

Charles Brannon
Program Editor

I've been learning the C programming language for a few months now. Not only is the study of the language fun in itself, it's also valuable for applications programming on new computers like the Atari 520ST and Commodore's Amiga. Each of these computers supports C as a primary applications language, a niche filled by BASIC and machine language on other machines. It will still be worthwhile to use machine language, but C is a good blend of readability, portability, efficiency, and raw speed (see "C: Language of the Future?" in the October 1985 GAZETTE).

I've recently been impressed with the Pro-Line C Power compiler. Even on a computer like the 64, with somewhat limited resources ("only" 64K, an 8-bit 1Mhz 6502, the slow 1541 disk drive, and no "true" operating system), C can perform exceptionally well.

C Power is a complete programming system. It supplants the operating system with a Unix-like shell that lets you execute commands and programs from a command line, and can pass command arguments to your program. A full-screen, 240-column (horizontal scrolling) text editor makes entering C programs easy and convenient. A version of the standard editor includes a simple C syntax checker. This lets you weed out some of your errors before you go through the elaborate process of compiling and linking.

Using C Power can be a bit tricky. The primary documentation is the 536-page "C Primer Plus," a worthwhile introduction to C written by the Waite Group (published by Howard Sams). The only documentation specific to C Power is 48 photocopied pages stapled together, printed on both sides by a letter-

quality printer. Although the documentation is adequate to get you started, and does include a full description of all the C library functions, it seems a little sparse for a product as complex as a language compiler.

Compiling a C program is fairly easy, though tedious. You start with side one of the C Power disk, and LOAD "SHELL",8 to RUN the command-line shell. Next you load the C editor by typing ED or CED. You type in or edit your C program with the editor, then save it to your work disk. You might first use the CCheck command from the C editor to save you some grief if your program contains any obvious errors. You then exit to the shell, reinsert the compiler disk, then enter "cc program name." The compiler starts (after a lengthy pause while it loads from disk) and prompts you to insert the source disk. You insert your work disk, press RETURN, and the compiler reads your file. You then reinsert the compiler disk, wait some more, then reinsert your work disk so that the compiler can write the completed object file to disk. But you can't run the program yet—you have to link it.

Reinserting the compiler disk, you type LINK from the shell. If you want to prepare a program that can be run independent of the shell, you type LINK -S. You can also have the linker create your program at a specific address. After the linker loads, you enter the name of your object file, and insert your work disk. After your object file is read into memory, you insert side two of the compiler disk and press up-arrow and RETURN. This links in any other library modules used by your program. Finally you reinsert your work disk, and press RETURN to write the finished, executable program to the disk. Be sure to append the .SH suffix if you want your program to run under the

shell. If you LINK -S, you can exit to BASIC and LOAD "program",8 and run it.

As you can see, running a C program involves more than just typing RUN. BASIC is a much easier programming environment to learn and use, but it is slower and less easily extensible than C. The difficulty of compiling and linking pays off with blinding execution speed. Also, linking lets you write large programs in small modules. Each module can be compiled, tested and debugged, then left alone. You don't have to recompile an entire program, just the module you're working on. You can then link all the modules (which is faster than compiling) whenever you want to test the entire program.

C Power is fast. The C benchmark used in "C: Language of the Future?" was a simple bubble sort demo. The bubble sort is not the best kind of sort to use, but it involves a variety of logical and arithmetic functions. The BASIC equivalent (timing the sort only) took two minutes to sort a list of 100 integers. The same program, compiled via C Power, sorted 100 integers in just over four seconds.

C Power
Pro-Line Software, Ltd.
755 The Queensway East, Unit 8
Mississauga, Ontario
Canada L4Y 4C5
\$99.95



We appreciate receiving both corrections and suggested modifications from readers. Address them to:

Bug-Swatter
c/o COMPUTE!'s GAZETTE
P.O. Box 5406
Greensboro, NC 27403

• "64 Disk Boot" from "Hints & Tips" (November 1985) does not work correctly. The line with the POKEs to 770 and 771 should be line 0 and not line 1.

• Some readers with black-and-white televisions or monochrome monitors have suggested that the screen and character colors of "Preview 80" (November 1985) are not ideal. Preview 80 displays blue characters on a black background. To change the character colors, POKE a color code (0-15) into 52500 before you SYS 52000. To change the characters to yellow, for example, POKE 52500,7. For white, POKE 52500,1.

• There are no corrections for "Maze-Mania" (September 1985). If the maze has the wrong shape or is missing some portals, check the spacing in line 170 and the PRINT statements in lines 210-300, especially where there's a {RVS} or {OFF} followed by a space.

• "Turbo-Disk" (July 1985) works on North American 64s, but several readers from Europe and Australia have reported problems with the program. Graeme McKenzie from Darwin, Australia, has apparently found a fix. (Not having access to an Australian 64, nor the 50 Hz electrical current, we can't test this correction). Change these two lines:

49554 DATA 221,162,4,202,208,253
49560 DATA 234,162,4,173,0,221

Also, the checksum in line 160 should be changed from 55976 to 55977. The reason for the incom-

patibility is very technical; it concerns the speed of the internal (1 MHz) clock and the number of clock cycles used by each machine language instruction.

Note that this modification does not apply to North American 64s.

• The printer used for making program listings put a superfluous question mark into line 560 of the Plus/4 version of "Kaleidoscope"

(October 1985). The last number should be 61, not 671.

• "X BASIC" (October 1985) works as listed. Readers who received an OUT OF MEMORY error after loading the program should type NEW before typing SYS 49152. In general, after an absolute load (LOAD "diskprogram",8,1 or LOAD "tape-program",1,1), it's necessary to type NEW to reset some memory pointers.

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Votalker C-64

A new speech synthesizer from Votrax can speak text as it's entered into the computer and spell words upon command. Three types of text vocalization are offered: Conversation mode, which reads text as its spoken; verbatim mode, which reads text and pronounces symbols; and character mode, which spells each word and pronounces numbers and symbols.

The 4 x 5 inch unit plugs into the Commodore 64 expansion port and contains its own amplifier, speaker, and external speaker jack. Suggested retail price, \$99.95.

Votrax, Inc., 1394 Rank, Troy, MI 48083-4074

Circle Reader Service Number 220.

New Mindscape Adventures

In *Quake Minus One*, one of three new adventures from Mindscape, the "Robot Liberation Front" has sabotaged an undersea power station in the middle of the Atlantic Ocean. It's up to the player to capture the renegade robots and prevent an earthquake. Field-of-view perspective and advanced animation are featured.

Shadowfire is a space adventure in which six super-hero characters must

beam aboard an alien spacecraft, locate and rescue a kidnapped ambassador, and destroy the alien craft. Also available is a *Shadowfire Game Changer* disk that enables players to create entirely new *Shadowfire* scenarios.

The medieval era is the setting for *Lords of Midnight*, an illustrated text adventure. Characters must be moved by day across the forbidden Land of Midnight in search of Doomark the Witchking. By night, the computer responds to the player's actions. More than 32,000 different landscapes can be displayed.

Each game lists for \$29.95 and can be played on the Commodore 64 or 128. The *Shadowfire Game Changer* disk is priced at \$9.95.

Mindscape, Inc., 3444 Dundee Rd., Northbrook, IL 60062

Circle Reader Service Number 221.

Six-Part Harmony

Three more voices can now be added to the Commodore 64 and 128's three standard voices with the VT-6 cartridge from V-Tech. The cartridge is sold with the *Visible Music Monitor* software, which supports both sound chips and enables music creation, editing, and playing, as well as disk or tape storage and retrieval.

Editing features allow control over the sequence in which music segments are played or repeated, and a playlist can be specified to play a group of songs automatically.

The system (*Visible Music Monitor* and VT-6 cartridge) runs on a Commodore 64 or 128 with either disk or tape and either color or monochrome monitor. Suggested retail price, \$89.

V-Tech, Inc., 2223 Rebecca, Hatfield, PA 19440

Circle Reader Service Number 222.

More From Bank Street

Brøderbund has released three new Bank Street programs for the Commodore 64. *Bank Street Speller*, a proof-reader and spelling checker for the popular *Bank Street Writer* word processor, highlights misspelled words with the use of its 30,000 word dictionary. *Bank Street Filer*, Brøderbund's new database management program, prints out customized reports. A mailing list and letter-writing program, *Bank Street Mailer*, includes a mailing list manager. Each program comes with a backup disk and lists for \$49.95.

Brøderbund Software, 17 Paul Dr., San Rafael, CA 94903-2101

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Sesame Street Software

Three new Sesame Street titles for ages four to six have been released from CBS Software. In *Ernie's Big Splash*, children help Ernie find his Rubber Duckie by building a pathway in Ernie's bathtub. Fire hydrants, a water slide, and a friendly alligator are among the available building pieces.

Grover's Animal Adventures is an animal classification activity with colorful graphics and music. The program presents four different animal environments: the African grasslands, the Atlantic Ocean, a North American forest, and a barnyard. Children select from an array of animated animals and objects and place them on land, water or in the sky.

Big Bird, Bert, Ernie, and other Sesame Street characters explore the city in *Sesame Street Pals Around Town*. Children can create their own scenes and stories with music and animated objects.

Each program is on disk and lists for \$14.95.

CBS Software, One Fawcett Place,
Greenwich, CT 06836

Circle Reader Service Number 224.

Gardening Guide

A comprehensive gardening and landscaping guide has been created for the Commodore 64 by Ortho Books. Called *Ortho's Computerized Gardening*, the program provides gardening information for specific areas according to zip code.

With the program, users can create plant lists according to flower color, growing conditions, watering requirements, growth habits, and desired use.

Also included is a plant encyclopedia, with information about hundreds of plants; a planning calendar and diary; and a calculator for determining landscape dimensions or planning a budget.

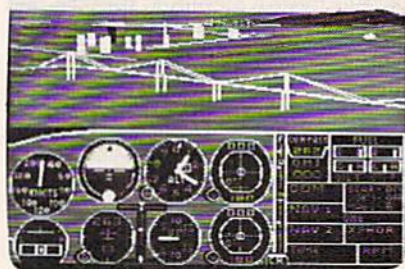
Ortho's Computerized Gardening comes with a 192-page gardening techniques book, and a bonus Garden Planning Kit. Suggested retail price is \$49.95.

Ortho Information Services, Chevron Chemical Co., 575 Market St., San Francisco, CA 94105

Circle Reader Service Number 225.

A Change Of Scenery

SubLogic has released six new scenery disks for the Commodore 64 versions of *Flight Simulator II* and *Jet*. The disks cover the Western half of the continental United States. Each disk includes major airports, cities, highways, rivers, lakes, and radio-nav aids.



Scenery disks are now available for SubLogic's *Flight Simulator II* and *Jet*.

The entire six-disk set can be purchased for \$99.95; individual scenery disk packages sell for \$19.95 each.

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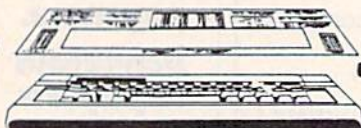
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How To Type In COMPUTE!'s GAZETTE Programs

Each month, COMPUTE!'s GAZETTE publishes programs for the Commodore 128, 64, Plus/4, 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, [F3], 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

[F1]	COMMODORE	1	
[F2]	COMMODORE	2	
[F3]	COMMODORE	3	
[F4]	COMMODORE	4	
[F5]	COMMODORE	5	
[F6]	COMMODORE	6	
[F7]	COMMODORE	7	
[F8]	COMMODORE	8	

The Automatic Proofreader

Charles Brannon, Program Editor

"The Automatic Proofreader" will help you type in program listings from *COMPUTE!'s GAZETTE* without typing mistakes. It is a short error-checking program that hides itself in memory. When activated, it lets you know immediately after typing a line from a program listing if you have made a mistake. Please read these instructions carefully before typing any programs in *COMPUTE!'s GAZETTE*.

Preparing The Proofreader

1. Using the listing below, type in the Proofreader. The same program works on both the VIC-20 and Commodore 64. Be very careful when entering the DATA statements—don't type an 1 instead of a 1, an O instead of a 0, extra commas, etc.

2. Save the Proofreader on tape or disk at least twice *before running it for the first time*. This is very important because the Proofreader erases this part of itself when you first type RUN.

3. After the Proofreader is saved, type RUN. It will check itself for typing errors in the DATA statements and warn you if there's a mistake. Correct any errors and save the corrected version. Keep a copy in a safe place—you'll need it again and again, every time you enter a program from *COMPUTE!'s GAZETTE*.

4. When a correct version of the Proofreader is run, it activates itself. You are now ready to enter a program listing. If you press RUN/STOP—RESTORE, the Proofreader is disabled. To reactivate it, just type the command SYS 886 and press RETURN.

Using The Proofreader

All VIC and 64 listings in *COMPUTE!'s GAZETTE* now have a *checksum number* appended to the end of each line, for example "rem 123". Don't enter this statement when typing in a program. It is just for your information. The rem makes the number harmless if someone does type it in. It will, however, use up memory if you enter it, and it will confuse the Proofreader, even if you entered the rest of the line correctly.

When you type in a line from a program listing and press RETURN, the Proofreader displays a number at the top of your screen. This checksum number must match the checksum number in the printed listing. If it doesn't, it means you typed the line differently than the

way it is listed. Immediately recheck your typing. Remember, don't type the rem statement with the checksum number; it is published only so you can check it against the number which appears on your screen.

The Proofreader is not picky with spaces. It will not notice extra spaces or missing ones. This is for your convenience, since spacing is generally not important. But occasionally proper spacing is important, so be extra careful with spaces, since the Proofreader will catch practically everything else that can go wrong.

There's another thing to watch out for: if you enter the line by using abbreviations for commands, the checksum will not match up. But there is a way to make the Proofreader check it. After entering the line, LIST it. This eliminates the abbreviations. Then move the cursor up to the line and press RETURN. It should now match the checksum. You can check whole groups of lines this way.

Special Tape SAVE Instructions

When you're done typing a listing, you must disable the Proofreader before saving the program on tape. Disable the Proofreader by pressing RUN/STOP—RESTORE (hold down the RUN/STOP key and sharply hit the RESTORE key). This procedure is not necessary for disk SAVES, but you must disable the Proofreader this way before a tape SAVE.

SAVE to tape erases the Proofreader from memory, so you'll have to load and run it again if you want to type another listing. SAVE to disk does not erase the Proofreader.

Since the Proofreader is a machine language program stored in the cassette buffer, it will be erased during a tape SAVE or LOAD. If you intend to type in a program in more than one sitting or wish to make a safety SAVE, follow this procedure:

1. Load and run the Proofreader.
2. Disable it by pressing RUN/STOP—RESTORE.
3. Type the following two lines in direct mode (without line numbers):

```
AS="PROOFREADER.T":FORX=1TO40:AS=
AS+" ":NEXT
FORX=886TO1018:AS=AS+CHR$(PEEK(X))
:NEXT:OPEN1,1,1,AS:CLOSE1
```

After you type the last line, you will be asked to press RECORD and PLAY. We recommend you start at the beginning of a new tape.

You now have a new version of the Proofreader (PROOFREADER.T, as renamed in the above code). Turn your computer off and on, then load the program you were working on. Put the cassette containing PROOFREADER.T into the tape unit and type:

OPEN1:CLOSE1

You can now get into the Proofreader by typing SYS 886. To test this, PRINT PEEK (886) should return the number 173. If it does not, repeat the steps above, making sure that AS (PROOFREADER.T) contains 13 characters.

The new version of Automatic Proofreader will load itself into the cassette buffer whenever you type OPEN1:CLOSE1 and PROOFREADER.T is the next program on your tape. It will not disturb the contents of BASIC memory.

The above code converts the machine language program into characters that are concatenated into a string. When you open a tape file, using the string as the name of the file, the tape header contains the machine language program (disguised as part of the filename). Opening and closing the tape file loads the header into the cassette buffer, but does not disturb BASIC programs already in memory.

Automatic Proofreader For VIC And 64

```
10 PRINT"[CLR]PLEASE WAIT...":FOR
I=886TO1018:READA:CK=CK+A:POKE
I,A:NEXT
20 IF CK<>17539 THEN PRINT"[DOWN]
YOU MADE AN ERROR":PRINT"IN DA
TA STATEMENTS.":END
30 SYS886:PRINT"[CLR]{2 DOWN}PROO
FREADER ACTIVATED.":NEW
40 DATA 173,036,003,201,150,208
50 DATA 001,096,141,151,003,173
60 DATA 037,003,141,152,003,169
70 DATA 150,141,036,003,169,003
80 DATA 141,037,003,169,000,133
90 DATA 254,096,032,087,241,133
100 DATA 251,134,252,132,253,008
110 DATA 201,013,240,017,201,032
120 DATA 240,005,024,101,254,133
130 DATA 254,165,251,166,252,164
140 DATA 253,040,096,169,013,032
150 DATA 210,255,165,214,141,251
160 DATA 003,206,251,003,169,000
170 DATA 133,216,169,019,032,210
180 DATA 255,169,018,032,210,255
190 DATA 169,058,032,210,255,166
200 DATA 254,169,000,133,254,172
210 DATA 151,003,192,087,208,006
220 DATA 032,205,189,076,235,003
230 DATA 032,205,221,169,032,032
240 DATA 210,255,032,210,255,173
250 DATA 251,003,133,214,076,173
260 DATA 003
```


All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

Disk Disassembler

Article on page 110.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```

100 BA=53280:PR=65490:CO=646:A
   C=780:PRINT" [CLR]":POKEBA,
   0:POKEBA+1,0 :rem 65
110 FORA=8280TO985:READB:POKEA,
   B:NEXT :rem 11
120 DATA 32,253,174,32,158,173
   ,32,130,183,168,169,0,145,
   34,162,0,181,0,157 :rem 51
130 DATA 0,160,202,208,248,165
   ,34,133,122,165,35,133,123
   ,32,172,3,169,1,133:rem 83
140 DATA 129,208,7,32,121,0,20
   ,0,240,43,32,115,0,176,32
   ,32,172,3,169 :rem 30
150 DATA 36,32,210,255,32,131,
   174,32,155,188,165,100,240
   ,3,32,181,3,165,101:rem 82
160 DATA 32,181,3,32,172,3,76,
   101,3,32,210,255,76,101,3,
   120,162,0,169 :rem 33
170 DATA 54,133,1,189,0,160,14
   ,9,0,202,208,248,169,55,133
   ,1,88,96,166,122 :rem 225
180 DATA 208,2,198,123,198,122
   ,96,72,74,74,74,74,32,195,
   3,104,41,15,76 :rem 142
190 DATA 195,3,170,189,202,3,7
   ,6,210,255,48,49,50,51,52,5
   ,3,54,55,56,57 :rem 88
200 DATA 65,66,67,68,69,70
   :rem 16
210 OPEN15,8,15:PRINT#15,"M-W"
   ;CHR$(106)CHR$(0)CHR$(1)CH
   R$(133):CLOSE15 :rem 218
220 OPEN1,0 :rem 83
230 POKEAC,147:SYSPR:DIM C$(25
   5),C(255) :rem 175
240 POKECO,1:PRINT" {HOME}
   {10 SPACES}DISK DISASSEMBL
   ER" :rem 123
250 READA$,B,C:IFA$="END"THEN2
   90 :rem 69
260 C$(B)=A$:C(B)=C :rem 196
270 GOTO250 :rem 105
280 POKE152,0:OPEN1,0:PRINT"
   [CLR]"TAB(4)" {6 SPACES}DIS
   K DISASSEMBLER":Q$="":NU$=
   "" :rem 79
290 PRINT:PRINT:PRINT"ENTER DI
   SASSEMBLY: {RVS}R{OFF}AM O
   R {RVS}D{OFF}ISK" :rem 230
300 GETMD$:IFMD$="D"ORMD$="R"
   T HEN320 :rem 88
310 GOTO300 :rem 96
320 IFMD$="R"THEN340 :rem 114
330 GOTO390 :rem 107
340 PRINT:PRINT"ENTER STARTING
   ADDRESS: "; :rem 148
350 INPUT#1,SA :rem 60
360 PRINT:PRINT" {DOWN}ENTER EN
   DING ADDRESS" :rem 123

```

```

370 PRINT"(IF NOT KNOWN PUT 0)
   : "; :rem 103
380 INPUT#1,ED:PRINT:GOTO420
   :rem 4
390 PRINT:PRINT"ENTER ML FILE
   {SPACE}NAME: "; :rem 1
400 INPUT#1,F$:OPEN2,8,2,"0":"+
   F$:CLOSE2:OPEN15,8,15:INPU
   T#15,A$,B$,C$,D$ :rem 36
410 IFVAL(A$)>0THEN860:rem 248
420 PRINT:PRINT" {2 DOWN}DO YOU
   WANT LIST HOLD [Y/N]: ";
   :rem 128
430 GETSP$:IFSP$="Y"ORSP$="N"
   T HEN450 :rem 167
440 GOTO430 :rem 104
450 PRINTSP$:IFSP$="Y"THENLH=1
   :rem 136
460 IFSP$="N"THENLH=0 :rem 239
470 CLOSE15:POKE198,0 :rem 222
480 PRINT" {DOWN}SEND TO SCREEN
   [Y/N]: "; :rem 14
490 GETSP$:IFSP$="Y"ORSP$="N"
   T HEN510 :rem 170
500 GOTO490 :rem 107
510 POKE198,0 :rem 195
520 PRINTSP$:IFSP$="Y"THENSC=1
   :rem 136
530 IFSP$="N"THENSC=0 :rem 239
540 PRINT" {DOWN}SEND TO PRINTE
   R [Y/N]: "; :rem 111
550 GETSP$:IFSP$="Y"ORSP$="N"
   T HEN570 :rem 173
560 GOTO550 :rem 110
570 POKE198,0 :rem 201
580 PRINTSP$:IFSP$="Y"THENPR=1
   :rem 154
590 IFSP$="N"THENPR=0 :rem 1
600 PRINT" {DOWN}SEND TO DISK [
   Y/N]: "; :rem 115
610 POKE198,0 :rem 196
620 GETSP$:IFSP$="Y"ORSP$="N"
   T HEN640 :rem 169
630 GOTO620 :rem 106
640 PRINTSP$:IFSP$="Y"THENDI=1
   :rem 130
650 IFDI=1ANDLH=1THENPRINT"
   {RVS} {DOWN}LIST HOLD DISAC
   TIVATED{OFF}":LH=0:ER=1:GO
   SUB860 :rem 89
660 IFSP$="N"THENDI=0 :rem 234
670 IFDI=0THEN700 :rem 236
680 PRINT"ENTER DESTINATION'S
   {SPACE}FILE NAME: "; :rem 95
690 INPUT#1,D$:PRINT:POKE198,0
   :rem 69
700 HF=0:PRINT" {DOWN}HEXADECIM
   AL OUTPUT [Y/N]: ";:POKE19
   8,0 :rem 30
710 GETSP$:IFSP$<>"Y"ANDSP$<>"
   N"THEN710 :rem 83
720 PRINTSP$:IFSP$="Y"THENHF=1
   :rem 130
730 PRINT" {DOWN}INFORMATION CO
   RRECT [Y/N]: "; :rem 215
740 GETYN$:IFYN$="Y"ORYN$="N"
   T HEN760 :rem 187
750 GOTO740 :rem 112
760 PRINTYN$:IFYN$="N"THEN280
   :rem 33
770 PRINT" {CLR}ADDR. {2 SPACES}
   COMMAND {7 SPACES}OP CODE "
   :CLOSE1 :rem 229
780 PRINT" {5 T$} {2 SPACES} {7 T$}
   {7 SPACES} {7 T$} " :rem 137
790 IFMD$="D"THENOPEN15,8,15:P
   RINT#15,"I0" :rem 159
800 IFMD$="D"THENOPEN2,8,0,F$:
   CLOSE1 :rem 107
810 IFST<>0THEN860 :rem 70
820 IFDI=1THENGOSUB1770:REM GO
   TO INIT FILE :rem 77

```

```

830 IFPR=1THENOPEN4,4 :rem 47
840 IFST<>0THEN860 :rem 73
850 GOTO990 :rem 120
860 REM CHECK FOR ERROR:rem 81
870 CC=0:IFVAL(A$)>0THENER=0
   :rem 149
880 IFER<>1THENPRINT" {HOME}
   {7 DOWN} {RVS}IO/ERROR:
   {OFF} ";A$," ";B$," ";C$,"
   ";D$ :rem 177
890 IFER<>1THENCLOSE1:CLOSE2:C
   LOSE3:CLOSE15 :rem 35
900 POKE54276,0:S=54272:V=S+24
   :POKEV,4 :rem 202
910 POKES+5,0*16+0:POKES+6,15*
   16+0:POKES+4,33 :rem 12
920 POKES,4:POKES+1,48:FORA=0
   T 0350:NEXT:POKES,2:POKES+1,
   24:FORA=0TO350:NEXT
   :rem 247
930 CC=CC+1:IFCC<>3THEN920
   :rem 7
940 POKEV,0:IFER=1THENRETURN
   :rem 91
950 PRINT:PRINT"PRESS {RVS}ANY
   KEY{OFF} TO RESTART"
   :rem 0
960 IFPEEK(197)<>64THEN280
   :rem 242
970 GOTO960 :rem 120
980 REM START DISASSEMBLER
   :rem 145
990 IFMD$="D"THENGET#2,LO$:REM
   GET STARTING ADDRESS
   :rem 106
1000 IFMD$="D"THENGET#2,HI$:LO
   =ASC(LO$+CHR$(0)):HI=ASC(
   HI$+CHR$(0)) :rem 71
1010 IFMD$="D"THENSEA=HI*256+LO
   :REM STARTING ADDRESS
   :rem 121
1020 IFDI=1ANDQQ=0THENGOSUB177
   0 :rem 173
1030 IFPEEK(653)THEN1030
   :rem 90
1040 SX=SX+1:IFSX=19ANDLH=1THE
   NGOSUB2040 :rem 25
1050 IFHFANDSCANDQ$<>" "THENSYS
   828,Q$:PRINTTAB(20);:SYS8
   28,NU$:PRINT:GOTO1070
   :rem 31
1060 IFSC=1THENPRINTQ$,NU$
   :rem 126
1070 IFPR=1THENPRINT#4,Q$+CHR$(
   16)+"20"+NU$ :rem 194
1080 IFDI=1THENGOSUB1840
   :rem 207
1090 Q$="":NU$="" :rem 66
1100 GOSUB2000:REM GET THE COM
   MAND :rem 226
1110 NU$=NU$+STR$(CD) :rem 174
1120 IFST<>0ANDDI=1THENGOSUB19
   70:CLOSE1:CLOSE2:CLOSE4:C
   LOSE15:END :rem 192
1130 IFST<>0THENCLOSE1:CLOSE2:
   CLOSE4:CLOSE15:END
   :rem 104
1140 IFSA>ED+1ANDED<>0THENAA=1
   :rem 49
1150 IFAA=1ANDDI=0THENCLOSE4:E
   ND :rem 253
1160 IFDI=1ANDAA=1THENGOSUB197
   0:CLOSE1:CLOSE2:CLOSE4:CL
   OSE15:END :rem 99
1170 C$=C$(CD):C=C(CD):rem 129
1180 Q$=Q$+RIGHT$("0000")+MID$(
   STR$(SA-1),2),5)+" "+LEFT
   $(C$,3) :rem 172
1190 IFC(CD)=1THENQ$=Q$+"
   {3 SPACES}":GOTO1030:REM
   {SPACE}1 BYTE :rem 98
1200 IFC(CD)=2THEN1250:REM 2 B
   YTE :rem 87

```


All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```

1210 IFC(CD)=3THEN1420:REM 3 B
YTE:rem 89
1220 IFC(CD)=4THEN1710:REM CON
DITIONS:rem 240
1230 Q$=Q$+" ".BYTE:rem 190
1240 Q$=Q$+STR$(CD):GOTO1030
:rem 69
1250 REM 2 BYTE COMMAND:rem 17
1260 D$=MID$(C$,4,1):GOSUB2000
:rem 93
1270 NU$=NU$+STR$(CD):rem 181
1280 S$=STR$(CD):Z$=RIGHT$(S$,
LEN(S$)-1):rem 4
1290 IFD$="0"THEN1340:rem 107
1300 IFD$="#"THEN1350:rem 87
1310 IFD$="I"THEN1360:rem 127
1320 IFD$="A"THEN1410:rem 116
1330 GOTO1230:REM BAD COMMAND
:rem 170
1340 Q$=Q$+STR$(CD):GOTO1370
:rem 77
1350 Q$=Q$+" "+Z$:GOTO1030
:rem 98
1360 Q$=Q$+" (" +Z$+"):rem 201
1370 D$=MID$(C$,5,1):rem 228
1380 IFD$="Y"THENQ$=Q$+"Y":GO
TO1030:rem 30
1390 IFD$="X"THENQ$=Q$+"X":GO
TO1030:rem 29
1400 GOTO1030:rem 194
1410 Q$=Q$+Z$:GOTO1030:rem 205
1420 REM 3 BYTE COMMAND:rem 17
1430 D$=MID$(C$,4,1):rem 224
1440 GOSUB2000:LO=CD:NU$=NU$+S
TR$(LO):rem 221
1450 GOSUB2000:HI=CD:NU$=NU$+S
TR$(HI):rem 202
1460 CD=HI*256+LO:rem 173
1470 CD$=RIGHT$(STR$(CD),LEN(S
TR$(CD))-1):rem 75
1480 IFD$="0"THEN1540:rem 110
1490 IFD$="#"THEN1550:rem 99
1500 IFD$="I"THEN1560:rem 130
1510 IFD$="A"THEN1630:rem 121
1520 IFD$="N"THEN1690:rem 63
1530 GOTO1230:REM BAD COMMAND
:rem 172
1540 Q$=Q$+" "+CD$:GOTO1030
:rem 109
1550 Q$=Q$+" "+CD$:GOTO1030
:rem 145
1560 Q$=Q$+" (" +CD$+"):rem 248
1570 D$=MID$(C$,5,1):rem 230
1580 IFD$="0"THEN1030:rem 57
1590 IFD$="Y"THENQ$=Q$+"Y":GO
TO1030:rem 33
1600 IFD$="X"THENQ$=Q$+"X":GO
TO1030:rem 23
1610 IFD$="N"THEN1030:rem 129
1620 GOTO1230:REM BAD COMMAND
:rem 172

```

```

1630 D$=MID$(C$,5,1):rem 227
1640 IFD$="0"THENQ$=Q$+" "+CD$:
GOTO1030:rem 21
1650 Q$=Q$+" "+CD$:rem 56
1660 IFD$="X"THENQ$=Q$+"X":
:rem 230
1670 IFD$="Y"THENQ$=Q$+"Y":
:rem 233
1680 GOTO1030:rem 204
1690 Q$=Q$+" "+CD$:GOTO1030
:rem 115
1700 GOTO1230:REM BAD COMMAND
:rem 171
1710 REM HANDLE CONDITION COMM
ANDS:rem 82
1720 GOSUB2000:rem 12
1730 TT=0:NU$=NU$+STR$(CD)
:rem 5
1740 IFCD=>129THENTT=1:CD=CD-1
28:rem 139
1750 IFTT=1THENQ$=Q$+STR$(SA-(
128-CD)):GOTO1030:rem 249
1760 Q$=Q$+STR$(SA+CD):GOTO103
0:rem 11
1770 REM INITIALIZE TO DISK FI
LE:rem 147
1780 OPEN1,8,1,"@0:" +D$+"P,W"
:rem 15
1790 LI=2049:QQ=1:rem 188
1800 HI=INT(LI/256):LO=LI-(HI*
256):rem 177
1810 PRINT#1,CHR$(LO):rem 255
1820 PRINT#1,CHR$(HI):rem 246
1830 RETURN:rem 172
1840 REM GOTO DISK:rem 21
1850 IFCD=199THENGOSUB1970:RET
URN:rem 94
1860 IFVAL(Q$)=0THENRETURN
:rem 131
1870 HI=INT(LI/256):LO=LI-(HI*
256):rem 184
1880 PRINT#1,CHR$(LO):rem 6
1890 PRINT#1,CHR$(HI):rem 253
1900 SS=VAL(Q$):rem 86
1910 HI=INT(SS/256):LO=SS-(HI*
256):rem 213
1920 PRINT#1,CHR$(LO):rem 1
1930 PRINT#1,CHR$(HI):rem 248
1940 DD$=MID$(Q$,7,20):rem 108
1950 PRINT#1,DD$:CHR$(0):
:rem 128
1960 RETURN:rem 176
1970 REM CLOSE DISK:rem 86
1980 PRINT#1,CHR$(0):CHR$(0):C
HR$(0):CHR$(0):rem 152
1990 CLOSE1:RETURN:rem 148
2000 REM*GET*BYTE*OFF*OF*DISK*
OR*RAM:rem 252
2010 IFMD$="D"THENGET#2,CD$:CD
=ASC(CD$+CHR$(0)):SA=SA+1
:rem 128
2020 IFMD$="R"THENC=PEEK(SA):
SA=SA+1:rem 211
2030 RETURN:rem 165
2040 SX=0:PRINT:PRINT"PRESS
{RVS}ANY KEY{OFF} TO CONT
INUE,{RVS}F1{OFF} TO ABOR
T." :rem 74
2050 GETA$:IFA$="0"THEN2050
:rem 177
2060 IFA$<"{F1}"THEN2080
:rem 248
2070 CLOSE2:GOTO280:rem 126
2080 PRINT"(CLR)ADDR.
{2 SPACES}COMMAND
{7 SPACES}OP CODE":rem 48
2090 PRINT"5 T3{2 SPACES}
7 T3{7 SPACES}7 T3":PRI
NT:RETURN:rem 150
2100 DATAADC#,105,2,ADC00,101,
2,ADC0X,117,2,ADCAB,109,3
,ADCAX,128,3,ADCA,121,3
:rem 243

```

```

2110 DATAADCIX,97,2,ADCIY,113,
2:rem 246
2120 DATAAND#,41,2,AND00,37,2,
AND0X,53,2,ANDAB,45,3,AND
AX,61,3,ANDAY,57,3:rem 32
2130 DATAANDIX,33,2,ANDIY,49,2
:rem 220
2140 DATAASLAC,10,1,ASL00,6,2,
ASL0X,22,2,ASLAB,14,3,ASL
AX,30,3:rem 239
2150 DATABCC,144,4,BCS,176,4,B
EQ,240,4,BIT00,36,2,BITAB
,44,3,BMI,48,4,BNE,208,4
:rem 37
2160 DATABPL,16,4,BRK,0,1,BVC,
80,4,BVS,112,4,CLC,24,1,C
LD,216,1,CLI,88,1:rem 181
2170 DATACLV,184,1,CMP#,201,2,
CMP00,197,2,CMP0X,213,2,C
MPAB,205,3,CMPAX,221,3
:rem 252
2180 DATACMPAY,217,3,CMPIX,193
,2,CMPIY,209,2:rem 43
2190 DATACPX#,224,2,CPX00,228,
2,CPXAB,236,3,CPY#,192,2,
CPY00,196,2,CPYAB,204,3
:rem 50
2200 DATADEC00,198,2,DEC0X,214
,2,DECAB,206,3,DECAX,222,
3,DEX,202,1,DEY,136,1
:rem 130
2210 DATAEOR#,73,2,EOR00,69,2,
EOR0X,85,2,EORAB,77,3,EOR
AB,93,3,EORAX,93,3
:rem 148
2220 DATAEORAY,89,3,EORIX,65,2
,EORIY,81,2,INC00,230,2,I
NC0X,246,2,INCAB,238,3
:rem 149
2230 DATAINCAX,254,3,INX,232,1
,INY,200,1,JMPAB,76,3,JMP
IN,108,3,JSR,32,3:rem 83
2240 DATALDA#,169,2,LDA00,165,
2,LDA0X,181,2,LDAAB,173,3
,LDAAX,189,3,LDAAY,185,3
:rem 85
2250 DATALDAIX,161,2,LDAIY,177
,2,LDX#,162,2,LDX00,166,2,
LDX0Y,182,2,LDXAB,174,3
:rem 180
2260 DATALDXAY,190,3,LDY#,160,
2,LDY00,164,2,LDY0X,180,2
,LDYAB,172,3,LDYAX,188,3
:rem 213
2270 DATALSRA,74,1,LSR00,70,2
,LSR0X,86,2,LSRAB,78,3,LS
RAX,94,3,NOP,234,1
:rem 220
2280 DATAORA#,9,2,ORA00,5,2,OR
A0X,21,2,ORAAB,13,3,ORAAX
,29,3,ORAY,25,3:rem 21
2290 DATAORAI,1,2,ORAIY,17,2,
PHA,72,1,PHP,8,1,PLA,104,
1,PLP,40,1,ROLAC,42,1
:rem 75
2300 DATAROL00,38,2,ROL0X,54,2
,ROLAB,46,3,ROLAX,62,3,RO
RAC,106,1,ROR00,102,2
:rem 74
2310 DATAROR0X,118,2,RORAB,110
,3,RORAX,126,3,RTI,64,1,R
TS,96,1,SBC#,233,2
:rem 142
2320 DATASBC00,229,2,SBC0X,245
,2,SBCAB,237,3,SBCAX,253,
3,SBCAY,249,3:rem 41
2330 SBCIX,225,2:rem 100
2340 DATASBCIY,241,2,SEC,56,1,
SED,248,1,SEI,120,1,STA00
,133,2,STA0X,149,2:rem 42
2350 DATASTAAB,141,3,STAAX,157
,3,STAY,153,3,STAI,129,
2,STAIY,145,2:rem 204

```



```

2360 STX00,134,2      :rem 76
2370 DATASTX0Y,150,2,STXAB,142
,3,STY00,132,2,STY0X,148,
2,STYAB,140,3      :rem 180
2380 DATATAX,170,1,TAY,168,1,T
SX,186,1,TXA,138,1,TXS,15
4,1,TYA,152,1      :rem 81
2390 DATA"END",0,0  :rem 187

```

All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

Sprint

See instructions in article on page 72 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: Sprint

```

8000:A2 7F B5 00 9D 00 7F CA 9F
8008:10 F8 A9 40 85 12 A9 00 50
8010:85 27 A9 10 85 31 A9 FE 17
8018:85 42 A9 FF 85 43 A9 00 2E
8020:85 44 20 8C 88 20 CF FF 26
8028:C9 0D F0 06 9D 81 97 E8 DA
8030:D0 F3 E0 00 D0 01 60 86 84
8038:0A A9 D0 20 D2 FF A9 00 36
8040:20 BD FF A9 0F A2 08 A0 0F
8048:0F 20 BA FF 20 C0 FF A9 DD
8050:00 85 3A A9 01 85 F7 A9 4C
8058:08 85 F8 A9 EE 85 2A A9 04
8060:92 85 2B A0 00 B1 2A 20 B6
8068:E3 8B E6 2A D0 02 E6 2B 45
8070:A5 2B C9 97 D0 04 A5 2A CD
8078:C9 31 90 E9 A9 FF 85 F9 AD
8080:85 06 A9 7D 85 FA 85 07 FC
8088:A9 00 85 2E 8D FF 7D 85 DE
8090:17 85 18 85 1F A9 00 85 FE
8098:38 A9 C0 85 39 A9 02 20 25
80A0:8C 88 20 15 88 20 D0 8C CA
80A8:E0 00 D0 03 4C 30 82 A5 32
80B0:17 18 69 04 85 17 90 02 5C
80B8:E6 18 A0 00 A5 10 91 38 10
80C0:C8 A5 11 91 38 A5 38 18 AB
80C8:69 02 85 38 90 02 E6 39 C6
80D0:20 4D 8C A5 33 C9 3A F0 47
80D8:04 C9 80 90 04 A2 00 86 98
80E0:1F C9 86 D0 02 E6 1F C9 75
80E8:83 D0 5C 20 4D 8C A5 44 99
80F0:D0 0C E6 44 A5 F7 8D E3 8A
80F8:0B A5 F8 8D E7 0B A0 00 8D
8100:A5 F7 91 42 C8 A5 F8 91 8A
8108:42 A5 33 C9 22 D0 06 20 19
8110:4D 8C 4C 09 81 A5 34 D0 D2
8118:12 A5 33 C9 2C D0 08 A9 EE
8120:00 20 E3 8B 4C 0F 81 C9 CB
8128:3A F0 04 A5 33 D0 F2 A9 CB
8130:00 20 E3 8B A9 00 20 E3 E1
8138:8B A5 F7 85 42 A5 F8 85 E1
8140:43 20 03 8C 4C D3 80 C9 92
8148:22 D0 06 20 CE 81 4C D3 3C
8150:80 C9 8F D0 03 4C A5 80 1A
8158:20 C3 8C 90 4D 20 47 8D FD
8160:A5 1F D0 02 B0 47 20 F4 10
8168:81 A5 1D 18 69 04 85 0F 30
8170:A5 06 38 E5 0F 85 06 B0 78
8178:02 C6 07 A0 00 A5 1D 05 EE
8180:1E 91 06 C8 A5 0C 91 06 CA
8188:C8 A5 F9 38 E5 0C 85 F9 80

```

```

8190:91 06 C8 A5 FA E9 00 85 56
8198:FA 91 06 A2 00 C8 BD D1 D8
81A0:97 91 06 E8 E4 1D 90 F5 D5
81A8:B0 03 20 4D 8C A5 33 F0 EF
81B0:03 4C D3 80 4C A5 80 A5 6A
81B8:06 38 E9 04 85 06 B0 02 F1
81C0:C6 07 A0 02 A5 F7 91 06 53
81C8:C8 A5 F8 91 06 60 20 B7 7B
81D0:81 A2 00 20 4D 8C F0 0A C7
81D8:C9 22 F0 06 20 E3 8B E8 58
81E0:D0 F1 84 0F A0 00 A9 30 D2
81E8:91 06 C8 8A 91 06 A4 0F F4
81F0:20 4D 8C 60 A5 1E D0 05 3B
81F8:A9 02 85 C0 60 A9 0A 85 06
8200:0C A5 1F F0 1D 20 74 91 4B
8208:20 D0 8C B0 05 A9 07 4C 17
8210:70 8A 20 DD 8C A5 33 C9 FC
8218:2C F0 F2 20 77 91 A5 13 30
8220:85 0C E6 0C A5 1E C9 20 E1
8228:F0 03 06 C0 60 E6 0C 60 FE
8230:E6 3A 20 CC FF A9 01 20 D0
8238:C3 FF A5 06 38 E5 17 85 41
8240:17 85 2C 85 19 A5 07 E5 63
8248:18 85 18 85 2D 85 1A A5 6F
8250:F7 8D 3D 08 A5 F8 8D 3E 47
8258:08 A9 04 20 8C 88 20 15 2A
8260:88 20 D0 8C E0 00 D0 03 C7
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8F20:20	03 8C	4C D5	8E C9	20 03	91C8:FE	20 4D	8C A9	01 85	29 6B	9470:60	A2 00	86 0A	86 0B	A0 FB
8F28:D0	05 A9	10 4C	70 8A	20 80	91D0:A9	00 85	FC 20	4D 8C	20 B8	9478:00	A5 03	10 04	C8 20	3F 2F
8F30:B9	8B 20	5B 8F	20 CD	8B EC	91D8:FF	91 A5	FE 0A	AA 20	5A 9A	9480:08	A2 02	A5 05	10 04	88 E9
8F38:A9	BD 20	E3 8B	20 03	8C 4D	91E0:E1	BD F1	91 20	E3 8B	BD F8	9488:20	3F 08	A2 0F	06 02	26 77
8F40:A9	85 20	E3 8B	A5 28	20 3B	91E8:F2	91 20	E3 8B	4C 8F	91 6A	9490:03	26 0A	26 0B	A5 0B	C5 33
8F48:E3	8B A9	BD 20	E3 8B	E6 DB	91F0:60	EC 08	22 0A	18 0A	2E 95	9498:05	D0 04	A5 0A	C5 04	90 53
8F50:13	D0 02	E6 14	20 03	8C 8F	91F8:0A	42 0A	38 0A	4C 0A	A5 B1	94A0:12	A5 0A	E5 04	85 0A	A5 CB
8F58:4C	D5 8E	20 74	91 20	9B AC	9200:33	C9 22	D0 22	20 59	92 59	94A8:0B	E5 05	85 0B	E6 02	D0 92
8F60:8E	90 18	20 DD	8C 20	5D AE	9208:20	5D 91	A5 1D	20 E3	8B DD	94B0:02	E6 03	CA 10	D7 C0	00 03
8F68:91	A5 13	20 E3	8B A9	AA C8	9210:A9	A2 20	E3 8B	A5 13	20 2E	94B8:F0	05 A2	00 20	3F 08	60 5E
8F70:20	E3 8B	20 77	91 A9	AA 0C	9218:E3	8B A9	A0 20	E3 8B	A5 9E	94C0:A5	02 25	04 85	02 A5	03 A4
8F78:4C	E3 8B	20 C3	8C B0	05 E0	9220:14	20 E3	8B 4C	BD C9	D4 9D	94C8:25	05 85	03 60	A5 02	05 49
8F80:A9	0B 4C	70 8A	20 47	8D B8	9228:80	90 06	20 A7	8F 4C	77 FF	94D0:04	85 02	A5 03	05 05	85 B3
8F88:A5	1E C9	00 F0	0E C9	10 9E	9230:91	20 C3	8C B0	07 A9	0B 5F	94D8:03	60 A5	03 30	11 A5	05 96
8F90:D0	05 A9	07 4C	70 8A	A9 E1	9238:4C	70 8A	20 47	8D A5	1E CC	94E0:30	0B A5	03 C5	05 D0	04 B1
8F98:10	4C 70	8A A9	AD 20	E3 B1	9240:C9	20 F0	05 A9	10 4C	70 57	94E8:A5	02 C5	04 60	38 60	A5 A8
8FA0:8B	20 03	8C 4C	6E 8F	A2 94	9248:8A	A9 AD	20 E3	8B 20	03 65	94F0:05	30 EF	A9 01	18 60	A9 14
8FA8:00	DD 54	8B F0	0A E8	E0 E4	9250:8C	E6 13	D0 02	E6 14	D0 89	94FB:FF	85 02	85 03	60 A9	00 09
8FB0:1F	90 F6	A9 07	4C 70	8A D1	9258:B7	20 4D	8C C9	22 F0	04 90	9500:85	02 85	03 60	20 01	09 DD
8FB8:E0	12 B0	05 A9	4E 4C	70 C1	9260:A9	22 85	34 A2	00 A5	33 6A	9508:20	ED 09	F0 EA	D0 EF	20 89
8FC0:8A	8A E9	12 0A	AA BD	D2 6F	9268:F0	0D C9	22 F0	09 D1	D1 5D	9510:01	ED 09	F0 ED	09 F0	E7 90 4D
8FC8:8F	48 BD	D1 8F	48 4C	74 41	9270:97	20 4D	8C E8	D0 EF	86 CC	9518:E5	B0 DC	20 01	09 20	ED 5A
8FD0:91	EA 8F	EA 8F	ED 8F	ED 55	9278:1D	20 4D	8C A5	06 85	22 19	9520:09	B0 DB	90 D2	20 01	09 A2
8FD8:8F	EA 8F	1B 90	B7 90	3B DD	9280:A5	07 85	23 A0	00 B1	22 A7	9528:20	ED 09	F0 D1	D0 C8	20 92
8FE0:90	59 90	7F 90	D9 90	FA B0	9288:C9	30 D0	21 C8	B1 22	C5 E1	9530:01	09 20	ED 09	90 C7	B0 CB
8FE8:90	20 91	20 A6	8E 20	5A 96	9290:1D	B0 18	C8 B1	22 85	13 3C	9538:BE	20 01	09 20	ED 09	F0 37
8FF0:91	A5 28	C9 02	D0 0C	BD 0D	9298:C8	B1 22	85 14	A0 FF	C8 17	9540:B6	90 B4	B0 B9	A5 05	85 80
8FF8:12	90 20	E3 8B	BD 13	90 91	92A0:C4	1D F0	18 B1	13 D9	D1 6E	9548:17	4C 3D	09 A5	17 30	03 37
9000:4C	E3 8B	BD 12	90 18	69 F9	92A8:97	F0 F4	A9 30	29 0F	18 6B	9550:4C	4F 0A	4C 45	0A A2	00 13
9008:03	20 E3	8B BD	13 90	4C 8F	92B0:69	04 65	22 85	22 90	CC FC	9558:2C	A2 02	A5 08	85 0F	E0 32
9010:E3	8B 86	08 4D	08 68	08 BA	92B8:E6	23 D0	C8 60	20 5A	91 8A	9560:02	D0 04	A5 09	85 0F	A0 B8
9018:76	08 5A	08 20	47 8D	A9 25	92C0:A6	FC A5	29 D0	0C BD	DE D0	9568:00	98 95	02 95	03 85	0C 5C
9020:AD	20 E3	8B 20	03 8C	A9 25	92C8:E2	20 E3	8B BD	DF 92	4C 53	9570:85	0E 4C	0F F0	3E B9	00 5F
9028:85	20 E3	8B A5	28 20	E3 3B	92D0:E3	8B BD	E0 92	20 E3	8B F8	9578:7E	C9 2D	D0 04	E6 0E	D0 B0
9030:8B	20 5D	91 A9	00 20	E3 55	92D8:BD	E1 92	4C E3	8B A8	08 13	9580:30	C9 30	90 2F	C9 3A	B0 0B
9038:8B	4C D5	8E A9	00 85	29 57	92E0:C0	08 06	0C 0B	0C 10	0C 9E	9588:2B	E9 2F	85 0D	B5 03	85 CC
9040:85	FC 20	FF 91	20 5A	91 BA	92E8:16	0C 2B	0C 31	0C 0B	08 1A	9590:0C	B5 02	0A 26	0C 0A	26 AB
9048:A6	28 BD	54 90	20 E3	8B 1C	92F0:0A	00 9E	32 30	36 31	00 CE	9598:0C	75 02	95 02	A5 0C	75 F4
9050:BD	55 90	4C E3	8B 69	0A A6	92F8:00	00 A9	FF 8D	0E D4	8D 2F	95A0:03	95 03	16 02	36 03	B5 19
9058:6C	A9 A9	00 85	29 85	FC 40	9300:0F	D4 A9	80 8D	12 D4	A9 29	95A8:02	65 D0	95 02	90 02	F6 76
9060:20	FF 91	20 5A	91 A5	28 52	9308:00	85 02	A9 00	85 03	A0 28	95B0:03	C8 D0	BE A5	0E F0	03 DF
9068:C9	02 D0	0A A9	2A 20	E3 C3	9310:00	98 91	02 E6	02 D0	02 92	95B8:20	3F 08	60 01	00 0A	00 E6
9070:8B	A9 09	4C E3	8B A9	2D 75	9318:E6	03 A5	03 C9	7E D0	04 46	95C0:64	00 E8	03 10	27 20	E6 AF
9078:20	E3 8B	A9 09	4C E3	8B 7B	9320:A5	02 C9	00 90	E9 20	E2 23	95C8:0A	A6 08	A9 20	9D 00	7E 34
9080:A9	02 85	28 20	A9 8E	A9 98	9328:0B	4C FF	FF A9	00 38	F5 9B	95D0:E6	08 60	A9 7E	2C A9	7F 8F
9088:A5	20 E3	8B A5	28 20	E3 AB	9330:02	95 02	A9 00	F5 03	95 0C	95D8:8D	47 0B	38 E9	76 8D	50 16
9090:8B	A9 8D	20 E3	8B A9	00 36	9338:03	60 A2	00 2C	A2 02	B5 F2	95E0:0B	A0 00	84 0C	A9 20	8D D6
9098:20	E3 8B	A9 7E	18 65	29 17	9340:03	10 03	20 3F	08 60	A2 CC	95E8:00	7E A5	03 10	0A A9	2D C1
90A0:20	E3 8B	20 5D	91 A9	01 C3	9348:00	2C A2	02 A1	02 95	02 31	95F0:8D	00 7E	A2 00	20 3F	08 E3
90A8:20	E3 8B	A9 85	20 E3	8B DE	9350:A9	00 95	03 60	A2 00	2C E8	95FB:C8	A2 08	A9 00	85 0D	A5 A2
90B0:A9	08 18	65 29	4C E3	8B CF	9358:A2	02 A9	00 95	03 A5	D3 5E	9600:03	DD D0	0A D0	05 A5	02 C8
90B8:A9	02 85	28 20	A6 8E	20 3B	9360:95	02 60	A2 00	2C A2	02 01	9608:DD	CF 0A	90 13	A5 02	38 CD
90C0:5A	91 A5	29 D0	0A A9	E6 A3	9368:AD	1B D4	95 02	AD 1B	D4 F2	9610:FD	CF 0A	85 02	A5 03	FD 74
90C8:20	E3 8B	A9 0A	4C E3	8B D3	9370:95	03 60	A2 00	2C A2	02 51	9618:D0	0A 85	03 E6	D0 D0	DF FD
90D0:A9	E9 20	E3 8B	A9 0A	4C E6	9378:B5	03 D0	05 B5	02 D0	01 FD	9620:E0	00 F0	0A A5	0D C9	00 71
90D8:E3	8B A9	02 85	28 20	80 B1	9380:00	B5 03	30 09	A0 90	95 2D	9628:D0	04 A5	0C F0	0A A5	0D 3C
90E0:8C	20 68	91 20	A9 8E	20 5B	9388:03	A9 01	95 02	60 A9	FF F9	9630:09	30 99	00 7E	C8 E6	0C 12
90E8:18	91 A5	32 85	41 20	8F 53	9390:95	02 95	03 60	86 06	84 93	9638:CA	CA 10	BF 84	00 60	46 A6
90F0:8C	A9 04	85 FC	20 FF	91 95	9398:07	8D B2	08 A0	00 C0	00 04	9640:3C	32 28	1E 14	0A A2	06 13
90F8:4C	44 91	A9 02	85 28	20 B4	93A0:F0	08 B1	06 99	00 7E	C8 6B	9648:A5	D3 D0	52 0B	90 06	CA 8F
9100:80	8C 20	68 91	20 A9	8E FF	93A8:D0	F4 84	08 60	86 06	84 34	9650:10	F6 4C	B3 0B	BD 52	0B 07
9108:20	18 91	20 8F	8C A9	08 7F	93B0:07	8D CA	08 A0	00 C0	00 1F	9658:85	02 A5	02 38	E5 D3	AA 49
9110:85	FC 20	FF 91	4C 44	91 11	93B8:F0	08 B1	06 99	00 7F	C8 85	9660:E0	00 F0	08 A9	20 20	D2 7D
9118:A5	33 85	72 A5	32 85	41 F4	93C0:D0	F4 84	09 60	86 06	84 5C	9668:FF	CA 10	F4 60	A5 02	4C 83
9120:60	A9 02	85 28	A9 0C	85 FB	93C8:07	A0 00	C4 C8	D0 08	B9 B5	9670:5F	96 A9	00 85	08 20	E4 99
9128:FC	20 80	8C 20	68 91	20 90	93D0:00	7E 91	06 C8	F0 F4	98 36	9678:FF	F0 05	8D 00	7E E6	08 2B
9130:A9	8E 20	4D 91	20 68	91 14	93D8:60	A2 00	A4 08	E4 09	F0 F9	9680:60	A5 B8	F0 0A	A9 3F	20 03
9138:20	A9 8E	20 18	91 20	8F 80	93E0:0A	BD 00	7F 99	00 7E	EB 27	9688:D2	FF A9	20 20	D2 FF	A2 45
9140:8C	20 FF	91 A5	41 85	32 3A	93E8:C8	D0 F2	84 08	60 A9	00 64	9690:00	20 CF	FF C9	D0 F0	06 2A
9148:A5	72 85	33 60	20 5A	91 88	93F0:85	03 85	05 A5	08 85	02 F6	9698:9D	00 7E	EB D0	F3 86	08 5E
9150:A9	FD 20	E3 8B	A9 0B	4C 6F	93F8:A5	09 85	04 A2	FF E8	E4 F1	96A0:A9	0D 4C	D2 FF	6C 02	00 52
9158:E3	8B A9	20 2C	A9 A9	2C 0F	9400:08	F0 13	E4 09	F0 F0	BD 02	96A8:A4	12 A2	00 B1	10 F0	07 B7
9160:A9	A5 2C	A9 8D	4C E3	8B D2	9408:00	7E D0	00 7F	F0 EF	85 B1	96B0:9D	00 7E	C8 E8	D0 F5	86 0


```

96D0:00 85 10 A9 00 85 11 4C 80
96D8:DD 0B A2 00 E4 08 F0 09 3E
96E0:BD 00 7E 20 D2 FF E8 D0 F7
96E8:F3 60 A5 02 85 14 A5 03 C7
96F0:85 15 60 A5 02 4C A8 08 27
96F8:A5 02 4C C0 08 20 1C 0C 14
9700:4C A8 08 20 1C 0C 4C C0 EC
9708:08 86 14 38 E5 02 18 65 AF
9710:14 AA 90 01 C8 A5 02 60 57
9718:20 37 0C 4C A8 08 20 37 48
9720:0C 4C C0 08 C6 14 8A 18 B4
9728:65 14 AA 90 01 C8 A5 02 E5
9730:60 00 00 00 00 00 00 8F

```

Program 2: 64 Doodler Demo

```

100 POKE53280,0:POKE53281,2:PR
INT"[CLR]{3 DOWN}[WHT]"TAB
(15)"64 DOODLER":rem 3
110 PRINT"[2 DOWN][BLK]"TAB(8)
"PLUG JOYSTICK INTO PORT 2
":rem 18
120 PRINT"[DOWN]"TAB(9)"USE IT
TO DRAW PICTURES":rem 228
130 PRINT"[DOWN]"TAB(10)"TRIGG
ER CLEARS SCREEN":PRINT"
[4 DOWN][WHT]"TAB(14)"PRES
S ANY KEY":rem 84
140 GETAS:IFA$="THEN140
":rem 77
150 PRINT"[CLR]":FORI=0TO7:REA
DP(I):NEXT:DATA1,2,4,8,16,
32,64,128:rem 140
160 FORI=0TO10:READDX(I),DY(I)
:NEXT:rem 160
170 DATA0,0,0,-1,0,1,0,0,-1,0,
-1,-1,-1,1,0,0,1,0,1,-1,1,
1:rem 136
180 POKE53272,PEEK(53272)OR8:P
OKE53265,PEEK(53265)OR32
:rem 100
190 GOSUB300:FORI=1024TO2023:P
OKEI,2:NEXT:rem 14
200 X=160:Y=100:rem 31
210 GOSUB280:J=PEEK(56320):K=J
AND16:IFK=0THENGOSUB300
:rem 237
220 J=JAND15:J=15-J:X=X+DX(J):
Y=Y+DY(J):rem 81
230 IFX>319THENX=0:rem 75
240 IFX<0THENX=319:rem 74
250 IFY>199THENY=0:rem 85
260 IFY<0THENY=199:rem 84
270 GOTO210:rem 101
280 RO=Y/8:CH=X/8:LI=YAND7:B
I=XAND7:BI=7-BI:B1=RO%320
:B2=CH%8:rem 115
290 BY=8192+B1+B2+LI:POKEBY,PE
EK(BY)ORP(BI):RETURN
:rem 108
300 FORI=8192TO16383:POKEI,0:N
EXT:RETURN:rem 29

```

All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

Space Arena

See instructions in article on page 48 before typing in.

```

C000:A9 37 85 FC A9 D7 85 FE 5B
C008:A0 00 84 FB 84 FD 78 A5 DC
C010:01 29 FB 85 01 B1 FD 91 90
C018:FB 88 D0 F9 C6 FE C6 FC 30
C020:A5 FC C9 2F D0 EF A0 2F 96
C028:B9 59 CF 99 00 34 88 10 62
C030:F7 A5 01 09 04 85 01 58 58
C038:A9 1C 8D 18 D0 A0 00 84 56

```

```

C040:FB 84 FD A9 20 85 FC A9 F5
C048:CC 85 FE B1 FD F0 1D 91 0C
C050:FB E6 FB D0 02 E6 FC E6 A2
C058:FD D0 02 E6 FE A5 FE C9 12
C060:CF D0 E8 A5 FD C9 59 D0 10
C068:E2 4C 8A C0 E6 FD D0 02 9E
C070:E6 FE B1 FD A8 A9 00 88 AF
C078:91 FB D0 FB B1 FD 18 65 B6
C080:FB 85 FB 90 02 E6 FC 4C DB
C088:57 C0 A0 18 A9 00 99 00 FB
C090:D4 88 10 FA A0 18 B9 36 5F
C098:C7 99 00 D4 88 10 F7 A0 C6
C0A0:00 B9 00 C8 99 00 04 B9 AB
C0A8:00 C9 99 00 05 B9 00 CA A9
C0B0:99 00 06 B9 00 CB 99 00 BD
C0B8:07 A9 0F 99 00 D8 99 00 3A
C0C0:D9 99 00 D4 99 00 DB 88 50
C0C8:D0 D7 20 FD C6 A0 26 B9 4B
C0D0:89 CF 99 28 D8 88 D0 F7 43
C0D8:A9 00 8D 20 D0 8D 21 D0 B2
C0E0:AD 34 C7 09 30 8D 5E 07 4B
C0E8:AD 35 C7 09 30 8D 0E 07 F2
C0F0:20 E4 FF C9 85 F0 36 C9 7E
C0F8:86 F0 1B C9 87 D0 F1 EE 4C
C100:34 C7 AD 34 C7 C9 06 D0 CA
C108:05 A9 01 8D 34 C7 09 30 74
C110:8D 5E 07 4C F0 C0 EE 35 35
C118:C7 AD 35 C7 C9 04 D0 05 13
C120:A9 01 8D 35 C7 09 30 8D 0E
C128:0E 07 4C F0 C0 A0 03 A9 45
C130:00 99 30 C7 88 10 FA 20 37
C138:FD C6 A9 00 8D 08 DC 8D 75
C140:09 DC 8D 0A DC A9 A0 85 26
C148:FD A9 04 85 FE A2 13 A0 57
C150:26 B1 FD C0 04 A9 20 91 AE
C158:FD 88 D0 F5 A5 FD 18 69 35
C160:28 85 FD 09 02 E6 FE CA 96
C168:D0 E5 A0 02 B9 00 09 69
C170:00 08 C8 D0 F7 A9 00 8D 10
C178:0E DC A2 10 8D A6 C7 95 40
C180:10 CA 10 F8 A9 84 8D FC C3
C188:07 A9 8C 8D F9 07 A9 00 A3
C190:85 47 85 4E A0 18 88 99 4E
C198:00 D4 D0 FA A9 0F 8D 18 D7
C1A0:D4 A9 80 8D 14 D4 A9 81 AA
C1A8:8D 12 D4 A0 07 A9 0C 99 AC
C1B0:27 D0 88 10 FA A9 0E 8D 36
C1B8:27 D0 8D 2D D0 A9 05 8D 4D
C1C0:28 D0 8D 2E D0 A9 3C 8D 54
C1C8:1C D0 A9 0B 8D 25 D0 A9 C0
C1D0:0F 8D 26 D0 AD 35 C7 0A EC
C1D8:0A 0A 0A 85 02 A9 60 38 2D
C1E0:E5 02 8D 07 DC 8D 06 DC FF
C1E8:A9 09 8D 0F DC A9 3F 8D BF
C1F0:15 D0 A9 01 2C 0F DC D0 A0
C1F8:FB A9 09 8D 0F DC AD 1E 44
C200:D0 85 02 29 C3 D0 03 4C D5
C208:DA C2 10 51 A5 02 29 01 4B
C210:F0 35 A2 00 A0 0E 20 58 85
C218:C4 D0 2C A9 01 20 EC C6 7D
C220:A2 01 B5 3E 30 04 4A 4C 44
C228:2C C2 38 6A 18 75 30 10 29
C230:08 C9 C0 80 0A A9 C0 D0 98
C238:06 C9 41 90 02 A9 40 95 31
C240:30 CA F0 DE 4C 4E C2 A2 60
C248:0E 20 D5 C4 D0 0F AD 15 17
C250:D0 29 7F 8D 15 D0 A0 00 7E
C258:84 1F 20 26 C5 A5 02 29 40
C260:40 F0 53 A5 02 29 02 F0 B0
C268:35 A2 02 A0 0C 20 58 C4 D1
C270:D0 2C A9 01 20 EC C6 A2 93
C278:01 B5 3C 30 04 4A 4C 83 DB
C280:C2 38 6A 18 75 32 10 08 E0
C288:C9 C0 B0 0A A9 C0 D0 06 D1
C290:C9 41 90 02 A9 40 95 32 29
C298:CA F0 DE 4C A5 C2 A2 0C E9
C2A0:20 D5 C4 D0 11 AD 15 D0 8B
C2A8:29 BF 8D 15 D0 A9 00 85 68
C2B0:1D A0 07 20 26 C5 A5 02 65
C2B8:29 02 F0 0C A2 02 20 D5 65
C2C0:C4 D0 05 A0 01 4C 5C C5 3F
C2C8:A5 02 29 01 F0 0C A2 00 D3
C2D0:20 D5 C4 D0 05 A0 00 4C 78
C2D8:5C C5 20 09 C6 C6 40 D0 35
C2E0:7A A9 07 85 40 A2 01 BD 93

```

```

C2E8:00 DC 29 04 D0 05 D6 41 94
C2F0:4C FC C2 BD 00 DC 29 08 DD
C2F8:D0 0D F6 41 B5 41 29 0F 31
C300:95 41 09 80 9D F8 07 BD CD
C308:00 DC 29 01 D0 28 B4 41 68
C310:8A 0A AA B5 30 18 79 73 58
C318:C7 C9 41 90 04 C9 C0 90 80
C320:02 95 30 B5 31 18 79 6F BB
C328:C7 C9 41 90 04 C9 C0 90 90
C330:02 95 31 8A 4A AA CA F0 7A
C338:AE AD 00 DC 29 01 85 02 80
C340:AD 01 DC 29 01 F0 04 A4 85
C348:02 D0 0B 18 69 10 E5 02 41
C350:8D 0F D4 4C 5B C3 A9 00 FE
C358:8D 0F D4 A5 43 D0 4E AD 07
C360:15 D0 29 BF 8D 15 D0 AD D7
C368:00 DC 29 10 D0 41 A0 00 1A
C370:20 41 C5 A9 80 85 43 A5 F1
C378:10 18 69 20 85 1C A5 11 36
C380:69 01 85 1D A5 20 18 69 C6
C388:40 85 2C A5 21 69 01 85 A7
C390:2D A4 41 B9 73 C7 0A 0A 74
C398:0A 0A 85 3C B9 6F C7 0A 41
C3A0:0A 0A 85 3D AD 15 D0 E4
C3A8:09 40 8D 15 D0 C6 43 A5 95
C3B0:44 D0 4E AD 15 D0 29 7F F0
C3B8:8D 15 D0 AD 01 DC 29 10 1F
C3C0:D0 41 A0 07 20 41 C5 A9 C0
C3C8:80 85 44 A5 12 18 69 50 E8
C3D0:85 1E A5 13 69 01 85 1F 02
C3D8:A5 22 18 69 40 85 2E A5 6F
C3E0:23 69 01 85 2F A4 42 B9 17
C3E8:73 C7 0A 0A 0A 85 3E BF
C3F0:B9 6F C7 0A 0A 0A 85 DC
C3F8:3F AD 15 D0 09 80 8D 15 B5
C400:D0 C6 44 AE 0A DC AD 09 3F
C408:DC F0 09 D8 A9 60 F8 38 E4
C410:ED 09 DC 88 85 02 4A 0A 0F
C418:4A 4A 09 30 8D 3C 04 A5 88
C420:02 29 0F 09 30 8D 3C 04 9D
C428:06 02 AD 34 C7 38 E5 02 5B
C430:09 30 8D 3A 04 AD 0A DC 67
C438:CD 34 C7 F0 03 4C F2 C1 AE
C440:A9 00 8D 15 D0 A0 02 B9 68
C448:00 08 99 00 C8 D0 F7 C3
C450:A9 01 8D 0E DC 4C 8A C0 6F
C458:B5 10 38 F9 10 00 85 FD F0
C460:B5 11 F9 11 00 85 FE 90 FD
C468:0F A5 FD F9 4F C7 A5 FE 26
C470:F9 50 C7 B0 5D 4C 93 C4 17
C478:B9 10 00 38 F5 10 85 FD 5F
C480:B9 11 00 F5 11 85 FE A5 CC
C488:FD FD 4F C7 A5 FE FD 50 6C
C490:C7 B0 3F B5 20 38 F9 20 63
C498:00 85 FD B5 21 38 F9 21 9D
C4A0:00 85 FE 90 0F A5 FD F9 79
C4A8:5F C7 A5 FE F9 60 C7 B0 0A
C4B0:21 4C CF C4 B9 20 00 38 AA
C4B8:F5 20 85 FD B9 21 00 F5 1E
C4C0:21 85 FE A5 FD FD 5F C7 E4
C4C8:A5 FE FD 60 C7 B0 03 A9 5B
C4D0:00 60 A9 01 60 A5 02 0A 5F
C4D8:0A 85 45 A0 0A 06 45 90 FE
C4E0:05 20 58 C4 F0 09 88 88 91
C4E8:C0 02 D0 F1 A9 01 60 A9 48
C4F0:01 85 45 C8 E8 B5 30 30 40
C4F8:07 4A 4A 4A 4A 4C 06 C5 DB
C500:4A 4A 4A 4A 09 F0 18 79 E6
C508:30 00 10 08 C9 C0 B0 0A EA
C510:A9 C0 D0 06 C9 41 90 02 91
C518:A9 40 99 30 00 CA 88 C6 C1
C520:45 F0 D2 A9 00 60 A9 00 54
C528:99 06 D4 99 47 00 99 04 A7
C530:D4 A9 0A 99 01 D4 A9 35 4F
C538:99 05 D4 A9 21 99 04 D4 53
C540:60 A9 00 99 06 D4 99 04 BA
C548:D4 A9 28 99 47 00 99 01 B5
C550:D4 A9 09 99 05 D4 A9 11 4B
C558:99 04 D4 60 A9 90 99 F8 0E
C560:07 B9 83 C7 8D 03 C6 E8 B9
C568:A9 01 85 48 A9 20 20 EC 39
C570:C6 A0 07 A9 00 88 99 0E 66
C578:D4 D0 FA A9 0A 8D 13 D4 1E
C580:A9 08 8D 0F D4 A9 81 8D 63
C588:12 D4 A9 1E 85 46 20 09 F7

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C590:C6	A9 01 2C 0F DC D0 FB 56	C838:84	5D 30 3A 30 30 5D 84 8E	CAE0:20	20 20 20 20 20 81 20 20 FB
C598:A9	09 8D 0F DC C6 46 D0 3D	C840:84	84 84 84 84 84 84 84 D1	CAE8:20	20 20 82 20 20 20 20 A4
C5A0:ED	A9 80 8D 12 D4 A9 8C 3A	C848:84	84 5D 30 30 30 5D EB	CAF0:20	20 20 20 20 20 80 5D 84
C5A8:8D	13 D4 A9 11 8D 0F D4 A6	C850:6B	40 40 40 40 71 40 40 3C	CAF8:5D	20 20 20 20 20 20 20 D
C5B0:A9	A0 8D 16 D4 A9 84 8D 30	C858:40	40 40 40 40 40 40 40 E9	CB00:20	20 20 20 20 20 13 10 6D
C5B8:17	D4 A9 1F 8D 18 D4 A9 4C	C860:40	71 40 40 40 40 71 40 A0	CB08:05	05 04 20 3D 20 35 20 DA
C5C0:81	8D 12 D4 A9 3C 8D 15 6E	C868:40	40 40 40 40 40 40 40 F9	CB10:81	20 20 20 20 80 20 20 D9
C5C8:D0	A9 46 85 46 20 09 C6 D3	C870:40	40 71 40 40 40 40 73 5B	CB18:81	20 20 20 20 20 20 5D 9D
C5D0:20	F0 C5 A9 01 2C 0F DC AF	C878:5D	20 20 20 20 20 20 20 A8	CB20:5D	20 20 20 20 20 20 20 56
C5D8:D0	FB A9 09 8D 0F DC C6 BA	C880:20	20 20 80 20 20 20 20 18	CB28:20	20 20 20 20 20 20 20 BF
C5E0:46	D0 EA A9 00 8D 17 D4 F4	C888:20	20 20 20 20 20 20 20 1A	CB30:20	20 20 20 20 20 20 20 C7
C5E8:A9	0F 8D 18 D4 4C 7A C1 CE	C890:20	20 20 20 20 20 20 20 22	CB38:20	20 20 20 20 20 20 20 CF
C5F0:C6	48 D0 14 A9 08 85 48 0E	C898:20	20 20 20 20 20 20 5D 67	CB40:20	20 20 20 20 20 20 5D 15
C5F8:A0	0A AD 85 C7 49 01 8D 58	C8A0:5D	20 20 20 20 20 20 20 D0	CB48:5D	20 20 20 20 20 20 20 7E
C600:85	C7 99 2E 04 88 10 FA B5	C8A8:20	20 20 20 20 20 20 20 3A	CB50:20	20 80 20 20 20 20 14 E7
C608:60	A2 0E B5 30 10 1D C9 51	C8B0:20	20 20 20 20 20 20 20 42	CB58:09	0D 05 20 3D 20 32 3A 63
C610:FE	B0 3E 75 10 95 10 B5 15	C8B8:20	20 20 20 20 20 20 20 4A	CB60:30	30 20 20 80 20 20 20 07
C618:11	E9 00 95 11 C9 05 90 4C	C8C0:20	20 20 20 20 20 20 5D 8F	CB68:20	20 20 20 20 20 20 5D 3D
C620:28	D0 2E B5 10 C9 40 B0 EF	C8C8:5D	20 20 20 80 20 20 20 FB	CB70:5D	20 83 20 20 20 20 20 13
C628:28	4C 49 C6 C9 03 90 21 0F	C8D0:20	13 20 10 20 01 20 03 84	CB78:20	20 20 20 20 20 20 81 71
C630:18	75 10 95 10 B5 11 69 65	C8D8:20	05 20 20 20 01 20 12 19	CB80:20	20 20 80 20 20 20 20 1E
C638:00	95 11 DD 87 C7 90 11 B8	C8E0:20	05 20 0E 20 01 20 20 0E	CB88:20	20 20 20 20 20 20 20 20
C640:D0	07 B5 10 DD 86 C7 90 D8	C8E8:20	20 20 20 20 20 20 5D B7	CB90:20	20 20 20 20 20 20 5D 65
C648:08	B5 30 49 FF A8 C8 94 AA	C8F0:5D	20 20 20 20 20 20 20 21	CB98:5D	20 20 20 20 20 20 20 CE
C650:30	B5 10 85 02 A0 08 B5 16	C8F8:80	63 63 63 63 63 63 63 19	CBA0:20	20 20 20 20 20 20 20 38
C658:11	C9 30 90 02 E9 30 26 2E	C900:63	63 63 63 63 63 63 63 93	CBA8:20	20 20 20 20 20 20 20 40
C660:FD	06 02 2A C9 30 90 04 85	C908:63	63 63 63 63 63 20 D1	CB80:20	20 20 20 20 20 80 20 09
C668:E9	30 E6 02 88 D0 F2 A5 07	C910:20	20 20 81 20 20 20 5D F6	CB88:20	20 20 20 20 20 20 5D 8D
C670:02	9D 00 D0 B5 31 10 1D 23	C918:5D	20 20 20 20 20 20 20 4A	CB80:4A	40 40 40 40 40 40 40 5D
C678:C9	FE B0 3E 75 20 95 20 1C	C920:20	20 20 20 20 20 20 20 B3	CB88:40	40 40 40 40 40 40 40 60
C680:B5	21 E9 00 95 21 C9 11 44	C928:20	20 20 20 20 20 20 20 BB	CB80:40	40 40 40 40 40 40 40 68
C688:90	28 D0 2E B5 20 C9 80 A7	C930:20	20 20 20 20 20 20 20 C3	CB88:40	40 40 40 40 40 40 40 70
C690:B0	28 4C B2 C6 C9 03 90 29	C938:20	20 20 20 20 20 20 5D 09	CB80:40	40 40 40 40 40 40 4B 83
C698:21	18 75 20 95 20 B5 21 27	C940:5D	20 20 20 20 20 81 20 35	CB88:00	00 00 00 00 00 00 00 80
C6A0:69	00 95 21 DD 97 C7 90 15	C948:20	20 20 20 20 20 20 20 DB	CBF0:00	00 00 00 00 00 00 00 88
C6A8:11	D0 07 B5 20 DD 96 C7 9C	C950:20	20 20 20 20 20 20 20 E3	CBF8:80	80 92 93 94 95 91 91 2C
C6B0:90	08 B5 31 49 FF A8 C8 B6	C958:20	20 20 83 20 20 20 20 22	CC00:01	80 00 01 03 C0 00 01 66
C6B8:94	31 B5 21 85 02 B5 20 65	C960:20	20 20 20 20 20 20 5D 31	CC08:03	C0 00 01 07 E0 00 01 20
C6C0:A0	06 46 02 6A 88 D0 FA 1B	C968:5D	20 20 20 20 20 20 20 9A	CC10:07	E0 00 01 0F F0 00 01 B2
C6C8:9D	01 D0 CA C3 80 03 4C 95	C970:20	20 20 20 20 20 20 20 04	CC18:0F	F0 00 01 1F F8 00 01 63
C6D0:0B	C6 A5 FD 8D 10 D0 A4 1D	C978:20	82 20 20 20 20 20 20 A4	CC20:1F	F8 00 01 30 0C 00 24 6D
C6D8:47	F0 06 88 84 47 8C 01 EA	C980:20	20 20 20 20 20 80 20 D4	CC28:30	00 02 70 00 02 F0 00 0B
C6E0:D4	A4 4E F0 06 88 84 4E 84	C988:80	20 60 20 20 20 20 5D 91	CC30:01	01 F0 00 01 03 F0 00 9E
C6E8:8C	08 D4 60 F8 18 7D 30 B2	C990:5D	20 20 20 20 20 20 20 C2	CC38:01	07 F0 00 01 0F F0 00 58
C6F0:C7	9D 30 C7 BD 31 C7 69 F7	C998:20	20 20 20 20 20 20 20 2C	CC40:01	1F F0 00 01 37 F0 00 07
C6F8:00	9D 31 C7 D8 A0 01 AD 89	C9A0:20	20 20 20 20 20 20 20 34	CC48:02	B0 00 02 30 00 24 0C 05
C700:32	C7 85 FD AD 33 C7 85 7A	C9A8:20	20 20 80 20 20 20 20 42	CC50:00	02 3C 00 02 FC 00 01 F6
C708:FE	A2 04 A9 00 06 FD 26 15	C9B0:20	20 20 20 20 20 20 5D 81	CC58:03	F8 00 01 0F F8 00 01 1F
C710:FE	2A CA D0 F8 09 30 99 F5	C9B8:5D	20 20 20 80 20 20 20 ED	CC60:3F	F8 00 01 07 F0 00 01 E4
C718:28	04 C8 C0 05 D0 0C A0 06	C9C0:20	06 31 20 20 20 13 14 32	CC68:01	F0 00 02 F0 00 02 60 CA
C720:23	AD 30 C7 85 FD AD 31 DF	C9C8:01	12 14 20 07 01 0D 05 41	CC70:00	02 60 00 29 7F FE 00 DB
C728:C7	85 FE C0 27 D0 DA 60 7B	C9D0:20	20 20 20 20 20 20 20 64	CC78:01	1F FC 00 01 0F F8 00 30
C730:00	00 00 00 01 01 00 06 D1	C9D8:20	20 20 20 20 20 20 5D A9	CC80:01	0F F0 00 01 07 E0 00 62
C738:00	00 11 0F 00 04 03 00 F0	C9E0:5D	20 20 20 20 20 20 20 13	CC88:01	03 C0 00 01 01 80 00 88
C740:00	15 0F 00 04 0C 00 00 47	C9E8:20	20 81 20 20 20 20 20 A8	CC90:01	03 00 24 38 00 02 1E 91
C748:15	0F 00 00 00 00 0F 30 74	C9F0:20	20 20 20 20 20 20 20 84	CC98:00	02 1F C0 00 01 1F F0 D5
C750:03	30 03 80 04 80 04 80 80	C9F8:20	20 20 20 20 20 20 20 8C	CCA0:00	01 1F FE 00 01 1F F0 81
C758:04	80 04 F0 00 F0 00 00 5D	CA00:20	20 20 20 20 20 20 5D D2	CCA8:00	01 1F C0 00 01 1E 00 B2
C760:03	00 03 C0 04 C0 04 C0 C9	CA08:5D	20 20 20 20 20 20 20 3C	CCB0:02	38 00 24 03 00 02 01 B8
C768:04	C0 04 00 01 00 01 FA AF	CA10:20	06 33 20 2D 20 03 08 97	CCB8:00	00 01 03 C0 00 01 07 F1
C770:FB	FC FE 00 02 04 05 06 4D	CA18:01	0E 07 05 20 13 10 05 55	CCC0:E0	00 01 0F F0 00 01 0F 74
C778:05	04 02 00 FE FC FB FA AA	CA20:05	04 20 20 20 20 20 20 21	CCC8:F8	00 01 1F FC 00 01 7F 5A
C780:FB	FC FE 3F 2E 85 F0 3C C6	CA28:80	83 20 20 20 20 20 5D 04	CCD0:FE	00 27 C0 00 02 C0 00 64
C788:F0	3C 70 3B 70 3B 70 3B ED	CA30:5D	20 83 20 20 20 20 20 D0	CCD8:01	01 E0 00 01 03 E0 00 25
C790:70	3B 30 3F 30 3F 00 3B DA	CA38:20	20 80 20 20 81 20 20 5F	CCE0:01	0F E0 00 01 7F F0 00 C2
C798:00	3B 00 39 00 39 00 39 A8	CA40:20	20 20 20 20 20 20 20 D5	CCE8:01	1F F0 00 01 07 F0 00 EE
C7A0:00	39 00 3D 00 3D 90 06 6E	CA48:20	20 20 20 20 80 20 20 5F	CCF0:01	01 F8 00 02 78 00 02 5E
C7A8:D0	3B 00 21 00 21 00 21 27	CA50:20	20 20 20 20 20 20 5D 23	CCF8:18	00 24 30 00 02 B0 00 8F
C7B0:00	21 00 00 00 00 00 25 F	CA58:5D	20 81 20 20 20 20 20 B8	CD00:01	37 F0 00 01 1F F0 00 6E
C7B8:C0	25 40 16 00 20 C0 29 86	CA60:20	06 35 20 2D 20 03 08 28	CD08:01	0F F0 00 01 07 F0 00 0C
C7C0:80	33 00 00 00 00 00 00 5D	CA68:01	0E 07 05 20 14 09 0D A3	CD10:01	03 F0 00 01 01 F0 00 F8
C7C8:00	00 00 00 00 00 00 00 58	CA70:05	20 0C 09 0D 09 14 20 77	CD18:02	F0 00 02 70 00 02 30 C8
C7D0:00	00 00 00 00 00 00 01 04 66	CA78:20	20 20 20 20 20 20 5D 4B	CD20:00	23 30 0C 00 01 1F F8 86
C7D8:0C	00 00 FF 00 DE 00 FF E9	CA80:5D	20 20 20 20 20 20 20 B4	CD28:00	01 1F F8 00 01 0F F0 8A
C7E0:00	FF 00 FF 00 FF 00 FF 70	CA88:20	20 20 20 80 20 20 20 9F	CD30:00	01 0F F0 00 01 07 E0 EF
C7E8:09	FF 00 4D 50 BB 4A FF D7	CA90:20	20 20 20 20 20 20 20 26	CD38:00	01 07 E0 00 01 03 C0 CD
C7F0:00	FF 00 FF 00 FF 00 FF 80	CA98:20	20 20 20 20 20 20 20 2E	CD40:00	01 03 C0 00 01 01 80 0F
C7F8:00	FB 08 DF 08 DF 00 DB 22	CAA0:20	20 20 20 20 20 20 5D 73	CD48:00	20 0C 00 02 02 00 02 B3
C800:55	40 40 40 40 40 40 40 E4	CAA8:5D	20 20 20 20 20 20 20 DC	CD50:0F	EC 00 01 0F F8 00 01 1C
C808:40	40 40 40 40 40 40 40 99	CAB0:20	20 20 20 20 20 20 20 46	CD58:0F	F0 00 01 0F E0 00 01 C4
C810:40	72 40 40 40 40 40 72 40 92	CAB8:20	20 20 20 20 20 80 20 0F	CD60:0F	C0 00 01 0F 80 00 01 3F
C818:40	40 40 40 40 40 40 40 A9	CAC0:20	20 20 20 20 20 20 20 56	CD68:0F	00 02 0E 00 02 02 00 CC
C820:40	40 72 40 40 40 40 49 01	CAC8:20	20 20 20 80 20 5D 11	CD70:1E	03 00 02 03 00 02 07 1F
C828:5D	30 30 30 30 5D 84 84 02	CAD0:5D	20 20 81 20 20 20 20 1E	CD78:80	00 01 07 C0 00 01 07 F3
C830:84	84 84 84 84 84 84 84 C1	CAD8:20	20 20 20 20 20 20 20 6F	CD80:F0	00 01 0F FE 00 01 0F AE


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CD88:F8 00 01 0F E0 00 01 1F D9
CD90:80 00 01 1E 00 02 18 00 A6
CD98:25 C0 00 01 01 80 00 01 12
CDA0:03 C0 00 01 07 E0 00 01 BA
CDA8:0F F0 00 01 1F F0 00 01 D5
CDB0:3F F8 00 01 7F FE 00 2D 5F
CDB8:1C 00 02 78 00 01 03 F8 2D
CDC0:00 01 0F F8 00 01 7F F8 0A
CDC8:00 01 0F F8 00 01 03 F8 19
CDD0:00 02 78 00 02 1C 00 2C A8
CDD8:7F FE 00 01 3F F8 00 01 E2
CDE0:1F F0 00 01 0F F0 00 01 95
CDE8:07 E0 00 01 03 C0 00 01 6C
CDF0:01 80 00 02 C0 00 20 30 C3
CDF8:00 02 3C 00 02 3F 00 02 AB
CE00:1F C0 00 01 1F F0 00 01 2B
CE08:1F FC 00 01 0F E0 00 01 81
CE10:0F 80 00 01 0F 00 02 06 E7
CE18:00 02 06 00 1E 0C 00 02 1A
CE20:0E 00 02 0F 00 02 0F 80 9C
CE28:00 01 0F C0 00 01 0F E0 F6
CE30:00 01 0F F0 00 01 0F F8 1A
CE38:00 01 0F EC 00 01 0D 00 E4
CE40:02 0C 00 21 08 10 00 01 75
CE48:04 32 00 01 06 14 00 01 06
CE50:14 A4 00 01 18 CC 00 01 26
CE58:03 00 02 6D 1C 00 01 08 79
CE60:4A 00 02 C0 00 01 09 30 B5
CE68:00 01 01 00 03 80 00 1D 9D
CE70:60 00 02 F0 00 02 60 00 56
CE78:3A FF 00 01 0F BE F0 0E A6
CE80:FF F0 3F F9 7C 3F F9 BC 73
CE88:3D 6A B8 F5 7B DA B5 BA 43
CE90:6A F5 B6 A6 F6 B6 A6 FB FD
CE98:DA 56 FA 6A 5A 3A AA 58 A8
CEA0:3A A5 A8 16 96 58 0B 56 BD
CEA8:60 0B 59 A0 00 01 AA 00 C7
CEB0:0C FF 00 01 0F EF B0 0B 09
CEB8:FF B0 3D 7F FC 3D B5 AC 17
CEC0:2F E5 B8 FF AC FA FF AB 53
CEC8:DA E5 AA 69 F6 EA AA FA EC
CED0:EF 96 FB 75 96 3A B5 98 84
CED8:3A 65 98 25 9A 58 09 55 EF
CEE0:60 0A 55 A0 00 01 AA 00 3F
CEE8:0C FF 00 01 03 FF F0 0E A4
CEF0:D7 F0 0E DB FC 3B FF AC B7
CEF8:3B EA 68 EF AE BA EF B5 F0
CF00:AA FE D5 A6 FE D5 E6 F5 EC
CF08:96 D6 F6 EB E6 3B EF 58 A2
CF10:3A AA 58 2A 99 98 09 99 FF
CF18:60 0A 55 A0 00 01 AA 00 78
CF20:0C FF 00 01 0F FB F0 0E 2E
CF28:FF F0 3B FF FC 3B 5A AC A1
CF30:3F 6E 98 6F 6D AE BF B6 71
CF38:AA FE 6A 66 F6 BA B6 DB 8C
CF40:AE 96 FE B5 56 3A B5 98 B7
CF48:39 A5 98 2A E5 98 09 5A A1
CF50:60 0A 55 A0 00 01 AA 00 B0
CF58:0B 00 00 00 10 00 00 00 FD
CF60:00 00 00 00 18 00 00 00 C0
CF68:00 20 04 00 3A 5C 00 20 F3
CF70:04 00 10 49 18 18 92 08 F6
CF78:00 33 CC 33 CC 33 CC 33 B1
CF80:CC 66 99 66 99 66 99 66 B9
CF88:99 0F 0E 0E 0E 0E 0E 30
CF90:0E 0E 0E 0E 0E 0E 0E 30
CF98:0E 0E 0F 04 04 04 0F 2C
CFA0:05 05 05 05 05 05 05 40
CFA8:05 05 05 0F 05 05 05 E8
CFB0:0F 42 46 00 00 00 00 31

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BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

The Fast Assembler

See instructions in article on page 78 before typing in.

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0801:0C 08 0A 00 9E 20 34 34 6C
0809:30 38 00 00 00 A9 36 85 D7
0811:01 A6 7A CA 30 0F BD 00 80
0819:02 C9 20 F0 F6 E8 BD 00 86
0821:02 C9 20 D0 01 E8 A0 04 A6
0829:84 0F BD 00 02 10 0A C9 25
0831:FF F0 06 E9 9F D0 16 A9 F2
0839:20 C9 20 F0 0C 85 08 C9 2F
0841:22 F0 4A C9 3F D0 4F A9 0A
0849:99 C8 99 FB 01 E8 D0 DA 73
0851:A4 71 24 0B 10 06 C8 A9 19
0859:90 99 FB 01 A5 0B 09 90 93
0861:C8 99 FB 01 24 0B 30 C2 3C
0869:C9 83 F0 05 49 8F D0 BA 92
0871:2C A9 3A 85 08 BD 00 02 DA
0879:F0 1A 24 0F 70 04 C5 08 25
0881:F0 C7 C9 22 D0 07 0A 45 53
0889:0F 85 0F A9 22 C8 99 FB 62
0891:01 E8 D0 E1 F0 5E 84 71 10
0899:86 7A A0 9E 84 22 A0 A0 18
08A1:84 23 A0 00 84 0B 51 22 E5
08A9:D0 07 E8 C8 BD 00 02 D0 50
08B1:F5 C9 80 D0 26 E8 BD 00 9C
08B9:02 20 1D 09 A0 92 A5 0B 2D
08C1:30 19 84 08 A0 0B D9 2E 54
08C9:09 F0 F1 88 10 F8 A4 08 17
08D1:C9 34 90 07 BD 00 02 C9 12
08D9:28 F0 E1 88 C8 B1 22 10 60
08E1:FB E6 0B A6 7A C8 B1 22 F1
08E9:00 C2 C8 F0 0A A4 71 BD BE
08F1:00 02 D0 11 4C C9 A5 A9 2C
08F9:3A 85 22 A9 09 85 23 A9 B5
0901:80 85 0B D0 A7 E8 C8 99 2F
0909:FB 01 20 1D 09 B0 0A BD 0C
0911:00 02 F0 E0 20 1D 09 90 E7
0919:EC 4C 2B 08 C9 30 90 0B D5
0921:C9 3A 90 08 C9 41 90 03 B0
0929:C9 5B 24 38 60 04 18 23 65
0931:26 31 32 33 2E 2D 2C 2B C5
0939:2A 42 59 54 C5 57 4F 52 D8
0941:C4 4F 52 C7 41 55 54 CF 2D
0949:4F 4C C4 49 4E 43 4C 55 B0
0951:44 C5 53 45 4E C4 55 4E 34
0959:53 45 4E C4 42 43 C3 42 65
0961:43 D3 42 45 D1 42 4D C9 A2
0969:42 4E C5 42 50 CC 42 56 9D
0971:C3 42 56 D3 41 44 C3 41 E1
0979:4E C4 43 4D D0 45 4F D2 2E
0981:4C 44 C1 4F 52 C1 53 42 7A
0989:C3 53 54 C1 41 53 CC 44 2E
0991:45 C3 49 4E C3 4C 53 D2 0E
0999:52 4F CC 52 4F D2 53 54 28
09A1:D8 43 50 D8 43 50 D9 4C E3
09A9:44 D8 4C 44 D9 53 54 D9 80
09B1:4A 53 D2 4A 4D D0 42 49 38
09B9:D4 42 52 CB 43 4C 43 C3 E3
09C1:4C C4 43 4C C9 43 4C D6 23
09C9:44 45 D8 44 45 D9 49 4E 21
09D1:D8 49 4E D9 4E 4F D0 50 AB
09D9:48 C1 50 48 D0 50 4C C1 31
09E1:50 4C D0 52 54 C9 52 54 31
09E9:D3 53 45 C3 53 45 C4 53 2C
09F1:45 C9 54 41 D8 54 41 D9 2C
09F9:54 53 D8 54 58 C1 54 58 36
0A01:D3 54 59 C1 00 48 AD 8D 65
0A09:02 C9 01 F0 F9 68 10 16 67
0A11:C9 FF F0 12 24 0F 30 0E 15
0A19:50 0F C5 08 D0 08 48 A5 2F
0A21:0F 49 40 85 0F 68 4C F3 16
0A29:A6 C9 90 F0 18 48 C9 83 1D
0A31:F0 05 49 8F D0 0B 2C A9 D5
0A39:3A 85 08 A5 0F 49 40 85 CA
0A41:0F 68 4C 24 A7 C8 B1 5F E5
0A49:30 05 88 A9 90 D0 F3 84 96
0A51:49 AA A0 FF CA 10 08 C8 38
0A59:B9 3A 09 10 FA 30 F5 C8 48
0A61:B9 3A 09 10 03 4C EF A6 D2
0A69:20 47 AB D0 F2 20 73 00 E0
0A71:A2 00 86 D0 C9 AC F0 16 71

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0A79:86 62 86 63 C9 24 F0 3F 70
0A81:C9 25 F0 28 C9 27 F0 17 48
0A89:20 79 00 4C 8D AE 20 73 AB
0A91:00 A5 FB A4 FC 84 62 85 1D
0A99:63 A2 90 38 4C 49 BC 20 BE
0AA1:AC 0B 48 20 73 00 68 D0 17
0AA9:EE 4C 08 AF 20 73 00 B0 C3
0AB1:E8 C9 32 B0 E4 4A 26 63 FD
0AB9:26 62 90 F0 4C 48 B2 20 A3
0AC1:73 00 90 0A C9 47 B0 D1 E0
0AC9:C9 41 90 CD E9 07 29 0F CE
0AD1:A2 04 06 63 26 62 B0 E4 30
0AD9:CA D0 F7 05 63 85 63 90 5F
0AE1:DE 8D A8 02 85 45 20 B2 32
0AE9:0B 20 13 B1 B0 03 4C 08 3B
0AF1:AF A2 00 86 D0 86 0E 20 AD
0AF9:AC B0 90 05 20 13 B1 90 CA
0B01:0A E0 07 B0 F2 E8 9D A8 5F
0B09:02 D0 EC E8 E0 08 B0 04 0D
0B11:A9 00 F0 F2 AD A9 02 85 E6
0B19:46 20 B2 C9 24 D0 06 E7
0B21:A9 FF 85 D0 D0 13 C9 25 19
0B29:D0 1B A5 10 D0 C0 A9 80 81
0B31:85 0E 05 45 85 45 8D A8 87
0B39:02 A5 46 09 80 85 46 8D 47
0B41:A9 02 20 AC 0B 05 10 49 51
0B49:28 D0 03 4C D1 B1 84 10 3B
0B51:A5 2D A6 2E 86 60 85 5F 5D
0B59:E4 30 90 04 C5 2F B0 1A A6
0B61:A0 00 B9 A8 02 51 5F D0 6E
0B69:08 C8 C0 08 90 F4 4C 85 C4
0B71:B1 A5 5F 69 0D 90 DF E8 9F
0B79:D0 DA 68 48 C9 2A D0 03 DB
0B81:4C 23 B1 AD AA 02 D0 03 99
0B89:4C 28 B1 A5 2F A4 30 20 EC
0B91:47 B1 A0 07 B9 A8 02 91 42
0B99:5F 88 10 F8 A0 07 4C 74 41
0BA1:B1 10 05 A0 08 4C C7 B5 F5
0BA9:4C F6 B5 0E 7A D0 02 E6 CA
0BB1:7B A0 00 B1 7A C9 3A B0 E8
0BB9:03 4C 84 00 60 A6 9D 30 FD
0BC1:29 E0 21 F0 B0 E0 20 F0 E4
0BC9:1A A9 0E A0 0E 4C 27 11 24
0BD1:A6 FD F0 0D A2 08 20 18 37
0BD9:E1 20 0C E1 20 CC FF F0 AD
0BE1:02 81 FB E6 FB D0 02 E6 55
0BE9:FC 60 4C AB B3 A5 66 30 0C
0BF1:12 A5 61 C9 91 B0 0C 20 CA
0BF9:9B BC A4 64 A5 65 85 14 C9
0C01:84 15 60 A5 9D A4 90 03 41
0C09:4C 48 B2 A9 00 A8 F0 EE BD
0C11:20 73 00 F0 04 C9 3B D0 B3
0C19:07 A9 00 85 15 85 FE 60 94
0C21:C9 23 D0 04 A2 01 D0 08 04
0C29:A2 00 C9 28 D0 05 A2 80 AE
0C31:20 73 00 86 FE 20 9E AD 02
0C39:24 0D 30 0A 20 EE 0B A5 C5
0C41:FE 30 1C F0 51 60 A5 FE CD
0C49:C9 01 F0 03 4C 08 AF 20 D6
0C51:A6 B6 A0 00 84 15 C9 00 8A
0C59:F0 02 B1 22 85 14 60 A2 A2
0C61:00 86 0B A0 00 BD 9F 0C C8
0C69:51 7A D0 04 E8 C8 D0 F5 25
0C71:0A D0 0D A6 0B BD AC 0C 83
0C79:85 FE 20 FB A8 4C 73 00 35
0C81:E8 BD 9E 0C 10 FA E6 0B 57
0C89:BD 9F 0C D0 D6 A5 FE 30 72
0C91:BB A9 02 85 FE 60 A9 03 5A
0C99:85 0B A2 08 D0 C5 2C 58 5A
0CA1:A9 29 2C D9 A9 00 2C D8 7A
0CA9:2C D9 00 05 06 0F 03 04 15
0CB1:20 73 00 20 C4 0C 20 79 C8
0CB9:00 C9 3B D0 03 20 3B A9 71
0CC1:4C AE A7 F0 05 C9 3B D0 46
0CC9:05 60 38 4C ED A7 C9 AF 99
0CD1:D0 F8 A2 09 8A D0 72 D0 C2
0CD9:03 4C 2F A8 E9 80 B0 03 AC
0CE1:4C 08 AF C9 40 B0 F9 C9 37
0CE9:08 08 0D 0A A8 B9 C7 0D 3D
0CF1:48 B9 C6 0D 48 4C 73 00 A0
0CF9:E9 08 AA C9 08 20 39 BD 2E
0D01:D6 D0 20 BE 0B 20 73 00 79
0D09:AD D6 C9 3B F0 D2 20 8A DB
0D11:AD A5 9D 4A 90 18 20 F7 E0
0D19:B7 18 A5 14 E5 FB A0 08 87

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0D21:A5 15 E5 FC 28 10 02 49 AE
0D29:FF C9 00 D0 04 8A 4C BE 64
0D31:0B A9 26 A0 0E 4C 27 11 0B
0D39:C9 1F 90 0D C9 38 B0 A0 14
0D41:BD D6 0D 20 BE 0B 4C 73 C1
0D49:00 48 BD D6 0D 85 02 20 3D
0D51:11 0C A5 15 20 9D 0D F0 7F
0D59:0C 20 9D 0D F0 7F A9 46 43
0D61:A0 0E 4C 27 11 A5 02 29 97
0D69:0F A8 B9 39 0E 10 06 A5 62
0D71:FE 09 10 85 FE 68 38 E9 9B
0D79:08 A6 FE A8 18 B9 5D 0E 1C
0D81:7D 74 0E 20 BE 0B A5 FE A7
0D89:29 0F F0 38 29 08 08 A5 BC
0D91:14 20 BE 0B 28 F0 2D A5 4B
0D99:15 4C BE 0B F0 06 A5 FE C3
0DA1:09 08 85 FE A5 FE 4A 4A EA
0DA9:4A 4A A5 02 B0 04 29 0F 47
0DB1:90 04 4A 4A 4A A8 A5 75
0DB9:FE 29 07 AA B9 39 0E 49 41
0DC1:FF 3D 94 0E 60 D4 0F D1 E4
0DC9:0F A7 0E 42 0F 11 10 2A 42
0DD1:10 B8 10 B0 10 90 B0 F0 44
0DD9:30 D0 10 50 70 05 05 05 ED
0DE1:05 05 05 05 06 17 11 11 70
0DE9:17 17 17 23 28 28 39 1A D8
0DF1:2B 2C 4C 24 00 18 D8 58 E2
0DF9:B8 CA 88 E8 C8 EA 48 08 4D
0E01:68 28 40 60 38 F8 7A AA AA
0E09:A8 BA 8A 9A 98 55 4E 44 1E
0E11:45 46 27 44 20 4C 4F 43 9E
0E19:41 54 49 4F 4E 20 43 4F D1
0E21:55 4E 54 45 D2 42 52 41 DF
0E29:4E 43 48 20 4F 55 54 20 E0
0E31:4F 46 20 52 41 4E 47 C5 47
0E39:1C 0C 04 14 84 6E 6C 0D EB
0E41:86 96 8E 8C 80 49 4C 4C EE
0E49:45 47 41 4C 20 41 44 44 99
0E51:52 45 53 53 49 4E 47 20 B9
0E59:4D 4F 44 C5 60 20 C0 40 1A
0E61:A0 00 E0 80 01 C1 E1 41 06
0E69:21 61 81 E0 C0 A2 A0 80 FE
0E71:14 40 20 09 09 05 15 15 D7
0E79:01 11 80 09 80 0D 1D 19 86
0E81:80 80 80 80 0C 14 14 62
0E89:80 80 80 80 0C 1C 1C A6
0E91:80 80 2C 01 02 04 08 10 E3
0E99:20 40 80 20 79 00 F0 04 99
0EA1:C9 3B D0 02 68 68 60 A9 FA
0EA9:00 85 FB 85 FD 85 B7 A9 1E
0EB1:C0 85 FC A5 9D 09 20 85 60
0EB9:9D 20 9C 0E 20 8A AD 20 C7
0EC1:F7 B7 84 FB 85 FC 20 9C 15
0EC9:0E 20 00 E2 E0 02 90 03 56
0ED1:4C 48 B2 8A 05 9D 85 9D 6C
0ED9:20 9C 0E 20 00 E2 86 FD 87
0EE1:20 0E E2 20 9E AD 20 A3 7F
0EE9:B6 20 BD FF A6 FD F0 B6 E6
0EF1:A9 08 A0 01 20 BA FF A5 9A
0EF9:9D 4A 90 AA A5 B7 D0 06 E7
0F01:A5 FD C9 08 B0 15 20 C1 07
0F09:E1 A2 08 20 18 E1 A5 FB 53
0F11:20 0C E1 A5 FC 20 0C E1 3B
0F19:4C CC FF 20 10 F7 4C 3B C6
0F21:A4 20 8B B0 85 49 84 4A BA
0F29:20 79 00 F0 07 C9 3B F0 8B
0F31:03 4C AC A9 A6 3A E8 D0 D4
0F39:03 4C 08 AF 20 92 0A 4C 93
0F41:D0 BB F0 10 20 6B A9 A5 7D
0F49:14 8D B1 02 A5 15 8D B2 7A
0F51:02 A9 80 2C A9 00 8D B0 C6
0F59:02 60 AD B0 02 29 BF 2C B1
0F61:A9 00 8D B0 02 A6 14 8E 72
0F69:FE 01 A6 15 8E FF 01 2C 10
0F71:B0 02 70 24 20 60 A5 86 0D
0F79:7A 84 7B 20 73 00 AA F0 49
0F81:D9 A2 FF 86 3A 90 03 4C 04
0F89:96 A4 AD B0 02 09 40 8D 1F
0F91:B0 02 20 79 00 4C 9C A4 33
0F99:10 C6 18 AD FE 01 6D B1 D7
0FA1:02 85 63 AD FF 01 6D B2 FA
0FA9:02 85 62 B0 B3 A2 90 38 03
0FB1:20 49 BC 20 DF BD 78 A2 55
0FB9:00 BD 00 01 C9 30 90 06 8D
0FC1:9D 77 02 E8 D0 F3 A9 20 25

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0FC9:9D 77 02 E8 86 C6 58 D0 34
0FD1:A3 A9 08 2C A9 00 85 02 4A
0FD9:20 9E AD 24 0D 30 1F 20 2F
0FE1:EE 0B A5 02 D0 0D A6 15 2C
0FE9:F0 09 A6 9D E0 20 F0 03 DD
0FF1:4C 48 B2 20 8D 0D 20 9C 1E
0FF9:0E 20 0E E2 D0 DA 20 A6 EF
1001:B6 85 64 A0 00 C4 64 F0 41
1009:ED B1 22 20 BE 0B C8 D0 57
1011:F4 A0 01 A9 08 91 2B 20 8B
1019:33 A5 A5 22 A4 23 65 2D BC
1021:85 2D 90 01 C8 84 2E 4C 72
1029:5C A6 20 9E AD 20 A3 B6 FA
1031:20 BD FF 20 00 E2 A9 09 BA
1039:A0 00 20 BA FF 20 C1 E1 3F
1041:A2 09 20 1E E1 20 12 E1 70
1049:A5 00 29 02 F0 05 A9 04 98
1051:4C 3B A4 20 12 E1 20 CC 22
1059:FF A5 7A 48 A5 7B 48 A2 05
1061:09 20 1E E1 20 12 E1 20 1D
1069:12 E1 AA F0 34 20 12 E1 97
1071:20 12 E1 A2 FF E8 20 12 82
1079:E1 9D 00 02 AF D0 F6 20 A8
1081:CC FF A9 FF 85 7A A9 01 A7
1089:85 7B 20 73 00 20 C4 0C 9C
1091:20 79 00 AA F0 C9 C9 3A 47
1099:F0 F0 C9 3B F0 C1 4C 08 8A
10A1:AF 20 CC FF A9 09 20 C3 B0
10A9:FF 68 85 7B 68 85 7A 60 FA
10B1:20 B4 10 A9 00 4C BE 0B 65
10B9:20 9E AD 20 A3 B6 A8 A9 3C
10C1:00 C0 58 90 03 4C 71 A5 F7
10C9:99 00 02 88 30 04 B1 22 96
10D1:90 F6 A5 7A 48 A5 7B 48 6C
10D9:A9 FF 85 7A A9 01 85 7B FE
10E1:20 73 00 90 07 A9 14 A0 9D
10E9:11 4C 27 11 20 6B A9 20 BD
10F1:7C A5 A5 14 8D FE 01 A5 BF
10F9:15 8D FF 01 8C FC 01 8C FE
1101:FD 01 84 0B A0 00 B9 FC 19
1109:01 20 BE 0B C8 C4 0B 90 3C
1111:F5 B0 96 4D 49 53 53 49 89
1119:4E 47 20 4C 49 4E 45 20 2B
1121:4E 55 4D 42 45 D2 85 22 30
1129:84 23 4C 47 A4 66 0F 0E 3F
1131:08 06 0A B1 0C 6E 0A A9 0D
1139:37 85 01 A9 00 85 58 85 5F
1141:5A 85 5F A9 C0 85 59 85 CC
1149:5B A9 A0 85 60 20 BB A3 8E
1151:A2 09 BD 2E 11 9D 02 03 A7
1159:CA 10 F7 A9 4C 8D C4 B5 56
1161:8D 92 B0 8D 43 B1 8D A5 7F
1169:A9 00 8D 8D 4E B5 8D 55 FE
1171:B1 A9 08 8D 0F B6 8D 89 A8
1179:B1 A9 EA 8D 10 B6 A9 60 24
1181:8D 69 B1 A9 8C A0 0B 8D 20
1189:44 B1 8C 45 B1 A9 E2 A0 BA
1191:0A 8D 93 B0 8C 94 B0 A9 5B
1199:A2 A0 0B 8D C5 B5 8C C6 54
11A1:B5 A9 07 A0 0C 8D 2C A0 9D
11A9:8C 2D A0 A9 22 A0 0F 8D 4B
11B1:A6 A9 8C A7 A9 A9 C4 A0 BB
11B9:0C 8D 49 A9 8C 4A A9 A9 93
11C1:FB A0 F0 8D 20 D0 8C 21 7F
11C9:9D A9 1B A0 12 8D 81 02 F7
11D1:8C 82 02 20 BF E3 A9 E4 E2
11D9:A0 11 20 1E AB 20 30 E4 99
11E1:4C 9D E3 93 08 0E 9B 11 08
11E9:20 2A 20 C1 D3 D3 C5 36
11F1:CD C2 CC C5 D2 20 56 33 98
11F9:20 2A 20 20 20 42 59 20 99
1201:D9 56 45 53 20 C8 41 4E 7A
1209:20 20 31 39 38 35 0D 0D BC
1211:20 20 20 20 20 20 20 35
1219:20 00 00 00 00 00 00 4D

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All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

Power BASIC: Printmaker

Article on page 104.

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: Printmaker—64 Version

```

100 FORI=49152TO49649:READA:X=
X+A:POKEI,A:NEXT :rem 120
110 IFX<>55761:THENPRINT"ERROR
[SPACE]IN DATA STATEMENTS.
":STOP :rem 236
120 NEW :rem 125
130 DATA 32,155,183,142,85,2,3
2,228,193,32 :rem 15
140 DATA 228,193,32,228,193,32
,140,193,160,193 :rem 221
150 DATA 169,109,32,30,171,169
,0,141,84,2 :rem 219
160 DATA 169,40,133,253,169,21
6,133,254,169,255 :rem 25
170 DATA 141,88,2,169,40,133,2
51,169,4,133 :rem 20
180 DATA 252,32,0,193,160,0,16
9,1,145,45 :rem 165
190 DATA 32,0,193,145,45,32,0,
193,165,20 :rem 165
200 DATA 145,45,32,0,193,165,2
1,145,45,24 :rem 213
210 DATA 165,20,109,85,2,133,2
0,144,2,230 :rem 201
220 DATA 21,32,0,193,160,0,140
,86,2,169 :rem 107
230 DATA 153,145,45,32,0,193,1
69,34,145,45 :rem 19
240 DATA 160,0,177,251,201,32,
240,25,201,96 :rem 49
250 DATA 240,21,177,253,41,15,
205,88,2,240 :rem 9
260 DATA 12,141,88,2,170,189,9
3,193,32,0 :rem 177
270 DATA 193,145,45,177,251,32
,7,193,32,0 :rem 228
280 DATA 193,145,45,230,251,20
8,2,230,252,230 :rem 156
290 DATA 253,208,2,230,254,165
,252,201,7,208 :rem 112
300 DATA 6,165,251,201,232,240
,37,238,86,2 :rem 10
310 DATA 173,86,2,201,25,208,1
79,32,0,193 :rem 220
320 DATA 169,34,160,0,145,45,3
2,0,193,169 :rem 222
330 DATA 59,145,45,32,0,193,16
9,0,168,145 :rem 232
340 DATA 45,76,51,192,160,0,32
,0,193,169 :rem 174
350 DATA 34,145,45,32,0,193,16
9,59,145,45 :rem 235
360 DATA 32,0,193,169,0,145,45
,32,0,193 :rem 118
370 DATA 145,45,32,0,193,145,4
5,32,0,193 :rem 170
380 DATA 32,51,165,108,2,3,230
,45,208,2 :rem 112
390 DATA 230,46,96,72,16,22,17
3,84,2,208 :rem 183
400 DATA 36,169,1,141,84,2,32,
0,193,169 :rem 122

```



```

410 DATA 18,160,0,145,45,76,51
    ,193,173,84 :rem 229
420 DATA 2,240,14,169,0,141,84
    ,2,32,0 :rem 2
430 DATA 193,169,146,160,0,145
    ,45,104,41,127 :rem 115
440 DATA 201,34,208,3,169,39,9
    ,6,201,32,176 :rem 22
450 DATA 4,24,105,64,96,201,64
    ,176,1,96 :rem 131
460 DATA 201,96,176,4,24,105,3
    ,2,96,201,128 :rem 18
470 DATA 176,4,24,105,64,96,16
    ,9,63,96,144 :rem 249
480 DATA 5,28,159,156,30,31,15
    ,8,129,149,150 :rem 81
490 DATA 151,152,153,154,155,1
    ,9,18,80,82,73 :rem 79
500 DATA 78,84,77,65,75,69,82,
    ,146,32,32 :rem 153
510 DATA 32,32,32,13,0,234,234
    ,234,234,234 :rem 252
520 DATA 234,234,234,234,234,2
    ,34,160,0,177,43 :rem 160
530 DATA 208,15,200,177,43,208
    ,10,173,85,2 :rem 11
540 DATA 133,20,169,0,133,21,9
    ,6,165,43,133 :rem 11
550 DATA 251,165,44,133,252,16
    ,0,0,177,251,133 :rem 161
560 DATA 253,200,177,251,133,2
    ,54,160,0,177,253 :rem 214
570 DATA 208,31,200,177,253,20
    ,8,26,160,2,177 :rem 117
580 DATA 251,133,20,200,177,25
    ,1,133,21,24,165 :rem 153
590 DATA 20,109,85,2,133,20,16
    ,5,21,105,0 :rem 157
600 DATA 133,21,96,165,253,133
    ,251,165,254,133 :rem 216
610 DATA 252,76,169,193,56,165
    ,45,233,1,133 :rem 80
620 DATA 45,165,46,233,0,133,4
    ,6,96 :rem 141

```

Program 2: Printmaker—VIC Version

```

100 POKE56,28:CLR :rem 220
110 FORI=7168TO7665:READA:X=X+
    A:POKEI,A:NEXT :rem 18
120 IFX<>52211THENPRINT"ERROR
    [SPACE]IN DATA STATEMENTS.
    ":STOP :rem 224
130 NEW :rem 126
140 DATA 32,155,215,142,162,2,
    ,32,228,29,32,228 :rem 206
150 DATA 29,32,228,29,32,140,2
    ,9,160,29,169,109 :rem 224
160 DATA 32,30,203,169,0,141,1
    ,61,2,169,22,133 :rem 145
170 DATA 253,169,150,133,254,1
    ,69,255,141,165,2 :rem 224
180 DATA 169,22,133,251,169,30
    ,133,252,32,0,29 :rem 209
190 DATA 160,0,169,1,145,45,32
    ,0,29,145,45,32,0 :rem 247
200 DATA 29,165,20,145,45,32,0
    ,29,165,21,145,45 :rem 254
210 DATA 24,165,20,109,162,2,1
    ,33,20,144,2,230 :rem 135
220 DATA 21,32,0,29,160,0,140,
    ,163,2,169 :rem 101
230 DATA 153,145,45,32,0,29,16
    ,9,34,145,45 :rem 225
240 DATA 160,0,177,251,201,32,
    ,240,25,201,96 :rem 49
250 DATA 240,21,177,253,41,15,
    ,205,165,2,240 :rem 53
260 DATA 12,141,165,2,170,189,
    ,93,29,32,0 :rem 171
270 DATA 29,145,45,177,251,32,
    ,7,29,32,0 :rem 128

```

```

280 DATA 29,145,45,230,251,208
    ,2,230,252,230 :rem 106
290 DATA 253,208,2,230,254,165
    ,252,201,31,208 :rem 157
300 DATA 6,165,251,201,250,240
    ,37,238,163,2 :rem 54
310 DATA 173,163,2,201,14,208,
    ,179,32,0,29 :rem 212
320 DATA 169,34,160,0,145,45,3
    ,2,0,29,169 :rem 172
330 DATA 59,145,45,32,0,29,169
    ,0,168,145 :rem 182
340 DATA 45,76,51,28,160,0,32,
    ,0,29,169 :rem 74
350 DATA 34,145,45,32,0,29,169
    ,59,145,45 :rem 185
360 DATA 32,0,29,169,0,145,45,
    ,32,0,29 :rem 18
370 DATA 145,45,32,0,29,145,45
    ,32,0,29 :rem 70
380 DATA 32,51,197,108,2,3,230
    ,45,208,2 :rem 117
390 DATA 230,46,96,72,16,22,17
    ,3,161,2,208 :rem 227
400 DATA 36,169,1,141,161,2,32
    ,0,29,169 :rem 116
410 DATA 18,160,0,145,45,76,51
    ,29,173,161 :rem 223
420 DATA 2,240,14,169,0,141,16
    ,1,2,32,0 :rem 46
430 DATA 29,169,146,160,0,145,
    ,45,104,41,127 :rem 65
440 DATA 201,34,208,3,169,39,9
    ,6,201,32,176 :rem 22
450 DATA 4,24,105,64,96,201,64
    ,176,1,96 :rem 131
460 DATA 201,96,176,4,24,105,3
    ,2,96,201,128 :rem 18
470 DATA 176,4,24,105,64,96,16
    ,9,63,96,144 :rem 249
480 DATA 5,28,159,156,30,31,15
    ,8,129,149,150 :rem 81
490 DATA 151,152,153,154,155,1
    ,9,18,80,82,73 :rem 79
500 DATA 78,84,77,65,75,69,82,
    ,146,32,32 :rem 153
510 DATA 32,32,32,13,0,234,234
    ,234,234,234 :rem 252
520 DATA 234,234,234,234,234,2
    ,34,160,0,177,43 :rem 160
530 DATA 208,15,200,177,43,208
    ,10,173,162,2 :rem 55
540 DATA 133,20,169,0,133,21,9
    ,6,165,43,133 :rem 11
550 DATA 251,165,44,133,252,16
    ,0,0,177,251,133 :rem 161
560 DATA 253,200,177,251,133,2
    ,54,160,0,177,253 :rem 214
570 DATA 208,31,200,177,253,20
    ,8,26,160,2,177 :rem 117
580 DATA 251,133,20,200,177,25
    ,1,133,21,24,165 :rem 153
590 DATA 20,109,162,2,133,20,1
    ,65,21,105,0 :rem 201
600 DATA 133,21,96,165,253,133
    ,251,165,254,133 :rem 216
610 DATA 252,76,169,29,56,165,
    ,45,233,1,133 :rem 30
620 DATA 45,165,46,233,0,133,4
    ,6,96 :rem 141

```

Program 3: Plus/4 and 16 Version

```

100 POKE56,62:CLR:FORI=15872TO
    16369:READA:POKEI,A:X=X+A:
    NEXT
110 IFX<>46904THENPRINT"ERROR
    [SPACE]IN DATA STATEMENTS.
    ":STOP
120 NEW
130 DATA 32,129,157,142,209,0,

```

```

    32,228,63,32
140 DATA 228,63,32,228,63,32,1
    ,40,63,160,63
150 DATA 169,109,32,136,144,16
    ,9,0,141,208,0
160 DATA 169,40,133,5,169,8,13
    ,3,6,169,255
170 DATA 141,212,0,169,40,133,
    ,3,169,12,133
180 DATA 4,32,0,63,160,0,169,1
    ,145,45
190 DATA 32,0,63,145,45,32,0,6
    ,3,165,20
200 DATA 145,45,32,0,63,165,21
    ,145,45,24
210 DATA 165,20,109,209,0,133,
    ,20,144,2,230
220 DATA 21,32,0,63,160,0,140,
    ,210,0,169
230 DATA 153,145,45,32,0,63,16
    ,9,34,145,45
240 DATA 160,0,177,3,201,32,24
    ,0,25,201,96
250 DATA 240,21,177,5,41,15,20
    ,5,212,0,240
260 DATA 12,141,212,0,170,189,
    ,93,63,32,0
270 DATA 63,145,45,177,3,32,7,
    ,63,32,0
280 DATA 63,145,45,230,3,208,2
    ,230,4,230
290 DATA 5,208,2,230,6,165,4,2
    ,01,15,208
300 DATA 6,165,3,201,232,240,3
    ,7,238,210,0
310 DATA 173,210,0,201,25,208,
    ,179,32,0,63
320 DATA 169,34,160,0,145,45,3
    ,2,0,63,169
330 DATA 59,145,45,32,0,63,169
    ,0,168,145
340 DATA 45,76,51,62,160,0,32,
    ,0,63,169
350 DATA 34,145,45,32,0,63,169
    ,59,145,45
360 DATA 32,0,63,169,0,145,45,
    ,32,0,63
370 DATA 145,45,32,0,63,145,45
    ,32,0,63
380 DATA 32,24,136,108,2,3,230
    ,45,208,2
390 DATA 230,46,96,72,16,22,17
    ,3,208,0,208
400 DATA 36,169,1,141,208,0,32
    ,0,63,169
410 DATA 18,160,0,145,45,76,51
    ,63,173,208
420 DATA 0,240,14,169,0,141,20
    ,8,0,32,0
430 DATA 63,169,146,160,0,145,
    ,45,104,41,127
440 DATA 201,34,208,3,169,39,9
    ,6,201,32,176
450 DATA 4,24,105,64,96,201,64
    ,176,1,96
460 DATA 201,96,176,4,24,105,3
    ,2,96,201,128
470 DATA 176,4,24,105,64,96,16
    ,9,63,96,144
480 DATA 5,28,159,156,30,31,15
    ,8,129,149,150
490 DATA 151,152,153,154,155,1
    ,9,18,80,82,73
500 DATA 78,84,77,65,75,69,82,
    ,146,32,32
510 DATA 32,32,32,13,0,234,234
    ,234,234,234
520 DATA 234,234,234,234,234,2
    ,34,160,0,177,43
530 DATA 208,15,200,177,43,208
    ,10,173,209,0
540 DATA 133,20,169,0,133,21,9
    ,6,165,43,133

```



```

550 DATA 3,165,44,133,4,160,0,
177,3,133
560 DATA 5,200,177,3,133,6,160
,0,177,5
570 DATA 208,31,200,177,5,208,
26,160,2,177
580 DATA 3,133,20,200,177,3,13
3,21,24,165
590 DATA 20,109,209,0,133,20,1
65,21,105,0
600 DATA 133,21,96,165,5,133,3
,165,6,133
610 DATA 4,76,169,63,56,165,45
,233,1,133
620 DATA 45,165,46,233,0,133,4
6,96

```

All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

```

:POKE204,0 :rem 52
240 POKE198,0:WAIT198,1:GETA$:
IFA$<"1"ORA$>"2"THEN240
:rem 14
250 POKE204,1:POKE207,0:PRINTA
$: :rem 67
260 NP=VAL(A$)-1:POKE247,NP:PR
INTTAB(11)"[2 DOWN]WHAT SP
EED [1-3][2 SPACES]"+
[LEFT]";:POKE204,0:rem 184
270 POKE198,0:WAIT198,1:GETA$:
IFA$<"1"ORA$>"3"THEN270
:rem 21
280 POKE204,1:POKE207,0:PRINTA
$:POKE146,31-VAL(A$)*10:IF
NP=1THEN320 :rem 196
290 PRINTTAB(11)"[2 DOWN]WHAT
[SPACE]LEVEL [1-9]
[2 SPACES]"+[LEFT]";:POKE
204,0 :rem 236
300 POKE198,0:WAIT198,1:GETA$:
IFA$<"1"ORA$>"9"THEN300
:rem 15
310 POKE204,1:POKE207,0:PRINTA
$:POKE890,100-VAL(A$)*10
:rem 88
320 DN$="{HOME}[18 DOWN][WHT]"
:CO$="{RVS}[53][40 SPACES]"
:rem 49
330 DO$="{RVS}[WHT][40 SPACES]"
:POKEBD,12:POKEBK,14
:rem 234
340 PRINT"[CLR][2 DOWN]":FORI=
1TO18:PRINTDO$;:NEXT:PRINT
"[HOME]";:FORI=1TO3:PRINTC
O$;:NEXT :rem 107
350 PRINT"[53][RVS][N3][WHT]O
[18 Y][OFF]+[RVS][17 Y]P
[53][H3][N3][WHT][H3]";:rem 23
360 PRINTTAB(20)"B"SPC(17)"[N3
[53][H3][N3][WHT][H3]"SPC(18)"
"B"SPC(17)"[N3][53][H3][N3]
[WHT][H3]"SPC(18)"B"SPC(17)
:rem 25
370 PRINT"[N3][53][H3][N3][WHT][H3]
"SPC(18)"B"SPC(17)"[N3][53]
[H3][N3][WHT][H3]"SPC(18)"B"S
PC(17)"[WHT][N3][53][H3][N3]
[WHT]O[Y]P";:SPC(16):rem 8
380 PRINT"B"SPC(14)"O[Y]P[53]
[H3][N3][BLK] [WHT] [M3]"SPC(
16);"B"SPC(15)"[H3] [BLK]
[53][H3][N3][BLK] [WHT] [N3]
SPC(15)"B"; :rem 173
390 PRINTSPC(15)"[H3] [BLK] [53]
[H3][N3][BLK] [WHT] [M3]"SPC(
16)"B"SPC(15)"[H3] [BLK]
[53][H3][N3][BLK] [WHT] [N3]
[16 SPACES]B"; :rem 123
400 PRINTSPC(15)"[H3] [BLK] [53]
[H3][N3][BLK] [WHT] [M3]"SPC(
16)"B"SPC(14)" [H3] [BLK]
[53][H3][N3][WHT]L[P3]@SPC(16
)"[WHT]B"SPC(15):rem 182
410 PRINTL[P3]@[53][H3][N3][WHT]
[H3]"SPC(18)"B"SPC(17)"
[WHT][N3][53][H3][N3][WHT][H3]"
SPC(18)"B"SPC(17)"[N3][53]
[H3][N3][WHT][H3]"SPC(18)
:rem 179
420 PRINT"B"SPC(4)SPC(13)"[N3]
[53][H3][N3][WHT][H3]"SPC(18)"
B"SPC(17)"[N3][53][H3][N3]
[WHT][H3]"SPC(18)"B"SPC(17)
:rem 46
430 PRINT"[N3][53][H3][N3][WHT]L
[18 P][OFF]I[RVS][17 P]@
[53][H3][2 UP]":FORI=1TO2
:rem 96
440 PRINTCO$;:NEXT:PRINT"[RVS]
[39 SPACES][HOME]":rem 191
450 POKE2023,160:POKE56295,12:
PRINT"[HOME][OFF][WHT]"SPC
(6)"SCORE 0"SPC(15)"SCORE
[SPACE]0"DN$ :rem 170

```

```

460 PRINTSPC(16)"[8 UP][RVS]
[4 SPACES]B[4 SPACES]
[9 DOWN][OFF]";:PRINTSPC(6
8)"F A C E - O F F"
:rem 146
470 POKE839,50:POKE840,39:POKE
849,0:POKE850,1:FORA=868TO
870:POKEA,140:NEXT:rem 212
480 IFPEEK(3)=1THENPOKE838,NP*
25+55:POKE848,0 :rem 156
490 IFPEEK(3)=2THENPOKE838,9:P
OKE848,1 :rem 20
500 POKE53269,15:SYS49152:POKE
53269,14:GOSUB660:A=PEEK(3
):SC(A)=SC(A)+1 :rem 122
510 PRINT"[HOME]"TAB(11)SC(2)S
PC(19)SC(1):IFSC(1)+SC(2)<
9THEN470 :rem 58
520 POKE53269,0 :rem 43
530 PRINT"[HOME][12 DOWN][WHT]
[RVS]"SPC(16)"GAMEBOVER":P
RINTDN$"[5 DOWN]"SPC(8)H$D
N$:V=60 :rem 51
540 A$="{RIGHT}PRESS FIRE BUTT
ON TO PLAY AGAIN":FORI=1TO
16:GOSUB640:GOSUB650:NEXTI
:rem 177
550 IFPEEK(56320)ANDPEEK(56321
)AND1THEN550 :rem 236
560 PRINTDN$:A$="{53}[RVS]
[OFF][WHT]PRESS FIRE BUTT
ON TO PLAY AGAIN[53][RVS]
[OFF]":V=63 :rem 121
570 FORI=20TO0STEP-1:GOSUB640:
PRINT"[UP]";:GOSUB650:NEXT
I :rem 26
580 POKE53274,128:POKE53269,0:
PRINTDN$"[5 DOWN][RVS][53]
[2 SPACES][OFF][WHT]UP TO
[SPACE]CHANGE OPTIONS";
:rem 18
590 PRINT"/ DOWN TO PLAY"
:rem 175
600 IF(PEEK(56320)ANDPEEK(5632
1)AND2)<2THENSC(1)=0:SC(2
)=0:POKE3,1:GOTO630:rem 96
610 IF(PEEK(56320)ANDPEEK(5632
1)AND1)<1THENPRINT"[CLR]"
:RUN200 :rem 58
620 GOTO600 :rem 103
630 PRINTDN$"[5 DOWN]"H$
[17 SPACES]":GOTO450
:rem 49
640 POKE214,22:PRINTCHR$(13)"
[UP]";:PRINTTAB(V-1)LEFT$(
A$,I)RIGHT$(A$,I):RETURN
:rem 153
650 FORZ=1TO30:NEXTZ:RETURN
:rem 61
660 POKE54277,20:FORM=1TO5:FOR
S=20TO0STEP10:POKE54273,S
:POKE54272,S+30 :rem 57
670 POKE54276,32:POKE54276,33:
POKEBK,S:NEXTS,M:POKEBK,14
:RETURN :rem 195
680 POKE53289,7:POKE2040,224:P
OKE2041,225:POKE2042,225:R
ETURN :rem 51
690 PRINT"[HOME][5 DOWN][73]
[4 SPACES][RVS][K3][D3][I3]
[OFF][EV][RVS][EV][C3][OFF]
[SPACE][D3][RVS][D3][F3][OFF]
[F3][RVS][K3][D3][I3][OFF][EV]
[4 SPACES][D3][RVS][D3][F3]
[OFF][F3][RVS][K3][D3][I3]
[OFF][EV][RVS][K3][D3][I3]
[OFF][EV]"SPC(8); :rem 98
700 PRINT"[RVS][K3][C3][OFF][F3]
[SPACE][RVS][K3][C3][EV][OFF]
[K3][RVS][K3][OFF][K3]
[2 SPACES][RVS][K3][C3][OFF]
[F3] [D3] [2 I] [F3] [RVS] [K3]
[OFF] [K3] [RVS] [K3] [OFF] [K3]
[RVS] [K3] [C3] [OFF] [F3] [RVS]
[K3] [C3] [OFF] [F3] "SPC(9)"

```

Face-Off

Article on page 50.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```

100 BD=53280:BK=53281:POKEBD,1
:POKEBK,1:PRINT"[CLR]":GOS
UB690 :rem 243
110 PRINT"[6 DOWN]"SPC(6)"READ
ING DATA... PLEASE WAIT"
:rem 7
120 FORA=49152TO49958:READB:C=
C+B:POKEA,B:NEXTA:IFC=8676
9THEN140 :rem 168
130 PRINT"[CLR]ERROR IN DATA S
TATEMENTS":STOP :rem 187
140 FORA=14336TO14463:READB:PO
KEA,B:NEXT:POKE53287,2:POK
E53288,3 :rem 107
150 ML$="{I3}"+CHR$(8)+"[X3]"+C
HR$(3)+"[23]XJ"+CHR$(16)+CH
R$(248)+"[LB3]T3":POKEB35,
0 :rem 234
160 POKEB36,208:POKEB30,0:POKE
831,216:POKEB28,0:POKEB29,
56:POKE56334,0 :rem 43
170 POKE1,51:ML$=ML$:SYS(PEEK(
51)+256*PEEK(52)):POKE1,55
:POKE56334,1 :rem 171
180 FORI=12552TO12559:READJ:PO
KEI,J:NEXT:FORI=12568TO125
75:READJ:POKEI,J:NEXT
:rem 132
190 FORI=0TO15:POKE54296,I:NEX
T:FORI=0TO23:POKE54272+I,0
:NEXT :rem 54
200 BD=53280:BK=53281:POKEBD,1
:POKEBK,1:POKE3,1:GOSUB690
:POKE53272,28 :rem 81
210 POKE53274,129:H$="{RVS}[53]
[20 SPACES]":GOSUB680
:rem 184
220 PRINT"[6 DOWN]"TAB(6)"
[RVS][WHT][27 SPACES][73]
[UP]":rem 175
230 PRINTTAB(9)"[1][2 SPACES]O
R[2 SPACES][2][2 SPACES]PL
AYERS[2 SPACES]"+[LEFT]";

```


All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

```
[RVS][K][OFF][K][2 SPACES]
"; rem 234
710 PRINT"[RVS][K][OFF][K]
[RVS][K][OFF][K][RVS][K]
[OFF][K][D][F][RVS][K]
[OFF][K][6 SPACES][RVS][K]
[OFF][K][RVS][K][OFF][K]
[RVS][K][OFF][K][2 SPACES]
[RVS][K][OFF][K]"SPC(10)"
[C][V][2 SPACES]"; rem 145
720 PRINT"[C][V][C][V] [RVS]
[2 I][OFF] [C][RVS][2 I]
[OFF][V][5 SPACES][RVS]
[2 I][OFF] [C][V]
[2 SPACES][C][V]":RETURN
rem 158
730 DATA 32,45,192,32,218,193,
198,251,208,13,165 rem 71
740 DATA 143,133,251,32,197,19
2,32,49,193,32,28 rem 20
750 DATA 192,165,3,240,232,96,
198,144,208,12,169 rem 77
760 DATA 130,133,144,165,143,2
01,45,240,2,230 rem 148
770 DATA 143,96,160,1,169,20,1
53,110,3,153,120,3 rem 42
780 DATA 136,16,245,165,247,20
8,6,173,122,3,141 rem 15
790 DATA 120,3,169,27,141,17,2
08,162,127,142,13 rem 7
800 DATA 220,232,142,15,212,14
2,18,212,160,23 rem 140
810 DATA 169,0,153,0,212,136,1
6,248,169,1,141,5 rem 0
820 DATA 212,169,15,141,24,212
,169,20,141,1,212 rem 246
830 DATA 169,134,141,20,3,169,
192,141,21,3,169 rem 216
840 DATA 129,141,26,208,169,0,
133,3,133,4,133,5 rem 255
850 DATA 96,169,1,141,25,208,1
65,3,208,36,162,4 rem 17
860 DATA 160,2,169,0,133,2,185
,70,3,157,0,208 rem 157
870 DATA 185,100,3,157,1,208,1
85,80,3,74,38,2 rem 168
880 DATA 202,202,136,16,233,16
5,2,141,16,208,169 rem 56
890 DATA 250,141,18,208,173,13
,220,41,1,240,3,76 rem 46
900 DATA 49,234,76,188,254,165
,4,48,25,24,109,60 rem 79
910 DATA 3,141,60,3,173,70,3,1
05,0,141,70,3,173 rem 236
920 DATA 80,3,105,0,141,80,3,1
6,32,73,255,24,105 rem 37
930 DATA 1,133,2,173,60,3,56,2
29,2,141,60,3,173 rem 248
940 DATA 70,3,233,0,141,70,3,1
73,80,3,233,0,141 rem 237
950 DATA 80,3,165,5,48,18,24,1
09,90,3,141,90,3 rem 215
960 DATA 173,100,3,105,0,141,1
00,3,76,48,193,73 rem 252
970 DATA 255,24,105,1,133,2,17
3,90,3,56,229,2 rem 161
980 DATA 141,90,3,173,100,3,23
3,0,141,100,3,96 rem 193
990 DATA 173,100,3,201,71,176,
7,165,5,16,3,32 rem 159
1000 DATA 205,193,201,212,144,
7,165,5,48,3,32 rem 148
1010 DATA 205,193,173,70,3,201
,27,176,15,174,80 rem 1
1020 DATA 3,208,10,165,4,16,6,
32,172,193,32,185 rem 251
```

```
1030 DATA 193,201,65,144,15,17
3,80,3,240,10,165 rem 249
1040 DATA 4,48,6,32,172,193,32
,185,193,160,1,169 rem 61
1050 DATA 2,133,142,173,80,3,2
17,81,3,208,39,173 rem 49
1060 DATA 70,3,56,249,71,3,201
,9,144,4,201,247 rem 205
1070 DATA 144,24,133,6,173,100
,3,56,249,101,3 rem 148
1080 DATA 133,7,201,9,144,4,20
1,247,144,5,132 rem 150
1090 DATA 142,32,200,194,136,1
6,206,96,32,234 rem 162
1100 DATA 194,165,4,73,255,24,
105,1,133,4,96,173 rem 54
1110 DATA 100,3,201,126,144,12
,201,157,176,8,173 rem 34
1120 DATA 80,3,24,105,1,133,3,
96,32,234,194,165 rem 251
1130 DATA 5,73,255,24,105,1,13
3,5,96,162,1,222 rem 198
1140 DATA 110,3,240,3,76,193,1
94,189,120,3,157 rem 211
1150 DATA 110,3,189,71,3,133,1
39,189,81,3,133 rem 164
1160 DATA 140,189,101,3,133,14
1,165,247,208,78 rem 217
1170 DATA 224,0,208,74,173,80,
3,240,3,56,176,9 rem 213
1180 DATA 173,70,3,201,140,176
,59,201,40,8,160 rem 203
1190 DATA 254,173,100,3,201,14
1,176,5,56,233,1 rem 199
1200 DATA 208,5,24,105,2,208,3
,56,233,1,201,74 rem 189
1210 DATA 176,5,40,169,253,208
,28,201,207,144,5 rem 5
1220 DATA 40,169,254,208,19,20
5,101,3,144,2,160 rem 248
1230 DATA 253,152,40,176,8,73,
3,76,78,194,189,0 rem 25
1240 DATA 220,74,168,176,10,18
9,101,3,201,72,240 rem 47
1250 DATA 3,222,101,3,152,74,1
68,176,10,189,101 rem 253
1260 DATA 3,201,209,240,3,254,
101,3,152,74,168 rem 199
1270 DATA 176,25,189,71,3,221,
245,194,240,17,189 rem 76
1280 DATA 71,3,56,233,1,157,71
,3,189,81,3,233,0 rem 2
1290 DATA 157,81,3,152,74,168,
176,25,189,71,3 rem 187
1300 DATA 221,247,194,240,17,1
89,71,3,24,105,1 rem 206
1310 DATA 157,71,3,189,81,3,10
5,0,157,81,3,152 rem 208
1320 DATA 74,176,0,32,115,193,
228,142,208,15,165 rem 57
1330 DATA 139,157,71,3,165,140
,157,81,3,165,141 rem 10
1340 DATA 157,101,3,202,16,1,9
6,76,220,193,32 rem 154
1350 DATA 234,194,138,72,165,6
,24,105,9,170,189 rem 24
1360 DATA 19,195,133,4,165,7,2
4,105,9,170,189,2 rem 16
1370 DATA 195,133,5,166,146,13
4,143,104,170,96 rem 224
1380 DATA 169,128,141,4,212,16
9,129,141,4,212,96 rem 66
1390 DATA 35,184,169,54,55,50,
39,0,0,1,254,255 rem 220
1400 DATA 255,149,149,180,180,
210,210,240,0,0,5 rem 242
1410 DATA 25,45,75,15,106,106,
106,132,138,149 rem 169
1420 DATA 160,171,182,193,204,
204,215,226,237 rem 163
1430 DATA 248,52,67,82,82,97,1
16,120,0,0,0,0,0,0 rem 31
1440 DATA 0,0,0,0,0,0,0,0,0,0,
248,0,1,252,0,3 rem 82
1450 DATA 254,0,3,254,0,3,254,
```

```
0,3,254,0,1,252,0 rem 223
1460 DATA 0,248,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0 rem 159
1470 DATA 0,0,0,0,0,0,0,0,0,25
5,0,0,0,0,0,0,0 rem 158
1480 DATA 0,0,0,0,0,254,0,3,25
5,128,3,255,128,7 rem 233
1490 DATA 255,192,7,255,192,7,
255,192,7,255,192 rem 37
1500 DATA 7,255,192,3,255,128,
3,255,128,0,254,0 rem 2
1510 DATA 0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0 rem 45
1520 DATA 165,231,231,231,231,
231,231,0,0,0,0 rem 122
1530 DATA 231,231,231,231,231,
231 rem 67
```

All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

The New MLX

Article on page 42.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```
100 POKE 56,50:CLR:DIM IN$,I,J
,A,B,A$,B$,A(7),N$ rem 34
110 C4=48:C6=16:C7=7:Z2=2:Z4=2
54:Z5=255:Z6=256:Z7=127
rem 238
120 FA=PEEK(45)+Z6*PEEK(46):BS
=PEEK(55)+Z6*PEEK(56):H$="
0123456789ABCDEF" rem 118
130 R$=CHR$(13):L$="{LEFT}":S$
="{RIGHT}":D$=CHR$(20):Z$=CHR$(0
):T$="{13 RIGHT}" rem 173
140 SD=54272:FOR I=SD TO SD+23
:POKE I,0:NEXT:POKE SD+24,
15:POKE 788,52 rem 194
150 PRINT"[CLR]"CHR$(142)CHR$(
8):POKE 53280,15:POKE 5328
1,15 rem 104
160 PRINT T$ "[RED][RVS]
[2 SPACES]8 @}[2 SPACES]"
SPC(28)"[2 SPACES][OFF]
[BLU] MLX II [RED][RVS]
[2 SPACES]"SPC(28)"
[12 SPACES][BLU]" rem 121
170 PRINT"[3 DOWN][3 SPACES]CO
MPUTE!'S MACHINE LANGUAGE
[SPACE]EDITOR[3 DOWN]"
rem 135
180 PRINT"[BLK]STARTING ADDRES
S E4}";GOSUB300:SA=AD:GOSU
B1040:IF F THEN180 rem 113
190 PRINT"[BLK][2 SPACES]ENDIN
G ADDRESS E4}";GOSUB300:EA
=AD:GOSUB1030:IF F THEN190
rem 173
200 INPUT"[3 DOWN][BLK]CLEAR W
ORKSPACE [Y/N] E4}";A$:IF L
EFT$(A$,1)<>"Y"THEN220
rem 9
210 PRINT"[2 DOWN][BLU]WORKING
..." :FOR I=BS TO BS+EA-SA+
```



```

7:POKE I,0:NEXT:PRINT"DONE
" :rem 139
220 PRINTTAB(10)"[2 DOWN][BLK]
[RVS] MLX COMMAND MENU
[DOWN][43]":PRINT TS"[RVS]E
[OFF]NTER DATA" :rem 62
230 PRINT TS"[RVS]D[OFF]ISPLAY
DATA":PRINT TS"[RVS]L
[OFF]OAD DATA" :rem 19
240 PRINT TS"[RVS]S[OFF]AVE FI
LE":PRINT TS"[RVS]Q[OFF]UI
T[2 DOWN][BLK]" :rem 238
250 GET AS:IF AS=NS THEN250
:rem 127
260 A=0:FOR I=1 TO 5:IF AS=MID
$( "EDLSQ",I,1)THEN A=I:I=5
:rem 42
270 NEXT:ON A GOTO420,610,690,
700,280:GOSUB1060:GOTO250
:rem 97
280 PRINT"[RVS] QUIT ":INPUT"
[DOWN][43]ARE YOU SURE [Y/N
]":AS:IF LEFT$(AS,1)<>"Y"TH
EN220 :rem 189
290 POKE SD+24,0:END :rem 95
300 IN$=NS:AD=0:INPUTIN$:IFLEN
(IN$)<>4THENRETURN :rem 31
310 B$=IN$:GOSUB320:AD=A:B$=MI
D$(IN$,3):GOSUB320:AD=AD*2
56+A:RETURN :rem 225
320 A=0:FOR J=1 TO 2:A$=MID$(B
$,J,1):B=ASC(A$)-C4+(A$>"0
")*C7:A=A*C6+B :rem 143
330 IF B<0 OR B>15 THEN AD=0:A
=-1:J=2 :rem 132
340 NEXT:RETURN :rem 240
350 B=INT(A/C6):PRINT MID$(H$,
B+1,1):B=A-B*C6:PRINT MID
$(H$,B+1,1):RETURN:rem 42
360 A=INT(AD/Z6):GOSUB350:A=AD
-A*Z6:GOSUB350:PRINT":
:rem 32
370 CK=INT(AD/Z6):CK=AD-Z4*CK+
Z5*(CK>Z7):GOTO390:rem 131
380 CK=CK*Z2+Z5*(CK>Z7)+A
:rem 168
390 CK=CK+Z5*(CK>Z5):RETURN
:rem 159
400 PRINT"[DOWN]STARTING AT[43
]":GOSUB300:IF IN$<>NS THE
N GOSUB1030:IF F THEN400
:rem 75
410 RETURN :rem 117
420 PRINT"[RVS] ENTER DATA ":G
OSUB400:IF IN$=NS THEN220
:rem 85
430 OPEN3,3:PRINT :rem 34
440 POKE198,0:GOSUB360:IF F TH
EN PRINT IN$:PRINT"[UP]
[5 RIGHT]": :rem 6
450 FOR I=0 TO 24 STEP 3:B$=S$
:FOR J=1 TO 2:IF F THEN B$
=MID$(IN$,I+J,1) :rem 226
460 PRINT"[RVS]"B$LS$:IF I<24T
HEN PRINT"[OFF]": :rem 15
470 GET AS:IF AS=NS THEN470
:rem 135
480 IF(A$>"/"ANDAS<".")OR(A$>
"@")ANDAS<"G")THEN540
:rem 100
490 IF AS=R$ AND((I=0)AND(J=1)
OR F)THEN PRINT B$:J=2:NE
XT:I=24:GOTO550 :rem 46
500 IF AS="[HOME]" THEN PRINT
[SPACE]B$:J=2:NEXT:I=24:NE
XT:F=0:GOTO440 :rem 66
510 IF(A$="[RIGHT]")ANDF THENP
RINT B$LS$:GOTO540:rem 107
520 IF AS<>L$ AND AS<>D$ OR((I
=0)AND(J=1))THEN GOSUB1060
:GOTO470 :rem 232
530 AS=L$+S$+L$:PRINT B$LS$:J=
2:J:IF J THEN PRINT L$:I=
I-3 :rem 12
540 PRINT AS$:NEXT J:PRINT S$:
:rem 2
550 NEXT I:PRINT:PRINT"[UP]
[5 RIGHT]":INPUT#3,IN$:IF
IN$=NS THEN CLOSE3:GOTO22
0 :rem 106
560 FOR I=1 TO 25 STEP3:B$=MID
$(IN$,I):GOSUB320:IF I<25
[SPACE]THEN GOSUB380:A(I/3
)=A :rem 81
570 NEXT:IF A<>CK THEN GOSUB10
60:PRINT"[BLK][RVS] ERROR:
REENTER LINE [43]":F=1:GOT
O440 :rem 161
580 GOSUB1080:B=BS+AD-SA:FOR I
=0 TO 7:POKE B+I,A(I):NEXT
:rem 245
590 AD=AD+8:IF AD>EA THEN CLOS
E3:PRINT"[DOWN][BLU]** END
OF ENTRY **[BLK][2 DOWN]"
:GOTO700 :rem 207
600 F=0:GOTO440 :rem 84
610 PRINT"[CLR][DOWN][RVS] DIS
PLAY DATA ":GOSUB400:IF IN
$=NS THEN220 :rem 146
620 PRINT"[DOWN][BLU]PRESS:
[RVS]SPACE[OFF] TO PAUSE,
[SPACE][RVS]RETURN[OFF] TO
BREAK[43][DOWN]" :rem 241
630 GOSUB360:B=BS+AD-SA:FORI=B
TO B+7:A=PEEK(I):GOSUB350:
GOSUB380:PRINT S$: :rem 56
640 NEXT:PRINT"[RVS]":A=CK:GO
SUB350:PRINT :rem 144
650 F=1:AD=AD+8:IF AD>EA THENP
RINT"[DOWN][BLU]** END OF
[SPACE]DATA ***:GOTO220
:rem 170
660 GET AS:IF AS=R$ THEN GOSUB
1080:GOTO220 :rem 65
670 IF AS=S$ THEN F=F+1:GOSUB1
080 :rem 28
680 ONFOTO630,660,630:rem 224
690 PRINT"[DOWN][RVS] LOAD DAT
A ":OP=1:GOTO710 :rem 31
700 PRINT"[DOWN][RVS] SAVE FIL
E ":OP=0 :rem 32
710 IN$=NS:INPUT"[DOWN]FILENAM
E[43]":IN$:IF IN$=NS THEN22
0 :rem 229
720 F=0:PRINT"[DOWN][BLK][RVS]
T[OFF]APE OR [RVS]D[OFF]IS
K: [43]": :rem 66
730 GET AS:IF AS="T"THEN PRINT
"T[DOWN]":GOTO880 :rem 90
740 IF AS<>"D"THEN730 :rem 90
750 PRINT"D[DOWN]":OPEN15,8,15
,"I0":B=EA-SA:IN$="0:"+IN
$:IF OP THEN810 :rem 163
760 OPEN 1,8,8,IN$+"P,W":GOSU
B860:IF A THEN220 :rem 66
770 AH=INT(SA/256):AL=SA-(AH*2
56):PRINT#1,CHR$(AL):CHR$(
AH): :rem 221
780 FOR I=0 TO B:PRINT#1,CHR$(
PEEK(BS+I)):IF ST THEN800
:rem 171
790 NEXT:CLOSE1:CLOSE15:GOTO94
0 :rem 230
800 GOSUB1060:PRINT"[DOWN]
[BLK]ERROR DURING SAVE:[43]
":GOSUB860:GOTO220 :rem 61
810 OPEN 1,8,8,IN$+"P,R":GOSU
B860:IF A THEN220 :rem 57
820 GET#1,AS,B$:AD=ASC(AS+Z$)+
256*ASC(B$+Z$):IF AD<>SA T
HEN F=1:GOTO850 :rem 155
830 FOR I=0 TO B:GET#1,AS:POKE
BS+I,ASC(AS+Z$):IF ST AND
(I<>B)THEN F=2:AD=I:I=B
:rem 180
840 NEXT:IF ST<>64 THEN F=3
:rem 20
850 CLOSE1:CLOSE15:ON ABS(F)>0
+1 GOTO960,970 :rem 12
860 INPUT#15,A,AS:IF A THEN CL
OSE1:CLOSE15:GOSUB1060:PRI
NT"[RVS]ERROR: "AS:rem 114
870 RETURN :rem 127
880 POKE183,PEEK(FA+2):POKE187
,PEEK(FA+3):POKE188,PEEK(F
A+4):IFOP=0THEN920:rem 178
890 SYS 63466:IF(PEEK(783)AND1
)THEN GOSUB1060:PRINT"
[DOWN][RVS] FILE NOT FOUND
":GOTO690 :rem 34
900 AD=PEEK(829)+256*PEEK(830)
:IF AD<>SA THEN F=1:GOTO97
0 :rem 201
910 A=PEEK(831)+256*PEEK(832)-
1:F=F-2*(A<EA)-3*(A>EA):AD
=A-AD:GOTO930 :rem 75
920 A=SA:B=EA+1:GOSUB1010:POKE
780,3:SYS 63338 :rem 107
930 A=BS:B=BS+(EA-SA)+1:GOSUB1
010:ON OP GOTO950:SYS 6359
1 :rem 38
940 GOSUB1080:PRINT"[BLU]** SA
VE COMPLETED ***:GOTO220
:rem 139
950 POKE147,0:SYS 63562:IF ST<
>64 THEN970 :rem 39
960 GOSUB1080:PRINT"[BLU]** LO
AD COMPLETED ***:GOTO220
:rem 126
970 GOSUB1060:PRINT"[BLK][RVS]
ERROR DURING LOAD:[DOWN]
[43]":ON F GOSUB980,990,100
0:GOTO220 :rem 233
980 PRINT"INCORRECT STARTING A
DDRESS (":GOSUB360:PRINT"
)":RETURN :rem 145
990 PRINT"LOAD ENDED AT ":AD=
SA+AD:GOSUB360:PRINT D$:RE
TURN :rem 159
1000 PRINT"TRUNCATED AT ENDING
ADDRESS":RETURN :rem 166
1010 AH=INT(A/256):AL=A-(AH*25
6):POKE193,AL:POKE194,AH
:rem 95
1020 AH=INT(B/256):AL=B-(AH*25
6):POKE174,AL:POKE175,AH:
RETURN :rem 122
1030 IF AD<SA OR AD>EA THEN105
0 :rem 135
1040 IF(AD>511 AND AD<40960)OR
(AD>49151 AND AD<53248)TH
EN GOSUB1080:F=0:RETURN
:rem 104
1050 GOSUB1060:PRINT"[RVS] INV
ALID ADDRESS [DOWN][BLK]"
:F=1:RETURN :rem 224
1060 POKE SD+5,31:POKE SD+6,20
8:POKE SD,240:POKE SD+1,4
:POKE SD+4,33 :rem 19
1070 FOR S=1 TO 100:NEXT:GOTO1
090 :rem 90
1080 POKE SD+5,8:POKE SD+6,240
:POKE SD,0:POKE SD+1,90:P
OKE SD+4,17 :rem 182
1090 FOR S=1 TO 100:NEXT:POKE
[SPACE]SD+4,0:POKE SD,0:P
OKE SD+1,0:RETURN :rem 8

```

All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

REM Highlighter

Article on page 108.

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: REM Highlighter—64 Disk Version

```
6 N=198:P=631:POKE53281,6
      :rem 146
10 PRINT"[CLR]"CHR$(14)CHR$(8)
  :PRINT"[7]REM [RVS]HIGHLIGHT
  TER[DOWN]
      :rem 191
12 INPUT"[2 DOWN]PROGRAM NAME"
  :NS=IFNS$=""THENPRINT"[5 UP]
  ":GOTO12
      :rem 166
14 QS=CHR$(34):PRINT"[CLR]
  [22 DOWN]LOADING [DOWN]":PR
  INTNS$[HOME][BLU]LOAD"Q$N$Q
  $",8
      :rem 164
16 PRINT"[4 DOWN]63994S=PE(S)+
  PE(S+1)*256
      :rem 185
18 PRINT"63995IFPE(S+4)=143TH
  "Q$"[HOME][CYN]"Q$":PE(S+2)+
  PE(S+3)*256:T=S+4:GOSUB63997
      :rem 116
20 PRINT"63996ON-(S<>.)GOSUB63994
  :?"Q$"[CLR][BLU]"Q$":GOSUB639
  99
      :rem 153
22 PRINT"63997T=T+1:IFPE(T)=.T
  HRET
      :rem 219
24 PRINT"63998ON-(PE(T)=32)GOSUB
  3997:POT+(T>S+5),18:RET
      :rem 111
26 PRINT"63999POP,19:FOI=1TO6:
  POP+I,13:763993+I:NE:POP+I,
  154:PON,8
      :rem 242
28 PRINT"?Q$"[6 DOWN][RVS]
  [CYN]HIGHLIGHTING"Q$":N=198
  :P=631:S=43:GOSUB63994:rem 175
30 POKEP,19:FORI=1TO8:POKEP+I,
  13:NEXT:POKEN,9
      :rem 125
```

Program 2: REM Highlighter—128 Disk Version

```
10 N=208:P=842:COLOR0,7:BANK0
12 PRINT"[CLR]"CHR$(14)CHR$(8)
  :PRINT"[7]REM [RVS]HIGHLIGHT
  TER[DOWN]
14 INPUT"[2 DOWN]PROGRAM NAME"
  :NS=IFNS$=""THENPRINT"[5 UP]
  ":GOTO14
16 QS=CHR$(34):PRINT"[CLR]
  [22 DOWN]LOADING [DOWN]":PR
  INTNS$[HOME][BLU]LOAD"Q$N$Q
  $",8
18 PRINT"[4 DOWN]63994S=PEE(S)
  +PEE(S+1)*256
20 PRINT"63995IFPEE(S+4)=143TH
  "?Q$"[HOME][CYN]"Q$":PEE(S+2)
  +PEE(S+3)*256:T=S+4:GOSUB639
  97
22 PRINT"63996ON-(S<>.)GOSUB63994
  :?"Q$"[CLR][BLU]"Q$":GOSUB639
  99
```

```
24 PRINT"63997T=T+1:IFPEE(T)=.
  THRET
26 PRINT"63998ON-(PEE(T)=32)GO
  63997:POKEP+(T>S+5),18:RET
28 PRINT"63999POKEP,19:FOI=1TO6
  :POKEP+I,13:763993+I:NE:POKEP
  +I,154:PON,8
30 PRINT"?Q$"[6 DOWN][RVS]
  [WHT]HIGHLIGHTING"Q$":N=208
  :P=842:S=45:GOSUB63994
32 POKEP,19:FORI=1TO8:POKEP+I,
  13:NEXT:POKEN,9
```

Program 3: REM Highlighter—VIC Disk Version

```
10 PRINT"[CLR]"CHR$(14)CHR$(8)
  :POKE36879,25:PRINT"[BLU]RE
  M [RVS]HIGHLIGHTER
      :rem 64
12 INPUT"[2 DOWN]PROGRAM NAME"
  :NS=IFNS$=""THENPRINT"[5 UP]
  ":GOTO12
      :rem 132
14 QS=CHR$(34):PRINT"[CLR]
  [22 DOWN]LOAD[4 SPACES]
  [GRN]"N$"[HOME][WHT]LOAD"Q$
  N$Q$",8
      :rem 242
16 PRINT"[4 DOWN]63994S=PE(S)+
  PE(S+1)*256
      :rem 185
18 PRINT"63995IFPE(S+4)=143TH
  =S+4:GOSUB63997
      :rem 184
20 PRINT"63996ON-(S<>.)GOSUB63994
  :GOSUB63999
      :rem 193
22 PRINT"63997T=T+1:IFPE(T)=.T
  HRET
      :rem 219
24 PRINT"63998ON-(PE(T)=32)GOSUB
  3997:POT+1*(T>S+5),18:RET
      :rem 202
26 PRINT"63999?"Q$"[CLR]"Q$":
  POP,19:FOI=1TO6:POP+I,13:76
  3993+I:NE:POP+I,31:PO198,8
      :rem 201
28 PRINT"?Q$"[RVS][BLU]HILIGH
  T[HOME][WHT]"Q$":P=631:S=PE
  (43)+PE(44)*256:GOSUB63995
  [HOME]
      :rem 71
30 POKE631,19:FORI=1TO8:POKE63
  1+I,13:NEXT:POKE198,9
      :rem 101
```

Program 4: REM Highlighter—Tape Version

Plus/4, 16, and 128 owners: See modifications in article.

```
63993 PRINT"[CLR]":N=198:P=631
  :S=PEEK(43)+PEEK(44)*256
  :GOTO63995
      :rem 52
63994 S=PEEK(S)+PEEK(S+1)*256
      :rem 127
63995 IFPEE(S+4)=143THENPRINT
  "[HOME]"PEEK(S+2)+PEEK(S
  +3)*256:T=S+4:GOSUB63997
      :rem 55
63996 ON-(S<>.)GOTO63994:GOTO6
  3999
      :rem 246
63997 T=T+1:IFPEE(T)=.THENRET
  URN
      :rem 96
63998 ON-(PEEK(T)=32)GOTO63997
  :POKET+1*(T>S+5),18:RETU
  RN
      :rem 109
63999 PRINT"[CLR]":POKEP,19:F
  ORI=1TO8:POKEP+I,13:PRIN
  T63991+I:NEXT:POKEN,9
      :rem 78
```

All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

Off-Screen Trace

See instructions in article on page 115 before typing in.

```
8800:78 A9 C0 20 6E 89 A9 80 3F
8808:20 6E 89 A9 80 20 96 89 CB
8810:AD 00 20 50 8A A9 00 8D 03
8818:C0 8B A9 0C 8D EE 8B A9 4B
8820:84 8D EF 8B A9 3F 8D F0 E3
8828:8B A9 95 8D F1 8B A9 14 1A
8830:8D F2 8B A9 01 8D F3 8B 82
8838:A9 1B 8D F4 8B A9 00 8D 76
8840:F5 8B AD 02 03 8D F3 8A C5
8848:AD 03 03 8D F4 8A AD 08 5F
8850:03 8D F5 8A AD 09 03 8D D2
8858:F6 8A AD 14 03 8D F7 8A 47
8860:AD 15 03 8D F8 8A A9 C4 D0
8868:8D 02 03 A9 88 8D 03 03 3F
8870:A9 D3 8D 08 03 A9 88 8D DA
8878:09 03 A9 53 8D 14 03 A9 A5
8880:89 8D 15 03 20 BA 8A A9 37
8888:93 20 D2 FF 20 BA 8A A9 70
8890:84 85 38 58 20 60 A6 4C ED
8898:86 E3 78 20 B1 8A AD F3 FD
88A0:8A 8D 02 03 AD F4 8A 8D AE
88A8:03 03 AD F5 8A 8D 08 03 AE
88B0:AD F6 8A 8D 09 03 AD F7 28
88B8:8A 8D 14 03 AD F8 8A 8D 19
88C0:15 03 58 60 A9 7F 2D F9 CD
88C8:8A 8D F9 8A A9 00 85 C6 89
88D0:6C F3 8A A5 7A 48 A5 7B 7C
88D8:48 C9 03 80 22 20 73 00 64
88E0:C9 9A F0 11 C9 89 F0 0D 10
88E8:C9 8D F0 09 C9 8A 8D 0D 18
88F0:A9 00 8D FA 8A A9 8D 41
88F8:F9 8A 8D F9 8A D0 4A 20 47
8900:B1 8A 20 1C 8A 20 E1 FF EC
8908:F0 16 A6 C5 E0 26 D0 0A 95
8910:A9 04 2C 8D 02 F0 03 20 51
8918:BA 8A A5 C5 C9 3C D0 E5 03
8920:20 B1 8A 20 73 00 C9 8D BF
8928:D0 09 EE FA 8A EE FA 8A 04
8930:4C 49 89 C9 8E D0 09 CE 22
8938:FA 8A CE FA 8A 4C 49 89 96
8940:C9 8A D0 05 A9 00 8D FA A8
8948:8A 68 85 7B 68 85 7A 6C DD
8950:F5 8A 60 08 78 A9 2C 2C
8958:8D 02 F0 0E A5 C5 C9 26 AF
8960:D0 08 2C F9 8A 30 03 2E 3E
8968:BA 8A 28 6C F7 8A 08 78 B9
8970:85 05 A9 8B 85 06 A9 C7 D4
8978:85 03 A9 00 85 04 8D FC 98
8980:8A A9 2E 8D FB 8A 20 76 A2
8988:8A AD 86 02 91 05 C8 AD 1D
8990:88 02 91 05 28 60 08 78 36
8998:85 05 A9 8B 85 06 A0 30 53
89A0:AD 02 DD 91 05 C8 AD 00 86
89A8:DD 91 05 C8 AD 18 D0 91 3D
89B0:05 C8 AD 21 D0 91 05 C8 DF
89B8:AD 11 D0 91 05 C8 AD 15 D5
89C0:D0 91 05 28 60 08 78 85 5D
89C8:03 A9 8B 85 04 A0 30 B1 46
89D0:03 8D 02 DD C8 B1 03 8D 87
89D8:00 DD C8 B1 03 8D 18 D0 E6
89E0:C8 B1 03 8D 21 D0 C8 B1 8D
89E8:03 8D 11 D0 C8 B1 03 8D B0
89F0:15 D0 28 60 08 78 85 03 FD
89F8:A9 8B 85 04 A9 C7 85 03 31
8A00:A9 00 85 06 8D FC 8A A9 1A
8A08:2E 8D FB 8A 20 76 8A B1 61
8A10:03 8D 86 02 C8 B1 03 8D 9B
8A18:88 02 28 60 A9 80 20 6E FA
8A20:89 A0 00 20 50 8A A9 C0 E4
8A28:20 F4 89 A9 20 AC FA 8A 8A
8A30:F0 06 20 D2 FF 88 D0 FA 2F
8A38:20 C9 BD A9 0D 20 D2 FF B0
8A40:A9 C0 20 6E 89 A9 80 20 59
8A48:F4 89 A0 01 20 50 8A 00 16
8A50:A9 D8 A2 8C C0 00 D0 06 3B
8A58:85 04 86 06 F0 04 85 06 0B
8A60:86 04 A9 00 85 03 85 05 37
8A68:A9 E8 8D FB 8A A9 03 8D 8C
8A70:FC 8A 20 76 8A 60 A0 00 29
```



```

8A78:AE FC 8A F0 0E B1 03 91 53
8A80:05 C8 D0 F9 E6 04 E6 06 1F
8A88:CA D0 F2 AE FB 8A F0 08 74
8A90:B1 03 91 05 C8 CA D0 F8 CD
8A98:60 A9 0C A0 00 99 00 D8 13
8AA0:99 00 D9 99 00 DA C0 E8 2D
8AA8:B0 03 99 00 DB 88 D0 ED 9A
8AB0:60 2C F9 8A 50 03 20 BA 72
8AB8:8A 60 2C F9 8A 50 0F A9 AD
8AC0:C0 20 6E 89 A0 01 20 50 3E
8AC8:8A A9 80 4C E2 8A A9 80 77
8AD0:20 96 89 A9 80 20 6E 89 52
8AD8:A0 00 20 50 8A 20 99 8A D9
8AE0:A9 C0 48 20 F4 89 68 20 C4
8AE8:C5 89 A9 40 4D F9 8A 8D 71
8AF0:F9 8A 60 00 00 00 00 00 B1
8AF8:00 00 00 00 00 00 00 00 0E

```

All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

BASIC Backup

Article on page 97.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```

100 PRINT"[CLR]LOADING...PLEAS
E WAIT.":POKE56334,PEEK(56
334)AND254 :rem 29
110 FORI=679TO767:READA:POKEI,
A:X=X+A:NEXT :rem 174
120 FORI=4096TO41996:READA:PO
KEI,A:X=X+A:NEXT :rem 117
130 IFX<129717THENPRINT"ERROR
IN DATA.":STOP :rem 25
140 POKE788,167:POKE789,2:POKE
56334,PEEK(56334)OR1 :rem 139
150 REM PART 1 DATA :rem 252
160 DATA 173,251,2,240,13,206,
251,2,208,8 :rem 208
170 DATA 169,30,141,251,2,238,
32,208,165,157 :rem 118
180 DATA 13,141,2,201,132,208,
20,165,197,201 :rem 96
190 DATA 4,208,11,165,1,41,254,
133,1,32 :rem 106
200 DATA 0,160,133,1,76,49,234,
173,250,2 :rem 158
210 DATA 240,248,162,2,222,253,
2,208,241,157 :rem 104
220 DATA 253,2,202,208,245,238,
253,2,208,230 :rem 103
230 DATA 173,32,208,141,252,2,
169,1,141,251 :rem 53
240 DATA 2,208,217,0,0,0,0,0 :rem 150
250 REM PART 2 DATA :rem 254
260 DATA 32,231,255,169,49,141,
20,3,169,234 :rem 70
270 DATA 141,21,3,32,31,161,17,
3,251,2,240 :rem 199
280 DATA 6,173,252,2,141,32,20,
8,32,240,161 :rem 4
290 DATA 32,49,161,8,162,11,16,
0,0,24,32 :rem 112
300 DATA 240,255,40,176,10,162

```

```

,150,32,174,162 :rem 151
310 DATA 208,3,32,78,160,120,1,
69,167,141,20 :rem 59
320 DATA 3,169,2,141,21,3,162,
4,160,164 :rem 107
330 DATA 32,48,162,165,1,9,1,9,
6,173,84 :rem 83
340 DATA 163,201,84,240,39,162,
2,189,251,162 :rem 118
350 DATA 157,51,163,202,16,247,
165,2,160,163 :rem 114
360 DATA 162,51,24,105,3,32,18,
9,255,162,8 :rem 225
370 DATA 160,15,152,32,186,255,
32,192,255,169 :rem 178
380 DATA 15,32,195,255,162,1,1,
89,254,162,157 :rem 132
390 DATA 52,163,202,16,247,162,
1,173,84,163 :rem 70
400 DATA 201,84,8,240,2,162,8,
160,255,169 :rem 221
410 DATA 1,32,186,255,165,2,16,
0,163,162,54 :rem 13
420 DATA 40,240,5,162,52,24,10,
5,2,32,189 :rem 160
430 DATA 255,166,45,164,46,169,
43,32,216,255 :rem 133
440 DATA 8,162,2,189,0,163,157,
51,163,202 :rem 222
450 DATA 16,247,40,176,82,173,
98,163,201,78 :rem 87
460 DATA 240,75,162,8,173,84,1,
63,201,68,240 :rem 75
470 DATA 9,162,178,32,174,162,
208,59,162,1 :rem 31
480 DATA 160,0,169,1,32,186,25,
5,165,2,162 :rem 225
490 DATA 54,160,163,32,189,255,
169,1,166,43 :rem 85
500 DATA 164,44,32,213,255,176,
30,32,183,255 :rem 115
510 DATA 162,3,41,16,240,2,162,
7,160,3 :rem 54
520 DATA 189,233,163,153,253,1,
63,202,136,16,246 :rem 15
530 DATA 162,241,160,163,32,48,
162,96,72,169 :rem 129
540 DATA 1,133,205,169,0,240,1,
3,72,169,1 :rem 162
550 DATA 72,133,205,88,120,165,
207,208,250,104 :rem 213
560 DATA 133,204,88,104,96,169,
54,133,253,160 :rem 179
570 DATA 12,162,3,169,16,32,66,
162,132,2 :rem 170
580 DATA 176,238,169,84,133,25,
3,160,12,162,5 :rem 131
590 DATA 169,1,32,66,162,176,2,
23,173,84,163 :rem 85
600 DATA 201,84,240,8,201,68,2,
08,230,166,2 :rem 8
610 DATA 240,209,169,98,133,25,
3,160,12,162,6 :rem 121
620 DATA 169,1,32,66,162,176,1,
93,173,98,163 :rem 90
630 DATA 201,89,240,4,201,78,2,
08,230,169,113 :rem 115
640 DATA 133,253,160,12,162,8,
169,3,32,66 :rem 224
650 DATA 162,176,167,132,253,1,
60,0,132,254,162 :rem 215
660 DATA 2,189,113,163,221,3,1,
63,208,5,202 :rem 10
670 DATA 16,245,48,60,185,113,
163,201,48,144 :rem 124
680 DATA 213,201,58,176,209,56,
233,48,170,165 :rem 182
690 DATA 254,10,176,200,133,25,
4,10,176,195,10 :rem 162
700 DATA 176,192,101,254,176,1,
88,133,254,138,101 :rem 67
710 DATA 254,176,181,133,254,2

```

```

00,198,253,208,210 :rem 62
720 DATA 141,249,162,73,255,17,
0,232,240,165,142 :rem 11
730 DATA 250,162,160,60,140,25,
0,2,169,60,141 :rem 103
740 DATA 254,2,141,255,2,173,2,
50,162,141,253 :rem 109
750 DATA 2,169,0,141,251,2,162,
2,189,3 :rem 68
760 DATA 163,157,113,163,202,1,
6,247,162,2,189 :rem 174
770 DATA 6,163,157,129,163,157,
145,163,202,16 :rem 179
780 DATA 244,173,250,2,240,30,
173,249,162,162 :rem 168
790 DATA 113,32,201,162,173,25,
1,2,8,173,253 :rem 62
800 DATA 2,162,145,40,208,7,73,
255,24,105 :rem 218
810 DATA 1,162,129,32,201,162,
162,9,160,163 :rem 57
820 DATA 134,253,132,254,160,0,
177,253,240,6 :rem 111
830 DATA 32,210,255,200,208,24,
6,24,96,133,251 :rem 161
840 DATA 24,32,240,255,169,163,
133,254,169,0 :rem 123
850 DATA 133,252,32,22,161,32,
228,255,208,5 :rem 64
860 DATA 32,225,255,208,246,32,
31,161,56,240 :rem 118
870 DATA 74,201,13,240,56,164,
252,201,20,240 :rem 103
880 DATA 21,196,251,240,223,20,
1,32,144,219,201 :rem 206
890 DATA 91,176,215,145,253,32,
210,255,230,252 :rem 221
900 DATA 208,206,192,0,240,202,
198,252,32,210 :rem 154
910 DATA 255,196,251,240,9,177,
253,136,145,253 :rem 234
920 DATA 200,200,208,243,136,1,
69,32,145,253,208 :rem 5
930 DATA 177,164,251,136,177,2,
53,201,32,208,3 :rem 172
940 DATA 136,16,247,200,24,96,
160,163,32,48 :rem 74
950 DATA 162,162,207,160,163,3,
2,48,162,32,225 :rem 168
960 DATA 255,240,7,32,228,255,
201,67,208,244 :rem 127
970 DATA 201,67,96,134,253,162,
163,134,254,170 :rem 229
980 DATA 160,2,169,32,145,253,
136,16,251,138 :rem 126
990 DATA 200,162,0,200,56,233,
10,232,176,251 :rem 102
1000 DATA 202,105,58,72,177,25,
3,200,145,253,136 :rem 0
1010 DATA 136,16,247,104,200,1,
45,253,138,208,227 :rem 50
1020 DATA 96,0,0,83,48,58,48,5,
8,32,58 :rem 39
1030 DATA 32,79,70,70,48,32,32,
147,13,32 :rem 168
1040 DATA 18,32,32,40,40,40,32,
66,65,67 :rem 115
1050 DATA 75,85,80,32,32,85,84,
73,76,73 :rem 145
1060 DATA 84,89,32,41,41,41,32,
32,13,13 :rem 112
1070 DATA 32,70,73,76,69,78,65,
77,69,32 :rem 156
1080 DATA 58,32,66,65,67,75,85,
80,32,32 :rem 144
1090 DATA 32,32,32,32,32,32,32,
32,13,13 :rem 96
1100 DATA 32,68,73,83,75,47,84,
65,80,69 :rem 149
1110 DATA 58,32,68,13,32,86,69,
82,73,70 :rem 138
1120 DATA 89,32,32,32,58,32,89

```



```

,13,13,32 :rem 122
1130 DATA 73,78,84,69,82,86,65 :rem 161
,76,32,58 :rem 161
1140 DATA 32,79,70,70,13,32,82 :rem 138
,69,77,65 :rem 138
1150 DATA 73,78,73,78,71,58,32 :rem 136
,32,32,32 :rem 136
1160 DATA 13,32,79,86,69,82,68 :rem 157
,85,69,32 :rem 157
1170 DATA 32,58,32,32,32,32,13 :rem 50
,0,13,32 :rem 50
1180 DATA 18,32,32,32,32,82,69 :rem 144
,65,68,89 :rem 144
1190 DATA 32,70,79,82,32,66,65 :rem 153
,67,75,85 :rem 153
1200 DATA 80,32,32,32,32,0,13 :rem 43
,13,32,18 :rem 43
1210 DATA 32,82,69,87,73,78,68 :rem 154
,32,84,65 :rem 154
1220 DATA 80,69,32,70,79,82,32 :rem 148
,86,69,82 :rem 148
1230 DATA 73,70,89,32,0,13,32 :rem 59
,32,32,32 :rem 59
1240 DATA 84,89,80,69,32,67,32 :rem 153
,84,79,32 :rem 153
1250 DATA 67,79,78,84,73,78,85 :rem 163
,69,13,13 :rem 163
1260 DATA 0,71,79,79,68,66,65 :rem 100
,68,33,13 :rem 100
1270 DATA 13,32,18,32,86,69,82 :rem 144
,73,70,89 :rem 144
1280 DATA 32,32,32,32,32,32,13 :rem 49
,0,13,82 :rem 49
1290 DATA 69,65,68,89,46,13,0 :rem 165

```

All Commodore 64 programs in this issue work with the Commodore 128 in 64 mode.

BASIC Windows

Article on page 106.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```

100 H=6:W=18:REM HEIGHT AND WI
DTH OF WINDOW :rem 26
110 R=10:C=10:REM ROW AND COLU
MN POSITION :rem 201
120 DIM S(H-1,W-1):REM SCREEN
[SPACE]CODE ARRAY :rem 16
130 DIM B$(H-1),C$(H-1):rem 85
140 B$(0)="[18 +3]" :rem 169
150 B$(1)="[+3]DELIVER MESSAGES
[+3]" :rem 174
160 B$(2)="[+3]IN YOUR PROGRAMS
[+3]" :rem 158
170 B$(3)="[+3]{2 SPACES}WITH W
INDOWS. [+3]" :rem 228
180 B$(4)="[+3]{16 SPACES}[+3]" :rem 81
190 B$(5)="[3 +3] F1 TO CONT.
[3 +3]" :rem 103
200 REM *** DEMONSTRATION - SE
T TEXT COLOR & FILL SCREEN
WITH CHARACTERS :rem 225
210 PRINT"[CLR]{WHT}";FORI=48
TO86:A$=A$+CHR$(I):NEXT:FO

```

```

RI=1TO24:PRINTA$:NEXT :rem 97
220 REM *** STORE ORIGINAL SCR
EEN CONTENTS AND PRINT WIN
DOW :rem 62
230 M=983+40*R+C:REM UPPER LEF
T CORNER OF WINDOW :rem 71
240 PRINT"[YEL]";REM SET WINDO
W COLOR :rem 102
250 POKE214,R-1:PRINT:PRINT"
{UP}";REM SET ROW NUMBER :rem 162
260 FORI=0TOH-1:FORJ=0TOW-1 :rem 174
:rem 174
270 S(I,J)=PEEK(M+J):NEXT:POKE
211,C-1:PRINTB$(I):M=M+40:
NEXT :rem 148
280 REM *** CONVERT STORED SCR
EEN CODES TO PRINTABLE STR
INGS :rem 138
290 FORI=0TOH-1:FORJ=0TOW-1:A=
S(I,J):IFA<32ORA>95THENA=A
+64:GOTO310 :rem 143
300 IFA>65THENIFA<96THENA=A+32 :rem 52
:rem 52
310 C$(I)=C$(I)+CHR$(A):NEXT:N
EXT :rem 131
320 REM *** PRESS 'F1' TO REWR
ITE ORIGINAL TEXT :rem 168
330 GETR$:IFR$<>CHR$(133)THEN3
30 :rem 83
340 PRINT"[WHT]";REM RESTORE O
RIGINAL TEXT COLOR:rem 200
350 POKE214,R-1:PRINT:PRINT"
{UP}";REM SET ROW NUMBER :rem 163
:rem 163
360 FORI=0TOH-1:POKE211,C-1:PR
INTC$(I):NEXT :rem 138
370 REM RETURN TO MAIN PROGRAM :rem 62

```

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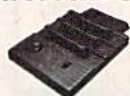
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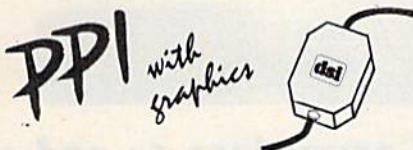
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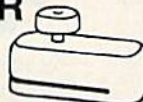
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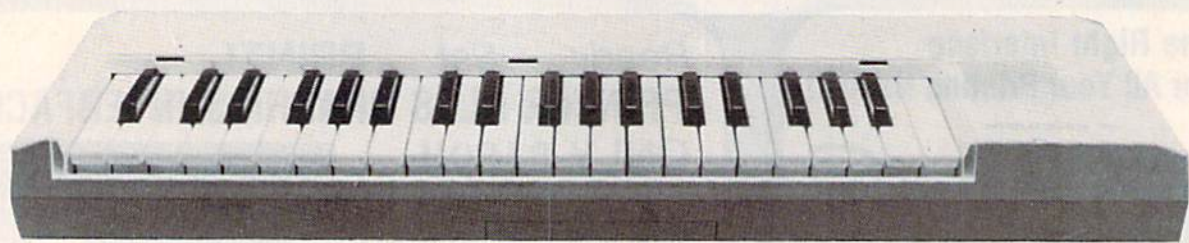
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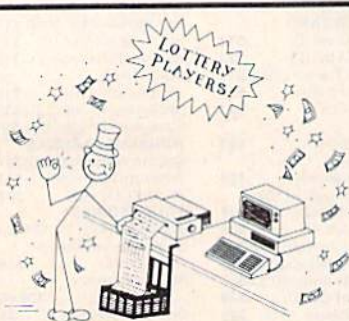
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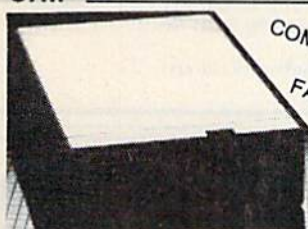
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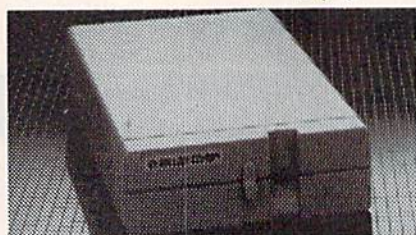
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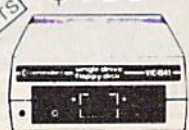
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- 1B. N/A
2. 9-27-85
3. Monthly
- 3A. Twelve
- 3B. \$24.00
4. 324 West Wendover Ave., Suite 200, Greensboro, NC 27408
5. Same
6. Publisher, James Casella, 825 Seventh Avenue, New York, NY 10019
Editor, Robert C. Lock, 324 W. Wendover Ave., Suite 200,
Greensboro, NC 27408
Managing Editor, Kathleen Martinek, 324 W. Wendover Ave., Suite 200,
Greensboro, NC 27408
7. American Broadcasting Companies, Inc., 1330 Ave. of the Americas,
New York, NY 10019
8. N/A
9. N/A
10. Extent and Nature of Circulation

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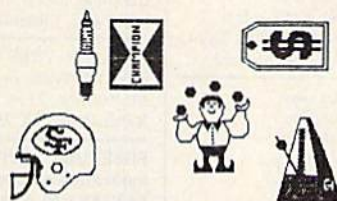
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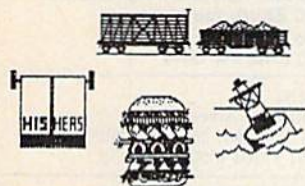
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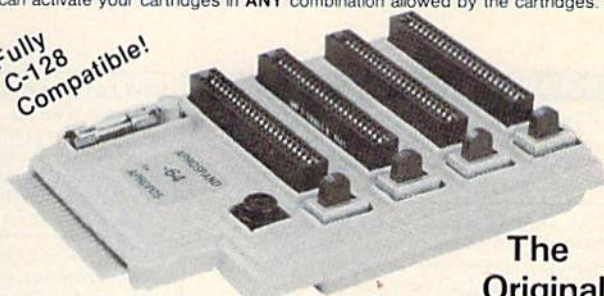
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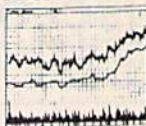


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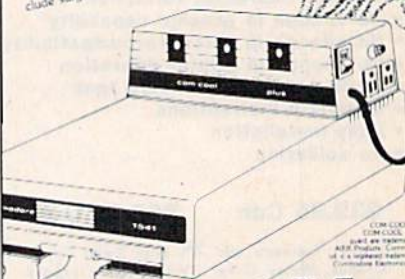


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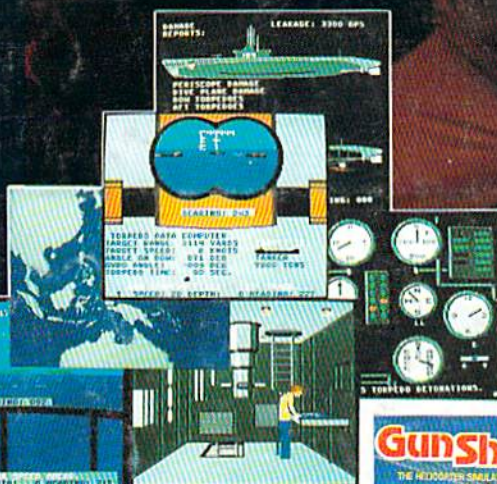
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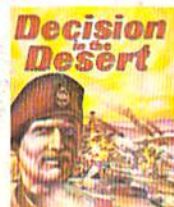
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