program uses the starting address of the program to determine whether it is BASIC or machine language, Auto Run can get confused. Therefore, any time you won't need to load any machine language programs, choose the first option (BASIC only).

Both versions end by printing the activation and deactivation addresses on the screen. Write these down for future reference. SYS to the address displayed, and Auto Run is activated.

Now display the directory on the screen. For the 64, type LOAD"$0",8 and LIST, or use a utility such as the "DOS Wedge" (from the 1541 Test/Demo Disk), "BASIC Aid," or "MetaBASIC." Commodore 128 owners can type DIRECTORY, CATALOG, or just press the F3 function key.

Next, move the cursor up to the program you want to run and press RETURN. The program is loaded, the screen is cleared, and the word RUN or SYS followed by an address is printed at the top of the screen. It's important to check whether the SYS address displayed at the top of the screen is the actual starting address for the program loaded. Although this is most likely the address to SYS to, this is not always the case.

If any error occurs during the load, the appropriate error message is printed at the top of the screen.

Once the program is loaded, you can simply press RETURN to run it or type LIST to view the program.

Using Auto Run With MetaBASIC

The 64 version of Auto Run was written to be compatible with MetaBASIC. To use the two programs at the same time, remember two rules. First, don't install Auto Run in memory locations 36864–40960; this part of memory is needed by MetaBASIC. Second, always load and enable MetaBASIC first. After you SYS to MetaBASIC, you can safely load Auto Run.

Auto Run should be compatible with most other programming utilities, too. If you seem to have a memory conflict, just relocate Auto Run to another portion of memory.

See program listings on page 105.

Commodore 128 Hi-Res Text Manipulation

James R. Schwartz

Drawing high-resolution screens on the 128 is reasonably easy because of BASIC 7.0's powerful graphics commands. This tutorial explores several interesting techniques for adding text to your hi-res artwork.

If you load the same high-resolution (hi-res) picture into a 64 and a 128, you'll find that the two screens look exactly the same. This shouldn't be surprising; the two computers use the same video chip. But the 128 (in 128 mode) has many drawing commands that aren't available on the 64. The 128 can DRAW, CIRCLE, BOX, PAINT, and so on, where the 64 is limited to PEEKs and POKEs.

These commands give you enormous power over the hi-res screen. Exactly 64,000 picture elements (pixels) fit on the screen, arranged in a grid that's 320 pixels wide by 200 deep. In the hi-res mode you have complete control over each and every pixel.

You can use this power to manipulate text as well as graphic images. The CHAR command, for example, displays text on the screen. In hi-res mode, you can use CHAR to add labels to your art.

But CHAR is limited to even eight-bit boundaries. You can use CHAR to place a character at position 0, 8, 16, 24, and so on, but not on the pixels in between. This means you can choose from 40 positions across and 25 down, the same dimensions found on the regular text screen.

Better Than CHAR

Using the fairly simple techniques mentioned here, you'll be able to fine-tune the placement of text on the screen. You can even create your own special characters. You'll also be able to write vertically on the screen, a useful feature for charts and graphs.

The first step is to create two arrays, H$ and V$, for the horizontal and vertical character sets, respectively. Type in this short program which draws the two character sets on the screen:

```
100 GRAPHIC2,1,4:FAST:FORI=35T
    O93:X=I-35-ABS(40*(I>74)):Y
    =ABS(I>74):CHAR1,X,Y,CHR$(I
    )
110 FORH=0TO7:FORV=0TO7:LOCATE
    H+X*8,V+Y*8:IFRDOT(2)=1THEN
    DRAW1,V+X*8,16-H+Y*8+8
120 NEXT:NEXT:NEXT:SLOW:WINDOW
    0,4,39,24,1
```

Even in FAST mode, it will still take quite a while to run—about 45 seconds. Fortunately, however, if you save the result as a binary file on a disk, future applications will take only a few seconds. To do this, enter this line in direct mode when the READY prompt appears:

```
BSAVE"HIRES CHAR",B0,P8192 TO
P9471
```

Now type NEW to erase the original program and type in part 2:

```
100 GRAPHIC1,1
110 FAST:BLOAD"HIRES CHAR",D0,
    U8,B0,P8192:DIMH$(93),V$(93
    ):X=0:Y=0:FORI=35TO93:SSHAP
    EH$(I),X,Y,X+7,Y+7:SSHAPEV$
    (I),X,Y+17,X+7,Y+23:X=X+8:I
    FX=320THENX=0:Y=Y+8
120 NEXT:SLOW
```

Here we're using the SSHAPE command to save rectangular areas of the screen into string variables. Once you've SSHAPEd a portion of the hi-res screen, you can use GSHAPE to place it anywhere on the screen. These two commands are like creating a rubber stamp which can copy a shape to different portions of the screen. In this case, the areas saved are the size of the individual characters. For ease of operation, the number in the array corresponds to the ASCII value of the character in that array position. For example, H$(65) contains the horizontal *A*; V$(90) contains the vertical ZZ, and so forth.

Writing On The Hi-Res Screen

We're now ready to manipulate text. To place a horizontal string on the screen, use the following subroutine. You should enter this subroutine with S$ defined as the string to be printed, and X and Y as the *x* and *y* coordinates of the upper left-hand corner of the first character in that string. The *x* coordinate can be 0–319, the *y* coordinate can be 0–199.

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```
1000 FORH=1TOLEN(S$):IFASC(MID
   $(S$,H,1))=32THEN1010:ELSEG
   SHAPEH$(ASC(MID$(S$,H,1))),
   X,Y-8
1010 X=X+8:NEXT:RETURN
```

To *perfectly* center a line on the screen, add the following subroutine. This time, you only have to supply S$ and Y, since X is calculated for you.

```
2000 X=159-LEN(S$)*4:GOTO1000
```

Here's an example showing the advantages of hi-res text manipulation. Add these lines to the program you have so far:

```
500 GRAPHIC1,1:DRAW1,119,39TO1
   99,39TO199,71TO119,71TO119,
   39
510 DRAW1,119,87TO199,87TO199,
   119TO119,119TO119,87
520 A$="SAMPLE":B$="CENTERING"
530 CHAR1,20-LEN(A$)/2,6,A$:CH
   AR1,20-LEN(B$)/2,7,B$
540 S$=A$:Y=103:GOSUB2000:S$=B
   $:Y=111:GOSUB2000:SLEEP10:G
   RAPHIC0:END
```

When you type RUN, you'll see the difference between the standard CHAR command (top box) and hi-res text manipulation (bottom box).

Even more fascinating is the ability to print vertically on the screen. Add this subroutine:

```
BR 3000 FOR V=1TO LEN(S$):IF A
        SC(MID$(S$,V,1))=32 TH
        EN 3010:ELSE GSHAPEV$(
        ASC(MID$(S$,V,1))),X-8
        ,Y-8
CS 3010 Y=Y-8:NEXT:RETURN
```

In direct mode, type DELETE 500–540, then enter these lines for a new demonstration:

```
500 GRAPHIC0:INPUT"{CLR}STRING
   TO BE PRINTED";S$:INPUT"X
   {SPACE}COORDINATE, Y COORDI
   NATE";X,Y
510 IFX<7ORX>319ORY<LEN(S$)*80
   RY>199THENPRINT"OUT OF RANG
   E":SLEEP2:GOTO500
520 GRAPHIC1,1:GOSUB3000:SLEEP
   10:GRAPHIC0:END
```

Run this program. You'll be prompted to enter a string and the appropriate coordinates. Note that line 510 makes sure that the *x* and *y* coordinates you entered will allow the string to fit on the screen; if not, you're returned to the prompt.

Custom Characters In Hi-Res

Now you can create your own special characters. Suppose, for example, that you need to create a cent sign (¢) for some purpose. The first step is to find a character you will not need and replace that with your new character. For this example, we will replace the dollar sign ($), CHR$(36), with the cent sign.

Draw an 8 × 8 grid, as in Figure 1. Label the vertical rows as shown and draw your new character in that grid. Now, add up the binary values for each horizontal row (Figure 2). Add these numbers as DATA statements in your program, with the following lines:

```
200 FAST:GRAPHIC1,1:RESTORE230
   :FORI=8192TO8199:READAD:POK
   EI,AD:NEXT
210 FORH=0TO7:FORV=0TO7:LOCATE
   H,V:IFRDOT(2)=1THENDRAW1,V+
   10,ABS(H-7)
220 NEXT:NEXT:SSHAPEH$(36),0,0
   ,7,7:SSHAPEV$(36),10,0,18,7
   :SLOW
230 DATA16,16,60,102,96,102,60
   ,16
```

The program above contains the DATA statements to make the cent sign. Also, note that the 36 in line 220 refers to the replacement of CHR$(36), the dollar sign we're replacing with the cent sign.

Figure 1

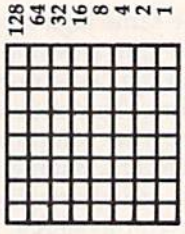
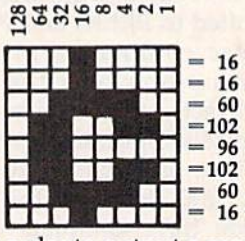


Figure 2



In order to output a cent sign to the hi-res screen, simply enter any of the subroutines with a dollar sign in the place where you would want a cent sign to appear. Delete lines 500–520, and enter the following for a new demonstration:

```
500 GRAPHIC1,1:S$="99$":X=151:
   Y=100:GOSUB1000:SLEEP10:GRA
   PHIC0:END
```

Type RUN to see the results.

You now have the basic tools to control text on the hi-res screen exactly as you see fit. You're no longer bound by the restraints of the CHAR command.

Personalizing the 128

Steve Stanko

Have you ever wished you could change the screen colors on your 128? Of course, there are BASIC commands to do this, but wouldn't it be nice to have the machine default to your colors each time you power up? How about having cursor mode, tab settings, and key repeats set up automatically? Want a favorite utility to load and run each time you turn on the computer? These programs can give your computer a whole new personality. For use with a 1541 or 1571 disk drive.

How can you change the default settings of the 128? The routine that specifies screen colors, tab settings, and the like when the computer is powered up or reset is in ROM—memory that can't be modified. However, you may have noticed that whenever the 128 is turned on or reset while the disk drive is on, it tries to read from a disk. If there is a disk in the drive, the 128 checks the sectors of the disk reserved for boot information. The boot information can be a short machine language routine, a command to load another program, or both. The key to customizing the 128 is to create an autobooting disk with a program that sets things up the way you like.

Program 1, "Autoboot Generator," creates the autobooting disk. Simply type in the program and save a copy of it on a disk you don't plan to use for autobooting. (Deleting the REMs in Program 1 won't hurt the program and will save a lot of space and typing time.) After saving a copy, load the program and type RUN. You'll be asked to insert the disk on which you want the autoboot information. The boot code must be written to a newly formatted disk; otherwise, the boot sector may use a place on the disk that other programs already occupy. If you haven't formatted the disk, the program offers to do that for you. (Before you format the disk, *be sure that it doesn't contain any programs you want to save.*) If you choose that option, be prepared for a slight delay while the disk is formatted. The boot information will then be written to the proper sectors. If a successful transfer occurred, a message will appear telling you so. Now you have an autobooting disk.

But this alone is not enough to make the computer default to your own personal preferences. What the autoboot information does is attempt to load and run a BASIC program named "Preferences" from the same disk. This program should set the values for the features you want to change. Program 2 is a short example of the sort of preference selection program you might write. To use Program 2, type in a copy and save it to the autoboot disk you prepared with Program 1. For the technique to work correctly, you must save Program 2 with the filename PREFERENCES.

Have It Your Way

Program 2 selects a 40-column text screen. If you prefer to start out with the 80-column display active, simply change the GRAPHIC 0 statement in line 10 to GRAPHIC 5. In fact, you can select any one of six different screen modes by changing the statement to GRAPHIC *mode*, where *mode* has one of the values shown in Table 1.

Table 1: Screen Modes

Mode	Screen
0	40-column text
1	bitmapped graphics (40-column)
2	split bitmapped and text (40-column)
3	multicolor bitmapped graphics (40-column)
4	split multicolor bitmapped and text (40-column)
5	80-column text

If you want the selected screen to be cleared, change the number following the SCNCLR statement in line 10 to the same value as the screen mode.

The COLOR statement can be used to specify new screen background, border, and character colors. Line 20 of Program 2 selects a light gray background and a medium gray border. The default character color will be dark gray. (That combination of colors shows up most clearly on my monochrome monitor.) To choose other colors, simply modify the COLOR statements. The statements have the format COLOR *color source,color*

number. Valid values for *color source* are given in Table 2. Table 3 shows valid *color number* values for the 40-column modes. The numbers are the same for the 80-column screen, but the colors are slightly different, as shown in Table 4.

Table 2: Color Sources

Number	Source
0	40-column background
1	40-column foreground
2	multicolor 1
3	multicolor 2
4	40-column border
5	character color (40- and 80-column)
6	80-column background

Table 3: 40-Column Colors

Number	Color	Number	Color
1	black	9	orange
2	white	10	brown
3	red	11	light red
4	cyan	12	dark gray
5	purple	13	medium gray
6	green	14	light green
7	blue	15	light blue
8	yellow	16	light gray

Table 4: 80-Column Colors

Number	Color	Number	Color
1	black	9	dark purple
2	white	10	dark yellow
3	dark red	11	light red
4	light cyan	12	dark cyan
5	light purple	13	medium gray
6	dark green	14	light green
7	dark blue	15	light blue
8	light yellow	16	light gray

Further Enhancements

Your Preferences program can change more than just screen colors. There are many other user selectable options such as tab stops, repeating keys, and cursor modes. Many of these are controlled by printing ESC (escape) sequences. An escape sequence is composed of an ESC character followed by an alphabetic character (or @). Table 5 shows the 128's escape sequences.

In immediate mode, simply press and release the ESC key, then press the letter key for the function you want. To use these sequences in a BASIC program such as Preferences, print an ESC character, CHR$(27), followed by the letter for the desired function. Line 30 of Program 2 uses this method to change the cursor to a solid, nonblinking block. You can add any other ESC sequences you want to your own Preferences program to control the various options.

Table 5: Escape Sequences

Function	ESC Sequence
Clear to end of screen	ESC @
Enable autoinsert mode	ESC A
Set bottom right corner of window	ESC B
Disable autoinsert mode	ESC C
Delete current line	ESC D
Switch to solid (nonblinking) cursor	ESC E
Switch to flashing cursor	ESC F
Enable bell tone when CHR$(7) is printed	ESC G
Disable bell tone	ESC H
Insert a blank line	ESC I
Move cursor to start of current line	ESC J
Move cursor to end of current line	ESC K
Enable screen scrolling	ESC L
Disable screen scrolling	ESC M
Set 80-column screen to normal video	ESC N
Cancel quote, insert, and reverse modes	ESC O
Erase to start of current line	ESC P
Erase to end of current line	ESC Q
Set 80-column screen to reverse video	ESC R
Switch to block cursor (80-column)	ESC S
Set top left corner of window	ESC T
Switch to underline cursor (80-column)	ESC U
Scroll screen up one line	ESC V
Scroll screen down one line	ESC W
Switch between 40- and 80-column displays	ESC X
Set default tab stops (every 8 columns)	ESC Y
Clear all tab stops	ESC Z

However, there is no ESC sequence for many of the features you might want to customize. For instance, there is no ESC sequence to specify which keys repeat. In this case, the operation is usually controlled by the value in a *flag* location in RAM. For example, location 2594 controls key repeating. The default value is 128, which allows all keys but the special function keys to repeat if held down. POKEing the value 64 into this location will prevent any keys from repeating. As a former Commodore 64 owner, my preference is to have only the space bar, INST/DEL, and cursor keys repeat. Storing a value of zero in location 2594 allows this. Line 40 in the example serves this purpose. There are many other features you can control by POKEing values in other locations. Refer to a detailed 128 memory map for more information.

Another important option is tab settings. Although default stops are set at every eighth column, you can change this to any pattern you desire—even an unusual sequence of stops such as at columns 5, 7, 19, 26, 27, and 39. You can set or clear tab stops indirectly by printing CHR$(24), but it's often easier to change the stops directly. Tab stop settings are controlled by the values in the tab stop bitmap, locations 852–861. Each bit in the map corresponds to a column on the screen. You change the tab settings by POKEing new values into the bitmap. To determine the numbers you want, let's look at the default 40-column settings:

Location	Value
852	128
853	128
854	128
855	128
856	128

The bitmap makes more sense if you look as these values in binary format, like this:

```
10000000100000001000000010000000 10000000
```

Bits set to 1 represent tab stops. In Program 2, tab stops are set every ten spaces, which yields the following pattern:

```
00000000100000000010000000001000000000 1
```

Or, if you group it into bytes:

```
00000000 01000000 00010000 000000100 00000001
```

When you translate the bit patterns back into decimal, the values to be placed in the tab stop bitmap locations are

```
0, 64, 16, 4, 1
```

Lines 50–60 of Program 2 set these tab stops. Tabs for an 80-column screen are just the same, only you

need five more bytes to map out the full 80-columns.

Your Preferences program can load other utilities or a favorite program that you use every time you turn on the computer. To load and execute another BASIC program, all you need to do is add a line with the statement RUN *"filename"*; or, if you want to retain the variables created in the Preferences program, add DLOAD *"filename"*. For machine language programs, use BLOAD *"filename"* followed by the SYS command to start the machine language, or use BOOT *"filename"* to have the program start automatically after loading.

You're no longer stuck with the decisions the 128's designers made; by autobooting this program, you can make the 128 into a truly personal computer.

Custom Autoboots

Program 1 creates an autoboot disk which attempts to load a BASIC program named Preferences, then executes the program by placing the characters RUN and a RETURN—CHR$(13)—into the keyboard buffer using a short machine language program following the filename data on an autobooting disk. It's quite simple to modify Program 1 to create an autoboot disk for any other BASIC program you desire. For a disk to be autobooted by the 128, sector 0 of track 1 of the disk must be set up as follows:

Bytes	Description
0–2	The characters CBM, the autoboot flag
3–4	Load address for program to autoboot, in low byte/high byte order (both bytes 0 for a BASIC program)
5	Bank number into which program should be loaded (0 for a BASIC program)
6	Number of additional sectors to load (0 for a BASIC program)

In Program 1, these values are contained in the DATA items of lines 1000–1010.

Then—starting at byte 7 of the sector—come the character codes for the name to be displayed after the BOOTING message, followed by a zero as delimiter. Program 1 uses PREFERENCES, since that's the name of the BASIC program being booted. However, there's no real requirement for using the actual filename—these characters are used only for the message, so you could substitute any other message you like by changing the DATA in line 1020 of Program 1. Just remember that the character string must end with a zero (see line 1030).

Following the zero byte comes the character codes for the filename to load, also followed by a zero byte. In this case, the character codes are important: They must correspond exactly to the name of the program you wish to boot from the disk. Program 1 uses the name PREFERENCES. To change this to another program name, modify the DATA in line 1040. Again, remember that the filename characters must be followed by a zero (see line 1050).

A short machine language routine can follow the filename; it will be executed after the specified program has been loaded. Since BASIC programs like Preferences will not run automatically after loading, Program 1 adds a routine that puts four characters into the keyboard buffer: R, U, N, and RETURN. After this a value of four is put into the location which holds the number characters in the keyboard buffer. This causes the computer to act as if you had typed RUN and pressed RETURN. In Program 1, the routine is contained in the DATA statements in lines 1060–1100.

To write this boot information to the disk, Program 1 frees sector 0 of track 1 so that data can be written to that block (line 220). It then opens a buffer for the sector data (line 230) and resets the buffer pointer (line 240). Lines 250–270 transfer the boot information from the DATA statements (lines 1000–1100) to the buffer. When there is no more data, the error trapping sends the program to line 280. If an OUT OF DATA error has occurred, the program continues; otherwise, the program prints the type of error and halts. Line 290 pads the rest of the boot sector with zeros. The disk command U2 (line 300) writes the sector buffer to the disk. Line 310 closes the disk buffer, and line 320 marks sector 0 of track 1 to make sure that the autoboot data isn't accidentally overwritten by a program.

See program listings on page 106.

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Fast Data Update

Ben B. Bowen

If you've discovered a clever time-saving technique or a brief but effective programming shortcut, send it to "Hints & Tips," c/o COMPUTE!'s GAZETTE. *If we use it, we'll pay you $35. Due to the volume of items submitted, we regret that we cannot reply individually to submissions.*

If you own a 128 and you've written BASIC programs that employ large numeric arrays, here's a technique that will vastly speed up the loading and saving of data in the arrays.

Variables That Change Over Time

There are several ways to assign values to variables: A = 23.5, for example, or READ A. In both cases, the information is an integral part of the BASIC program. The value assigned to variable A is "fixed"; to change it would require rewriting part of the program.

In some programs, however, variables have to start out with different values. If CB represents your checkbook balance, you can't just assign a value to the variable because the balance changes from day to day. You'd have to begin the program with an INPUT statement or, better yet, save the previous balance in a disk file. Total rainfall for the month is another example: Each time you ran a weather program, you'd want to load the previous total from a disk file. There are many more examples where certain variables contain changeable values.

If you own a 128 and you're using arrays whose values may change, the load and save routines probably look something like this:

```
100 DIM A(50): DOPEN#1,"DATA"
110 FOR J=0TO50: INPUT#1,A(J):
    NEXT: DCLOSE#1
.
. (main program here)
.
500 SCRATCH"DATA": DOPEN#1,
    "DATA",W
510 FOR J=0TO50: PRINT#1,A(J): NEXT
520 DCLOSE#1: END
```

For the typical BASIC program, as the dimensions grow larger, the loading and saving operations become quite slow, as you probably know. Fortunately, there's an alternative that works very well.

The POINTER

The 128's POINTER function can be very useful, as we'll see in a moment. If you're not familiar with it, it works like this: You provide a variable name and it tells you where that variable is kept in memory. For example, PRINT POINTER (A) would print the memory address—in bank 1, where variables are stored—for the variable A. The two bytes immediately before the address spell out the name of the variable, and the five bytes after it signify the value in floating-point format. Integer variables (A%) also use five bytes (at least, when they're not in an array), but only the first two bytes are used for the value. String variables use the first byte for the length of the string, and the next two point to the location of the string of characters higher up in memory.

If you'd like to experiment, define a few variables, find out where they are with POINTER, and then either PEEK the locations or use the built-in machine language monitor's M (Memory display) command. Be sure to type BANK 1 before PEEKing. If you're using the monitor, precede the memory location with a 1 (M 1040E, for example), to insure that you're looking in bank 1.

Now that we know how to find a variable (or an array of variables), we can BLOAD and BSAVE:

```
100 DIM A(50)
110 BLOAD "DATA", B1, P(POINTER
    (A(0))): REM LOAD THE ARRAY
.
. (main program here)
.
500 SCRATCH"DATA"
510 BSAVE"DATA", B1, P(POINTER
    (A(0))) TO P(POINTER(A(50)+4)):
    REM SAVE IT
520 END
```

The B1 designates a BLOAD or BSAVE from bank 1. The addition of 4 in line 510 is necessary because numeric arrays use five bytes per element and POINTER indicates the first byte of the five-byte value.

If you're using integer arrays, you'll have to change line 510:

```
510 BSAVE"DATA", B1, P(POINTER
    (A%(0))) TO P(POINTER(A%(50)+1))
```

Note that we add 1 instead of 4. Integer arrays use two bytes per value instead of the five used by floating-point arrays.

This technique isn't really practical for string arrays because, when POINTER acts on strings, it provides an address that turns out to be a series of pointers to the actual strings stored higher in memory. Since strings move around as they're redefined, it's difficult to pin them down for loading and saving. It might be possible, but you'd have to overcome several sticky problems. It's best to reserve this technique for numeric and integer arrays only.

How Fast Is It?

In tests which compared INPUT# against BLOAD, this technique was roughly three times faster. With a 128 and 1541, INPUT# needed about 37 seconds to read in an array of 1100 numbers. BLOAD and POINTER took only 13 seconds to load the array.

Writing the file to disk was about six times faster. The same array of 1100 numbers was written to a 1541 disk with PRINT#; the time was 34 seconds. When BSAVE and POINTER were used, the time was approximately 6 seconds. That's quite an improvement.

These tests were performed with a 1541. If you own a 1571, the times should be even better, due to the faster speed.

Arrays And Overlays

The examples above are fairly simple: loading the array into memory at the start of the program and saving out the new values at the end. Another application would be to set up variable overlays which you'd BLOAD selectively during a program.

Take an adventure game, for example. Let's say that during the course of a game, the player meets and helps out a wounded elf. In the initial encounter, the elf might be neutral, but as a result of the help he becomes friendly. If you BSAVE the variables for this character, the next time he would be friendly toward the player. In the same vein, you could break up the adventure map into pieces and BLOAD them as the player moves around.

Variable overlays could also be useful in a program that tracks prices of stocks. Instead of loading an entire four-year history of the prices, break up the high, low, and closing prices into weeks (or months), and load them into memory as you need them. You could then graph individual prices by daily fluctuations, or calculate weekly or monthly changes. Just BLOAD the appropriate files one by one and manipulate the data as you wish.

There are many other applications for this technique. If you use arrays in your programs, BLOADing and BSAVEing directly to memory is fast and efficient.

machine language for beginners

An All Machine Language Game

Richard Mansfield
Senior Editor

This month we'll conclude our series on translating a BASIC game into machine language (ML) by exploring the ML version of the program. You can type the program in, and it will assemble as is on the LADS assembler. It requires only minor adjustments to work with most other assemblers. The resulting game will run on the 64 or the 128 (in 40-column mode). Note the changes in lines 18 and 110.

The Usual Preliminaries

As always in ML, we define some variables first. We name the "print a character" routine PRINT and the "print a number" routine OUTNUM. These are addresses of ROM routines built into the computer, and you find them in books such as COMPUTE!'s *Mapping the Commodore 64*. Then, in line 20, we establish two memory locations which will point during the game to the current location onscreen of the player and enemy. *Pointers*, as they're called, are special two-byte locations in the first 256 addresses in the computer. You define their locations yourself; the computer uses much of zero page, but you're safe using addresses 250–255. All during the game, we'll be adjusting these pointers and they will always know where their respective characters are on the screen RAM memory locations.

```
1 *= $B00
3 .O
4 ;{12 SPACES}SIMPLE GAME
5 ;
18 PRINT = $FFD2:OUTNUM = $
   8E32; ($BDCD FOR C64)
20 PLRPTR = 250:ENYPTR = 25
   2
100 LDA #147:JSR PRINT;
    {11 SPACES}CLEAR SCREEN
110 PLR = 1054:ENY = 1034:K
    E = 212 ;(203 FOR C64)
111 LDA #<PLR:STA PLRPTR:LD
    A #>PLR:STA PLRPTR+1:LD
    A #<ENY:STA ENYPTR:LDA
    {SPACE}#>ENY
112 STA ENYPTR+1
120 NEXT LDX #24
130 LOOP JSR PLAYER:JSR DEL
    AY:JSR ENEMY
140 DEX:BNE LOOP
150 LDA X:EOR #1:STA X
160 JMP NEXT
1000 PLAYER LDY #0:LDA #32:
     STA (PLRPTR),Y
1010 LDA KE:CMP #47:BNE UP
1011 LDA PLRPTR:CMP #222:BE
     Q MOVE
1012 CLC:LDA PLRPTR:ADC #40
     :STA PLRPTR:LDA PLRPTR
     +1:ADC #0
1013 STA PLRPTR+1:JMP MOVE
1020 UP LDA KE:CMP #44:BNE
     {SPACE}MOVE
1021 LDA PLRPTR:CMP #30:BEQ
      MOVE
1022 SEC:LDA PLRPTR:SBC #40
     :STA PLRPTR:LDA PLRPTR
     +1:SBC #0:STA PLRPTR+1
1030 MOVE LDA #219:LDY #0:S
     TA (PLRPTR),Y
1031 LDY #20:LDA (ENYPTR),Y
     :CMP #32:BEQ RETURN
1032 INC COUNT:BNE SHOWSCOR
     E:INC COUNT+1
1033 SHOWSCORE LDA #19:JSR
     {SPACE}PRINT:LDA #7:JS
     R PRINT:STX XHOLD
1034 LDX COUNT:LDA COUNT+1:
     JSR OUTNUM:LDX XHOLD
1040 RETURN RTS
2000 ENEMY LDY #0:LDA #32:S
     TA (ENYPTR),Y
2010 LDA X:BNE UPEN:CLC:LDA
      ENYPTR:ADC #40:STA EN
     YPTR:LDA ENYPTR+1:ADC
     {SPACE}#0
```

```
2011 STA ENYPTR+1:JMP MOVEE
     NY
2020 UPEN SEC:LDA ENYPTR:SB
     C #40:STA ENYPTR:LDA E
     NYPTR+1:SBC #0:STA ENY
     PTR+1
2030 MOVEENY LDA #209:LDY #
     0:STA (ENYPTR),Y
2040 RTS
3000 ;{11 SPACES}SLOW THING
     S DOWN
3010 DELAY LDA #10:STA TIME
     R:LDY #0
3020 MORE DEY:BNE MORE
3030 DEC TIMER:BNE MORE:RTS
4000 ;{11 SPACES}STORAGE AR
     EA
4010 X .BYTE 0
4020 TIMER .BYTE 0
4030 COUNT .BYTE 0 0
4040 XHOLD .BUTE 0
```

Line 100 begins the initialization phase of the game, the preliminary housekeeping chores which need to be accomplished before we can begin the game proper. First, we clear the screen by printing the screen-clear character. Next, the starting addresses for the player and enemy characters are assigned their positions on the first line of screen RAM, and the address where keyboard entries are detected is identified as KE for use later in the game. It's not necessary to use all these labels, but it makes the game easier to program when things have names. Lines 1010 and 1020 are easier to understand since we can quickly see that LDA KE means we're looking for keypresses.

Lines 111–112 put the player and enemy starting locations into their respective pointers. From now on, we'll be adjusting those pointers as the characters move about the screen.

At last we're at the main loop of the program: lines 120–160. Since we want the enemy to move up and down the screen, we're going to count the X register down to zero before changing the direction in which the enemy moves. If the enemy's going down the screen, we DEX in line 140 until X has reached zero, and then we fall through that BNE and change the direction flag (also called X, but unrelated to the counter register) with EOR. EOR *toggles* the flag. If it's a 1, EOR makes it a 0, and vice versa. This is a handy way to distinguish between two possible activities (in our case, the up or down movement of the enemy). All our enemy-moving subroutine has to do is check X and it knows whether to move the enemy up or down. (See the start of line 2010.)

The bulk of the program is divided into three subroutines: 1000 moves the player, 2000 moves the enemy, and 3000 is a delay routine which is necessary because, at ML's great speeds, the game goes far too fast to be playable.

Blocking A Runaway Player

Unlike the enemy, the player doesn't move along predictable pathways; the human controls where and when the player moves. As with any animation, the first thing you do is erase the character onscreen (line 1000) to prepare to move to a new location by printing the character somewhere else. Line 1010 checks for a keypress and, if it doesn't find that the < key has been pressed (moving the player down), it jumps to check for the > key at line 1020. If, however, the player is supposed to move down the screen, we need to make sure he's not going off the screen entirely, and line 1011 checks to see if there's a 222 as part of the player pointer address. If we didn't stop him, the player could plow up through RAM memory until he scrambled the computer's brains.

There's no magic formula to find that 222. It works this way: We started the player off in address 1054, and we move him down the screen by adding 40 to that address. He can move 24 times, so we multiply 40 * 24, and the result is 960. This means that the lowest possible location that the character can occupy onscreen is 960 + 1054, or 2014. Whenever the player character lands here, we don't want to allow him to go any further.

How do we extract a 222 from 2014? This part *is* a formula. Divide the 2014 by 256, which gives you 7.8671 (just round it off to four decimal places). Drop the whole number, the 7, and multiply the fraction by 256. So 256 * 0.8671 is 222 (round off the whole number). No legal screen address for the player character includes 222, so we know he's tried to go offscreen and we abort (BEQ MOVE). Another way to check for border violations in games is to draw an actual frame around the screen and disallow any movement into the frame character.

If there is still room to move down, however, we add 40 to the player's current position and then go down to line 1030, which prints the player character onscreen. Moving up is accomplished the same way with an upper-boundary check in line 1021 and a subtraction of 40 from the player pointer. We figure out the boundary check number 30 the same way we did before. The player starts off at his lowest legal screen RAM address: 1054. So, 1054/256 gives 4.1171, and, dropping the whole number, we multiply 0.1171 * 256 to get our boundary check number: 30.

Moving The Alien

Line 1031 is a collision detection. In this game, you get points whenever your player is parallel onscreen with the enemy. We look 20 spaces to the right of the enemy, and if nothing is there (the "blank character" 32), we skip over the scoring section and return to the main loop. On the other hand, if there *is* something there, the player and enemy are lined up, and we add one to the score (line 1032), print the HOME character, print the "bell" sound (this only works on the 128), and then, in line 1034, we put the value of the score into the registers and JSR to the ROM routine which prints the number onscreen. Notice that this ROM routine uses the X register and we, too, are using it (to keep track of the enemy's movements). So, we set aside a byte down at the very end of the game to let us temporarily save X while we go into the ROM routine.

The enemy subroutine is simpler. It first blanks out the character, then merely decides whether to move up one line or down one line depending on that toggle flag X in line 4010.

The delay loop is fairly simple. Its only job is to waste a bit of time. We put 10 into our timer byte (line 4020) and count the Y register down from 255 to 0 in line 3020. Then we lower TIMER by 1 and, if it's not yet 0, go back and count 256 Y's again. All this happens ten times and that seems a good speed—not too easy, not too hard. However, it's here where you could move the game to "higher levels" or allow a user to choose the difficulty level of a game. LDA #5:STA TIMER would make the game far more difficult.

Garbage Collection

Todd Heimarck
Assistant Editor

If you have an hour to spare, turn on your 64 and type in the short program below. Save it to tape or disk and then run it. After four minutes have elapsed, the computer will reach a number near 2925. Then it will pause for a long time. Your 64 isn't locked up, it's just rearranging a few strings, shuffling them around in memory.

```
10 X$="A":J=0:T=0:S=0
20 DIMA$(9000)
30 FORJ=0TO9000
40 PRINTJ,:T=TI
50 A$(J)="A"+"":A$(9000-J)="B"
   +""
60 A$(J)="C"+"":A$(9000-J)="D"
   +""
70 S=TI-T:PRINTS,
80 IFS>3600THENSTOP
90 NEXTJ
```

The lengthy pause can be attributed to *garbage collection*. The program has temporarily run out of free memory for dynamic strings.

Static And Dynamic Strings

When you assign a string to a variable, the computer establishes a variable *descriptor*, which provides important information about the string. The descriptor has three parts: the variable name, the string's length, and a pointer to the beginning of the string.

Look at the first part of line 10 above. When the computer sees X$="A", it sets up a descriptor that looks something like this:

Name: X$
Length: 1 byte
Address: 2057 ($0809)

At location 2057 we'd find the letter *A*. Here, X$ is a *static* string variable. The entire string is within the program, so the address is a location inside the program.

If you concatenate two strings, you force the string to be *dynamic*—stored outside of the program in free memory between variables and the end of BASIC memory. If the first line were **X$="PORT" + "MANTEAU"**, a 64 would have to add together the two parts to form the string PORTMANTEAU, which would be stored high in memory:

Name: X$
Length: 11 bytes
Address: 40949 ($9FF5)

So we have two types of strings: inside the program (static) and outside the program (dynamic).

INPUT and GET always create dynamic strings. Let's say a program asks for a first name with INPUT F$ and the user types GREG. The descriptor for F$ points to the address where the characters *G-R-E-G* are stored. Later, INPUT F$ happens again and this time the user types CHRIS. The descriptor stays where it is, but the length has to be changed to 5 and the letters *C-H-R-I-S* are put into memory. The address in the descriptor now points to the new string.

What happens to the original GREG string? PEEK into memory and you'll find that the four letters are still there. But there's no descriptor that points to these characters. They use up four bytes of memory and don't do anything useful. We can call GREG a "dead" or "garbage" string.

When too much garbage builds up, the computer has to clean house. It looks through the list of descriptors, saving the active strings and throwing out any outdated, useless strings. That's garbage collection.

A World's Record

The 64 program above doesn't do anything important, but it does generate a lot of garbage. I wrote it to maximize garbage collection, to set a new record for pauses. A 64 can spend up to 61 minutes (over an hour) collecting garbage.

What happens if you run the program on a 128?

We know that under the worst conditions, the 64 takes roughly an hour for garbage collection. We also know the 128 has 75 percent more memory for variables, which means that much more garbage. Let's guess that the 128 needs 1:45 (almost two hours) for garbage collection. To make things worse, the 128 operates more slowly than any other Commodore computer when it's working in SLOW mode. (If you type FAST, the 128 is the fastest Commodore.)

We can thus expect a new world's record somewhere in the range of two to three hours for the 128's garbage collection.

The 128 won't set the record, however. The worst possible time on the 128 is somewhere around *six seconds* (not minutes). Even in SLOW mode, the 128 is 600 times faster than the 64 when it comes to discarding garbage strings.

If you investigate, you'll discover that the 128 appends two extra bytes to each string (on the 128 all strings are dynamic). Call these two bytes a *back pointer*. The descriptor still points to the string, but the back pointer points back to the descriptor.

When a string becomes garbage, the back pointer acquires an address of $FF*xx*, where *xx* is the length of the string. The address $FF*xx* is always impossible, so dead strings are immediately recognizable. When *xx* indicates the length, the 128 can quickly determine how much space should be closed up.

You need two more bytes per string, which uses up memory. But the time needed for garbage collection is reduced from a theoretical two to three hours to a mere six seconds. It's worth giving up a little memory for such a vast increase in speed.

simple answers to common questions

Tom R. Halfhill, Staff Editor

Each month, COMPUTE!'s GAZETTE *tackles some questions commonly asked by Commodore users. If you have a question you'd like to see answered here, send it to this column, c/o* COMPUTE!'s GAZETTE, *P.O. Box 5406, Greensboro, NC 27403.*

Q. Help! I am the lucky recipient of a VIC-20 computer. I call it my "Model T." I have been going crazy trying to find both software and hardware. Is there an upgrade kit available? Where can I find software and hardware? Or should I just ditch my Model T and purchase a 64, Plus/4, or 128?

A. Finding ongoing support for a discontinued computer is a common problem that almost all of us face at one time or another. Once a computer is no longer made, the installed base of users becomes a shrinking market compared to the growing ranks of owners who are buying machines that are still in the stores. To answer your questions:

1. We're not sure what you mean by an upgrade kit. You can't convert the VIC-20 into a 64 or 128. But plug-in cartridges were made to upgrade the VIC's memory to 32K and even more by using bank-switching techniques. Other cartridges added 40- and 80-column video capability.

2. To find hardware and software, check with local Commodore dealers—they may have some left-over VIC products stashed away in a back room. Study the classified ads in your local newspaper and weekly shopping news—somebody may be selling secondhand VIC equipment. Commodore user groups are another excellent source for used hardware and software. Keep in mind that almost all hardware sold for the 64—including disk drives, modems, and printers—works on the VIC as well. To accumulate software, you can type in programs from back issues of magazines such as COMPUTE!'s GAZETTE and COMPUTE!. Also, most of the best programs have been reprinted in various COMPUTE! books.

3. Whether you should shelve your "Model T" and buy a newer computer is a personal decision. If the VIC-20 suits your purposes, there's no compelling reason to do so; obsolescence is relative. But if you do decide to buy another computer, remember that the Plus/4 is no longer manufactured either, and has even less support than the VIC since it never really caught on.

Q. In a recent edition of my local newspaper, I read an article that I find quite disturbing. It describes something called a "Trojan Horse" program that an IBM user downloaded from a bulletin board system (BBS). Somehow the program erased all of his programs. How can a downloaded program erase all of the programs you have? I am thinking of buying a modem, but this article has me wondering if modems and BBSs are all that safe to use.

A. This incident received a lot of attention. The IBM user had downloaded a public domain program that was supposed to be a graphics utility. Instead, when he ran the program, it reformatted his computer's hard disk and displayed the message, "Arf! Arf! Got you!" This turned out to be rather a poor joke, because unfortunately the hard disk contained this man's entire software library of 900 programs.

Responsible BBS system operators (sysops) are alert to this kind of vandalism. Before making donated programs available for downloading, they are checking them more carefully and discarding programs from anonymous sources. Still, there's always the possibility that something like this could slip through. If it happens, immediately notify the sysop of the BBS. To be safe, you can thoroughly test a newly downloaded program on a scratch disk before saving it onto another disk. And as always, you should keep separate backups of your irreplaceable programs and files.

The chances that you'll become a victim of a Trojan Horse program are not very great. Unlike the man in the article, very few Commodore owners have their entire software collection on a hard disk, so there's little reason to fear losing your entire program library. Certainly, we wouldn't let it deter you from exploring the fascinating world of BBSs and public domain software.

Q. There was a letter in the May 1986 issue of COMPUTE!'s GAZETTE asking about double-precision math in Commodore 64 BASIC. The reader wanted to translate an IBM program and wanted to know how to simulate double-precision math on the 64. Just tell him to forget it. His program will probably be just as good. Years ago, my company bought some minicomputers and I converted a very large FORTRAN root locus program for a mainframe computer to run on the mini, which also didn't have double precision. It worked fine.

George D. Johnson

A. The other reader didn't tell us what kind of program he was converting, so we don't know if the lack of double-precision math would make a difference or not. If the program is using repetitive or recursive calculations, the rounding errors in single-precision math could accumulate and lead to a significant error in the final result. At any rate, we agree it's worth a try.

computing for families

Vancouver 1986: Distance Is A State Of Mind

Fred D'Ignazio
Associate Editor

I just returned home from two of the most exhausting, intense, and joyful weeks of my life. I journeyed to Vancouver, British Columbia, where I spoke and moderated panels at the World Congress on Education and Technology. Then I taught a seven-day teacher's workshop on "Electronic Media and the Imagination" at Simon Fraser University (just outside Vancouver). Last, I attended the Consumer Electronics Show in Chicago.

These three experiences may take me months to absorb and assimilate. However, I've returned home with a single thought that seems to summarize everything I've seen and done. The thought comes from Kathleen Forsythe of Canada's Knowledge (satellite public TV) Network. In her presentation at the World Congress, she said "Distance is a state of mind."

This is an enormously powerful idea.

I first saw how powerful it was when I climbed onto a stage in the B.C. Place Stadium in Vancouver and turned to face 7000 World Congress participants. This huge crowd had come to hear me and six other "super panelists" debate the future of education and technology. Down there on that little stage looking up I felt very, very tiny. I felt dwarfed by the huge stadium and all the little faces that looked out at me. Never was I more conscious of technology's sometimes gigantic, inhuman scale. The nearest member of the audience sat about 30 meters away, so I felt separated from the audience. And thanks to a faulty speaker system, I couldn't hear or respond to the words of my fellow panelists, who sat only a few feet away.

Technology was the subject of the congress. It had even brought us to the conference. And now it was pulling us apart.

Suddenly, Seymour Papert, father of the Logo language, and another of the "super panelists," leaned over toward his fellow panelists and engaged each of us in a personal conversation.

We responded in a personal manner, and that vast audience leaned forward and listened in, like guests at the family dinner table. For a little while all of us forgot we were in a huge hockey arena and instead felt like we were involved in a cozy, intimate conversation.

The next day, Papert returned to the stage alone. He continued his "coffee table" approach in front of thousands of delegates from around the world. And again he was successful in reaching out to almost every one. His success came both from what he said and how he said it. He spoke of "technology with a heart" and of people "falling in love" with things that mattered to them. He emphasized the importance of feelings and emotions in the learning process. And he conveyed these messages in a most unconventional speaking style. For example, he wandered away from the microphone frequently. He picked up his little laptop computer and juggled it and threw it into the air. He bopped the microphone with his fist when he became excited. And the tone of his voice and the rhythms of his words were intimate, personal, and conversational.

"Conversation" is the key word. When people can use technology to have a conversation, then the technology becomes a bridge to connect them rather than a barrier to divide them. An example of one of the conversations that occurred at the conference was the World Congress Online network.

In her speech at the Congress, "How Media Enhances the Learning Process," Kathleen Forsythe spoke of the conversation that can take place between a person who appears on television and the audience sitting in their classroom or home. The real person on camera might be distant from the viewer in both space and time, but he or she can reach out to another person and begin a real conversation with them. The conversation, of course, is begun by the TV person, then continued between the viewer and the little voice inside his or her head. Thinking is really a little conversation inside our heads. And books and TV can spark this conversation as easily as computers. In fact, according to Kathleen, this is the real measure of how interactive a technology is. "Just because you press a button and a few words or pictures appear on a screen does not make the computer interactive," she said.

Ken Werker, Anne Marx, and the British Columbia School Trustees (school boards) Association organized the congress. And they deserve tremendous congratulations for bringing educators, parents, scientists, and technologists together from over 50 countries to talk with each other and share their concerns about the future.

My suggestion to the BCSTA is that technology be used to enhance the conversation even further. For example, the next time a World Congress is held (probably in another couple years), we should take Gerri Sinclair's idea of the World Conference Online and extend it as far as we can. Teachers, parents, and school board members in cities and towns around the world should be able to hold local conferences and be linked together with the main conference in Vancouver. This way everyone who cares deeply about children and their future can enter the conversation and participate actively in its outcome.

news & products

128 Products From Abacus

Abacus Software has introduced several new 128 products, as well as additional 128 book titles. Included are the *BASIC Compiler for the 128*, with a suggested retail price of $59.95 (a Commodore 64 version, priced at $39.95, is also available); *CadPak-128* ($59.95), a 128 version of the popular computer-aided design package originally released for the 64; and *Super C Version 3* ($59.95), the latest version of the company's C language compiler, which is a full K & R implementation with both graphics and math libraries, RAM disk support, a UNIX-like shell, and machine language interface.

Abacus also announced it would introduce *Super Pascal Development System* ($59.95) for the 128, as well as the following new 128 books: *BASIC 7.0 Internals* ($19.95), *C-128 BASIC Training Guide* ($16.95), and *C-128 Peeks and Pokes* ($19.95).

Abacus Software, P.O. Box 7219, Grand Rapids, MI 49510.

Circle Reader Service Number 170.

subLogic Baseball

Pure-Stat Baseball, a realistic baseball simulation package with complete statistical features, is being released by subLogic for the Commodore 64 (other versions to follow).

This strategy game is for one or two players, and offers every team from the 1985 pro season, eight classic teams from the past, and the ability to draft new players or create your own. Three different stadiums are included on the disk, plus an optional stadium disk lets you use any major league stadium in the U.S. The emphasis throughout is on complete statistical realism. You select the team you wish to manage, pick the team to play against, determine your starting lineup, designate a starting pitcher, and substitute players as you desire.

The program maintains a complete statistical record of each team player's performance, broken down into individual stats versus right-handed and left-handed pitchers or batters. Player stats and box scores can be displayed on the screen or printed out.

The suggested retail price is $49.95.

subLogic Corp., 713 Edgebrook Dr., Champaign, IL 61820.

Circle Reader Service Number 171.

Baudville's New Software

Baudville has released a new line of software for the Commodore 64. *Video Vegas* offers blackjack, draw poker, slots, and keno for the beginning and more professional at-home gamblers.

You can learn and analyze scales, chords, and tuning for all types of fretted string instruments with *Guitar Wizard*. This program is for the novice and experienced musician.

Ted Bear's Rainy Day Games combines three children's card games, Concentration, Old Maid, and Go Fish, into one game package for young people. The children play the games with their computer playmate, Ted Bear.

List price for each package is $29.95.

Baudville, 1001 Medical Park Dr., S.E., Grand Rapids, MI 49506.

Circle Reader Service Number 172.

Modem Fun

Dreamrider Software has released a new full-graphics game that is played through your modem. In *Operation Terminal*, you search the antimatter complex to find top secret documents before they fall into enemy hands. Your opponent, who accesses the program through a modem, tries to outsmart you and find the documents before you. There is also a single player option.

Dreamrider Software offers a free bulletin board service that gives you the names and phone numbers of other players in your area.

Operation Terminal requires a Commodore 64, disk drive, and joystick. The modem is optional, but the game is compatible with most major modem brands.

Suggested retail price is $39.95.

Dreamrider Software, Inc., 970 N. Main St., Crete, IL 60417.

Circle Reader Service Number 173.

Garfield On Disk

Create with GARFIELD! from DLM lets students learn while they have fun creating posters, cartoons, and labels with the comic strip character, Garfield, and his friends. The students select a background, choose the characters, set up a comical situation, add captions, and then print out the scenario. The program promotes creative thinking and writing and helps students develop a sense of design, balance, sequencing, and spatial relations.

The software package includes a floppy disk, user/teacher manual, and an activity sheet that suggests ways to use the program.

Suggested retail price for the Commodore 64 is $29.95.

DLM, One DLM Park, P.O. Box 4000, Allen, TX 75002.

Circle Reader Service Number 174.

Computerized Greeting Cards

Personalize greeting cards, banners, stickers, and other stationery with two new software packages for the Commodore 64 from Hi Tech Expressions. Animated scenes are set to music in *CardWare*. This program lets you design your own greeting cards using scenes and messages from the program or personalize the card with your own message.

WareWithAll is a complete sup-

ply package that includes designer-printed paper, stickers, disk labels, color-coordinated envelopes, and markers. You can use these supplies to create greeting cards, banners, party goods, and animated disks.

A dot-matrix printer is required to print out the greeting cards.

CardWare retails for $9.95 and *WareWithAll* retails for $14.95.

Hi Tech Expressions, 2699 S. Bayshore Dr., Coconut Grove, FL 33133.

Circle Reader Service Number 175.

IntelliCreations Games

IntelliCreations is releasing two new software packages for the Commodore 64. *Crosscheck* is a crossword puzzle game that can be played by up to four people. The object is to build a continuous word chain from the center of the board to your home base. The length of the word is determined by spinning an on-screen die. IntelliCreations licensed the game from TSR, the creators of the original board game.

Mercenary: Escape from Targ is licensed from Novagen in England. This game combines flight simulation with high-speed, three-dimensional vector graphics. In *Mercenary,* you are a twenty-first-century soldier of fortune who has crash landed on the planet Targ. Your goal is to find a craft so you can escape the planet. To do so, you must help out the warring factions.

Crosscheck is available for $39.95 and *Mercenary: Escape from Targ* is available for $29.95.

IntelliCreations, Inc., 19808 Nordhoff Pl., Chatsworth, CA 91311.

Circle Reader Service Number 176.

Write Your Own Mystery Or Romance Novel

Two new titles have been added to Woodbury Software's PlayWriter Series. These titles help children between the ages of 7 and 14 write, edit, print, and illustrate their own hard-cover novels. *MYSTERY!* guides young authors in writing a detective novel by letting the writer choose and describe the sleuth, determine the method and motive of the murder, create a cast of characters, and even decide who the murderer is.

Castles & Creatures is a fantasy adventure that includes dragons, knights, princes, princesses, sorcerers, and romance.

Both software packages include a story disk, color stickers, full-page illustrations, a hardcover book jacket, paper, and instructions to use on the Commodore 64.

Retail price for *MYSTERY!* and *Castles & Creatures* is $39.95.

Woodbury Software, 127 White Oak Ln., CN 1001, Old Bridge, NJ 08857.

Circle Reader Service Number 177.

Novel Study Guide

An aid to studying literature, *The Novel Approach* from CBS Software, helps students develop critical reading skills and learn more about a novel than characterization and plot. This software package is designed to pique the reader's interest, enhance understanding, and develop vocabulary and critical thinking skills before, during, and after reading the novel. Each program includes a reference guide, *The Book Scanner,* which provides background information on the book, the author, and related books.

Animal Farm and *Lord of the Flies* are both available now. *A Tale of Two Cities, The Call of the Wild,* and *Romeo and Juliet* will be available in the fall of 1986 for the Commodore.

Each software program costs $59.95 and includes a program guide, a teacher's guide, and a reproducible activity guide. Complete lab packs are $179.85.

CBS Inc., 1 Fawcett Pl., Greenwich, CT 06836.

Circle Reader Service Number 178.

Database Management For The 128

Database Plus 128 from SPC Software is an enhanced version of *Database Plus* for the Commodore 64. This new version includes rapid global search; statistical analysis with graphic output; up to 50 fields to create; virtual disk operation; 58K available memory; fast sorting, retrieval, and storage of data; a fully documented manual on disk; 12 templates; label maker; and full screen editing plus a report generator.

Database Plus 128 is designed for the Commodore 128 on an 80-column monitor display with a 1541/1571 disk drive and any appropriately interfaced printer.

Retail price for *Database Plus 128* is $19.95.

SPC Software Limited, P.O. Box 197, Thornhill, Ontario, Canada L3T 3N3.

Circle Reader Service Number 179.

Commodore 128 Database

Mid-Kansas Computers has introduced a database for the Commodore 128. *Flex File 128* is self-booting, and self-contained, has automatic 40 or 80 columns, supports fast mode in 80 columns, and handles up to 10,000 records. This program is compatible with data disks created on earlier versions of *Flex File* and *Practifile* and features up to 40 fields per record, user routines in BASIC, on-board help screens, file sorting, sequential filing, a label generator, and a report writer.

Flex File 128 has a retail price of $49.95.

Mid-Kansas Computers, 204 W. 6th, P.O. Box 506, Newton, KS 67114.

Circle Reader Service Number 180.

Music Software Guide

Commodore 64 & 128 Music Software Guide from Unsinn Publications is a reference for educators, musicians, and amateurs to music software for the Commodore 64 and 128. The text is divided into sections covering theory, ear training, fingerings, composition, entertainment, and graphics, plus a special section devoted to MIDI. Each software description includes age group and price.

Authored by Lolita Walker-Gilkes, a nationally known computer music consultant, the *Commodore 64 & 128 Music Software Guide* retails for $11.95.

Unsinn Publications, P.O. Box 672, Drexel Hill, PA 19026.

Circle Reader Service Number 181.

IBM And 128 File Compatibility

S.O.G.W.A.P. Software has announced *The Big Blue Reader,* a software program that allows users to transfer word processing and ASCII files generated on most IBM-compatible software to Commodore 128 DOS files, and vice versa. The

files can then be edited using Commodore word processing programs or as straight ASCII text, then transferred back to the IBM-compatible formats. *The Big Blue Reader* is self-booting when the computer is turned on. A menu appears on the 80-column screen. On the 40-column screen, the program offers a main menu with submenu options. Prompts take the user through the copying sequence.

If the file is to be copied to Commodore format, it can be saved as a program file or a sequential file. The program also offers the user the option of translating MS-DOS standard ASCII characters to Commodore ASCII characters, and vice versa.

The Big Blue Reader is for use with the Commodore 128 and 1571 disk drive, and retails for $29.95, plus $2 shipping and handling (California residents add 6.5% sales tax).

S.O.G.W.A.P. Software, Inc., 611 Boccaccio Ave., Venice, CA 90291.

Circle Reader Service Number 182.

Commodore 64 Brainteasers

Master Fix It, an advanced version of the *Fix It* entertainment program from Random House, is a series of puzzles and brain twisters to intrigue and entertain the user. Each screen contains a disassembled machine called a kit, which you have to fix. In fixing the machine, you create colorful, animated mind benders. *Master Fix It* contains over 100 kits, some stretching over one, two, or four screens. There's also a construction mode that lets you create and save your own designs.

Master Fix It for the Commodore 64 costs $19.95.

Random House Software, 400 Hahn Rd., Westminster, MD 21157.

Circle Reader Service Number 183.

64 Hard Disk Drive

InConTrol (ICT) has introduced the Data Chief 10 megabyte or 20 megabyte hard disk drive system with floppy drive backup for the Commodore 64.

The system includes a 170K floppy drive, a 135-watt power supply, hard disk drive, and controller/driver cards housed in a PC-style metal case. A second hard disk can be added without an additional driver card. With an expansion kit (available Fall 1986), three hard disks can be installed. The hard drive lets you store in original individual disk format, gives easy access to programs via disk number, offers prerecorded hard disk utilities including wedge commands, and is expandable. A 90-day warranty is offered, plus free utility upgrades in the form of quarterly updates, notes, and software for a one year period.

The Model HFD-60, a 10-megabyte hard disk system with floppy, is priced at $895; the HFD-120, a 20-megabyte system with floppy, costs $995.

InConTrol, Inc. (ICT), 103 Baughman's Lane, Suite 301, Frederick, MD 21701.

Circle Reader Service Number 184.

Commodore 16 And Plus/4 Software

Robinson Software Associates (RSA) has announced three software releases for the Commodore 16 and Plus/4 computers, including *Bounty Hunter, Grave Robbers,* and *Savings & Loan.*

Bounty Hunter is a text adventure set in the Old West in which you round up a gang of outlaws. *Grave Robbers* is a graphics adventure in which the player finds secret treasures at a gravesite. *Savings & Loan* is a home finance program that lets you calculate principal and interest payments, amortization figures on loans, and savings rates and types.

The programs sell for $9.95 each, plus $1.50 for postage and handling.

RSA, 50 South Valley Rd., B2, Paoli, PA 19301.

Circle Reader Service Number 185.

Macro Assembler For 64

E-Z Macro Assembler from Memotron Software is a machine language assembler for the 64 that sells for $39.95, plus $3.50 for postage and handling. A similar program for the 128 is also under development which will take advantage of 80 characters per line, the fast mode, extra memory, and extra kernal capabilities.

Memotron Software, P.O. Box 714, McPherson, KS 67460.

Circle Reader Service Number 186.

Two Centronics-To-Commodore Interfaces

The Interface 32000 allows connection of printers with a Centronics interface to any computer with an IEEE 488 bus. The device address may be set, by a DIP switch, between 1 and 7. For Commodore computers, two code changes inside the device can be changed into ASCII. Output can be switched between changed and unchanged code at any time by means of a secondary address. Suggested retail price is $149.

The Interface 92008-G will connect any printer with a Centronics port to a Commodore 64 or 128. The interface allows printing of all CBM special characters, block graphics, single point graphics, etc.; it is 100-percent compatible with the original CBM printer. With the use of built-in DIP switches, the interface can be set to suit almost any printer. It contains an 8K buffer, and retails for $59.

BlueBox Interfaces, Wolfgang Guertzen, 6925 Rosemead Bl., #24, San Gabriel, CA 91775.

Circle Reader Service Number 187.

Classical Music On Disk

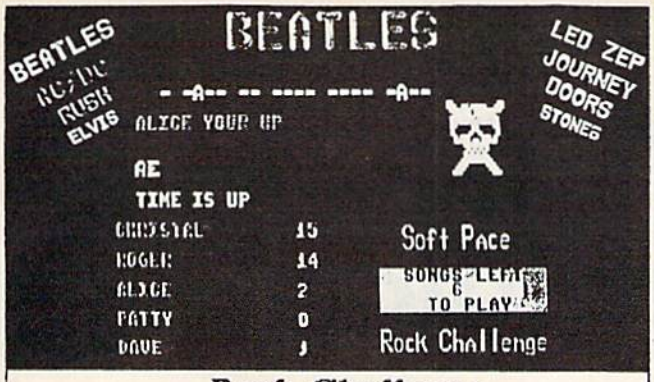
Free Spirit Software has released volume two of its classical music disk, *Music of the Masters. Music of the Masters, Volume II,* for the Commodore 64 contains 40 compositions by the great composers, such as Mozart, Bach, Beethoven, Brahms, and others. Instrument simulations include piano, harpsichord, violin, flute, guitar, and clarinet. There's also screen commentary on the composers.

The disk is not copy protected.

Music of the Masters, Volume II is available for $9.95. Both volumes can be purchased for $16.95.

Free Spirit Software, Inc., 5836 S. Mozart, Chicago, IL 60629.

Circle Reader Service Number 188.



Rock Challenge

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Example: You choose the Beatles with 35 songs in your game. The program chooses one of the over 100 songs by the Beatles and places it at the top as a series of dashes. The first player guesses a letter in the song. If it's there he wins a point and continues his turn till he guesses a wrong letter or solves the song for a 5 point bonus.

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Pigskin Predictions!

Tired of wrestling with Sunday point spreads? Let your Commodore 64/128 do it for you! Pigskin Predictions, the best-selling NFL handicapper, takes the hassle out of rating National Football League games. Forget about obscure, meaningless statistics. Just spend a few minutes typing in each week's scores and let our point spread software go to work. Here's what Pigskin Predictions has to offer:

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COMPUTE!'s GAZETTE Author Guide

Here are some suggestions which serve to improve the speed and accuracy of publication for prospective authors. COMPUTE!'s GAZETTE is primarily interested in new and timely articles on the Commodore 128, 64, Plus/4, 16, and VIC-20. We are much more concerned with the content of an article than with its style, but articles should as be clear and well-explained as possible.

The guidelines below will permit your good ideas and programs to be more easily edited and published:

1. The upper left corner of the first page should contain your name, address, telephone number, and the date of submission.

2. The following information should appear in the upper right corner of the first page. If your article is specifically directed to one model of computer, please state the model name. In addition, *please indicate the memory requirements of programs.*

3. The underlined title of the article should start about 2/3 of the way down the first page.

4. Following pages should be typed normally, except that in the upper right corner there should be an abbreviation of the title, your last name, and the page number. For example: Memory Map/Smith/2.

5. All lines within the text of the article must be double- or triple-spaced. A one-inch margin should be left at the right, left, top, and bottom of each page. No words should be divided at the ends of lines. And please do not justify. Leave the lines ragged.

6. Standard typing or computer paper should be used (no erasable, onionskin, or other thin paper) and typing should be on one side of the paper only (upper- and lowercase).

7. Sheets should be attached together with a paper clip. Staples should not be used.

8. If you are submitting more than one article, send each one in a separate mailer with its own tape or disk.

9. Short programs (under 20 lines) can easily be included within the text. Longer programs should be separate listings. *It is essential that we have a copy of the program, recorded twice, on a tape or disk.* If your article was written with a word processor, we also appreciate a copy of the text file on the tape or disk. Please use high-quality 10 or 30 minute tapes with the program recorded on both sides. The tape or disk should be labeled with the author's name and the title of the article. Tapes are fairly sturdy, but disks need to be enclosed within plastic or cardboard mailers (available at photography, stationery, or computer supply stores).

10. A good general rule is to spell out the numbers zero through ten in your article and write higher numbers as numerals (1024). The exceptions to this are: Figure 5, Table 3, TAB(4), etc. Within ordinary text, however, the zero through ten should appear as words, not numbers. Also, symbols and abbreviations should not be used within text: use "and" (not &), "reference" (not ref.), "through" (not thru).

11. For greater clarity, use all capitals when referring to keys (RETURN, CTRL, SHIFT), BASIC words (LIST, RND, GOTO), and the language BASIC. Headlines and subheads should, however, be initial caps only, and emphasized words are not capitalized. If you wish to emphasize, underline the word and it will be italicized during typesetting.

12. Articles can be of any length—from a single-line routine to a multi-issue series. The average article is about four to eight double-spaced, typed pages.

13. If you want to include photographs, they should be either 5×7 black and white glossies or color slides.

14. We do not consider articles which are submitted simultaneously to other publishers. If you wish to send an article to another magazine for consideration, please do not submit it to us.

15. COMPUTE!'s GAZETTE pays between $70 and $800 for published articles. In general, the rate reflects the length and quality of the article. Payment is made upon acceptance. Following submission (Editorial Department, COMPUTE!'s GAZETTE, P.O. Box 5406, Greensboro, NC 27403) it will take from two to four weeks for us to reply. If your work is accepted, you will be notified by a letter which will include a contract for you to sign and return. *Rejected manuscripts are returned to authors who enclose a self-addressed, stamped envelope.*

16. If your article is accepted and you have since made improvements to the program, please submit an entirely new tape or disk and a new copy of the article reflecting the update. We cannot easily make revisions to programs and articles. It is necessary that you send the revised version as if it were a new submission entirely, but be sure to indicate that your submission is a revised version by writing, "Revision" on the envelope and the article.

17. COMPUTE!'s GAZETTE does not accept unsolicited product reviews. If you are interested in serving on our panel of reviewers, contact our Features Editor for details.

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

Each month, COMPUTE!'s GAZETTE publishes programs for the Commodore 128, 64, Plus/4, 16, and VIC-20. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. All 64 programs run on the 128 in 64 mode. Be sure to read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

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

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

Special Characters

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

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

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

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

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

The Quote Mode

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

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

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

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

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

For Commodore 64 Only

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

The Automatic Proofreader

Philip I. Nelson, Assistant Editor

"The Automatic Proofreader" helps you type in program listings for the 128, 64, Plus/4, 16, and VIC-20 and prevents nearly every kind of typing mistake.

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

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

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

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

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

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

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

Though the Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. However, the Proofreader is purposely difficult to dislodge: It's not affected by tape or disk operations, or by pressing RUN/STOP– RESTORE. The simplest way to disable it is to turn the computer off then on. A gentler method is to SYS to the computer's built-in reset routine (SYS 65341 for the 128, 64738 for the 64, 65526 for the Plus/4 and 16, and 64802 for the VIC). These reset routines erase any program in memory, so be sure to save the program you're typing in before entering the SYS command.

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

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

The New Automatic Proofreader

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

MLX Machine Language Entry Program For Commodore 64 and 128

Ottis R. Cowper, Technical Editor

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

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

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

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

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

Entering A Listing

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

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

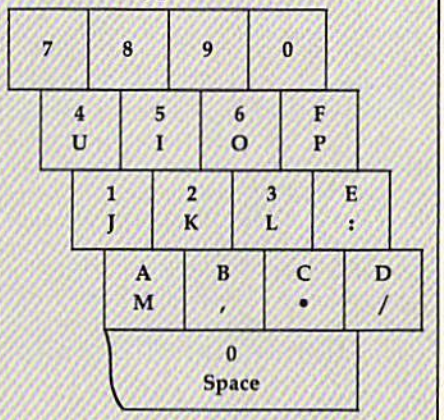
Invalid Characters Banned

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

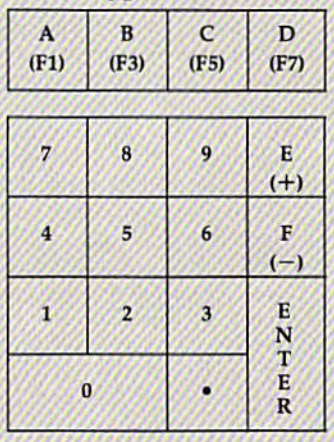
Only the numerals 0–9 and the letters A–F can be typed in. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, 128 MLX redefines the function keys and + and − keys on the numeric keypad so that you can enter data one-handed. (The 64 version incorporates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

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

64 MLX Keypad



128 MLX Keypad



Editing Features

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

number prompt.

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

Display Data

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

Other Menu Options

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

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

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

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

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

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

The Finished Product

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

An Ounce Of Prevention

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

Program 1: MLX For Commodore 64

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

```
      RESS[4]";:GOSUB300:SA=AD:GOSUB1040:IF F THEN180
GF 190 PRINT"{BLK}{2 SPACES}ENDING ADDRESS[4]";:GOSUB300:EA=AD:GOSUB1030:IF {SPACE}F THEN190
KR 200 INPUT"{3 DOWN}{BLK}CLEAR WORKSPACE [Y/N][4]";A$:IF LEFT$(A$,1)<>"Y"THEN220
PG 210 PRINT"{2 DOWN}{BLU}WORKING...";:FORI=BS TO BS+EA-SA+7:POKE I,0:NEXT:PRINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}{BLK}{RVS} MLX COMMAND {SPACE}MENU {DOWN}[4]":PRINT T$"{RVS}E{OFF}NTER DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISPLAY DATA":PRINT T$"{RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE FILE":PRINT T$"{RVS}Q{OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=MID$("EDLSQ",I,1)THEN A=I:I=5
FD 270 NEXT:ON A GOTO420,610,690,700,280:GOSUB1060:GOTO250
EJ 280 PRINT"{RVS} QUIT ":INPUT"{DOWN}[4]ARE YOU SURE [Y/N]";A$:IF LEFT$(A$,1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF LEN(IN$)<>4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$=MID$(IN$,3):GOSUB320:AD=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID$(B$,J,1):B=ASC(A$)-C4+(A$>"@")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(H$,B+1,1);:B=A-B*C6:PRINT MID$(H$,B+1,1);:RETURN
RR 360 A=INT(AD/Z6):GOSUB350:A=AD-A*Z6:GOSUB350:PRINT":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*CK+Z5*(CK>Z7):GOTO390
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT [4]";:GOSUB300:IF IN$<>N$ THEN GOSUB1030:IF F {SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA {SPACE}":GOSUB400:IF IN$=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F THEN PRINT IN$:PRINT"{UP}{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:B$=S$:FOR J=1 TO 2:IF F THEN B$=MID$(IN$,I+J,1)
HA 460 PRINT"{RVS}"B$L$;:IF I<24THEN PRINT"{OFF}";
HD 470 GET A$:IF A$=N$ THEN470
FK 480 IF(A$>"/"ANDA$<":")OR(A$>"@"ANDA$<"G")THEN540
GS 485 A=-(A$="M")-2*(A$=",")-3*(A$=".")-4*(A$="/")-5*(A$="J")-6*(A$="K")
FX 486 A=A-7*(A$="L")-8*(A$=":")-9*(A$="U")-10*(A$="I")-11*(A$="O")-12*(A$="P")
CM 487 A=A-13*(A$=S$):IF A THEN A$=MID$("ABCD123E456F0",A,1):GOTO 540
MP 490 IF A$=R$ AND((I=0)AND(J=1)OR F)THEN PRINT B$;:J=2:NEXT:I=24:GOTO550
KC 500 IF A$="{HOME}" THEN PRINT B$:J=2:NEXT:I=24:NEXT:F=0:GOTO440
MX 510 IF(A$="{RIGHT}")ANDF THENPRINT B$L$;:GOTO540
GK 520 IF A$<>L$ AND A$<>D$ OR((I=0)AND(J=1))THEN GOSUB1060:GOTO470
HG 530 A$=L$+S$+L$:PRINT B$L$;:J=2-J:IF J THEN PRINT {SPACE}L$;:I=I-3
QS 540 PRINT A$;:NEXT J:PRINT {SPACE}S$;
PM 550 NEXT I:PRINT:PRINT"{UP}{5 RIGHT}";:INPUT#3,IN$:IF IN$=N$ THEN CLOSE3:GOTO220
QC 560 FOR I=1 TO 25 STEP3:B$=MID$(IN$,I):GOSUB320:IF I<25 THEN GOSUB380:A(I/3)=A
PK 570 NEXT:IF A<>CK THEN GOSUB1060:PRINT"{BLK}{RVS}{SPACE}ERROR: REENTER LINE [4]":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FOR I=0 TO 7:POKE B+I,A(I):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN CLOSE3:PRINT"{DOWN}{BLU}** END OF ENTRY **{BLK}{2 DOWN}":GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"{CLR}{DOWN}{RVS}{SPACE}DISPLAY DATA ":GOSUB400:IF IN$=N$ THEN220
RJ 620 PRINT"{DOWN}{BLU}PRESS: {RVS}SPACE{OFF} TO PAUSE, {RVS}RETURN{OFF} TO BREAK[4]{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FOR I=BTO B+7:A=PEEK(I):GOSUB350:GOSUB380:PRINT S$;
CC 640 NEXT:PRINT"{RVS}";:A=CK:GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA THENPRINT"{DOWN}{BLU}** END OF DATA **":GOTO220
KC 660 GET A$:IF A$=R$ THEN GOSUB1080:GOTO220
EQ 670 IF A$=S$ THEN F=F+1:GOSUB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"{DOWN}{RVS} LOAD {SPACE}DATA ":OP=1:GOTO710
PC 700 PRINT"{DOWN}{RVS} SAVE {SPACE}FILE ":OP=0
RX 710 IN$=N$:INPUT"{DOWN}FILE NAME[4]";IN$:IF IN$=N$ {SPACE}THEN220
PR 720 F=0:PRINT"{DOWN}{BLK}{RVS}T{OFF}APE OR {RVS}D{OFF}ISK: [4]";
FP 730 GET A$:IF A$="T"THEN PRINT"T{DOWN}":GOTO880
HQ 740 IF A$<>"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8,15,"I0:":B=EA-SA:IN$="0:"+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+",P,W":GOSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(AH*256):PRINT#1,CHR$(AL);CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CHR$(PEEK(BS+I));:IF ST THEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOTO940
GS 800 GOSUB1060:PRINT"{DOWN}{BLK}ERROR DURING SAVE:[4]":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+",P,R":GOSUB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z$)+256*ASC(B$+Z$):IF AD<>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,A$:POKE BS+I,ASC(A$+Z$):IF(I<>B)AND ST THEN F=2:AD=I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F>0)+1 GOTO960,970
SA 860 INPUT#15,A,A$:IF A THEN CLOSE1:CLOSE15:GOSUB1060:PRINT"{RVS}ERROR: "A$
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE187,PEEK(FA+3):POKE188,PEEK(FA+4):IFOP=0THEN920
HJ 890 SYS 63466:IF(PEEK(783)AND1)THEN GOSUB1060:PRINT"{DOWN}{RVS} FILE NOT {SPACE}FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(830):IF AD<>SA THEN F=1:GOTO970
SC 910 A=PEEK(831)+256*PEEK(832)-1:F=F-2*(A<EA)-3*(A>EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:POKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOSUB1010:ON OP GOTO950:SYS 63591
AE 940 GOSUB1080:PRINT"{BLU}** SAVE COMPLETED **":GOTO220
XP 950 POKE147,0:SYS 63562:IF {SPACE}ST>0 THEN970
FR 960 GOSUB1080:PRINT"{BLU}** LOAD COMPLETED **":GOTO220
DP 970 GOSUB1060:PRINT"{BLK}{RVS}ERROR DURING LOAD:{DOWN}[4]":ON F GOSUB980,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTING ADDRESS (";:GOSUB360:PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT ";:AD=SA+AD:GOSUB360:PRINT D$:RETURN
FD 1000 PRINT"TRUNCATED AT ENDING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH*256):POKE193,AL:POKE194,AH
FF 1020 AH=INT(B/256):AL=B-(AH*256):POKE174,AL:POKE175,AH:RETURN
FX 1030 IF AD<SA OR AD>EA THEN1050
HA 1040 IF(AD>511 AND AD<40960
```

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

Program 2: MLX For Commodore 128

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

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

bug-swatter

• "Power BASIC: Input Windows" (April) works properly. But readers who use the routine in their own programs may discover that if the string in variable T$ (which contains the results from the machine language routine) is assigned to another variable, the second variable will change the next time the ML input routine is called. The best solution is to concatenate a null string when T$ is assigned to another variable:

```
SYS 49152: REM CALL INPUT
  WINDOWS
B$ = T$ + ""
```

The two quotation marks should be typed with no character inside (type SHIFT-2 twice).

• Some readers have reported that they didn't see the correct checksum numbers in certain lines of "Fontmaker." The "Automatic Proofreader" is very sensitive to the position of spaces inside quotation marks, and a few lines of Fontmaker were listed with spaces at the end of a line, where {SPACE} should have appeared.

In lines 690 and 1300, a space should be inserted after CHOICE:. And lines 1030 and 1590 should have a space before every {DOWN} {LEFT}.

• Reader Samuel D. Gillett has pointed out that files translated by "ASCII Teleconverter" (March) may be corrupted by unnecessary CHR$(0)s. To fix this, change line 260:

```
260 B$ = LEFT$(A$,1)
```

In addition, the program closes all files and ends when the last character is read from the source file. This final character is not written to the destination file. The statement **IF QP=64 THEN 290** should be removed from the end of line 230. It should then be added to the end of 270.

• The "Automatic Proofreader" determines which computer it's running on by PEEKing locations 772–773, the vector pointing to the routine that tokenizes BASIC commands. Several readers have discovered that the Proofreader doesn't work properly when the *Super Expander, Simons' BASIC,* or "MetaBASIC" program is active. In general, most programs or cartridges that add new commands will change the values in 772–773. The Proofreader should still work with these programs, but you'll have to adjust the first few lines, where 772–773 are PEEKed.

• Some readers have asked about certain functions of "SpeedScript-80" (June). CTRL-I properly toggles insert mode on and off, but the command line does not change color. The color change was a function of the 40-column raster interrupt, which is not available in 80 columns. CTRL-J also works correctly, but you must press CTRL-H first (as in the 40-column version). After pressing RESTORE and typing Y in response to the EXIT SPEEDSCRIPT (Y/N)? prompt, the screen will seem to freeze. This is because the computer has gone back to standard 64 mode with the standard 40-column screen. You'll have to switch to 40 columns after exiting SpeedScript-80. Finally, the SHIFT–CTRL-P print preview (printing to the screen) works correctly, but it prints to the 40-column screen. If you use this feature to see where page breaks occur, switch to the 40-column screen before pressing S for screen.

• An extraneous question mark appears in line 170 of "128 Sprite Rotator" (August). The last number in that line should be 280, not 2?80.

User Group Update

When writing to a user group for information, please remember to enclose a self-addressed envelope with postage that is appropriate for the country to which you're writing.

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

COMPUTE! Publications
P.O. Box 5406
Greensboro, NC 27403
Attn: Commodore User Groups

User Group Notes

Metropolitan Life Commodore Users SIG has changed its address to P.O. Box 1543, Murray Hill Station, New York, NY 10156. This group is only for employees of Metropolitan Life Insurance Company.

Down East Commodore Users Group has changed its address to P.O. Box 1255, Havelock, NC 28532.

Miami 2064 Commodore Users Group has a new address: 11531 S.W. 84 St., Miami, FL 33173.

The Greater Omaha Commodore Users Group has changed its address to P.O. Box 241155, Omaha, NE 68124.

Commodore 64 Boise User's Group (64-BUG) has changed its address to 7200 Modoc St., Boise, ID 83709.

White River Commodore 64 Users Group address is now P.O. Box 98, Wilkenson, WA 98386.

New Listings

CALIFORNIA

North Bay User's Group (NBUG), P.O. Box 7156, Vallejo, CA 94590

IDAHO

PFP 64 Software Exchange, 742 E. 19th, Jerome, ID 83338

NEW YORK

WW STUG, 77 Kenton Place, Hamburg, NY 14075

NORTH CAROLINA

Sanlee Commodore Club, 4628 Willett Rd., Sanford, NC 27330

OKLAHOMA

Commodore User's Group of Lawton, P.O. Box 3392, Lawton, OK 73501

VIRGINIA

Adventurer's Guild, 313 William St., Fredericksburg, VA 22401

Outside The U.S.

CANADA

Ottawa Home Computing Club, P.O. Box 4164, Station "C", Ottawa, Ontario, Canada, K1Y 4P3

COM-VIC, P.O. Box 666, Victoria Station, Westmount, Quebec, Canada H3Z 2Y7

Wise Budget '64, C.P.1027, Malartic, Quebec, Canada, J0Y 1Z0

ENGLAND

West Riding Commodore Computer Group, Bernard Flowers, 6 Earlswood Ave., Leeds, England, LS16 8DD

MEXICO

Century Soft's Users Group (C/S-UG), Jose Ramon Ruisanchez and Alejandro Vergara, Avenida 2 #143, Mexico DF, Mexico 03800

Fast File Copier

See instructions in article on page 66 before typing in.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```
0801:0D 08 0A 00 9E 28 32 30 05
0809:36 33 29 00 00 00 20 5A C0
0811:09 20 40 11 4C 12 08 20 A1
0819:44 E5 20 FC 09 B1 FD 91 35
0821:03 20 D0 0A 20 B6 0A A9 0F
0829:16 C5 FE D0 F0 A0 00 20 CC
0831:F1 0A A0 60 20 F1 0A 20 D3
0839:4F 0A C9 85 D0 03 4C FC 2D
0841:08 20 72 0B 20 1B 0B AD 8D
0849:A7 02 85 02 A9 00 85 FD D4
0851:A9 0D 85 FE A9 00 85 07 79
0859:20 0C 0A 90 0A C6 07 D0 11
0861:03 4C 67 09 4C FC 08 20 0A
0869:66 0B A0 00 B1 FB 2A 90 E5
0871:03 2A 90 03 4C F6 08 20 3E
0879:C4 0A A5 02 38 F1 FB 90 55
0881:74 85 02 A9 01 85 07 20 54
0889:BD 0A B1 FB 09 20 91 FB D8
0891:A0 10 20 F1 0A 20 48 0B 85
0899:A9 00 20 8C 0B 20 38 0A 9E
08A1:20 9C 0B A2 02 A9 00 85 B0
08A9:90 20 A5 FF A0 00 91 FD E4
08B1:20 D0 0A A5 90 D0 2D CA 8E
08B9:D0 EB 20 B9 0B 20 66 0B 7D
08C1:20 C4 0A 20 C4 0A A9 08 FF
08C9:AA A0 00 20 BA FF A5 22 9C
08D1:A2 40 A0 03 20 BD FF A9 29
08D9:00 A6 FD A4 FE 20 D5 FF C1
08E1:86 FD 84 FE A0 02 A5 FD 8B
08E9:91 03 C8 A5 FE 91 03 20 5B
08F1:E7 FF 20 A9 0B 20 92 0A 9C
08F9:4C 59 08 20 1B 0B 20 0C DA
0901:0A B0 14 20 66 0B A0 00 69
0909:B1 FB 2A 90 04 A9 80 91 9A
0911:FB 20 92 0A 4C FF 08 78 07
0919:A5 01 29 FD 85 01 20 FC B0
0921:09 B1 03 91 FD 20 D0 0A B9
0929:20 B6 0A A9 16 C5 FE D0 6B
0931:F0 A5 01 09 03 85 01 58 5E
0939:A0 90 20 F5 0A 20 72 0A E2
0941:A5 A1 D0 F9 20 E4 FF C9 A6
0949:00 F0 F5 20 67 0A C9 51 A0
0951:D0 03 4C 98 11 C9 41 D0 A2
0959:06 20 BA 0F 4C 11 14 C9 57
0961:53 D0 DD 4C 18 08 A9 FE 05
0969:25 01 85 01 A0 96 20 F1 A0
0971:0A 20 4F 0A C9 85 D0 03 24
0979:4C FC 08 20 72 0B 20 1B 0F
0981:0B A9 00 85 FD A9 0D 85 12
0989:FE A9 00 85 07 20 0C 0A B8
0991:90 0A C6 07 D0 03 4C 2E 11
0999:08 4C FC 08 20 66 0B A0 34
09A1:00 B1 FB 2A 90 4F 2A B0 09
09A9:4C 2A B0 06 A9 01 85 07 46
09B1:D0 43 A9 C0 91 FB A0 1D 19
09B9:20 F1 0A 20 48 0B A9 01 5E
09C1:20 8C 0B 20 38 0A 20 AE 43
09C9:FF A5 BA 20 B1 FF A5 B9 31
09D1:20 93 FF A0 02 B1 03 C5 85
09D9:FD D0 07 C8 B1 03 C5 FE B0
09E1:F0 0D A0 00 B1 FD 20 A8 32
09E9:FF 20 D0 0A 4C D4 09 20 A6
09F1:AE FF 20 A9 0B 20 92 0A 02
09F9:4C 8E 09 A9 00 A8 85 FD 3D
```

```
0A01:85 03 A9 0D 85 FE A9 E0 FA
0A09:85 04 60 A5 04 CD A9 02 F3
0A11:F0 01 60 A5 03 CD A8 02 E6
0A19:F0 11 60 AD AB 02 C5 04 C5
0A21:F0 01 60 AD AA 02 C5 03 C0
0A29:F0 01 60 18 60 20 66 0B DE
0A31:A9 00 A8 AA 4C C4 0A 20 83
0A39:2E 0A 20 C4 0A B1 FB F0 37
0A41:0A 9D 40 03 E8 20 A8 FF 13
0A49:4C 3B 0A 86 22 60 A0 48 18
0A51:20 F1 0A A0 78 20 F1 0A 6F
0A59:20 72 0A A5 A1 D0 F9 20 1A
0A61:E4 FF C9 00 F0 F5 48 A9 BA
0A69:00 8D 18 D4 8D 04 D4 68 BF
0A71:60 A9 10 8D 04 D4 A9 7F 41
0A79:8D 01 D4 A9 0B 8D 05 D4 37
0A81:A9 0F 8D 18 D4 A9 00 85 34
0A89:A1 85 A2 A9 11 8D 04 D4 5A
0A91:60 18 A5 03 69 04 85 03 2A
0A99:90 02 E6 04 60 38 A5 03 C5
0AA1:E9 04 85 03 B0 02 C6 04 AB
0AA9:60 38 A5 03 E9 01 85 03 42
0AB1:B0 02 C6 04 60 E6 03 D0 2D
0AB9:02 E6 04 60 E6 FB D0 02 D9
0AC1:E6 FC 60 38 A5 FB E9 01 0A
0AC9:85 FB B0 02 C6 FC 60 E6 A7
0AD1:FD D0 02 E6 FE 60 A0 1D 9F
0AD9:98 20 D2 FF CA D0 F9 60 8A
0AE1:A0 9D D0 F4 A0 91 D0 F0 F4
0AE9:A0 11 D0 EC A0 20 D0 E8 8B
0AF1:A9 0C D0 0A A9 0E D0 06 C5
0AF9:A9 0F D0 02 A9 0D 85 06 73
0B01:B1 05 AA F0 11 A9 20 20 25
0B09:D2 FF CA D0 F8 F0 07 B1 3A
0B11:05 F0 06 20 D2 FF C8 D0 A1
0B19:F6 60 AD AA 02 85 03 AD FC
0B21:AB 02 85 04 60 20 0C 0A 24
0B29:B0 3A 20 66 0B A2 02 A5 1D
0B31:02 29 10 F0 02 A2 16 20 8A
0B39:D7 0A A0 00 B1 FB 29 80 22
0B41:F0 05 A9 12 20 D2 FF 20 D3
0B49:C4 0A 20 C4 0A A0 00 B1 19
0B51:FB F0 06 20 D2 FF 4C 4B DE
0B59:0B A9 92 20 D2 FF A9 0D AA
0B61:20 D2 FF 18 60 A0 00 B1 F4
0B69:03 85 FB C8 B1 03 85 FC 10
0B71:60 20 8A 0B A9 49 20 7D F1
0B79:0B 4C AE FF 20 A8 FF A9 4B
0B81:30 20 A8 FF A9 3A 4C A8 44
0B89:FF A9 0F 48 A5 BA 20 B1 7A
0B91:FF 68 09 60 85 B9 09 F0 FE
0B99:4C 93 FF 20 AE FF A5 BA 38
0BA1:20 B4 FF A5 B9 4C 96 FF 7B
0BA9:20 8A 0B 20 9C 0B 20 A5 CC
0BB1:FF 20 D2 FF C9 0D D0 F6 45
0BB9:20 AB FF 4C C2 0B 20 AE C0
0BC1:FF A5 BA 20 B1 FF A5 B9 2D
0BC9:29 EF 09 E0 20 93 FF 4C 3B
0BD1:AE FF 00 00 00 00 00 00 3F
0BD9:00 00 00 00 00 00 00 00 EF
0BE1:00 00 00 00 00 00 00 00 F7
0BE9:00 00 00 00 00 00 00 00 FF
0BF1:00 00 00 00 00 00 00 00 08
0BF9:00 00 00 00 00 00 00 0F 1F
0C01:12 43 4F 50 59 20 46 49 03
0C09:4C 45 53 92 0D 0D 00 00 C8
0C11:12 4C 4F 41 44 49 4E 47 6E
0C19:92 20 20 00 00 12 53 41 B6
0C21:56 49 4E 47 20 92 20 20 A0
0C29:00 08 11 12 20 46 41 53 76
0C31:54 20 46 49 4C 45 20 43 D3
0C39:4F 50 49 45 52 20 20 56 34
0C41:31 2E 33 20 92 0D 00 0B B9
0C49:50 52 45 53 53 20 12 20 5B
0C51:46 31 20 92 20 54 4F 20 17
0C59:41 42 4F 52 54 0D 00 0B 93
0C61:49 4E 53 45 52 54 20 12 A6
0C69:53 4F 55 52 43 45 92 20 43
0C71:44 49 53 4B 0D 0D 00 08 C1
0C79:50 52 45 53 53 20 12 41 AC
0C81:4E 59 20 4B 45 59 92 20 A4
0C89:54 4F 20 43 4F 4E 54 49 7D
0C91:4E 55 45 0D 00 08 49 4E A0
0C99:53 45 52 54 20 12 44 45 53
0CA1:53 54 49 4E 41 54 49 4F C3
0CA9:4E 92 20 44 49 53 4B 0D 11
0CB1:0D 00 0D 12 20 52 45 4E 36
0CB9:41 4D 45 20 46 49 4C 45 A5
0CC1:53 20 92 0D 0D 00 00 12 29
0CC9:52 45 4E 41 4D 45 3A 20 4E
0CD1:20 20 92 20 00 00 12 4E C8
0CD9:45 57 20 4E 41 4D 45 3F 5C
0CE1:20 92 20 00 00 00 00 00 B2
0CE9:00 00 00 00 00 00 00 00 02
0CF1:00 00 00 00 00 00 00 00 0A
0CF9:00 00 00 00 00 00 00 00 12
0D01:0D 0D 00 04 54 48 49 53 CE
0D09:20 50 52 4F 47 52 41 4D D9
0D11:20 57 49 4C 4C 20 43 4F B7
0D19:50 59 20 4F 52 20 53 43 A7
0D21:52 41 54 43 48 0D 00 0D F6
0D29:53 45 4C 45 43 54 45 44 56
0D31:20 46 49 4C 45 53 0D 00 6C
0D39:00 0D 50 52 45 53 53 20 04
0D41:12 43 55 52 53 4F 52 92 14
0D49:20 4B 45 59 53 20 54 4F 97
0D51:20 4D 4F 56 45 0D 50 52 6F
0D59:45 53 53 20 12 53 50 41 17
0D61:43 45 92 20 54 4F 20 53 36
0D69:45 4C 45 43 54 20 46 49 0F
0D71:4C 45 53 0D 12 20 46 31 0D
0D79:20 92 20 43 4F 50 59 20 0F
0D81:46 49 4C 45 53 20 20 20 6A
0D89:20 20 12 20 46 32 20 92 CD
0D91:20 56 41 4C 49 44 41 54 70
0D99:45 20 44 49 53 4B 0D 12 6F
0DA1:20 46 33 20 92 20 44 45 A8
0DA9:4C 45 54 45 20 46 49 4C 13
0DB1:45 53 20 20 20 12 20 46 19
0DB9:34 20 92 20 52 45 4E 41 CF
0DC1:4D 45 20 46 49 4C 45 53 95
0DC9:0D 12 20 46 35 20 92 20 C6
0DD1:50 52 45 56 49 4F 55 53 3C
0DD9:20 50 41 47 45 20 20 12 B1
0DE1:20 46 37 20 92 20 4E 45 7D
0DE9:58 54 20 50 41 47 45 00 FF
0DF1:00 00 00 00 00 00 00 00 0C
0DF9:00 00 00 00 00 00 00 0C 20
0E01:12 53 43 52 41 54 43 48 B2
0E09:49 4E 47 20 46 49 4C 45 7D
0E11:53 92 0D 0D 00 00 12 53 65
0E19:43 52 41 54 43 48 3F 20 B2
0E21:59 2F 4E 92 20 00 00 91 3B
0E29:12 53 43 52 41 54 43 48 DA
0E31:49 4E 47 20 20 92 20 0D 09
0E39:00 0F 12 44 49 53 4B 20 ED
0E41:46 4F 52 4D 41 54 92 0D 01
0E49:0D 00 00 44 49 53 4B 20 7E
0E51:4E 41 4D 45 20 3F 20 00 21
0E59:00 44 49 53 4B 20 49 44 96
0E61:20 3F 20 00 00 0D 12 51 0B
0E69:92 55 49 54 20 20 12 41 79
0E71:92 4E 4F 54 48 45 52 20 B5
0E79:44 49 53 4B 20 20 12 46 15
0E81:92 4F 52 4D 41 54 20 41 B6
0E89:20 44 49 53 4B 0D 00 00 B3
0E91:0D 50 52 45 53 53 20 12 21
0E99:53 92 20 54 4F 20 43 4F 1E
0EA1:50 59 20 53 41 4D 45 20 5F
0EA9:46 49 4C 45 53 20 41 47 FD
0EB1:41 49 4E 0D 50 52 45 53 05
0EB9:53 20 12 41 92 20 54 4F EA
0EC1:20 43 4F 50 59 20 46 52 D7
0EC9:4F 4D 20 41 4E 4F 54 48 99
0ED1:45 52 20 44 49 53 4B 0D A8
0ED9:50 52 45 53 53 20 12 51 21
0EE1:92 20 54 4F 20 51 55 49 09
0EE9:54 0D 00 00 00 00 00 00 73
0EF1:00 00 00 00 00 00 00 00 0E
0EF9:00 00 00 00 00 00 00 00 16
0F01:50 52 45 53 53 20 12 20 19
0F09:56 20 92 20 54 4F 20 56 25
0F11:45 52 49 46 59 20 45 41 0B
0F19:43 48 20 54 49 54 4C 45 AD
0F21:0D 42 45 46 4F 52 45 20 D1
0F29:53 43 52 41 54 43 48 49 A9
0F31:4E 47 0D 0D 50 52 45 53 64
0F39:53 20 12 20 41 20 92 20 1D
0F41:54 4F 20 41 55 54 4F 4D 5D
0F49:41 54 49 43 41 4C 4C 59 A7
0F51:20 53 43 52 41 54 43 48 0C
0F59:0D 53 45 4C 45 43 54 45 65
0F61:44 20 46 49 4C 45 53 0D 32
0F69:0D 00 0C 4E 4F 20 46 49 45
0F71:4C 45 53 20 4F 4E 20 44 AB
0F79:49 53 4B 0D 00 0F 12 20 CB
0F81:56 41 4C 49 44 41 54 45 4E
0F89:20 92 0D 0D 00 00 0D 12 FA
0F91:56 41 4C 49 44 41 54 49 62
0F99:4E 47 20 44 49 53 4B 92 B9
0FA1:0D 0D 00 0C 12 4C 4F 41 EB
0FA9:44 49 4E 47 20 44 49 52 71
0FB1:45 43 54 4F 52 59 92 0D EC
0FB9:00 20 44 E5 A9 00 8D 21 50
0FC1:D0 85 05 A9 08 8D 20 D0 6C
0FC9:A2 02 20 E9 0A A0 2A 20 A3
0FD1:F1 0A A0 00 20 FD 0A A0 2D
0FD9:04 20 FD 0A A0 28 20 FD 46
0FE1:0A A2 08 20 E9 0A A0 60 C9
0FE9:20 F1 0A 20 4F 0A C9 85 93
0FF1:D0 03 4C C3 13 20 44 E5 86
0FF9:A2 0A 20 E9 0A A0 A4 20 CA
1001:F9 0A A9 FF 85 FB A9 CF 15
1009:85 FC A9 00 85 03 A9 C0 AC
1011:85 04 A9 C2 8D A7 02 20 85
1019:72 0B A9 00 20 8C 0B A9 5D
1021:24 20 A8 FF 20 9C 0B A9 A3
1029:00 85 90 A0 03 84 02 20 15
1031:A5 FF 85 07 A4 90 F0 03 91
1039:4C DE 10 20 A5 FF A4 90 42
1041:D0 F6 A4 02 88 D0 E6 91 23
1049:FB 20 CF 10 A5 07 91 FB D2
1051:20 A5 FF A4 90 D0 E1 AA 6B
1059:F0 5B C9 22 D0 F2 20 CF 86
1061:10 20 A5 FF A4 90 D0 75 C4
1069:AA F0 4A 91 FB C9 22 D0 99
1071:ED A9 2C 91 FB 20 A5 FF 3D
1079:A4 90 D0 61 AA D0 04 91 72
1081:FB F0 32 C9 50 F0 1E C9 0B
1089:53 F0 10 C9 55 F0 0C C9 7E
1091:52 F0 08 C9 2A D0 DE A9 B0
1099:71 D0 05 48 20 CF 10 68 94
10A1:91 FB 20 CF 10 98 91 FB 8C
10A9:20 CF 10 20 A5 FF A4 90 D8
10B1:D0 2B AA D0 F6 A5 FB 91 3F
10B9:03 C8 A5 FC 91 03 A9 00 FD
10C1:C8 91 03 C8 91 03 20 92 03
10C9:0A A0 02 4C 2E 10 38 A5 E3
10D1:FB E9 01 85 FB B0 05 C6 56
10D9:FC CE A7 02 60 A5 90 29 25
10E1:BF F0 09 20 AB FF 20 A9 88
10E9:0B 4C C3 13 20 B9 0B 38 82
10F1:A5 03 E9 09 85 03 B0 02 0F
10F9:C6 04 20 BD 0A A5 FB 8D CA
1101:A8 02 A5 FC 8D A9 02 A5 39
1109:04 C9 BF D0 08 A0 6B 20 5E
1111:F9 0A 4C C3 13 A0 00 B1 45
1119:03 91 FB 20 CF 10 20 AA 4C
1121:0A A5 03 C9 FF D0 F0 A5 79
1129:04 C9 BF D0 EA 20 BD 0A 22
1131:A5 FB 8D AA 02 85 03 A5 53
1139:FC 8D AB 02 85 04 60 20 EF
1141:E4 FF C9 00 F0 F9 C9 91 A3
1149:D0 03 4C 52 13 C9 11 D0 F5
1151:03 4C 23 13 C9 1D D0 03 05
1159:4C E3 12 C9 9D D0 03 4C FB
1161:F5 12 C9 13 D0 03 4C 07 9F
1169:13 C9 20 D0 03 4C ED 11 CE
1171:C9 85 D0 03 4C 18 08 C9 C0
1179:86 D0 03 4C 45 12 C9 87 C5
1181:D0 03 4C D7 11 C9 88 D0 65
1189:03 4C BE 11 C9 41 D0 03 21
1191:4C 5A 09 C9 51 D0 10 20 3C
1199:44 E5 A9 06 8D 21 D0 A9 29
11A1:0E 8D 20 D0 6C 02 A0 C9 B5
11A9:46 D0 03 4C 7E 13 C9 89 A5
11B1:D0 03 4C 16 12 C9 8A D0 85
11B9:03 4C 62 14 60 20 07 13 A2
11C1:A9 20 85 07 20 92 0A 20 61
11C9:0C 0A B0 07 C6 07 D0 F4 E3
11D1:4C 11 14 4C 07 13 20 07 71
11D9:13 A9 20 85 07 20 9E 0A 4C
11E1:20 1C 0A B0 EE C6 07 D0 D8
```

```
11E9:F4 4C 11 14 20 66 0B A9 57
11F1:80 A0 00 51 FB 91 FB A9 59
11F9:0D 20 D2 FF A9 91 20 D2 AB
1201:FF 20 26 0B A9 91 20 D2 49
1209:FF A5 02 29 10 F0 05 A2 5A
1211:14 4C D7 0A 60 20 44 E5 DF
1219:A0 7E 20 F9 0A 20 4F 0A 4A
1221:C9 85 D0 03 4C C3 13 A0 0E
1229:8E 20 F9 0A 20 8A 0B A9 67
1231:56 20 7D 0B 20 AE FF 20 C4
1239:A9 0B 20 4F 0A C9 85 F0 61
1241:E3 4C 5A 09 20 44 E5 A0 C4
1249:00 20 F9 0A A0 48 20 F1 AD
1251:0A 20 1B 0B 20 E4 FF C9 F4
1259:00 F0 F9 C9 56 F0 0E C9 F1
1261:41 F0 0A C9 85 D0 ED 20 AB
1269:1B 0B 4C 11 14 85 07 20 5D
1271:44 E5 A0 00 20 F5 0A 20 52
1279:0C 0A 90 06 20 EC 0F 4C B7
1281:11 14 20 66 0B A0 00 B1 2A
1289:FB 29 80 F0 3D A0 16 20 CD
1291:F5 0A 20 D5 14 A5 07 C9 A3
1299:56 D0 16 20 E4 FF C9 00 9C
12A1:F0 F9 C9 4E F0 24 C9 85 0C
12A9:D0 03 4C 68 12 C9 59 D0 42
12B1:EA A0 27 20 F5 0A 20 8A FC
12B9:0B A9 53 20 7D 0B 20 2E C0
12C1:0A 20 D1 12 20 AE FF 20 2A
12C9:A9 0B 20 92 0A 4C 78 12 37
12D1:20 C4 0A B1 FB F0 0A C9 15
12D9:2C F0 06 20 A8 FF 4C D1 C2
12E1:12 60 A5 02 29 10 D0 0B 32
12E9:A9 10 85 07 20 23 13 C6 82
12F1:07 D0 F9 60 A5 02 29 10 AA
12F9:F0 0B A9 10 85 07 20 52 6A
1301:13 C6 07 D0 F9 60 20 5D 3F
1309:14 A9 00 85 02 AD AC 02 1E
1311:85 03 AD AD 02 85 04 20 99
1319:66 E5 A2 08 20 E9 0A 4C C9
1321:53 14 A9 1F C5 02 F0 0B 40
1329:20 92 0A 20 0C 0A 90 04 F4
1331:20 9E 0A 60 20 5D 14 E6 DB
1339:02 A5 02 C9 10 D0 0A A2 21
1341:10 20 E5 0A A2 14 20 D7 52
1349:0A A9 11 20 D2 FF 4C 53 85
1351:14 A9 00 C5 02 F0 0B 20 52
1359:9E 0A 20 1C 0A 90 04 20 D1
1361:92 0A 60 20 5D 14 C6 02 2C
1369:A5 02 C9 0F D0 0A A2 10 11
1371:20 E9 0A A2 14 20 E1 0A 7C
1379:A9 91 4C 4C 13 20 44 E5 AE
1381:A0 3A 20 F5 0A A0 4B 20 73
1389:F5 0A A2 11 20 E4 13 98 E5
1391:48 A0 59 20 F5 0A A2 03 51
1399:68 A8 20 E6 13 A9 00 99 69
13A1:40 03 A0 96 20 F1 0A 20 23
13A9:4F 0A C9 85 D0 03 4C C3 7A
13B1:13 20 8A 0B A9 4E 20 7D AF
13B9:0B 20 03 14 20 AE FF 20 EA
13C1:A9 0B A0 65 20 F5 0A 20 F6
13C9:E4 FF C9 00 F0 F9 C9 51 EF
13D1:D0 03 4C 98 11 C9 41 D0 37
13D9:03 4C 5A 09 C9 46 D0 E7 61
13E1:4C 7E 13 A0 FF 20 CF FF 5A
13E9:C8 CA 10 06 99 40 03 88 E5
13F1:D0 03 99 40 03 C9 0D D0 A2
13F9:EC 20 D2 FF A9 2C 99 40 6A
1401:03 60 A0 00 B9 40 03 F0 9C
1409:06 20 A8 FF C8 D0 F5 60 27
1411:A5 03 8D AC 02 A5 04 8D 85
1419:AD 02 A9 00 85 02 20 44 86
1421:E5 A0 39 20 FD 0A A0 65 4C
1429:20 F5 0A A2 28 A0 2A 20 82
1431:D9 0A 20 26 0B B0 17 20 98
1439:92 0A E6 02 A5 02 C9 20 13
1441:F0 0C C9 10 D0 05 A2 10 0F
1449:20 E5 0A 4C 33 14 20 0A 35
1451:13 60 A9 76 20 D2 FF A9 AD
1459:9D 4C D2 FF A9 20 4C 55 79
1461:14 20 44 E5 A0 B3 20 F1 88
1469:0A 20 1B 0B 20 0C 0A 90 88
1471:03 4C 7D 12 20 66 0B A0 50
1479:00 B1 FB 29 80 D0 06 20 93
1481:92 0A 4C 6D 14 A0 C7 20 A8
1489:F1 0A 20 D5 14 A0 D6 20 7F
1491:F1 0A A0 00 20 CF FF C9 53
1499:0D D0 06 20 D2 FF 4C 80 EE
14A1:14 99 40 03 C8 20 CF FF D8
14A9:C9 0D D0 F5 20 D2 FF A9 69
14B1:3D 99 40 03 C8 A9 00 99 9D
14B9:40 03 20 8A 0B A9 52 20 33
14C1:7D 0B 20 03 14 20 2E 0A 27
14C9:20 D1 12 20 AE FF 20 A9 1A
14D1:0B 4C 80 14 20 C4 0A 20 2C
14D9:C4 0A A0 00 B1 FB F0 0A 64
14E1:C9 2C F0 06 20 D2 FF 4C 11
14E9:D8 14 4C 5F 0B 00 00 00 5B
```

80-Column Character Editor

See instructions in article on page 68 before typing in.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: 80-Column Character Editor

```
HA 10 FAST:COLOR6,1:GRAPHIC1,1
      :DIM B(8,8),BF(8,8):CP=0
      :U$=CHR$(142)
MK 20 FORI=0TO192:READX:POKEDE
      C("D00")+I,X:S=S+X:NEXT:
      IFS<>24972THENPRINTCHR$(
      14)"ERROR IN DATA"+CHR$(
      142):END:ELSESYSDEC("D46
      "):GOTO140
JM 30 DATA 142,0,214,44,0,214,
      16,251,141,1,214,96,162,
      18,169,0,32,0,13,232,169
      ,0,32,0,13,162,31,169,1,
      32,0,13,162,18,76,0,13
QP 40 DATA 134,251,132,252,162
      ,18,165,252,32,0,13,232,
      165,251,32,0,13,162,31,1
      42,0,214,44,0,214,16,251
      ,173,1,214,133,250,96
HS 50 DATA 169,0,160,208,133,2
      18,132,219,133,250,169,3
      2,133,251,160,0,162,14,1
      69,218,32,116,255,145,25
      0,200,192,8,144,242,24,1
      65,250
HJ 60 DATA 105,8,133,250,144,2
      ,230,251,24,165,218,105,
      8,133,218,144,220,230,21
      9,165,219,201,224,144,21
      2,96
HA 70 DATA 169,0,160,32,133,21
      8,132,219,162,18,169,32,
      32,204,205,232,169,0,32,
      204,205,160,0,162,14,169
      ,218,32,116,255,32,202,2
      05
XC 80 DATA 200,192,8,144,241,1
      69,0,32,202,205,136,208,
      250,24,165,218,105,8,133
      ,218,144,224,230,219,165
      ,219,201,48,144,216,96
AH 90 POKEDEC("D15"),ADAND255
QS 100 POKEDEC("D0F"),AD/256
KD 110 POKEDEC("D1C"),BI
JQ 120 SYSDEC("D0C")
SS 130 RETURN
```

```
PB 140 PRINT"{CLR}{WHT}";TAB(7
       )U$;"* C O M M O D O R
       {SPACE}E{3 SPACES}1 2 8
       {5 SPACES}C H A R A C T
        E R{3 SPACES}E D I T O
       R *"
BJ 150 PRINTU$;TAB(8)"{2 DOWN}
       {7}@ A B C D E F G H I
       {SPACE}J K L M N O P Q
       {SPACE}R S T U V W X Y
       {SPACE}Z [ £ ] ↑ ←"
PG 160 PRINTU$;TAB(8)"
       {2 SPACES}! ";CHR$(34)"
        # $ % & ' ( ) * + , -
       {SPACE}. / 0 1 2 3 4 5
       {SPACE}6 7 8 9 : ; < =
       {SPACE}> ?
SQ 170 PRINTU$;TAB(8)"* A B C
       {SPACE}D E F G H I J K
       {SPACE}L M N O P Q R S
       {SPACE}T U V W X Y Z +
       {SPACE}{-} | {*}"
FK 180 PRINTU$;TAB(8)"
       {2 SPACES}{K} {I} {T}
       {@} {G} {+} {M} {£} £
        {N} {Q} {D} {Z} {S}
       {P} {A} {E} {R} {W} {H}
        {J} {L} {Y} {U} {O} @
       {SPACE}{F} {C} {X} {V}
       {SPACE}{B}{DOWN}"
XJ 190 PRINTTAB(8)"{N}@ A B C
       {SPACE}D E F G H I J K
       {SPACE}L M N O P Q R S
       {SPACE}T U V W X Y Z [
       {SPACE}£ ] ↑ ←"
DE 200 PRINTTAB(8)"{2 SPACES}!
        ";CHR$(34)" # $ % & '
       {SPACE}( ) * + , - . /
       {SPACE}0 1 2 3 4 5 6 7
       {SPACE}8 9 : ; < = > ?
FS 210 PRINTTAB(8)"* A B C D E
        F G H I J K L M N O P
       {SPACE}Q R S T U V W X
       {SPACE}Y Z + {-} | T
       {*}"
PG 220 PRINTTAB(8)"{2 SPACES}
       {K} {I} {T} {@} {G} {+}
        {M} {£} £ {N} {Q}
       {D} {Z} {S} {P} {A} {E}
        {R} {W} {H} {J} {L}
       {Y} {U} {O} @ {F} {C}
       {X} {V} {B}"
FJ 230 SYS52332,,14,50
SA 240 PRINTCHR$(14)"{CYN}<ENT
       ER> - {4}SAVE CHARACTER
       ":PRINTTAB(52)"{CYN}<CL
       R> - {4}CLEAR CHARACTER
       ":PRINTTAB(50)"{CYN}<SP
       ACE> - {4}TOGGLE BIT":P
       RINTTAB(52)"{CYN}<ESC>
       {SPACE}- {4}ABORT"
MA 250 PRINTTAB(56)"{DOWN}{3}Q
        - {RED}QUIT"
FD 260 SYS52332,,14,0
MX 270 PRINTCHR$(14)"
       {3 SPACES}{CYN}E - {4}E
       DIT CHARACTER":PRINT"
       {3 SPACES}{CYN}S - {4}S
       WITCH CHARACTER SETS":P
       RINT"{3 SPACES}{CYN}@ -
        {4}SAVE CHARACTER SET"
       :PRINT"{3 SPACES}{CYN}L
        - {4}LOAD CHARACTER SE
       T"
HP 280 PRINTCHR$(14)"{DOWN}
       {3 SPACES}{CYN}C - {4}C
       OPY CHARACTER FROM BUFF
       ER":PRINT"{3 SPACES}
       {CYN}B - {4}COPY CHARAC
       TER TO BUFFER"
EK 290 SYS52332,,13,1:FORX=1TO
       8:PRINTTAB(36)"{WHT}...
```

```
      .....":NEXT:FORX=1TO8:F
      ORY=1TO8:B(X,Y)=0:NEXTY
      ,X:PS=1:LN=1:CH=1:CL=1:
      OF=0
BH 300 IFOF=0THENSYS52332,,2+C
      L,6+(CH*2):ELSE SYS5233
      2,,7+CL,6+(CH*2)
QS 310 PRINTCHR$(27)"F"CHR$(27
      )"S";
CF 320 GETKEYA$
CR 330 IFA$="{UP}"THENCL=CL-1:
      IFCL<1THENCL=4
XR 340 IFA$="{DOWN}"THENCL=CL+
      1:IFCL>4THENCL=1
PA 350 IFA$="{LEFT}"THENCH=CH-
      1:IFCH<1THENCH=32
RS 360 IFA$="{RIGHT}"THENCH=CH
      +1:IFCH>32THENCH=1
GD 370 IFA$=CHR$(13)ORA$="E"TH
      ENGOSUB590:GOSUB540
AG 380 IFA$="@"THENGOSUB670
BG 390 IFA$="L"THENGOSUB700
CM 400 IFA$="S"THENBEGIN:IFOF=
      0THENOF=2048:ELSEOF=0:B
      END
DB 410 IFA$="Q"THENPRINT"
      {17 DOWN}"U$:END
CP 420 GOTO300
DM 430 GETKEYA$
MR 440 IFA$="{DOWN}"THENLN=LN+
      1:IFLN>8THENLN=1
FC 450 IFA$="{UP}"THENLN=LN-1:
      IFLN<1THENLN=8
BS 460 IFA$="{RIGHT}"THENPS=PS
      +1:IFPS>8THENPS=1
CF 470 IFA$="{LEFT}"THENPS=PS-
      1:IFPS<1THENPS=8
MS 480 IFA$=" "THEN BEGIN:IFB(
      PS,LN)=0 THEN B(PS,LN)=
      1:PRINT"{RVS}{YEL}
      {OFF}{LEFT}";: ELSE B(P
      S,LN)=0:PRINT"{WHT}.
      {LEFT}";:BEND
KK 490 IFA$=CHR$(13)THEN560
GS 500 IFA$=CHR$(27)THENSYS 52
      332,,13,1:GOTO580
EF 510 IFA$="{CLR}"THENSYS5233
      2,,13,1:FORX=1TO8:PRINT
      TAB(36)"{WHT}........":
      NEXT:FORX=1TO8:FORY=1TO
      8:B(X,Y)=0:NEXTY,X:
AE 520 IFA$="C"THENGOSUB790
BQ 530 IFA$="B"THENGOSUB730
BC 540 SYS52332,,LN+12,PS+35:P
      RINTCHR$(27)"U";
HG 550 GOTO430
FX 560 BS=DEC("2000"):FD=BS+(8
      *(((CL-1)*32)+(CH-1))-1
      )+1+OF:FORAD=FDTOFD+7:B
      T=0:RV=0:FORB=7TO0STEP-
      1:IFB(8-B,AD-FD+1)>0THE
      NBT=BT+2↑B:ELSERV=RV+2↑
      B
HM 570 NEXTB:POKEAD,BT:POKEAD+
      1024,RV:NEXTAD:SYSDEC("
      D81"):SYS52332,,12,1
SJ 580 FORX=1TO8:PRINTTAB(36)"
      {WHT}........":NEXT:FOR
      X=1TO8:FORY=1TO8:B(X,Y)
      =0:NEXTY,X:RETURN
CM 590 IFOF>0THENBS=DEC("2000"
      ):FD=BS+(16*(((CL-1)*32
      )+(CH-1))-1)+1+OF+2048:
      FORY=1TO8:FORX=1TO8:B(X
      ,Y)=0:NEXTX,Y:GOTO610
CC 600 BS=DEC("2000"):FD=BS+(1
      6*(((CL-1)*32)+(CH-1))-
      1)+1+OF:FORY=1TO8:FORX=
      1TO8:B(X,Y)=0:NEXTX,Y
PE 610 FORAD=FDTOFD+7:SYSDEC("
      D25"),,ADAND255,AD/256:
      IFPEEK(250)>0THEN630
SB 620 NEXTAD:GOTO650
PF 630 FORB=7TO0STEP-1:IF(PEEK
      (250)AND2↑B) >0THENB(8-
      B,AD-FD+1)=1
AK 640 NEXTB:GOTO620
GD 650 FORY=1TO8:FORX=1TO8:SYS
      52332,,12+Y,35+X:IF B(X
      ,Y)=1 THEN PRINT"{RVS}
      {YEL} {OFF}";: ELSE PRI
      NT"{WHT}.";
BA 660 NEXTX,Y:RETURN
ME 670 SYS52332,,23,15:PRINTCH
      R$(14)CHR$(7)"[63]PRESS
      {SPACE}<ESC> TO ABORT O
      R ANY OTHER KEY TO SAVE
      ...";:GETKEYA$
RJ 680 IFA$=CHR$(27)THENSYS523
      32,,23,1:PRINTA$"Q";:RE
      TURN
SJ 690 SCRATCH"CHAR.SET":BSAVE
      "CHAR.SET",P8192 TO P12
      288:SYS52332,,23,1:PRIN
      TCHR$(27)"Q";:RETURN
EG 700 SYS52332,,23,15:PRINTCH
      R$(14)CHR$(7)"[63]PRESS
      {SPACE}<ESC> TO ABORT O
      R ANY OTHER KEY TO LOAD
      ...";:GETKEYA$
SK 710 IFA$=CHR$(27) THEN SYS5
      2332,,23,1:PRINTA$"Q";:
      RETURN
CC 720 BLOAD"CHAR.SET",P8192:S
      YSDEC("D81"):SYS52332,,
      22,1:PRINTCHR$(27)"Q";:
      RETURN
AK 730 IFOF=0THENBS=DEC("2000"
      ):FD=BS+(16*(((CL-1)*32
      )+(CH-1))-1)+1+OF:FORY=
      1TO8:FORX=1TO8:BF(X,Y)=
      0:NEXTX,Y:GOTO750
BH 740 BS=DEC("2000"):FD=BS+(1
      6*(((CL-1)*32)+(CH-1))-
      1)+1+OF+2048:FORY=1TO8:
      FORX=1TO8:BF(X,Y)=0:NEX
      TX,Y
RF 750 FORAD=FDTOFD+7:SYSDEC("
      D25"),,ADAND255,AD/256:
      IFPEEK(250)>0THEN770
KA 760 NEXTAD:RETURN
HX 770 FORB=7TO0STEP-1:IF(PEEK
      (250)AND2↑B) >0THENBF(8
      -B,AD-FD+1)=1
CP 780 NEXTB:GOTO760
QS 790 FORY=1TO8:FORX=1TO8:B(X
      ,Y)=BF(X,Y):NEXTX,Y
FQ 800 FORY=1TO8:FORX=1TO8:SYS
      52332,,12+Y,35+X:IFB(X,
      Y)=1THENPRINT"{RVS}
      {YEL} {OFF}";:ELSEPRINT
      "{WHT}.";
XJ 810 NEXTX,Y:RETURN
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 2: Boot80

```
0C00:4C 10 0C 43 48 41 52 2E 12
0C08:53 45 54 FF 00 FF 00 FF A5
0C10:A9 0C AA 20 68 FF A9 01 EE
0C18:A2 08 A0 00 20 BA FF A9 2D
0C20:08 A2 03 A0 0C 20 BD FF AB
0C28:A9 00 A2 00 A0 20 20 D5 05
0C30:FF 20 E7 FF A9 00 A0 20 FB
0C38:85 DA 84 DB A2 12 A9 20 E8
0C40:20 CC CD E8 A9 00 20 CC 3E
0C48:CD A0 00 A2 0E A9 DA 20 86
0C50:74 FF 20 CA CD C8 C0 08 6E
0C58:90 F1 A9 00 20 CA CD 88 BA
0C60:D0 FA 18 A5 DA 69 08 85 0F
0C68:DA 90 E0 E6 DB A5 DB C9 93
0C70:30 90 D8 60 00 00 00 00 E5
```

DATA Transformer For LADS

See instructions in article on page 71 before typing in.

```
8000:A9 01 85 FB A9 08 85 FC FB
8008:A9 11 85 FD 85 F7 A9 2F 41
8010:85 FE 85 F8 A2 00 A0 00 2A
8018:8C 57 81 B1 FB 91 FD F0 93
8020:0E 20 1E 81 20 2C 81 E8 A9
8028:E0 02 D0 EF 4C 3F 80 EE 82
8030:57 81 AD 57 81 C9 02 F0 90
8038:03 4C 21 80 4C CC 80 A2 33
8040:00 A0 00 B1 FB 91 FD 20 C6
8048:1E 81 20 2C 81 E8 E0 02 F2
8050:D0 F1 B1 FB C9 83 F0 12 7C
8058:20 81 FF A2 00 BD 3A 81 E0
8060:F0 07 20 D2 FF E8 4C 5D 66
8068:80 60 A2 00 A0 00 BD 4C E2
8070:81 F0 0C 91 FD 20 2C 81 53
8078:E8 4C 6E 80 20 2C 81 20 AB
8080:1E 81 B1 FB C9 2C F0 09 D0
8088:C9 00 F0 0C 91 FD 4C 7C E6
8090:80 A9 20 91 FD 4C 7C 80 F3
8098:91 FD 20 1E 81 20 2C 81 2E
80A0:38 A5 FD E9 11 8D 53 81 6C
80A8:A5 FE E9 2F 8D 54 81 A0 CD
80B0:00 18 A9 01 6D 53 81 91 4A
80B8:F7 A9 08 6D 54 81 C8 91 C3
80C0:F7 A5 FD 85 F7 A5 FE 85 19
80C8:F8 4C 14 80 A2 00 A0 00 3A
80D0:A9 00 91 FD 20 2C 81 A5 13
80D8:FD 8D 55 81 A5 FE 8D 56 99
80E0:81 A9 01 85 FB A9 08 85 A1
80E8:FC A9 11 85 FD A9 2F 85 C7
80F0:FE A0 00 B1 FD 91 FB A5 88
80F8:FD CD 55 81 F0 09 20 2C 47
8100:81 20 1E 81 4C F3 80 A5 80
8108:FE CD 56 81 F0 03 4C FE 0C
8110:80 A5 FB 85 2D 85 2F A5 18
8118:FC 85 2E 85 30 60 18 A5 F1
8120:FB 69 01 85 FB A5 FC 69 CD
8128:00 85 FC 60 18 A5 FD 69 EE
8130:01 85 FD A5 FE 69 00 85 52
8138:FE 60 45 52 52 4F 52 20 35
8140:45 52 52 4F 52 20 45 52 A9
8148:52 4F 52 00 2E 42 59 54 14
8150:45 20 00 00 00 00 00 00 FD
```

Jujitsu

For 128, Plus/4, and 16 modifications, see instructions in article on page 50 before typing in.

```
KM 100 DIM HU(13),SU(13),CA$(1
       3),CL(13),CL$(13):PRINT
       "{CLR}"
JD 110 DEF FNR(X)=INT(RND(1)*X
       )
XC 120 POKE 53281,0:POKE 53280
       ,0
BE 130 AA$="A23456789TJQK":Z=R
       ND(-TI):S=54272
CH 140 FOR A=50000 TO A+81:REA
       D B:POKE A,B:NEXT
PK 160 FOR I=1 TO 13
MK 170 CL(I)=I
JD 180 CA$(I)=MID$(AA$,I,1):CL
       $(I)=MID$(AA$,I,1):NEXT
ED 190 REM * SHUFFLE DECK *
```

```
SP 200 FOR I=1 TO 13
QC 210 X=FNR(13)+1:Y=FNR(13)+1
KQ 220 H$=CL$(X):CL$(X)=CL$(Y)
       :CL$(Y)=H$
CG 230 H=CL(X):CL(X)=CL(Y):CL(
       Y)=H:NEXT
AE 240 REM * START MAIN LOOP *
QD 250 FOR R=1 TO 13
BJ 260 PRINT"{CLR}{PUR}RRRRRRR
       RRRRRRRRRRRRRRRRRRRRRR
       RRRRRRRRRR"
HS 270 PRINT"{UP}{6 SPACES}Z
       {3 SPACES}J{2 SPACES}U
       {2 SPACES}J{2 SPACES}I
       {2 SPACES}T{2 SPACES}S
       {2 SPACES}U{3 SPACES}Z
       {7 SPACES}"
PR 280 PRINT"{UP}{40 Y}"
CX 290 PRINT"{UP}{RED}S{8} YOU
       R HAND:{RED}"
GB 300 FOR I=1 TO 13
AX 310 IF HU(I)=1 THEN 330
XF 320 PRINT CA$(I);" ";
XF 330 NEXT:PRINT
MC 340 PRINT"{DOWN}{BLU}A{8} M
       Y HAND:{BLU}"
CF 350 FOR I=1 TO 13
KK 360 IF SU(I)=1 THEN 380
PK 370 PRINT CA$(I);" ";
DG 380 NEXT:PRINT
KQ 390 PRINT"{DOWN}{GRN}X{8} C
       LUBS PLAYED:{GRN}"
KJ 400 FOR I=1 TO R-1:IF R=1 T
       HEN 420
HB 410 PRINT CL$(I);" ";
AJ 420 NEXT:PRINT
MG 430 PRINT"{PUR}{40 P}"
AG 440 REM * SHOW CARD AND BID
        *
AR 450 PRINT"{8}WHAT DO YOU BI
       D FOR THE {GRN}"CL$(R)"
       X{8} ?"
MF 460 POKE 198,0
SX 470 GET A$:IF A$="" THEN 47
       0
KS 480 IF A$="A" OR A$="T" OR
       {SPACE}A$="J" OR A$="Q"
        OR A$="K" THEN 500
JA 490 IF A$<"2" OR A$>"9" THE
       N 470
QM 500 FOR I=1 TO 13:IF A$=MID
       $(AA$,I,1) THEN HB=I:I=
       13:GOTO 520
JB 510 NEXT
DD 520 IF HU(HB)=1 THEN GOSUB
       {SPACE}1180:PRINT"
       {2 UP}":GOTO 450
PR 530 SYS 50000
JH 540 REM * COMPUTER CALCULAT
       ES BID *
XC 550 IF R>=7 THEN 670
RF 560 IF CL(R)>=8 AND RND(1)<
       .38 THEN SB=FNR(13)+1:G
       OTO 640
KB 570 M=5:IF CL(R)<4 THEN M=3
EJ 580 MM=FNR(4)
FR 590 IF CL(R)<=4 THEN SB=CL(
       R)+FNR(M)
HC 600 IF CL(R)>=5 THEN SB=CL(
       R)+FNR(M)+MM
EC 610 IF CL(R)>10 THEN SB=CL(
       R)+FNR(M)+1
HP 620 IF SB>13 THEN SB=13
XB 630 C=C+1:IF C=20 THEN C=0:
       GOTO 880
GH 640 IF SU(SB)=1 THEN 580
FF 650 C=0:GOTO 940
QR 660 REM * CHECK HIGH HEART
       {SPACE}AND SPADE *
CR 670 FOR I=13 TO 1 STEP-1:IF
        HU(I)=1 THEN 690
DM 680 HH=I:I=1
RR 690 NEXT
XB 700 FOR I=13 TO 1 STEP-1:IF
        SU(I)=1 THEN 720
QX 710 SH=I:I=1
CS 720 NEXT
RK 730 IF R=13 THEN SB=SH:GOTO
        940
SA 740 IF HH>=SH AND HS+CL(R)>
       =46 THEN SB=SH:GOTO 940
AS 750 REM * CONSIDER REMAININ
       G CLUBS *
KF 760 FOR I=1 TO 13:IF I=R TH
       EN NEXT
QH 770 CT=CT+CL(I):NEXT
PB 780 FOR I=1 TO 13:IF I=R TH
       EN 800
EM 790 IF CL(I)>CH THEN CH=CL(
       I)
SD 800 NEXT
JJ 810 IF R=12 AND CH>CL(R) TH
       EN 880
BB 820 IF HH=SH AND CL(R)>CH T
       HEN SB=SH:GOTO 920
RB 830 IF HH>SH AND CL(R)>CH T
       HEN 880
BC 840 IF HH<SH AND CL(R)>CH T
       HEN SB=SH:GOTO 920
HJ 850 IF R>=10 AND CL(R)<=8 A
       ND HH<=SH AND CT/(13-R)
       >=8 THEN 880
QG 860 CT=0:CH=0:GOTO 570
ED 870 REM * GO FOR LOW CARD *
RH 880 FOR I=1 TO 13
MJ 890 IF SU(I)=1 THEN 910
HS 900 SB=I:I=13
RM 910 NEXT
PB 920 CT=0:CH=0
HA 930 REM * SEE WHO GETS TRIC
       K *
EJ 940 PRINT TAB(8)"{DOWN}YOU
       {SPACE}BID {RED}"SPC(3)
       CA$(HB)"S{8}":HU(HB)=1
XK 950 PRINT TAB(8)"I BID
       {BLU}"SPC(5)CA$(SB)"A
       {8}":SU(SB)=1:PRINT
GG 960 IF HB=SB THEN PRINT TAB
       (12)"IT'S A TIE":GOSUB
       {SPACE}1010:NEXTR
KD 970 IF SB>HB THEN PRINTTAB(
       8)"SPADES WIN THE TRICK
       ":SS=SS+CL(R):GOSUB1010
       :NEXTR
CC 980 PRINT TAB(8)"HEARTS WIN
        THE TRICK":HS=HS+CL(R)
       :GOSUB 1010:NEXTR
SD 1000 REM * CALCULATE AND DI
       SPLAY SCORE *
MK 1010 PRINT TAB(8)"{DOWN}HEA
       RTS SCORE ="HS
RG 1020 PRINT TAB(8)"SPADES SC
       ORE ="SS
RA 1030 FOR I=1 TO 3000:NEXT
PA 1040 IF HS>=46 OR SS>=46 TH
       EN 1080
RJ 1050 CL(R)=0:IF R=13 THEN 1
       080
FC 1060 RETURN
KM 1070 REM * DISPLAY FINAL RE
       SULTS *
HF 1080 PRINT"{CLR}"
AA 1090 IF SS=HS THEN CO=4:PRI
       NT TAB(14)"{8 DOWN}
       {PUR}TIE GAME":GOTO 11
       20
PF 1100 IF SS>HS THEN CO=6:PRI
       NT TAB(13)"{8 DOWN}
       {BLU}COMPUTER WINS":GO
       TO 1120
KB 1110 CO=2:PRINT TAB(15)"
       {8 DOWN}{RED}YOU WIN"
JE 1120 PRINT"{2 DOWN}{8}"TAB(
       12)"PLAY AGAIN (Y/N)"
JQ 1130 POKE 198,0
QB 1140 GETA$:IF A$<>"Y" AND A
       $<>"N" THEN 1140
MD 1150 IF A$="N" THEN END
PD 1160 RUN
QS 1180 POKE S,150:POKE S+1,5:
       POKE S+5,0:POKE S+6,24
       0:POKE S+24,15:POKE S+
       4,17
HX 1190 FOR I=0 TO 500:NEXT:PO
       KE S+24,0:RETURN
CP 1200 DATA 32,133,195,169,9,
       141,5,212
QD 1210 DATA 169,30,141,15,212
       ,169,130,141
KB 1220 DATA 1,212,169,15,141,
       24,212,169
SR 1230 DATA 40,141,4,212,169,
       7,141,163
GH 1240 DATA 195,32,145,195,16
       9,31,141,4
JJ 1250 DATA 212,169,20,141,16
       3,195,32,145
RB 1260 DATA 195,32,133,195,96
       ,162,0,138
KE 1270 DATA 157,0,212,232,224
       ,24,208,248
HF 1280 DATA 96,165,162,24,109
       ,163,195,141
FM 1290 DATA 162,195,165,162,2
       05,162,195,208,249,96
```

Window Wizard

See instructions in article on page 62 before typing in.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: Window Wizard

```
C000:4C 1D C0 00 20 CB 00 00 37
C008:05 14 12 0E 01 01 01 00 42
C010:20 32 32 9C DC 00 00 00 25
C018:00 00 00 00 00 A5 7C C9 F2
C020:4C D0 03 4C 3F C0 A9 4C BD
C028:85 7C A9 7A 85 7D A9 C0 9E
C030:85 7E 78 A9 58 8D 18 03 E9
C038:A9 C0 8D 19 03 58 60 A9 E5
C040:C9 85 7C A9 3A 85 7D A9 BE
C048:B0 85 7E 78 A9 47 8D 18 78
C050:03 A9 FE 8D 19 03 58 60 5C
C058:48 8A 48 98 48 78 20 BC 54
C060:F6 20 E1 FF D0 08 68 A8 C1
C068:68 AA 68 4C 66 FE 58 20 9A
C070:24 CB 68 A8 68 AA 68 78 C5
C078:40 00 48 C9 21 D0 18 A5 E1
C080:7B C9 02 F0 12 A5 D4 D0 23
C088:0E AD 79 C0 C9 A7 D0 04 4A
C090:A5 61 F0 03 68 D0 10 68 9A
C098:C9 20 F0 03 8D 79 C0 C9 F2
C0A0:3A 90 01 60 4C 80 00 20 0E
C0A8:73 00 48 20 73 00 F0 0C 78
C0B0:C9 2C F0 08 C9 28 F0 04 95
C0B8:C9 3A D0 EF 68 C9 9F F0 61
C0C0:49 C9 A0 F0 4B C9 44 F0 77
C0C8:4D C9 99 F0 52 C9 86 F0 5D
C0D0:51 C9 96 F0 50 C9 A4 F0 33
C0D8:4F C9 9C F0 4E C9 8C F0 BA
C0E0:50 C9 45 F0 4F C9 41 F0 C9
C0E8:4E C9 94 F0 4D C9 93 F0 4F
C0F0:1F C9 48 F0 4B C9 53 F0 A5
```

```
C0F8:59 C9 43 F0 46 C9 4D F0 F5
C100:45 C9 4B F0 44 C9 42 F0 CF
C108:43 60 20 DA CA 4C 55 C1 EA
C110:20 BE C7 4C 55 C1 20 40 43
C118:C5 20 22 C8 4C 55 C1 4C DE
C120:CA C1 4C 6A C1 4C 8E C1 C7
C128:4C B2 C1 20 F8 C1 4C 55 75
C130:C1 4C 58 C2 4C 93 C2 4C 61
C138:43 C2 20 67 C7 4C 55 C1 64
C140:4C AD C2 4C FC C2 4C 25 23
C148:C3 4C 62 C3 20 C6 C5 4C 3D
C150:55 C1 20 E5 C2 20 79 00 DA
C158:F0 0D C9 3A F0 09 20 73 D3
C160:00 F0 04 C9 3A D0 F7 4C 8E
C168:79 00 A9 00 8D 18 C0 20 4C
C170:40 C5 AD 1A C0 D0 11 98 E0
C178:AC 18 C0 99 08 C0 EE 18 43
C180:C0 AD 18 C0 C9 04 90 E7 46
C188:20 2A C4 4C 55 C1 A9 00 09
C190:8D 18 C0 20 40 C5 AD 1A 89
C198:C0 D0 11 98 AC 18 C0 99 3D
C1A0:0C C0 EE 18 C0 AD 18 C0 67
C1A8:C9 07 90 E7 20 2A C4 4C E2
C1B0:55 C1 AD 0C C0 48 A9 01 41
C1B8:8D 0C C0 20 40 C5 98 AA 15
C1C0:20 9D C4 68 8D 0C C0 4C 45
C1C8:55 C1 20 40 C5 98 48 20 B0
C1D0:40 C5 68 AA 18 20 F0 FF C0
C1D8:20 40 C5 AD 04 C0 85 FB 3A
C1E0:AD 05 C0 85 FC A0 FF C8 20
C1E8:CC 06 C0 B0 08 B1 FB 20 96
C1F0:D2 FF 4C E7 C1 4C 55 C1 91
C1F8:EE 08 C0 EE 09 C0 AE 0A AF
C200:C0 CA CA 8E 0A C0 AE 0B 96
C208:C0 CA CA 8E 0B C0 AD 0F A8
C210:C0 48 AD 10 C0 8D 0F C0 D9
C218:AD 0D C0 48 A9 00 8D 0D C9
C220:C0 20 C6 C5 68 8D 0D C0 97
C228:68 8D 0F C0 AE 0B C0 E8 3F
C230:E8 8E 0B C0 AE 0A C0 E8 43
C238:E8 8E 0A C0 CE 09 C0 CE 0E
C240:08 C0 60 20 60 C4 20 82 E0
C248:C4 20 F8 C1 20 40 C5 20 21
C250:22 C8 20 EC CA 4C 55 C1 DF
C258:A9 9C 8D 13 C0 A9 DC 8D B0
C260:14 C0 A0 00 8C 03 C0 20 46
C268:40 C5 AD 1A C0 D0 21 C0 23
C270:09 90 05 A2 0E 4C 37 A4 1E
C278:8C 03 C0 AD 13 C0 18 69 2D
C280:04 8D 13 C0 AD 14 C0 18 31
C288:69 04 8D 14 C0 88 D0 EB 6C
C290:4C 55 C1 20 92 C4 20 40 F3
C298:C5 98 AA E0 19 90 05 A2 42
C2A0:0E 4C 37 A4 20 FF E9 20 66
C2A8:19 CB 4C 55 C1 20 40 C5 61
C2B0:8C 21 D0 20 40 C5 AD 1A 6F
C2B8:C0 D0 27 8C 20 D0 20 40 45
C2C0:C5 AD 1A C0 D0 1C 8C 86 7A
C2C8:02 A9 00 85 FB A9 D8 85 CF
C2D0:FC A2 04 A0 00 AD 86 02 CD
C2D8:91 FB C8 D0 FB E6 FC CA 8C
C2E0:D0 F6 4C 55 C1 20 40 C5 40
C2E8:98 48 20 40 C5 AD 1A C0 AE
C2F0:F0 02 A0 01 8C 1C C0 68 52
C2F8:20 5F C9 60 20 40 C5 98 CB
C300:48 20 40 C5 AD 06 C0 C9 E8
C308:29 90 06 68 A2 17 4C 37 D0
C310:A4 38 A9 28 ED 06 C0 4A 03
C318:A8 68 AA 18 20 F0 FF 4C F5
C320:DB C1 4C 55 C1 20 60 C4 F8
C328:20 82 C4 20 67 C7 20 40 D5
C330:C5 20 C6 C5 20 22 C8 A9 9C
C338:00 85 C6 20 E4 FF F0 FB 01
C340:48 20 40 C5 A0 00 A9 01 B1
C348:91 47 C8 B1 47 85 FB C8 AF
C350:B1 47 85 FC A0 00 68 91 6A
C358:FB 20 EC CA 20 BE C7 4C 08
C360:55 C1 A9 00 8D 76 03 8D 12
C368:77 03 8D 78 03 AD 06 C0 41
C370:48 20 40 C5 AD 1A C0 D0 B0
C378:19 8C 76 03 20 40 C5 AD E9
C380:1A C0 D0 0E 8C 77 03 20 A8
C388:40 C5 AD 1A C0 D0 03 8C D4
C390:78 03 AD 77 03 F0 03 8D B1
C398:0A C0 AD 78 03 F0 03 8D 02
C3A0:0B C0 AD 76 03 F0 1C C9 D8
C3A8:01 D0 03 CE 08 C0 C9 02 0B
C3B0:D0 03 EE 09 C0 C9 03 D0 D3
C3B8:03 EE 08 C0 C9 04 D0 03 8D
C3C0:CE 09 C0 68 8D 06 C0 20 B6
C3C8:2A C4 20 60 C4 20 82 C4 11
C3D0:AD 13 C0 48 AD 14 C0 48 18
C3D8:AD 03 C0 48 20 BE C7 68 88
C3E0:8D 03 C0 68 8D 14 C0 68 35
C3E8:8D 13 C0 AD 11 C0 48 AD B8
C3F0:0D C0 48 AD 0C C0 48 A2 A9
C3F8:01 8E 11 C0 CA 8E 0C C0 3C
C400:8E 0D C0 8E 0D C0 AD 0A E5
C408:C0 8D 15 C0 AD 0B C0 8D AC
C410:16 C0 20 09 C6 20 22 C8 2D
C418:68 8D 0C C0 68 8D 0D C0 1B
C420:68 8D 11 C0 20 EC CA 4C 06
C428:55 C1 18 AD 08 C0 6D 0B D3
C430:C0 6D 0D C0 C9 1A B0 23 5E
C438:AD 09 C0 6D 0A C0 C9 29 D9
C440:B0 19 AD 0B C0 C9 02 90 90
C448:12 AD 0A C0 C9 02 90 0B 16
C450:AD 0D C0 F0 05 AD 09 C0 CC
C458:F0 01 60 A2 0E 4C 37 A4 85
C460:A2 00 B5 FB 9D 5D 03 E8 03
C468:E0 04 D0 F6 B5 41 9D 5D 38
C470:03 E8 E0 08 D0 F6 A5 14 14
C478:9D 5D 03 E8 A5 15 9D 5D 31
C480:03 60 A2 00 B5 D9 9D DE 27
C488:03 09 80 95 D9 E8 E0 19 8C
C490:D0 F2 38 20 F0 FF 8E 6F 5C
C498:03 8C 70 03 60 AD 0C C0 97
C4A0:F0 2D A9 F0 8D 06 D4 A9 0A
C4A8:08 8D 0F D4 A9 81 8D 12 49
C4B0:D4 A9 0F 8D 18 D4 A9 17 48
C4B8:8D 04 D4 AD 1B D4 8D 01 C7
C4C0:D4 20 CF C4 A2 18 A9 00 CB
C4C8:9D 00 D4 CA D0 FA 60 20 BB
C4D0:B3 EE CA D0 FA 60 A9 00 03
C4D8:85 FB AD 88 02 85 FC A9 2C
C4E0:00 85 FD A9 D8 85 FE AC AD
C4E8:08 C0 C8 88 F0 09 20 10 44
C4F0:C5 20 1C C5 4C EB C4 18 F8
C4F8:A5 FB 6D 09 C0 85 FB 90 37
C500:02 E6 FC 18 A5 FD 6D 09 70
C508:C0 85 FD 90 02 E6 FE 60 28
C510:18 A5 FB 69 28 85 FB 90 07
C518:02 E6 FC 60 18 A5 FD 69 C0
C520:28 85 FD 90 02 E6 FE 60 F3
C528:18 A5 45 69 28 85 45 90 DA
C530:02 E6 46 60 18 A5 47 69 94
C538:28 85 47 90 02 E6 48 60 C7
C540:A0 00 8C 06 C0 8C 1A C0 3B
C548:B1 7A C9 2C F0 09 C9 28 AE
C550:F0 05 C8 8C 1A C0 60 20 2C
C558:73 00 B1 7A C9 22 D0 32 26
C560:20 73 00 A6 7A A4 7B 8E 2F
C568:04 C0 8C 05 C0 A0 FF A2 33
C570:00 C8 B1 7A C9 22 F0 F9 BE
C578:C9 00 F0 08 C9 3A F0 04 A4
C580:E8 4C 71 C5 8E 06 C0 20 4C
C588:73 00 F0 04 C9 3A D0 F7 FC
C590:38 60 C9 3A B0 08 20 9E B1
C598:AD 20 AA B1 18 60 20 8B 81
C5A0:B0 A5 0D F0 15 A0 00 B1 7B
C5A8:47 8D 06 C0 C8 B1 47 8D 31
C5B0:04 C0 C8 B1 47 8D 05 C0 DD
C5B8:38 60 A5 47 A4 48 20 A2 CA
C5C0:BB 20 AA B1 18 60 A9 01 39
C5C8:8D 15 C0 8D 16 C0 A9 00 58
C5D0:8D 19 C0 A9 00 8D 6D 03 30
C5D8:AD 15 C0 CD 0A C0 B0 06 30
C5E0:EE 15 C0 EE 6D 03 AD 16 19
C5E8:C0 CD 0B C0 B0 06 EE 16 47
C5F0:C0 EE 6D 03 AD 6D 03 F0 90
C5F8:0F 20 09 C6 AE 12 C0 20 01
C600:CF C4 20 07 C7 4C CE C5 ED
C608:60 20 D6 C4 A2 01 A0 00 4F
C610:E0 01 F0 66 38 8A ED 16 B0
C618:C0 C9 FF D0 05 A9 00 8D E1
C620:19 C0 EC 16 C0 90 03 4C 04
C628:C2 C6 C0 00 F0 1C 38 98 E1
C630:ED 15 C0 C9 FF F0 24 AD 68
C638:19 C0 D0 0A AD 10 C0 91 FD
C640:FB AD 0E C0 91 FD C8 4C 67
C648:2A C6 AD 0F C0 D0 02 A9 3A
C650:74 91 FB AD 0E C0 91 FD 6B
C658:C8 D0 CF 88 AD 10 C0 91 C1
C660:FB C8 AD 0F C0 D0 02 A9 BB
C668:6A 91 FB AD 0E C0 91 FD 7E
C670:E8 20 10 C5 20 1C C5 4C 22
C678:0E C6 C0 00 F0 1B 38 98 D3
C680:ED 15 C0 C9 FF F0 23 AD B6
C688:0F C0 D0 02 A9 77 91 FB 52
C690:AD 0E C0 91 FD C8 4C 7A CF
C698:C6 AD 0F C0 D0 02 A9 4F 14
C6A0:91 FB AD 0E C0 91 FD C8 9D
C6A8:D0 D0 AD 0F C0 D0 02 A9 70
C6B0:50 91 FB AD 0E C0 91 FD B9
C6B8:E8 20 10 C5 20 1C C5 4C 6A
C6C0:0E C6 C0 00 F0 1B 38 98 1C
C6C8:ED 15 C0 C9 FF F0 23 AD FE
C6D0:0F C0 D0 02 A9 6F 91 FB 7A
C6D8:AD 0E C0 91 FD C8 4C C2 60
C6E0:C6 AD 0F C0 D0 02 A9 4C 59
C6E8:91 FB AD 0E C0 91 FD C8 E5
C6F0:D0 D0 AD 0F C0 D0 02 A9 B8
C6F8:7A 91 FB AD 0E C0 91 FD 17
C700:20 10 C5 20 1C C5 60 CE E5
C708:15 C0 AD 0D C0 F0 54 38 83
C710:A5 FB E9 01 85 45 A5 FC 48
C718:E9 00 85 46 38 A5 FD E9 EF
C720:01 85 47 A5 FE E9 00 85 F9
C728:48 A0 00 B1 45 09 80 91 FF
C730:45 A9 00 91 47 C8 CC 15 F1
C738:C0 90 F0 F0 EE 38 A5 45 62
C740:E9 28 85 45 A5 46 E9 00 ED
C748:85 46 38 A5 47 E9 28 85 45
C750:47 A5 48 E9 00 85 48 A0 DB
C758:00 B1 45 09 80 91 45 A9 0C
C760:00 91 47 EE 15 C0 60 AD 46
C768:13 C0 C9 BC B0 12 18 69 1E
C770:04 8D 13 C0 AD 14 C0 18 2B
C778:69 04 8D 14 C0 EE 03 C0 39
C780:A9 00 85 FB AD 88 02 85 6E
C788:FC A9 00 85 FD AD 13 C0 E6
C790:85 FE A9 00 85 45 A9 D8 45
C798:85 46 A9 00 85 47 AD 14 6A
C7A0:C0 85 48 A2 04 A0 00 B1 79
C7A8:FB 91 FD B1 45 91 47 C8 3D
C7B0:D0 F5 E6 FC E6 FE E6 46 1A
C7B8:E6 48 CA D0 EA 60 AD 13 7B
C7C0:C0 C9 A0 90 5C A9 00 AE 78
C7C8:88 02 85 FD 86 FE A9 00 31
C7D0:A2 D8 85 47 86 48 A9 00 B5
C7D8:AE 13 C0 85 FB 86 FC AE 97
C7E0:14 C0 85 45 86 46 A2 04 46
C7E8:A0 00 78 A9 34 85 01 B1 DD
C7F0:FB 91 FD B1 45 48 A9 37 93
C7F8:85 01 58 68 91 47 C8 D0 29
C800:E9 E6 FC E6 FE E6 46 E6 55
C808:48 CA D0 DE AD 13 C0 38 EB
C810:E9 04 8D 13 C0 AD 14 C0 20
C818:38 E9 04 8D 14 C0 CE 03 DD
C820:C0 60 AE 0B C0 CA CA 8E 06
C828:16 C0 AE 0A C0 CA CA CA FC
C830:8E 15 C0 20 FB C8 A9 00 BE
C838:8D 6B 03 AD 04 C0 85 FB D0
C840:8D 74 03 AD 05 C0 85 FC 24
C848:8D 75 03 20 15 C9 AD 6B F6
C850:03 F0 01 60 A2 00 8E 18 10
C858:C0 E8 8E 6C 03 AC 18 C0 D8
C860:CC 15 C0 B0 3A A0 00 B1 C6
C868:FB C9 0D D0 07 A2 00 86 62
C870:C7 4C D6 C8 48 20 D2 FF C8
C878:AE 11 C0 20 9D C4 68 C9 5A
C880:20 90 07 C9 80 B0 03 EE 7F
C888:18 C0 20 3E C9 AD 6B 03 1D
C890:F0 CB AD 74 03 8D 04 C0 A1
C898:AD 75 03 8D 05 C0 60 A0 24
C8A0:00 B1 FB C9 20 F0 1F 90 4E
C8A8:09 C9 80 B0 05 A9 9D 20 76
C8B0:D2 FF 20 2A C9 CE 18 C0 CC
C8B8:D0 E5 AE 15 C0 CA 20 3E 03
C8C0:C9 CA D0 FA F0 10 20 D2 8E
C8C8:FF A9 A0 EE 18 C0 AC 18 FC
C8D0:C0 CC 15 C0 90 F0 A9 00 40
C8D8:8D 18 C0 AE 6C 03 EC 16 99
```

```
C8E0:C0 90 06 EE 6B 03 4C 8A 31
C8E8:C8 EE 6C 03 A6 C7 A9 0D 0D
C8F0:20 D2 FF 86 C7 20 08 C9 48
C8F8:4C 8A C8 18 AE 08 C0 E8 ED
C900:AC 09 C0 C8 20 F0 FF 60 F5
C908:38 20 F0 FF 18 AC 09 C0 24
C910:C8 20 F0 FF 60 18 AD 04 F0
C918:C0 6D 06 C0 85 FD AD 05 B8
C920:C0 6D 07 C0 85 FE 20 51 16
C928:C9 60 38 A5 FB E9 01 85 29
C930:FB 8D 04 C0 A5 FC E9 00 A6
C938:85 FC 8D 05 C0 60 18 A5 2D
C940:FB 69 01 85 FB 8D 04 C0 83
C948:A5 FC 69 00 85 FC 8D 05 5B
C950:C0 A5 FB C5 FD A5 FC E5 EF
C958:FE 90 03 EE 6B 03 60 8D 94
C960:1B C0 EE 08 C0 EE 09 C0 A4
C968:AE 0B C0 CA CA 8E 0B C0 42
C970:AE 0A C0 CA CA 8E 0A C0 08
C978:20 D6 C4 AD 0B C0 8D 16 D1
C980:C0 AD 0A C0 8D 15 C0 AD 1D
C988:1C C0 F0 1C CE 1C C0 AD 50
C990:1B C0 C9 01 F0 29 C9 02 EC
C998:F0 71 C9 03 D0 03 4C 31 C6
C9A0:CA C9 04 D0 03 4C 5B CA 64
C9A8:AE 0A C0 E8 E8 8E 0A C0 13
C9B0:AE 0B C0 E8 E8 8E 0B C0 5D
C9B8:CE 08 C0 CE 09 C0 60 CE 95
C9C0:16 C0 A5 FB 85 45 A5 FC 8D
C9C8:85 46 A5 FD 85 47 A5 FE D8
C9D0:85 48 20 10 C5 20 1C C5 EA
C9D8:A2 00 A0 00 B1 FB 91 45 B7
C9E0:B1 FD 91 47 C8 CC 15 C0 D7
C9E8:D0 F2 20 10 C5 20 1C C5 53
C9F0:20 28 C5 20 34 C5 E8 EC D0
C9F8:16 C0 D0 DE A9 20 A0 00 DE
CA00:91 45 C8 CC 15 C0 D0 F8 DB
CA08:4C 78 C9 AE 16 C0 AC 15 28
CA10:C0 88 88 B1 FB 48 B1 FD B6
CA18:C8 91 FD 68 91 FB 88 D0 1B
CA20:F1 A9 20 91 FB 20 10 C5 7C
CA28:20 1C C5 CA D0 E0 4C 78 55
CA30:C9 20 85 CA AE 16 C0 CA 2A
CA38:AC 15 C0 88 B1 45 91 FB CB
CA40:B1 47 91 FD 88 10 F5 20 23
CA48:AD CA CA D0 EB AC 15 C0 CA
CA50:88 A9 20 91 FB 88 10 FB CF
CA58:4C 78 C9 CE 15 C0 AE 16 77
CA60:C0 A0 00 C8 B1 FB 48 B1 CA
CA68:FD 88 91 FD 68 91 FB C8 7B
CA70:CC 15 C0 D0 EE A9 20 91 C6
CA78:FB 20 10 C5 20 1C C5 CA 3A
CA80:D0 DF 4C 78 C9 AE 16 C0 7D
CA88:CA 20 10 C5 20 1C C5 CA B1
CA90:D0 F7 38 A5 FB E9 28 85 4B
CA98:45 A5 FC E9 00 85 46 38 53
CAA0:A5 FD E9 28 85 47 A5 FE DB
CAA8:E9 00 85 48 60 38 A5 FB 93
CAB0:E9 28 85 FB B0 02 C6 FC CD
CAB8:38 A5 FD E9 28 85 FD B0 36
CAC0:02 C6 FE 38 A5 45 E9 28 AA
CAC8:85 45 B0 02 C6 46 38 A5 0E
CAD0:47 E9 28 85 47 B0 02 C6 A9
CAD8:48 60 20 60 C4 20 82 C4 25
CAE0:20 67 C7 20 40 C5 20 C6 7B
CAE8:C5 20 22 C8 A2 00 BD 5D 28
CAF0:03 95 FB E8 E0 04 D0 F6 2B
CAF8:BD 5D 03 95 41 E8 E0 08 F5
CB00:D0 F6 BD 5D 03 85 14 E8 8A
CB08:BD 5D 03 85 15 A2 00 BD 7F
CB10:DE 03 95 D9 E8 E0 19 D0 F5
CB18:F6 18 AE 6F 03 AC 70 03 AC
CB20:20 F0 FF 60 A9 3D 85 FB 53
CB28:A9 CB 85 FC A0 00 B1 FB 6C
CB30:F0 0A 20 D2 FF C8 D0 F6 AF
CB38:E6 FC D0 F2 60 93 20 20 7D
CB40:20 20 20 57 49 4E 44 4F C4
CB48:57 20 57 49 5A 41 52 44 D3
CB50:20 A0 A0 20 A0 A0 A0 20 1F
CB58:A0 A0 A0 A0 A0 A0 A0 0D 5C
CB60:21 4F 50 45 4E 2C 53 24 A8
CB68:0D 21 43 4C 4F 53 45 0D 5B
CB70:21 44 49 4D 28 52 2C 43 CD
CB78:2C 57 2C 48 29 0D 21 44 0A
CB80:45 46 28 54 4F 4E 45 2C 01
CB88:33 44 2C 48 55 45 2C 42 2F
CB90:43 48 52 2C 49 43 48 52 23
CB98:2C 4C 52 41 54 45 2C 42 0A
CBA0:52 41 54 45 29 0D 20 5B A9
CBA8:54 4F 4E 45 20 20 31 3D 7D
CBB0:4F 4E 20 4F 3D 4F 46 46 76
CBB8:5D 20 5B 33 44 20 20 20 A8
CBC0:20 31 3D 4F 4E 20 30 3D E1
CBC8:4F 46 46 5D 0D 21 52 45 0F
CBD0:53 54 4F 52 45 28 53 43 EA
CBD8:52 45 45 4E 29 0D 21 43 7B
CBE0:4C 52 0D 21 41 47 41 49 D9
CBE8:4E 2C 53 24 0D 21 44 49 1E
CBF0:53 50 4C 41 59 2C 53 24 2A
CBF8:0D 21 42 4F 58 0D 21 50 26
CC00:52 49 4E 54 40 2C 52 2C A7
CC08:43 2C 53 24 0D 21 43 45 B3
CC10:4E 54 45 52 2C 52 2C 53 0A
CC18:24 0D 21 48 55 45 28 42 02
CC20:41 43 4B 47 52 4F 55 4E D1
CC28:44 2C 42 4F 52 44 45 52 AC
CC30:2C 54 45 58 54 29 0D 21 A5
CC38:54 4F 4E 45 2C 44 55 52 5D
CC40:41 54 49 4F 4E 0D 21 53 E9
CC48:41 56 45 0D 21 4C 4F 41 AB
CC50:44 0D 21 45 52 41 53 45 4B
CC58:2C 52 4F 57 0D 21 53 43 D2
CC60:52 4F 4C 4C 28 44 49 52 7C
CC68:45 43 54 49 4F 4E 2C 41 E1
CC70:4D 4F 55 4E 54 29 0D 20 95
CC78:5B 55 50 3D 31 20 52 49 EA
CC80:47 48 54 3D 32 20 44 4F 18
CC88:57 4E 3D 33 20 4C 45 46 3F
CC90:54 3D 34 5D 0D 21 4B 49 CC
CC98:4E 45 54 49 43 28 44 49 56
CCA0:52 45 43 54 49 4F 4E 2C B2
CCA8:4E 45 57 20 57 2C 4E 45 F4
CCB0:57 20 48 29 0D 21 4D 45 66
CCB8:4E 55 2C 4D 24 2C 4B 24 B5
CCC0:0D 00 2C 00 00 00 00 00 66
```

Program 2: Window Demo

```
FB 10 IF TE=0 THEN TE=49152:LO
      AD"WINDOW WIZARD",8,1
MD 20 SYS TE:PRINT"{CLR}";:!HU
      E(6,6,14):FORI=0TO23
MD 30 PRINT"{4 SPACES}WINDOW W
      IZARD{5 SPACES}WINDOW WI
      ZARD":NEXT
XF 40 PRINT"{4 SPACES}WINDOW W
      IZARD{5 SPACES}WINDOW WI
      ZARD{CYN}";:!RESTORE
GA 50 !DEF(1,0,1,0,32,50,50):!
      DIM(4,20,19,15)
QJ 60 A$="WELCOME TO THE WONDE
      RFUL WORLD OF WINDOW WIZ
      ARD"+CHR$(13)+CHR$(13)
CB 70 A$=A$+"{8}PREPARE TO BE
      {SPACE}BEWILDERED AND AM
      AZED BY THE POWER OF YOU
      R C-64...{CYN}"
PJ 80 A$=A$+CHR$(13)+CHR$(13)+
      " PRESS THE SPACE
      {2 SPACES}BAR TO CONTINU
      E "
XX 90 !OPEN,A$
RH 100 GOSUB1110:!DIM(8,3,30,1
      0)
RX 110 A$="WITH WIZARD, YOU CA
       N PRINT ANY MESSAGE (UP
       TO 255 CHARACTERS) IN
       {SPACE}A "
QJ 120 A$=A$+"MAGIC WINDOW. AN
       D WAIT TIL YOU SEE WHAT
        CAN BE DONE WITH THE W
       INDOW"
CJ 130 !OPEN,A$
GB 140 GOSUB1110:!DEF(1,0,10,1
       02,32):!DIM(14,12,25,9)
BR 150 A$="{YEL}YOU CAN, FOR E
       XAMPLE, CHANGE EITHER T
       HE COLOR OF THE WINDOW
       {SPACE}OR THE"
QK 160 A$=A$+" CHARACTER USED
       {SPACE}FOR THE BORDER O
       F THE WINDOW.{CYN}":!OP
       EN,A$
PF 170 GOSUB1110:!DEF(0,0,1,0,
       32,35,35):!DIM(1,18,14,
       14)
PA 180 A$="AS YOU CAN HEAR, TH
       E PRINTING CAN BE DONE
       {SPACE}WITH OR WITHOUT
       {SPACE}SOUND."
MR 190 !OPEN,A$
RK 200 GOSUB1110:!DEF(1,0,1,0,
       32,1,1):!DIM(10,5,25,6)
MQ 210 A$="AND YOU CAN VARY TH
       E SPEED BOTH FOR THE WI
       NDOW AND THE PRINTING."
KS 220 !OPEN,A$
HA 230 GOSUB1110:!DEF(1,1,1,0,
       32,25,25):!DIM(2,2,24,1
       0)
QS 240 A$="NOTICE THE THREE DI
       MENSIONAL EFFECT OF THI
       S WINDOW? THAT'S JUST O
       NE "
DE 250 A$=A$+"OF THE MANY EFFE
       CTS AT YOUR COMMAND.":!
       OPEN,A$
FS 260 GOSUB1110:A$="AND YOU C
       AN REUSE A WINDOW WHENE
       VER YOU WISH...":!AGAIN
       ,A$
BM 270 GOSUB1110:!DEF(1,1,1,16
       0,160,25,25):!DIM(6,20,
       18,12)
QK 280 A$="{RVS}{WHT}YOU CAN C
       HANGE THE INTERIOR OF T
       HE WINDOW, TOO.{OFF}
       {CYN}":!OPEN,A$
JA 290 GOSUB1110:!DEF(1,0,0,0,
       32,5,50):!DIM(0,0,40,25
       )
AJ 300 A$=CHR$(13)+"AND FOR TH
       E REAL KICKER --"+CHR$(
       13)+CHR$(13)
XC 310 A$=A$+"{CYN} VERY SLOWL
       Y NOW, PRESS THE SPACE
       {SPACE}BAR EIGHT TIMES
       {SPACE}"
DX 320 A$=A$+"TO STEP {8}BACKW
       ARDS{CYN} THROUGH THE W
       INDOWS.":!OPEN,A$
MX 330 FOR I=1 TO 8
MG 340 GOSUB1110
GM 350 !CLOSE:NEXTI
EC 360 !DIM(6,15,22,12):!DEF(1
       ,1,1,0,32,35,35)
AB 370 A$="OF COURSE, THERE AR
       E MANY MORE COMMANDS AV
       AILABLE THROUGH WINDOW
       {SPACE}"
MD 380 A$=A$+"WIZARD. FOR EXAM
       PLE, PRESS THE SPACE BA
       R TO '!SAVE' "
QB 390 A$=A$+"THE SCREEN...":!
       OPEN,A$
RA 400 GOSUB1110:!SAVE:A$="PRE
       SS IT AGAIN TO CLEAR TH
       E SCREEN...":!AGAIN,A$
QA 410 GOSUB1110:PRINT"{CLR}"
AD 420 A$="AND NOW PRESS IT ON
       CE MORE TO '!LOAD' THE
       {SPACE}SCREEN WE SAVED
       {SPACE}BEFORE...
JF 430 !AGAIN,A$
SM 440 GOSUB1110:!LOAD:FOR I=1
       TO500:NEXT
```

```
DD 450 A$="AND WE'RE RIGHT BAC
       K WHERE WE STARTED FROM
       ..."
HR 460 !AGAIN,A$:FORI=1TO2000:
       NEXT:!CLOSE
KC 470 !RESTORE:!DEF(0,1,1,0,3
       2,10,20):!DIM(4,4,22,12
       )
DD 480 A$="WHAT ARE SOME OF TH
       E OTHER COMMANDS AVAILA
       BLE?":!OPEN,A$
QQ 490 FORI=1TO2000:NEXT
CA 500 A$="WELL, YOU CAN USE W
       IZARD'S '!TONE' COMMAND
        FOR YOUR OWN PURPOSES.
       "
KQ 510 A$=A$+CHR$(13)+"PRESS T
       HE SPACE BAR TO HEAR IT
        (PRESS {8}RETURN{CYN}
       {SPACE}TO MOVE ON)
HP 520 !AGAIN,A$
RC 530 GETK$:IFK$=""THEN530
BB 540 IFK$=CHR$(13) THEN570
XX 550 IFK$<>CHR$(32)THEN530
FK 560 !TONE,80:GOTO530
FC 570 A$="AND YOU HAVE TOTAL
       {SPACE}SCROLLING OF ANY
        AREA OF THE SCREEN, AS
        WELL."
QM 580 A$=A$+"PRESS THE NUMBER
       S 1 TO 4 TO SEE WHAT I
       {SPACE}MEAN (OR PRESS
       {8}RETURN{CYN} TO"
FG 590 A$=A$+" MOVE ON).":!AGA
       IN,A$
BQ 600 GETK$:IFK$=""THEN600
BR 610 IFK$=CHR$(13)THEN660
FS 620 IFK$<"1"ORK$>"4"THEN600
PS 630 K=VAL(K$)
RX 640 T=12:IF K/2=INT(K/2) TH
       EN T=22
KA 650 FORI=1TOT:!SCROLL,K,1:F
       ORJ=1TO50:NEXT:NEXT:GOT
       O570
DJ 660 A$="{CYN}AND THE '!ERAS
       E' COMMAND WILL ERASE A
       NY ROW YOU DIRECT."+CHR
       $(13)
XH 670 A$=A$+"PRESS A NUMBER K
       EY AND WE'LL ERASE THAT
        ROW..."
RF 680 A$=A$+" (OR PRESS {8}RE
       TURN{CYN} TO MOVE ON)
KE 690 !AGAIN,A$
AE 700 K$="":GETK$:IFK$=""THEN
       700
DM 710 IFK$=CHR$(13)THEN740
DR 720 IFK$<"0"ORK$>"9"THEN700
ER 730 L=VAL(K$):!ERASE,L:GOTO
       700
GH 740 !CLOSE:!DIM(12,4,30,7)
XB 750 A$="AND NOW WE NEED TO
       {SPACE}MOVE OUR WINDOW
       {SPACE}DOWN HERE TO SHO
       W YOU THE NEXT"
JC 760 A$=A$+" WIZARD COMMAND.
       ..":!OPEN,A$:FORI=1TO15
       00:NEXT
HD 770 A$="LET'S CLEAR THE TOP
        OF THE SCREEN WITH OUR
        '!ERASE' COMMAND..."
FP 780 !AGAIN,A$:FOR I=0 TO 11
       :!ERASE,I:NEXT:FORI=1TO
       2000:NEXT
SJ 790 A$="AND NOW WE'LL EXAMI
       NE YET ANOTHER COMMAND.
       ..":!AGAIN,A$
SS 800 FORI=1TO2000:NEXT:!CENT
       ER,3,"NOTICE HOW"
PJ 810 !CENTER,4,"THESE THREE
       {SPACE}LINES ARE ALL":!
       CENTER,5,"CENTERED?"
QM 820 A$="IT WAS DONE WITH WI
       ZARD'S '!CENTER' COMMAN
       D.":!AGAIN,A$
RD 830 FORI=1TO3000:NEXT:!CLOS
       E:!RESTORE:!DIM(0,1,38,
       5)
XQ 840 A$="YOU MAY DISCOVER TH
       AT WIZARD'S '!BOX' COMM
       AND WILL COME IN HANDY.
       .."
JQ 850 !OPEN,A$:FORI=1TO1500:N
       EXT:!DEF(0,0,0,0,32,20,
       15):!DIM(7,1,18,10):!BO
       X
DJ 860 !DIM(7,21,18,10):!BOX:!
       DIM(18,1,12,6):!BOX:!DI
       M(18,14,12,6):!BOX
GA 870 !DIM(18,27,12,6):!BOX:F
       ORI=1TO2000:NEXT:!CLOSE
       :!RESTORE
RE 880 !DEF(1,1,1,0,32,35,35):
       !DIM(1,20,19,8)
CE 890 A$="AND YOU CAN USE THE
        '!KINETIC' COMMAND TO
       {SPACE}MOVE WINDOWS..."
       :!OPEN,A$
DJ 900 FORI=1TO1500:NEXT:FORI=
       1TO12:!KINETIC(3,0,0):!
       KINETIC(4,0,0):NEXT
FA 910 A$="AND, USING THE SAME
        COMMAND, YOU CAN CONTR
       OL THE SIZE OF ANY OF "
QA 920 A$=A$+"YOUR MAGIC WINDO
       WS...":!AGAIN,A$:FORI=1
       TO1500:NEXT
SR 930 FORI=1TO12:J=19+I:K=8+I
       :!KINETIC(1,J,K):NEXT:!
       DIM(10,5,30,9)
JC 940 A$="THERE ARE ALSO COMM
       ANDS LIKE '!RESTORE', '
       !PRINT@', AND '!DISPLAY
       '."
PF 950 A$=A$+CHR$(13)+CHR$(13)
       +"BUT THE LAST ONE WE'L
       L DEMONSTRATE "
RK 960 A$=A$+"IS THE '!MENU' C
       OMMAND. IT'S A HANDY ON
       E.":!OPEN,A$
CF 970 FOR I=1TO1500:NEXT:R$=C
       HR$(13):M$="{5 SPACES}M
       ENU"+R$+R$
GH 980 M$=M$+"1.{2 SPACES}THIS
        IS AN"+R$:M$=M$+"2.
       {2 SPACES}AN EXAMPLE OF
       "+R$+"3.{2 SPACES}A WIN
       DOW"+R$
DS 990 M$=M$+"4.{2 SPACES}GENE
       RATED"+R$+"5.{2 SPACES}
       MENU":M$=M$+R$+"6.
       {2 SPACES}PRESS A KEY"
RB 1000 !DEF(1,1,0,0,32,10,30)
       :!DIM(5,16,22,11):!MEN
       U,M$,K$:!DIM(16,5,35,6
       )
QB 1010 !DEF(1,1,1,0,32,10,10)
SK 1020 A$="YOU JUST PRESSED T
       HE '"+K$+"' KEY."+CHR$
       (13)
KR 1030 IFK$<"1"ORK$>"6"THENA$
       =A$+"THAT WASN'T EVEN
       {SPACE}ON THE MENU"
FS 1040 !OPEN,A$:FORI=1TO2000:
       NEXT:!DIM(3,1,20,20)
CE 1050 A$="{8}SYS 49152{CYN}
       {SPACE}ACTS AS A TOGGL
       E SWITCH. IF WIZARD IS
        OFF, IT WILL "
QC 1060 A$=A$+"TURN IT ON AND
       {SPACE}IF WIZARD IS ON
        IT WILL TURN IT OFF.
       "+R$+R$
BF 1070 A$=A$+"TAPPING {8}REST
       ORE{CYN} WILL GIVE YOU
        A FULL PAGE REVIEW OF
        ALL 19 OF "
RA 1080 A$=A$+"WIZARD'S COMMAN
       DS"+R$+R$
BG 1090 A$=A$+"{8}PRESS THE SP
       ACE BAR TO END THIS DE
       MONSTRATION.{CYN}":!OP
       EN,A$
CP 1100 GOSUB1110:PRINT"{CLR}"
       :END
XM 1110 K$="":GETK$:IFK$=""THE
       N1110
HH 1120 RETURN
```

DOS Window

See instructions in article on page 70 before typing in.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: DOS Window Object File

```
CA60:4C 94 CA 3D 00 00 00 00 6E
CA68:00 00 00 00 00 00 00 00 FD
CA70:00 00 00 00 00 00 00 00 06
CA78:00 00 00 00 00 00 00 00 0E
CA80:00 00 00 00 00 00 00 00 16
CA88:00 00 00 FF 00 03 01 0E 3A
CA90:FE F6 31 EA 78 AD 14 03 DD
CA98:8D 92 CA AD 15 03 8D 93 31
CAA0:CA A9 B2 8D 14 03 A9 CA FF
CAA8:8D 15 03 A9 00 8D 8B CA 5D
CAB0:58 60 AD 8D 02 C9 04 D0 29
CAB8:0B A5 C5 C9 12 D0 05 AD 1E
CAC0:8B CA F0 03 6C 92 CA A9 0A
CAC8:FF 8D 8B CA 20 E7 FF A9 2A
CAD0:00 85 D4 20 90 FF AD 86 CA
CAD8:02 8D 8F CA AD 20 D0 8D 8E
CAE0:90 CA AD 21 D0 8D 91 CA E3
CAE8:78 A2 00 B5 00 9D 00 A0 D5
CAF0:BD 00 04 9D 00 A1 BD 00 C1
CAF8:05 9D 00 A2 BD 00 06 9D 3A
CB00:00 A3 BD 00 07 9D 00 A4 8B
CB08:BD 00 D8 9D 00 A5 BD 00 85
CB10:D9 9D 00 A6 BD 00 DA 9D A7
CB18:00 A7 BD 00 DB 9D 00 A8 4F
CB20:E8 D0 C8 58 A9 0E 8D 21 C0
CB28:D0 A9 93 20 D2 FF A2 00 E2
CB30:8E 20 D0 8E 86 02 8E 87 FA
CB38:02 20 66 CD A9 92 20 D2 2D
CB40:FF A2 27 A9 40 9D C8 04 0E
CB48:CA 10 FA 20 93 CD A2 00 C3
CB50:8A 9D 00 D8 E8 D0 FA 20 C2
CB58:CB CE 20 E4 FF F0 F8 8D 1F
CB60:8D CA C9 44 D0 0F A2 09 FF
CB68:86 FD 20 84 CD A9 01 8D B3
CB70:29 D8 4C C7 CC C9 49 D0 C9
CB78:08 A9 01 8D 51 D8 4C 95 93
CB80:CE C9 56 D0 08 A9 01 8D 40
CB88:79 D8 4C 95 CE C9 0D D0 7E
CB90:6B 78 A9 36 85 01 A2 00 0A
CB98:BD 00 A1 9D 00 04 BD 00 A8
CBA0:A2 9D 00 05 BD 00 A3 9D 14
CBA8:00 06 BD 00 A4 9D 00 07 1C
CBB0:BD 00 A5 9D 00 D8 BD 00 94
CBB8:A6 9D 00 D9 BD 00 A7 9D 83
```

```
CBC0:00 DA BD 00 A8 9D 00 DB 5E
CBC8:E8 D0 CD A2 39 BD 00 A0 4E
CBD0:95 00 E8 D0 F8 A2 2A BD C1
CBD8:00 A0 95 00 CA D0 F8 58 2F
CBE0:AD 8F CA 8D 86 02 AD 90 8D
CBE8:CA 8D 20 D0 AD 91 CA 8D 31
CBF0:21 D0 A9 00 8D 8B CA 85 38
CBF8:C6 4C BC FE C9 53 D0 0B D6
CC00:A9 01 8D B0 D8 20 D2 CD 26
CC08:4C 92 CE C9 52 D0 08 A9 72
CC10:01 8D A1 D8 4C 89 CE C9 3F
CC18:43 D0 08 A9 01 8D 88 D8 4B
CC20:4C 89 CE C9 5E D0 08 A9 A8
CC28:01 8D 6B D8 4C 38 CC C9 47
CC30:4C D0 48 A9 01 8D 43 D8 65
CC38:20 D2 CD 20 0D CE A2 08 43
CC40:86 BA AD 8D CA C9 4C D0 41
CC48:03 A9 00 2C A9 01 85 B9 A6
CC50:AD 8E CA A2 63 A0 CA 20 3B
CC58:BD FF A6 2B A4 2C A9 00 81
CC60:20 D5 FF B0 13 AD 8D CA BF
CC68:C9 4C D0 0C 86 2D 84 2E F4
CC70:86 2F 84 30 86 31 84 32 E0
CC78:4C B5 CE C9 5F D0 25 A9 4E
CC80:01 8D 60 D8 20 D2 CD 20 9F
CC88:0D CE A2 08 86 BA AD 8E 3A
CC90:CA A2 63 A0 CA 20 BD FF 01
CC98:A6 2D A4 2E A9 2B 20 D8 5B
CCA0:FF 4C B5 CE C9 4E D0 0B 25
CCA8:A9 01 8D 38 D8 20 CB CD 39
CCB0:4C 92 CE C9 55 D0 0D 20 B3
CCB8:BE CE A9 55 20 A8 FF A9 3D
CCC0:3B 4C A5 CE 4C 57 CB 20 24
CCC8:6E CE A9 09 85 FD 20 77 EE
CCD0:CD A9 01 A2 FF A0 CE 20 46
CCD8:BD FF A9 60 85 B9 20 D5 B5
CCE0:F3 A5 BA 20 B4 FF A5 B9 E1
CCE8:20 96 FF A9 00 85 90 A0 AA
CCF0:03 84 B7 20 A5 FF 85 C3 22
CCF8:20 A5 FF 85 C4 A4 90 D0 0F
CD00:52 A4 B7 88 D0 EB A6 C3 B4
CD08:A5 C4 20 CD BD 20 A5 FF 42
CD10:A6 90 D0 3F C9 00 F0 06 67
CD18:20 D2 FF 4C 0D CD A9 0D 3D
CD20:20 D2 FF E6 FD A5 FD C9 3B
CD28:17 D0 20 E6 FD 20 77 CD 23
CD30:A2 BB 20 66 CD 20 E1 FF 29
CD38:F0 19 20 CB CE 20 E4 FF 14
CD40:C9 0D D0 F1 20 80 CD A9 85
CD48:0A 85 FD 20 77 CD A0 02 42
CD50:4C F1 CC A2 18 86 FD 20 49
CD58:77 CD 20 B8 CD 20 42 F6 1D
CD60:20 AB FF 4C 4B CB BD 00 C0
CD68:CF F0 06 20 D2 FF E8 D0 24
CD70:F5 A9 20 20 D2 FF 60 A6 75
CD78:FD A0 06 18 20 F0 FF 60 A2
CD80:A9 0A 85 FD 20 77 CD 20 9E
CD88:B8 CD E6 FD A5 FD C9 19 82
CD90:D0 F2 60 20 6E CE 20 C2 11
CD98:CD A9 08 85 BA 20 B4 FF 9E
CDA0:A9 6F 85 B9 20 96 FF 20 B4
CDA8:A5 FF C9 0D F0 06 20 D2 D3
CDB0:FF 4C A7 CD 20 AB FF 60 41
CDB8:A2 1B A9 20 20 D2 FF CA BA
CDC0:10 F8 A2 06 A0 0A 18 20 D4
CDC8:F0 FF 60 20 6E CE A2 F4 D3
CDD0:D0 0C 20 6E CE A2 D8 D0 46
CDD8:05 20 6E CE A2 D3 20 66 C4
CDE0:CD A9 63 85 FB A9 CA 85 34
CDE8:FC A9 00 8D 8E CA A0 28 4F
CDF0:91 FB 88 10 FB 60 20 6E 76
CDF8:CE A2 E4 20 66 CD A9 3D 3E
CE00:A0 00 8C 8E CA 91 FB E6 E3
CE08:FB EE 8E CA 60 A4 CC F0 FD
CE10:08 A4 D3 B1 D1 09 80 91 B5
CE18:D1 20 CB CE 20 E1 FF D0 66
CE20:05 68 68 4C 29 CB 20 E4 C9
CE28:FF F0 E2 C9 0D F0 2E C9 4D
CE30:14 F0 2B AE 8E CA E0 13 D8
CE38:F0 D3 C9 7F 10 CF C9 20 E7
CE40:30 CB C9 22 F0 C7 A0 00 2C
CE48:91 FB E6 FB EE 8E CA 20 B1
CE50:D2 FF A4 D3 B1 D1 29 7F CF
CE58:91 D1 4C 0D CE 60 AE 8E 71
CE60:CA F0 AA C6 FB CE 8E CA 64
CE68:20 D2 FF 4C 0D CE A2 06 7E
CE70:A0 0A 18 20 F0 FF A2 46 F8
CE78:A9 20 20 D2 FF CA 10 FA 6A
CE80:A2 07 A0 00 18 20 F0 FF 68
CE88:60 20 D9 CD 20 0D CE 20 69
CE90:F6 CD 20 0D CE 20 BE CE 35
CE98:AD 8D CA 20 A8 FF A9 30 94
CEA0:20 A8 FF A9 3A 20 A8 FF B6
CEA8:A0 00 B9 63 CA F0 06 20 4A
CEB0:A8 FF C8 D0 F5 20 AE FF 56
CEB8:20 E7 FF 4C 4B CB A5 BA B4
CEC0:20 B1 FF A9 6F 85 B9 20 9A
CEC8:93 FF 60 AD 0B DD A2 00 2C
CED0:48 29 10 A0 02 10 0C A9 FA
CED8:BA 9D BF 04 B9 09 DD E8 0A
CEE0:48 29 F0 4A 4A 4A 4A 18 D7
CEE8:69 B0 9D BF 04 E8 68 29 D4
CEF0:0F 18 69 B0 9D BF 04 E8 31
CEF8:88 10 DC AD 08 DD 60 24 F1
CF00:12 20 20 20 20 20 20 20 98
CF08:20 20 20 20 20 20 20 20 A7
CF10:20 20 20 20 20 20 20 20 AF
CF18:20 20 20 20 20 20 20 20 B7
CF20:20 20 20 20 20 20 20 20 BF
CF28:20 92 20 44 3A 44 49 52 8C
CF30:45 43 54 4F 52 59 20 20 1B
CF38:20 20 4E 3A 46 4F 52 4D BE
CF40:41 54 20 20 20 4C 3A 4C 8E
CF48:4F 41 44 2C 38 0D 20 49 AA
CF50:3A 49 4E 49 54 49 41 4C 54
CF58:49 5A 45 20 20 20 5F 3A 58
CF60:53 41 56 45 20 20 20 20 FA
CF68:20 5E 3A 4C 4F 41 44 2C EF
CF70:38 2C 31 0D 20 56 3A 56 53
CF78:41 4C 49 44 41 54 45 20 3F
CF80:20 20 20 20 43 3A 43 4F 17
CF88:50 59 20 20 20 20 20 55 C3
CF90:3A 52 45 53 45 54 0D 20 75
CF98:52 3A 52 45 4E 41 4D 45 E5
CFA0:20 20 20 20 20 20 20 53 73
CFA8:3A 53 43 52 41 54 43 48 F1
CFB0:0D 0D 12 53 54 41 54 55 37
CFB8:53 3A 00 12 50 52 45 53 5B
CFC0:53 20 52 45 54 55 52 4E 9B
CFC8:2C 20 4F 52 20 53 54 4F DB
CFD0:50 92 00 12 4E 45 57 20 B4
CFD8:12 46 49 4C 45 4E 41 4D 34
CFE0:45 3A 92 00 12 4F 4C 44 AE
CFE8:20 46 49 4C 45 4E 41 4D 4B
CFF0:45 3A 92 00 12 4E 41 4D AD
CFF8:45 2C 49 44 3A 92 00 00 CF
```

Program 2: DOS Window Boot

```
XA 10 PRINT"{CLR}":IFA=0THENA=
      1:PRINT"{2 DOWN}{8}
      {2 SPACES}LOADING...":LO
      AD"DOS-WINDOW.OBJ",8,1
EF 20 CLR:DIM T(4):A$=CHR$(157
      )+CHR$(157)+CHR$(157):N$
      ="DOS-WINDOW"
HC 30 PRINTCHR$(147)SPC(134)N$
      :PRINTSPC(43)"WANT TO SE
      T THE T.O.D. CLOCK ? Y";
JK 40 PRINT A$;:INPUT B$:IFB$<
      >"Y"THEN80
QE 50 PRINT:INPUT"{2 SPACES}HO
      URS{4 SPACES}{5 LEFT}";T
      (1):IFT(1)>12THENPRINT"
      {3 UP}":GOTO50
PR 60 INPUT"{DOWN}MINUTES
      {4 SPACES}{4 LEFT}";T(2)
      :IFT(2)>59THENPRINT"
      {3 UP}":GOTO60
GE 70 INPUT"{DOWN}SECONDS
      {4 SPACES}{4 LEFT}";T(3)
      :IFT(3)>59THENPRINT"
      {3 UP}":GOTO70
ER 80 FORI=1TO3:H=INT(T(I)/10)
      :L=T(I)-10*H:T(I)=16*H+L
      :NEXT
AB 90 C=56587:POKEC+4,PEEK(C+4
      )AND127
DG 100 FORI=0TO3:POKEC-I,T(I+1
      ):NEXT
GA 110 PRINT"{2 DOWN}1.TO USE
      {SPACE}"N$", PRESS CTRL
      -D.":PRINT
MQ 120 PRINT"2.PRESS RETURN AT
       THE "CHR$(18)"STATUS:"
      CHR$(146)" LINE, TO"
JA 130 PRINTSPC(2)"CLOSE WINDO
      W AND RETURN."
GH 140 PRINT"{DOWN}3.TO DEACTI
      VATE, PRESS RUN/STOP-RE
      STORE."
XE 150 PRINT"4.SYS 51808, TO R
      EACTIVATE.":SYS51808:NE
      W
```

Cell Runner

See instructions in article on page 52 before typing in.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```
C000:20 18 E5 A9 8E 20 D2 FF 89
C008:A9 08 20 D2 FF A2 00 A9 C5
C010:0E 9D 00 D8 9D 00 D9 9D CB
C018:00 DA 9D 00 DB E8 D0 F1 1A
C020:A9 09 8D 20 D0 A9 09 8D 39
C028:21 D0 A9 06 8D 27 C8 A9 48
C030:00 8D 26 C8 8D 23 C8 8D 7E
C038:24 C8 A9 01 8D 20 C8 A9 6B
C040:07 8D 19 C8 A2 00 BD 3B 24
C048:C6 9D 00 04 9D 70 07 E8 7A
C050:E0 50 D0 F2 A2 00 BD 8B BB
C058:C6 9D 50 04 9D A0 04 9D 04
C060:F0 04 9D 40 05 9D 90 05 D7
C068:9D E0 05 9D 30 06 9D 80 C0
C070:06 9D D0 06 9D 20 07 E8 3B
C078:E0 50 D0 DA 20 31 C3 A2 36
C080:00 BD DB C6 9D 40 03 E8 36
C088:E0 3F D0 F5 A2 00 BD 1A 6E
C090:C7 9D 80 03 E8 E0 3F D0 B7
C098:F5 A9 0D 8D F8 07 A9 0E 3F
C0A0:8D F9 07 A9 00 8D 10 D0 0A
C0A8:8D 1D D0 8D 17 D0 A2 9E 0B
C0B0:A0 DF 8E 00 D0 8C 01 D0 D7
C0B8:A2 56 A0 2D 8E 02 D0 8C B2
C0C0:03 D0 A9 00 8D 27 D0 8D 65
C0C8:28 D0 A9 01 8D 15 D0 A2 DC
C0D0:00 BD 09 C8 9D 72 04 E8 17
C0D8:E0 05 D0 F5 A9 30 A2 31 0A
C0E0:8D 9A 04 8E 9B 04 A2 00 6B
C0E8:BD 14 C8 9D 12 05 E8 E0 98
C0F0:04 D0 F5 A9 3A 8D 3A 05 83
C0F8:A9 33 8D 3B 05 A9 30 8D 3E
C100:3C 05 A2 00 BD 0E C8 9D 8C
C108:B2 05 E8 E0 05 D0 F5 A9 52
C110:30 8D DA 05 8D DB 05 8D 2E
C118:DC 05 8D DD 05 A2 00 A9 37
C120:00 9D 00 D4 E8 E0 19 D0 26
C128:F8 A9 80 8D 00 D4 A9 1F 41
C130:8D 01 D4 A9 44 8D 05 D4 27
C138:A9 1F 8D 18 D4 A9 0E 8D 82
C140:03 D4 A9 0C 8D 08 D4 A9 50
C148:4B 8D 0C D4 A9 F2 8D 17 EE
C150:D4 A9 02 8D 16 D4 A9 84 9D
C158:A2 0A 8D 13 D4 8E 14 D4 70
C160:A9 13 A2 C3 8D 18 03 8E 6F
C168:19 03 A9 7F 8D 0D DD A9 6C
C170:82 8D 0D DD A9 63 A2 02 3A
C178:8D 04 DD 8E 05 DD A9 11 6C
```

```
C180:8D 0E DD A9 00 A2 06 8D C8
C188:06 DD 8E 07 DD A9 51 8D 8E
C190:0F DD 20 9F C5 A9 82 A2 8D
C198:DB 85 FD 86 FE A5 91 C9 0F
C1A0:7F D0 03 4C 66 FE AD 09 D0
C1A8:DD 29 70 C9 30 D0 12 20 19
C1B0:9E C3 AD 00 DC 29 10 D0 A6
C1B8:F9 A9 08 8D 04 D4 4C 00 89
C1C0:C0 20 75 C5 C6 00 AD 00 49
C1C8:DC 29 0F C9 0E F0 23 A2 A0
C1D0:00 8E 21 C8 C9 0D F0 5A 67
C1D8:C9 0B F0 53 C9 0A F0 4F FE
C1E0:C9 09 F0 4B C9 07 F0 77 22
C1E8:C9 06 F0 73 C9 05 F0 6F DB
C1F0:D0 AB EE 21 C8 AD 21 C8 BF
C1F8:C9 14 D0 06 20 22 C4 4C 40
C200:9D C1 AD 01 D0 C9 2F F0 87
C208:5E 20 67 C5 A0 00 B1 8D 04
C210:29 0F C9 09 F0 16 AD 01 F3
C218:D0 38 E9 10 8D 01 D0 38 9C
C220:A5 FD E9 50 85 FD A5 FE A8
C228:E9 00 85 FE 4C C5 C2 4C 8E
C230:62 C2 AD 01 D0 C9 DF F0 BB
C238:2E 20 59 C5 A0 00 B1 8D 5A
C240:29 0F C9 09 F0 16 AD 01 24
C248:D0 18 69 10 8D 01 D0 18 94
C250:A5 FD 69 50 85 FD A5 FE C8
C258:69 00 85 FE 4C C5 C2 4C 7E
C260:95 C2 AD 00 D0 C9 56 F0 62
C268:5C 20 3D C5 A0 00 B1 8D 1E
C270:29 0F C9 09 F0 16 AD 00 53
C278:D0 38 E9 18 8D 00 D0 38 79
C280:A5 FD E9 03 85 FD A5 FE 34
C288:E9 00 85 FE 20 5A C4 20 B7
C290:5A C4 4C C5 C2 AD 00 D0 F7
C298:C9 FE F0 29 20 4B C5 A0 CD
C2A0:00 B1 8D 29 0F C9 09 F0 79
C2A8:1C AD 00 D0 18 69 18 8D D8
C2B0:00 D0 18 A5 FD 69 03 85 E8
C2B8:FD A5 FE 69 00 85 FE 20 51
C2C0:5A C4 20 5A C4 20 65 C4 84
C2C8:AD 18 C8 F0 40 A9 7F 8D 88
C2D0:0D DD 20 B1 C5 20 B1 C5 4B
C2D8:20 B1 C5 A9 00 8D 12 D4 5D
C2E0:20 C9 C5 AD 9A 04 C9 34 29
C2E8:D0 12 20 C3 C3 AD 00 DC 4D
C2F0:29 10 D0 F9 A9 08 8D 04 55
C2F8:D4 4C 00 C0 20 20 C5 20 35
C300:9F C5 20 B0 C4 20 34 C3 AA
C308:A9 82 8D 0D DD 20 5A C4 70
C310:4C 9D C1 48 8A 48 98 48 D0
C318:20 31 C3 AD 09 DD 29 70 D1
C320:C9 20 D0 0A A9 40 8D 04 BC
C328:D4 A9 41 8D 04 D4 4C 51 E2
C330:FE 20 3D C4 A9 57 A2 D8 FB
C338:85 FB 86 FC AE 22 C8 A0 52
C340:00 A9 0A 8D 1D C8 A9 02 AD
C348:8D 1C C8 A9 08 8D 1B C8 C6
C350:A9 03 8D 1A C8 E6 FB A5 40
C358:FB D0 02 E6 FC BD 59 C7 1A
C360:F0 06 18 69 08 4C 6C C3 89
C368:18 6D 19 C8 91 FB CE 1A 3B
C370:C8 D0 E2 E8 CE 1B C8 D0 C0
C378:D7 8A 38 E9 08 AA 18 A5 F4
C380:FB 69 10 85 FB A5 FC 69 94
C388:00 85 FC CE 1C C8 D0 BB 5F
C390:8A 18 69 08 AA CE 1D C8 A4
C398:D0 AC 20 65 C4 60 A2 7F 7A
C3A0:8E 0D DD A9 30 8D 3C 05 3E
C3A8:A9 00 8D 86 02 18 A2 02 D6
C3B0:A0 00 20 F0 FF A2 00 BD E3
C3B8:28 C8 20 D2 FF E8 E0 39 56
C3C0:D0 F5 60 18 A2 00 A0 00 12
C3C8:20 F0 FF A9 00 8D 86 02 7C
C3D0:A2 00 A9 20 20 D2 FF E8 16
C3D8:E0 50 D0 F8 18 A2 01 A0 7C
C3E0:08 20 F0 FF A2 00 A9 A4 9F
C3E8:20 D2 FF E8 E0 18 D0 F8 C5
C3F0:A2 AA A0 2D 8E 02 D0 8C 06
C3F8:03 D0 A9 02 8D 15 D0 18 06
C400:A2 02 A0 00 20 F0 FF A2 D6
C408:00 BD 61 C8 20 D2 FF E8 EE
C410:E0 19 D0 F5 A2 00 BD 3D 97
C418:C8 20 D2 FF E8 E0 24 D0 4C
C420:F5 60 20 A5 C4 A9 00 8D 75
C428:21 C8 A9 9E A2 DF 8D 00 43
C430:D0 8E 01 D0 A9 82 A2 DB 6B
C438:85 FD 86 FE 60 20 9E E0 66
C440:A5 8C 45 8D 45 8E 45 8F BF
C448:C9 58 90 05 E9 58 4C 48 C0
C450:C4 CD 22 C8 F0 E7 8D 22 E4
C458:C8 60 A2 14 A0 FF 88 D0 DA
C460:FD CA D0 F8 60 AD 01 D0 D1
C468:C9 DF F0 33 A0 00 B1 FD 86
C470:29 0F CD 19 C8 F0 28 C9 C1
C478:0E F0 1C AD 01 D0 18 69 88
C480:10 8D 01 D0 18 A5 FD 69 5F
C488:50 85 FD A5 FE 69 00 85 D8
C490:FE 20 A5 C4 4C 65 C4 A9 CD
C498:01 8D 18 C8 4C A4 C4 A9 BD
C4A0:00 8D 18 C8 60 A9 80 8D 55
C4A8:0B D4 A9 81 8D 0B D4 60 DC
C4B0:EE 20 C8 AD 20 C8 C9 06 6B
C4B8:D0 05 A9 01 8D 20 C8 C9 79
C4C0:01 F0 10 C9 02 F0 14 C9 6B
C4C8:03 F0 18 C9 04 F0 1C C9 95
C4D0:05 F0 20 A9 07 8D 19 C8 21
C4D8:4C F8 C4 A9 0F 8D 19 C8 A3
C4E0:4C F8 C4 A9 03 8D 19 C8 4B
C4E8:4C F8 C4 A9 01 8D 19 C8 43
C4F0:4C F8 C4 A9 0D 8D 19 C8 AB
C4F8:A9 9E A2 DF 8D 00 D0 8E ED
C500:01 D0 A9 82 A2 DB 85 FD 2B
C508:86 FE A2 01 18 BD 9A 04 EB
C510:7D 1E C8 C9 3A 90 02 E9 99
C518:0A 9D 9A 04 CA 10 EE 60 78
C520:AD 26 C8 38 E9 20 8D 26 B9
C528:C8 8D 06 DD AD 27 C8 E9 9F
C530:00 8D 27 C8 8D 07 DD A9 7E
C538:51 8D 0F DD 60 38 A5 FD BC
C540:E9 03 85 8D A5 FE E9 00 08
C548:85 8E 60 18 A5 FD 69 03 C2
C550:85 8D A5 FE 69 00 85 8E 8B
C558:60 18 A5 FD 69 50 85 8D D3
C560:A5 FE 69 00 85 8E 60 38 0B
C568:A5 FD E9 50 85 8D A5 FE 35
C570:E9 00 85 8E 60 A2 7F 8E A5
C578:0D DD A9 30 F8 38 ED 09 C7
C580:DD D8 A2 82 8E 0D DD 8D 9F
C588:25 C8 A8 4A 4A 4A 4A 29 CB
C590:0F 09 30 8D 3B 05 98 29 0D
C598:0F 09 30 8D 3C 05 60 A9 2D
C5A0:00 8D 0B DD 8D 0A DD 8D AC
C5A8:09 DD 8D 08 DD AD 08 DD F5
C5B0:60 A9 11 8D 12 D4 A9 10 19
C5B8:8D 12 D4 A2 00 8E 0F D4 81
C5C0:A0 4B 88 D0 FD E8 D0 F5 B8
C5C8:60 F8 18 AD 24 C8 6D 25 E4
C5D0:C8 8D 24 C8 AD 23 C8 69 2A
C5D8:00 8D 23 C8 18 AD 24 C8 41
C5E0:69 10 8D 24 C8 AD 23 C8 25
C5E8:69 00 8D 23 C8 D8 AD 23 35
C5F0:C8 4A 4A 4A 4A 29 0F 09 7F
C5F8:30 8D DA 05 AD 23 C8 29 60
C600:0F 09 30 8D DB 05 AD 24 A8
C608:C8 4A 4A 4A 4A 29 0F 09 98
C610:30 8D DC 05 AD 24 C8 29 BD
C618:0F 09 30 8D DD 05 60 43 55
C620:45 4C 4C 20 52 55 4E 4E C1
C628:45 52 20 4A 4F 48 4E 20 ED
C630:4B 52 55 54 43 48 20 31 94
C638:39 38 36 20 20 20 20 20 1B
C640:20 20 20 E9 E3 E3 E3 E3 E2
C648:E3 E3 E3 E3 E3 E3 E3 E3 D5
C650:E3 E3 E3 E3 E3 E3 E3 E3 DD
C658:E3 E3 DF 20 20 20 20 20 B0
C660:20 20 20 20 20 20 20 20 ED
C668:20 20 20 5F A0 A0 A0 A0 71
C670:A0 A0 A0 A0 A0 A0 A0 A0 FD
C678:A0 A0 A0 A0 A0 A0 A0 A0 06
C680:A0 A0 69 20 20 20 20 20 97
C688:20 20 20 20 20 20 20 20 16
C690:20 20 20 E9 E3 DF E9 E3 2F
C698:DF E9 E3 DF E9 E3 DF E9 93
C6A0:E3 DF E9 E3 DF E9 E3 DF E1
C6A8:E9 E3 DF 20 20 20 20 20 04
C6B0:20 20 20 20 20 20 20 20 3E
C6B8:20 20 20 5F A0 69 5F A0 62
C6C0:69 5F A0 69 5F A0 69 5F 35
C6C8:A0 69 5F A0 69 5F A0 69 6A
C6D0:5F A0 69 20 20 20 20 20 47
C6D8:20 20 20 00 00 00 00 00 82
C6E0:00 00 00 00 00 00 00 00 6E
C6E8:00 00 00 06 00 00 0F 30 25
C6F0:00 0F 30 00 06 60 00 3F 39
C6F8:C0 00 7F 80 00 DF 00 00 5E
C700:DF 00 00 1B 00 00 1B 00 67
C708:00 19 80 00 19 C0 00 38 F1
C710:00 00 00 00 00 00 00 00 9F
C718:00 00 00 00 00 00 00 00 A7
C720:00 00 00 00 00 00 00 00 AF
C728:00 00 00 00 00 00 00 00 B7
C730:CC 60 00 DE 60 00 DE 60 4D
C738:00 6C C0 00 3F 80 00 1F 16
C740:00 00 1F 00 00 1F 00 00 30
C748:1B 00 00 1B 00 00 1B 00 4D
C750:00 1B 00 00 3B 80 00 00 82
C758:00 00 00 01 00 00 01 01 FA
C760:00 00 00 01 00 00 00 01 01
C768:01 00 00 00 01 00 01 01 83
C770:00 00 01 00 00 01 00 00 24
C778:00 01 01 00 00 00 01 00 6A
C780:00 00 01 01 00 00 00 00 40
C788:01 00 01 01 00 01 00 00 CC
C790:00 01 01 00 00 01 00 00 84
C798:01 01 00 01 01 00 00 01 02
C7A0:00 00 01 00 00 00 01 00 52
C7A8:00 01 00 00 01 01 00 01 85
C7B0:01 00 00 00 01 00 01 01 CB
C7B8:00 01 01 00 01 01 00 00 B4
C7C0:00 00 00 00 00 00 01 00 52
C7C8:00 00 01 00 00 00 01 01 7B
C7D0:00 01 00 01 00 01 00 01 B5
C7D8:00 01 00 00 00 01 01 00 AE
C7E0:00 00 01 01 01 00 01 01 AB
C7E8:00 01 01 00 01 00 01 01 E3
C7F0:00 00 00 01 00 00 01 01 93
C7F8:00 01 01 00 00 00 00 00 E8
C800:01 01 00 00 00 01 00 00 56
C808:01 0C 05 16 05 0C 13 03 A0
C810:0F 12 05 20 14 09 0D 05 34
C818:00 07 00 00 00 00 00 01 6C
C820:01 00 00 00 00 00 00 06 38
C828:59 4F 55 27 52 45 0D 4F 68
C830:55 54 20 4F 46 0D 54 49 D2
C838:4D 45 2E 0D 0D 50 52 45 EB
C840:53 53 0D 54 48 45 0D 46 EE
C848:49 52 45 0D 42 55 54 54 F0
C850:4F 4E 0D 54 4F 0D 50 4C 9F
C858:41 59 0D 41 47 41 49 4E B6
C860:2E 59 4F 55 27 52 45 0D B8
C868:4F 55 54 2D 2D 0D 47 4F CF
C870:4F 44 0D 57 4F 52 4B 2E 5A
C878:0D 0D 00 00 00 00 00 00 D3
```

Auto Run

Article on page 72.

Program 1: Auto Run—64 Version

```
QF 100 SA=49152:HB=INT(SA/256)
       :LB=SA-256*HB
MR 110 C=0:Q=SA:FOR A=1 TO 246
       :READ B:C=C+B:IF B=500
       {SPACE}THEN POKE Q,HB:G
       OTO 140
BM 120 IF B<0 THEN POKE Q,ABS(
       B):Q=Q+1:POKE Q,HB:GOTO
        140
XQ 130 POKE Q,B
AH 140 Q=Q+1:NEXT:IF C<>32626
       {SPACE}THEN PRINT"{CLR}
       ERROR IN DATA STATEMENT
       S":STOP
RH 150 PRINT"{CLR}{2 DOWN}{8}
       {SPACE}SYS"SA"TO ACTIVA
       TE":PRINT"{DOWN} SYS"SA
       +17"TO DEACTIVATE"
FB 160 DATA 162,1,189,4,3,157,
       -30
```

```
CS 170 DATA 202,16,247,162,32,
       160,500,208
JK 180 DATA 6,174,-30,172,-31,
       142
HF 190 DATA 4,3,140,5,3,96,0,0
AS 200 DATA 162,255,232,189,0,
       2,201,48
DX 210 DATA 144,4,201,58,144,2
       44,201,32
CP 220 DATA 240,240,201,34,240
       ,3,108,-30
MQ 230 DATA 232,134,252,232,24
       0,247,189
RF 240 DATA 0,2,201,34,208,246
       ,138,56
KF 250 DATA 229,252,166,252,16
       0,2,32,189
CM 260 DATA 255,169,1,162,8,16
       0,0,32
PX 270 DATA 186,255,32,192,255
       ,162,1,32
XD 280 DATA 198,255,32,207,255
       ,133,253,32
CA 290 DATA 207,255,133,254,16
       9,1,32,195
QR 300 DATA 255,32,204,255,169
       ,1,162,8
JJ 310 DATA 168,32,186,255,169
       ,0,32,213
MM 320 DATA 255,8,169,147,32,2
       10,255,40
JB 330 DATA 176,59,134,45,132,
       46,32,51
AP 340 DATA 165,165,253,197,43
       ,208,16,165
EK 350 DATA 254,197,44,208,10,
       169,241,160
FG 360 DATA 500,32,30,171,24,1
       44,14,169
HB 370 DATA 245,160,500,32,30,
       171,166,253
KP 380 DATA 165,254,32,205,189
       ,169,13,32
SB 390 DATA 210,255,169,145,32
       ,210,255,32
FQ 400 DATA 94,166,108,2,3,169
       ,15,162
CK 410 DATA 8,168,32,186,255,1
       69,0,32
GB 420 DATA 189,255,32,192,255
       ,162,15,32
DP 430 DATA 198,255,32,207,255
       ,72,32,210
XQ 440 DATA 255,104,201,13,208
       ,244,169,15
FB 450 DATA 32,195,255,32,204,
       255,76,191
ME 460 DATA 192,82,85,78,0,83,
       89,83,32,0
```

Program 2: Auto Run—128 Version

```
DS 10 FAST:SA=3072:HB=INT(SA/2
      56):LB=SA-256*HB
QA 20 C=0:Q=SA:FORA=1TO246:REA
      DB:C=C+B:IFB=500THENPOKE
      Q,HB:GOTO50
SJ 30 IFB<0THENPOKEQ,ABS(B):Q=
      Q+1:POKEQ,HB:GOTO50
RS 40 POKEQ,B
GG 50 Q=Q+1:NEXT:SLOW:IFC<>309
      94THENPRINT"{CLR}ERROR I
      N DATA STATEMENTS":STOP
HB 60 PRINT"{CLR}{2 DOWN} 1. B
      ASIC":PRINT"{DOWN} 2. BA
      SIC AND ML":GETKEY A$:IF
       A$="1" THEN POKE SA+132
      ,0:POKESA+157,76:POKESA+
      158,169:POKESA+159,HB:GO
      TO 80
PX 70 IF A$="2" THEN 80:ELSE G
      OTO 60
XF 80 PRINT"{CLR}{2 DOWN} SYS"
      SA"TO ACTIVATE":PRINT"
      {DOWN} SYS"SA+17"TO DEAC
      TIVATE"
RA 180 DATA 162,1,189,4,3,157,
       -30
MX 190 DATA 202,16,247,162,32,
       160,500,208
DK 200 DATA 6,174,-30,172,-31,
       142
QF 210 DATA 4,3,140,5,3,96,0,0
JQ 220 DATA 162,255,232,189,0,
       2,201,48
PS 230 DATA 144,4,201,58,144,2
       44,201,32
MK 240 DATA 240,240,201,34,240
       ,3,108,-30
GM 250 DATA 169,0,141,0,255,23
       2,134
SD 260 DATA 252,232,240,242,18
       9,0,2,201
CR 270 DATA 34,208,246,138,56,
       229,252,166
BH 280 DATA 252,160,2,32,189,2
       55,169,1
MA 290 DATA 162,8,160,0,32,186
       ,255,169
AJ 300 DATA 0,170,32,104,255,3
       2,192,255
RS 310 DATA 162,1,32,198,255,3
       2,207,255
GH 320 DATA 133,253,32,207,255
       ,133,254,169
BG 330 DATA 1,32,195,255,32,20
       4,255,169
JH 340 DATA 1,162,8,160,1,32,1
       86,255
RQ 350 DATA 169,0,166,45,164,4
       6,32,213
KH 360 DATA 255,8,169,147,32,2
       10,255,40
RF 370 DATA 176,55,32,79,79,16
       5,253,197
XM 380 DATA 45,208,16,165,254,
       197,46,208
QM 390 DATA 10,32,125,255,82,8
       5,78,0
BE 400 DATA 24,144,15,32,125,2
       55,83,89
HK 410 DATA 83,32,0,166,253,16
       5,254,32
CX 420 DATA 50,142,32,125,255,
       13,145,0
MG 430 DATA 32,204,255,32,250,
       81,108,2
EP 440 DATA 3,169,15,162,8,168
       ,32,186
KS 450 DATA 255,169,0,32,189,2
       55,32,192
HJ 460 DATA 255,162,15,32,198,
       255,32,207
GX 470 DATA 255,72,32,210,255,
       104,201,13
AB 480 DATA 208,244,169,15,32,
       195,255,24
AC 490 DATA 144,206
```

Personalizing The 128

Article on page 75.

Program 1: Autoboot Generator

```
AJ 100 TRAP 280
JB 110 COLOR 4,12:COLOR 0,12:P
       RINT"{CLR}{DOWN}{YEL}PL
       EASE INSERT DISKETTE FO
       R AUTOBOOT"
EC 120 PRINT"PREFERENCES TO BE
        WRITTEN ON. IT MUST"
AE 130 PRINT"BE FORMATTED TO W
       ORK. IF IT IS NOT,"
KM 140 PRINT"ANSWER YES TO THE
        PROMPT BELOW."
PK 150 INPUT"{DOWN}FORMAT DISK
       ";AN$
PC 160 IF LEFT$(AN$,1)<>"Y" TH
       EN 210
MG 170 PRINT"{DOWN}DISK NAME (
       UP TO 16 CHARACTERS)":I
       NPUT DN$
BM 180 INPUT"{DOWN}DISK ID (TW
       O CHARACTERS)";DI$
KB 190 PRINT"{DOWN}INSERT DISK
        AND PRESS ANY KEY":GET
       KEY DL$
BM 200 OPEN 15,8,15,"N0:"+DN$+
       ","+DI$:GOTO 220
RG 210 OPEN 15,8,15
QR 220 PRINT#15,"B-F:0,1,0":RE
       M UN-WRITE-PROTECT TRAC
       K 1 SECTOR 0
BG 230 OPEN 5,8,5,"#":REM OPEN
        A BUFFER
JS 240 PRINT#15,"B-P:5,0":CN=0
       :REM SET BLOCK POINTER
       {SPACE}TO START OF DATA
FE 250 READ D:CN=CN+1
CR 260 PRINT#5,CHR$(D);:REM WR
       ITE DATA TO BUFFER
RF 270 GOTO 250
GE 280 IF ER=13 THEN RESUME 29
       0:ELSE PRINT ERR$(ER):S
       TOP
JR 290 FOR C=1 TO (255-CN):PRI
       NT#5,CHR$(0);:NEXT C:RE
       M SET REST OF BLOCK TO
       {SPACE}0
DP 300 PRINT#15,"U2:5,0,1,0":R
       EM WRITE AUTOBOOT DATA
       {SPACE}TO DISK
MA 310 CLOSE 5
SB 320 PRINT#15,"B-A:0,1,0":RE
       M WRITE-PROTECT TRACK 1
        SECTOR 0
CA 330 CLOSE 15
XA 340 PRINT"{CLR}{DOWN}AUTOBO
       OT PREFERENCES CODE TRA
       NSFERRED.."
JJ 350 PRINT"IN ORDER FOR THE
       {SPACE}DISK TO BOOT YOU
       R"
JS 360 PRINT"PREFERENCES, YOU
       {SPACE}MUST HAVE A COPY
        OF"
BR 370 PRINT"THE PROGRAM 'PREF
       ERENCES' ON THIS DISK."
HP 380 PRINT"{DOWN} -REFER TO
       {SPACE}THE ARTICLE FOR
       {SPACE}DETAILS-"
HS 390 A$=DS$:END
GM 1000 DATA 67,66,77:REM 'CBM

SF 1010 DATA 0,0,0,0:REM NULLS
DR 1020 DATA 80,82,69,70,69,82
        ,69,78,67,69,83:REM ME
        SSAGE FOR BOOT 'PREFER
        ENCES'
JH 1030 DATA 0:REM DELIMITER
DB 1040 DATA 80,82,69,70,69,82
        ,69,78,67,69,83:REM BA
        SIC PROGRAM 'PREFERENC
        ES'
GA 1050 DATA 0:REM DELIMITER
FX 1060 DATA 169,82,141,74,3:R
        EM 'R'
KC 1070 DATA 169,85,141,75,3:R
        EM 'U'
QR 1080 DATA 169,78,141,76,3:R
```

```
        EM 'N'
AD 1090 DATA 169,13,141,77,3:R
        EM (RETURN)
DK 1100 DATA 169,4,133,208,96:
        REM SET KEYBOARD BUFFE
        R TO 4 CHARS AND EXIT
```

Program 2: Preferences

```
KQ 10 GRAPHIC 0:SCNCLR 0
MM 20 COLOR 0,16:COLOR 5,12:CO
      LOR 4,13
PS 30 PRINT CHR$(27);"E":REM D
      ISABLE BLINK
DJ 40 POKE 2594,0:REM DISABLE
      {SPACE}REPEAT
FK 50 POKE 852,0:POKE 853,64:P
      OKE 854,16
KR 60 POKE 855,4:POKE 856,1:RE
      M TAB BITS
QA 70 NEW:CLR
```

Video Jigsaw

Article on page 65.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```
SG 10 IF AA=1THEN90
SX 20 POKE53280,0:POKE53281,0:
      PRINT"{CLR}{13}"TAB(13)"
      {RVS} VIDEO JIGSAW "
QA 30 GOSUB1230:AA=1:PRINT"
      {CLR}{2 DOWN}{7 SPACES}L
      OADING "N$(A)
MG 40 PRINT"{3 DOWN} PLEASE WA
      IT....{BLK}"
CR 50 IFLEFT$(N$(A),1)="D"THEN
      ZZ=1
DK 60 IFLEFT$(N$(A),1)="{13}"TH
      ENZZ=2
AD 70 POKE49990,ZZ
CB 80 LOAD N$(A),8,1
XQ 90 POKE55,0:POKE56,92:CLR:Z
      Z=PEEK(49990):DIM N$(19)
BF 100 FORA=828TO873:READ D:PO
       KEA,D:NEXT
DX 110 FORA=49879TO49973:READ
       {SPACE}D:POKEA,D:NEXT
SS 120 PRINT"{CLR}{BLU}":POKE7
       81,8:POKE782,5:POKE783,
       0:SYS65520
GC 130 PRINT"{RVS}CHOOSE SIZE
       {SPACE}OF PUZZLE PIECES
       :"
DM 140 PRINT"{2 RIGHT}{DOWN}(S
       MALLER NUMBERS GIVE HAR
       DER PUZZLES)"
SK 150 POKE781,14:POKE782,2:PO
       KE783,0:SYS65520
SA 160 PRINT"LENGTH ({RVS}FROM
        2 TO 12{OFF})";:INPUT
       {SPACE}L$
CC 170 L=VAL(L$):IFL<2ORL>12TH
       EN150
GH 180 POKE781,18:POKE782,2:PO
       KE783,0:SYS65520
DG 190 PRINT "WIDTH{2 SPACES}(
       {RVS}FROM 2 TO 20{OFF})
       ";:INPUT W$
BM 200 W=VAL(W$):IFW<2ORW>20TH
       EN180
BH 210 PRINT"{CLR}{3 DOWN}
       {3 SPACES}ONCE PUZZLE A
       PPEARS YOU MAY SEE"
XB 220 PRINT"{DOWN}{3 SPACES}P
       ICTURE AS IT SHOULD LOO
       K WHEN"
RA 230 PRINT"{DOWN}{3 SPACES}F
       INISHED BY PRESSING
       {RVS}F1"
MC 240 PRINT"{YEL}{2 DOWN}
       {3 SPACES}PLUG JOYSTICK
        INTO PORT 2"
FX 250 PRINT"{GRN}{2 DOWN}
       {3 SPACES}PUZZLE CONSTR
       UCTION WILL BLANK"
GP 260 PRINT"{3 SPACES}SCREEN
       {SPACE}FOR 1 TO 2 MINUT
       ES{2 DOWN}"
MQ 270 PRINT"{2 SPACES}PRESS A
       NY KEY TO START CONSTRU
       CTION"
GR 280 GET K$:IFK$=""THEN PRIN
       T"{UP}";:POKE646,PEEK(5
       6325):GOTO270
FD 290 POKE53265,PEEK(53265)AN
       D239
MS 300 IFZZ=1THENGOSUB1530
XB 310 IFZZ=2THENGOSUB1570:GOS
       UB1530:POKE53281,PEEK(3
       4576)
PH 320 FORA=32704TO32767:READ
       {SPACE}D:POKEA,D:NEXT
SK 330 V=53248:SID=54272:XX =2
       4+(W*4-4):YY=50+(L*4)-4
MK 340 POKESID+5,9:POKESID+6,9
SG 350 MAX=XX+(INT(40/W)-1)*8*
       W:MYX=YY+(INT(25/L)-1)*
       8*L
EP 360 DIM S(1000):DIMC(1000)
RF 370 DEF FN HI(M)=INT(M/256)
       :DEF FN LO(M)=M-256*FN
       {SPACE}HI(M)
FK 380 FOR N =0 TO INT (25/L)-
       1
XC 390 FOR N1=0 TO INT (40/W)-
       1
HC 400 B=B+1
RM 410 S(B)=24576+N1*(W*8)+N*(
       L*320)
CF 420 C(B)=55296+N1*(W)+N*(40
       *L)
GH 430 A$=A$+CHR$(B)
CF 440 NEXT N1:NEXTN
DE 450 D$=A$:B$=A$
SQ 460 FORI=1TOB:A=I+INT((B+1-
       I)*RND(0))
PE 470 D$=MID$(D$,A,1)+LEFT$(D
       $,A-1)+RIGHT$(D$,B-A)
PA 480 NEXT
DD 490 Z=INT(LEN(D$)/2)*2-2
SC 500 FORI=1TO Z STEP2:X1=ASC
       (MID$(D$,I,1)):X2=ASC(M
       ID$(D$,I+1,1))
AH 510 GOSUB1020:GOSUB760
CD 520 POKE53280,I:NEXT:D$=B$:
       B$=A$
MK 530 B=1
PF 540 POKEV+28,PEEK(V+28)OR1:
       POKEV+39,7:POKEV+37,2:P
       OKEV+38,5:POKEV,X
MF 550 POKEV+1,Y:POKE24568,255
       :POKEV+21,1
BA 560 POKE53265,PEEK(53265)AN
       D239
QR 570 POKE53265,59:POKE53272,
       120:POKE56576,PEEK(5657
       6)AND254
DF 580 IFZZ=2THENPOKE53270,216
BB 590 POKE53265,PEEK(53265)OR
       16
MA 600 POKESID+24,15
JQ 610 LE=L*8:WE=W*8
JS 620 X=XX:Y=YY
HX 630 GETK$:IFK$="{F1}"THENGO
       SUB1150
BM 640 TG=1-TG:POKEV+21,TG:J2=
       PEEK(56320)
RJ 650 FR=J2AND16:JV=15-(J2AND
       15)
HC 660 IF FR=0THENGOSUB950:GOT
       O630
RE 670 IFJV=1 AND Y>YY THENY=Y
       -LE:B=B-INT(40/W):GOTO7
       10
SH 680 IFJV=2 AND Y<MYX THENY=
       Y+LE:B=B+INT(40/W):GOTO
       710
SP 690 IFJV=4 AND X>XX THENX=X
       -WE:B=B-1:GOTO710
AH 700 IFJV=8 AND X<MAX THENX=
       X+WE:B=B+1
SA 710 TR=(X>255)
GD 720 POKEV+16,TR*(-1)
KA 730 POKEV,X+(TR*255):POKEV+
       1,Y
GC 740 GOTO630
SP 750 GOSUB1020:IFB$=D$THEN E
       N=1
EA 760 FORN=0TOL-1:FOR N1=0TOW
       -1
QP 770 Y1=S(X1)+(N1*8)+(N*320)
       :C1=C(X1)+N1+N*40:V1=C1
       -31744
QX 780 Y2=S(X2)+(N1*8)+(N*320)
       :C2=C(X2)+N1+N*40:V2=C2
       -31744
AS 790 YL=FN LO(Y1):YH= FN HI(
       Y1)
RK 800 XL=FN LO(Y2):XH= FN HI(
       Y2)
BH 810 POKE165,YL:POKE166,YH:P
       OKE167,XL:POKE168,XH
FG 820 SYS 828
KG 830 IFZZ=2 THEN POKE49160,P
       EEK(C1):POKEC1,PEEK(C2)
       :POKEC2,PEEK(49160)
GM 840 POKE49161,PEEK(V1):POKE
       V1,PEEK(V2):POKEV2,PEEK
       (49161)
DH 850 NEXT:NEXT
PD 860 IFEN=1THEN1060
GQ 870 RETURN
AR 880 POKE53270,200:POKE53265
       ,27:POKE53272,21:POKE56
       576,PEEK(56576)OR1:POKE
       V+21,0
HQ 890 POKE53280,0:POKE53281,0
       :PRINT"{CLR}{DOWN}{13}
       {3 SPACES}LOAD ANOTHER
       {SPACE}PICTURE PUZZLE A
       ND"
PS 900 PRINT"{2 DOWN}
       {9 SPACES}PLAY AGAIN
       {RVS}(Y/N){OFF} ";
GB 910 GETA$:IFA$=""THEN910
EG 920 IFA$="N"THEN POKE55,0:P
       OKE56,160:CLR:STOP
SS 930 IFA$="Y"THENPRINT:GOTO3
       0
HB 940 GOTO910
CP 950 FL=FL+1
EM 960 IFFL=2THENX2=B:IFX2=X1T
       HEN FL=1:RETURN
QR 970 IF FL=2 THEN FL=0:GOSUB
       990:GOSUB750:RETURN
DF 980 X1=B:GOSUB1000:RETURN
KC 990 HF=110:LF=0:GOSUB1010:R
       ETURN
EJ 1000 HF=70:LF=0:GOSUB1010:R
        ETURN
HP 1010 POKESID+1,HF:POKESID,L
        F:POKESID+4,17:POKESID
        +4,16:RETURN
KF 1020 IFX1>X2THENX3=X1:X1=X2
```

```
        :X2=X3
PF 1030 X1$=MID$(B$,X1,1):X2$=
        MID$(B$,X2,1)
BD 1040 B$=LEFT$(B$,X1-1)+X2$+
        MID$(B$,X1+1,X2-X1-1)+
        X1$+RIGHT$(B$,LEN(B$)-
        X2)
AD 1050 RETURN
HS 1060 FOR R=0TO2
JC 1070 POKESID+5,85:POKESID+6
        ,85:POKESID+12,85:POKE
        SID+13,85
DM 1080 POKESID+4,33:POKESID+1
        1,17
JP 1090 FORN=0TO5:FORX=0TO3:V(
        X)=PEEK(850+(N*4)+X):N
        EXT
AQ 1100 POKESID+1,V(0):POKESID
        ,V(1):POKESID+8,V(2):P
        OKESID+7,V(3):POKE5328
        0,V(2)
JH 1110 IFH1=50THEN FOR T=1TO2
        00:NEXT
BP 1120 FORT=1TO125:NEXT:NEXT
CJ 1130 POKESID+4,32:POKESID+1
        1,16:FORW=1TO500:NEXT:
        NEXT
JJ 1140 GOTO880
AP 1150 IFZZ=2THENGOSUB1620
JD 1160 POKE53272,8:POKE56576,
        (PEEK(56576)AND252)OR1
HD 1170 POKEV+21,0
EG 1180 GETK$:IFK$<>"{F1}"THEN
        1180
DG 1190 IFZZ=2THENGOSUB1620
QS 1200 POKE53272,120:POKE5657
        6,(PEEK(56576)AND252)O
        R2
RE 1210 POKEV+21,1
RR 1220 RETURN
GM 1230 PRINT"{3 DOWN} PLEASE
        {SPACE}INSERT DISK CON
        TAINING {RVS}DOODLE
        {OFF}":N=1
BF 1240 PRINT TAB(8);"OR {RVS}
        KOALA{OFF} PICTURE FIL
        ES"
RG 1250 PRINT"{3 DOWN}
        {7 SPACES}PRESS ANY KE
        Y WHEN READY"
MX 1260 GETK$:IF K$=""THEN1260
MX 1270 PRINT"{CLR}{DOWN}"TAB(
        12);"{RVS} PICTURE FIL
        ES {2 DOWN}"
RR 1280 OPEN1,8,0,"$"
JR 1290 GET#1,B$:IFST<>0THEN14
        00
QM 1300 IFN>19THEN1400
EQ 1310 IFB$<>CHR$(34)THEN1290
RG 1320 N$=""
HG 1330 GET#1,B$:IFB$<>CHR$(34
        )THEN N$=N$+B$:GOTO133
        0
CQ 1340 GET#1,B$:IFB$=CHR$(32)
        THEN1340
JD 1350 IFLEFT$(N$,1)=" "THEN
        {SPACE}N=N-1:GOTO1380
JF 1360 IFLEFT$(N$,2)<>"DD"AND
        LEFT$(N$,1)<>"[13]" THE
        NN=N-1:GOTO1380
RM 1370 N$(N)=N$:PRINTTAB(12)N
        $(N)
FC 1380 GET#1,B$:IFB$<>""THEN1
        380
FX 1390 IF ST=0THEN N=N+1:GOTO
        1290
DJ 1400 CLOSE1
KG 1410 IFN=1THENPRINT"
        {6 SPACES}{RVS}NO PICT
        URES ON THIS DISK":FOR
        I=1TO2000:NEXT:GOTO123
        0
PC 1420 PRINT"{DOWN}{2 SPACES}
        (USE CURSOR UP/DOWN TO
         HIGHLIGHT)
QF 1430 PRINT"{DOWN}{4 SPACES}
        {RVS}PRESS RETURN TO L
        OAD PICTURE{DOWN}
MR 1440 A=1:C1=0:C=125:GOSUB15
        10
SX 1450 K=PEEK(197):SH=PEEK(65
        3):IFK<>7ANDK<>1THEN14
        50
CA 1460 IFK=7ANDSH=0ANDA<(N-1)
        THENC1=1:GOSUB1500
GF 1470 IFK=7AND SH=1ANDA>1THE
        NC1=-1:GOSUB1500
KC 1480 IFK=1THENRETURN
HA 1490 GOTO1450
JR 1500 FORI=0TO24:POKE55296+I
        +(A)*40+C,8:NEXT
KE 1510 A=A+C1:FORI=0TO24:POKE
        55296+I+(A)*40+C,1:NEX
        T
SS 1520 RETURN
EQ 1530 POKE49872,0:POKE49873,
        92:POKE49874,0:POKE498
        75,96:POKE49876,0
DA 1540 POKE49877,128:POKE4987
        8,0:SYS49879
XX 1550 POKE49872,0:POKE49873,
        96:POKE49874,0:POKE498
        75,128:POKE49876,0
JB 1560 POKE49877,160:POKE498
        8,0:SYS49879:RETURN
KP 1570 POKE49872,64:POKE49873
        ,127:POKE49874,39:POKE
        49875,131:POKE49876,0
QC 1580 POKE49877,92:POKE49878
        ,0:SYS49879
FM 1590 POKE49872,40:POKE49873
        ,131:POKE49874,15:POKE
        49875,135:POKE49876,0
CH 1600 POKE49877,216:POKE4987
        8,0:SYS49879
RR 1610 POKE49877,196:POKE4987
        8,0:SYS49879:RETURN
MG 1620 POKE49872,0:POKE49873,
        216:POKE49874,0:POKE49
        875,220:POKE49876,0
KB 1630 POKE49877,196:POKE4987
        8,1:SYS49879:RETURN
GJ 1640 DATA 160,0,177,165,153
        ,0,192,177
QH 1650 DATA 167,145,165,185,0
        ,192,145,167
EG 1660 DATA 200,192,8,208,237
        ,96,25,30
MA 1670 DATA 18,209,33,135,25,
        30,42,62
SK 1680 DATA 31,165,50,60,37,1
        62,42,62
AP 1690 DATA 31,165,50,60,37,1
        62
RS 1700 DATA 173,210,194,205,2
        08,194,173
SR 1710 DATA 211,194,237,209,1
        94,144,80,173
JF 1720 DATA 208,194,133,251,1
        73,209,194
SE 1730 DATA 133,252,173,212,1
        94,133,253
HX 1740 DATA 173,213,194,133,2
        54,173,210
FM 1750 DATA 194,133,247,173,2
        11,194,133
CE 1760 DATA 248,173,214,194,1
        33,249,160,0
ER 1770 DATA 177,251,166,249,2
        40,8,133,250
SS 1780 DATA 177,253,145,251,1
        65,250,145
KS 1790 DATA 253,230,251,208,2
        ,230,252,230
AP 1800 DATA 253,208,2,230,254
        ,165,252,197
EB 1810 DATA 248,208,222,165,2
        47,197,251,48
RC 1820 DATA 3,76,10,195,96
QC 1830 DATA 170,192,0,187,0,0
        ,169,0
DM 1840 DATA 0,183,64,0,193,14
        4,0,0
AF 1850 DATA 116,0,0,25,0,0,7,
        64
BK 1860 DATA 0,1,144,0,0,116,0
        ,0
MK 1870 DATA 25,0,0,7,0,0,0,0
EX 1880 DATA 0,0,0,0,0,0,0,0
HS 1890 DATA 0,0,0,0,0,0,0,0
RR 1900 DATA 0,0,0,0,0,0,0,197
```

Eagles And Gators

See instructions in article on page 53 before typing in.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```
0801:18 08 00 00 9E 32 30 37 74
0809:36 3A 8F 22 14 14 14 14 04
0811:45 41 47 4C 45 53 00 00 39
0819:00 00 00 A0 00 A9 56 85 0C
0821:03 A9 08 85 04 A9 00 85 C2
0829:05 A9 40 85 06 A9 E3 85 AA
0831:FB A9 1C 85 FC A5 03 E5 EF
0839:FB A5 04 E5 FC B0 13 B1 12
0841:03 91 05 E6 03 D0 02 E6 8C
0849:04 E6 05 D0 02 E6 06 4C C6
0851:36 08 4C 00 40 A9 3B 85 AC
0859:FB A9 03 85 FC A0 BF A9 1E
0861:00 91 FB 88 D0 F9 A9 FF 9F
0869:85 FB A9 D3 85 FC A0 19 28
0871:A9 00 91 FB 88 D0 F9 A9 6D
0879:93 20 D2 FF A9 00 8D 20 3E
0881:D0 8D 21 D0 18 A0 0B A2 8A
0889:05 20 F0 FF A9 00 85 FB 96
0891:A9 45 85 FC 20 AD 42 18 9C
0899:A0 0C A2 08 20 F0 FF A9 40
08A1:14 85 FB A9 45 85 FC 20 91
08A9:AD 42 20 1E 43 18 A0 0A CC
08B1:A2 0E 20 F0 FF A9 26 85 22
08B9:FB A9 45 85 FC 20 AD 42 39
08C1:20 CD 42 18 A0 0D A2 11 AE
08C9:20 F0 FF A9 3B 85 FB A9 52
08D1:45 85 FC A0 00 20 BD 42 CD
08D9:AD 04 DC 8D 86 02 B1 FB D1
08E1:C9 7E F0 07 20 D2 FF C8 1A
08E9:4C 80 40 20 9F FF 20 E4 6C
08F1:FF C9 00 F0 CE C9 59 F0 C4
08F9:78 C9 4E F0 03 4C 6E 40 F7
0901:A9 93 20 D2 FF 20 74 42 A9
0909:20 6D 41 18 A0 11 A2 09 C7
0911:20 F0 FF A9 4C 85 FB A9 24
0919:45 85 FC 20 AD 42 18 A0 18
0921:14 A2 0B 20 F0 FF A9 5E 82
0929:85 FB A9 45 85 FC 20 AD 94
0931:42 18 A0 11 A2 0F 20 F0 12
0939:FF A9 68 85 FB A9 45 85 B1
0941:FC 20 AD 42 20 9F FF 20 53
0949:E4 FF C9 00 F0 F6 C9 51 4F
0951:D0 03 4C E2 FC C9 31 B0 66
0959:03 4C EF 40 C9 3A B0 E4 7F
0961:38 E9 30 8D 3F 03 A9 93 D5
0969:20 D2 FF 20 EA 4B 4C 0F 6E
0971:54 A9 93 20 D2 FF 20 74 D7
0979:42 18 A0 04 A2 00 20 F0 4D
```

```
0981:FF A9 7C 85 FB A9 45 85 7C
0989:FC A9 05 85 FD A9 47 85 28
0991:FE A0 00 B1 FB 20 D2 FF 6C
0999:A5 FB C9 FF 90 02 E6 FC 0E
09A1:E6 FB A5 FB C5 FD A5 FC 09
09A9:E5 FE 90 E7 20 EC 50 AD 02
09B1:67 03 C9 00 F0 09 AD 6A E2
09B9:03 C9 00 F0 02 D0 ED 4C 4A
09C1:AB 40 A9 40 85 FB A9 03 65
09C9:85 FC A9 E4 85 FD A0 08 CE
09D1:A5 FD 91 FB E6 FD E6 FD 23
09D9:88 C0 01 D0 F3 A9 EA 91 3B
09E1:FB A0 08 A9 48 85 FB A9 AF
09E9:0D 91 FB 88 D0 F9 A9 50 01
09F1:85 FB A9 F2 85 FD A0 08 97
09F9:A5 FD 91 FB E6 FD E6 FD 4B
0A01:88 C0 01 D0 F3 A9 F2 91 74
0A09:FB A9 59 85 FB A0 07 A9 23
0A11:00 91 FB 88 D0 F9 A9 5B AE
0A19:8D 6C 03 A9 4E 8D 6E 03 92
0A21:A9 03 8D 6D 03 8D 6F 03 83
0A29:A9 71 85 FB A9 32 85 FD FD
0A31:A0 08 A5 FD 91 FB 18 69 42
0A39:0A 85 FD 88 D0 F4 A9 79 23
0A41:85 FB A9 E6 85 FD A0 08 28
0A49:A5 FD 91 FB 38 E9 0A 85 A4
0A51:FD 88 D0 F4 A9 81 85 FB 4A
0A59:A0 10 A9 FF 91 FB 88 A9 2E
0A61:01 91 FB 88 D0 F4 A9 82 92
0A69:8D 92 03 A9 8A 8D 94 03 9A
0A71:A9 72 8D 96 03 A9 7A 8D 53
0A79:98 03 A9 03 8D 93 03 8D 4E
0A81:95 03 8D 97 03 8D 99 03 D0
0A89:A9 1E 8D 00 D0 A9 46 8D F2
0A91:02 D0 A9 6E 8D 04 D0 A9 BE
0A99:96 8D 06 D0 A9 BE 8D 08 95
0AA1:D0 A9 E6 8D 0A D0 A9 0F 34
0AA9:8D 0C D0 A9 37 8D 0E D0 19
0AB1:A9 C0 8D 10 D0 A9 00 8D 38
0AB9:17 D0 8D 1D D0 A9 01 8D CD
0AC1:18 D4 EA A9 FF 8D 15 D0 40
0AC9:60 78 A9 00 8D 0E DC A9 69
0AD1:8C 8D 14 03 A9 4A 8D 15 E8
0AD9:03 A9 0F 8D 88 4A A9 96 EB
0AE1:8D 89 4A A9 00 8D 8A 4A 98
0AE9:A9 03 8D 8B 4A AD 11 D0 F9
0AF1:29 7F 8D 11 D0 AD 89 4A D7
0AF9:8D 12 D0 A9 01 8D 1A D0 51
0B01:58 60 A0 00 B1 FB C9 7E FE
0B09:F0 07 20 D2 FF C8 4C AF F5
0B11:42 60 EE 01 D0 CE 03 D0 E6
0B19:CE 0D D0 EE 0F D0 20 CA A9
0B21:44 60 A9 1E 8D 00 D0 A9 40
0B29:46 8D 02 D0 A9 C0 8D 10 8E
0B31:D0 A9 0F 8D 0C D0 A9 37 03
0B39:8D 0E D0 A9 07 8D 27 D0 DB
0B41:8D 2E D0 A9 0D 8D 28 D0 1E
0B49:8D 2D D0 A9 C3 8D 15 D0 75
0B51:A9 FF 8D F8 07 8D FF 07 F2
0B59:A9 E4 8D F9 07 A9 EA 8D 11
0B61:FE 07 60 EA EA A0 00 B1 FE
0B69:FB 91 FD C8 C0 40 F0 02 19
0B71:D0 F5 60 A9 08 85 FB A9 0C
0B79:47 85 FC A9 C0 85 FD A9 90
0B81:3A 85 FE 20 10 43 A9 80 59
0B89:85 FD 20 10 43 A9 48 85 BD
0B91:FB A9 00 85 FD A9 3B 85 FA
0B99:FE 20 10 43 A9 40 85 FD C4
0BA1:A9 3A 85 FE 20 10 43 A9 2D
0BA9:88 85 FB A9 00 85 FD 20 B1
0BB1:10 43 A9 40 85 FD A9 3B 8C
0BB9:85 FE 20 10 43 A9 C8 85 2F
0BC1:FB A9 80 85 FD 20 10 43 7C
0BC9:A9 C0 85 FD A9 39 85 FE B1
0BD1:20 10 43 A9 08 85 FB A9 F6
0BD9:48 85 FC A9 80 85 FD 20 E5
0BE1:10 43 A9 C0 85 FD A9 3B C4
0BE9:85 FE 20 10 43 A9 48 85 5E
0BF1:FB A9 40 85 FD A9 39 85 5F
0BF9:FE 20 10 43 A9 00 85 FD 24
0C01:A9 3C 85 FE 20 10 43 A9 0F
0C09:88 85 FB A9 40 85 FD 20 15
0C11:10 43 A9 00 85 FD A9 39 E7
0C19:85 FE 20 10 43 A9 C8 85 90
0C21:FB A9 48 85 FC A9 40 85 97
0C29:FD A9 3E 85 FE 20 10 43 A6
0C31:A9 00 85 FD 20 10 43 A9 20
0C39:08 85 FB A9 49 85 FC A9 D4
0C41:80 85 FD 20 10 43 A9 C0 5E
0C49:85 FD A9 3D 85 FE 20 10 25
0C51:43 A9 48 85 FB A9 80 85 E3
0C59:FD 20 10 43 A9 C0 85 FD 08
0C61:A9 3E 85 FE 20 10 43 A9 EF
0C69:88 85 FB A9 00 85 FD A9 FC
0C71:3F 85 FE 20 10 43 A9 40 8D
0C79:85 FD A9 3D 85 FE 20 10 55
0C81:43 A9 C8 85 FB A9 00 85 23
0C89:FD 20 10 43 A9 40 85 FD 36
0C91:A9 3F 85 FE 20 10 43 A9 60
0C99:08 85 FB A9 4A 85 FC A9 3D
0CA1:C0 85 FD A9 3C 85 FE 20 EB
0CA9:10 43 A9 80 85 FD A9 3F 8E
0CB1:85 FE 20 10 43 A9 48 85 28
0CB9:FB A9 C0 85 FD 20 10 43 7E
0CC1:A9 80 85 FD A9 3C 85 FE A7
0CC9:20 10 43 A9 0F 8D 05 D4 86
0CD1:8D 0C D4 8D 13 D4 A9 F0 57
0CD9:8D 06 D4 8D 0D D4 8D 14 98
0CE1:D4 A9 3F 8D 00 D4 A9 18 4E
0CE9:8D 01 D4 A9 42 8D 07 D4 69
0CF1:A9 06 8D 08 D4 A9 0C 8D 85
0CF9:0E D4 A9 06 8D 0F D4 A9 DF
0D01:15 8D 04 D4 8D 0B D4 8D A6
0D09:12 D4 A9 3F 8D 18 D4 A9 AA
0D11:F7 8D 17 D4 A9 22 8D 16 C1
0D19:D4 A9 0F 8D 15 D4 60 AD 2D
0D21:3E 03 C9 2F F0 04 EE 3E FA
0D29:03 60 A9 00 8D 3E 03 EE 6C
0D31:3F 03 AD 3F 03 8D 0E D4 94
0D39:CE 40 03 AD 40 03 8D 16 45
0D41:D4 AD 3F 03 C9 35 90 06 93
0D49:A9 18 8D 01 D4 60 AD 3F C2
0D51:03 8D 01 D4 60 8E 08 9F AA
0D59:00 20 45 41 47 4C 45 53 81
0D61:20 26 20 47 41 54 4F 52 D9
0D69:53 20 92 7E 00 00 00 00 6F
0D71:00 00 00 00 00 00 00 00 8B
0D79:00 00 00 9F 57 41 4E 54 3E
0D81:20 49 4E 53 54 52 55 43 D6
0D89:54 49 4F 4E 53 20 3F 7E 07
0D91:50 52 45 53 53 20 12 59 DE
0D99:92 20 4F 52 20 12 4E 92 8C
0DA1:7E 90 50 49 43 4B 20 53 98
0DA9:4B 49 4C 4C 20 4C 45 56 1D
0DB1:45 4C 7E 28 20 31 20 63 3D
0DB9:20 39 20 29 7E 9E 50 52 2A
0DC1:45 53 53 20 12 51 92 20 DA
0DC9:20 54 4F 20 51 55 49 54 BB
0DD1:7E 90 12 77 11 9D 20 11 59
0DD9:9D 9D 00 00 20 20 20 92 7E
0DE1:63 69 11 9D 7B 91 91 50 99
0DE9:4C 55 47 20 4A 4F 59 53 FF
0DF1:54 49 43 4B 53 20 49 4E A1
0DF9:2E 2E 11 11 7B 91 9D 75 BC
0E01:63 63 63 63 12 20 20 20 BB
0E09:91 9D 9D 20 91 9D 69 8D 6E
0E11:11 11 11 00 20 12 50 4F 55
0E19:52 54 20 32 20 46 4F 52 A5
0E21:20 45 41 47 4C 45 53 92 EB
0E29:20 20 20 12 50 4F 52 54 3B
0E31:20 31 20 46 4F 52 20 47 5D
0E39:41 54 4F 52 53 92 8D 11 2B
0E41:00 20 43 4C 41 4D 50 20 92
0E49:59 4F 55 52 20 43 52 45 AD
0E51:41 54 55 52 45 53 20 54 FE
0E59:4F 20 54 48 45 20 42 4F B2
0E61:52 44 45 52 20 42 59 8D CF
0E69:11 20 50 52 45 53 53 49 AC
0E71:4E 47 20 12 46 49 52 45 EC
0E79:20 42 55 54 54 4F 4E 92 35
0E81:20 57 48 45 4E 20 54 48 C4
0E89:45 59 20 48 49 54 20 49 4C
0E91:54 69 11 9D 62 11 9D 9D 5E
0E99:6D 62 6E 11 9D 9D 2A 11 AC
0EA1:9D 7A 8D 91 91 20 42 4F D6
0EA9:52 44 45 52 20 4D 4F 56 F8
0EB1:45 53 20 57 48 45 4E 20 D2
0EB9:53 49 44 45 53 20 41 52 9E
0EC1:45 20 55 4E 45 51 55 41 73
0EC9:4C 8D 9F 11 11 20 20 20 DD
0ED1:4D 4F 56 45 20 52 49 47 AB
0ED9:48 54 20 4F 52 20 4C 45 19
0EE1:46 54 20 54 4F 20 43 4F 50
0EE9:4E 54 52 4F 4C 20 41 8D 74
0EF1:11 20 20 20 20 20 20 20 86
0EF9:20 20 44 49 46 46 45 52 73
0F01:45 4E 54 20 43 52 45 41 11
0F09:54 55 52 45 8D 11 11 20 38
0F11:20 05 57 49 4E 20 42 59 D0
0F19:20 50 55 53 48 49 4E 47 86
0F21:20 4F 50 50 4F 4E 45 4E BE
0F29:54 53 20 4F 46 46 20 53 1E
0F31:43 52 45 45 4E 8D 11 11 5E
0F39:9E 20 20 20 20 20 12 50 AA
0F41:52 45 53 53 20 46 49 52 78
0F49:45 20 42 55 54 54 4F 4E 90
0F51:20 54 4F 20 42 45 47 49 7F
0F59:4E 92 00 00 00 00 03 80 C9
0F61:00 0F C0 02 1F 80 06 37 B9
0F69:80 03 7D 80 01 FF A0 00 89
0F71:FF 30 00 7F E0 00 7F 00 99
0F79:00 7F E0 00 FF 60 01 FE 16
0F81:00 03 3E 00 06 3E 00 04 55
0F89:1E 00 00 1C 00 00 1E 00 B4
0F91:00 0E 08 00 0F 30 00 03 70
0F99:E0 00 01 80 00 00 0C 00 68
0FA1:00 1E 00 00 3E 00 04 3F 80
0FA9:00 0E 6D 20 03 FF 30 00 73
0FB1:FF 60 00 FF C0 00 7F 00 EC
0FB9:00 FF C0 00 FF 60 03 FE 76
0FC1:00 06 7C 00 00 7C 00 00 E2
0FC9:3C 00 00 3C 00 00 3C 00 42
0FD1:00 1C 00 00 1E 00 00 0F F6
0FD9:E0 00 03 80 FF 00 18 00 01
0FE1:00 3C 00 00 3C 00 04 7E 77
0FE9:20 0C 5A 30 06 FF 60 03 5D
0FF1:FF C0 00 FF 00 00 FF 00 40
0FF9:00 FF 00 03 FF C0 06 FF 57
1001:60 00 7E 00 00 7C 00 00 13
1009:7C 00 00 3C 00 00 3C 00 A3
1011:00 3C 00 00 3C 00 00 1E 40
1019:00 00 07 80 00 00 18 00 52
1021:00 3C 00 00 3C 00 04 7E B8
1029:20 0C 5A 30 06 FF 60 03 9E
1031:FF C0 00 FF 00 00 FF 00 81
1039:00 FF 00 03 FF C0 06 FF 98
1041:60 00 7E 00 00 7E 00 00 5B
1049:7E 00 00 3C 00 00 3C 00 E4
1051:00 3C 00 00 3C 00 00 18 7A
1059:00 00 18 00 F7 00 18 00 6C
1061:00 3C 00 00 3C 00 04 7E F8
1069:20 0C 5A 30 06 FF 60 03 DE
1071:FF C0 00 FF 00 00 FF 00 C1
1079:00 FF 00 03 FF C0 06 FF D8
1081:60 00 7E 00 00 3E 00 00 9A
1089:3E 00 00 3C 00 00 3C 00 05
1091:00 3C 00 00 3C 00 00 78 1B
1099:00 01 E0 00 00 00 30 00 76
10A1:00 78 00 00 7C 00 00 FC C0
10A9:20 04 B6 70 0C FF C0 06 A0
10B1:FF 00 03 FF 00 00 FE 00 30
10B9:03 FF 00 06 FF 00 00 7F 3B
10C1:C0 00 3E 60 00 3E 00 00 09
10C9:3C 00 00 3C 00 00 3C 00 44
10D1:00 38 00 00 78 00 07 F0 C2
10D9:00 01 C0 00 FF 01 C0 00 D7
10E1:03 F0 00 01 F8 40 01 EC 87
10E9:60 01 BE C0 05 FF 80 0C 93
10F1:FF 00 07 FE 00 00 FE 00 E0
10F9:07 FE 00 06 FF 00 00 7F 3D
1101:80 00 7C C0 00 7C 60 00 B1
1109:78 20 00 38 00 00 78 00 E3
1111:10 70 00 0C F0 00 07 C0 6E
1119:00 01 80 00 00 00 00 00 8B
1121:00 00 00 00 00 00 00 00 43
1129:00 0E 00 70 1F 3C F8 7F 31
1131:FF FE 7E 7E 7E FC 99 3F 25
1139:EF 18 F7 8F 3C F1 C7 E7 72
1141:E3 07 C3 E0 03 C3 C0 07 4D
1149:E7 E0 1E FF 78 0E 3C 30 FF
1151:00 00 00 00 00 00 00 00 73
1159:00 00 00 00 FF 00 00 00 7B
1161:00 00 00 00 00 00 00 00 83
1169:00 1E 00 78 7F BD FE FF 8B
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1171:FF FF DE 7E 7B 8E DB 71 96
1179:0F 18 F0 03 18 C0 07 FF 49
1181:E0 07 81 E0 07 C3 E0 03 20
1189:FF C0 07 FF E0 3E 3C 7C B1
1191:1C 00 38 00 00 00 00 00 C8
1199:00 00 00 00 FF 00 00 00 BB
11A1:00 00 00 00 00 00 30 00 24
11A9:0C FE 00 7F FF 99 FF DF CF
11B1:FF FB 1E 3C 78 0E FF 70 C6
11B9:07 18 E0 07 18 E0 0F FF 54
11C1:F0 0F 18 F0 07 81 E0 07 39
11C9:FF E0 07 FF E0 1E 7E 78 F9
11D1:3E 00 7C 20 00 04 00 00 B4
11D9:00 00 00 00 00 00 00 00 FB
11E1:00 00 00 00 00 00 F8 00 F5
11E9:1F FE 00 7F 7F 81 FE 3F 92
11F1:DB FC 1F 3C F8 0E FF 70 59
11F9:07 99 E0 0F 18 F0 0F FF B5
1201:F0 0E 7E 70 07 18 E0 03 55
1209:C3 C0 0E FF E0 0E 7E 70 AD
1211:3E 00 7C 22 00 44 00 00 17
1219:00 00 00 00 FF 00 00 00 3D
1221:C0 00 03 E0 00 07 7C 00 29
1229:3E 7F 81 FE 3F 81 FC 1F 85
1231:DB F8 06 FF 60 03 3C C0 8A
1239:07 99 E0 0E 18 70 0F FF E4
1241:F0 0C FF 30 07 3C E0 03 D1
1249:81 C0 03 FF C0 0F 7E F0 EE
1251:18 00 18 3E 00 7C 32 00 BE
1259:4C 00 00 00 00 C0 00 03 A9
1261:C0 00 03 70 00 0E 7E 00 82
1269:7E 3F 81 FC 1F 81 F8 1F AC
1271:C3 F8 06 FF 60 03 7E C0 43
1279:07 99 E0 0E 18 70 0F DB 01
1281:F0 0C FF 30 06 3C 60 03 09
1289:81 C0 03 FF C0 0E 7E E0 1B
1291:1C 00 38 3F 00 FC 31 00 15
1299:8C 30 00 0C FF 1C 00 38 79
12A1:30 00 0C 38 00 1C 3E 00 CF
12A9:7C 3F 81 FC 1F C3 F8 0F E4
12B1:C3 F0 06 FF 60 03 7E C0 81
12B9:07 BD E0 0E 18 70 0B DB 42
12C1:D0 0C FF 30 06 3C 60 03 39
12C9:81 C0 03 FF C0 07 7E E0 3F
12D1:1C 00 38 3E 00 7C 33 00 47
12D9:CC 18 00 18 00 0F 7C 00 21
12E1:03 AC 12 D0 A2 02 CC 88 41
12E9:4A F0 07 88 CC 88 4A F0 E6
12F1:01 CA BD 89 4A 8D 21 D0 35
12F9:8D 20 D0 BD 87 4A 8D 12 75
1301:D0 AD 19 D0 8D 19 D0 E0 7E
1309:01 D0 06 20 C8 4A 4C C2 71
1311:4A 20 59 4B 20 EA FF 68 59
1319:A8 68 AA 68 40 AD 7A 03 3A
1321:8D 01 D0 AD 7B 03 8D 03 49
1329:D0 AD 7C 03 8D 05 D0 AD B2
1331:7D 03 8D 07 D0 AD 7E 03 36
1339:8D 09 D0 AD 7F 03 8D 0B 8B
1341:D0 AD 80 03 8D 0D D0 AD 6B
1349:81 03 8D 0F D0 AD 41 03 56
1351:8D F8 07 AD 42 03 8D F9 6B
1359:07 AD 43 03 8D FA 07 AD 1B
1361:44 03 8D FB 07 AD 45 03 58
1369:8D FC 07 AD 46 03 8D FD A8
1371:07 AD 47 03 8D FE 07 AD C3
1379:48 03 8D FF 07 AD 49 03 BA
1381:8D 27 D0 AD 4A 03 8D 28 CE
1389:D0 AD 4B 03 8D 29 D0 AD 7D
1391:4C 03 8D 2A D0 AD 4D 03 CD
1399:8D 2B D0 AD 4E 03 8D 2C 0C
13A1:D0 AD 4F 03 8D 2D D0 AD 26
13A9:50 03 8D 2E D0 60 AD 72 23
13B1:03 8D 01 D0 AD 73 03 8D B8
13B9:03 D0 AD 74 03 8D 05 D0 BB
13C1:AD 75 03 8D 07 D0 AD 76 A2
13C9:03 8D 09 D0 AD 77 03 8D E1
13D1:0B D0 AD 78 03 8D 0D D0 28
13D9:AD 79 03 8D 0F D0 AD 51 D6
13E1:03 8D F8 07 AD 52 03 8D C6
13E9:F9 07 AD 53 03 8D FA 07 05
13F1:AD 54 03 8D FB 07 AD 55 E9
13F9:03 8D FC 07 AD 56 03 8D 6F
1401:FD 07 AD 57 03 8D FE 07 68
1409:AD 58 03 8D FF 07 AD 59 28
1411:03 8D 27 D0 AD 5A 03 8D 7A
1419:28 D0 AD 5B 03 8D 29 D0 66
1421:AD 5C 03 8D 2A D0 AD 5D BD
1429:03 8D 2B D0 AD 5E 03 8D 23
1431:2C D0 AD 5F 03 8D 2D D0 C8
1439:AD 60 03 8D 2E D0 60 A0 9F
1441:00 A9 00 85 FB A9 D4 85 E1
1449:FC A9 00 91 FB C0 0F F0 65
1451:04 C8 4C F4 4B A9 0F 8D 33
1459:18 D4 A9 00 8D 17 D4 A9 14
1461:60 8D 05 D4 A9 19 8D 13 EA
1469:D4 A9 0F 8D 00 D4 8D 07 96
1471:D4 8D 0E D4 A9 0F 8D 01 1C
1479:D4 A9 4F 8D 08 D4 A9 4F 6F
1481:8D 0F D4 A9 00 8D 04 D4 7C
1489:A9 00 8D 0B D4 A9 00 8D C3
1491:12 D4 A9 00 8D 06 D4 8D E8
1499:0D D4 8D 14 D4 A9 60 8D 0C
14A1:0C D4 60 A9 60 8D 05 D4 C3
14A9:AD 89 4A 4A 4A 4A 85 FB 7B
14B1:A9 24 E5 FB 8D 01 D4 A9 F7
14B9:60 8D 05 D4 A9 20 8D 04 50
14C1:D4 A9 21 8D 04 D4 60 A9 99
14C9:60 8D 0C D4 AD 89 4A 4A C6
14D1:4A 4A 8D 08 D4 A9 80 8D BF
14D9:0B D4 A9 81 8D 0B D4 60 AC
14E1:A9 2A 8D 3C 03 A9 10 8D 4B
14E9:12 D4 A9 15 8D 12 D4 60 95
14F1:A9 04 8D 3C 03 A9 10 8D D1
14F9:12 D4 A9 15 8D 12 D4 60 A5
1501:A9 09 8D 8A 4A A5 FB 85 03
1509:FD A5 FC 85 FE 98 8D 3D 46
1511:03 A9 10 8D 12 D4 A9 15 4E
1519:8D 12 D4 A2 1F A9 00 8D 80
1521:0F D4 20 97 4D 8A 8D 3E 73
1529:03 0A 0A 0A 0A 8D 0F D4 B2
1531:A0 12 20 5B 4D AD 3E 03 8A
1539:AA CA D0 E6 AD 3D 03 A8 05
1541:A5 FD 85 FB A5 FE 85 FC 5F
1549:A9 E0 8D 0F D4 A9 85 8D 09
1551:12 D4 A9 00 8D 8A 4A 60 7A
1559:A9 09 8D 8B 4A A5 FB 85 6B
1561:FD A5 FC 85 FE 98 8D 3D 9E
1569:03 A9 10 8D 12 D4 A9 15 A6
1571:8D 12 D4 A2 18 A9 08 8D B0
1579:0F D4 20 75 4D 8A 8D 3E A9
1581:03 0A 0A EA EA 8D 08 D4 12
1589:A0 12 20 5B 4D AD 3E 03 E2
1591:AA CA D0 E6 AD 3D 03 A8 5D
1599:A5 FD 85 FB A5 FE 85 FC B7
15A1:A9 E0 8D 0F D4 A9 15 8D 80
15A9:12 D4 A9 03 8D 8B 4A 60 07
15B1:C0 00 F0 15 C0 01 D0 03 5A
15B9:4C 6F 4D 88 A2 C6 CA D0 AE
15C1:FD 88 D0 EC A2 C3 CA D0 80
15C9:FD 60 A9 41 85 FB A9 03 C6
15D1:85 FC A0 00 B1 FB C9 F1 15
15D9:F0 08 18 69 01 91 FB 4C AA
15E1:91 4D A9 E4 91 FB C8 C0 7A
15E9:08 D0 E9 60 A9 51 85 FB 29
15F1:A9 03 85 FC A0 00 B1 FB 96
15F9:C9 FF F0 08 18 69 01 91 A1
1601:FB 4C B3 4D A9 F2 91 FB C1
1609:C8 C0 08 D0 E9 A0 08 EE A8
1611:3C 03 AD 3C 03 8D 0F D4 D6
1619:88 D0 F4 60 AD 6C 03 18 9F
1621:69 29 85 FB AD 6D 03 85 6B
1629:FC AD 67 03 C9 00 D0 61 AD
1631:A0 00 B1 FB C9 00 F0 43 17
1639:A5 FB 38 E9 10 85 FB A0 0C
1641:00 B1 FB 18 69 19 CD 89 AF
1649:4A B0 03 4C 31 4E 20 AB 9A
1651:4C AD 89 4A 38 E9 17 91 0E
1659:FB A5 FB 18 69 10 85 FB 80
1661:A9 00 91 FB A5 FB 18 69 0B
1669:08 85 FB B1 FB C9 00 F0 8D
1671:03 4C 3C 4E A9 FF 91 FB 0B
1679:4C 3C 4E A5 FB 38 E9 10 A3
1681:85 FB A9 25 91 FB A5 FB BA
1689:18 69 10 85 FB A9 01 91 90
1691:FB 60 AD 6E 03 18 69 41 FC
1699:85 FB AD 6F 03 85 FC AD 0A
16A1:6A 03 C9 00 D0 61 A0 00 4A
16A9:B1 FB C9 00 F0 43 A5 FB C2
16B1:38 E9 10 85 FB A0 00 B1 E2
16B9:FB 38 E9 08 CD 89 4A 90 69
16C1:03 4C A7 4E AD 89 4A 18 9C
16C9:69 05 91 FB 20 03 4D A5 2B
16D1:FB 18 69 10 85 FB A9 00 9F
16D9:91 FB A5 FB 38 E9 08 85 41
16E1:FB B1 FB C9 00 F0 03 4C AA
16E9:B2 4E A9 01 91 FB 4C B2 10
16F1:4E A5 FB 38 E9 10 85 FB 48
16F9:A9 F7 91 FB A5 FB 18 69 A1
1701:10 85 FB A9 FF 91 FB 60 51
1709:AD 6C 03 85 FB AD 6D 03 56
1711:85 FC A0 00 AD 65 03 C9 28
1719:FF F0 06 C9 01 F0 20 D0 BD
1721:3B A9 00 91 FB A5 FB C9 A8
1729:59 F0 0A C6 FB A5 FB 8D E9
1731:6C 03 4C 07 4F A9 60 85 B7
1739:FB 8D 6C 03 4C 07 4F A0 44
1741:00 A9 00 91 FB A5 FB C9 2B
1749:60 F0 0A E6 FB A5 FB 8D 8F
1751:6C 03 4C 07 4F A9 59 85 C9
1759:FB 8D 6C 03 AD 70 03 C9 A5
1761:11 D0 05 A9 0C 8D 70 03 02
1769:EE 70 03 AD 70 03 91 FB 15
1771:AD 6E 03 85 FB AD 6F 03 43
1779:85 FC AD 64 03 C9 FF F0 D5
1781:06 C9 01 F0 22 D0 3D A0 C3
1789:00 A9 0D 91 FB A5 FB C9 15
1791:49 F0 0A C6 FB A5 FB 8D 4A
1799:6E 03 4C 6F 4F A9 50 85 87
17A1:FB 8D 6E 03 4C 6F 4F A0 8E
17A9:00 A9 0D 91 FB A5 FB C9 35
17B1:50 F0 0A E6 FB A5 FB 8D EF
17B9:6E 03 4C 6F 4F A9 49 85 99
17C1:FB 8D 6E 03 AD 71 03 C9 52
17C9:09 D0 05 A9 03 8D 71 03 20
17D1:EE 71 03 AD 71 03 91 FB C5
17D9:AD A8 03 F0 04 CE A8 03 28
17E1:60 A9 03 8D A8 03 A9 82 0B
17E9:85 FB A9 03 85 FC A0 00 A0
17F1:B1 FB C9 00 D0 1A A5 FB 67
17F9:38 E9 29 85 FB A9 06 91 60
1801:FB A5 FB 18 69 29 85 FB 90
1809:C0 07 F0 19 C8 4C 9B 4F 09
1811:A5 FB 38 E9 29 85 FB A9 B9
1819:00 91 FB A5 FB 18 69 29 C3
1821:85 FB 4C B3 4F A9 8A 85 93
1829:FB A9 03 85 FC A0 00 B1 96
1831:FB C9 00 D0 1B A5 FB 38 7E
1839:E9 41 85 FB A9 01 91 FB 8F
1841:A5 FB 18 69 41 85 FB C0 B5
1849:07 F0 04 C8 4C DA 4F 60 13
1851:A5 FB 38 E9 41 85 FB A9 BA
1859:0D 91 FB A5 FB 18 69 41 A2
1861:85 FB 4C F2 4F A9 82 85 B7
1869:FB A9 03 85 FC A9 72 85 B3
1871:FD A9 03 85 FE A0 00 B1 EF
1879:FB C9 FF F0 06 C9 01 F0 73
1881:26 D0 1B B1 FD 18 69 17 B1
1889:CD 89 4A B0 0A B1 FD 18 82
1891:69 01 91 FD 4C 49 50 20 11
1899:C2 50 A9 01 91 FB C0 07 89
18A1:F0 04 C8 4C 22 50 60 B1 ED
18A9:FD C9 1E 90 0A B1 FD 38 63
18B1:E9 01 91 FD 4C 49 50 A9 FA
18B9:FF 91 FB 4C 49 50 A9 8A FB
18C1:85 FB A9 03 85 FC A9 7A 07
18C9:85 FD A9 03 85 FE A0 00 0B
18D1:B1 FB C9 FF F0 06 C9 01 47
18D9:F0 1F D0 14 B1 FD C9 FB BA
18E1:B0 0A B1 FD 18 69 01 91 FC
18E9:FD 4C 9B 50 A9 01 91 FB 15
18F1:C0 07 F0 04 C8 4C 7B 50 61
18F9:60 B1 FD 38 E9 06 CD 89 96
1901:4A 90 0A B1 FD 38 E9 01 7E
1909:91 FD 4C 9B 50 20 D7 50 C9
1911:A9 FF 91 FB 4C 9B 50 A9 25
1919:10 8D 0C D4 A9 45 8D 08 0B
1921:D4 A9 80 8D 0B D4 A9 81 91
1929:8D 0B D4 60 A9 24 8D 05 83
1931:D4 A9 2F 8D 01 D4 A9 10 B5
1939:8D 04 D4 A9 11 8D 04 D4 04
1941:60 AD 00 DC A0 00 A2 00 27
1949:4A B0 01 88 4A B0 01 C8 55
1951:4A B0 01 CA 4A B0 01 E8 A1
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1959:4A 8E 66 03 2A 29 01 8D D6
1961:68 03 AD 01 DC A0 00 A2 5A
1969:00 4A B0 01 88 4A B0 01 24
1971:C8 4A B0 01 CA 4A B0 01 A2
1979:E8 4A 8E 69 03 2A 29 01 2F
1981:8D 6B 03 AD 68 03 C9 00 73
1989:D0 11 AD 67 03 C9 00 D0 A4
1991:12 AD AB 03 C9 FF F0 0B 19
1999:EE AB 03 A9 01 8D 67 03 39
19A1:4C 5C 51 20 9B 4C A9 00 9E
19A9:8D AB 03 AD 68 03 8D 67 9A
19B1:03 AD 6B 03 C9 00 D0 11 6F
19B9:AD 6A 03 C9 00 D0 12 AD 6F
19C1:AC 03 C9 FF F0 0B EE AC 82
19C9:03 A9 01 8D 6A 03 4C 8A 63
19D1:51 20 8B 4C A9 00 8D AC FF
19D9:03 AD 6B 03 8D 6A 03 AD 60
19E1:66 03 C9 00 F0 11 AD 65 CD
19E9:03 C9 00 F0 12 AD AD 03 C4
19F1:C9 01 F0 0B EE AD 03 A9 F5
19F9:00 8D 65 03 4C B8 51 20 74
1A01:72 4C A9 00 8D AD 03 AD 8D
1A09:66 03 8D 65 03 AD 69 03 DD
1A11:C9 00 F0 11 AD 64 03 C9 28
1A19:00 F0 12 AD AE 03 C9 01 BC
1A21:F0 0B EE AE 03 A9 00 8D A5
1A29:64 03 4C E6 51 20 4E 4C 3C
1A31:A9 00 8D AE 03 AD 69 03 7B
1A39:8D 64 03 60 A9 82 85 FB 12
1A41:A9 03 85 FC A9 00 8D 9A 8E
1A49:03 A0 00 B1 FB C9 00 D0 1A
1A51:03 EE 9A 03 C0 07 F0 04 4E
1A59:C8 4C F6 51 A9 8A 85 FB 77
1A61:A9 03 85 FC A9 00 8D 9B AF
1A69:03 A0 00 B1 FB C9 00 D0 3A
1A71:03 EE 9B 03 C0 07 F0 04 8E
1A79:C8 4C 16 52 AD 9B 03 CD BC
1A81:9A 03 90 6D F0 6A AD 89 C2
1A89:4A C9 3E D0 03 4C 8B 53 DD
1A91:38 E9 01 8D 89 4A A9 82 A0
1A99:85 FB A9 03 85 FC A0 00 56
1AA1:B1 FB C9 00 D0 15 A5 FB 09
1AA9:38 E9 10 85 FB B1 FB 38 A5
1AB1:E9 01 91 FB A5 FB 18 69 C3
1AB9:10 85 FB C0 07 F0 04 C8 AF
1AC1:4C 4B 52 A9 8A 85 FB A9 DF
1AC9:03 85 FC A0 00 B1 FB C9 13
1AD1:00 D0 15 A5 FB 38 E9 10 DB
1AD9:85 FB B1 FB 38 E9 01 91 C2
1AE1:FB A5 FB 18 69 10 85 FB 11
1AE9:C0 07 F0 04 C8 4C 78 52 59
1AF1:60 AD 89 4A C9 E8 D0 03 2E
1AF9:4C 07 53 18 69 01 8D 89 F5
1B01:4A A9 82 85 FB A9 03 85 81
1B09:FC A0 00 B1 FB C9 00 D0 D8
1B11:15 A5 FB 38 E9 10 85 FB D4
1B19:B1 FB 18 69 01 91 FB A5 AC
1B21:FB 18 69 10 85 FB C0 07 2E
1B29:F0 04 C8 4C B6 52 A9 8A 93
1B31:85 FB A9 03 85 FC A0 00 EF
1B39:B1 FB C9 00 D0 15 A5 FB A2
1B41:38 E9 10 85 FB B1 FB 18 1F
1B49:69 01 91 FB A5 FB 18 69 1D
1B51:10 85 FB C0 07 F0 04 C8 49
1B59:4C E3 52 60 A9 60 8D 0C F4
1B61:D4 8D 05 D4 A9 00 8D 5C 18
1B69:03 A9 20 8D 75 03 A9 FF 73
1B71:8D 85 03 A9 FA 8D 89 4A 36
1B79:A9 08 8D 15 D0 A9 08 8D 54
1B81:1D D0 8D 17 D0 A9 5C 8D 11
1B89:AF 03 A9 10 8D 04 D4 A9 5E
1B91:15 8D 04 D4 AD 3D 03 8D 79
1B99:0F D4 AD 75 03 8D 01 D4 BE
1BA1:20 97 4D 20 10 50 20 10 8B
1BA9:50 A0 40 20 5B 4D AD AF 55
1BB1:03 C9 01 F0 06 CE AF 03 D8
1BB9:4C 35 53 A9 00 8D 15 D0 99
1BC1:A9 FF 8D 3D 03 A0 FF 20 0D
1BC9:5B 4D AD 3D 03 D0 06 CE C0
1BD1:3D 03 4C 70 53 A9 00 8D C6
1BD9:17 D0 8D 1D D0 4C AB 40 A2
1BE1:A9 15 8D 13 D4 8D 05 D4 D0
1BE9:A9 0D 8D 4C 03 A9 E0 8D BC
1BF1:7D 03 A9 01 8D 8D 03 A9 3F
1BF9:1C 8D 89 4A A9 08 8D 15 15
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1C01:D0 A9 08 8D 1D D0 8D 17 44
1C09:D0 A9 5C 8D AF 03 A9 10 65
1C11:8D 12 D4 A9 15 8D 12 D4 A1
1C19:AD 3D 03 8D 01 D4 AD 7D E4
1C21:03 8D 0F D4 20 75 4D 20 FE
1C29:69 50 20 69 50 A0 40 20 6A
1C31:5B 4D AD AF 03 C9 01 F0 4D
1C39:06 CE AF 03 4C B9 53 A9 E7
1C41:00 8D 15 D0 A9 FF 8D 3D 32
1C49:03 A0 FF 20 5B 4D AD 3D D5
1C51:03 D0 06 CE 3D 03 4C F4 70
1C59:53 A9 00 8D 17 D0 8D 1D B2
1C61:D0 4C AB 40 AC 3F 03 A9 A0
1C69:0A 8D 3F 03 CE 3F 03 88 24
1C71:D0 FA AD A0 03 C9 3C F0 39
1C79:06 EE A0 03 4C 3B 54 20 CC
1C81:EC 50 20 C7 4D 20 3D 4E 78
1C89:20 B3 4E A9 00 8D A0 03 9D
1C91:AD A1 03 C9 0F F0 06 EE 3D
1C99:A1 03 4C 53 54 20 10 50 B5
1CA1:20 69 50 A9 00 8D A1 03 65
1CA9:AD A2 03 C9 1E F0 06 EE 0E
1CB1:A2 03 4C 6B 54 20 75 4D 97
1CB9:20 97 4D A9 00 8D A2 03 AA
1CC1:AD A3 03 C9 FF F0 06 EE 75
1CC9:A3 03 4C 80 54 20 E7 51 6A
1CD1:A9 00 8D A3 03 AE 3F 03 1F
1CD9:A0 18 88 D0 FD CA D0 F8 3C
1CE1:4C 1D 54 00 00 00 00 00 12
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Ultrafont+

See instructions in article on page 36 before typing in.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```
C000:4C 13 C5 00 01 03 04 00 41
C008:01 03 04 00 AD 30 02 48 C5
C010:AD 2D 02 8D 30 02 8D 4F C0
C018:02 20 2F C1 68 8D 30 02 80
C020:A9 64 85 FC A9 00 85 FB 64
C028:85 A7 A9 D8 85 A8 A9 08 43
C030:8D 28 02 A9 02 8D 2A 02 F9
C038:A9 05 8D 29 02 AE 03 C0 A5
C040:AD 4F 02 CD 30 02 D0 02 B6
C048:A2 02 8E 50 02 A0 00 B1 B6
C050:FD AA AD 3F 02 F0 03 4C 4B
C058:E9 C0 A9 CF 91 FB 8A 0A CC
C060:AA B0 08 AD 50 02 91 A7 94
C068:4C 70 C0 AD 04 C0 91 A7 0D
C070:C8 C0 08 D0 DD 18 A5 FB 2B
C078:69 08 85 FB 85 A7 A5 FC 34
C080:69 00 85 FC 69 74 85 A8 08
C088:18 A5 FD 69 08 85 FD A5 CD
C090:FE 69 00 85 FE 38 EE 4F 4A
C098:02 CE 29 02 AD 29 02 D0 FA
C0A0:9C 38 AD 4F 02 E9 05 8D 78
C0A8:4F 02 38 A5 FD E9 27 85 1F
C0B0:FD A5 FE E9 00 85 FE CE FB
C0B8:28 02 AD 28 02 F0 03 4C 2D
C0C0:38 C0 CE 2A 02 AD 2A 02 28
C0C8:F0 1E A9 08 8D 28 02 18 29
C0D0:AD 4F 02 69 20 8D 4F 02 AB
C0D8:18 A5 FD 69 F8 85 FD A5 A5
C0E0:FE 69 00 85 FE 4C 38 C0 EE
C0E8:60 86 61 A9 00 8D 2B 02 91
C0F0:06 61 2E 2B 02 06 61 2E 5F
C0F8:2B 02 AE 2B 02 A9 CF 91 01
C100:FB C8 A9 F7 91 FB 88 BD B3
C108:03 C0 91 A7 C8 91 A7 C8 8E
C110:C0 08 D0 D7 4C 75 C0 A9 F0
C118:00 8D 1A D0 A5 01 29 FB CE
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C120:85 01 60 A5 01 09 04 85 C6
C128:01 A9 01 8D 1A D0 60 A9 0E
C130:00 85 FE AD 30 02 0A 85 F2
C138:FD 26 FE 06 FD 26 FE 06 11
C140:FD 26 FE A9 70 05 FE 85 E1
C148:FE 60 20 2F C1 A0 00 B1 9C
C150:FD 49 FF 91 FD C8 C0 08 DA
C158:D0 F5 20 0C C0 60 A9 66 C7
C160:85 FC A9 DA 85 A8 AD 3A 2D
C168:02 AE 3F 02 F0 02 09 08 4A
C170:8D 50 02 A9 84 85 FB 85 61
C178:A7 A2 08 A9 00 85 61 A0 8D
C180:00 A5 61 91 FB E6 61 AD 9E
C188:50 02 91 A7 C8 C0 20 D0 BB
C190:F0 18 A5 FB 69 28 85 FB F9
C198:85 A7 A5 FC 69 00 85 FC A0
C1A0:69 74 85 A8 CA D0 D8 60 DC
C1A8:20 A9 CB AD 2C 02 8D 18 97
C1B0:D0 A9 C8 0D 3F 02 8D 16 24
C1B8:D0 A9 00 8D 20 D0 8D 21 68
C1C0:D0 20 5E C1 AD 3A 02 AE A5
C1C8:3F 02 F0 02 09 08 8D 86 B4
C1D0:02 A5 D1 85 F3 18 A5 D2 6F
C1D8:69 74 85 F4 A4 D3 B1 D1 D7
C1E0:49 80 91 D1 B1 F3 48 AD 14
C1E8:86 02 91 F3 20 E4 FF F0 27
C1F0:FB AA A4 D3 C9 85 D0 06 FA
C1F8:EE 20 D0 EE 21 D0 C9 86 6B
C200:D0 08 B1 D1 8D 52 02 4C 49
C208:1A C2 C9 87 D0 0C AD 52 61
C210:02 91 D1 68 AD 86 02 48 8F
C218:A2 1D B1 D1 49 80 91 D1 CA
C220:68 91 F3 8A 20 D2 FF 20 D1
C228:E1 FF D0 A5 20 C9 CB A9 7C
C230:00 8D 86 02 A9 0C 8D 20 C2
C238:D0 4C A9 C4 20 17 C1 A9 45
C240:70 85 FC AD 53 02 85 FE 86
C248:A2 08 A9 00 85 FD 85 FB 81
C250:A8 B1 FD 91 FB C8 D0 F9 0E
C258:E6 FE E6 FC CA D0 F2 A5 E2
C260:FC C9 80 F0 07 A9 D0 85 FB
C268:FE 4C 48 C2 20 23 C1 A2 69
C270:04 BD 06 C0 9D 02 C0 CA 75
C278:D0 F7 60 A9 70 85 FC A9 48
C280:74 85 FE A9 00 85 FD 85 B3
C288:FB A8 A2 04 B1 FB 49 FF DA
C290:91 FD C8 D0 F7 E6 FE E6 C4
C298:FC CA D0 F0 60 20 2F C1 1C
C2A0:A0 00 B1 FD 0A 08 4A 28 B9
C2A8:2A 91 FD C8 C0 08 D0 F2 AE
C2B0:4C 0C C0 20 2F C1 A0 00 3B
C2B8:B1 FD 4A 08 0A 28 6A 91 B7
C2C0:FD C8 C0 08 D0 F2 4C 0C 07
C2C8:C0 20 2F C1 A0 00 B1 FD 1F
C2D0:85 61 C8 B1 FD 88 91 FD D8
C2D8:C8 C8 C0 08 D0 F5 A5 61 98
C2E0:88 91 FD 4C 0C C0 20 2F 66
C2E8:C1 A0 07 B1 FD 85 61 88 C4
C2F0:B1 FD C8 91 FD 88 10 F7 2B
C2F8:C8 A5 61 91 FD 4C 0C C0 8B
C300:20 2F C1 A0 00 A9 00 85 D1
C308:61 A2 08 B1 FD 0A 66 61 4B
C310:CA D0 FA A5 61 91 FD C8 01
C318:C0 08 D0 E9 4C D1 C8 20 16
C320:2F C1 A0 08 A9 00 99 30 F4
C328:02 88 D0 FA A9 07 85 61 72
C330:98 AA A9 00 85 07 B1 FD 8D
C338:4A 91 FD 26 07 CA 10 FB EA
C340:A6 61 A5 07 1D 31 02 9D E7
C348:31 02 C6 61 A5 61 10 E0 8B
C350:C8 C0 08 D0 D7 88 B9 31 FF
C358:02 91 FD 88 10 F8 4C 0C 96
C360:C0 20 2F C1 A0 00 98 91 1A
C368:FD C8 C0 08 D0 F9 4C 0C CC
C370:C0 78 A9 7F 8D 0D DC A9 A7
C378:01 8D 1A D0 A9 B1 8D 12 75
C380:D0 A9 1B 8D 11 D0 A9 92 C8
C388:8D 14 03 A9 C3 8D 15 03 58
C390:58 60 AD 12 D0 C9 B1 D0 15
C398:27 A9 F2 8D 12 D0 AD 2C B0
C3A0:02 8D 18 D0 AD 16 D0 29 2D
C3A8:EF 0D 3F 02 8D 16 D0 AD 87
C3B0:39 02 8D 21 D0 A9 01 8D D5
C3B8:19 D0 68 A8 68 AA 68 40 97
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C3C0:A9 B1 8D 12 D0 A9 9E 8D 54
C3C8:18 D0 AD 20 D0 8D 21 D0 18
C3D0:A9 C8 8D 16 D0 EE 25 D0 CF
C3D8:A9 01 8D 19 D0 4C 31 EA BD
C3E0:55 40 00 40 40 00 4C 40 02
C3E8:00 4C 40 00 4C 40 00 4C 3B
C3F0:40 00 40 40 00 55 40 00 7A
C3F8:00 00 55 50 00 40 10 00 51
C400:40 10 00 40 10 00 40 10 C2
C408:00 40 10 00 40 10 00 40 26
C410:10 00 40 10 00 55 50 00 A0
C418:00 00 00 FF FF FF 00 01 A2
C420:01 01 00 FF 01 00 00 FF 72
C428:01 00 00 FF 01 12 55 4C 79
C430:54 52 41 46 4F 4E 54 20 81
C438:2B 20 56 2E 32 92 5F 45 EC
C440:52 52 4F 52 20 4F 4E 20 91
C448:53 41 56 45 2F 4C 4F 41 75
C450:44 5F 12 54 92 41 50 45 DA
C458:20 4F 52 20 12 44 92 49 22
C460:53 4B 3F 5F 46 49 4C 45 79
C468:4E 41 4D 45 3A 5F 45 4E 8F
C470:54 45 52 20 43 4F 4C 4F 01
C478:52 20 4B 45 59 5F 55 53 37
C480:45 20 52 4F 4D 20 53 45 CA
C488:54 3F 20 28 59 2F 4E 29 DF
C490:5F 12 55 92 50 50 45 52 C2
C498:43 41 53 45 20 4F 52 20 D5
C4A0:12 4C 92 4F 57 45 52 3F 41
C4A8:5F A9 2D A0 C4 85 FB 84 B4
C4B0:FC A0 28 A9 20 99 BF 67 CE
C4B8:88 D0 FA B1 FB C8 C9 5F 2B
C4C0:D0 F9 88 84 61 98 4A 49 D5
C4C8:FF 38 69 14 A8 A2 18 18 E6
C4D0:20 F0 FF A0 00 B1 FB 20 8F
C4D8:D2 FF C8 C4 61 90 F6 60 CC
C4E0:85 FB 84 FC A0 28 A9 20 A5
C4E8:99 BF 67 88 D0 FA A2 18 74
C4F0:A0 00 18 20 F0 FF A0 00 98
C4F8:B1 FB C9 5F F0 06 20 D2 3C
C500:FF C8 D0 F4 60 AE 4C 02 7F
C508:F0 08 A0 00 C8 D0 FD CA 72
C510:D0 FA 60 AD 02 DD 09 03 46
C518:8D 02 DD AD 00 DD 29 FC 48
C520:09 02 8D 00 DD A9 64 8D 4E
C528:88 02 A9 93 20 D2 FF A9 DC
C530:00 8D 86 02 A9 08 20 D2 90
C538:FF A0 00 98 99 80 63 C8 D3
C540:10 FA A8 B9 E0 C3 99 80 0D
C548:63 C8 C0 17 D0 F5 A0 00 E0
C550:B9 F7 C3 99 C0 63 C8 C0 AE
C558:20 D0 F5 A9 9C 8D 2C 02 F6
C560:A9 0C 8D 20 D0 A9 80 8D 33
C568:8A 02 20 71 C3 A9 30 8D 87
C570:4C 02 A9 0B 8D 39 02 A9 87
C578:07 A9 00 8D 30 02 8D 2D 9C
C580:02 8D 3F 02 AD 06 C0 09 88
C588:08 8D 3A 02 AD 04 C0 8D 6F
C590:22 D0 AD 05 C0 8D 23 D0 BA
C598:20 0C C0 20 5E C1 A9 CB 6A
C5A0:CD 0B C0 F0 11 8D 0B C0 92
C5A8:A2 D0 8E 53 02 20 3C C2 8C
C5B0:20 0C C0 4C C6 C5 A9 7E 4B
C5B8:A0 C4 20 AD C4 20 E4 FF 15
C5C0:F0 FB C9 4E F0 1D A9 91 C2
C5C8:A0 C4 20 AD C4 20 E4 FF 25
C5D0:F0 FB A2 D0 C9 4C D0 02 58
C5D8:A2 D8 8E 53 02 20 3C C2 BE
C5E0:20 0C C0 20 A9 C4 A9 8E DB
C5E8:8D F8 67 A9 8F 8D F9 67 0F
C5F0:A9 03 8D 15 D0 A9 18 8D FF
C5F8:00 D0 A9 00 8D 10 D0 A9 E5
C600:33 8D 01 D0 A9 B0 8D 03 E5
C608:D0 A9 35 8D 02 D0 A9 00 8E
C610:8D 1D D0 8D 17 D0 8D 26 DB
C618:D0 A9 03 8D 1C D0 A9 00 29
C620:8D 3B 02 8D 3C 02 AD 00 A1
C628:DC 48 29 0F 49 0F 8D 3D 2B
C630:02 68 29 10 8D 3E 02 20 88
C638:E4 FF F0 06 20 C5 C7 4C AA
C640:26 C6 20 05 C5 AD 3E 02 4A
C648:D0 03 20 58 C7 AD 3E 02 FB
C650:49 10 8D 4B 02 AD 3D 02 30
C658:F0 CC AE 3D 02 BD 17 C4 35
C660:AC 3F 02 F0 01 0A 18 6D 31
C668:3B 02 8D 3B 02 18 AD 3C 81
C670:02 7D 22 C4 8D 3C 02 AE FE
C678:3B 02 10 1B A2 00 8E 3B 45
C680:02 AD 30 02 29 1F F0 0F 57
C688:CE 2D 02 A2 07 AD 3F 02 A2
C690:F0 02 A2 06 8E 3B 02 AE DF
C698:3B 02 E0 28 90 16 A2 27 2C
C6A0:8E 3B 02 AD 30 02 29 1F 5A
C6A8:C9 1F F0 08 EE 2D 02 A2 54
C6B0:20 8E 3B 02 AC 3C 02 10 E3
C6B8:1A A0 00 8C 3C 02 AD 30 B9
C6C0:02 C9 20 90 0E 38 AD 2D A8
C6C8:02 E9 20 8D 2D 02 A0 07 68
C6D0:8C 3C 02 AC 3C 02 C0 10 3A
C6D8:90 1A A0 0F 8C 3C 02 AD 41
C6E0:30 02 C9 E0 B0 0E 18 AD E9
C6E8:2D 02 69 20 8D 2D 02 A0 82
C6F0:08 8C 3C 02 AD 3B 02 AC 58
C6F8:3C 02 4A 4A 4A C0 08 90 09
C700:02 69 1F 6D 2D 02 8D 30 62
C708:02 29 E0 4A 4A 69 B0 8D 8A
C710:03 D0 AD 30 02 29 1F 0A 0B
C718:0A 0A 69 35 8D 02 D0 A9 6F
C720:00 69 00 85 61 AD 3C 02 9E
C728:0A 0A 0A 69 33 8D 01 D0 B9
C730:AD 3B 02 0A 0A 0A 26 61 6C
C738:69 18 8D 00 D0 A5 61 69 7D
C740:00 8D 10 D0 AD 30 02 CD 42
C748:51 02 F0 09 20 0C C0 AD 10
C750:30 02 8D 51 02 4C 26 C6 93
C758:20 2F C1 AD 3C 02 29 07 1A
C760:A8 AD 3B 02 29 07 49 07 36
C768:AA E8 86 61 38 A9 00 2A 01
C770:CA D0 FC AE 3F 02 D0 30 F7
C778:85 61 AD 4B 02 D0 16 A9 B6
C780:00 8D 40 02 8D 26 D0 B1 F3
C788:FD 25 61 D0 08 A9 01 8D 10
C790:40 02 8D 26 D0 A5 61 49 FD
C798:FF 31 FD AE 40 02 F0 02 0D
C7A0:05 61 91 FD 20 0C C0 60 30
C7A8:85 62 4A 05 62 49 FF 31 96
C7B0:FD A6 61 CA 85 61 AD 42 11
C7B8:02 4A 2A CA D0 FC 05 61 B3
C7C0:91 FD 4C 0C C0 8D 41 02 A3
C7C8:AE E1 C7 DD E1 C7 F0 04 13
C7D0:CA D0 F8 60 CA 8A 0A AA 5E
C7D8:BD 06 C8 48 BD 05 C8 48 42
C7E0:60 23 85 89 86 8A 4D 52 FD
C7E8:93 12 91 11 9D 1D 46 87 7F
C7F0:8B 31 32 33 34 13 88 8C 97
C7F8:21 22 23 24 56 53 4C 18 F8
C800:04 06 83 54 05 B2 C2 9C DF
C808:C2 E5 C2 C8 C2 FF C2 1E 13
C810:C3 60 C3 49 C1 53 C8 69 FE
C818:C8 7F C8 95 C8 AD C8 F6 E5
C820:C8 19 C9 2A C9 2A C9 2A EC
C828:C9 2A C9 41 C9 5A C9 70 32
C830:C9 82 C9 82 C9 82 C9 82 17
C838:C9 CC C9 02 CB 8E CB A2 0E
C840:CB 23 CC 7A C2 4A C8 A7 3A
C848:C1 D8 C8 A2 FF 9A 20 81 60
C850:FF 4C 13 C5 AD 3C 02 29 3F
C858:07 85 61 38 AD 3C 02 E9 CA
C860:08 38 E5 61 8D 3C 02 4C 84
C868:A9 C8 AD 3C 02 29 07 85 C2
C870:61 18 AD 3C 02 69 08 38 30
C878:E5 61 8D 3C 02 4C A9 C8 28
C880:AD 3B 02 29 07 85 61 38 D3
C888:AD 3B 02 E9 08 38 E5 61 EC
C890:8D 3B 02 4C A9 C8 AD 3B C3
C898:02 29 07 85 61 18 AD 3B B0
C8A0:02 69 08 38 E5 61 8D 3B 1D
C8A8:02 68 68 4C 77 C6 20 2F 6D
C8B0:C1 20 17 C1 A0 07 18 AD 29
C8B8:53 02 65 FE 69 8F 85 FC A2
C8C0:A5 FD 85 FB B1 FB 91 FD B3
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C8D0:C0 AD 3F 02 D0 03 4C 0C 6D
C8D8:C0 20 2F C1 A0 07 B1 FD 57
C8E0:A2 04 4A 08 4A 66 61 28 65
C8E8:66 61 CA D0 F5 A5 61 91 07
C8F0:FD 88 10 EA 4C 0C C0 A9 12
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C900:D0 20 0C C0 20 5E C1 A9 39
C908:32 8D 41 02 20 2B C9 AD 4F
C910:3B 02 29 FE 8D 3B 02 4C 80
C918:A9 C8 A9 00 8D 3F 02 8D E2
C920:1D D0 A9 01 20 37 C9 20 4D
C928:0C C0 60 AD 3F 02 D0 01 7D
C930:60 38 AD 41 02 E9 31 8D 73
C938:42 02 AA BD 03 C0 8D 26 FA
C940:D0 60 AD 3B 02 0D 3C 02 7C
C948:D0 03 8D 2D 02 A9 00 8D CD
C950:3B 02 8D 3C 02 20 0C C0 E0
C958:4C A9 C8 20 4A C1 20 4A 7B
C960:C1 20 2F C1 A0 00 B1 FD 45
C968:99 43 02 C8 C0 08 D0 F6 25
C970:60 20 2F C1 A0 00 B9 43 F9
C978:02 91 FD C8 C0 08 D0 F6 7C
C980:4C 0C C0 A9 6E A0 C4 20 8F
C988:AD C4 20 E4 FF F0 FB A2 D4
C990:00 DD DA E8 F0 08 E8 E0 DF
C998:10 D0 F6 4C A9 C4 38 AD 8A
C9A0:41 02 E9 21 A8 8A 99 03 4A
C9A8:C0 C0 03 F0 0A C0 00 F0 80
C9B0:16 99 21 D0 4C C7 C9 AE AA
C9B8:3F 02 F0 02 29 07 8D 3A 65
C9C0:02 99 03 C0 20 5E C1 20 46
C9C8:0C C0 4C A9 C4 A9 F1 A0 08
C9D0:C9 20 AD C4 20 E4 FF 38 20
C9D8:E9 30 30 F8 C9 0A B0 F4 CF
C9E0:85 61 38 A9 09 E5 61 0A DD
C9E8:0A 0A 0A 8D 4C 02 4C A9 CA
C9F0:C4 43 55 52 53 4F 52 20 24
C9F8:56 45 4C 4F 43 49 54 59 C8
CA00:20 28 30 2D 39 29 3F 5F D4
CA08:A0 00 8C 4E 02 A9 A4 20 84
CA10:D2 FF A9 9D 20 D2 FF 20 8A
CA18:E4 FF F0 FB AC 4E 02 85 26
CA20:61 A9 20 20 D2 FF A9 9D 5E
CA28:20 D2 FF A5 61 C9 0D F0 1A
CA30:27 C9 14 D0 0D C0 00 F0 B7
CA38:D1 88 A9 9D 20 D2 FF 4C 80
CA40:0A CA 29 7F C9 20 90 C2 5D
CA48:C0 14 F0 BE A5 61 99 00 33
CA50:02 20 D2 FF C8 4C 0A CA 9F
CA58:A9 5F 99 00 02 98 60 20 21
CA60:E7 FF A9 52 A0 C4 20 AD 4A
CA68:C4 20 E4 FF F0 FB A2 01 C2
CA70:C9 54 F0 0B A2 08 C9 44 DB
CA78:F0 05 68 68 4C A9 C4 8D 7B
CA80:4D 02 A0 00 A9 01 20 BA 9D
CA88:FF A9 64 A0 C4 20 E0 C4 4C
CA90:20 08 CA D0 07 AD 4D 02 2A
CA98:C9 54 D0 ED AD 4D 02 C9 91
CAA0:44 D0 45 A9 53 8D 14 02 CA
CAA8:A9 30 8D 15 02 A9 3A 8D DA
CAB0:16 02 A0 00 B9 00 02 99 51
CAB8:17 02 C8 CC 4E 02 D0 F4 51
CAC0:C8 C8 C8 AD 41 02 C9 53 D9
CAC8:D0 1A 98 48 A0 02 A2 14 4B
CAD0:20 BD FF A9 0F A2 08 A0 34
CAD8:0F 20 BA FF 20 C0 FF 20 79
CAE0:E7 FF 68 A8 88 4C F6 CA 30
CAE8:A0 00 B9 00 02 99 15 02 A8
CAF0:C8 CC 4E 02 D0 F4 98 A2 36
CAF8:15 A0 02 20 BD FF A9 A0 65
CB00:85 B2 60 20 5F CA 20 A9 25
CB08:CB A9 00 85 FD 85 FB A9 EF
CB10:70 85 FC A2 FF A0 77 A9 26
CB18:FB 20 D8 FF B0 0B 20 B7 7A
CB20:FF D0 06 20 C9 CB 4C A9 6E
CB28:C4 20 C9 CB 20 E7 FF AD 6E
CB30:4D 02 C9 44 F0 0F A9 3F C2
CB38:A0 C4 20 AD C4 20 E4 FF A0
CB40:F0 FB 4C A9 C4 A9 00 20 60
CB48:BD FF A9 0F A2 08 A0 0F 6A
CB50:20 BA FF 20 C0 FF A2 0F 03
CB58:20 C6 FF A0 00 20 CF FF DB
CB60:C9 0D F0 07 99 00 02 C8 48
CB68:4C 5D CB A9 5F 99 00 02 F4
CB70:20 CC FF A9 00 A0 02 20 8C
CB78:AD C4 A2 0F 20 C9 FF A9 2F
CB80:49 20 D2 FF A9 0D 20 D2 B3
CB88:FF 20 E7 FF 4C 3D CB 20 34
CB90:5F CA 20 A9 CB A9 00 A2 D0
CB98:00 A0 70 20 D5 FF B0 89 02
CBA0:4C C9 CB A9 04 8D 88 02 4E
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CBA8:00 78 A9 00 8D 1A D0 A9 B3
CBB0:FF 8D 0D DC A9 31 8D 14 5C
CBB8:03 A9 EA 8D 15 03 A9 00 7A
CBC0:8D 15 D0 A9 93 58 4C D2 82
CBC8:FF A9 93 20 D2 FF 20 71 87
CBD0:C3 A9 03 8D 15 D0 20 0C 26
CBD8:C0 20 5E C1 4C A9 C4 F8 4C
CBE0:A9 00 8D 00 01 8D 01 01 40
CBE8:E0 00 F0 15 CA 18 AD 00 72
CBF0:01 69 01 8D 00 01 AD 01 BC
CBF8:01 69 00 8D 01 01 4C E8 D1
CC00:CB D8 AD 01 01 09 30 8D 95
CC08:02 01 AD 00 01 29 F0 4A 71
CC10:4A 4A 4A 09 30 8D 01 01 F5
CC18:AD 00 01 29 0F 09 30 8D C5
CC20:00 01 60 60 38 A5 2D E9 A8
CC28:02 85 2D A5 2E E9 00 85 C2
CC30:2E A9 18 85 39 A9 F6 85 8A
CC38:3A A9 00 8D 4F 02 85 FB BB
CC40:85 FD A9 70 85 FE AD 53 2F
CC48:02 85 FC 20 17 C1 A0 00 E6
CC50:B1 FB D1 FD D0 3E C8 C0 AD
CC58:08 D0 F5 EE 4F 02 18 A5 30
CC60:FD 69 08 85 FD 85 FB A5 50
CC68:FE 69 00 85 FE 6D 53 02 8A
CC70:69 8F 85 FC AD 4F 02 D0 A2
CC78:D5 A9 00 A8 91 2D C8 91 56
CC80:2D 18 A5 2D 69 02 85 2D C9
CC88:A5 2E 69 00 85 2E 20 23 F5
CC90:C1 4C 33 A5 A0 00 18 A5 B9
CC98:2D 69 29 91 2D C8 A5 2E 67
CCA0:69 00 91 2D C8 A5 39 91 D4
CCA8:2D C8 A5 3A 91 2D C8 A9 DF
CCB0:83 91 2D AE 4F 02 20 DF A3
CCB8:CB C8 AD 02 01 91 2D C8 B1
CCC0:AD 01 01 91 2D C8 AD 00 92
CCC8:01 91 2D C8 84 61 A0 00 64
CCD0:84 62 B1 FD AA 20 DF CB BC
CCD8:A4 61 A9 2C 91 2D C8 AD 95
CCE0:02 01 91 2D AD 01 01 C8 FC
CCE8:91 2D AD 00 01 C8 91 2D C7
CCF0:C8 84 61 A4 62 C8 C0 08 46
CCF8:D0 D6 A4 61 A9 00 91 2D F8
CD00:A0 00 B1 2D 48 C8 B1 2D EA
CD08:85 2E 68 85 2D E6 39 D0 9F
CD10:02 E6 3A 4C 5B CC 00 00 80
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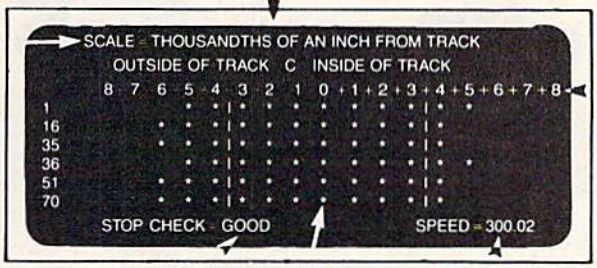

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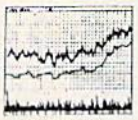

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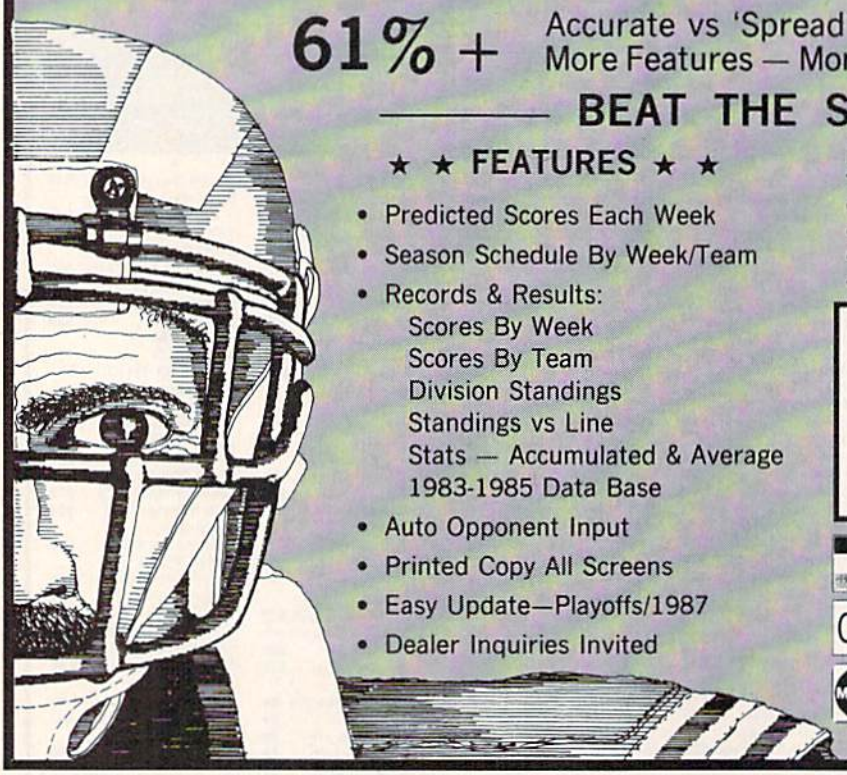

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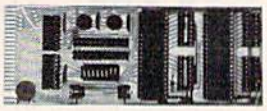

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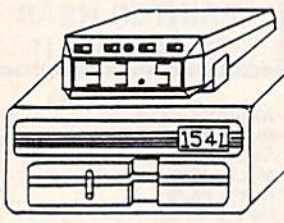

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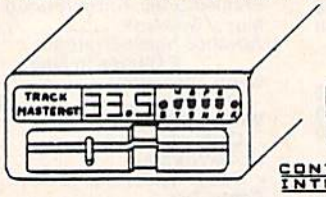

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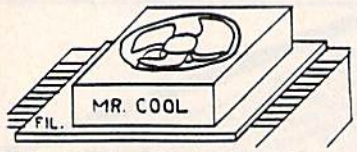

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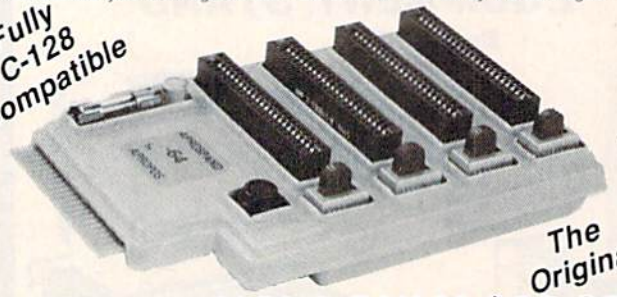

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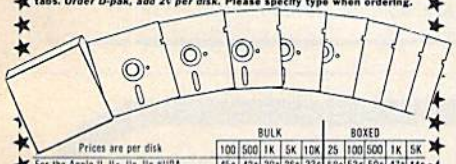

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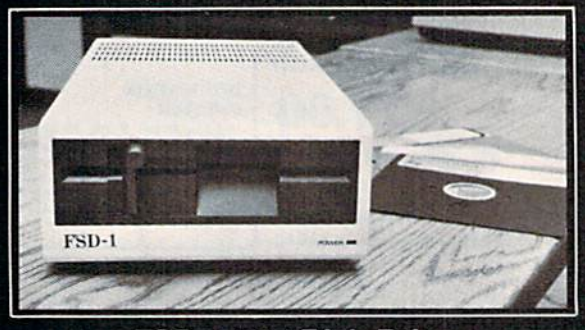

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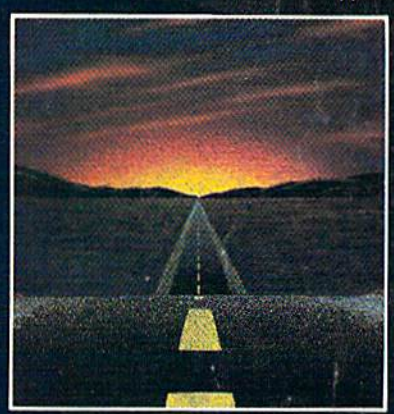

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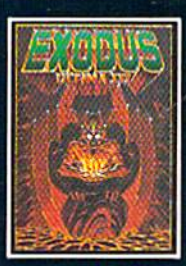

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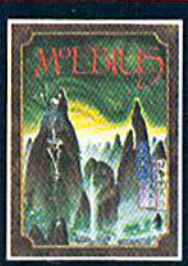

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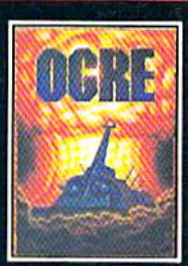

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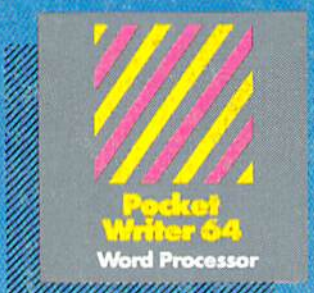

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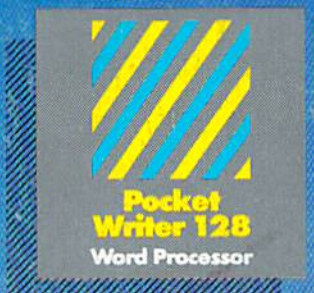

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