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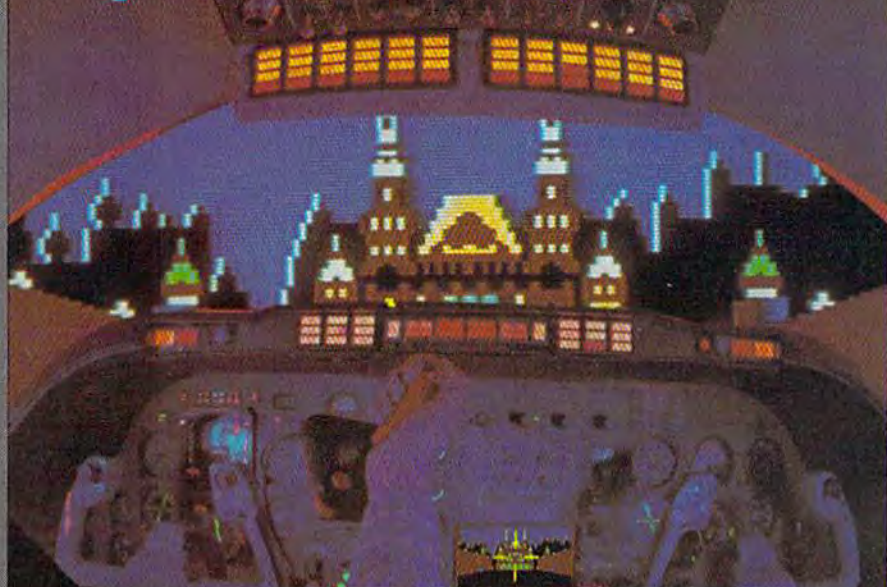
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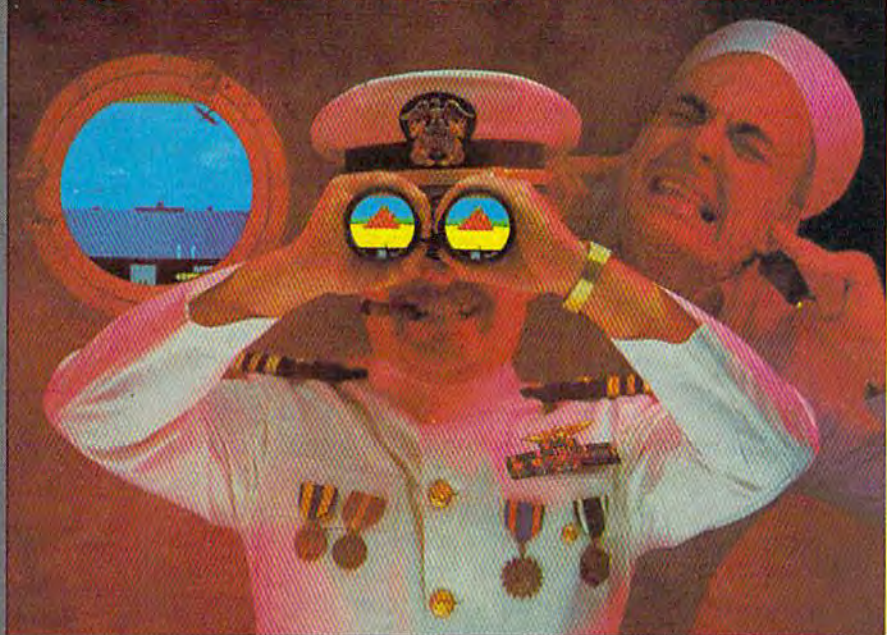
RAID OVER MOSCOW

"Play It Like There's No Tomorrow!"



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Attach your modem and set it for originate. Turn on your computer and load and run C/G Term (published in last month's GAZETTE).

Then place the phone call to your local C/G BBS. When you hear the carrier signal (a high-pitched tone), unplug the cord from the telephone handset and plug it into the modem if you have a VICmodem. (Automodem users should move the T/D switch from T to D.)

Then press the space bar on your VIC or 64 and you'll see the welcome message from the BBS. You'll then be asked for an ID number. If this is your first time on the board, you won't yet have an ID number, so press RETURN to tell the BBS that you are a new user.

You'll see a brief message, then you'll be asked to supply your name, address, and phone number so the sysop (system operator) can set up your account. Although you might want to use a pseudonym while on the bulletin board, you must provide the sysop with your real name, address, and phone number. Once that information is entered, you'll receive the main menu containing nine options:

MAIN MENU

- 1) Read messages
 - 2) Leave a message
 - 3) Pick up EMAIL
 - 4) Send EMAIL
 - 5) Download library
 - 6) Upload area
 - 7) Chat with the sysop
 - 8) New password or handle
 - 9) Log off
- >

Messages are public; anyone can leave them for anyone else to read. Email ("Electronic Mail"), as its name implies, is a private message from one user to one other. You can only read EMAIL addressed to you.

As a new user, you can only read messages, chat with the sysop (system operator), or log off.

After the sysop has contacted you and given you an ID number and password, you'll have full access to the bulletin board.

Read A Message

To read the public messages, type a 1 when you see the prompt (>) at the end of the main menu. You will then be given the choice to read the full text of messages or to scan the headers—who sent the message, who it's addressed to, and the subject. When you type in your choice, you'll be told which messages the board contains, and asked for the number of the first message you want to read. As a new user, you probably want to begin with the first message, which is displayed after you enter a 1 and press RETURN.

At the end of each message, on the bottom

line of your screen you'll see the prompt:

RETURN r m (?=help)

To read the next message, press RETURN; to go to the read messages menu, press r; to get back to the main menu, press m. And if you forget what each response means, type a question mark.

You can read the entire message file by pressing RETURN after each message is displayed. To go back and read an earlier message, press r for the read messages menu and enter the message number you want.

Sending Messages

To leave a message on the board (after you've been signed up by the sysop), select option 2. Your screen will clear and you'll be prompted to name the person you're leaving the message for. Type in the person's handle (a name less than 25 characters) and RETURN. The program automatically inserts your name and ID number into the message, so everyone knows you sent it. Next, the subject prompt will appear. Respond with a line of less than 32 characters and RETURN.

The screen will clear again, and you're ready to type in the message. You can type freely, using the cursor keys or RETURN to move the cursor around. Use the color and reverse keys just as you do when your computer is in immediate mode with no program running. And your terminal program includes a routine that won't let your message scroll up the screen if you accidentally move the cursor onto the bottom line of the screen.

When you're finished composing your message, press f2. You'll see the prompt "one moment please..." on the bottom line of the screen, then the cursor will disappear, and the computer will seem to pause while it collects the message from the screen, translates it into a form that can be transmitted, and sends it to the bulletin board where the message is stored in the message file.

The time required to transmit and store a message depends on the length of the message. A message of 1000 characters with several colors can take as long as 30-40 seconds.

When this automatic process is complete, you'll see this prompt on the bottom line of your screen:

Message # XXX has been sent

Then the screen will clear and the main menu will be displayed.

Electronic Mail

The procedure for reading and sending private messages is essentially the same.

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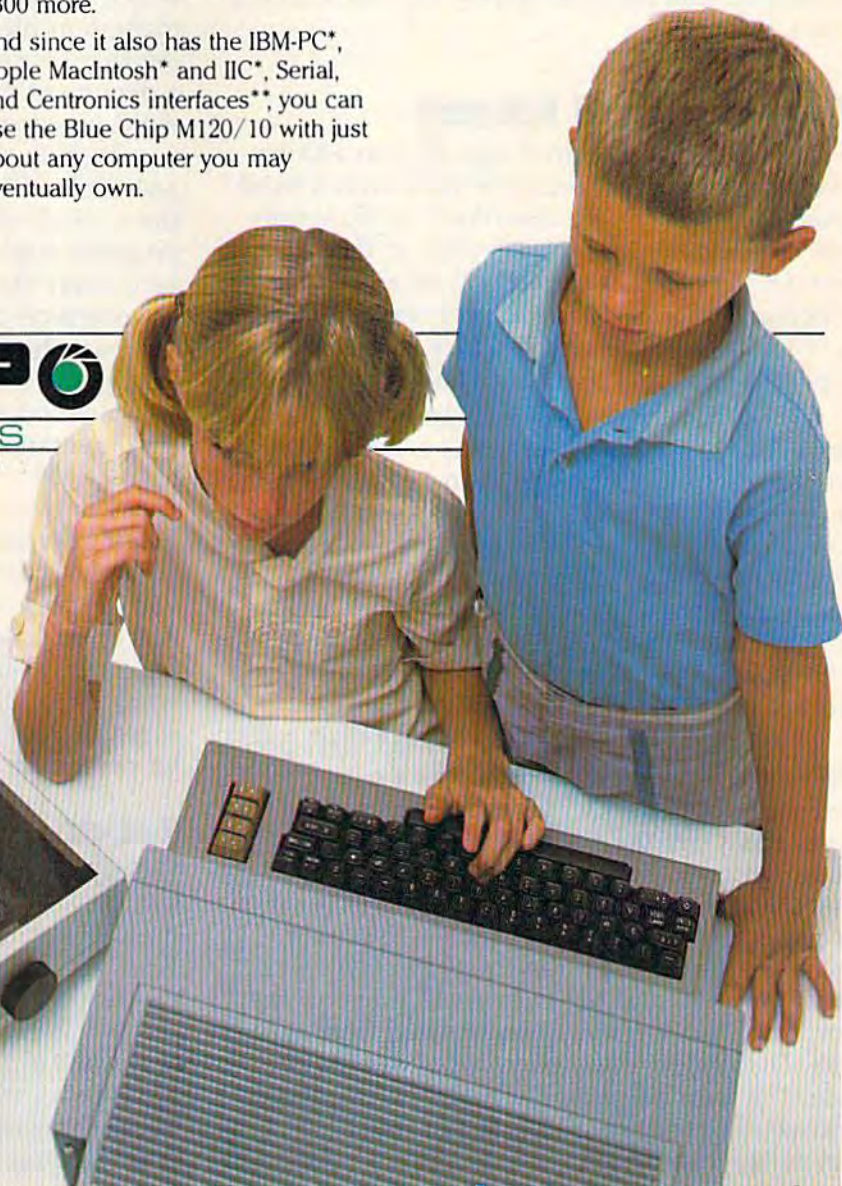
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If you choose option 3, the BBS will search its electronic mail (email) file tables for messages addressed to your user ID number. If the files contain messages for you, the BBS will send the first email message, with a prompt in the bottom line of the screen asking whether you want to erase the message. After you read the email and respond by typing y or n (yes or no), the BBS will display your next email message, and so on, until the last message is sent. The BBS then clears the screen and returns you to the main menu.

Each time you pick up your mail, the BBS sends all your messages, whether you have read them before or not. So, to avoid cluttering your mailbox with old letters, it's a good idea to erase each one after you read it.

To send email to another bulletin board member, you follow the same steps as in sending regular messages. But when the "To" prompt appears, you must enter a user ID number instead of a name. The program ignores any non-numeric input.

The Download Library

If you select the download option, you will be given a menu of the available files, with a brief description of each. To download a file, simply type the number of your selection at the > prompt. After a pause, you will be asked to enter a filename so your terminal program can store the file on disk. (Be sure the filename is not a duplicate of some file already on the disk.)

After you supply the filename, the download procedure is automatic. You will see a series of numbers scrolling up the screen as the file comes in. When the transfer is complete, you'll be returned to the main menu. (For a more detailed discussion of the transfer procedure, see last month's article.) The BBS transfers files at an approximate rate of 1K bytes in two minutes. So a file containing about 5000 bytes (20 disk blocks) will transfer in 10 minutes.

Any file you download from the C/G BBS is ready to use when it's stored on disk. Some BBS software sends files which must be converted before they are usable, but your terminal program performs this conversion before it stores the file. If you're anxious to try out the program or text file you just downloaded, select main menu option 9. You'll see the 9 displayed after the > prompt, and the cursor will move to the next line. You are now disconnected from the BBS. Disconnect the modem from the phone line, clear the terminal program from the computer, and you're ready to load and run the downloaded program.

Uploading To The BBS

The C/G BBS allows callers to upload files as well. So long as there is room on the email disk, a caller can submit a file for inclusion in the download library. The upload procedure is similar to downloading, except that you supply the filename of an existing file on your disk. The terminal program collects the file from your disk and transmits it to the BBS.

As part of regular BBS maintenance, the sysop will look at the submitted file and decide whether to add it to the download menu. To avoid duplicate filenames, the BBS stores the transmitted file using a name in the sequence UP01, UP02, UP03, and so on. When the file is uploaded, the BBS sends a record of the transfer to the printer, so the sysop will know who sent the file and what the caller wants to name the file.

All upload operations should involve two files: the file itself and a documentation file which explains how to use the main file. A documentation file can be as simple as a BASIC listing that consists of REM statements, or it can be a document produced with *SpeedScript* or another word processor.

To help the sysop and other callers identify your uploaded files, you should use file extensions which describe the type of file. A BASIC program might have the extension .BAS, a documentation file of REMark statements might have an extension .REM or .DOC, a *SpeedScript* file can bear the extension .SPD, and so on. For example, a machine language sort program could be uploaded as SORT.ML and its accompanying documentation file might be SORT.SPD or SORT.REM.

The next option allows you to change your name or password. When the sysop opens your account, your first name will be put in the file. If you prefer to use a pseudonym or nickname, use this option. Also use it to change your password regularly. If another caller discovers your password, he or she can go on-line and leave messages in your name. If the BBS has a fee, you'll be paying for their time.

Talking To The Operator

If you find some of the BBS procedures confusing, or you just want to say hello, you can leave messages and email for the sysop (for email, use ID # 1000). For an immediate conversation, you can use option 7, chat with the sysop. When you select this chat feature, the BBS tells the sysop you want to talk. After you page the sysop, continue using the board. If the sysop is available, he or she will make contact at a point when you are receiving the main menu. So don't page the



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sysop and then proceed to download a file that takes 20 minutes. Return to the main menu frequently so the sysop can make the connection.

The sysop activates the chat feature by pressing the f1 key on the BBS keyboard at any time after he or she is paged. The board contains an interrupt routine that goes to the chat mode instead of the main menu.

In chat mode, the caller and the sysop type normally, just as when two copies of C/G Term are communicating. The sysop can change his or her border color by pressing f3, change the background color with f4, and clear the screen with f6. When the two of you are through talking, the sysop returns the caller to the main menu by pressing f2.

Maintenance

Just as with a regular cork bulletin board, someone must update an electronic board, removing outdated messages and generally maintaining order.

The sysop can perform maintenance on the C/G BBS in one of two ways: Use the maintenance sequence, which occurs when the board is first run, or force the board to maintenance mode by pressing f7 while the board is on-line. This causes the program to go to the maintenance routines when the current caller logs off. The maintenance call can be canceled by pressing f8.

Normally, when you log off, the BBS updates its tables to include new messages or changes in your name or password, and adds your time on-line to the cumulative time stored in your user file. (Cumulative time is stored as total minutes, in binary coded decimal format.) In addition, your user ID number and time on-line are sent to the printer so the sysop will have a running record of traffic on the BBS. This printed record helps the sysop keep up with who is using the board and when the upload area is getting full, so he or she can perform timely maintenance.

Maintenance includes defining the system, updating the download library and processing uploaded files, typing in new user information, and updating the message files.

At the beginning of maintenance, the sysop sees this menu:

Does your system have:

- 1) one drive, # 0, device 8
- 2) two drives, # 0, devices 8 and 9
- 3) two drives, # 0 and 1, device 8

If the BBS is being run with one 1541 drive, option 1 is selected. With one drive, only the public message files are in use. The board does not have email, download, or upload capability.

With two drives, the board is fully opera-

tional. The system operates with the message disk in drive 0 (or device 8) and the email disk in drive 1 (or device 9).

After the system is defined, there is a pause of a few seconds while the tables containing message locations are loaded into memory from a file on the message disk.

An Automatic Menu Builder

Then the download menu is created automatically from files which the sysop stores on the email disk while the board is off-line. The download library can contain up to nine files. Each filename to be included in the download library must begin with the letter D. The BBS prints each filename in turn and asks the sysop to type in a description of up to 50 characters. The menu is then compiled and stored in memory.

If the email disk contains no filenames beginning with D, the program will display an empty menu, and a caller must type a 0 to return to the main menu. The email storage file takes up 405 blocks, leaving 259 available for the download library and uploaded files.

Changing User Information

After the download menu, the sysop is given the option of updating the user information files and message files.

If the user files are chosen, the sysop will see a menu which allows him or her to change the user's name, password, cumulative time on-line, or status. The first three options are used mainly in setting up a new account. After the initial entry, the user can maintain his or her own name and password changes, and cumulative time is computed automatically.

However, option four, status, is accessible only to the sysop. Through this option, the sysop can enter a code that automatically refuses to let the user log onto the board. Such a feature is a regrettable necessity.

Updating Messages

By choosing to update messages, the sysop causes the board to talk to itself. The program gets its input from the keyboard instead of from the modem, so the sysop can read messages, erase messages, and leave messages for other users.

The sysop reads messages just as other callers do, except that he or she has the added ability to erase regular messages by typing a k (kill message) at the RETURN r m (?=help) prompt. This feature is accessible only from the BBS keyboard; the erase routine ignores modem input while the BBS is on-line.

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To leave a message or email, the sysop must use C/G Term to create the message. Load and run C/G Term and press CTRL-C then f8 to enter message mode and create a message. The BBS message disk is then inserted into the drive, and the message is saved to disk by pressing f5.

Then, when the sysop is performing system maintenance and selects the send message option, the program asks for the filename of the message. After the name is entered, the program automatically adds the message to the system files.

To exit from the message maintenance mode, the sysop selects 9) Log off, and the program returns to the regular maintenance sequence.

When maintenance is complete, the sysop responds with an n to the prompt:

Update system files (y or n)

and the BBS is ready to take the next call.

Creating The BBS

The complete BBS will consist of three disks containing seven files. First, the bulletin board program and the auxiliary programs (see below) must be typed in and stored on a disk. Then a message disk is created, containing the message file, the user information file, and a file which holds the tables necessary to locate and display each message. The third disk will contain the email messages, and the download and upload libraries.

To create the message file, load the following program (CREATEMSG) and insert the formatted message disk in device 8. Then run the program, which creates a relative file of 401 records, each containing 254 bytes:

```
10 REM CREATE RELATIVE MESSAGE FILE
20 OPEN15,8,15:OPEN1,8,2,"MSGFILE1,L,"+CHR$(254)
30 PRINT#15,"P"+CHR$(98)+CHR$(145)+CHR$(1)+CHR$(1)
40 PRINT#1,"@END"
50 CLOSE1:CLOSE15
60 END
```

Remove the message disk and insert the formatted email disk. Then make the following change in the program:

In line 20, for "MSGFILE1,L," substitute "EMAIL,L,"

Then run the program, which now creates the email relative file. Next, remove the email disk and insert the message disk again. Make these changes to the program:

```
10 REM CREATE RELATIVE USER STATUS FILE
20 OPEN15,8,15:OPEN1,8,2,"USTAT,L,"+CHR$(86)
```

```
30 PRINT#15,"P"+CHR$(98)+CHR$(244)+CHR$(1)+CHR$(1)
```

Now run the modified program. This will create the user information file, which consists of 500 relative records of 86 bytes each. (One record holds two user files.)

Finally, type NEW, then load the short machine language program (Program 1, "Tables Setup"):

LOAD "TABLES.OBJ",8

Insert the message disk and run this program to create and store to disk a file containing the initial message file pointers and other default settings which the BBS will need for its first run.

These files need be created only once, before the board is run for the first time. After that, the BBS program handles the file contents automatically.

After the files are created on the message and email disks, you should select the files you want to include in the download library and store them onto the email disk.

Going On-Line

When you are ready for the BBS debut, connect the Automodem to the 64 and the phone line, and set the switches for full duplex, answer, and data. Then load the bulletin board program (Program 2):

LOAD "BBS",8

Insert the message disks and email disks, and run the program. After you go through the initial maintenance sequence, the BBS will wait for the first caller. You can now call yourself a sysop.

But being a sysop involves more than running the program and walking away.

Operating a bulletin board requires a large commitment of time and resources. Also, there's a certain amount of paperwork, and several decisions to be made before you go on-line.

First, the phone line and computer system will be unavailable for other use while the BBS is running. If you have only one phone and one computer, you'll have to operate the board part-time. You may want to consider establishing regular operating hours, so people will know when to call. And be sure to notify your friends that you will be unavailable to talk on the phone during those hours.

If you plan to have a separate phone line and computer just for your board, you can run the BBS 24 hours a day. But your 64 and disk drive can overheat under such heavy use, so round-the-clock operation is not recommended. Since the disk space available for file transfers is limited, you'll need to take the board off-line at least once a day, anyway.

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If you run the BBS for several hours before you turn off the computer, then you should provide ventilation, especially for the disk drive. I've found that filter fans work well for this purpose. A filter fan is a small fan which draws air in its bottom, through a filter, and pushes the air out the top. The filter traps dust, smoke, and other harmful airborne debris. There are several desktop models available for \$20-\$50.

Although the BBS can run unattended, you should monitor the system regularly. Callers will want to chat, the upload area will fill up, and you need to check the printout for new users.

A new user's name, address, and phone number are printed out so you can verify the information and add the caller's new ID number and password to the user information file.

Each regular caller generates at least two lines on the printer. The last three digits of the ID number are printed when the caller logs on. On log-off, the ID number is printed again, with the number of minutes the caller was on-line. If a file is uploaded, the ID number is printed, followed by the filename the caller gave the file and the name under which it's stored on the email disk (UP01, UP02, and so on).

To keep your upload and download functions running smoothly, you should process uploaded files every day. While the BBS is waiting for a call, move the T/D switch to T for telephone. Remove the system disks and press RUN/STOP-RESTORE. Insert the email disk in device 8 or drive 0. Then look on the day's printout for the upload filenames UP01 and so on.

Check the filename the caller gave the file to see which are document files. Then load each document file and read it to see what the main file contains. If you decide to include the file in the download library, you must rename it (see the manual that came with your drive for details on renaming files). Your new filename should begin with the letter D.

Remember that you can only have nine files in the download library, so you will have to scratch files to make room for new ones.

Since you can have up to 999 bulletin board members, you may want to set up a record-keeping system to keep track of who's got what ID number, which files they upload, and cumulative time on-line.

If you decide to run a free board, then this basic paperwork will be sufficient.

Bulletin boards traditionally are free and open to all, but several factors are changing that situation.

As more people become active in telecommunications, boards are more crowded. Some sysops are setting time limits for each caller.

Also, there have been cases recently in which the police have confiscated sysops' computers when illegal material such as stolen credit card numbers and pirated software have been found on the boards. Consequently, many sysops are being more selective about who they let on their boards.

And finally, many sysops can't afford to absorb the cost of an extra phone line and extra computer system to operate a 24-hour board. These sysops charge a small fee to cover those costs.

Each of these factors means more work for the sysop. You should check the messages regularly and cancel any that contain illegal material. The C/G BBS doesn't allow anonymous messages, so you can identify the caller who left the unacceptable message and notify them by email why their message was canceled.

If you charge a fee, you'll need a way to keep track of billing and income (be sure to keep complete records for tax purposes).

Typing In The Machine Language

First type in, save, and run MLX, found elsewhere in this issue. When prompted for the starting address, respond with 2049. The ending address is 17828. Be sure to save this program to which you will append Part 2 next month. C/G BBS is over 14K, so, for the sake of magazine space, we're publishing the first half of the code this month and the second half next month. Instructions on resuming with Part 2 will appear next month.

If you'd rather not type in the program, send \$3, a stamped, self-addressed mailer, and a blank disk, and I'll send you the entire ready-to-run BBS object code, the auxiliary programs, and the bulletin board source code (in PAL/LADS format).

Robert Sims
100 Lee Street
Jamestown, NC 27282

See program listings on page 177. ☺

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Auto Line

Don Gibson

This handy utility, which is compatible with Automatic Proofreader, automatically numbers a BASIC program as it is being written. It can also quickly delete a range of lines. For the VIC and 64.

Some computers, including Commodore's new Plus/4 and 16, have an auto-number command built into BASIC. You can turn it on whenever you're writing a program; after you enter a program line, the computer figures out the next line number and prints it. You choose what the increment will be: one, three, five, ten, or whatever.

It turns out to be fairly simple to add such a feature to the VIC or 64. "Auto Line," a short machine language wedge, automatically numbers lines, and also serves as a quick-delete utility.

Entering Auto Line

After typing in the program listing, save it to tape or disk before running. The last statement to be executed is a NEW, so the BASIC loader program erases itself after completing the POKEs. If you use Automatic Proofreader, make sure you disable it with RUN/STOP-RESTORE before you save Auto Line.

The 64 version (Program 1) is put into memory starting at location 49152, a safe area for machine language (ML) programs, but the BASIC loader program can move the ML elsewhere if you need the block of memory beginning at 49152 for another purpose. One possibility is the cassette buffer (starting at 828). To relocate the 64 version of Auto Line, change the variable SA (starting address) in line 10 to a safe part of memory.

The VIC version gives you two choices of where the program will go, the cassette buffer or a protected spot at the top of BASIC memory. When you first run it, you will be asked where you want to put Auto Line. If you store programs on tape, avoid using the cassette buffer for Auto Line. Instead, tape users should choose the op-

tion of putting the program at the top of memory, which will subtract 104 bytes from available BASIC RAM.

If you're using 8K or more memory expansion with your VIC, you'll have to change line 10 accordingly. PRINT PEEK(56),PEEK(55) will tell you the normal values for top of memory, which you can then plug into line 10. Or, if you're using expansion memory, you can delete line 10 altogether (the disadvantage to removing the line is that if you run the loader program more than once, the top of memory will move down 104 bytes each time).

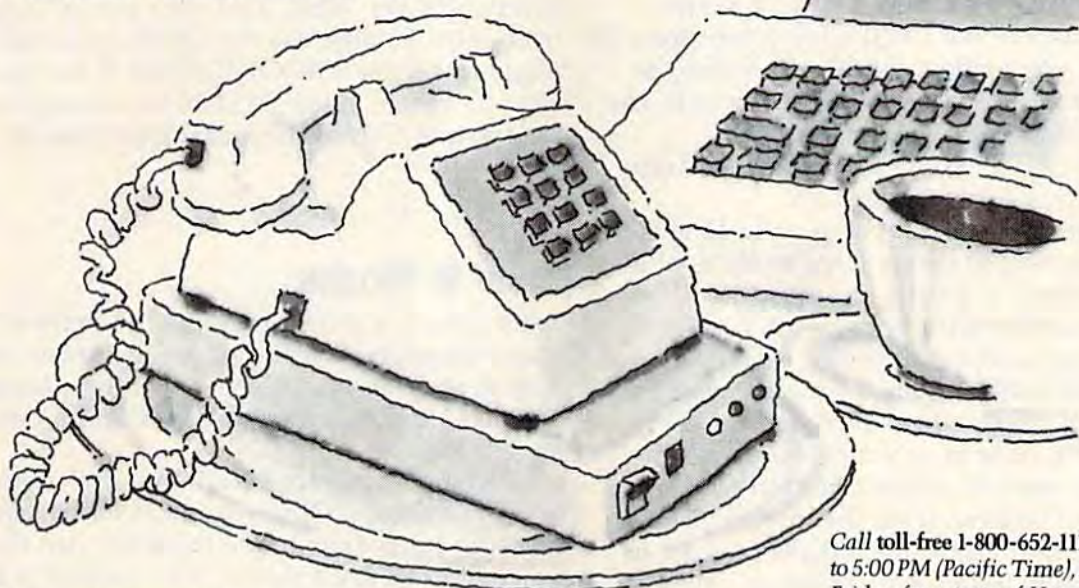
The program defaults to incrementing lines by ten; line 10 is followed by 20, then 30, and so on. You can change this, however. Line 110 of the VIC version (line 60 of the 64 version) sets variable IN (increment) to ten. You can change it to any number from 1 to 255. If you want to change increments in the middle of the program, you can POKE the number you want into SA+46 (SA is the starting address, the SYS number). For example, if you choose to put the program in the cassette buffer, starting at 828, to change to increments of five, POKE 828+46,5 will work (don't use POKE SA+46—the variable SA loses its value after the program is NEWed). Or if you're using the 64 version, starting at 49152, POKE 49152+46,20 would change the increment to twenty.

Line Numbering And Line Deleting

After saving Auto Line, type RUN. If you typed it in correctly, you should see a message telling you the SYS number. Write down the number (in case you want to disable Auto Line and then turn it on again). Type SYS and the number on the screen, and the first line number will appear on the screen. The program thinks you're starting at zero, so the first number will be the same as the increment value. It should be ten (unless you changed the increment variable IN as described above).

You can now type a BASIC line, press RETURN, and the next line number appears. Enter

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the next line and the program continues, automatically printing the appropriate line numbers.

What if you don't want the program to start with line 10? Press the DELETE key three times, until the 10 is erased (or just type a SHIFT-RETURN to move to a blank line), then type the line number you want followed by a BASIC line. The program keeps track of the last line number used, and adjusts itself accordingly. You also have full control of the usual editing functions. If you discover you made a mistake on a line, do what you would usually do—cursor up to it, correct it, and press RETURN.

Press the RUN/STOP key to disable Auto Line. The SYS will turn it back on.

An interesting by-product of Auto Line is that it can be used to delete large sections of a program. To erase a BASIC line, you simply enter the line number with nothing after it. So, with Auto Line working, pressing RETURN again and again will erase the lines which appear on the screen. Of course, if the increment is set to ten, you won't erase lines which were later inserted. If you want to delete a section of a program, it might be best to set the increment to 1, with a POKE to the starting address plus 46, as explained above. If you're planning to delete a lot of lines, you'll have to press RETURN many times. POKEing a 128 into location 650 causes all keys (including RETURN) to repeat, and saves wear and tear on your fingers when you're doing a massive delete.

Compatible With Proofreader

Auto Line is also compatible with Automatic Proofreader, so you can use both to type in programs from the GAZETTE (if they're numbered in regular increments). Since Proofreader resides in the cassette buffer, you must not put Auto Line there (and if you're using tape, you must load Auto Line before loading Proofreader). Put Auto Line at 49152 on a 64, at the top of memory on a VIC.

To use the two programs as a combination, change line 70 (64 version) or line 120 (VIC version). Delete the NEW statement at the very end of the line and replace it with
LOAD"AUTOPROOF",8 (disk) or
LOAD"AUTOPROOF",1 (tape). When you load a program from within another program, it loads and automatically runs.

Tape users can also follow the directions on the Proofreader page for creating a PROOFREADER.T file, placed right after Auto Line, and add OPEN1:CLOSE1 to Auto Line, in place of the NEW statement in line 70 (64 version) or line 120 (VIC version).

You can use both Auto Line and Automatic

Proofreader to work on a partial program which has been saved to tape, but you have to load them in the correct order. First, if you have not done so, create a PROOFREADER.T file (as described in the Proofreader article). Load and run Auto Line, making sure you put it high in memory, with a starting address SA of 49152 on a 64, or top of BASIC in a VIC. Don't enter the enabling SYS yet. Next, load your partial program from tape. Finally, use the OPEN1:CLOSE1 technique to get the PROOFREADER.T file into the cassette buffer. Enter SYS886 to start up Proofreader, and SYS to the starting address of Auto Line.

How It Works

Auto Line is a short program (104 bytes of machine language) which derives its power from Kernal routines and specific operating system pointers. It contains two wedges and a pointer-switch routine.

When a program is running, the computer is in *program mode*. Otherwise, it is in *immediate mode*. In immediate mode there are two things you can do: Type a BASIC line without a line number, for immediate execution (PRINT FRE(0), for example) or enter a line number followed by a BASIC line.

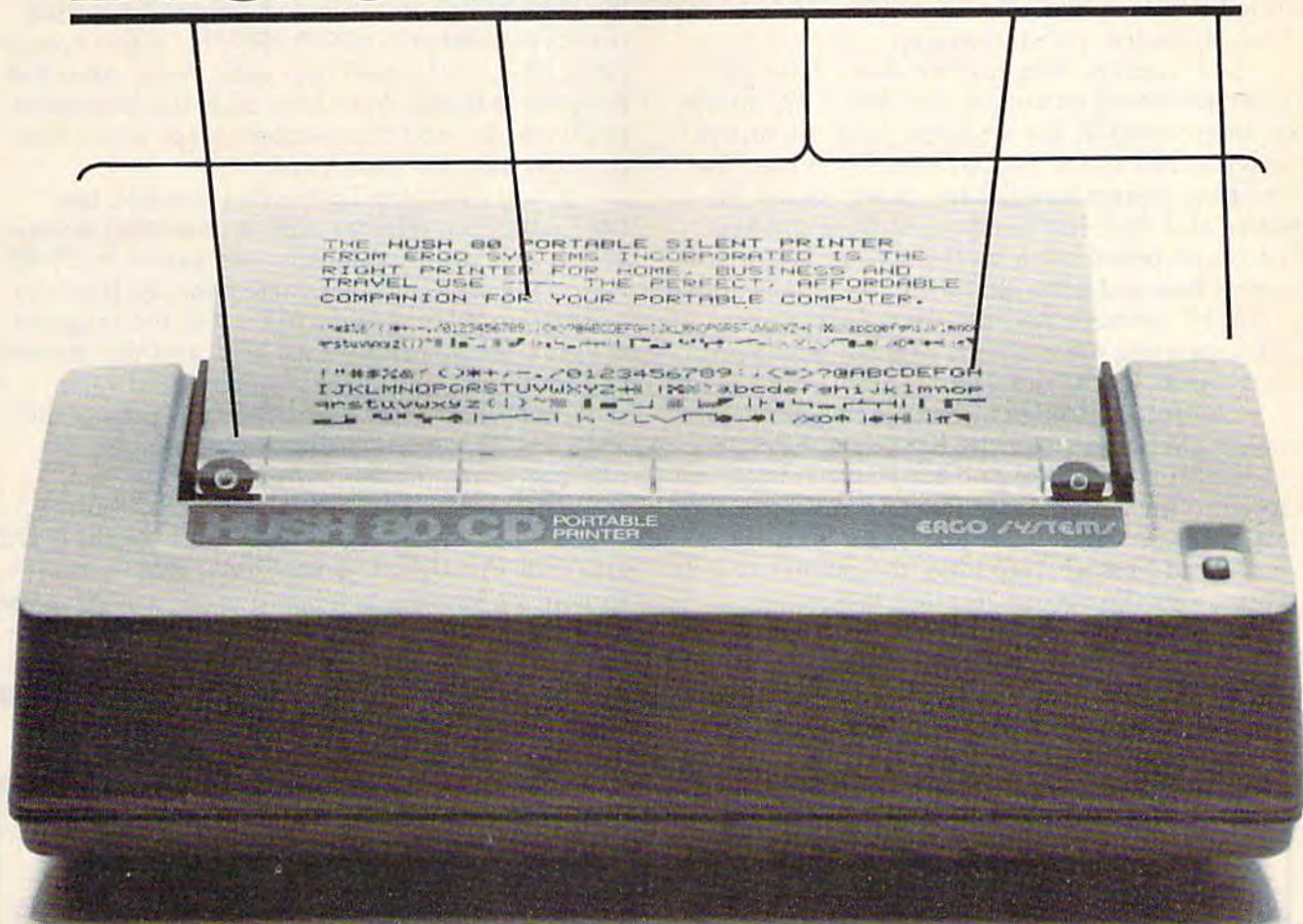
The workhorse routine of BASIC is called MAIN. When the computer is in immediate mode, MAIN calls a subroutine which checks for a keypress. When it finds one, it prints the character on the screen. It also handles things like cursor controls and insertions/deletions. Pressing RETURN sends MAIN to an evaluation routine, which looks for a number at the beginning of the line. If there's a number, the line is tokenized and added to the BASIC program in memory.

Since BASIC line numbers are stored in a Low Byte/High Byte format, the ASCII numbers on the screen have to be translated to two bytes. So if you begin a line with the number 600, the operating system has to change the three characters "6" and "0" and "0" to a low byte 88, high byte 2 (since $88 + 2 \times 256$ equals 600). The results of the translation are temporarily stored in zero page locations 20-21 (\$14-15).

A pointer at 770-771 (\$0302-0303) tells BASIC where the MAIN routine is located.

The pointer-switch routine at the beginning of Auto Line changes 770-771 to point to the first wedge. The wedge program checks 20-21 for the last line number and then adds ten (or whatever increment you have chosen) to calculate the next line number. The new integer value (low byte/high byte) is then sent through

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the integer-to-floating-point conversion routine. The resulting floating point (FP) number is then sent through the BASIC FP-to-ASCII routine, to get the characters which will be printed to the screen. An 88 and 2, for example, would be converted first to a five byte FP number, then to the three characters which make up "600".

In a machine language version of the Dynamic Keyboard technique, the ASCII characters are then stored in the keyboard buffer, and the wedge jumps to the regular MAIN routine. The operating system handles the characters in the buffer as if they had been typed from the keyboard and prints them on the screen. When you enter a line and press RETURN, the line is added to BASIC memory, and the wedge takes over again, printing the next line number based on what's in bytes 20 and 21.

The second wedge intercepts the IRQ interrupt. It checks to see if the STOP key has been pressed. If so, the IRQ and MAIN vectors are restored to their normal values, which has the effect of turning Auto Line off. If you SYS to the starting address of Auto Line, the pointer-switch routine sets the vectors to point to the two wedges, turning Auto Line back on.

One quirk of Auto Line is that if it's running and you LIST a program, the listing will be followed by the usual READY prompt and a number one less than the increment. If you're

numbering by ten, the number nine will follow the READY prompt.

This is because the two bytes which hold the line number (20 and 21) are sometimes used for other purposes. LIST uses 20-21 to keep track of the highest line to list and the highest possible two-byte number is 65535 (\$FFFF). If you type a plain LIST, a 255 goes into both bytes. After the program is listed, Auto Line adds the increment to 20 and 21, and the number wraps around to one less than the increment.

If you use a top limit when you list, like LIST -100, the number (100 in this case) is converted to a two-byte integer and stored in 20-21. Auto Line then adds the increment. So if you're numbering by tens and LIST -100, the program is listed, the screen says READY, and the number 110 appears.

If you find this feature annoying, press the RUN/STOP key to disable Auto Line before LISTing your program.

The highest line number allowed in BASIC is 63999; anything higher will cause an ILLEGAL QUANTITY ERROR. Thus, if you use Auto Line to write a program numbered in the 63000 range, it's possible you'll reach the limit, in which case the bytes at 20-21 are scrambled. It's perhaps best to avoid line numbers in this range, or enter them while Auto Line is turned off.

See program listings on page 195. ☐

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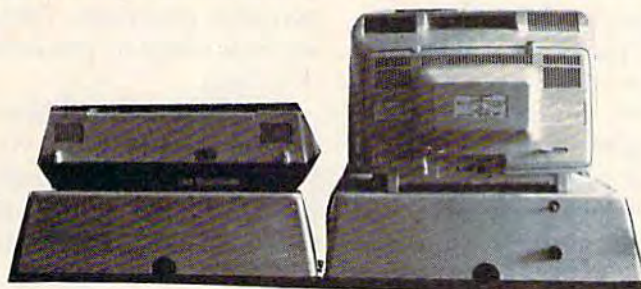
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Redefined characters, sprites, medium- and high-resolution, page-flipping, fine scrolling, and 16 colors give the 64 some of the best graphics capabilities found on any low-cost computer. But what are graphics good for? Games, at least, make good use of graphics. Business programs can draw detailed colored graphs that extract meaning out of a seemingly patternless mass of numbers. Yet graphics for their own sake—art, if you will—are a valid application for computers.

Computer drawing programs can bring out latent talent, even from those who protest "I just can't draw." One reason is that such programs take away much of the tedium normally associated with creating graphic art. If you can't draw a straight line, or if your circles look more like mutant eggs, you can get the computer to do it for you, with mathematical precision. Those who have been frustrated with pencil and paper will revel in the artistic freedom and power offered by a good drawing program.

Graphics Peripherals

There are several ways to enter graphics into a computer. The most straightforward is a camera that takes pictures and converts them into computer pixels. No skill or technique is necessary; just point the camera and shoot. Unfortunately, camera digitization is usually too expensive for use with a home computer. Even so, it remains a tantalizing alternative. The technology is available; we can only wait for prices to come down.

The keyboard can be used to give commands for circles, lines, and boxes, with the cursor keys used to move around the graphics screen. This can be tediously slow and indirect.

The next step up is a joystick. Instead of

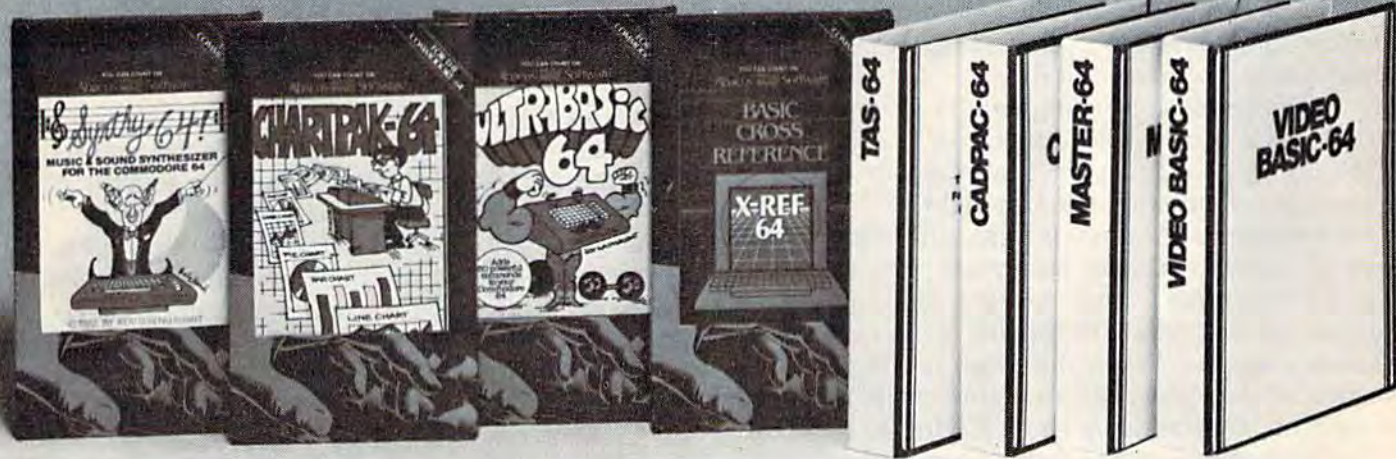
pressing keys labeled with directions, you just push the joystick in the desired direction. Avid game players have developed specialized joystick dexterity, which is instantly applicable to a drawing program. The major drawback of a joystick is that it can only move in four cardinal and four diagonal directions. Freehand drawing with a joystick tends to produce awkward, sharp-angled drawings.

A trackball, made of a billiard ball mounted on two wheels, gives you smoother control. When you move the ball, the wheels spin, and the direction of spin is similar to joystick directions. If you spin the ball forward, an "up" value is returned, the same as if you pressed the joystick forward. Unlike a joystick, a trackball can return a series of directions that better approximate the spin of the ball, so you effectively get more than just eight directions. Any program that works with a joystick will also work with a trackball. A trackball can be imprecise, though, since it tends to keep spinning after you've started it rolling. It can also be difficult to draw straight lines with a trackball, but it's much easier to approximate curves than with a joystick.

Mousing Around

A mouse controller is not a rodent trainer; it's a device similar to an upside-down trackball. As you move the mouse on the desktop, it reports its relative position. The screen cursor mimics the mouse movements. After some practice, moving the cursor with the mouse becomes second nature. The Macintosh and Lisa computers brought the mouse to prominence, and mouse controllers are the latest rage for the Apple II and IBM PC. Some people feel that mouse controllers are a gimmick, and could be replaced by inexpensive

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joysticks or trackballs.

However, what business executive would want to be seen using a joystick with *Lotus 1-2-3*? A mouse is an improvement over joysticks, giving precise, natural control. It's a little strange to draw with one, though. We're used to pencil and paper, and drawing with a mouse is like using a pencil point mounted underneath a cigarette package. Since mice must roll about, they consume some desk space, and some surfaces are not conducive to easy rolling.

The promise of being able to draw directly on the TV screen with a light pen is enticing. At the tip of a light pen is a phototransistor, which turns on when stimulated by light. A TV screen does not emit continuous light, although it seems so to our slow human perception. The electron gun behind the TV tube sweeps from left to right, top to bottom, redrawing the screen 60 times a second. When the beam reaches the position of the light pen, the light-sensitive pen turns on, commanding the VIC chip to store the current position of the raster beam. A light pen, then, merely reports its current horizontal and vertical position. You need software to drive a light pen and make it seem that you are drawing directly on the screen.

In practice, light pens have some drawbacks. Foremost is that we're used to drawing on a horizontal surface, whereas a TV screen, of course, is vertical. Holding your arm and hand in the required position can be quickly tiring, often within seconds. Light pens are also imprecise in that the tip of the light pen covers several pixels, making it challenging to exactly position the light pen. Since it's almost impossible to hold the pen rock-steady, the position jitters about, so it's difficult to draw straight or smooth lines. Many light pen programs take several samples of the light pen's position, then compute an average. This alleviates the jitter problem, but slows down on-screen response.

Getting In Touch

Of all the input devices, the touch tablet is the easiest to use. A touch tablet is an inexpensive version of a digital graphics tablet. You draw with a stylus on a rectangular pad, which tells the computer where the pen is on the pad. The most expensive digital pads offer high resolution, using magnetic fields to sense the position of the stylus. Touch tablets sense pressure, and are relatively inexpensive. Since they detect pressure, you can draw with your finger or a blunt stylus. You have to learn to look at the screen while you're drawing, trusting that the tablet will relay your movements. It's easy to trace drawings with a touch tablet, so even if you're not an artist, you can look like one. Tablets offer many of the

advantages of mouse or light pen controllers, and are best for drawing, although the mouse or light pen are easier to use for pointing and making on-screen menu selections.

There are numerous drawing programs available for the 64. To give you an idea of the state of the art (pun intended), we'll take a brief look at some of the most popular drawing programs for the 64: *KoalaPad* from Koala Technologies, the *Tech Sketch Light Pen* with *Micro Illustrator*, *Peripheral Vision* from Futurehouse, and *Doodle!* from City Software.

Some drawing programs include the graphics controller. The *KoalaPad* includes a touch tablet, and both *Tech Sketch* and *Peripheral Vision* come with light pens. The *Tech Sketch* light pen has a switch on the tip, but the *Peripheral Vision* lightpen requires you to trigger it from the keyboard. *Doodle!* works with a standard Atari-type joystick, though City Software recommends you use a trackball. The hardware has to be considered when comparing the prices of these products. Both Futurehouse and Koala Technology justify the expense of the hardware by offering a wide range of programs that make good use of the light pen or touch tablet.

Both the *Tech Sketch* light pen and the *KoalaPad* come with very similar versions of *Micro Illustrator*, which Koala Technologies has dubbed *KoalaPainter*. *Micro Illustrator*, which is licensed by Island Graphics, is a popular base for graphics programs on many computers. *KoalaPainter* does offer some improvements over the version of *Micro Illustrator* used by the *Tech Sketch* light pen, but you may want to make your decision in terms of the controller (touch tablet or light pen) and the price. *Micro Illustrator* is one of the easiest graphics programs to learn and use, and versions exist for several computers. Both *Peripheral Vision* and *Doodle!* have features unavailable in *Micro Illustrator*, but are somewhat harder to learn and use. *Micro Illustrator* and *KoalaPainter* both use a full screen menu with pictures and descriptions. You just point to the command you want, then go back to the graphics page. You draw a circle by pressing the button once, then moving the controller. As you move the controller, the circle gets larger or smaller, depending which direction you move. When the circle is the size you like, press the button again to stamp it down. *KoalaPainter* lets you move the circle after you've defined it.

Peripheral Vision draws circles in three steps. First you lay down an X-shaped mark that represents the center of the circle, then you place another mark to represent the outer edge of the circle. Finally, you select the circle by pointing to a small menu at the bottom of the screen. You don't actually see the circle until it's permanently

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drawn, whereas both *Micro Illustrator* and *KoalaPainter* let you preview the circle as you are expanding the size.

Doodle! also does not let you preview the circle, but it's still very easy to draw one. You select the circle mode with a function key. If you can't remember which function key to use, there are some brief help screens available for each command. In the circle mode, the cursor changes to two intersecting arrows. You move the joystick left and right to move the horizontal arrows toward or away from the center. This represents the horizontal axis of the circle or oval. Moving up or down adjusts the vertical arrows. You then press the joystick button, and the joystick can be used to position the cursor. The fire button alternates between moving the cursor and positioning the arrows. You then press the back-arrow key to draw the circle.

The various ways of drawing circles offer a good idea of the philosophy of these programs. While less direct than the others, *Doodle!* makes it easy to draw not just circles, but ovals of any proportion.

Features common to all these programs are freehand drawing, lines, connected lines, rectangles, circles, mirror image, fill-in, multiple colors, and zoom. With *KoalaPainter* or *Micro Illustrator*, you fill in an area by selecting Fill. The cursor changes to the word Fill. You move the cursor inside the figure, then press the button to fill the area. A figure must be completely enclosed, or else the Fill can escape through tiny holes in the outline, sometimes washing over and erasing your entire picture (like trying to fill a leaky swimming pool and ending up flooding your backyard). *Peripheral Vision* is unique here. It quickly traces the outline, and will not perform the Fill unless the outline is complete.

KoalaPainter, *Doodle!*, and *Peripheral Vision* each let you move and copy areas of the screen, although *Micro Illustrator* lacks this feature. *Peripheral Vision's* copy command only copies the outlines of shapes, not what's inside them, but it's fun to watch the cursor continually trace the shape. With *KoalaPainter*, you draw a box around the area you want to move, then press the button. You then move the box, press the button, and the area is copied. *Doodle!* also boxes in the area, but you can actually re-size the shape before you put it down. You can grab a section of the screen, and reduce or enlarge it before you set it down. You can also reverse and flip horizontally and vertically. A unique feature of *Doodle!* produces an effect much like op-art. All the lines within the box are doubled.

In summary, I've found *Micro Illustrator* and *KoalaPainter* to be the easiest to learn and use, with the choice made on the basis of price and

the peripheral used (light pen or touch tablet). *Peripheral Vision* can be purchased with its own light pen, and has some innovative touches. *Doodle!* needs no extra hardware. It's not as easy to learn, but has more features and variations than any of the other drawing programs covered here. If you can, go to your local computer or software store and try them all out. See which one is best for your drawing needs.

KoalaPad with KoalaPainter
Koala Technologies, Inc.
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Santa Clara, CA 95052-8100
\$99.95 disk; \$110 cartridge

Peripheral Vision
Futurehouse, Inc.
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Chapel Hill, NC 27514
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Doodle!
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725 West Wisconsin Avenue
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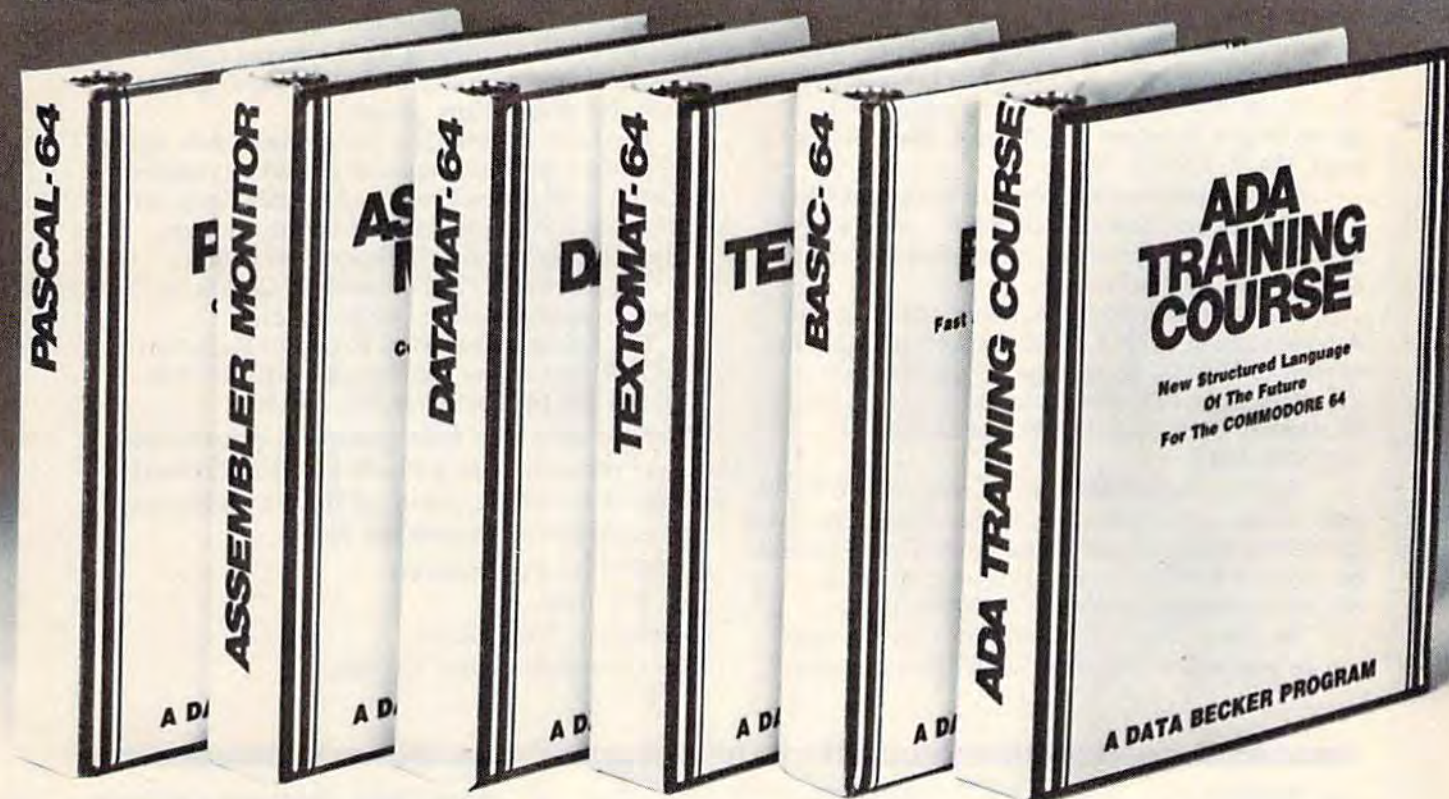


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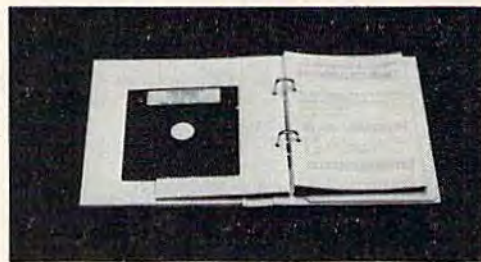
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User Group Update

Changes

A software exchange user group, American Program Exchange 64 (A.P.E. 64), has been started in California. For more information, write A.P.E., James Wyatt, Executor, 3820 Brave Ave., Bakersfield, CA 93309.

The Commodore 64 West users club of West Los Angeles and Santa Monica has a new address. The club can be contacted at P.O. Box 406, Santa Monica, CA 90406-0406.

The Suburban 64 Users Group, listed in the August Gazette with a Massachusetts address, has moved to Florida. It can now be reached care of Ken Partridge, 1360 SW 82nd Terrace, Apt. #625, Plantation, FL 33324. The phone number is (305)474-6923.

The Fox Valley PET Users Group, based in Illinois, has a new name and address. Correspondence to the Fox Valley Commodore Users Group should be sent to Herb Gross, 833 Prospect, Elgin, IL 60120; the phone number is (312)695-1316.

The New Mexico Commodore User's Group can be reached at P.O. Box 37127, Albuquerque,

NM 87176. The new president is Susan Palmer.

The updated address for the Irving Commodore User Group is P.O. Box 165034, Irving, TX 75016. No phone calls, please.

The Grey Locker User Group has a new name and contact persons. Inquiries should be directed to Littleton C-64 Users Group, c/o either Jamie Silva, 8 Richmond St., Littleton, NH 03561, or Tom Walker, Mt. Eustis Rd., Littleton, NH 03561.

The Merrick (NY) Commodore Club is no longer accepting mail or telephone calls.

The Commodore Users Group of Rochester (CUGOR) has a new mailing address: CUGOR, P.O. Box 26514, Rochester, NY 14626.

When writing to a user group for information, please remember to include a self-addressed, stamped envelope. Send additions, deletions, and corrections for this list to:

COMPUTE! Publications

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Greensboro, NC 27403

attn: Commodore User Groups

New Listings

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Pasadena Commodore Computer Club
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Arcadia, CA 91006
(818)904-0607

Fresno Commodore Users Group
Greg Edwards
091 W. 9th, #203
Clovis, CA 93612

San Bernardino Commodore 64 Club
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1804 N. Dundee
Highland, CA 92346
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Michael V. Brazonis
QTRS 5938-A
Colorado Springs, CO 80913
(303)576-4219

Western Slope Commodore User Group
c/o On Screen Computer Store
535 Main Street
Grand Junction, CO 81501
(303)242-0083

DELAWARE

First State Commodore Club
P.O. Box 1313
Dover, DE 19903

FLORIDA

**Lake Sumter Commodore Users Group
(L.S.C.U.G.)**
Roger Coffey
P.O. Box 416
Leesburg, FL 32748
(904)343-2688

**The Central Florida Commodore User's
Club, Inc.**
Thurman Lawson
P.O. Box 15949
Orlando, FL 32858
(305)886-0390

GEORGIA

CCC64UG
P.O. Box 842
Morroe, GA 30260

Covington C-64 User Group
Keith L. Brown
P.O. Box 642
Oxford, GA 30267

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Coeur d' Alene, ID 83814
(208)765-3803

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Alton, IL 62002
(618)462-7136

Gateway Computer Club
Richard Fisher
P.O. Box 207
Belleville, IL 62222

Chess Players' Commodore User Group
John R. Menke
723 Barton Street
Mt. Vernon, IL 62864

Spud Users Group
P.O. Box 471
River Forest, IL 60305
BBS: (312)456-0395 or
(312)344-SPUD

INDIANA

Fulton County Commodore User's Group
Brian Eshelman
R.R. 1, Box 22
Rochester, IN 46975
(219)223-2672
or
Jim Tyler
1703 Madison Ave.
Rochester, IN 46975
(219)223-4430

IOWA

Penn City User Group
James A. Lair
R.R. 1, Box 390
Fort Madison, IA 52627
(319)372-1648

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Glasgow Commodore User's Group
Steve England
P.O. Box 154
Glasgow, KY 42141

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**Olney Square Commodore User Group
(OSUG)**
Jon Hadidi
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Olney, MD 20832
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(816)747-2406

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(201)867-5283

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Ridgewood, NJ 07450
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Butler, PA 16001

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Jim O'Rear (512)854-4156
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2904 N. Alleghaney
Odessa, TX 79764
(915)332-2582

The Users
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(214)722-9774

VIRGINIA

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Bothell, WA 98011

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Robert Adler
Snowdon P.O. Box 792
Montreal
Quebec, Canada H3X 3X9
(514)739-3046

Helsinki Area VIC User Group
Matti Aarnio
Linnustajankj 2B7
SF-02940 ESPOO
Finland

IHS division: Users
contact: Massimiliano Lisa
Via Borgonuovo 19
Milano, Italy

Marlborough Commodore Users Group
Robin Vercoe
42 Rogers Street
Blenheim
Marlborough, New Zealand

Commodore Users' of Panama (C.U.P.)
Raymond Dragseth
Box 1487
Balboa Ancon,
Republic of Panama
Phone: 60-4758
BBS: 82-3336

Commodore Hardware Users Group—Riyadh (CHUG-R)
Don W. Fry, Jr.
USREP/JECOR-CENPRO
Box 259
APO NY 09038

Note: This user group is in Saudi Arabia. The above address should be used by people with APO privileges, or by U.S. user groups. Persons using international or Saudi Arabian mail should use the following address:

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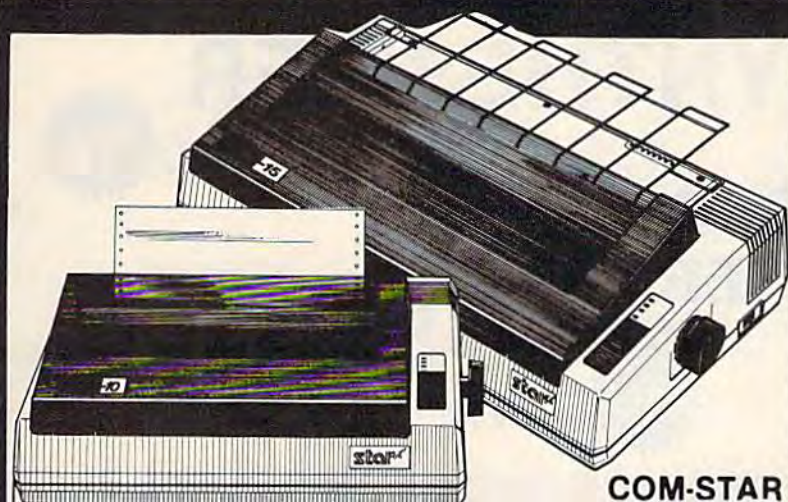
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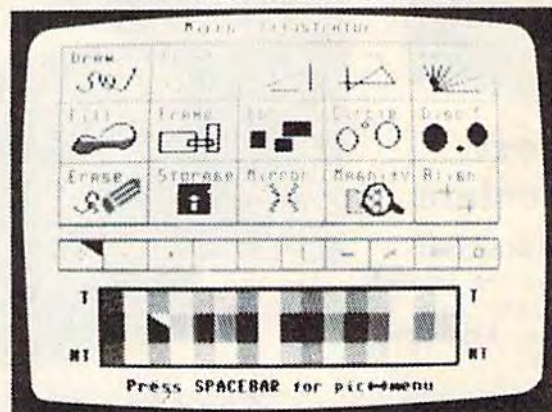
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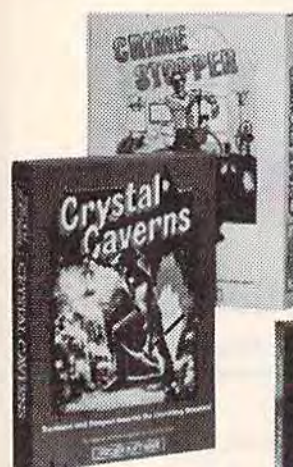
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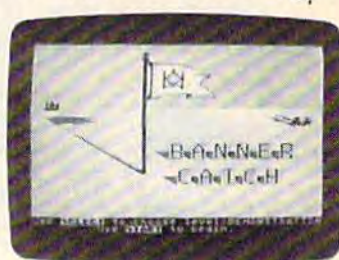
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Key Memory Locations

This month we'll take a look at some of the more useful memory locations in the VIC. We'll see how to use them, and offer some programming hints.

The *Commodore VIC-20 Programmer's Reference Guide* lists over three pages of useful memory locations. Unfortunately, little is mentioned about how the VIC uses these locations or how you can use them in your programs.

Let's take a look at some of these memory locations, explore their uses, and work out some nifty programming techniques and subroutines you can use in your programs.

43-44 (\$2B-\$2C): Start of BASIC

These two bytes point to the start of BASIC program memory. The address is stored in the Low Byte/High Byte (LBHB) format (see accompanying article). By POKEing values here, you can move the start of the BASIC program storage area to a different location in RAM.

Under normal circumstances, there's no need to move the start of BASIC. The VIC and 64 have an automatic relocation feature that loads a program at the current start of BASIC storage area even though it may have been saved from another location.

For example, a BASIC program may have been saved from an unexpanded VIC where the start of BASIC is normally 4096. When you plug an 8K or larger memory expander into the VIC, the start of BASIC moves to 4608. If the program that was saved on the unexpanded VIC is loaded back into an expanded VIC using the LOAD "filename", device number format (where device number is 1 for tape and 8 for disk), it loads at the start of the BASIC program area, even though BASIC storage starts at a different location.

LOAD "filename", device number is a relocatable load—it loads a program at the start

of BASIC wherever that may be. (The only exception is if the program was put on tape with a non-relocatable save, SAVE "filename",1,1; there is no comparable non-relocatable save for disk.) The LOAD "filename", device number, 1 (we've added a ,1) format is a non-relocatable load, and loads the program into the same memory locations from where it was saved. Non-relocatable loads are used primarily for machine language (ML) programs.

Under certain circumstances, though, moving the start of BASIC is necessary. Using custom characters on a VIC with 8K or more memory expansion is one such case. Because the VIC chip, which reads the character generator, cannot "see" into expansion RAM, you cannot place your custom characters at the top of BASIC RAM as you might do with the unexpanded VIC. The custom characters have to go somewhere between 4096 and 8192 (and you don't want them smack dab in the middle of BASIC).

In this case, you need to move the start of BASIC up so that you can load the custom characters into an area of RAM the VIC chip can access. Moving the BASIC storage area to begin at location 5632 instead of 4608 provides 512 bytes starting at 5120 for the custom characters. To do this, POKE 44,22:POKE 5632,0:NEW. Each time you increase the value in memory location 44 by 1, you move the start of the BASIC program area up one page, or 256 bytes. Each time you increase the value in location 43, you move the start of BASIC program area up one byte.

When you move the BASIC program storage area, it's best to do it without a BASIC program in memory. Otherwise you're likely to lose all or part of the program.

If you're combining machine language with your BASIC programs, moving BASIC up will provide you with a safe area to put your ML subroutines. You can POKE the ML into the protected area below BASIC.

Here's a short program that will move the start of BASIC storage up one to ten pages (256-2560 bytes). Type it in, save it, then run it. When prompted, enter how many pages you want to move BASIC up (1-10). Using the dynamic keyboard technique, the program moves BASIC, enters NEW, and leaves your VIC ready to load or enter a program.

```
10 PRINT "{CLR}MOVE BASIC UP HOW MANY PAGES
  ? (1-10)"
20 INPUT PG
30 IF PG < 1 OR PG > 10 THEN 10
40 N = PEEK(44) + PG
50 PRINT "{CLR}POKE44, "; N: POKE(256 * N, N + P
  EEK(43)) - 1, 0: NEW"
60 POKE631, 19: POKE632, 13: POKE198, 2
```

45-46 (\$2D-\$2E): End of BASIC program/start of non-array variables

These memory locations point to one byte past the end of the BASIC program currently in memory.

As a BASIC program runs, the operating system builds variables (but not array variables), starting here and upwards into memory. This pointer (as well as memory locations 174 and 175) can also be useful in finding the end of your BASIC program.

55-56 (\$37-\$38): End of free RAM

This pointer is much like memory locations 43 and 44 except that it signals the top of free RAM, or the end of available user BASIC memory.

If you think of memory as a football field, locations 43 and 44 point to the beginning of memory (your own goal line) and 55 and 56 point to the end of memory (the other goal line). BASIC programs begin at the beginning of memory and variables are stacked on top of the BASIC program, which is why you lose variable values when you add, delete, or change a BASIC line. Arrays are put on top of the other variables. Dynamic strings, on the other hand, begin at the top of memory (the opposite goal line) and extend downward in memory. (Dynamic strings are those that require evaluation, like `A$` in `A$ = A$ + B$`, or `A$ = CHR$(65)`, or `INPUT A$`.) Whatever is left between the end of arrays and the beginning of strings is free memory. When the pointer to the end of arrays meets the pointer to the beginning of strings, you get an **OUT OF MEMORY** error.

By POKEing lower values into locations 55 and 56, you can lower the top of RAM, thus providing a safe place to store your custom characters (in the unexpanded VIC) or machine language routines. Each time you decrease the value in location 56 by one, the top of memory

moves down one page (256 bytes). Decreasing the value in location 55 moves the top of memory down one byte. The memory is still there, you've simply fooled BASIC into thinking it's not available for string variables. If you plan to lower the top of memory, you should do it *before* defining any strings, or you may lose them.

For example, if you turn your unexpanded VIC off then on again and enter: `PRINT PEEK(55) + 256 * PEEK(56)` you should get 7680 which is the end of user BASIC memory. Now if you enter `POKE 56, (PEEK(56) - 1): CLR` (CLR erases variables and is necessary whenever you change the top of memory pointer) then re-enter the above line, you'll get a value of 7424. By decrementing the value of location 56 by one, we've moved the top of RAM to 7424. The 256 bytes between 7424 and 7680 are now a safe place to put your ML program or custom characters.

Here's a program that will move the top of BASIC RAM down from one to ten pages. When prompted, enter 1 to 10 then press RETURN. The program will automatically move BASIC down and leave your VIC ready to use.

```
10 PRINT "{CLR}MOVE BASIC DOWN HOW
  {3 SPACES}MANY PAGES (1-10)?"
20 INPUT N: IF N < 1 OR N > 10 THEN 10
30 POKE56, (PEEK(56) - N): CLR
```

67-68 (\$43-\$44): INPUT, GET, and READ information source pointer

These two bytes point to the source of information being input into the computer when using the BASIC INPUT, GET, or READ commands. In the case of INPUT and GET, they point to the *BASIC input buffer*. When using READ, they point to the memory location of the DATA statement.

The *BASIC input buffer* is an area of memory that runs from memory locations 512 to 600. This is 89 characters in length, and corresponds to the 88 character BASIC lines or the 88 characters allowed when using the INPUT command (the extra byte is used as a marker for the end of input). When you use an INPUT statement in your BASIC program, the information is temporarily stored in this buffer until a carriage return is encountered. This pointer will point one byte past the last character entered in the input buffer. As an example, enter the following program:

```
10 PRINT "{CLR}ENTER CHARACTER(S)": INPUT CH
  $
20 PRINT "{DOWN}BUFFER POINTER="; PEEK(67) +
  256 * PEEK(68)
```

Run the program and when prompted by the INPUT statement, enter A then press RETURN. As

How The VIC Stores Numbers

Many of the pointers discussed in this month's VICreations are pairs of bytes that store numbers in the Low Byte/High Byte (LBHB) format. Many microcomputers use this format to store large numbers.

Because a single byte can hold a number no larger than 255, two bytes are needed to store numbers 256 or greater. The LBHB method can store numbers from 0 to 65535. Numbers are broken down and stored in memory with the *least significant byte* (LSB) first, and the *most significant byte* (MSB) last.

The MSB is derived by dividing the number you wish to store by 256, then storing the integer value in the MSB. The remainder of the division is then stored in the LSB. Use the following formula to read LBHB numbers in memory:

$$\text{NUMBER} = \text{LSB} + (256 * \text{MSB})$$

As an example, let's use memory locations 43 and 44, which point to the start of BASIC program storage. Using the above formula, we can find the start of BASIC by entering:

```
PRINT PEEK(43)+(256*PEEK(44))
```

The result should be 4097 if you have an unexpanded VIC, 4609 with 8K or more expansion.

Storing LBHB Numbers

Let's say you wish to move the start of BASIC to memory location 7000. To do this, you have to POKE the proper values into memory locations 43 and 44 using the LBHB format. Here's how it's done:

First, divide 7000 by 256 (which gives you 27 with a remainder of 88), then POKE the integer result, the MSB, into memory location 44.

$$7000 / 256 = \text{integer } 27, \text{ so POKE } 44, 27$$

Next, store the remainder of this division into the LSB, which is memory location 43.

$$7000 - (256 * 27) = 88, \text{ so POKE } 43, 88$$

Now we've POKEd a value of 88 into memory location 43, and a 27 into location 44. If we use the formula to read the values in LBHB format, we get:

$$\begin{aligned} \text{Beginning of BASIC} &= \text{PEEK}(43) + \\ &(256 * \text{PEEK}(44)) \\ \text{or } 7000 &= 88 + (256 * 27) \end{aligned}$$

To actually change the beginning of BASIC requires more than just POKEing new numbers into this pointer. The byte right before the first byte of BASIC has to contain a zero, so you'd have to POKE 6999,0 and then type NEW (to reset some pointers used by variables).

Reading And Storing

To automatically read or store numbers using the LBHB format, use these two formulas:

To read an LBHB number, where N is the number:

$$N = \text{BYTE1} + (256 * \text{BYTE2})$$

To store an LBHB number, where N is the number to be stored:

$$\begin{aligned} \text{HB} &= \text{INT}(N/256); \text{POKE } \text{BYTE1}, N- \\ &(\text{HB} * 256); \text{POKE } \text{BYTE2}, \text{HB} \end{aligned}$$

you can see, the pointer value here is 513. The character code for the letter A was placed in the first byte of the input buffer (512), and the pointer was then incremented one byte past it. Run the program again, but this time when prompted, enter: ABCDEFGHIJ then press RETURN. The pointer is now indicating 522, one byte past the 10 characters entered.

When using the READ statement, the pointer works in much the same way, except that it points either to the zero byte at the end of each DATA statement or to the commas between DATA items. The operating system uses a zero to indicate the end of a BASIC line. Enter and run

this example program after turning your unexpanded VIC off then on:

```
5 PRINT "{CLR}"
10 READ A$
20 IF A$ <> "END DATA" THEN PRINT A$; GOTO 10
30 PRINT "{DOWN} LAST DATA="; PEEK(67)+256*PEEK(68)
50 DATA FRED
60 DATA GEORGE
70 DATA END DATA
```

The value displayed by the pointer here is 4215. This is one byte past the last character in DATA statement 70.

These pointers can be useful in monitoring input into the system, whether it's via the key-

board or a READ statement.

For instance, you might have an application where you want the user to enter a number 10 digits or less. It would be easiest to monitor the size of the number using string commands. For example, enter:

```
A=123
```

Then enter:

```
PRINT LEN(STR$(A))-1
```

As you can see, by first converting the variable A to a string (STR\$(A)), then determining the length of the string minus one (because negative numbers are preceded by a minus sign, positive numbers by a space) will correctly give us a 3.

However, numbers containing 10 or more digits present a problem because the VIC automatically converts these numbers into scientific exponentiation form. As an example enter:

```
A=1234567890:PRINTA
```

The result here is 1.23456789E+09 (meaning 1.23456789 times ten to the ninth power). This won't do us much good because if we try to use the above string/length conversion command on this number, we'll get a value of 14. The operating system treats the decimal point and the "E" denoting exponentiation as part of the string. For example, enter:

```
PRINT LEN(STR$(A))-1
```

This is where our pointers come into use. By using the INPUT command and the pointers in the program, we can accurately determine the length of input up to 88 characters long. Here's a program which is designed to allow the user to enter a number containing only 1 to 10 digits:

```
10 PRINT "{CLR}ENTER A NUMBER, ":PRINT"LIMIT 10 DIGITS, ":PRINT"NO COMMAS."
20 INPUT A
30 IF PEEK(67)+256*PEEK(68)>522 THEN GOTO 10
40 PRINTA
```

When prompted to enter a number, enter 1234567890. As indicated, the length here is 10 digits, and the program accepts the input as valid.

Now run the program again, entering 12345678901. In this case, the number was not accepted because it is 11 digits in length. The key to this technique is line 30, which checks to see if the pointers were incremented past memory location 522 (522 minus the beginning of the buffer, 512, = 10 digits), and if so, refuses to accept the data.

139-143 (\$8B-\$8F): Random seed value

These bytes are the root (or "seed") of the BASIC RND command. When the RND com-

mand is used in a BASIC program, these bytes are multiplied, added, and otherwise scrambled in hopes of creating a truly random number. But they have limited use in BASIC programs, where the RND command can be used.

However, when programming in machine language, you can use the random seed to produce a random number without branching back to BASIC. To do this, JSR (Jump to SubRoutine—much like the GOSUB in BASIC) to memory location \$E094 (decimal 57492). This is the beginning of the Kernal subroutine that "spins" the random seed bytes, and produces a random number. After the JSR, you can process any of the five random seed bytes as you wish. Memory location 143 seems to be the most random of the five. (For more information on random numbers and the random seed, refer to "Inside Random Numbers" in the June 1984 issue of COMPUTE!'s GAZETTE.

144 (\$90): Status word (ST)

This byte corresponds to the BASIC reserved variable ST (STATUS). When you open or close channels, or perform input/output operations, this byte indicates the final status of the operation.

As is true with the random seed, it has limited use in BASIC where you can use the ST variable itself. But in machine language, this byte is handy for checking the status of an input/output operation.

An input/output operation will set various bits in this memory location as noted:

Cassette:

- Bit 2 = Short Block
- Bit 3 = Long Block
- Bit 4 = Unrecoverable error (read), mismatch
- Bit 5 = Checksum Error
- Bit 6 = End of File
- Bit 7 = End of Tape

Serial devices:

- Bit 0 = Time Out (Write)
- Bit 1 = Time Out (Read)
- Bit 6 = EOI (End of Input)
- Bit 7 = Device Not Present

Checking location 144 can be very useful when you're reading a file of unknown length from tape or disk: After opening the file, use GET# to get bytes one at a time, followed by the line:

```
IF PEEK(144)=64 THEN CLOSE file number:END
```

or the equivalent:

```
IF ST=64 THEN CLOSE file number:END
```

When bit 6 is set (when location 144 has a value of 64), that means you've reached the end of the file and it's time to close it.

Time Clock

David W. Martin

Put a digital clock on your computer screen with this machine language program. For the VIC and 64.

There's a clock inside your computer. It starts ticking immediately when you flip the on switch and continues until you turn your VIC or 64 off.

It's called the jiffy clock, a three-byte section of memory that ticks every sixtieth of a second (jiffy). You can read the time in jiffies with `PRINT TI` or find how many seconds it's been since you turned on the computer with `PRINT TI/60`. To get a more readable time, `PRINT TI$` gives you hours, minutes, and seconds (131500, for example, would be 13 hours, 15 minutes, 0 seconds, or a quarter past one in the afternoon).

`TI` and `TI$` are called reserved variables. They are reserved for timekeeping only; you can't use them in your programs, unless it's for checking the time. To set the clock, you can define `TI$`, using the HHMMSS (Hours, Minutes, Seconds) format inside quotation marks. Enter `TI$="063000"` to set the clock to 6:30 a.m., for example. You can't set `TI` directly; you have to set `TI$`, which affects both time variables.

The Stopwatch Function

The jiffy clock sometimes comes in handy. When you're running benchmark tests, you can set the clock to 000000 just before running the routine being checked. When it's done, `PRINT TI` to see how much time the program took to run. In this way, you find the fastest ways of doing things like alphabetizing. It's like using a stopwatch on a programming technique.

The clock can also be used as an alternative

to `FOR-NEXT` delay loops. Define a variable as `TI+60` (for a one second delay) and keep looping around until `TI` is greater than or equal to the variable.

If you need to keep time in a program like a racing game or a touch typing program, you simply read the jiffy clock.

Commodore 64 owners have two Time Of Day (TOD) clocks, in addition to the jiffy clock. They're built into one of the interface chips. The TOD clocks count in tenths of seconds rather than sixtieths.

A Time Display Window

You could use a one line program to continually display the time, such as:

```
1 PRINT "{CLR/HOME}";TI$:GOTO1
```

except for one problem. To keep the time updated, the program would have to be running all the time, which means you couldn't use the computer for anything else.

"Time Clock" eliminates this problem. It prints the time in the upper righthand corner of the screen, and leaves the computer available for other tasks. A machine language interrupt drives the program. In other words, it runs in the period when the operating system does its housekeeping (like updating the screen).

To use Time Clock, type it in and save it before running. If the internal checksum does not match up, check the DATA statements (and remember to save your corrected version).

Next, you will be asked to set the clock. The VIC version operates in military time (10:00 p.m. should be entered as 22 hours, 00 minutes, 00 seconds). The 64 version uses a 12-hour clock, with a.m. and p.m. Both versions wrap around



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and reset at midnight.


After the clock is set, the time will appear in the upper corner. You can press STOP and type NEW without affecting the clock. RUN/STOP-RESTORE will erase the clock. To regain it, you'll have to SYS828 (VIC version), SYS49171 (64 version).

Both versions run independently from the jiffy clock, so you can use TI and TI\$ as clocks which are separate from the time displayed on the screen.

Because the jiffy clock does not keep correct time when information is being written to or read from the cassette, the 64 version of Time Clock reads a TOD clock, which is not affected by tape.

The 64 version counts in tenths of seconds, the VIC version in sixtieths. The VIC program also uses the function keys. Press f1 to stop the clock, f3 to start the clock, f5 to clear the clock, and f7 to set the time. With these keys, the program can be used as a computerized stopwatch.

The VIC version is stored in the cassette buffer, so you must avoid cassette operations while running the program. RUN/STOP-RESTORE allows you to save or load from tape, but you'll lose the clock function.

See program listings on page 195. 

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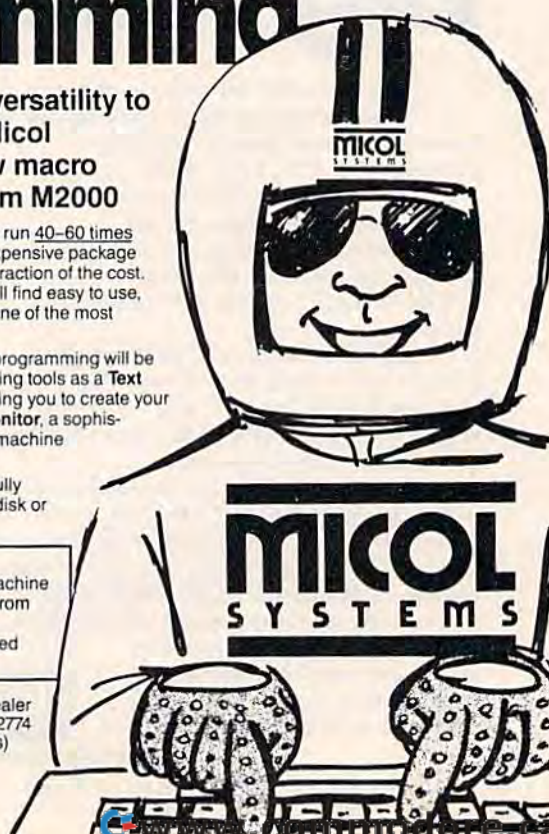
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Cassette Index

Paul N. Peasley

If you're a tape user, here's a short program that will help you organize each of your tapes by creating a built-in index. For the VIC or 64.

If you're tired of accumulating a lot of small pieces of paper with lists of each tape's files, "Cassette Index" might be a worthwhile alternative. This program offers a built-in index for each side of each cassette—a list of the contents and the approximate locations for each of the programs.

Up To 21 Programs Per Tape

If you've glanced ahead at the program listing, you'll notice that it's very short. However, before you start typing it in, be sure to read the instructions so you can use the program properly. There's a bit of extra work up front, but you'll find the payoff is well worth the effort.

First, turn on your VIC (any expansion) or 64 and type in the program, but pause when you get to the DATA statements (beginning with line 39). These statements will contain the actual names and locations (counter readings) for your programs. Note that the program names and counter readings are entered in pairs, separated by a comma, and that the entries PROGRAM NAME, COUNTER are used in the DATA statements to separate each set of eight pairs. The program allows you to catalog up to 21 programs on one tape.

Continue typing in the program until it's complete. (Include the sample DATA statements as listed.) Next, save it as the first program on a blank cassette, press STOP on the Datassette, and type RUN. If you discover any typing errors, correct them, and again save the program as the first on your tape. (From this point on, we'll refer to this tape with Cassette Index as the *destination* tape, since it will be the tape to which your programs will be saved. The tapes from which we

get the programs we'll call the *source* tape.)

Since you will be copying programs from one tape to another, you might want to stop and think about how you want to organize the new tapes. Perhaps you could put all arcade-type games on one tape, adventure games on another, and programming utilities on yet another. Since it's easier to get to the first program on a tape, you should think about starting with the programs you use most, your favorites. When you have a rough plan, you can proceed.

Next, remove the destination tape (do not rewind it, leave the tape positioned just after the indexer program). Enter NEW, place the source tape in the Datassette, and load a program into memory. At the READY prompt, remove the source tape and insert the destination tape. Reset the counter to 000. Now save the program in memory to the destination tape.

The next step is to write on a sheet of paper the program name and the length (the counter reading after the save is completed). A typical example might look like:

PROGRAM NAME	LENGTH
Ramtest	009

For each program you wish to save on the rest of the source tape, follow the procedures we've just outlined, making sure to reset the tape counter to zero before saving each program on the destination tape.

A Little Redundancy

The remaining steps may seem a bit tedious, but if you've kept a manual log of your tape contents, you've done most of this procedure already. One more bit of repetition, however, will result in automated tape files and more than make up for any extra time spent now.

On your sheet of paper, next to Program Name and Length, enter a new heading to the right called Counter Reading. For the first program listed, enter 000. Then add the length of this first program and enter the result under Counter Reading for the next program. For

example, if the first program was 009 in length, you should enter $000 + 009 = 009$ for the *second* program's counter reading. When you've manually calculated all the counter reading values for each program, you'll notice one value left over at the end without an accompanying program name. This reading is the tape location where the next program will be saved. Assign this blank filename the temporary name of *NEXT PRG*.

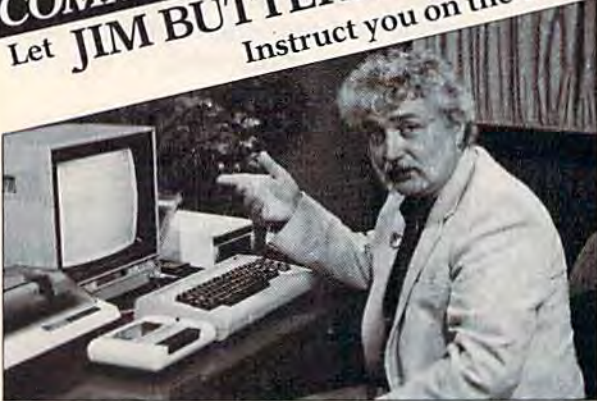
When you've saved as many programs as you wish, put the destination tape into the Datassette and rewind it to the beginning. Enter NEW, then load the Cassette Index program. When loading is completed, press STOP on the recorder and LIST Cassette Index to the first DATA statement (line 39). Using the list on your sheet of paper, change DUMMY NAME01 to the name of your first program (insert or delete characters as necessary). Because the first program begins at counter reading 000, this will remain unchanged in the DATA statement as written.

Next, change DUMMY NAME02 to the name of the next program on your list, and change the 000 reading after this name to the correct value as shown on your list. Continue modifying the DATA statements in this manner using the information on your list.

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The Payoff

After completing all the DATA statement changes, rewind the destination tape to the beginning and save the newly modified Cassette Index. At the READY prompt, type RUN and follow the directions on your screen. To add more programs to Cassette Index and the tape:

1. Load Cassette Index (destination tape).
2. Reset the program counter to 000.
3. Determine the program name and counter reading for the last program saved on the cassette.
4. FAST FORWARD to that reading, then press STOP on the recorder.
5. Enter VERIFY "program name" and press RETURN. (The computer will read, but not load the program. This technique positions the tape at the next location available for saving a program. Ignore the ?VERIFY ERROR message.)
6. Make a note of this (beginning) counter reading.
7. Remove the destination tape, but *do not* rewind it.
8. Insert the source tape and load the program to be added to the destination tape. Make a note of the program name.
9. When loading is complete, make a note of the final counter reading.
10. Insert the destination tape (with Cassette Index), but *do not* rewind it.
11. Save the program to the destination tape.
12. Rewind the destination tape to the beginning.
13. Enter NEW, then load Cassette Index, already on the tape.
14. LIST the DATA statement containing the program name (step 3).
15. Change the next program name to the name of the program you added to the cassette.
16. Change the counter reading value to the value of the beginning counter reading you noted in step 6.
17. Change the counter reading value for the next (dummy) program to the value of the final counter reading which you noted in step 9.
18. Rewind the tape.
19. Save the newly modified Cassette Index at the beginning of the tape.
20. VERIFY this save.

If you'd rather not type in the program, send \$3, a self-addressed, stamped mailer, and a blank tape to:

Paul N. Peasley
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See program listing on page 198. 

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Disk/Tape Backup

N. A. Marshall

If you have a Datassette and disk drive, this program can provide extra security by doing an automatic backup of files from disk to tape or vice versa. For the VIC (with 8K or more expansion) and 64.

Most all computer owners have at least once become exasperated with a lost program or one that refuses to load. "I should have backed it up" is a common refrain. It can be a frustrating experience. "Disk/Tape Backup" is a security utility for those with tape and disk drives. It's a two-phase—backup and restore—program that handles sequential and program files. The backup phase, or process, is for disk to tape; the restore phase is for tape to disk.

At the start of the backup process, the program saves itself as the first program on the tape. This ensures that there is a copy for restoring files later. During backup, the program dates the disk in a file called SYS DATE. It also writes the time and date and a directory of all files to be processed onto the tape.

Selecting Disk Files

Before dating the disk, the program asks if all files are to be processed, and the tape size in minutes. It uses the tape size information in deciding when to call for another cassette.

If all files are to be processed, the program reads the directory, lists it, and puts it into a table. If only selected files are to be processed, the program reads the directory, displays each filename and asks if it is to be processed. The files you selected are then put in the table. When the directory is finished, the table is sorted and the backup commences. This process can take a couple of hours because of the speed of the tape drive.

Program Variables

BH	Number of bytes that tape file header uses (300)
BD	Number of bytes per disk block (256)
BK	Block number
BM	Number of bytes per half minute of tape (840)
BO	Border address (53280)
DA	Dash
DIR	Directory file number (8)
FP	Disk file file number (5)
K0	Constant 0
K1	Constant 1
K2	Constant 2
K3	Constant 3
K4	Constant 4
LN()	Number of blocks in each file
NB	Number of bytes written
NC	Tape record size
NE	Number of equal characters
NF	Number of files
PS	Size of DTB in bytes (approx. 8000)
SP	Space (32)
TB	Tape size in bytes
TM	Tape size in minutes
AF\$	All switch
AN\$	Normal/abnormal switch
BR\$	Backup/restore switch
CO\$	CHR\$(0)
CO\$	Comma
DA\$	Date
DN\$	Disk name
FM\$	Name in bring down procedure
NA\$()	Names of files to be processed
RC\$	Record code
SP\$	Spaces
TS()	Types of files
TY\$()	File types for files to be processed
VN\$	Version (2)

During the backup, typing a P when prompted causes the program to stop and ask if you wish to quit. Press Q to close all files and end the run.

The Restore Phase

The second phase, restoring, is similar in operation to the backup phase. The process is similar,

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but direction is reversed. It backs up from tape to disk. Be careful, files on disk will be replaced by files of the same name from tape. Before the restore starts, the program offers to reformat the disk, so a brand new unformatted disk will work just fine. Program design is straightforward, and screen instructions and prompts should be clear even to beginners.

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See program listing on page 199. 

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Now, it depends, as it always did, on you. As we move closer to Election Day, let's all remember: one vote does make a difference.

Leonard H. Goldenson
Chairman of the Board

A handwritten signature in dark ink that reads "Leonard H. Goldenson".



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NEWS & PRODUCTS

More 64 Memory

Mosaic Electronics is introducing *Access-M*, a memory expansion system for the Commodore 64 which gives the computer access to 64K or 128K of RAM through bank-switching techniques.

The system is based on Mosaic's "scanning RAM" technology, called *RAMSCAN*, which can access any position in the *Access-M* memory through a memory window at \$C000. Programs and data of any length can be accessed through this 4K window. Or the 4K block can be split into two 2K windows. *RAMSCAN* allows BASIC and machine language programs to be stacked through the normal \$C000 address simultaneously and accessed immediately.

The *RAMSCAN* circuit resides on a custom chip, *MCHIP*, and supports *MDISK*, a RAM disk package. *MDISK* is accessed with normal BASIC commands or Kernal calls, and operates without interfering with other programs.

Access-M is available in versions with 64K or 128K. Future enhancements will include a one-megabyte memory expander with an independent power supply, so data is not lost when the computer is turned off.

Telephone Number Correction

Note: The telephone number published with the News and Products announcement for HyTech in the August issue of *COMPUTE!'s GAZETTE* is not the number for that company or for any private business. The number used is that of an agency of the federal government and was erroneously supplied to *COMPUTE!* Publications.

35 New BASIC Commands For VIC-20

Air Software has announced *Magic BASIC*, a software extension to VIC-20 BASIC which adds 35 new commands.

The program loads into VIC-20s with 10K or more of free memory, and uses about 7K of memory for the high-resolution screen and the machine language routines added to VIC BASIC.

Among the routines are *TRACE* and variable *DUMP*, as well as a set of graphics com-

mands for plotting on a 176 × 160 pixel screen. The graphics commands include *SHAPE*, which allows the use of custom characters or normal VIC characters on the high-resolution screen.

The custom character set can be located anywhere in memory, and can be longer than 255 characters. The program is not copy-protected.

Available on cassette, *Magic BASIC* retails for \$24.95.

Air Software
P.O. Box 1109
Stockbridge, MA 01262
(413) 298-4943

Home Information/Telecommunications System For 64

Chemical Bank has announced that its *PRONTO* home information and banking system is now compatible with the Commodore 64.

The system works on a 64, modem, and *PRONTO* software, allowing subscribers to perform such tasks as bill paying, transferring funds, determining bank balances, tracking a budget, and balancing checkbooks.

In addition, subscribers can

send electronic mail to other PRONTO subscribers, and can access certain information services available through the system, such as economic and business briefs, tax guides, magazine articles, and interest rates.

PRONTO is available for a \$12 per month service charge, which includes the software.

*Chemical Bank
Metropolitan Division
52 Broadway
New York, NY 10004
1-800-782-1100*

New Peripherals For VIC And 64

Maxtron has introduced several new peripherals for the VIC and 64: a printer interface, a dot-matrix printer, a power supply, a cassette drive, and speech synthesizer.

The Maxprint+G printer interface (\$89.95) plugs into the serial port. It translates from serial-Commodore ASCII to Centronics parallel true ASCII. No modifications or extra cables are required.

The Maxprint-80 (\$349) prints bi-directionally at 80 cps, with an 8 × 9 square dot matrix, user-selectable character and graphic styles, and sprocket or friction feed.

The DC-1 cassette drive (\$59.95) includes a built-in counter, SAVE indicator, PAUSE, and AUTO STOP.

The Chatterbox (\$59.95)

speech synthesizer for the VIC-20 is a cartridge which produces recognizable words through a TV/monitor speaker. The power supply retails for \$35.

*Maxtron
1825A Durfee Avenue
South El Monte, CA 91733
(818) 350-5706*

New 64 Terminal Software

Versaterm II, a terminal software program for the Commodore 64, has been announced by Electrosharp.

Data can be downloaded to a 43,000-byte buffer or directly to disk or printer. Downloaded image files and BASIC listings can then be converted into operable programs.

Phone numbers can be stored, recalled, and automatically dialed when used with the 1650 Automodem. If the line is busy, the number can be automatically redialed until a connection is made.

Versaterm II allows the user to store, retrieve, and send up to 25 keywords or phrases with a single keystroke.

The program is available on tape or disk for \$34.95.

*Electrosharp
1981 Sandalwood Drive
Santa Maria, CA 93455
(805) 922-4095*

Speed Reading On The 64

Evelyn Wood Reading Dynamics, a familiar name in the field of reading skills and comprehension, has introduced software to teach those skills on the Commodore 64.

Produced and distributed by Timeworks, Inc., the *Evelyn Wood Dynamic Reader* program includes exercises and comprehension quizzes aimed at improving both reading speed and comprehension.

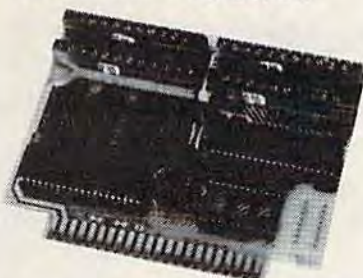
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*Timeworks, Inc.
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Deerfield, IL 60015
(312) 291-9200*

COMPUTE!'s GAZETTE welcomes announcements of new products for VIC-20 and Commodore 64 computers. Please send press releases, photos, and product samples (if available) well in advance to: Selby Bateman, Features Editor, COMPUTE!'s GAZETTE, P.O. Box 5406, Greensboro, NC 27403.

New product releases are selected from submissions for reasons of timeliness, uniqueness, available space, and general interest. Readers should be aware that News & Products often contains an edited version of material submitted by vendors. We are unable to vouch for its accuracy at time of publication. ©

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A Beginner's Guide To Typing In Programs

What Is A Program?

A computer cannot perform any task by itself. Like a car without gas, a computer has *potential*, but without a program, it isn't going anywhere. Most of the programs published in *COMPUTE!'s GAZETTE* for Commodore are written in a computer language called BASIC. BASIC is easy to learn and is built into all VIC-20s and Commodore 64s.

BASIC Programs

Each month, *COMPUTE!'s GAZETTE* for Commodore publishes programs for both the VIC and 64. To start out, type in only programs written for your machine, e.g., "VIC Version" if you have a VIC-20. Later, when you gain experience with your computer's BASIC, you can try typing in and converting certain programs from another computer to yours.

Computers can be picky. Unlike the English language, which is full of ambiguities, BASIC usually has only one "right way" of stating something. Every letter, character, or number is significant. A common mistake is substituting a letter such as O for the numeral 0, a lowercase l for the numeral 1, or an uppercase B for the numeral 8. Also, you must enter all punctuation such as colons and commas just as they appear in the magazine. Spacing can be important. To be safe, type in the listings *exactly* as they appear.

Braces And Special Characters

The exception to this typing rule is when you see the braces, such as "{DOWN}". Anything within a set of braces is a special character or characters that cannot easily be listed on a printer. When you come across such a special statement, refer to "How To Type In *COMPUTE!'s GAZETTE* Programs."

About DATA Statements

Some programs contain a section or sections of DATA statements. These lines provide information needed by the program. Some DATA statements contain actual programs (called machine language); others contain graphics codes. These lines are especially sensitive to errors.

If a single number in any one DATA statement is mistyped, your machine could "lock up," or "crash." The keyboard and STOP key may seem "dead," and the screen may go blank. Don't panic - no damage is done. To regain control, you have

to turn off your computer, then turn it back on. This will erase whatever program was in memory, so *always SAVE a copy of your program before you RUN it*. If your computer crashes, you can LOAD the program and look for your mistake.

Sometimes a mistyped DATA statement will cause an error message when the program is RUN. The error message may refer to the program line that READs the data. *The error is still in the DATA statements, though.*

Get To Know Your Machine

You should familiarize yourself with your computer before attempting to type in a program. Learn the statements you use to store and retrieve programs from tape or disk. You'll want to save a copy of your program, so that you won't have to type it in every time you want to use it. Learn to use your machine's editing functions. How do you change a line if you made a mistake? You can always retype the line, but you at least need to know how to backspace. Do you know how to enter inverse video, lowercase, and control characters? It's all explained in your computer's manuals.

A Quick Review

1. Type in the program a line at a time, in order. Press RETURN at the end of each line. Use backspace or the back arrow to correct mistakes.
2. Check the line you've typed against the line in the magazine. You can check the entire program again if you get an error when you RUN the program.
3. Make sure you've entered statements in braces as the appropriate control key (see "How To Type *COMPUTE!'s GAZETTE* Programs" elsewhere in the magazine).

*We regret that we are not able to respond to individual inquiries about programs, products, or services appearing in *COMPUTE!'s GAZETTE* for Commodore due to increasing publication activity. On those infrequent occasions when a published program contains a typo, the correction will appear in the magazine, usually within eight weeks. If you have specific questions about items or programs which you've seen in *COMPUTE!'s GAZETTE* for Commodore, please send them to Gazette Feedback, P.O. Box 5406, Greensboro, NC 27403.*

How To Type In COMPUTE!'s GAZETTE Programs

Many of the programs which are listed in COMPUTE!'s GAZETTE contain special control characters (cursor control, color keys, inverse video, etc.). To make it easy to know exactly what to type when entering one of these programs into your computer, we have established the following listing conventions.

Generally, any VIC-20 or Commodore 64 program listings will contain words within braces which spell out any special characters: {DOWN} would mean to press the cursor down key. {5 SPACES} would mean to press the space bar five times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing the other key), the key would be underlined in our listings. For example, S would mean to type the S key while holding the shift key. This would appear on your screen as a "heart" symbol. If you find an underlined key enclosed in braces (e.g., {10 N}), you should type the key as many times as indicated (in our example, you would enter ten shifted N's).

If a key is enclosed in special brackets, {key}, you should hold down the *Commodore key* while pressing the key inside the special brackets. (The Commodore key is the key in the lower left corner of the keyboard.) Again, if the key is preceded by a number, you should press the key as many times as necessary.

Rarely, you'll see a solitary letter of the alphabet enclosed in braces. These characters can be entered on the Commodore 64 by holding down

the CTRL key while typing the letter in the braces. For example, {A} would indicate that you should press CTRL-A. You should never have to enter such a character on the VIC-20, but if you do, you would have to leave the quote mode (press RETURN and cursor back up to the position where the control character should go), press CTRL-9 (RVS ON), the letter in braces, and then CTRL-0 (RVS OFF).

About the *quote mode*: You know that you can move the cursor around the screen with the CRSR keys. Sometimes a programmer will want to move the cursor under program control. That's why you see all the {LEFT}'s, {HOME}'s, and {BLU}'s in our programs. The only way the computer can tell the difference between direct and programmed cursor control is the quote mode.

Once you press the quote (the double quote, SHIFT-2), you are in the quote mode. If you type something and then try to change it by moving the cursor left, you'll only get a bunch of reverse-video lines. These are the symbols for cursor left. The only editing key that isn't programmable is the DEL key; you can still use DEL to back up and edit the line. Once you type another quote, you are out of quote mode.

You also go into quote mode when you INSERT spaces into a line. In any case, the easiest way to get out of quote mode is to just press RETURN. You'll then be out of quote mode and you can cursor up to the mistyped line and fix it.

Use the following table when entering cursor and color control keys:

When You Read:	Press:	See:	When You Read:	Press:	See:	When You Read:	Press:	See:
{CLR}	SHIFT CLR/HOME		{CYN}	CTRL 4		{7}	CTRL 7	
{HOME}	CLR/HOME		{PUR}	CTRL 5		{8}	CTRL 8	
{UP}	SHIFT CRSR ↑		{GRN}	CTRL 6		{F1}		
{DOWN}	CRSR ↓		{BLU}	CTRL 7		{F2}	SHIFT F1	
{LEFT}	SHIFT CRSR ←		{YEL}	CTRL 8		{F3}		
{RIGHT}	CRSR →		{1}	CTRL 1		{F4}	SHIFT F2	
{RVS}	CTRL 9		{2}	CTRL 2		{F5}		
{OFF}	CTRL 0		{3}	CTRL 3		{F6}	SHIFT F3	
{BLK}	CTRL 1		{4}	CTRL 4		{F7}		
{WHT}	CTRL 2		{5}	CTRL 5		{F8}	SHIFT F4	
{RED}	CTRL 3		{6}	CTRL 6				

The Automatic Proofreader

"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 l 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 SAVEing 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 three lines in direct mode (without line numbers):

```
AS="PROOFREADER.T":BS="[10 SPACES]":FO
RX=1TO4:AS=AS+BS:NEXTX
FORX=886 TO 1018:AS=AS+CHR$(PEEK(X)):N
EXTX
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 and that BS contains 10 spaces.

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.

Automatic Proofreader For VIC And 64

```
100 PRINT"[CLR]PLEASE WAIT...":FORI=886TO
1018:READA:CK=CK+A:POKEI,A:NEXT
110 IF CK<>17539 THEN PRINT"[DOWN]YOU MAD
E AN ERROR":PRINT"IN DATA STATEMENTS.
":END
120 SYS886:PRINT"[CLR][2 DOWN]PROOFREADER
ACTIVATED.":NEW
886 DATA 173,036,003,201,150,208
892 DATA 001,096,141,151,003,173
898 DATA 037,003,141,152,003,169
904 DATA 150,141,036,003,169,003
910 DATA 141,037,003,169,000,133
916 DATA 254,096,032,087,241,133
922 DATA 251,134,252,132,253,008
928 DATA 201,013,240,017,201,032
934 DATA 240,005,024,101,254,133
940 DATA 254,165,251,166,252,164
946 DATA 253,040,096,169,013,032
952 DATA 210,255,165,214,141,251
958 DATA 003,206,251,003,169,000
964 DATA 133,216,169,019,032,210
970 DATA 255,169,018,032,210,255
976 DATA 169,058,032,210,255,166
982 DATA 254,169,000,133,254,172
988 DATA 151,003,192,087,208,006
994 DATA 032,205,189,076,235,003
1000 DATA 032,205,221,169,032,032
1006 DATA 210,255,032,210,255,173
1012 DATA 251,003,133,214,076,173
1018 DATA 003
```


MLX Machine Language Entry Program

For Commodore 64

Charles Brannon, Program Editor

MLX is a labor-saving utility that allows almost fail-safe entry of machine language programs published in *COMPUTE!*. You need to know nothing about machine language to use MLX—it was designed for everyone.

MLX is a new way to enter long machine language (ML) programs with a minimum of fuss. MLX lets you enter the numbers from a special list that looks similar to BASIC DATA statements. It checks your typing on a line-by-line basis. It won't let you enter illegal characters when you should be typing numbers. It won't let you enter numbers greater than 255 (forbidden in ML). It won't let you enter the wrong numbers on the wrong line. In addition, MLX creates a ready-to-use tape or disk file. You can then use the LOAD command to read the program into the computer, as with any program:

```
LOAD "filename",1,1 (for tape)
LOAD "filename",8,1 (for disk)
```

To start the program, you enter a SYS command that transfers control from BASIC to machine language. The starting SYS number always appears in the appropriate article.

Using MLX

Type in and save MLX (you'll want to use it in the future). When you're ready to type in an ML program, run MLX. MLX asks you for two numbers: the starting address and the ending address. These numbers are given in the article accompanying the ML program.

You'll see a prompt corresponding to the starting address. The prompt is the current line you are entering from the listing. It increases by six each time you enter a line. That's because each line has seven numbers—six actual data numbers plus a *checksum number*. The checksum verifies that you typed the previous six numbers correctly. If you enter any of the six numbers wrong, or enter the checksum wrong, the computer rings a buzzer and prompts you to reenter the line. If you enter it correctly, a bell tone sounds and you continue to the next line.

MLX accepts only numbers as input. If you make a typing error, press the INST/DEL key; the entire number is deleted. You can press it as many times as necessary back to the start of the line. If you enter three-digit numbers as listed, the computer automatically prints the comma and goes on to accept the next number. If you enter less than three digits, you can press either the SPACE bar or RETURN key to advance to the next number. The checksum automati-

cally appears in inverse video for emphasis.

To simplify your typing, MLX redefines part of the keyboard as a numeric keypad:

U	I	O		7	8	9	
H	J	K	L	become 0	4	5	6
M	,	.			1	2	3

MLX Commands

When you finish typing an ML listing (assuming you type it all in one session) you can then save the completed program on tape or disk. Follow the screen instructions. If you get any errors while saving, you probably have a bad disk, or the disk is full, or you've made a typo when entering the MLX program itself.

You don't have to enter the whole ML program in one sitting. MLX lets you enter as much as you want, save it, and then reload the file from tape or disk later.

MLX recognizes these commands:

SHIFT-S: Save	SHIFT-N: New Address
SHIFT-S: Load	SHIFT-D: Display

When you enter a command, MLX jumps out of the line you've been typing, so we recommend you do it at a new prompt. Use the Save command to save what you've been working on. It will save on tape or disk, as if you've finished, but the tape or disk won't work, of course, until you finish the typing. Remember what address you stop at. The next time you run MLX, answer all the prompts as you did before, then insert the disk or tape. When you get to the entry prompt, press SHIFT-L to reload the partly completed file into memory. Then use the New Address command to resume typing.

To use the New Address command, press SHIFT-N and enter the address where you previously stopped. The prompt will change, and you can then continue typing. Always enter a New Address that matches up with one of the line numbers in the special listing, or else the checksum won't work. The Display command lets you display a section of your typing. After you press SHIFT-D, enter two addresses within the line number range of the listing. You can abort the listing by pressing any key.

What if you forgot where you stopped typing? Use the Display command to scan memory from the beginning to the end of the program. When you reach the end of your typing, the lines will contain a random pattern of numbers. When you see the end of your typing, press any key to stop the listing. Use the New Address command to continue typing from the proper location.

See program listing on page 186.

Bug-Swatter:

Modifications And Corrections

• "Vocab Builder" (October) was written to run on both a VIC and 64, with either a disk or tape drive. Several tape users have written to say the program does not save or load test items.

There are two places in the program where the disk error channel is checked. When the program was tested, it worked with tape, but only because a disk drive was also connected to the computer. If you own a Datassette, but not a disk drive, delete lines 572, 575, 902, and 905. Then change the following lines:

```
570 OPEN1,1,1,N$
900 OPEN1,1,0,N$
```

• Both VIC and 64 versions of "Beekeeper" (July) work as listed, but they suffer from a subtle programming error. Reader Bob Lynch became proficient enough to reach the nineteenth level (a feat unmatched by our testers) and got an OUT OF MEMORY error.

This condition can be traced to line 410, where the swarm level is updated. A GOTO jumps out of the subroutine in lines 300-480. The GOSUBs build up on the stack until level 19, where the computer thinks it is nineteen subroutines into the program. The stack fills up and the game stops. If you think you can reach level 19, make the following changes (both versions).

First, at the end of line 410, change GOTO45 to RETURN. Then, LIST lines 150 and 210, add a colon and the following line (immediately after the GOSUB):

```
ON(I=4001)+2)GOTO45,xxx
```

In place of xxx put the next line (160 or 220). Finally, LIST lines 100 and 270. In line 100, eliminate the GOTO after the GOSUB, add the ON-GOTO line above, with the number 120 in lieu of xxx. In line 270, delete GOTO50, add the ON-GOTO after the GOSUB, with the number 50 instead of xxx. These changes will allow you to go beyond swarm 19.

• The 64 version of "The Tomb" (October) works as listed, except the high score remains at zero. Line 4010 is the culprit, and can be fixed by deleting the less than (<) character. The line should read IF SC>PH THEN PH=SC. Thanks to Reader Jim Willman for this correction. **66**

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(Article on page 118.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Requires MLX (see instructions in article).

Program 1: Tables Setup

```
2049 :011,008,010,000,158,050,238
2055 :048,054,049,000,000,000,158
2061 :024,169,170,105,022,133,124
2067 :253,169,008,105,053,133,228
2073 :254,162,000,142,102,008,181
2079 :169,170,133,251,169,008,163
2085 :133,252,169,000,168,145,136
2091 :251,230,251,166,251,224,136
2097 :000,208,002,230,252,166,139
2103 :251,228,253,208,235,166,116
2109 :252,228,253,208,229,169,120
2115 :001,162,008,160,001,032,175
2121 :186,255,169,006,162,103,186
2127 :160,008,032,189,255,169,124
2133 :109,133,251,169,008,133,120
2139 :252,166,253,164,254,169,069
2145 :251,032,216,255,000,000,083
2151 :084,065,066,076,069,083,034
2157 :001,008,049,058,085,080,134
2163 :048,049,044,080,044,087,211
2169 :000,104,002,104,000,115,190
2175 :001,115,255,255,001,000,242
2181 :001,000,001,000,002,000,137
2187 :000,121,002,121,000,133,004
2193 :001,133,000,139,003,139,048
2199 :001,000,000,001,000,000,153
2205 :049,000,000,000,000,000,206
2211 :048,000,000,000,000,000,211
2217 :049,000,013,013,013,013,014
```

Program 2: C/G Bulletin Board, Part 1

Note: See article before typing in. Part 2 will be published next month.

```
2049 :011,008,010,000,158,050,238
2055 :048,054,049,000,000,000,158
2061 :120,169,064,141,020,003,018
2067 :169,015,141,021,003,088,200
2073 :165,001,041,254,133,001,108
2079 :169,147,032,210,255,169,245
2085 :013,032,210,255,169,006,210
2091 :141,032,208,169,001,141,223
2097 :033,208,162,058,141,003,142
2103 :065,173,024,208,009,002,024
2109 :141,024,208,032,202,020,176
2115 :169,006,141,147,002,032,052
2121 :078,008,076,115,008,162,008
2127 :000,142,161,069,162,162,007
```

```
2133 :134,251,162,069,134,252,063
2139 :172,161,069,169,000,145,039
2145 :251,032,130,038,174,161,115
2151 :069,224,060,208,239,166,045
2157 :252,224,087,144,233,096,121
2163 :032,091,038,169,032,141,106
2169 :043,025,169,069,141,044,100
2175 :025,032,034,025,032,004,023
2181 :038,162,000,142,014,071,048
2187 :032,076,038,032,176,025,006
2193 :173,242,071,201,020,208,036
2199 :019,174,014,071,224,000,141
2205 :240,236,206,014,071,173,073
2211 :242,071,032,210,255,076,025
2217 :139,008,201,013,240,009,011
2223 :141,012,071,032,210,255,128
2229 :076,139,008,032,210,255,133
2235 :032,174,045,174,237,071,152
2241 :224,000,208,174,173,012,216
2247 :071,201,049,208,008,162,130
2253 :000,142,005,070,076,008,250
2259 :009,162,001,142,005,070,088
2265 :173,012,071,201,050,208,164
2271 :024,162,009,142,160,069,021
2277 :162,048,142,013,065,142,033
2283 :194,067,142,226,067,162,069
2289 :001,142,252,069,076,008,021
2295 :009,173,012,071,201,051,252
2301 :240,009,032,240,037,032,075
2307 :048,046,076,115,008,032,072
2313 :095,024,032,157,045,032,138
2319 :204,255,169,003,162,008,048
2325 :160,000,032,186,255,169,055
2331 :006,162,103,160,067,032,045
2337 :189,255,169,000,162,176,216
2343 :160,103,032,213,255,162,196
2349 :000,142,161,069,032,204,141
2355 :255,032,048,046,076,099,095
2361 :017,162,000,142,023,071,216
2367 :032,048,046,032,091,038,094
2373 :169,137,141,043,025,169,241
2379 :066,141,044,025,032,034,161
2385 :025,032,204,045,174,237,030
2391 :071,224,000,208,097,162,081
2397 :001,142,249,071,169,167,124
2403 :141,043,025,169,066,141,172
2409 :044,025,032,034,025,032,041
2415 :076,038,032,176,025,173,119
2421 :242,071,201,049,208,003,123
2427 :076,186,015,201,050,208,091
2433 :184,169,019,141,102,072,048
2439 :032,112,030,169,049,141,156
2445 :016,071,169,048,141,017,091
2451 :071,141,018,071,141,019,096
2457 :071,162,002,142,014,071,103
2463 :174,014,071,189,094,068,001
2469 :158,019,072,238,014,071,225
2475 :174,014,071,224,007,144,037
2481 :237,174,014,071,169,027,101
2487 :157,019,072,076,248,011,254
2493 :162,000,142,249,071,032,077
2499 :112,030,169,000,141,213,092
2505 :064,141,214,064,141,102,159
2511 :072,169,002,162,002,160,006
2517 :255,032,186,255,169,001,087
2523 :162,147,160,002,032,189,143
2529 :255,032,192,255,032,102,069
2535 :027,162,000,142,102,072,224
2541 :142,003,070,169,032,141,026
2547 :003,221,169,000,141,001,010
```


2553 : 221, 173, 001, 221, 041, 008, 146
 2559 : 201, 000, 208, 247, 169, 032, 088
 2565 : 141, 001, 221, 173, 003, 221, 253
 2571 : 041, 251, 141, 003, 221, 173, 073
 2577 : 001, 221, 041, 016, 201, 000, 241
 2583 : 208, 239, 032, 204, 255, 162, 099
 2589 : 002, 032, 198, 255, 032, 207, 243
 2595 : 255, 201, 019, 208, 006, 141, 097
 2601 : 102, 072, 076, 053, 010, 201, 043
 2607 : 022, 208, 003, 141, 102, 072, 083
 2613 : 032, 204, 255, 162, 002, 032, 228
 2619 : 201, 255, 169, 002, 032, 210, 160
 2625 : 255, 032, 210, 255, 174, 102, 069
 2631 : 072, 224, 000, 240, 205, 162, 206
 2637 : 000, 142, 003, 070, 032, 091, 159
 2643 : 038, 160, 000, 132, 251, 132, 028
 2649 : 252, 132, 253, 140, 150, 072, 064
 2655 : 142, 060, 087, 132, 254, 032, 034
 2661 : 064, 038, 162, 001, 142, 023, 019
 2667 : 071, 162, 000, 138, 142, 178, 030
 2673 : 002, 174, 178, 002, 157, 016, 130
 2679 : 071, 157, 001, 072, 238, 178, 068
 2685 : 002, 174, 178, 002, 224, 006, 199
 2691 : 208, 237, 032, 112, 030, 169, 151
 2697 : 174, 141, 043, 025, 169, 061, 238
 2703 : 141, 044, 025, 032, 034, 025, 188
 2709 : 032, 234, 020, 032, 091, 038, 084
 2715 : 162, 000, 142, 014, 071, 032, 064
 2721 : 102, 025, 032, 076, 038, 032, 210
 2727 : 176, 025, 173, 242, 071, 201, 031
 2733 : 020, 240, 066, 201, 013, 240, 185
 2739 : 027, 174, 014, 071, 157, 016, 126
 2745 : 071, 032, 189, 022, 238, 014, 239
 2751 : 071, 174, 014, 071, 224, 005, 238
 2757 : 144, 223, 162, 000, 142, 020, 120
 2763 : 071, 076, 233, 010, 174, 014, 013
 2769 : 071, 224, 000, 208, 003, 076, 023
 2775 : 203, 025, 173, 016, 071, 201, 136
 2781 : 049, 208, 009, 032, 091, 038, 136
 2787 : 032, 095, 024, 076, 002, 011, 211
 2793 : 238, 150, 072, 032, 240, 037, 234
 2799 : 076, 149, 010, 174, 014, 071, 221
 2805 : 224, 000, 240, 173, 206, 014, 078
 2811 : 071, 032, 189, 022, 076, 166, 039
 2817 : 010, 162, 000, 142, 178, 002, 239
 2823 : 174, 178, 002, 189, 016, 071, 125
 2829 : 201, 000, 240, 009, 157, 001, 109
 2835 : 072, 238, 178, 002, 076, 007, 080
 2841 : 011, 032, 213, 029, 174, 213, 185
 2847 : 064, 224, 000, 208, 010, 174, 199
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 5529 :002,070,142,001,070,076,002
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 5583 :213,080,076,165,021,201,195
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 5595 :201,133,208,005,169,000,167
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 5607 :173,012,071,201,000,162,082
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 5637 :012,071,032,210,255,173,246
 5643 :012,071,201,034,208,004,029
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 5661 :000,142,213,080,032,204,188
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 5763 :141,242,071,076,175,022,090
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 5775 :198,255,032,228,255,141,228
 5781 :242,071,201,000,208,020,123
 5787 :174,003,070,224,001,208,067
 5793 :003,076,251,022,032,222,255
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 5841 :002,032,201,255,173,242,090
 5847 :071,032,210,255,032,204,251
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 5865 :032,204,255,162,001,032,151
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 5877 :242,071,032,204,255,096,121
 5883 :169,056,141,043,025,169,086
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 8169 :029,240,003,076,169,031,013
 8175 :173,050,072,201,051,144,162
 8181 :017,240,003,076,169,031,013
 8187 :173,049,072,201,053,144,175
 8193 :005,240,003,076,169,031,013
 8199 :032,241,028,174,090,072,132
 8205 :224,000,240,011,032,240,248
 8211 :037,162,000,142,090,072,010
 8217 :076,146,030,238,161,069,233
 8223 :174,161,069,189,049,072,233
 8229 :201,000,240,243,041,015,009
 8235 :141,056,072,174,161,069,204
 8241 :224,004,240,084,238,161,232
 8247 :069,174,161,069,189,049,254
 8253 :072,041,015,010,141,054,138
 8259 :072,010,010,024,109,056,092
 8265 :072,109,054,072,141,056,065
 8271 :072,174,161,069,224,004,015
 8277 :240,050,032,073,030,032,030
 8283 :159,056,174,161,069,224,166
 8289 :004,240,037,032,073,030,001
 8295 :032,201,056,032,220,056,188
 8301 :174,161,069,224,004,240,213
 8307 :021,032,073,030,162,010,187
 8313 :142,025,070,032,201,056,135
 8319 :206,025,070,174,025,070,185
 8325 :224,000,208,243,173,199,156
 8331 :103,205,057,072,144,018,226
 8337 :240,003,076,169,031,173,069
 8343 :198,103,205,056,072,144,161
 8349 :005,240,003,076,169,031,169
 8355 :056,173,056,072,237,198,187
 8361 :103,141,246,103,173,057,224
 8367 :072,237,199,103,141,247,150
 8373 :103,024,169,115,109,247,180
 8379 :103,141,005,104,173,246,191
 8385 :103,141,004,104,024,173,230
 8391 :246,103,141,002,104,173,200
 8397 :247,103,141,003,104,014,049
 8403 :002,104,046,003,104,024,238
 8409 :169,104,109,003,104,141,079
 8415 :003,104,032,091,038,032,011
 8421 :048,046,169,220,141,043,128
 8427 :025,169,064,141,044,025,191

8433 :032,034,025,169,251,141,125
 8439 :043,025,169,103,141,044,004
 8445 :025,032,034,025,032,048,193
 8451 :046,032,237,054,169,068,097
 8457 :133,251,173,003,104,133,038
 8463 :252,172,002,104,140,161,078
 8469 :069,177,251,141,213,064,168
 8475 :032,130,038,172,161,069,117
 8481 :177,251,141,214,064,032,144
 8487 :237,054,169,252,133,251,111
 8493 :173,005,104,133,252,172,116
 8499 :004,104,140,161,069,177,194
 8505 :251,141,094,072,032,238,117
 8511 :045,174,010,070,224,000,074
 8517 :240,080,169,161,133,251,079
 8523 :141,143,029,169,072,133,250
 8529 :252,141,144,029,032,120,031
 8535 :029,172,094,072,169,255,110
 8541 :145,251,032,032,030,032,103
 8547 :032,030,032,204,255,162,046
 8553 :001,032,201,255,160,000,242
 8559 :140,161,069,172,161,069,115
 8565 :177,251,032,210,255,032,050
 8571 :130,038,174,161,069,224,151
 8577 :253,144,238,169,001,032,198
 8583 :195,255,032,037,046,162,094
 8589 :000,142,010,070,032,095,234
 8595 :024,076,154,033,032,105,059
 8601 :034,169,140,141,043,025,193
 8607 :169,065,141,044,025,032,123
 8613 :034,025,032,004,038,032,074
 8619 :101,022,173,242,071,201,213
 8625 :082,240,004,201,114,208,002
 8631 :011,162,000,142,105,072,163
 8637 :032,188,028,076,146,030,177
 8643 :201,077,240,004,201,109,003
 8649 :208,008,162,000,142,105,058
 8655 :072,076,228,011,201,063,090
 8661 :208,019,032,188,028,169,089
 8667 :077,141,043,025,169,065,227
 8673 :141,044,025,032,034,025,014
 8679 :076,154,033,201,013,240,180
 8685 :066,174,023,071,224,000,027
 8691 :208,050,201,075,208,046,007
 8697 :162,001,142,010,070,162,028
 8703 :000,142,161,069,142,014,015
 8709 :071,162,004,142,023,070,221
 8715 :174,023,070,189,251,103,053
 8721 :172,014,071,153,049,072,036
 8727 :238,014,071,206,023,070,133
 8733 :174,014,071,224,004,208,212
 8739 :231,076,061,033,032,188,144
 8745 :028,032,240,037,076,154,096
 8751 :033,032,107,056,032,241,036
 8757 :028,174,090,072,224,000,129
 8763 :240,011,032,240,037,162,013
 8769 :000,142,090,072,076,146,079
 8775 :030,032,032,037,032,188,166
 8781 :028,174,196,103,236,246,036
 8787 :103,176,016,174,247,103,134
 8793 :236,197,103,144,008,162,171
 8799 :000,142,105,072,076,146,124
 8805 :030,076,182,032,162,000,071
 8811 :142,108,072,142,115,072,246
 8817 :142,236,071,142,103,072,111
 8823 :032,032,030,032,032,030,051
 8829 :032,233,022,173,242,071,130
 8835 :141,012,071,162,001,236,242
 8841 :108,072,208,003,076,201,037
 8847 :035,174,115,072,236,094,101

8853 :072,176,006,238,115,072,060
 8859 :076,125,034,162,001,142,183
 8865 :108,072,173,012,071,141,226
 8871 :103,072,032,173,037,173,245
 8877 :012,071,201,255,208,019,171
 8883 :169,230,141,043,025,169,188
 8889 :066,141,044,025,032,034,015
 8895 :025,032,048,046,076,184,090
 8901 :036,032,233,022,173,242,167
 8907 :071,141,012,071,174,105,009
 8913 :072,224,000,208,027,174,146
 8919 :023,071,224,000,240,008,013
 8925 :169,007,141,242,071,032,115
 8931 :244,036,173,012,071,141,136
 8937 :242,071,141,250,080,076,069
 8943 :017,035,032,233,022,173,239
 8949 :242,071,201,000,240,246,221
 8955 :032,173,037,032,233,022,012
 8961 :173,242,071,201,000,240,160
 8967 :246,032,173,037,032,091,106
 8973 :038,076,195,035,174,023,042
 8979 :071,224,000,240,003,032,077
 8985 :244,036,173,242,071,201,224
 8991 :048,208,014,173,024,208,194
 8997 :041,253,141,024,208,032,224
 9003 :173,037,076,059,035,173,084
 9009 :024,208,009,002,141,024,201
 9015 :208,032,173,037,032,233,002
 9021 :022,173,242,071,174,102,077
 9027 :072,224,022,208,017,173,015
 9033 :242,071,041,015,201,008,139
 9039 :176,003,076,089,035,169,115
 9045 :049,141,242,071,174,023,017
 9051 :071,224,000,240,006,173,037
 9057 :242,071,032,244,036,173,127
 9063 :242,071,041,015,141,032,133
 9069 :208,032,173,037,032,233,056
 9075 :022,173,242,071,201,000,056
 9081 :240,246,174,102,072,224,155
 9087 :022,208,017,173,242,071,092
 9093 :041,015,201,008,176,003,065
 9099 :076,147,035,169,049,141,244
 9105 :242,071,174,023,071,224,182
 9111 :000,240,006,173,242,071,115
 9117 :032,244,036,173,242,071,187
 9123 :041,015,141,033,208,032,121
 9129 :173,037,173,250,080,201,059
 9135 :048,208,017,173,103,072,028
 9141 :201,019,208,010,173,102,126
 9147 :072,201,022,208,003,076,001
 9153 :193,036,032,013,038,076,069
 9159 :125,034,173,242,071,201,021
 9165 :026,208,006,032,173,037,175
 9171 :076,184,036,173,242,071,225
 9177 :201,027,208,067,174,236,106
 9183 :071,224,000,208,017,032,007
 9189 :048,046,032,030,038,162,073
 9195 :001,142,236,071,032,173,122
 9201 :037,076,125,034,032,048,081
 9207 :046,174,236,071,224,001,231
 9213 :240,021,162,000,142,236,030
 9219 :071,032,173,037,174,105,083
 9225 :072,224,000,208,003,076,080
 9231 :125,034,076,184,036,032,246
 9237 :047,038,238,236,071,032,171
 9243 :173,037,076,125,034,162,122
 9249 :000,142,000,070,173,242,148
 9255 :071,201,018,208,008,162,195
 9261 :001,142,255,069,076,169,245
 9267 :036,201,146,208,008,162,044


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9273 :000,142,255,069,076,169,000
9279 :036,173,242,071,201,013,031
9285 :208,036,174,255,069,224,011
9291 :000,240,021,169,146,141,024
9297 :242,071,032,189,022,169,038
9303 :013,141,242,071,032,189,007
9309 :022,169,018,141,242,071,244
9315 :162,000,142,000,070,076,037
9321 :169,036,174,102,072,224,114
9327 :022,208,035,173,242,071,094
9333 :201,022,208,008,169,000,213
9339 :141,242,071,076,169,036,090
9345 :201,129,240,008,201,149,033
9351 :144,032,201,156,176,028,104
9357 :169,144,141,242,071,076,216
9363 :169,036,173,242,071,201,015
9369 :022,208,013,169,013,141,207
9375 :242,071,162,001,142,000,009
9381 :070,076,071,036,173,242,065
9387 :071,141,012,071,032,189,175
9393 :022,032,173,037,076,125,130
9399 :034,032,204,255,169,001,110
9405 :032,195,255,096,169,039,207
9411 :141,043,025,169,065,141,011
9417 :044,025,032,034,025,032,137
9423 :204,045,174,237,071,224,138
9429 :001,208,011,165,078,141,049
9435 :242,071,032,189,022,076,083
9441 :184,036,165,089,141,242,058
9447 :071,032,189,022,173,012,218
9453 :071,141,242,071,076,195,009
9459 :035,032,204,255,174,023,198
9465 :071,224,000,208,009,173,166
9471 :242,071,032,210,255,076,117
9477 :028,037,162,002,032,201,211
9483 :255,173,242,071,032,210,226
9489 :255,032,204,029,174,088,031
9495 :072,224,000,208,216,032,007
9501 :204,255,096,238,246,103,147
9507 :174,246,103,224,000,208,222
9513 :003,238,247,103,096,169,129
9519 :000,141,015,071,174,015,207
9525 :071,157,019,072,238,015,113
9531 :071,174,015,071,224,026,128
9537 :144,240,096,032,046,037,148
9543 :169,212,141,043,025,169,062
9549 :065,141,044,025,032,034,162
9555 :025,032,004,038,162,000,088
9561 :142,015,071,032,016,023,132
9567 :173,242,071,201,013,208,235
9573 :008,169,027,141,242,071,247
9579 :076,138,037,201,020,208,019
9585 :024,174,015,071,224,000,109
9591 :240,227,032,189,022,206,011
9597 :015,071,174,015,071,169,128
9603 :000,157,019,072,076,092,035
9609 :037,032,189,022,174,015,094
9615 :071,173,242,071,157,019,108
9621 :072,201,027,240,013,238,172
9627 :015,071,174,015,071,224,213
9633 :026,176,003,076,092,037,059
9639 :162,001,142,004,070,096,130
9645 :238,094,072,174,094,072,149
9651 :224,253,208,056,162,000,058
9657 :142,094,072,032,204,255,216
9663 :238,213,064,174,213,064,133
9669 :224,000,208,003,238,214,060
9675 :064,174,214,064,224,001,176
9681 :208,017,174,213,064,224,085
9687 :145,144,010,162,001,142,051

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9693 :213,064,162,000,142,214,248
9699 :064,032,032,030,032,032,193
9705 :030,162,001,032,198,255,143
9711 :096,032,048,046,169,204,066
9717 :141,043,025,169,064,141,060
9723 :044,025,032,034,025,032,187
9729 :218,023,096,169,062,141,198
9735 :242,071,032,189,022,096,147
9741 :032,091,038,169,020,141,248
9747 :043,025,169,065,141,044,250
9753 :025,032,034,025,096,032,013

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MLX

(Article on page 175.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

MLX—64 Version

```

10 REM LINES CHANGED FROM MLX VERSION 2.0
   0 ARE 750,765,770 AND 860 :rem 50
20 REM LINE CHANGED FROM MLX VERSION 2.01
   IS 300 :rem 147
100 PRINT"[CLR]";CHR$(142);CHR$(8);:PO
    KE53281,1:POKE53280,1 :rem 67
101 POKE 788,52:REM DISABLE RUN/STOP
    :rem 119
110 PRINT"[RVS]{39 SPACES}"; :rem 176
120 PRINT"[RVS]{14 SPACES}{RIGHT}[OFF]"; :rem 176
    [RVS]{RIGHT}[RIGHT]{2 SPACES}[*]
    [OFF]"; :rem 250
130 PRINT"[RVS]{14 SPACES}{RIGHT}[G]
    [RIGHT]{2 RIGHT}[OFF]"; :rem 35
140 PRINT"[RVS]{41 SPACES}"; :rem 120
200 PRINT"[2 DOWN]{PUR}[BLK] MACHINE LANG
    UAGE EDITOR VERSION 2.02{5 DOWN}"
    :rem 238
210 PRINT"[5]{2 UP}STARTING ADDRESS?
    {8 SPACES}{9 LEFT}"; :rem 143
215 INPUTS:F=1-F:C$=CHR$(31+119*F)
    :rem 166
220 IFS<256OR(S>40960ANDS<49152)ORS>53247
    THENGOSUB3000:GOTO210 :rem 235
225 PRINT:PRINT:PRINT :rem 180
230 PRINT"[5]{2 UP}ENDING ADDRESS?
    {8 SPACES}{9 LEFT}";:INPUTE:F=1-F:C$=
    CHR$(31+119*F) :rem 20
240 IFE<256OR(E>40960ANDE<49152)ORE>53247
    THENGOSUB3000:GOTO230 :rem 183
250 IFE<STHENPRINTC$;"[RVS]ENDING < START
    {2 SPACES}":GOSUB1000:GOTO 230
    :rem 176
260 PRINT:PRINT:PRINT :rem 179
300 PRINT"[CLR]";CHR$(14):AD=S :rem 56
310 A=1:PRINTRIGHT$("0000"+MID$(STR$(AD),
    2),5);:rem 33
315 FORJ=AT06 :rem 33
320 GOSUB570:IFN=-1THENJ=J+N:GOTO320
    :rem 228

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390 IFN=-211 THEN 710 :rem 62
400 IFN=-204 THEN 790 :rem 64
410 IFN=-206 THEN PRINT:INPUT "{DOWN} ENTER N
EW ADDRESS";ZZ :rem 44
415 IFN=-206 THEN IFZZ<SORZZ> THEN PRINT"
{RVS} OUT OF RANGE":GOSUB1000:GOTO410 :rem 225
417 IFN=-206 THEN AD=ZZ:PRINT:GOTO310 :rem 238
420 IF N<>-196 THEN 480 :rem 133
430 PRINT:INPUT"DISPLAY:FROM";F:PRINT,"TO
";:INPUTT :rem 234
440 IFF<SORF>EORT<SORT> THEN PRINT"AT LEAS
T";S;"{LEFT}, NOT MORE THAN";E:GOTO43
0 :rem 159
450 FORI=FTOTSTEP6:PRINT:PRINTRIGHT$( "000
0"+MID$(STR$(I),2),5);":": :rem 30
451 FORK=0TO5:N=PEEK(I+K):PRINTRIGHT$( "00
"+MID$(STR$(N),2),3);":": :rem 66
460 GETA$:IFA$>" THEN PRINT:PRINT:GOTO310 :rem 25
470 NEXTK:PRINTCHR$(20);:NEXTI:PRINT:PRIN
T:GOTO310 :rem 50
480 IFN<0 THEN PRINT:GOTO310 :rem 168
490 A(J)=N:NEXTJ :rem 199
500 CKSUM=AD-INT(AD/256)*256:FORI=1TO6:CK
SUM=(CKSUM+A(I))AND255:NEXT :rem 200
510 PRINTCHR$(18);:GOSUB570:PRINTCHR$(146
); :rem 94
511 IFN=-1 THEN A=6:GOTO315 :rem 254
515 PRINTCHR$(20):IFN=CKSUM THEN 530 :rem 122
520 PRINT:PRINT"LINE ENTERED WRONG : RE-E
NTER":PRINT:GOSUB1000:GOTO310 :rem 176
530 GOSUB2000 :rem 218
540 FORI=1TO6:POKEAD+I-1,A(I):NEXT:POKE54
272,0:POKE54273,0 :rem 227
550 AD=AD+6:IF AD<E THEN 310 :rem 212
560 GOTO 710 :rem 108
570 N=0:Z=0 :rem 88
580 PRINT"{$}"; :rem 81
581 GETA$:IFA$=" THEN 581 :rem 95
582 AV=- (A$="M")-2*(A$="," )-3*(A$="." )-4*
(A$="J")-5*(A$="K")-6*(A$="L") :rem 41
583 AV=AV-7*(A$="U")-8*(A$="I")-9*(A$="O"
):IFA$="H" THEN A$="0" :rem 134
584 IFAV>0 THEN A$=CHR$(48+AV) :rem 134
585 PRINTCHR$(20);:A=ASC(A$):IFA=13ORA=44
ORA=32 THEN 670 :rem 229
590 IFA>128 THEN N=-A:RETURN :rem 137
600 IFA<>20 THEN 630 :rem 10
610 GOSUB690:IFI=1ANDT=44 THEN N=-1:PRINT"
{OFF}{LEFT}{LEFT}";:GOTO690 :rem 62
620 GOTO570 :rem 109
630 IFA<48ORA>57 THEN 580 :rem 105
640 PRINTA$;:N=N*10+A-48 :rem 106
650 IFN>255 THEN A=20:GOSUB1000:GOTO600 :rem 229
660 Z=Z+1:IFZ<3 THEN 580 :rem 71
670 IFZ=0 THEN GOSUB1000:GOTO570 :rem 114
680 PRINT",";:RETURN :rem 240
690 S%=PEEK(209)+256*PEEK(210)+PEEK(211)
:rem 149
691 FORI=1TO3:T=PEEK(S%-I) :rem 67
695 IFT<>44ANDT<>58 THEN POKES%-I,32:NEXT :rem 205
700 PRINTLEFT$("{3 LEFT}",I-1);:RETURN :rem 7
710 PRINT"{CLR}{RVS}*** SAVE ***{3 DOWN}" :rem 236
715 PRINT"{2 DOWN}(PRESS {RVS}RETURN{OFF})

```

```

ALONE TO CANCEL SAVE){DOWN}":rem 106
720 F$="":INPUT "{DOWN} FILENAME";F$:IFF$=
"" THEN PRINT:PRINT:GOTO310 :rem 71
730 PRINT:PRINT "{2 DOWN}{RVS}T{OFF}APE OR
{RVS}D{OFF}ISK: (T/D)" :rem 228
740 GETA$:IFA$<"T"AND A$<"D" THEN 740 :rem 36
750 DV=1-7*(A$="D"):IFDV=8 THEN F$="0:" +F$:
OPEN15,8,15,"S"+F$:CLOSE15 :rem 212
760 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
):POKE782,ZK/256 :rem 3
762 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
T$):SYS65469 :rem 109
763 POKE780,1:POKE781,DV:POKE782,1:SYS654
66 :rem 69
765 K=S:POKE254,K/256:POKE253,K-PEEK(254)
*256:POKE780,253 :rem 17
766 K=E+1:POKE782,K/256:POKE781,K-PEEK(78
2)*256:SYS65496 :rem 235
770 IF(PEEK(783)AND1)OR(191ANDST) THEN 780 :rem 111
775 PRINT"{DOWN}DONE.{DOWN}":GOTO310 :rem 113
780 PRINT"{DOWN}ERROR ON SAVE.{2 SPACES}T
RY AGAIN.":IFDV=1 THEN 720 :rem 171
781 OPEN15,8,15:INPUT#15,E1$,E2$:PRINT E1$
;E2$:CLOSE15:GOTO720 :rem 103
790 PRINT"{CLR}{RVS}*** LOAD ***{2 DOWN}" :rem 212
795 PRINT"{2 DOWN}(PRESS {RVS}RETURN{OFF})
ALONE TO CANCEL LOAD)" :rem 82
800 F$="":INPUT "{2 DOWN} FILENAME";F$:IFF
$="" THEN PRINT:GOTO310 :rem 144
810 PRINT:PRINT "{2 DOWN}{RVS}T{OFF}APE OR
{RVS}D{OFF}ISK: (T/D)" :rem 227
820 GETA$:IFA$<"T"AND A$<"D" THEN 820 :rem 34
830 DV=1-7*(A$="D"):IFDV=8 THEN F$="0:" +F$:
:rem 157
840 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
):POKE782,ZK/256 :rem 2
841 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
T$):SYS65469 :rem 107
845 POKE780,1:POKE781,DV:POKE782,1:SYS654
66 :rem 70
850 POKE780,0:SYS65493 :rem 11
860 IF(PEEK(783)AND1)OR(191ANDST) THEN 870 :rem 111
865 PRINT"{DOWN}DONE.":GOTO310 :rem 96
870 PRINT"{DOWN}ERROR ON LOAD.{2 SPACES}T
RY AGAIN.{DOWN}":IFDV=1 THEN 800 :rem 172
880 OPEN15,8,15:INPUT#15,E1$,E2$:PRINT E1$
;E2$:CLOSE15:GOTO800 :rem 102
1000 REM BUZZER :rem 135
1001 POKE54296,15:POKE54277,45:POKE54278,
165 :rem 207
1002 POKE54276,33:POKE 54273,6:POKE54272,
5 :rem 42
1003 FORT=1TO200:NEXT:POKE54276,32:POKE54
273,0:POKE54272,0:RETURN :rem 202
2000 REM BELL SOUND :rem 78
2001 POKE54296,15:POKE54277,0:POKE54278,2
47 :rem 152
2002 POKE 54276,17:POKE54273,40:POKE54272
,0 :rem 86
2003 FORT=1TO100:NEXT:POKE54276,16:RETURN :rem 57
3000 PRINTC$;"{RVS}NOT ZERO PAGE OR ROM":
GOTO1000 :rem 89

```


Cosmic Combat

(Article on page 92.)

BEFORE TYPING...

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Program 1: Cosmic Combat—VIC Loader

```
1 POKE36879,105:POKE56,28:POKE52,28:PRINT
  "{CLR}" {WHT}" :rem 166
2 FORT=7168TO7271:READN:POKET,N:NEXT
  :rem 72
3 FORT=7424TO7431:POKET,0:NEXT :rem 128
4 DATA24,24,24,24,189,255,255,129,129,153
  ,189,231,255,189,153,129 :rem 208
5 DATA0,238,136,232,40,238,0,255 :rem 78
6 DATA0,238,170,174,172,234,0,255,0,228,1
  30,239,130,228,0,224 :rem 218
7 DATA0,234,138,238,42,234,0,255,0,187,17
  0,187,160,163,0,255 :rem 183
8 DATA0,136,4,190,132,136,0,128,8,8,8,8
  ,8,8,8 :rem 57
9 DATA128,64,32,16,8,4,2,1,1,2,4,8,16,32,
  64,128 :rem 39
10 DATA0,0,0,255,0,0,0,0,0,255,0,255,0,25
  5,0,255,0 :rem 135
11 DATA127,99,99,99,103,103,103,127,12,12
  ,12,12,28,28,28,28 :rem 138
12 DATA127,3,3,127,96,96,96,127,126,6,6,1
  26,7,7,7,127 :rem 111
13 DATA96,102,102,127,6,6,6,6,127,96,96,1
  27,3,3,3,127 :rem 94
14 DATA127,96,96,127,99,99,99,127,127,3,3
  ,7,14,12,12,12 :rem 218
15 DATA63,35,35,63,99,99,99,127,127,99,99
  ,127,3,3,3,127 :rem 241
16 FORT=7551TO7631:READC:POKET,C:NEXT
  :rem 99
17 PRINT"[WHT] NOW LOADING PART II":FORT=
  1TO4:PRINT:NEXT :rem 243
19 S$="LO"+CHR$(34)+"CC"+CHR$(34)+" :"+C
  HR$(131) :rem 89
20 REM CHANGE ,8 TO ,1 IN LINE 19 IF USIN
  G TAPE :rem 184
21 FORI=1TOLEN(S$):POKE630+I,ASC(MID$(S$,
  I)):NEXT:POKE198,I:END :rem 90
```

Program 2: Cosmic Combat—VIC Main Program

```
1 MT$="ATTACK FORCE":GOTO93 :rem 125
2 POKEZ+CL, :POKEZ,32:Z=FNF(SL)+SK+Z:POKE
  Z+CL,2:POKEZ,1:RETURN :rem 33
3 POKECL+EL,2:POKEEL,1:POKECL+EL,2:POKEEL
  ,1:POKECL+ET,2:POKEET,1:POKECL+CL,5:POKE
  L, :rem 237
4 RETURN :rem 20
5 M=CL+T:POKEM-23,7:POKET-23,9:POKEM+23,7
  :POKET+23,9:POKEM-21,7:POKET-21,10
  :rem 10
6 POKEM+21,7:POKET+21,10:POKEM-22,7:POKET
  -22,8:POKEM+22,7:POKET+22,8:RETURN
  :rem 73
```

```
7 DIMJS(2,2):POKE37139,0:DD=37154:PA=3713
  7:PB=37152:CL=30720:FQ=36877:CM=36869:S
  B=36879 :rem 201
8 FORI=0TO2:FORJ=0TO2:READJS(J,I):NEXTJ,I
  :DATA-1,0,1,-1,0,1,-1,0,1 :rem 131
9 POKECM,255:POKEED,127:POKESB,8:S1=36876
  :V=36878:S2=36874 :rem 199
10 DEFFNF(T)=INT(RND(1)*T)+1:DEFFNK(T)=PE
  EK(EL)+PEEK(ET)+PEEK(EL) :rem 138
11 DEFFNX(T)=((PAND16)=T)-((PEEK(PB)AND12
  8)=.):DEFFNY(T)=-(PAND32)=T) :rem 44
13 PRINT"[CLR]" {2 RIGHT}BCD"SC" {HOME}"TAB(
  13)"EFG"2-DE:L=8130:K=L:C=L:POKECL+L,5
  :POKEL, :rem 196
14 POKEV,15:FORT=1TO812:NEXT :rem 22
15 EL=7728:POKECL+EL,2:POKEEL,1:EL=7734:P
  OKEEL+CL,2:POKEEL,1:ET=7741:POKECL+ET,
  2 :rem 103
16 POKEET,1:A=A+3 :rem 227
17 P=PEEK(PA):X=FNX(.):FR=FNX(.):IFX=.GOT
  O23 :rem 219
19 K=K+X:IFK=8119ORK=8142GOTO23 :rem 122
21 L=L+X:POKECL+CL,5:POKEL, :POKECL+CL, :PO
  KEC,32:C=L :rem 157
23 K=L:POKES1, :IFFR=.THENIFW=.GOTO29
  :rem 112
25 IFW=1THENPOKES1, :FORT=FTOF-330STEP-22
  :POKET+CL, :POKET,32:NEXT:W=.GOTO29
  :rem 218
27 IFW=.THENF=L-22:POKES1,198:FORT=FTOF-3
  30STEP-22:POKET+CL,6:POKET,8:NEXT:W=1
  :rem 231
29 IFFNK(.)>3GOTO43 :rem 105
31 IFQ=1GOTO39 :rem 87
33 IFQ=2GOTO49 :rem 91
35 Z=EL:GOSUB2:EL=Z:IFEL>8120THENED=EL:GO
  TO69 :rem 169
37 Q=1:GOTO17 :rem 4
39 Z=EL:GOSUB2:EL=Z:IFEL>8120THENED=EL:GO
  TO69 :rem 65
41 Q=2:GOTO17 :rem 0
43 IFPEEK(EL)>1THENED=EL:GOTO53 :rem 205
45 IFPEEK(EL)>1THENED=EL:GOTO53 :rem 153
47 IFPEEK(ET)>1THENED=ET:GOTO53 :rem 225
49 Z=ET:GOSUB2:ET=Z:IFET>8120THENED=ET:GO
  TO69 :rem 206
51 Q=.GOTO17 :rem 253
53 T=ED:POKET+CL,2:POKET,1:GOSUB5:POKECL+
  T-1,7:POKET-1,11:POKECL+T+1,7:POKET+1,
  11 :rem 30
55 FORT=250TO150STEP-3:POKES1,T:NEXT:POKE
  S1, :IFXM=.THENIFSC>5000THENDE=DE-1:XM
  =1 :rem 212
57 SC=SC+100:HE=HE+100:IFHE>2000THENKK=KK
  +1:HE=.GOSUB107 :rem 172
59 A=A+1:IFA>24THENA=.GOTO87 :rem 244
61 IFEL=EDTHENEL=FNF(7)+7727 :rem 174
63 IFEL=EDTHENEL=FNF(7)+7734 :rem 120
65 IFET=EDTHENET=FNF(14)+7727 :rem 240
67 PRINT"[CLR]" {2 RIGHT}BCD"SC" {HOME}"TAB(
  13)"EFG"2-DE:GOSUB3:GOTO17 :rem 19
69 FORT=-3TO3:IFT+ED>8119ANDT+ED<8142THEN
  POKECL+T+ED,3:POKET+ED,12 :rem 100
71 NEXT:POKES1, :IFSC>.THENSC=SC-20:HE=HE
  -20 :rem 0
73 POKEFQ,150:FORN=15TO3STEP-2:POKEV,N:FO
  RT=1TO99:NEXTT,N:POKEFQ, :POKEV,15
  :rem 152
75 IFL>ED-4ANDL<ED+4GOTO79 :rem 91
77 GOTO61 :rem 14
79 DE=DE+1:T=L:GOSUB5 :rem 33
```



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81 POKES2,235:FORT=1TO863:NEXT:POKES2,228
   :FORT=1TO1245:NEXT           :rem 4
83 POKES2,.:IFDE=3THENGOTO103   :rem 55
85 GOTO13                         :rem 10
87 AW=AW+1                       :rem 56
89 POKESB,105:PRINT"{CLR}":POKECM,240
                                   :rem 80
91 LG=LEN(STR$(AW))+LEN(MT$):GL=LG/2:PRIN
   T"{CLR}{9 DOWN}"TAB(11-GL)MT$AW
                                   :rem 108
92 FORT=1TO2687:NEXT:POKECM,255:POKESB,8:
   GOTO 13                         :rem 1
93 POKE36879,105:PRINT"{CLR}{WHT}"TAB(92)
   "COSMIC COMBAT"SPC(98)"SKILL LEVEL"SPC
   (34)"1-2-3-4-5"               :rem 212
95 FORT=7724TO7742:POKET,32:POKET+88,32:P
   OKET+3,160:POKET+91,160:GETK$:IFK$<>"
   GOTO99                         :rem 133
97 NEXT:FORT=7745TO7727STEP-1:POKET,32:PO
   KET+88,32:POKET-3,160:POKET+85,160:NEX
   T:GOTO95                       :rem 213
99 KK=VAL(K$):IFKK=0ORKK>5THENNEXT
                                   :rem 204
101 GOSUB107:PRINT"{CLR}":GOTO7   :rem 242
103 POKEDD,255:FORT=1TO2647:NEXT:POKECM,2
   40:PRINT"{CLR}"SPC(94)"GAME OVER
                                   :rem 90
105 FORT=1TO2647:NEXT:CLR:GOTO93  :rem 40
107 IFKK<3THENSK=21-KK:SL=(KK*2)+1:rem 17
109 IFKK=3THENSK=42:SL=3         :rem 232
111 IFKK=4THENSK=41:SL=5        :rem 227
113 IFKK>4THENSK=64:SL=3        :rem 233
115 RETURN                       :rem 119

```

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49344 :208,008,169,001,141,014,221
49350 :192,076,203,192,096,173,106
49356 :016,208,041,001,208,011,177
49362 :173,016,208,041,239,141,004
49368 :016,208,076,229,192,173,086
49374 :016,208,009,016,141,016,116
49380 :208,173,001,208,233,022,049
49386 :141,009,208,173,000,208,205
49392 :141,008,208,169,001,141,140
49398 :014,192,076,023,193,169,145
49404 :033,141,004,212,174,073,121
49410 :192,202,142,073,192,142,177
49416 :001,212,173,009,208,056,155
49422 :233,002,141,009,208,201,040
49428 :030,144,017,173,030,208,110
49434 :141,003,192,041,016,240,147
49440 :006,032,068,193,076,040,191
49446 :193,096,169,196,141,252,061
49452 :007,169,200,141,073,192,058
49458 :169,000,141,001,212,141,202
49464 :000,212,141,009,208,141,255
49470 :008,208,141,014,192,096,209
49476 :173,003,192,041,014,141,120
49482 :003,192,032,128,193,208,062
49488 :001,096,141,008,192,010,016
49494 :141,010,192,172,008,192,033
49500 :169,197,145,251,160,015,005
49506 :032,152,193,032,003,197,195
49512 :173,003,192,073,255,045,077
49518 :016,208,141,016,208,172,103
49524 :008,192,152,024,105,192,021
49530 :145,251,032,161,193,096,232

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49536 :201,002,208,003,169,001,200
49542 :096,201,004,208,003,169,047
49548 :002,096,201,008,208,003,146
49554 :169,003,096,169,000,096,167
49560 :162,255,202,208,253,136,088
49566 :208,248,096,160,001,177,024
49572 :253,105,005,145,253,201,102
49578 :010,144,019,056,233,010,130
49584 :145,253,200,192,007,240,189
49590 :009,177,253,105,001,145,104
49596 :253,076,169,193,173,022,050
49602 :192,105,048,141,017,004,189
49608 :173,023,192,105,048,141,114
49614 :016,004,141,016,004,173,048
49620 :024,192,105,048,141,015,225
49626 :004,173,025,192,105,048,253
49632 :141,014,004,173,026,192,006
49638 :105,048,141,013,004,096,125
49644 :032,003,194,009,030,141,133
49650 :011,192,032,003,194,041,203
49656 :031,141,012,192,096,032,240
49662 :003,194,041,003,096,169,248
49668 :255,141,015,212,169,128,156
49674 :141,018,212,173,027,212,025
49680 :096,032,001,196,172,027,028
49686 :192,136,032,003,194,041,108
49692 :031,201,031,208,014,032,033
49698 :003,194,024,105,001,041,146
49704 :003,170,202,138,153,074,012
49710 :192,185,074,192,141,077,139
49716 :192,173,027,192,010,141,019
49722 :010,192,168,173,077,192,102
49728 :201,001,240,007,201,002,204
49734 :240,055,076,174,194,177,218
49740 :247,056,233,001,170,144,159
49746 :003,076,102,194,145,247,081

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Program 3:

Cosmic Combat—64 Version

Requires MLX (see instructions in article).

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49152 :076,086,196,000,015,015,132
49158 :001,000,000,000,000,000,007
49164 :000,004,000,001,024,060,101
49170 :000,015,001,254,000,000,032
49176 :000,000,000,000,083,067,174
49182 :079,082,069,032,058,032,126
49188 :000,083,072,073,080,083,171
49194 :032,058,032,000,065,084,057
49200 :084,065,067,075,032,032,147
49206 :000,000,000,032,032,032,150
49212 :032,032,032,032,032,032,252
49218 :032,032,032,032,032,032,002
49224 :000,000,000,000,000,000,072
49230 :173,000,220,041,015,201,216
49236 :015,240,008,201,011,240,031
49242 :007,201,007,240,045,076,154
49248 :182,192,173,000,208,056,139
49254 :233,001,144,003,076,118,165
49260 :192,141,000,208,206,016,103
49266 :208,076,182,192,170,173,091
49272 :016,208,041,001,240,003,117
49278 :142,000,208,236,016,192,152
49284 :144,048,142,000,208,076,238
49290 :182,192,173,000,208,024,149
49296 :105,001,176,003,076,160,153
49302 :192,141,000,208,238,016,177
49308 :208,076,182,192,170,173,133
49314 :016,208,041,001,208,006,130
49320 :142,000,208,076,182,192,200
49326 :236,017,192,176,003,142,172
49332 :000,208,173,014,192,208,207
49338 :015,173,000,220,041,016,139

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49752 :173,018,192,073,255,045,076
 49758 :016,208,141,016,208,076,247
 49764 :174,194,173,016,208,045,142
 49770 :018,192,240,006,138,145,077
 49776 :247,076,174,194,236,016,031
 49782 :192,144,053,138,145,247,013
 49788 :076,174,194,177,247,024,248
 49794 :105,001,170,176,003,076,149
 49800 :152,194,145,247,173,016,039
 49806 :208,013,018,192,141,016,218
 49812 :208,076,174,194,173,016,221
 49818 :208,045,018,192,208,006,063
 49824 :138,145,247,076,174,194,110
 49830 :236,017,192,176,003,138,160
 49836 :145,247,177,249,024,105,095
 49842 :001,145,249,201,230,144,124
 49848 :003,076,059,195,177,249,175
 49854 :201,060,176,001,096,173,129
 49860 :030,208,041,015,208,001,187
 49866 :096,141,003,192,041,001,164
 49872 :240,004,032,059,195,096,066
 49878 :173,003,192,041,002,240,097
 49884 :005,169,001,032,251,194,104
 49890 :173,003,192,041,004,240,111
 49896 :005,169,002,032,251,194,117
 49902 :173,003,192,041,008,240,127
 49908 :005,169,003,032,251,194,130
 49914 :096,141,008,192,010,141,070
 49920 :010,192,172,008,192,169,231
 49926 :197,145,251,169,129,141,014
 49932 :011,212,160,020,032,152,087
 49938 :193,169,128,141,011,212,104
 49944 :160,020,032,152,193,032,101
 49950 :003,197,169,001,174,008,070
 49956 :192,010,202,208,252,073,205
 49962 :255,045,016,208,141,016,211
 49968 :208,173,008,192,168,024,053
 49974 :105,192,145,251,096,172,247
 49980 :027,192,169,199,145,251,019
 49986 :169,129,141,011,212,152,112
 49992 :010,168,177,247,056,233,195
 49998 :012,145,247,176,011,173,074
 50004 :018,192,073,255,045,016,171
 50010 :208,141,016,208,173,018,086
 50016 :192,141,029,208,160,020,078
 50022 :032,152,193,173,030,208,122
 50028 :041,001,240,003,032,157,070
 50034 :195,160,030,032,152,193,108
 50040 :169,128,141,011,212,032,045
 50046 :003,197,169,255,077,018,077
 50052 :192,045,016,208,141,016,238
 50058 :208,172,027,192,152,024,145
 50064 :105,192,145,251,032,032,133
 50070 :196,169,000,141,029,208,125
 50076 :096,169,000,141,014,192,000
 50082 :141,001,212,141,000,212,101
 50088 :141,004,212,141,008,208,114
 50094 :141,009,208,169,017,045,251
 50100 :021,208,141,021,208,169,180
 50106 :198,141,248,007,160,255,171
 50112 :032,152,193,169,000,141,111
 50118 :021,208,141,016,208,169,193
 50124 :180,141,000,208,169,230,108
 50130 :141,001,208,169,192,141,038
 50136 :248,007,032,235,195,032,197
 50142 :014,196,173,013,192,240,026
 50148 :005,169,031,141,021,208,035
 50154 :096,160,002,032,236,193,185

50160 :173,012,192,145,249,173,160
 50166 :011,192,145,247,200,200,217
 50172 :192,008,208,237,096,169,138
 50178 :001,174,027,192,010,202,096
 50184 :208,252,141,018,192,096,147
 50190 :206,013,192,173,013,192,035
 50196 :024,105,048,141,034,004,120
 50202 :169,001,141,034,216,096,171
 50208 :032,063,196,173,003,192,179
 50214 :208,014,160,001,177,253,083
 50220 :240,009,170,202,138,145,180
 50226 :253,032,192,193,096,169,217
 50232 :009,145,253,200,076,042,013
 50238 :196,160,001,177,253,208,033
 50244 :011,200,192,006,208,247,164
 50250 :169,001,141,003,192,096,164
 50256 :169,000,141,003,192,096,169
 50262 :032,035,197,173,141,002,154
 50268 :208,251,238,027,192,173,157
 50274 :027,192,201,004,208,005,223
 50280 :169,001,141,027,192,032,154
 50286 :078,192,173,014,192,240,231
 50292 :008,032,251,192,173,004,008
 50298 :192,240,019,032,023,197,057
 50304 :032,017,194,173,004,192,228
 50310 :048,008,173,013,192,208,008
 50316 :204,076,232,200,169,000,253
 50322 :141,009,208,141,008,208,093
 50328 :141,004,212,141,011,212,105
 50334 :141,000,212,141,001,212,097
 50340 :169,001,141,003,192,032,190
 50346 :165,200,206,007,192,206,122
 50352 :007,192,206,007,192,169,181
 50358 :000,141,014,192,141,073,231
 50364 :192,141,021,208,141,027,150
 50370 :192,160,060,032,152,193,215
 50376 :173,005,192,024,105,003,190
 50382 :141,004,192,141,005,192,113
 50388 :238,006,192,032,235,195,086
 50394 :169,180,141,000,208,169,061
 50400 :230,141,001,208,169,254,203
 50406 :045,016,208,141,016,208,096
 50412 :169,031,141,021,208,169,207
 50418 :010,160,020,032,152,193,041
 50424 :170,202,138,208,246,032,220
 50430 :044,200,076,089,196,032,123
 50436 :236,193,172,010,192,173,212
 50442 :012,192,145,249,173,011,024
 50448 :192,145,247,206,004,192,234
 50454 :096,174,007,192,160,007,146
 50460 :136,208,253,202,208,248,003
 50466 :096,169,000,141,030,208,166
 50472 :141,004,212,141,011,212,249
 50478 :141,022,192,141,023,192,245
 50484 :141,024,192,141,025,192,255
 50490 :141,026,192,141,056,192,038
 50496 :141,055,192,141,007,212,044
 50502 :141,032,208,141,033,208,065
 50508 :133,247,032,203,199,169,035
 50514 :006,141,037,208,169,009,140
 50520 :141,038,208,169,230,141,247
 50526 :013,208,141,015,208,160,071
 50532 :000,169,001,153,000,216,127
 50538 :200,192,006,208,248,160,096
 50544 :000,169,192,153,248,007,113
 50550 :024,105,001,200,192,009,137
 50556 :208,245,169,031,141,028,178
 50562 :208,141,021,208,169,180,033

50568 :141,000,208,169,230,141,001
 50574 :001,208,169,075,141,007,231
 50580 :192,169,004,141,013,192,091
 50586 :169,032,141,004,192,141,065
 50592 :005,192,169,007,141,039,201
 50598 :208,169,002,141,040,208,166
 50604 :169,004,141,041,208,169,136
 50610 :005,141,042,208,169,007,238
 50616 :141,043,208,169,048,141,166
 50622 :018,004,169,017,141,005,032
 50628 :212,169,241,141,006,212,153
 50634 :169,200,141,001,212,141,042
 50640 :000,212,169,015,141,024,001
 50646 :212,169,031,141,012,212,223
 50652 :169,250,141,013,212,169,150
 50658 :015,141,008,212,032,235,101
 50664 :195,169,255,141,073,192,233
 50670 :169,001,141,044,208,169,202
 50676 :208,133,248,169,001,133,112
 50682 :249,169,208,133,250,169,148
 50688 :248,133,251,169,007,133,173
 50694 :252,169,021,133,253,169,235
 50700 :192,133,254,032,048,198,101
 50706 :032,104,198,032,044,200,116
 50712 :032,014,196,096,169,001,020
 50718 :141,000,216,141,001,216,233
 50724 :141,002,216,141,003,216,243
 50730 :141,004,216,141,005,216,253
 50736 :169,147,032,210,255,024,117
 50742 :160,005,162,000,032,240,141
 50748 :255,169,028,160,192,032,128
 50754 :030,171,024,160,026,162,127
 50760 :000,032,240,255,169,037,037
 50766 :160,192,032,030,171,169,064
 50772 :048,141,017,004,141,016,195
 50778 :004,141,015,004,141,014,153
 50784 :004,141,013,004,141,018,161
 50790 :004,096,169,005,133,105,102
 50796 :169,216,133,106,160,000,124
 50802 :169,001,145,105,200,192,158
 50808 :030,208,249,169,240,133,125
 50814 :105,160,000,169,001,145,194
 50820 :105,200,192,012,208,249,074
 50826 :096,000,000,000,000,032,010
 50832 :000,000,032,000,000,032,208
 50838 :000,000,032,000,000,032,214
 50844 :000,000,032,000,004,084,020
 50850 :064,004,084,064,004,084,210
 50856 :064,006,086,064,010,086,228
 50862 :128,042,086,160,012,000,090
 50868 :192,063,003,240,255,207,116
 50874 :252,000,000,000,000,000,182
 50880 :000,000,000,000,000,000,192
 50886 :000,000,000,000,000,063,005
 50892 :251,255,014,170,172,015,057
 50898 :170,188,003,234,240,000,021
 50904 :234,192,000,234,192,000,044
 50910 :251,192,021,123,085,005,131
 50916 :123,084,001,123,080,000,127
 50922 :059,000,000,063,000,000,100
 50928 :008,000,000,008,000,000,000
 50934 :008,000,000,000,000,000,254
 50940 :000,000,000,000,000,000,252
 50946 :000,000,000,000,000,000,002
 50952 :000,000,000,000,000,000,008
 50958 :000,000,000,000,000,000,014
 50964 :000,016,000,000,016,000,052
 50970 :000,016,000,000,016,000,058

50976 :000,016,000,000,016,000,064
 50982 :000,016,000,000,016,000,070
 50988 :000,016,000,000,016,000,076
 50994 :000,016,000,000,016,000,082
 51000 :000,016,000,000,016,000,088
 51006 :000,000,000,000,000,000,062
 51012 :000,000,000,000,000,000,068
 51018 :000,064,000,001,016,000,155
 51024 :004,016,000,004,004,000,108
 51030 :016,001,000,064,001,000,168
 51036 :064,000,065,000,000,065,030
 51042 :000,000,000,000,000,020,118
 51048 :000,085,020,085,000,020,058
 51054 :000,000,000,000,000,065,175
 51060 :000,000,065,000,001,000,182
 51066 :064,001,000,064,004,000,255
 51072 :016,016,000,004,016,000,180
 51078 :004,064,000,001,000,000,203
 51084 :000,000,000,000,000,000,140
 51090 :004,000,001,005,064,005,225
 51096 :004,080,001,021,080,017,099
 51102 :016,000,001,005,017,065,006
 51108 :021,081,080,004,081,016,191
 51114 :021,004,081,069,005,016,110
 51120 :016,020,005,017,016,001,251
 51126 :017,000,000,001,000,000,200
 51132 :020,000,000,069,000,000,021
 51138 :020,000,000,000,000,000,214
 51144 :000,000,000,160,063,185,096
 51150 :139,198,153,000,048,136,112
 51156 :016,247,160,063,185,203,062
 51162 :198,153,064,048,153,128,194
 51168 :048,153,192,048,136,016,049
 51174 :241,160,063,185,011,199,065
 51180 :153,000,049,136,016,247,069
 51186 :160,063,185,075,199,153,053
 51192 :064,049,136,016,247,160,152
 51198 :063,185,139,199,153,128,097
 51204 :049,136,016,247,162,003,105
 51210 :160,000,169,170,032,036,065
 51216 :200,169,000,162,003,032,070
 51222 :036,200,192,064,176,007,185
 51228 :162,003,169,170,076,014,110
 51234 :200,096,153,192,049,200,156
 51240 :202,208,249,096,024,160,211
 51246 :015,162,010,032,240,255,248
 51252 :169,046,160,192,032,030,169
 51258 :171,032,083,200,160,255,191
 51264 :032,152,193,024,160,015,128
 51270 :162,010,032,240,255,169,170
 51276 :057,160,192,032,030,171,206
 51282 :096,173,055,192,024,105,215
 51288 :001,201,010,144,005,238,175
 51294 :056,192,169,000,141,055,195
 51300 :192,173,056,192,024,105,074
 51306 :048,141,167,005,173,055,183
 51312 :192,024,105,048,141,168,022
 51318 :005,169,001,141,167,217,050
 51324 :141,168,217,160,200,032,018
 51330 :152,193,096,152,160,002,117
 51336 :032,152,193,168,173,003,089
 51342 :192,009,000,141,003,192,167
 51348 :177,249,201,030,144,010,191
 51354 :170,202,138,145,249,169,203
 51360 :001,141,003,192,096,173,254
 51366 :003,192,208,001,096,169,067
 51372 :000,141,003,192,160,002,158
 51378 :032,133,200,200,200,032,207


```

51384 :133,200,200,200,032,133,058
51390 :200,076,165,200,071,065,199
51396 :077,069,032,079,086,069,096
51402 :082,000,080,082,069,083,086
51408 :083,032,084,082,073,071,121
51414 :071,069,082,032,084,079,119
51420 :032,080,076,065,089,032,082
51426 :065,071,065,073,078,000,066
51432 :169,000,141,021,208,024,027
51438 :160,015,162,010,032,240,089
51444 :255,169,194,160,200,032,230
51450 :030,171,024,160,006,162,035
51456 :013,032,240,255,169,204,145
51462 :160,200,032,030,171,173,004
51468 :000,220,041,016,208,249,234
51474 :076,086,196,013,013,013,159

```

Letter Attack

(Article on page 70.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE's Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1: Letter Attack—VIC Version

```

10 POKE36879,26 :rem 53
20 HS=0:BT=9999:V=36878:S=36875:N=36877:A
   =30720:B=7682 :rem 39
30 PRINT "{CLR}[10 DOWN]{4 RIGHT}LETTER A
   TTACK!" :rem 142
50 FOR T=1 TO 1500:NEXT :rem 240
100 PRINT "{CLR}":SC=0:TM=0:POKE 198,0
   :rem 225
110 PRINT "{5 DOWN}{2 SPACES}CHOOSE DIFFI
   CULTY" :rem 108
120 PRINT "{DOWN}[4 SPACES]LEVEL ({RVS}1
   {OFF} - {RVS}9{OFF})" :rem 29
130 DL$="":GET DL$:IF DL$="" THEN 130
   :rem 88
150 IF DL$<"1" OR DL$>"9" THEN 130:rem 93
160 DL=VAL(DL$):DL=10-DL:POKE 198,0
   :rem 216
170 PRINT "{2 DOWN}{2 SPACES}HOW MANY LET
   TERS" :rem 209
180 PRINT "{DOWN}[2 SPACES]WOULD YOU LIKE
   ?" :rem 103
190 PRINT "{DOWN}[6 SPACES]{RVS}1{OFF}0 -
   {RVS}9{OFF}0" :rem 187
200 NL$="":GET NL$:IF NL$="" THEN 200
   :rem 114
210 PRINT NL$ :rem 222
220 IF NL$<"1" OR NL$>"9" THEN 200
   :rem 109
230 NL=VAL(NL$):NL=NL*10:LR=NL :rem 67
270 PRINT "{CLR}" :rem 253
280 POKE 38400,2:POKE 7680,77:POKE 38404,
   2:POKE 7684,78 :rem 165
290 FOR I=7703 TO 8143 STEP 22 :rem 236
300 POKE I+A,2:POKE I,101:POKE I+A+2,2:PO
   KE I+2,103 :rem 237
310 NEXT I :rem 28

```

```

320 POKE 38884,2:POKE 8164,78:POKE 38888,
   2:POKE 8168,77 :rem 188
330 PRINT "{BLK}{HOME}{DOWN}[8 RIGHT]DIFF
   ICULTY" :rem 246
340 PRINT "{8 RIGHT}LEVEL:" :rem 2
350 PRINT "{DOWN}[11 RIGHT]";10-DL:rem 18
360 PRINT "{DOWN}[8 RIGHT]LETTERS"
   :rem 134
370 PRINT "{8 RIGHT}REMAINING:" :rem 39
380 PRINT "{DOWN}[11 RIGHT]";LR :rem 149
390 PRINT "{DOWN}[8 RIGHT]SCORE:" :rem 28
400 PRINT "{3 DOWN}[8 RIGHT]HIGH SCORE:"
   :rem 86
410 PRINT "{DOWN}[11 RIGHT]";HS :rem 140
420 IF BT<>9999 THEN POKE BT+30718,4:POKE
   BT-2,62 :rem 141
470 FOR I=38402 TO 38886 STEP 22 :rem 93
480 POKE I,6 :rem 118
490 NEXT I :rem 37
500 LE=INT(RND(1)*26+1):LC=LE+64 :rem 31
510 FOR J=1 TO 26 :rem 64
520 POKE B,J :rem 126
530 FOR T=1 TO 20:NEXT :rem 191
540 NEXT J :rem 34
550 FOR I=1 TO LE :rem 108
560 POKE B,I :rem 129
570 NEXT I :rem 36
580 POKE B,32:A$="":CN=0:POKE V,15:POKE 19
   8,0 :rem 175
590 FOR I=7704 TO 8166 STEP 22 :rem 245
600 POKE S,220-CN :rem 150
610 POKE I,LE :rem 204
620 FOR J=1 TO DL :rem 106
630 IF A$="" THEN GET A$ :rem 130
640 NEXT J :rem 35
650 IF A$="" THEN 680 :rem 221
660 IF ASC(A$)=LC THEN 820 :rem 77
670 A$="" :rem 131
680 POKE I,32 :rem 167
690 CN=CN+3 :rem 92
700 NEXT I :rem 31
710 POKE S,0:POKE V,0 :rem 145
720 FOR T=1 TO 100:NEXT :rem 239
730 LR=LR-1 :rem 113
740 PRINT "{HOME}[9 DOWN][11 RIGHT]
   {6 SPACES}" :rem 87
750 PRINT "{HOME}[9 DOWN][11 RIGHT]";LR
   :rem 49
760 IF LR=0 THEN 1010 :rem 40
770 GOTO 500 :rem 108
780 REM :rem 131
820 POKE I+30722,5:POKE I+2,31:POKE S,0:P
   OKE V,0:POKE V,15:POKE N,175 :rem 63
830 FOR K=1 TO 30 :rem 65
840 POKE I,81 :rem 169
850 FOR T=1 TO 20:NEXT :rem 196
860 POKE I,87 :rem 177
870 FOR T=1 TO 20:NEXT :rem 198
880 NEXT K :rem 42
890 POKE I,32:POKE N,0:POKE V,0 :rem 216
900 IF I<BT THEN BT=I :rem 142
910 TM=TM+(I-7682)/22:SC=SC+1:LR=LR-1
   :rem 133
920 PRINT "{HOME}[9 DOWN][11 RIGHT]
   {6 SPACES}" :rem 87
930 PRINT "{HOME}[9 DOWN][11 RIGHT]";LR
   :rem 49
940 PRINT "{3 DOWN}[11 RIGHT]";SC:rem 177
950 IF LR=0 THEN 1010 :rem 41
960 GOTO 500 :rem 109
1010 FOR T=1 TO 750:NEXT :rem 35

```



```

1020 PRINT "{CLR}{2 DOWN}SCORE:";SC
                                     :rem 208
1030 IF SC>HS THEN HS=SC
                                     :rem 95
1040 PRINT "{2 DOWN}HIGH SCORE:";HS
                                     :rem 100
1050 PRINT "{2 DOWN}HIGHEST POSSIBLE"
                                     :rem 38
1060 PRINT "SCORE:";NL
                                     :rem 35
1070 ER=(SC/NL)*100
                                     :rem 7
1080 PRINT "{2 DOWN}EFFICIENCY"
                                     :rem 145
1090 PRINT "RATING:";ER;"%"
                                     :rem 16
1100 IF SC=0 THEN AT=0:GOTO 1120
                                     :rem 188
1110 AT=INT(TM/SC)
                                     :rem 55
1120 PRINT "{2 DOWN}AVERAGE TIME:";AT
                                     :rem 235
1130 PRINT "({RVS}1{OFF} - GOOD {RVS}22
{OFF} -BAD)"
                                     :rem 14
1140 PRINT "{2 DOWN}WOULD YOU LIKE TO"
                                     :rem 9
1150 PRINT "PLAY AGAIN? (Y OR N)"
                                     :rem 6
1160 POKE 198,0
                                     :rem 245
1170 A$="":GET A$:IF A$="" THEN 1170
                                     :rem 213
1180 IF A$="Y" THEN 100
                                     :rem 88
1185 IFA$<>"N"THEN1170
                                     :rem 199
1190 PRINT "{CLR}":END
                                     :rem 64

```

Program 2:

Letter Attack—64 Version

```

10 POKE53280,2:POKE 53281,1
                                     :rem 185
20 HS=0:BT=9999:V=54296:S=54273:N=128:A=5
4272:B=1027:TAB$="{10 RIGHT}"
                                     :rem 120
22 FOR I=ATO A+24:POKEI,0:NEXT
                                     :rem 14
25 POKE 54277,100:POKE 54278,100
                                     :rem 140
30 PRINT "{CLR}{10 DOWN}{13 RIGHT}LETTER
{SPACE}ATTACK!"
                                     :rem 147
50 FORT=1TO1000:NEXT
                                     :rem 235
100 PRINT "{CLR}":SC=0:TM=0:POKE 198,0
                                     :rem 225
110 PRINT "{4 DOWN}"TAB$"CHOOSE DIFFICULT
Y"
                                     :rem 154
120 PRINT TAB$"LEVEL ({RVS}1{OFF} - {RVS}
9{OFF})"
                                     :rem 7
130 DL$="":GET DL$:IF DL$="" THEN 130
                                     :rem 88
140 IF DL$<"1" OR DL$>"9" THEN 130
                                     :rem 92
150 PRINT TAB$ DL$
                                     :rem 210
160 DL=VAL(DL$):DL=10-DL:POKE 198,0
                                     :rem 216
170 PRINT TAB$"{2 DOWN}HOW MANY LETTERS"
                                     :rem 204
180 PRINT TAB$"WOULD YOU LIKE?"
                                     :rem 81
190 PRINT TAB$"{DOWN}{RVS}1{OFF}0 - {RVS}
9{OFF}0"
                                     :rem 182
200 NL$="":GET NL$:IF NL$="" THEN 200
                                     :rem 114
210 IF NL$<"1" OR NL$>"9" THEN 200
                                     :rem 108
220 PRINT NL$
                                     :rem 223
230 NL=VAL(NL$):NL=NL*10:LR=NL
                                     :rem 67
270 PRINT "{CLR}"
                                     :rem 253
280 POKE 55296,2:POKE 1024,77:POKE 55302,
2:POKE 1030,78
                                     :rem 138
290 FOR I=1065 TO 1945 STEP 40
                                     :rem 234
300 POKE I+A,2:POKE I,101:POKE I+A+4,2:PO
KE I+4,103
                                     :rem 241
310 NEXT I
                                     :rem 28
320 POKE 56256,2:POKE 1984,78:POKE 56262,
2:POKE 1990,77
                                     :rem 166
330 PRINT "{BLK}{HOME}{DOWN}{8 RIGHT}DIFF
ICULTY"
                                     :rem 246

```

```

340 PRINT "{8 RIGHT}LEVEL:"
                                     :rem 2
350 PRINT "{DOWN}{11 RIGHT}";10-DL:rem 18
360 PRINT "{DOWN}{8 RIGHT}LETTERS"
                                     :rem 134
370 PRINT "{8 RIGHT}REMAINING:"
                                     :rem 39
380 PRINT "{DOWN}{11 RIGHT}";LR
                                     :rem 149
390 PRINT "{DOWN}{8 RIGHT}SCORE:"
                                     :rem 28
400 PRINT "{3 DOWN}{8 RIGHT}HIGH SCORE:"
                                     :rem 86
410 PRINT "{DOWN}{11 RIGHT}";HS
                                     :rem 140
420 IF BT<>9999 THEN POKE BT+54269,4:POKE
BT-3,62
                                     :rem 149
470 FOR I=55299 TO 56259 STEP 40
                                     :rem 100
480 POKE I,6
                                     :rem 118
490 NEXT I
                                     :rem 37
500 LE=INT(RND(1)*26+1):LC=LE+64
                                     :rem 31
510 FOR J=1 TO 26
                                     :rem 64
520 POKE B,J
                                     :rem 126
530 FORT=1TO20:NEXT
                                     :rem 191
540 NEXT J
                                     :rem 34
550 FOR I=1 TO LE
                                     :rem 108
560 POKE B,I
                                     :rem 129
570 NEXT I
                                     :rem 36
580 POKE B,32:A$="":CN=0:POKEV,15:POKE 19
8,0
                                     :rem 175
585 POKE 54276,17
                                     :rem 109
590 FOR I=1027 TO 1988 STEP 40
                                     :rem 242
600 POKE S,220-CN
                                     :rem 150
610 POKE I,LE
                                     :rem 204
620 FOR J=1 TO DL
                                     :rem 106
630 IF A$="" THEN GET A$
                                     :rem 130
640 NEXT J
                                     :rem 35
650 IF A$="" THEN 680
                                     :rem 221
660 IF ASC(A$)=LC THEN 820
                                     :rem 77
670 A$=""
                                     :rem 131
680 POKE I,32
                                     :rem 167
690 CN=CN+3
                                     :rem 92
700 NEXT I
                                     :rem 31
710 POKE 54276,16
                                     :rem 98
720 FORT=1TO100:NEXT
                                     :rem 239
730 LR=LR-1
                                     :rem 113
740 PRINT "{HOME}{9 DOWN}{11 RIGHT}
{6 SPACES}"
                                     :rem 87
750 PRINT "{HOME}{9 DOWN}{11 RIGHT}";LR
                                     :rem 49
760 IF LR=0 THEN 1010
                                     :rem 40
770 GOTO 500
                                     :rem 108
820 POKE I+A+3,5:POKE I+3,31:POKE S,20:PO
KE V,15:POKE 54276,129
                                     :rem 177
830 FOR K=1 TO 30
                                     :rem 65
840 POKE I,81
                                     :rem 169
850 FORT=1TO20:NEXT
                                     :rem 196
860 POKE I,87
                                     :rem 177
870 FORT=1TO20:NEXT
                                     :rem 198
880 NEXT K
                                     :rem 42
890 POKE I,32:POKE 54276,128
                                     :rem 226
900 IF I<BT THEN BT=I
                                     :rem 142
910 TM=TM+(I-1026)/40:SC=SC+1:LR=LR-1
                                     :rem 119
920 PRINT "{HOME}{9 DOWN}{11 RIGHT}
{6 SPACES}"
                                     :rem 87
930 PRINT "{HOME}{9 DOWN}{11 RIGHT}";LR
                                     :rem 49
940 PRINT "{3 DOWN}{11 RIGHT}";SC:rem 177
950 IF LR=0 THEN 1010
                                     :rem 41
960 GOTO 500
                                     :rem 109
1010 FORT=1TO750:NEXT
                                     :rem 35
1020 PRINT "{CLR}{2 DOWN}"TAB$"SCORE:";SC
                                     :rem 15
1030 IF SC>HS THEN HS=SC
                                     :rem 95
1040 PRINT TAB$"{2 DOWN}HIGH SCORE:";HS
                                     :rem 95

```



```

1050 PRINT TAB$(2 DOWN)HIGHEST POSSIBLE"
:rem 33
1060 PRINT TAB$SCORE:";NL
:rem 30
1070 ER=(SC/NL)*100
:rem 7
1080 PRINT TAB$(2 DOWN)EFFICIENCY"
:rem 140
1090 PRINT TAB$RATING:";ER;"%"
:rem 11
1100 IF SC=0 THEN AT=0:GOTO 1120
:rem 188
1110 AT=INT(TM/SC)
:rem 55
1120 PRINT TAB$(2 DOWN)AVERAGE TIME:";AT
:rem 230
1130 PRINT TAB$({RVS}1{OFF} - GOOD {RVS}
22{OFF} -BAD)"
:rem 9
1140 PRINT TAB$(2 DOWN)WOULD YOU LIKE TO
"
:rem 4
1150 PRINT TAB$PLAY AGAIN? (Y OR N)"
:rem 1
1160 POKE 198,0
:rem 245
1170 AS$="":GET AS$:IF AS$="" THEN 1170
:rem 213
1180 IF AS$="Y" THEN 100
:rem 88
1181 IF AS$<>"N"THEN1170
:rem 195
1190 PRINT "{CLR}":END
:rem 64

```

Machine Language For Beginners

(Article on page 108.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 2: 64 Easydir

```

830 JSR 979
833 JSR 65484
836 JSR 65484
839 LDX #1
841 JSR 65478
844 JSR 65508
847 JSR 65508
850 LDY #29
852 JSR 65508
855 JSR 65490
858 DEY
859 BNE 852
861 LDA #13
863 JSR 65490
866 JMP 896
869 JSR 959
872 JSR 65508
875 CMP #13
877 BEQ 935
879 CMP #34
881 BNE 872
883 JSR 65508
886 CMP #34
888 BEQ 896
890 JSR 65490
893 JMP 883
896 JSR 65508
899 BEQ 914
901 CMP #42
903 BNE 896
905 JSR 65490
908 JSR 65490
911 JMP 896
914 JSR 65508
917 JSR 65508
920 JSR 65508
923 STA 1013
926 JSR 65508
929 STA 1012
932 JMP 869
935 LDA #70
937 JSR 65490
940 LDA #82
942 JSR 65490
945 LDA #69
947 JSR 65490
950 LDA #1
952 JSR 65475
955 JSR 65484
958 RTS
959 LDA #32
961 JSR 65490
964 LDA 1012
967 LDX 1013
970 JSR 48589
973 LDA #45

```

```

975 JSR 65490
978 RTS
979 JSR 65484
982 LDA #1
984 STA 184
986 LDA #8
988 STA 186
990 LDA #0
992 STA 185
994 LDA #2
996 STA 183
998 LDA #242
1000 STA 167
1002 LDA #3
1004 STA 188
1006 JSR 57793
1009 RTS
1010 BIT 48
1012 BRK
1013 BRK

```

Program 2a: VIC Substitutions

```

970 JSR 56781
1006 JSR 57790

```

Program 3: BASIC Loader For Easydir

```

800 FOR ADRES=830TO1011:READ DATTA
810 POKE ADRES,DATTA:NEXT ADRES
830 DATA 32, 211, 3, 32, 204, 255
836 DATA 32, 204, 255, 162, 1, 32
842 DATA 198, 255, 32, 228, 255, 32
848 DATA 228, 255, 160, 29, 32, 228
854 DATA 255, 32, 210, 255, 136, 208
860 DATA 247, 169, 13, 32, 210, 255
866 DATA 76, 128, 3, 32, 191, 3
872 DATA 32, 228, 255, 201, 13, 240
878 DATA 56, 201, 34, 208, 245, 32
884 DATA 228, 255, 201, 34, 240, 6
890 DATA 32, 210, 255, 76, 115, 3
896 DATA 32, 228, 255, 240, 13, 201
902 DATA 42, 208, 247, 32, 210, 255
908 DATA 32, 210, 255, 76, 128, 3
914 DATA 32, 228, 255, 32, 228, 255
920 DATA 32, 228, 255, 141, 245, 3
926 DATA 32, 228, 255, 141, 244, 3
932 DATA 76, 101, 3, 169, 70, 32
938 DATA 210, 255, 169, 82, 32, 210
944 DATA 255, 169, 69, 32, 210, 255
950 DATA 169, 1, 32, 195, 255, 32
956 DATA 204, 255, 96, 169, 32, 32
962 DATA 210, 255, 173, 244, 3, 174
968 DATA 245, 3, 32, 205, 189, 169
974 DATA 45, 32, 210, 255, 96, 32
980 DATA 204, 255, 169, 1, 133, 184
986 DATA 169, 8, 133, 186, 169, 0
992 DATA 133, 185, 169, 2, 133, 183
998 DATA 169, 242, 133, 187, 169, 3
1004 DATA 133, 188, 32, 193, 225, 96
1010 DATA 36, 48

```

Program 3a: VIC Substitutions

```

968 DATA 245, 3, 32, 205, 221, 169
1004 DATA 133, 188, 32, 190, 225, 96

```

Program 4: Direct Machine Language Save Routine

```

10 REM MACHINE LANGUAGE SAVE TO DISK
20 OPEN1,8,1,"0:NAME"
30 INPUT "ML PROGRAM'S STARTING ADDRESS"
;SA
40 INPUT "ITS ENDING ADDRESS";EA:EA=EA+1
:POKE780,253
50 SH=SA/256:SH%=SH:S1=SH-SH%:SL%=S1*256
60 EH=EA/256:EH%=EH:E1=EH-EH%:EL%=E1*256
70 POKE253,SL%:POKE254,SH%:POKE781,EL%:P
OKE782,EH%:SYS 65496:CLOSE1

```


Auto Line

(Article on page 130.)

Program 1: Auto Line—64 Version

```
10 SA=49152:REM CHANGE STARTING ADDRESS T
   O RELOCATE :rem 95
20 FORI=SATOSA+103:READA:X=X+A:POKEI,A:NE
   XT :rem 27
30 SB=SA+29:POKESA+7,INT(SB/256):POKESA+2
   ,SB-INT(SB/256)*256 :rem 51
40 SC=SA+88:POKESA+23,INT(SC/256):POKESA+
   18,SC-INT(SC/256)*256 :rem 162
50 IFX<>11563THENPRINT"ERROR IN DATA STAT
   EMENTS.":STOP :rem 183
60 IN=10:POKESA+46,IN:REM INCREMENT CHANG
   E :rem 89
70 PRINT"{CLR}{RVS}SYS"STR$(SA) TO RUN
   {OFF}":NEW :rem 112
80 DATA 120,169,29,141,2,3,169 :rem 195
90 DATA 192,141,3,3,169,0,133 :rem 138
100 DATA 20,133,21,169,88,141,20 :rem 23
110 DATA 3,169,192,141,21,3,88 :rem 191
120 DATA 96,173,21,3,201,234,208 :rem 27
130 DATA 6,32,138,255,76,131,164 :rem 38
140 DATA 165,20,24,105,10,133,99 :rem 27
150 DATA 165,21,105,0,133,98,162 :rem 30
160 DATA 144,56,32,73,188,32,221 :rem 39
170 DATA 189,162,0,189,1,1,240 :rem 191
180 DATA 6,157,119,2,232,208,245 :rem 39
190 DATA 169,32,157,119,2,232,134 :rem 90
200 DATA 198,76,131,164,32,225,255 :rem 141
210 DATA 208,8,32,138,255,169,13 :rem 40
220 DATA 32,210,255,76,49,234 :rem 145
```

Program 2: Auto Line—VIC Version

Note: If using expansion memory, change line 10 as described in the article.

```
10 POKE56,30:POKE55,0:REM POINTERS TO NOR
   MAL TOP OF MEMORY ON VIC :rem 151
20 PRINT"{CLR}PLACE AT TOP MEMORY,":PRINT
   "OR IN CASSETTE BUFFER" :rem 17
30 INPUT"({RVS}T{OFF})/({RVS}C{OFF})":A$:IF
   A$<>"T"AND A$<>"C"THEN30 :rem 65
40 IF A$="C" THEN SA=828:GOTO70 :rem 152
50 T=PEEK(55)+PEEK(56)*256:T=T-104:POKE56
   ,INT(T/256):POKE55,T-INT(T/256)*256:SA
   =T :rem 232
60 POKE52,INT(T/256):POKE51,T-INT(T/256)*
   256 :rem 35
70 FORI=SATOSA+103:READA:X=X+A:POKEI,A:NE
   XT :rem 32
80 SB=SA+29:POKESA+7,INT(SB/256):POKESA+2
   ,SB-INT(SB/256)*256 :rem 56
90 SC=SA+88:POKESA+23,INT(SC/256):POKESA+
   18,SC-INT(SC/256)*256 :rem 167
100 IF X<>11575 THEN PRINT"ERROR IN DATA
   {SPACE}STATEMENTS.":END :rem 119
110 IN=10:POKESA+46,IN:REM INCREMENT CHAN
   GE :rem 133
120 PRINT"{CLR}{RVS}SYS"STR$(SA) TO RUN
   {OFF}":NEW :rem 156
130 DATA 120,169,89,141,2,3,169 :rem 245
140 DATA 3,141,3,3,169,0,133 :rem 77
```

```
150 DATA 20,133,21,169,148,141,20 :rem 73
160 DATA 3,169,3,141,21,3,88 :rem 91
170 DATA 96,173,21,3,201,234,208 :rem 32
180 DATA 6,32,138,255,76,131,196 :rem 48
190 DATA 165,20,24,105,10,133,99 :rem 32
200 DATA 165,21,105,0,133,98,162 :rem 26
210 DATA 144,56,32,73,220,32,221 :rem 22
220 DATA 221,162,0,189,1,1,240 :rem 174
230 DATA 6,157,119,2,232,208,245 :rem 35
240 DATA 169,32,157,119,2,232,134 :rem 86
250 DATA 198,76,131,196,32,225,255 :rem 151
260 DATA 208,8,32,138,255,169,13 :rem 45
270 DATA 32,210,255,76,191,234 :rem 196
```

Power Basic

(Article on page 158.)

Program 1: Time Clock—VIC Version

```
10 PRINT"{CLR}{RVS}PLEASE WAIT" :rem 198
20 FORI=828TO1002:READA:X=X+A:POKEI,A:NEX
   T :rem 153
30 IF X<>21647 THEN PRINT"ERROR IN DATA S
   TATEMENTS.":END :rem 74
40 SYS828:FR=1004:Z1=1 :rem 12
50 PRINT"{CLR}{4 SPACES}{4 DOWN}CHOOSE:
   {DOWN}" :rem 25
60 PRINT"{4 SPACES}{RVS}{BLK}F1{OFF}{BLU}
   :STOP CLOCK" :rem 237
70 PRINT"{DOWN}{4 SPACES}{RVS}{BLK}F3
   {OFF}{BLU}:START CLOCK" :rem 73
80 PRINT"{DOWN}{4 SPACES}{RVS}{BLK}F5
   {OFF}{BLU}:CLEAR CLOCK" :rem 37
90 PRINT"{DOWN}{4 SPACES}{RVS}{BLK}F7
   {OFF}{BLU}:SET TIME" :rem 112
100 GETA$:IFA$<CHR$(133)ORA$>CHR$(136)THE
   N100 :rem 25
110 ON ASC(A$)-132 GOTO120,170,180,130 :rem 148
120 POKEFR,Z1:GOTO100 :rem 21
130 POKEFR,Z1:INPUT"{CLR}{2 DOWN}HOURS? 0
   0{4 LEFT}":H$:IFLEN(H$)<>2THEN130 :rem 244
140 INPUT"MINUTES? 00{4 LEFT}":M$:IF LEN(
   M$)<>2 THEN 140 :rem 39
150 INPUT"SECONDS? 00{4 LEFT}":S$:IF LEN(
   S$)<>2 THEN 150 :rem 31
160 T$=H$+M$+S$+"00":FORI=1TO8:POKE1005+I
   ,ASC(MID$(T$,I)):NEXT:GOTO50 :rem 252
170 POKEFR,,:GOTO100 :rem 189
180 POKEFR,Z1:SYS853:GOTO100 :rem 244
190 DATA 173,20,3,141,233,3,173 :rem 232
200 DATA 21,3,141,234,3,120,169 :rem 223
210 DATA 100,141,20,3,169,3,141 :rem 218
220 DATA 21,3,169,0,141,236,3 :rem 128
230 DATA 169,48,162,9,157,237,3 :rem 1
240 DATA 202,208,250,88,96,173,236 :rem 146
250 DATA 3,208,53,162,8,24,189 :rem 199
260 DATA 237,3,105,1,141,235,3 :rem 179
270 DATA 201,58,208,5,169,48,141 :rem 44
280 DATA 235,3,138,41,1,240,12 :rem 180
290 DATA 173,235,3,201,54,208,5 :rem 240
300 DATA 169,48,141,235,3,173,235 :rem 89
```



```

310 DATA 3,157,237,3,202,240,7 :rem 182
320 DATA 201,48,208,249,76,107,3 :rem 39
330 DATA 173,238,3,201,50,208,15 :rem 27
340 DATA 173,239,3,201,52,208,8 :rem 241
350 DATA 169,48,141,238,3,141,239 :rem 96
360 DATA 3,162,8,160,12,169,9 :rem 146
370 DATA 133,253,133,251,173,136,2 :rem 131
380 DATA 133,252,165,244,41,254,133 :rem 186
390 DATA 254,173,134,2,145,253,189 :rem 148
400 DATA 237,3,9,128,145,251,138 :rem 39
410 DATA 41,1,240,10,136,169,58 :rem 235
420 DATA 145,251,173,134,2,145,253 :rem 131
430 DATA 136,202,208,225,76,49,234 :rem 141

```

```

450 DATA 4,173,134,2,141,37,216 :rem 237
460 DATA 173,11,220,48,5,169,1 :rem 191
470 DATA 76,117,192,169,16,141,39 :rem 104
480 DATA 4,173,134,2,141,39,216 :rem 242
490 DATA 76,49,234,0,256 :rem 167
500 RETURN :rem 117

```

3-D Labyrinth

(Article on page 96.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 2: Time Clock—64 Version

```

100 Y=PEEK(49269):IFY<>141THENGOSUB270 :rem 37
110 POKE56335,0:PRINT"{CLR}{WHT}":INPUT"A :rem 153
    M OR PM ({RVS}A[OFF]/[RVS]P[OFF])";A$
120 IF A$<>"A" AND A$<>"P" THEN 110 :rem 141
130 B=0:IF A$="P" THEN B=128 :rem 139
140 INPUT"{3 DOWN}TIME (HHMMSS FORMAT)";T :rem 104
    $
150 IF LEN(T$)<>6 THEN 140 :rem 65
160 IF VAL(LEFT$(T$,2))>12 THEN 250 :rem 55
170 IF VAL(MID$(T$,3,2))>59 OR VAL(MID$(T :rem 88
    $,5,2))>59 THEN 250
180 FORA=1TO5STEP2:D=VAL(MID$(T$,A,1)):D= :rem 209
    D*16+VAL(MID$(T$,A+1,1))
190 POKE49154-(A-1)/2,D:NEXTA :rem 120
200 IF LEFT$(T$,2)="12" THEN B=128-B :rem 51
210 POKE49154,PEEK(49154)AND127:POKE49154 :rem 219
    ,PEEK(49154)ORB
220 PRINT"{3 DOWN}{6 SPACES}PRESS ANY KEY :rem 147
    TO START CLOCK"
230 GET A$:IF A$="" THEN 230 :rem 77
240 PRINT"{CLR}":SYS49155:END :rem 76
250 PRINT"{DOWN}ERROR IN INPUT.":FORI=1TO :rem 21
    1000:NEXT:GOTO140
260 REM ML LOADER :rem 204
270 I=49155 :rem 39
280 READ A:IF A=256 THEN 300 :rem 157
290 POKE I,A:I=I+1:X=X+A:GOTO 280:rem 133
300 IF X<>13794 THEN PRINT"ERROR IN DATA :rem 126
    {SPACE}STATEMENTS.":END
310 DATA 162,3,189,255 :rem 60
320 DATA 191,157,8,220,202,208,247 :rem 134
330 DATA 169,0,141,8,220,120,169 :rem 29
340 DATA 32,141,20,3,169,192,141 :rem 27
350 DATA 21,3,88,96,169,58,141 :rem 210
360 DATA 29,4,173,134,2,141,29 :rem 192
370 DATA 216,162,3,160,0,189,8 :rem 194
380 DATA 220,41,112,74,74,74,74 :rem 246
390 DATA 24,105,176,153,30,4,173 :rem 35
400 DATA 134,2,153,30,216,200,189 :rem 73
410 DATA 8,220,41,15,24,105,176 :rem 232
420 DATA 153,30,4,173,134,2,153 :rem 230
430 DATA 30,216,200,202,208,213,173 :rem 166
440 DATA 8,220,24,105,176,141,37 :rem 32

```

```

1 X=PEEK(648)*256:SYS 65517:GP=PEEK(781): :rem 230
    IFGP=40THENCN$=CHR$(13)
2 DIM M$(17,17):O$="{DOWN}[2 SPACES]{RVS} :rem 229
    PRESS ANY KEY":IFGP<>40THENPOKE36879,11
3 FORJ=1TO17:FOR I=2TO16:M$(I,J)=1:M$(17, :rem 172
    J)=1:M$(I,17)=1:M$(I,1)=1:NEXTI,J
4 FORI=3TO16STEP2:FORJ=3TO16STEP2:M$(I,J) :rem 177
    =1:NEXTJ,I:AJ=0:Q$="N"
5 FORK=1TO37:I=INT(RND(1)*15)+2:J=INT(RND :rem 244
    (1)*15)+2:M$(I,J)=1:NEXT:Q=1:B=2:C=2
6 FORI=1TO26:READW:READY:M$(W,Y)=0:NEXT:R :rem 62
    ESTORE:TI$="000000":E=0:D=-1:AI=D
7 POKE198,0:PRINT"{CLR}{WHT}"TAB(10)Q$:IF :rem 35
    M$(B+E,C+D)=1THEN32
8 PRINT"{HOME} {DOWN}M{DOWN}M{DOWN}M :rem 116
    {DOWN}M{DOWN}M{DOWN}M{DOWN}M{DOWN}M
    {DOWN}M{DOWN}M{DOWN}M{DOWN}M{DOWN}M
    {DOWN}M{DOWN}M{DOWN}M{DOWN}M{DOWN}M
    {DOWN}M{DOWN}M"
9 PRINT"~{UP}N{UP}N{UP}N{UP}N{UP}N{UP}N :rem 224
    {UP}N{UP}N{UP}N{UP}N{UP}N{UP}N{UP}N
    INTTAB(13)"{UP}N{UP}N{UP}N{UP}N{UP}N
    {UP}N{UP}N{UP}N{UP}N{UP}N{UP}N{UP}N
10 IF M$(B+AI,C+AJ)=0THENGOSUB58 :rem 88
11 IFM$(B-AI,C-AJ)=0THENGOSUB60 :rem 86
12 IFM$(B+2*E,C+2*D)=1THEN38 :rem 5
13 IFM$(B+2*E+AI,C+2*D+AJ)=0THENGOSUB52 :rem 236
14 IFM$(B+2*E-AI,C+2*D-AJ)=0THENGOSUB54 :rem 243
15 IFM$(B+3*E,C+3*D)=1THEN40 :rem 3
16 IFM$(B+4*E,C+4*D)=1THEN45 :rem 11
17 IFM$(B+4*E+AI,C+4*D+AJ)=0THENGOSUB56 :rem 248
18 IFM$(B+4*E-AI,C+4*D-AJ)=0THENGOSUB57 :rem 254
19 IFM$(B+5*E,C+5*D)=1THEN47 :rem 18
20 GOSUB48:GETQ$:IFQ$=""THEN20 :rem 45
21 IFQ$="Q"THENPRINT"{CLR}":ZS=1:GOSUB63 :rem 36
    GOTO76
22 IFQ$="N"THENE=0:D=-1:AI=-1:AJ=0:GOTO7 :rem 108
23 IFQ$="S"THENE=0:D=1:AI=1:AJ=0:GOTO7 :rem 24
24 IFQ$="E"THENE=1:D=0:AI=0:AJ=-1:GOTO7 :rem 56

```



```

25 IFQ$="W"THEN$=-1:D=0:AI=0:AJ=1:GOTO7          :rem 75
26 IF Q$="H"THENQ$="":GOSUB62:GOTO7              :rem 38
27 IFQ$=" "THENQ$="":GOTO29                        :rem 241
28 GOTO20                                           :rem 5
29 IFM$(B+E,C+D)<>0THEN20                          :rem 136
30 IF M$(B+2*E,C+2*D)=1THEN20                    :rem 252
31 B=B+2*E:C=C+2*D:GOTO7                          :rem 99
32 PRINT"{HOME}O[20 Y]P";CR$;:FORI=1TO19        :rem 72
33 PRINT"[G]{20 SPACES}[M]";CR$;:NEXT            :rem 4
34 PRINT"L[20 P]@[HOME]"                          :rem 125
35 PRINT"[HOME]";TAB(10)Q$:IFB+E=2ANDC+D=        :rem 10
  1ANDQ$="N"THENPRINTTAB(8)"{UP}{RVS}STA
  RT"
36 IFB=16ANDC=16ANDQ$="S"THENPRINTTAB(7);      :rem 2
  "{WHT}{5 DOWN}{RVS}FINISH":FORI=1TO300
  :NEXT
37 GOTO20                                           :rem 5
38 PRINT"{HOME}{4 DOWN}{4 RIGHT}O[12 Y]P"      :rem 92
  :FORI=1TO12:PRINT"[4 RIGHT][G]
  {12 SPACES}[M]":NEXT
39 PRINT"[4 RIGHT]L[12 P]@":GOTO20:rem 64
40 PRINT"{HOME}{5 DOWN}{5 RIGHT}O[10 Y]P"      :rem 252
  :FORI=1TO10:PRINTTAB(5)"[G]{10 SPACES}
  [M]":NEXT
41 PRINTTAB(5)"L[10 P]@"                          :rem 239
42 IFB=2ANDC=3=1ANDQ$="N"THENPRINT"{HOME}
  {7 DOWN}"TAB(10)"{RVS}S"                      :rem 93
43 IFB=16ANDC+3=17ANDQ$="S"THENPRINT"
  {HOME}{7 DOWN}"TAB(10)"{RVS}F":rem 192
44 GOTO20                                           :rem 3
45 PRINT"{HOME}{8 DOWN}"TAB(8)"O[4 Y]P
  {DOWN}{6 LEFT}[G]{4 SPACES}[M]{DOWN}
  {6 LEFT}[G]{4 SPACES}[M]{DOWN}{6 LEFT}
  [G]{4 SPACES}[M]"                             :rem 21
46 PRINTTAB(8)"[G]{4 SPACES}[M]{DOWN}
  {6 LEFT}L[4 P]@":GOTO20                      :rem 189
47 PRINT"{HOME}":PRINTTAB(9)"{8 DOWN}O
  [2 Y]P{DOWN}{4 LEFT}[G]{2 SPACES}[M]
  {DOWN}{4 LEFT}[G]{2 SPACES}[M]{DOWN}
  {4 LEFT}L[2 P]@":GOTO20                      :rem 48
48 IFB<>16ORC<>16ORQ$<>"S"THENRETURN          :rem 25
49 FORI=1TO1E3:NEXT:PRINT"{CLR}{3 DOWN}"TAB(5)"YOU MADE IT":PRINTTAB(5)"IN"VAL(TI$)"SEC" :rem 6
50 PRINT"{2 DOWN}"TAB(4)"{RVS}PRESS ANY KEY"    :rem 104
51 FORI=1TO1E3:NEXT:POKE198,0:GOSUB73:PRINT"{CLR}":GOTO63 :rem 206
52 PRINT"{HOME}{3 DOWN}{RIGHT}{DOWN}
  {2 RIGHT}[M]{DOWN}{2 LEFT}[M]P{DOWN}
  {2 LEFT}[2 M]{DOWN}{2 LEFT}[2 M]{DOWN}
  {2 LEFT}[2 M]{DOWN}{2 LEFT}[2 M]{DOWN}
  {2 LEFT}[2 M]{DOWN}{2 LEFT}[2 M]{DOWN}
  {2 LEFT}[2 M]{DOWN}{2 LEFT}[2 M]{DOWN}
  {2 LEFT}[2 M]{DOWN}{2 LEFT}[2 M]";
  :rem 132
53 PRINT"{DOWN}{2 LEFT}[M]@[DOWN]{2 LEFT}
  [M]":RETURN :rem 241
54 PRINT"{HOME}":PRINTTAB(17)"{3 DOWN}
  [G]{DOWN}{2 LEFT}O[G]{DOWN}{2 LEFT}
  [2 G]{DOWN}{2 LEFT}[2 G]{DOWN}{2 LEFT}
  [2 G]{DOWN}{2 LEFT}[2 G]{DOWN}{2 LEFT}
  [2 G]{DOWN}{2 LEFT}[2 G]"; :rem 98
55 PRINT"[DOWN]{2 LEFT}[2 G]{DOWN}
  {2 LEFT}[2 G]":PRINTTAB(17)"L[G]{DOWN}

```

```

    {2 LEFT} {G}":RETURN                                :rem 123
56 PRINT"{HOME}"TAB(7)"{8 DOWN}{M} {DOWN}"
    {2 LEFT}{M}P{DOWN}{2 LEFT}{2 M}{DOWN}
    {2 LEFT}{2 M}{DOWN}{2 LEFT}{M}@{DOWN}
    {2 LEFT}{M}":RETURN                                :rem 205
57 PRINT"HOME":PRINTTAB(13)"{7 DOWN}"
    {G}{DOWN}{2 LEFT}O{G}{DOWN}{2 LEFT}
    {2 G}{DOWN}{2 LEFT}{2 G}{DOWN}{2 LEFT}
    L{G}{DOWN}{2 LEFT} {G}":RETURN:rem 178
58 PRINT"HOME" {DOWN}{LEFT}P{DOWN}{LEFT}
    {M}{DOWN}{LEFT}{M}{DOWN}{LEFT}{M}
    {DOWN}{LEFT}{M}{DOWN}{LEFT}{M}{DOWN}
    {LEFT}{M}{DOWN}{LEFT}{M}{DOWN}{LEFT}
    {M}{DOWN}{LEFT}{M}{DOWN}{LEFT}{M}
    {DOWN}{LEFT}{M}{DOWN}{LEFT}{M}{DOWN}
    {LEFT}{M}{DOWN}{LEFT}{M}{DOWN}{LEFT}
    {M}{DOWN}{LEFT}{M}{DOWN}{LEFT}{M}
    {DOWN}{LEFT}{M}{DOWN}{LEFT}@{DOWN}
    {LEFT} {HOME}"                                :rem 242
59 RETURN                                                :rem 78
60 FORI=X+(2*GP)TOX+(21*GP)STEPGP:POKEI,1
    01:NEXT:POKEX,32                                :rem 67
61 POKEX+(1*GP),79:POKEX+(20*GP),76:POKEX
    +(21*GP),32:RETURN                                :rem 253
62 PRINT"{CLR}{2 SPACES}YOU ARE HERE":ZS=
    1                                                :rem 26
63 FORJ=1TO17:FORI=1TO17                                :rem 246
64 IFM%(I,J)=1THENPRINT"{RVS} {OFF}";:GOT
    068                                                :rem 169
65 IFI=BANDJ=CTHENPRINT"{CYN}Z{WHT}";:GOT
    068                                                :rem 249
66 IFM%(I,J)=5THENPRINT"R";:GOTO68:rem 93
67 PRINT"{RIGHT}";                                :rem 150
68 NEXTI:PRINT"":NEXTJ                                :rem 196
69 IF ZSTHENZS=0:RETURN                                :rem 14
70 POKE198,0:PRINT0$:GOSUB73:CLR:GOTO1
                                                :rem 177
71 DATA2,2,2,3,2,4,4,2,4,4,4,3,16,14,16,1
    6,14,16,15,16,14,14,8,5,8,6,8,7
                                                :rem 209
72 DATA8,8,8,9,8,10,14,8,14,9,14,10,3,2,2
    ,5,5,2,12,10,10,10,6,6
                                                :rem 23
73 GETA$:IFA$=""THEN73                                :rem 247
74 IFA$="Q"THENPOKE198,0:SYS198                    :rem 104
75 PRINT"{CLR}":RETURN                                :rem 234
76 PRINT0$:WAIT198,1:POKE198,0:SYS198
                                                :rem 29

```

Programming Commodore's Magic Voice

(Article on page 161.)

Finger Talk

Note: This program is designed for use with a 64 equipped with the Magic Voice module.

```

10 DIM C$(10),EQ$(40),HO$(40),T$(20):GOTO
   80                                     :rem 189
20 FORI=1TO40:IFK$=HO$(I)THENK$=EQ$(I):I=
   40                                     :rem 36
30 NEXT:FORI=1TO3                       :rem 80
40 IFK$<>H1$(I)THEN60                  :rem 168
50 K$=E1$(I):SAYK$:T$(W)=K$:W=W+1:K$=E1$(
   I+3):I=3                             :rem 205
60 NEXT:RETURN                          :rem 191

```



```

70 FORI=0TOW-1:SAYT$(I):NEXT:FORI=0TOW-1:
  T$(I)="":NEXT:W=0:RETURN :rem 155
80 POKE49457,76:POKE49458,174:POKE49459,1
  67:REM AVERT ILLEGAL QTY ERROR:rem 224
90 FORK=1TO10:READC$(K)=CHR$(C):NEXT:RE
  M EDITING COMMANDS :rem 162
100 FORI=1TO40:READH$(I),EQ$(I):NEXT:REM
  HOMONYMS & EQUIVALENTS :rem 55
110 FORI=1TO3:READH1$(I):NEXT:FORI=1TO6:R
  EADE1$(I):NEXT:REM 2-PART EQUIVALENTS
  :rem 197
120 POKE53281,1:POKE53280,6:POKE53272,23:
  REM SCREEN COLORS & LOWERCASE:rem 103
130 PRINT"[CLR]{8 DOWN}{7 RIGHT}{RVS}
  {RED}{7 RIGHT}FINGER TALK{8 RIGHT}"
  :rem 19
140 PRINT"[5 DOWN]":INPUT"[12 RIGHT]{RVS}
  {GRN}RATE (1-10){RIGHT}{OFF}":RT$
  :rem 197
150 RT=VAL(RT$):IFRT<1ORRT>10THEN130
  :rem 252
160 PRINT "{4 DOWN}{PUR}{9 RIGHT}SAY EACH
  LETTER (Y/N) ?" :rem 1
170 GETA$:IFA$="":ORA$<>"Y"ANDA$<>"N"THEN1
  70 :rem 180
180 PL=-(A$="Y") :rem 47
190 GOSUB380 :rem 181
200 PRINT"[P]{LEFT}":RATE(RT):RT=(RT=10)
  *10+RT:POKE1024,RT+48:POKE55296,0
  :rem 190
210 GETA$:IFA$="":THEN210 :rem 73
220 IFPOS(0)>78THENA$=CHR$(13) :rem 202
230 PRINT "{LEFT}":T=0:FORI=1TO10:IFA$=C
  $(I)THEN T=T+1 :rem 171
240 NEXTI:IFT=3ORT=8THENPRINTC$(8):GOSUB3
  80 :rem 22
250 IFT=2ORT=4ORT=7THENPRINTA$:IFT=4ANDL
  EN(K$)>0THENK$=MID$(K$,1,LEN(K$)-1)
  :rem 161
260 IFT<>0THEN200 :rem 230
270 IFA$=CHR$(133)THENRT=RT+1+(RT=10)*10:
  GOTO200 :rem 23
280 IFA$>CHR$(192)ANDA$<CHR$(218)THENPRIN
  TA$:A$=CHR$(ASC(A$)-128):GOTO360
  :rem 6
290 IFA$<>CHR$(32)THEN320 :rem 132
300 IFK$="":THENPRINTA$:GOTO200 :rem 115
310 GOSUB20:PRINTA$:SAYK$:T$(W)=K$:K$=""
  :W=W+1:GOTO200 :rem 41
320 IFA$<>CHR$(13)THEN350 :rem 128
330 IFK$="":THENPRINTA$:GOSUB70:GOTO200
  :rem 151
340 GOSUB20:T$(W)=K$:K$="" :W=W+1:PRINTA$:
  :GOSUB70:GOTO200 :rem 183
350 PRINTA$: :rem 197
360 K$=K$+A$:IFPL=1THEN:SAYA$ :rem 210
370 GOTO200 :rem 101
380 PRINT"[CLR]{RVS}{GRN}{4 SPACES}LET YO
  UR {RED} FINGERS {CYN} DO THE {RED} T
  ALKING {OFF}{WHT}{BLU}":RETURN
  :rem 150
390 DATA 17,18,19,20,29,145,146,147,148,1
  57 :rem 85
400 REM 17=CD 18=RVS 19=HM 20=DEL 29=CR 1
  45=CU 146=ROFF 147=CLR 148=INST 157=C
  L :rem 225
410 DATA AD,ADD,BEE,B,SEE,C,SEA,C,GEE,G,G
  RAY,GREY,EYE,I,INN,IN,JAY,J :rem 139
420 DATA MOOR,MORE,KNOT,NOT,ORE,OR,OAR,OR
  ,PEA,P,QUEUE,Q,TEA,T,TEE,T,TIE,TY
  :rem 46

```

```

430 DATA EWE,U,EWES,USE,WEE,WE :rem 97
440 DATA #,NUMBER,&,AND,',APOSTROPHE,*,TI
  MES,+,PLUS,-,MINUS :rem 123
450 DATA 0,ZERO,1,ONE,2,TWO,3,THREE,4,FOU
  R,5,FIVE,6,SIX,7,SEVEN,8,EIGHT:rem 83
460 DATA 9,NINE,=,EQUALS,?,QUESTION,@,AT
  :rem 223
470 DATA /,<,>,DIVIDED,LESS,MORE,BY,THAN,
  THAN :rem 18

```

Cassette Index

(Article on page 88.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

```

1 SYS65517 :rem 56
2 IFPEEK(781)=40THENMT$="{WHT}":GOTO4
  :rem 153
3 MT$="{BLU}" :rem 152
4 PRINTMT$:PRINT"[CLR]{10 DOWN}{4 RIGHT}
  {RVS}CASSETTE INDEX" :rem 40
5 FORQ=1TO2000:NEXT :rem 185
6 PRINT"[CLR]{2 DOWN}{3 RIGHT}{RVS}CASSE
  TE INDEX{OFF}":PRINT"[DOWN] TO USE THIS
  INDEX:" :rem 33
7 PRINT"[DOWN]{RIGHT}1 RESET CASSETTE"
  :rem 70
8 PRINT"[3 SPACES]COUNTER TO 000" :rem 92
9 PRINT"[DOWN]{RIGHT}2 FIND PROGRAM AND"
  :rem 118
10 PRINT"[3 SPACES]LOCATION" :rem 139
11 PRINT"[5 SPACES](NEXT PAGE)" :rem 224
12 PRINT"[DOWN]{RIGHT}3 ADVANCE TAPE USIN
  G" :rem 55
13 PRINT"[3 SPACES]F.FWD, TO LOCATION"
  :rem 178
14 PRINT"[3 SPACES]DESIRED" :rem 54
15 PRINT"[DOWN]{RIGHT}4 STOP TAPE & FOLLO
  W" :rem 2
16 PRINT"[3 SPACES]{RVS}LOAD{OFF} INSTRU
  CTIONS:PRINT"[DOWN] {RVS}PRESS A KEY T
  O BEGIN{OFF}" :rem 48
17 GETAN$:IFAN$="":GOTO17 :rem 153
18 PRINT"[CLR]{2 DOWN}{3 RIGHT}{RVS}CASSE
  TTE INDEX{OFF}":PRINT"[DOWN]THIS CASSE
  TTE HAS" :rem 74
19 PRINT"THE FOLLOWING PROGRAMS" :rem 56
20 PRINT"AT THE APPROXIMATE":PRINT"COUNT
  E R READING SHOWN:{DOWN}" :rem 242
21 READA$:READB$ :rem 160
22 PRINTA$TAB(14)B$ :rem 73
23 FORX=1TO8 :rem 237
24 READA$ :rem 231
25 IFA$="-1"GOTO33 :rem 217
26 READB$ :rem 234
27 IFB$="-1"GOTO33 :rem 220
28 PRINTTAB(1)A$TAB(16)B$ :rem 170
29 NEXTX :rem 2
30 PRINT:PRINT"PRESS KEY TO CONTINUE"
  :rem 121
31 GETP$:IFP$="":GOTO31 :rem 19

```



```

32 IFA$<>"-1"GOTO18:IFB$<>"-1"GOTO18      :rem 4
33 PRINT:PRINT"[BLK]{2 SPACES}** END OF I    :rem 223
   NDEX **"MT$
34 PRINT"[HOME]{20 DOWN}SHOW AGAIN (Y/N)"    :rem 31
   ;:INPUTAN$
35 IFAN$="Y"THENGOTO38                        :rem 87
36 IFAN$<>"N"THENGOTO34                       :rem 134
37 END                                         :rem 65
38 RESTORE:GOTO18                            :rem 107
39 DATAPROGRAM NAME,COUNTER,DUMMY NAME01,    :rem 240
   000,DUMMY NAME02,000,DUMMY NAME03,000
40 DATADUMMY NAME04,000,DUMMY NAME05,000,    :rem 60
   DUMMY NAME06,000,DUMMY NAME07,000
41 DATADUMMY NAME08,000,PROGRAM NAME,COUN    :rem 245
   TER,DUMMY NAME09,000,DUMMY NAME10,000
42 DATADUMMY NAME11,000,DUMMY NAME12,000,    :rem 54
   DUMMY NAME13,000,DUMMY NAME14,000
43 DATADUMMY NAME15,000,DUMMY NAME16,000,    :rem 250
   PROGRAM NAME,COUNTER,DUMMY NAME17,000
44 DATADUMMY NAME18,000,DUMMY NAME19,000,    :rem 204
   DUMMY NAME20,000,DUMMY NAME21,000,-1

```

Disk/Tape Backup

(Article on page 164.)

```

10 SYS65517:IFPEEK(781)=40THENMT$="{WHT}"    :rem 56
   :GOTO30
20 MT$="{BLU}"                                :rem 199
30 GOSUB1500:IFBR$="R"THEN450                 :rem 205
40 FORS1=K1TONF:GOSUB930                     :rem 21
50 GET#FP,A$:A$=MID$(A$+C0$,K1,K1):ZT=ST      :rem 253
60 BK=BK+K1:PRINT UP$;TAB(17);BK:R$=""       :rem 184
70 GETI$:IFI$<>" "GOTO330                     :rem 119
80 LB$=A$:LB=ASC(LB$):NE=K1                  :rem 33
90 IFZTTHENGOSUB150:GOSUB220:GOTO250        :rem 67
100 GET#FP,A$:A$=MID$(A$+C0$,K1,K1):ZT=ST    :rem 41
110 IFLEN(R$)>CMTHENGOSUB150:GOSUB220:GOT    :rem 1
   O60
120 IFLB$<>A$THEN140                          :rem 119
130 IFNE<250THENNE=NE+K1:GOTO90              :rem 158
140 GOSUB150:GOTO80                          :rem 134
150 IFNE>K1GOTO190                           :rem 69
160 IFLB<CSTHENR$=R$+LB$:RETURN              :rem 213
170 IFLB<233 OR LB=245THENR$=R$+CHR$(230)    :rem 241
   +LB$:RETURN
180 R$=R$+LB$:RETURN                          :rem 185
190 IFLB=SPTHENR$=R$+CS$+CHR$(NE):RETURN     :rem 254
200 IFLB=DATHENR$=R$+CHR$(245)+CHR$(NE):R    :rem 11
   ETURN
210 R$=R$+CHR$(231)+CHR$(NE)+LB$:RETURN      :rem 214
220 L$=MID$(STR$(LEN(R$)+K4),K2):rem 247
230 PRINT#1,MID$(L$+SP$,K1,K3);"D";R$;      :rem 84
240 NB=NB+LEN(R$)+4:RETURN                   :rem 61

```

```

250 GOSUB410:PRINT UP$;TAB(30);NB:rem 205
260 GOSUB2490:CLOSE FP                      :rem 45
270 NEXTS1                                  :rem 92
280 PRINT"TO RESTORE FILES LOAD THIS";      :rem 56
290 PRINT" PROGRAM FROM THE BACKUP TAPE"    :rem 121
300 GOSUB 860                               :rem 177
310 FORSL=K1TO20:NEXT                      :rem 81
320 GOTO 2480                               :rem 156
330 PRINT"Q QUIT, SPACE CONTINUE":rem 248
340 GETI$:IFI$=" "GOTO340                  :rem 107
350 IFI$<>"Q"GOTO370                        :rem 118
360 CLOSEFP:AN$="A":GOSUB410:GOTO2480      :rem 228
370 PRINT UP$ "{23 SPACES}" UP$           :rem 253
380 PRINT CHR$(18) " P TO PAUSE" CHR$(146  :rem 41
   ) UP$:GOTO80
390 PRINT#1,"024F";MID$(NA$+SP$,K1,16);MI    :rem 165
   D$(TY$,K1,K1);MID$(LN$+SP$,K1,K3);
400 NB=NB+24:RETURN                         :rem 156
410 PRINT#1,"005E";AN$:NB=NB+8:PRINT#1,C0    :rem 96
   $;C0$;C0$;:CLOSE1:RETURN
420 EN=LEN(DT$)                             :rem 82
430 IFASC(MID$(DT$,EN,1))<>160THENRETURN     :rem 149
440 DT$=LEFT$(DT$,EN-K1):GOTO420           :rem 94
450 GOSUB1110                               :rem 220
460 FOR S1=K1TONF                          :rem 245
470 BK=K0:NA$=NA$(S1):TY$=TY$(S1):rem 128
480 OPEN 1,1,0:NB=NB+300:GOSUB840:rem 99
490 FM$="":PRINT:PRINT UP$ CHR$(18) " FOU    :rem 19
   ND" CHR$(146) " ";
500 IFRC$<>"F"THENCLOSE1:GOTO480           :rem 198
510 FORX=K1TO16:GET#1,I$:FM$=FM$+I$:NEXT    :rem 149
520 PRINT FM$:GET#1,A$,A$,A$,A$           :rem 141
530 IFFM$=NA$GOTO580                       :rem 164
540 GOSUB840:IFRC$="N"THENCLOSE1:GOSUB152    :rem 109
   0:GOTO480
550 NB=NB+LN:FORX=K1TOLN-K4:GET#K1,A$:NEX    :rem 240
   T:GOSUB840
560 IFRC$="D"GOTO550                       :rem 123
570 CLOSE1:GOTO480                         :rem 82
580 X=LEN(NA$):IFMID$(NA$,X,K1)=" "THENNA    :rem 147
   $=MID$(NA$,K1,X-K1):GOTO580
590 OPENFP,8,FP,"@0:"+NA$+C0$+TY$+"W"      :rem 83
600 GOSUB840:IFRC$="D"GOTO640              :rem 204
610 IFRC$="E"GOTO760                        :rem 123
620 IFRC$="N"THENGOSUB1510:GOTO470:rem 51
630 PRINT " EXPECTED D OR E":GOTO2480      :rem 39
640 BK=BK+K1:PRINT UP$;TAB(24);BK:rem 185
650 L=0                                      :rem 84
660 L=L+K1:IFL>LN-K4GOTO600               :rem 128
670 GET#1,A$:A$=MID$(A$+C0$,K1,K1):A=ASC(    :rem 73
   A$)
680 IFA<230THENPRINT#FP,A$;:GOTO660       :rem 143
690 IFA=230THENGET#1,A$:L=L+K1:A$=MID$(A$    :rem 232
   +C0$,K1,K1):PRINT#FP,A$;:GOTO660
700 IFA=231THEN730                         :rem 3
710 IFA=232 OR A=245 THEN750               :rem 193
720 PRINT#FP,A$;:GOTO660                  :rem 186
730 GET#1,A$,A1$:L=L+K2:A1$=MID$(A1$+C0$,    :rem 220
   K1,K1)
740 FORX=K1TOASC(A$):PRINT#FP,A1$;:NEXT:G    :rem 200
   OTO660

```



```

750 GET#1,A1$:L=L+K1:FORX=K1TOASC(A1$):PR
INT#FP,CHR$(A-200);:NEXT:GOTO660
:rem 156
760 GOSUB2490:CLOSE1:CLOSE FP :rem 19
770 IF A$<>"A"GOTO820 :rem 100
780 PRINT " FILE'" NA$ "' IS INCOMPLETE
:rem 63
790 PRINT"Q TO QUIT, SPACE TO CONTINUE
:rem 38
800 GETA$:IFA$="GOTO800 :rem 93
810 IFA$="Q"GOTO2480 :rem 102
820 NEXT S1:GOSUB860 :rem 181
830 FORSL=K1TO20:NEXT:GOTO2480 :rem 153
840 GET#1,L1$,L2$,L3$,RC$ :rem 31
850 LN=VAL(L1$+L2$+L3$):NB=NB+LN:RETURN
:rem 90
860 TT=VAL(MID$(TI$,K1,K2))*3600+VAL(MID$
(TI$,K3,K2))*60 :rem 93
870 TT=TT+INT(NB/25):HH=INT(TT/3600)
:rem 156
880 MM=INT((TT-HH*3600)/60) :rem 241
890 HH$=MID$(STR$(HH),2):IFLEN(HH$)<2THEN
HH$="0"+HH$ :rem 203
900 MM$=MID$(STR$(MM),2):IFLEN(MM$)<2THEN
MM$="0"+MM$ :rem 245
910 TI$=HH$+MM$+"00":PRINT "ESTIMATED TIM
E=";TI$ :rem 23
920 RETURN :rem 123
930 NA$=NA$(S1):TY$=TY$(S1) :rem 2
940 IFNB+LN(S1)*(BD+5)+BH<TB GOTO1050
:rem 61
950 OPEN 1,1,1,NA$:GOSUB390 :rem 240
960 PRINT#1,"004N";:CLOSE1 :rem 238
970 PRINT " LOAD ANOTHER CASSETTE"
:rem 254
980 PRINT "{3 SPACES}TYPE Q TO QUIT,"
:rem 23
990 PRINT "{2 SPACES}SPACE TO CONTINUE"
:rem 231
1000 GETA$:IF A$="" THEN1000 :rem 165
1010 IF A$="Q" GOTO2480 :rem 143
1020 PRINT " TAPE SIZE (MIN) ";TM:MID$(BS
$,1,LEN(STR$(TM))+2); :rem 173
1030 INPUT TM$:IFTM$=""THENTM$=STR$(TM)
:rem 104
1040 TB=VAL(TM$)*BM:GOSUB860:NK=K0:rem 36
1050 PRINT SP$;CR$ :rem 14
1060 PRINT"{4 SPACES}{UP}{RVS}P TO PAUSE
{OFF}":PRINTUP$ UP$ :rem 151
1070 PRINTNA$:BK=K0 :rem 135
1080 LN$=MID$(STR$(LN(S1)),K2) :rem 153
1090 OPEN FP,8,FP,"0:"+NA$+CO$+TY$+",R"
:rem 58
1100 OPEN 1,1,1,NA$:NB=NB+BH:GOSUB390:RET
URN :rem 122
1110 PRINT "{DOWN} FORMAT DISK (N OR Y)"
:rem 50
1120 INPUT " ";A$ :rem 56
1130 IFA$<>"Y"GOTO1200 :rem 204
1140 ND$="":PRINT "{DOWN} DISK NAME";
:rem 160
1150 INPUTND$:IFND$=""GOTO1200 :rem 9
1160 ID$="":PRINT " DISK ID{2 SPACES}";
:rem 248
1170 INPUTID$:IFID$=""GOTO1200 :rem 1
1180 PRINT#15,"N0: ";ND$;";";ID$ :rem 144
1190 GOSUB 2490:IFELTHEN2490 :rem 87
1200 PRINT " OPEN DTB.ID.FILE" :rem 169
1210 OPEN 1,1,0,"DTB.ID.FILE" :rem 51
1220 NB=NB+300 :rem 224
1230 GOSUB840 :rem 226
1240 GET#1,A$ :rem 140
1250 IFA$<>VN$ THENPRINT " VERSION ERROR"
:GOTO2480 :rem 239
1260 PRINT "{CLR}{DOWN} FROM DISK:";
:rem 18
1270 FORX=1TO20:GET#1,A$:PRINT A$;:NEXT
:rem 91
1280 PRINT:PRINT "BACKED UP ON{2 SPACES}D
ATE:"; :rem 210
1290 FORX=1TO8 :GET#1,A$:PRINT A$;:NEXT
:rem 51
1300 PRINT " TIME:"; :rem 57
1310 FORX=1TO6 :GET#1,A$:PRINT A$;:NEXT
:rem 42
1320 PRINT :rem 83
1330 NF=0 :rem 200
1340 GOSUB840 :rem 228
1350 IFRC$="F" THEN1380 :rem 211
1360 IFRC$="E" THEN CLOSE1:RETURN:rem 200
1370 PRINT " REC CD ERROR":GOTO2480
:rem 200
1380 NA$="":FORX=1TO16:GET#1,A$:PRINTA$;
:rem 87
1390 NA$=NA$+A$:NEXT :rem 121
1400 GET#1,TY$:PRINT " TY$ " "; :rem 81
1410 GET#1,A$,A2$,A3$:PRINT A$;A2$;A3$;
:rem 30
1420 PRINT:IFAF$="Y"THEN1480 :rem 158
1430 PRINT UP$:PRINT"BKUP Y OR N";
:rem 222
1440 YN$="":INPUT YN$ :rem 170
1450 IFMID$(YN$+"Y",K1,K1)="Y"GOTO1480
:rem 107
1460 IF YN$="N"GOTO1340 :rem 245
1470 GOTO1430 :rem 205
1480 NF=NF+K1 :rem 217
1490 NA$(NF)=NA$:TY$(NF)=TY$:GOTO1340
:rem 143
1500 RETURN :rem 166
1510 CLOSEFP:CLOSE1 :rem 180
1520 PRINT" LOAD CONTINUATION TAPE"
:rem 126
1530 PRINT" TYPE Q TO QUIT" :rem 19
1540 PRINT"{6 SPACES}SPACE TO CONTINUE"
:rem 15
1550 GETA$:IFA$="GOTO1550 :rem 195
1560 IFA$="Q"GOTO2480 :rem 153
1570 GOSUB860:NK=0:RETURN :rem 60
1580 DIM LN(150),NA$(150),T$(4),TY$(150)
:rem 252
1590 BH=300:BD=256:BK=0:BM=840:BO=53280:C
M=250:CS=230:DA=45:DIR=8:FP=5:rem 24
1600 K0=0:K1=1:K2=2:K3=3:K4=4 :rem 75
1610 NB=0:NC=0:NE=0:NF=0:PS=8000:SP=32:TB
=0:TM=60 :rem 142
1620 AF$="":AN$="N":BR$="":FORX=1TO40:BS$
=BS$+CHR$(157):NEXT :rem 142
1630 C0$=CHR$(0):CB$="":CO$="":CS$=CHR$(
232) :rem 59
1640 DA$="":DN$="":FM$="":RC$="":SP$="
{9 SPACES}":SP$=SP$+SP$+SP$:UP$=CHR$
(145) :rem 227
1650 VN$="2" :rem 71
1660 OPEN15,8,15:POKE BO,0 :rem 177
1670 PRINTMT$:PRINTCHR$(147):PRINT"
{2 SPACES}DISK TO TAPE BACKUP
{2 DOWN}" :rem 176
1680 T$(K0)="DEL":T$(1)="SEQ":T$(2)="PRG"
:T$(3)="USR":T$(4)="REL" :rem 242
1690 PRINT"BACKUP OR RESTORE":INPUT"(B OR
R)";BR$ :rem 163

```



```

1700 BR$=MID$(BR$+" ",1,1) :rem 237
1710 IF BR$<>"B" AND BR$<>"R" GOTO2480 :rem 66
:rem 178
1720 PRINT"[DOWN]PROCESS ALL FILES":INPUT :rem 11
"(Y OR N)":AF$ :rem 88
1730 AF$=MID$(AF$+"Y",1,1) :rem 47
1740 IF AF$<>"Y" AND AF$<>"N" GOTO2480 :rem 113
:rem 174
1750 IF BR$="R"THEN1890 :rem 115
1760 PRINT "[DOWN]TAPE SIZE (MIN) ";TM;MI :rem 115
D$(BS$,1,LEN(STR$(TM))+2); :rem 201
1770 INPUT TM$:IFTM$=" "THENTM$=STR$(TM) :rem 115
:rem 115
1780 TM=VAL(TM$):TB=TM*BM :rem 14
1790 OPEN 3,8,3,"0:SYS DATE,S,R" :rem 237
1800 INPUT#15,E1,E2$,E3,E4 :rem 148
1810 IF E1 THEN D$="00/00/00":GOTO1830 :rem 164
:rem 164
1820 INPUT#3,D$ :rem 69
1830 CLOSE3 :rem 117
1840 PRINT "{DOWN} MM/DD/YY "; :rem 28
1850 INPUT DA$:IF DA$=" " THEN DA$=D$ :rem 119
:rem 119
1860 IF D$=DA$ GOTO1890 :rem 183
1870 DA$=MID$(DA$+"{8 SPACES}",1,8):OPEN :rem 179
{SPACE}3,8,3,"0:SYS DATE,S,W": :rem 245
1880 GOSUB2490:PRINT#3,DA$:CLOSE3:rem 245
1890 T$=TI$ :rem 72
1900 PRINT "{DOWN} HHMM{5 SPACES}? "T$;MI :rem 153
D$(BS$,1,LEN(T$)+2); :rem 153
1910 INPUT T$:TI$=MID$(T$+"000000",1,6) :rem 32
:rem 32
1920 IF BR$="R"THENRETURN :rem 245
1930 PRINT"{CLR}{2 SPACES}READING DIRECTO :rem 63
RY{DOWN}":OPEN DIR,8,DIR,"$": :rem 26
1940 FOR L=K1 TO 142:GET#DIR,A$:NEXT :rem 227
:rem 227
1950 DN$=" ":FORL=K1TO16:GET#DIR,A$ :rem 118
:rem 118
1960 DN$=DN$+A$:NEXT:PRINT "{CLR} DISK:"D :rem 185
N$; :rem 185
1970 DT$=DN$:GOSUB420:DN$=DT$ :rem 157
1980 GET#DIR,A$,A$,I1$,I2$,A$,O1$,O2$ :rem 84
:rem 84
1990 PRINT" ID:";I1$;I2$;:PRINT" OS:";O1$ :rem 232
;O2$"{DOWN}" :rem 196
2000 FOR L=K1TO89:GET#DIR,A$:NEXT:rem 232
2010 NF=0 :rem 165
2020 RB=DIR:R$="" :rem 165
2030 FORR=K1TO254:GET#RB,A$:R$=R$+MID$(A$ :rem 239
+C0$,K1,K1):NEXT:ZS=ST :rem 192
2040 B=K0 :rem 129
2050 PRINT"{CLR} DISK:"DN$; :rem 214
2060 PRINTTAB(23)"ID:";I1$;I2$;:PRINT" OS :rem 148
: ";O1$;O2$"{DOWN}" :rem 141
2070 FOR P=K1 TO 8 :rem 141
2080 T=ASC(MID$(R$,B+K1)):IFT=K0THENT=128 :rem 237
:rem 237
2090 L=ASC(MID$(R$,B+29)):H=ASC(MID$(R$,B :rem 227
+30)) :rem 227
2100 L=(L+256*H):IFL=K0THEN2200 :rem 227
2110 N$=MID$(R$,B+K4,16) :rem 155
2120 TY$=T$(T-128):IF TY$="DEL"THEN2200 :rem 38
:rem 38
2130 DT$=N$:GOSUB420:N$=DT$ :rem 111
2140 PRINT L;TAB(4);TY$;"{2 SPACES}";N$ :rem 214
:rem 214
2150 IFAF$="Y" THEN PRINT:GOTO2180 :rem 202
:rem 202
2160 PRINT" Y/N ? Y";MID$(BS$,1,3); :rem 135

```

```

2170 YN$=" ":INPUTYN$:IFYN$="N"GOTO2200 :rem 11
:rem 88
2180 NF=NF+K1:NA$(NF)=N$ :rem 113
2190 TY$(NF)=MID$(TY$,K1,K1):LN(NF)=L :rem 115
:rem 115
2200 B=B+32:NEXT P:PRINT"[DOWN]{2 SPACES} :rem 115
PLEASE WAIT..." :rem 172
2210 IF ZS=K0 THEN2020 :rem 27
2220 CLOSE DIR :rem 157
2230 IF NF<K2THEN2360 :rem 157
2240 FORI=1TO2000:NEXT:PRINT "{CLR}{DOWN} :rem 226
{5 SPACES}SORTING ....{DOWN}" :rem 104
2250 FORS1=K1TONF-K1:SM=S1 :rem 213
2260 FORS2=S1+K1TONF :rem 86
2270 IF NA$(SM)>NA$(S2)THENS2=S2 :rem 144
2280 NEXTS2 :rem 180
2290 IFSM=S1THEN2330 :rem 251
2300 NA$(K0)=NA$(S1):NA$(S1)=NA$(SM):NA$( :rem 176
SM)=NA$(0) :rem 103
2310 TY$(K0)=TY$(S1):TY$(S1)=TY$(SM):TY$( :rem 33
SM)=TY$(0) :rem 246
2320 LN(K0)=LN(S1):LN(S1)=LN(SM):LN(SM)=L :rem 120
N(0) :rem 59
2330 PRINT " " NA$(S1) :rem 117
2340 NEXTS1:PRINT" "NA$(NF):PRINT:rem 78
2350 GOSUB 2520:NB=NB+PS :rem 67
2360 OPEN 1,1,1,"DTB.ID.FILE" :rem 0
2370 NB=NB+BH+39 :rem 34
2380 PRINT#1,"039V";VN$; :rem 152
2390 PRINT#1,MID$(DN$+SP$,K1,20); :rem 47
2400 PRINT#1,MID$(DA$+SP$,K1,8);TI$; :rem 230
:rem 221
2410 FORS1=K1TONF :rem 174
2420 LN$=MID$(STR$(LN(S1)),K2) :rem 173
2430 NA$=NA$(S1):TY$=TY$(S1) :rem 187
2440 GOSUB390 :rem 72
2450 NEXTS1:GOSUB 410 :rem 167
2460 IF NF<K1GOTO2480 :rem 159
2470 RETURN :rem 48
2480 CLOSE15:END :rem 37
2490 INPUT#15,E1,E2$,E3,E4:IFE1THENPRINTE :rem 37
1;E2$;E3;E4 :rem 37
2500 RETURN :rem 37
2510 END :rem 37
2520 SAVE"DTB":RETURN :rem 37
2530 SAVE"@0:DTB",8 :rem 37

```

Word Guess

(Article on page 66.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE's Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1: Word Guess—64 Version

```

9 N=100:GT=30 :rem 202
10 GOSUB877 :rem 135

```



```

15 POKE53280,2:POKE53281,1:PRINT"[CLR]F7] :rem 246
" :rem 246
17 V=54296:W=54276:A=54277:H=54273:L=5427 :rem 251
2:S=54278 :rem 251
20 DIM L$(10),M$(15),D$(10),WU(N),WD$( :rem 103
N),AL$(27)
25 FORI=1TON:READWD$(I):WU(I)=0:NEXT :rem 11
:rem 44
26 FORI=1TO27:READAL$(I):NEXT :rem 130
28 GOSUB503 :rem 182
30 RN=INT(N*RND(1))+1 :rem 195
35 IFWU(RN)=1THEN110 :rem 111
40 WU(RN)=1 :rem 28
50 LN=LEN(WD$(RN)) :rem 62
55 FORI=1TOLN:GN$=MID$(WD$(RN),I,1):LE$(I :rem 47
)=GN$:NEXT
80 PRINT"[CLR]{2 DOWN}";TAB(13);"GUESS TH :rem 86
IS WORD" :rem 86
85 V1=1205-LN:V2=1285-LN :rem 86
90 FORI=1TOLN:POKEV1,32:POKEV2,67:POKEV1+ :rem 21
L,0:POKEV2+L,0:V1=V1+2:V2=V2+2:NEXT
102 PRINT"[HOME]{7 DOWN}ENTER YOUR GUESS :rem 66
{SPACE}" :rem 11
104 PRINT"[HOME]{10 DOWN}LETTERS GUESSED :rem 163
{SPACE}SO FAR:" :rem 177
106 IT=TI/60 :rem 63
107 TL=TI-TV=TL-60:TU=GT*60 :rem 124
108 GETGS$:IFGS$<>"THEN112 :rem 40
109 GOSUB310:IFTU=0THENG$=CHR$(45):GOTO1 :rem 72
15 :rem 167
110 IFGS$=""THEN108 :rem 104
112 IFLEN(G$)>1THEN108 :rem 53
113 IFASC(G$)<65ORASC(G$)>90THEN108 :rem 115
:rem 195
115 GU=GU+1 :rem 52
120 M$(GU)=G$ :rem 34
125 FORI=1TOLN :rem 66
130 IFLE$(I)=D$(I)THEN145 :rem 37
140 IFGS$=LE$(I)THENDI$(I)=G$:GOSUB610 :rem 36
:rem 221
145 NEXTI :rem 62
160 FORJ=1TO27 :rem 140
170 IFM$(GU)=AL$(J)THEN177 :rem 107
173 NEXTJ :rem 149
177 V3=1525-LN-5+GU*2-2 :rem 125
178 IFJ=27THENJ=45 :rem 149
180 POKEV3,J:POKEV3+L,0 :rem 116
185 GL=0:GL=LN+5-GU :rem 218
190 PRINT"[HOME]{15 DOWN}GUESSES LEFT: :rem 61
{8 SPACES}{6 LEFT}";GL
195 AG=1 :rem 58
200 FORI=1TOLN:IFDI$(I)<>LE$(I)THENAG=0 :rem 116
:rem 110
202 NEXTI :rem 28
204 IFAG=0ANDGL>0THEN107 :rem 181
206 ET=TI/60:FT=INT(ET-IT):TM=INT(FT/60): :rem 58
TS=FT-(TM*60)
208 BA$=STR$(TS):SA$=MID$(BA$,2,2) :rem 116
:rem 218
210 IFTS<10THENSA$=""MID$(BA$,2,1) :rem 61
:rem 218
214 PRINT"[HOME]{15 DOWN}";TAB(20);"GUESS :rem 58
TIME";TM;CHR$(58);SA$
215 IFGL=0ANDAG=0THENGOSUB705 :rem 97
220 IFAG=1THENGOSUB810 :rem 209
225 PRINT"[HOME]{21 DOWN}{BLK}F3 TO QUIT" :rem 107
:rem 107
230 PRINT"F5 TO GO TO A DIFFERENT WORDF7] :rem 107
" :rem 107
235 GETAC$:IFAC$=""THEN235 :rem 221
240 IFAC$="{F5}"THEN28 :rem 110
245 IFAC$="{F3}"THEN PRINT"[CLR]":END :rem 125
:rem 106
250 GOTO235 :rem 182
310 TV=TV+60 :rem 231
320 TM=TI-TV :rem 44
330 IFTM<60THEN320 :rem 48
340 TU=(GT*60-TV+TL)/60 :rem 82
350 BS=STR$(TU) :rem 190
360 SS=MID$(BS,2,2) :rem 97
370 IFTU<10THENSS$=""MID$(BS,2,1):rem 89
380 PRINT"[HOME]{7 DOWN}";TAB(24);"TIME :rem 124
":SS :rem 224
390 RETURN :rem 129
503 SP$="" :rem 121
505 FORI=1TO10:LE$(I)=SP$:M$(I)=SP$:DI$( :rem 161
I)=SP$:PK(I)=32:PM(I)=32:NEXT:rem 121
510 FORI=1TO15:M$(I)=SP$:NEXT :rem 121
530 GU=0 :rem 121
540 RETURN :rem 65
610 FORJ=1TO26 :rem 199
620 IFDI$(I)=AL$(J)THEN625 :rem 36
623 NEXTJ :rem 31
625 V1=1205-LN+I*2-2 :rem 160
630 POKEV1,J:POKEV1+L,0 :rem 192
635 POKEV,15:POKEW,33:POKEA,32:POKES,240 :rem 138
:rem 159
640 FORT=1TO10:POKEH,68:POKEL,149:NEXT :rem 246
:rem 128
645 POKEH,0:POKEL,0:POKEW,0 :rem 92
650 FORT=1TO150:NEXT :rem 220
655 RETURN :rem 240
705 PRINT"[HOME]{18 DOWN}{8 SPACES}SORRY, :rem 191
YOU MISSED THE WORD"
710 PRINT"[8 SPACES]IT WAS ";WD$(RN) :rem 75
:rem 158
715 POKEV,15:POKEW,33:POKEA,32:POKES,240 :rem 122
:rem 40
720 FORT=1TO200:POKEH,6:POKEL,16:NEXT :rem 192
:rem 144
725 POKEH,0:POKEL,0:POKEW,0 :rem 131
730 RETURN :rem 187
810 PRINT"[HOME]{18 DOWN}{8 SPACES}*** CO :rem 160
NGRATULATIONS ***"
815 POKEV,15:POKEW,33:POKEA,32:POKES,240 :rem 125
:rem 144
820 FORT=1TO25:POKEH,68:POKEL,149:NEXT :rem 131
:rem 187
825 POKEH,0:POKEL,0 :rem 160
830 FORT=1TO100:POKEH,68:POKEL,149:NEXT :rem 125
:rem 125
835 POKEH,0:POKEL,0:POKEW,0 :rem 98
850 RETURN :rem 12
877 POKE53281,15:POKE53280,10 :rem 220
880 PRINT"[CLR]{8 DOWN}{10 SPACES}{BLK}W :rem 243
{SPACE}O R D - G U E S S" :rem 201
890 PRINT:PRINT"[10 SPACES]INSTRUCT :rem 42
IONS (Y/N)" :rem 219
895 GETAB$:IFAB$=""THEN895 :rem 130
897 IFAB$<>"Y"THEN975 :rem 35
905 POKE53281,13:POKE53280,3 :rem 109
910 PRINTCHR$(144);"[CLR]{15 SPACES}WORD- :rem 924
GUESS":PRINT
915 PRINT"[3 SPACES]THE OBJECT OF WORD-GU :rem 924
ESS IS TO DE-"
920 PRINT"TERMINE THE LETTERS THAT MAKE U :rem 924
P A WORD."
922 PRINT"[3 SPACES]THE WORD CAN BE UP TO :rem 924
10 CHARACTERS"
924 PRINT"LONG.{2 SPACES}YOU HAVE 5 MORE

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[SPACE]GUESSES THAN THE" :rem 130
926 PRINT"LENGTH OF THE WORD TO DETERMINE
ALL THE" :rem 224
928 PRINT"LETTERS." :rem 197
932 PRINT"{3 SPACES}YOU HAVE";GT;"SECONDS
TO MAKE A GUESS." :rem 171
934 PRINT"IF THE LETTER IS IN THE WORD, I
T WILL" :rem 2
936 PRINT"SHOW IN ITS PROPER SLOT. ALL LE
TTERS" :rem 127
938 PRINT"USED WILL BE DISPLAYED FOR REFE
RENCE." :rem 168
940 PRINT"{3 SPACES}MULTIPLE OCCURENCES O
F THE SAME" :rem 96
942 PRINT"LETTER WILL BE SHOWN IN ALL APP
ROPRIATE" :rem 69
944 PRINT"SLOTS.":PRINT :rem 252
946 PRINT"{3 SPACES}AFTER GUESSING A WORD
, PRESS:" :rem 187
948 PRINT"{5 SPACES}{RVS}F3{OFF} TO QUIT"
:PRINTTAB(8)"OR" :rem 133
950 PRINT"{5 SPACES}{RVS}F5{OFF} TO GUESS
ANOTHER WORD" :rem 5
952 PRINT:PRINTTAB(15);"GOOD LUCK!" :rem 122
954 PRINTTAB(8);"PRESS ANY KEY TO START" :rem 157
956 GETAD$:IFAD$=""THEN956 :rem 243
975 RETURN :rem 133
1000 DATA DEGREE,DIVISION,SCROD,NAIVE,THI
NKER :rem 159
1005 DATA WATER,LIGHT,REGIME,REVAMP,HYMN :rem 75
1010 DATA REGENCY,SYMPATHY,COUPON,PLANT,S
POTLIGHT :rem 41
1015 DATA EXPRESS,AARDVARK,RUBBER,EMINENC
E,BOOMERANG :rem 167
1020 DATA POETIC,EARTHQUAKE,MAIL,PARALYZE
,HEAT :rem 233
1025 DATA LAPSE,NITROGEN,GLASS,IDIOT,MEMO
RY :rem 57
1030 DATA FLOWER,COMPUTER,LANDMARK,MESSAG
E,CLARITY :rem 51
1035 DATA AMAZING,HARMONY,GALLON,JELLYFIS
H,FLAME :rem 132
1040 DATA ENVOIOUS,DOORBELL,DESTINY,DAISY,
CORSAGE :rem 169
1045 DATA CANARY,BOYCOTT,OFFER,BENEFICIAL
,ARMADILLO :rem 63
1050 DATA ANGELIC,MONTH,BALMY,MARGARINE,L
ODGE :rem 127
1055 DATA ORIGINAL,OXYGEN,SKIING,PLASMA,P
REMATURE :rem 252
1060 DATA SPECIAL,REGARD,REFUGEE,SHAKE,WA
TERCRESS :rem 185
1065 DATA SALOON,WASHABLE,WHATEVER,YOLK,W
INDOW :rem 38
1070 DATA ACTION,ZENITH,YELLOW,TRICYCLE,Y
AM :rem 68
1075 DATA FETCH,PRICE,CHEMICAL,DOWNWIND,H
IBERNATE :rem 166
1080 DATA COUNTERACT,CLOVERLEAF,EARTHQUAK
E,FLEXIBLE,QUEEN :rem 34
1085 DATA PRECEDENT,ORANGE,CONSTRUCT,UNIC
ORN,IMPORTANT :rem 143
1090 DATA MEDALIST,YOURSELF,NOVICE,GEOGRA
PHY,EXPENSIVE :rem 129
1100 DATA MONITOR,HEADACHE,TELEVISION,TAX
,LANGUAGE :rem 10
2000 DATA A,B,C,D,E,F,G,H,I,J,K,L,M :rem 135

```

```

2010 DATA N,O,P,Q,R,S,T,U,V,W,X,Y,Z,- :rem 138

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Program 2: Word Guess—VIC Version

Note: 8K or more expansion required.

```

9 N=100:GT=30 :rem 202
10 GOSUB880 :rem 129
15 POKE36879,26:PRINT"{CLR}" :rem 216
17 V=36878:H=36876:L=33792 :rem 163
20 DIMLE$(10),MI$(15),DI$(10),WU(N),WD$(N
),AL$(27) :rem 103
25 FORI=1TON:READ WD$(I):WU(I)=0:NEXT :rem 11
26 FORI=1TO27:READ AL$(I):NEXT :rem 44
28 GOSUB503 :rem 130
30 RN=INT(N*RND(1))+1 :rem 182
35 IF WU(RN)=1 THEN 110 :rem 195
40 WU(RN)=1 :rem 111
50 LN=LEN(WD$(RN)):REM FIND LENGTH OF WOR
D :rem 238
55 FOR I=1TOLN:GN$=MID$(WD$(RN),I,1):LE$(
I)=GN$:NEXT :rem 62
80 PRINT "{CLR}{2 DOWN}{BLU}{4 SPACES}GUE
SS THIS WORD" :rem 8
85 V1=4196-LN:V2=4240-LN :rem 92
90 FOR I=1TOLN:POKEV1,32:POKEV2,67:POKEV1
+L,0:POKEV2+L,0:V1=V1+2:V2=V2+2:NEXT :rem 21
102 PRINT "{HOME}{8 DOWN}ENTER YOUR GUESS
" :rem 83
104 PRINT "{HOME}{11 DOWN}LETTERS GUESSED
SO FAR:" :rem 28
106 IT=TI/60 :rem 163
107 TL=TI:TV=TL-60:TU=GT*60 :rem 177
108 GET GS$:IF GS$<>" "THEN 112 :rem 63
109 GOSUB310:IFTU=0THENGSS$=CHR$(45):GOTO1
15 :rem 124
110 IF GS$=""THEN 108 :rem 40
112 IF LEN(GS$)>1 THEN 108 :rem 72
113 IF ASC(GS$)<65 OR ASC(GS$)>90 THEN 10
8 :rem 167
115 GU=GU+1 :rem 104
120 MI$(GU)=GS$ :rem 53
125 FOR I=1TOLN :rem 115
130 IF LE$(I)=DI$(I) THEN 145 :rem 195
140 IFGS$=LE$(I)THENDI$(I)=GS$:GOSUB610 :rem 52
145 NEXT I :rem 34
160 FOR J = 1 TO 27 :rem 66
170 IF MI$(GU)=AL$(J) THEN 177 :rem 37
173 NEXT J :rem 36
177 V3=4375-LN-5+GU*2-2 :rem 227
178 IF J=27 THEN J=45:REM POKE POSITION F
OR DASH :rem 7
180 POKEV3,J:POKEV3+L,0 :rem 140
185 GL=0:GL=LN+5-GU :rem 107
190 PRINT "{HOME}{15 DOWN}GUESSES LEFT:
{8 SPACES}{6 LEFT}";GL :rem 125
195 AG=1 :rem 149
200 FOR I=1TOLN:IFDI$(I)<>LE$(I)THENAG=0 :rem 110
202 NEXT I :rem 28
204 IF AG=0 AND GL>0 THEN 107 :rem 181
206 ET=TI/60:FT=INT(ET-IT):TM=INT(FT/60):
TS=FT-(TM*60) :rem 58
208 BA$=STR$(TS):SA$=MID$(BA$,2,2) :rem 116
210 IF TS<10THENSA$=""+"0"+MID$(BA$,2,1) :rem 218
214 PRINT"{HOME}{19 DOWN}{3 SPACES}GUESS

```



```

    {SPACE}TIME";TM:"SA$           :rem 134
215 IFGL=0ANDAG=0THENGOSUB705      :rem 58
220 IFAG=1THENGOSUB810             :rem 97
225 PRINT "{HOME}{21 DOWN}{BLK}{6 SPACES}
    {RVS}F3{OFF} TO QUIT"         :rem 117
230 PRINT "{4 SPACES}{RVS}F5{OFF} ANOTHER
    WORD";:POKE198,0              :rem 116
235 GET AC$:IF AC$="" THEN 235      :rem 221
240 IF AC$="{F5}" THEN 28          :rem 110
245 IF AC$="{F3}" THEN PRINT "{CLR}"
                                   :rem 108
250 END                             :rem 110
310 TV=TV+60                       :rem 182
320 TM=TI-TV                       :rem 231
330 IF TM<60 THEN320               :rem 44
340 TU=(GT*60-TV+TL)/60           :rem 48
350 B$=STR$(TU)                   :rem 82
360 S$=MID$(B$,2,2)               :rem 190
370 IF TU<10 THENS$="0"+MID$(B$,2,1)
                                   :rem 97
380 PRINT "{HOME}{19 DOWN}";TAB(6);"TIME
    {SPACE}":S$                  :rem 245
390 RETURN                         :rem 124
503 SP$=" "                        :rem 224
505 FOR I = 1TO10:LE$(I)=SP$:MI$(I)=SP$:D
    I$(I)=SP$:PK(I)=32:PM(I)=32:NEXT
                                   :rem 129
510 FOR I=11TO15:MI$(I)=SP$:NEXT :rem 121
530 GU=0                          :rem 161
540 RETURN                         :rem 121
610 FOR J=1 TO 26                  :rem 65
620 IF DI$(I)=AL$(J)THEN 625      :rem 199
623 NEXT J                        :rem 36
625 V1=4196-LN+I*2-2              :rem 43
630 POKE V1,J:POKEV1+L,0          :rem 160
635 POKEV,15                      :rem 181
640 FORT=1TO10:POKEH,218:NEXT     :rem 56
645 POKEH,0                       :rem 114
650 FORT=1TO150:NEXT              :rem 246
655 RETURN                         :rem 128
705 PRINT "{HOME}{15 DOWN} SORRY, THE WOR
    D WAS"                       :rem 82
710 PRINT"{DOWN}{7 SPACES}{RVS}";WD$(RN)"
    {OFF}"                       :rem 77
715 POKE V,15                     :rem 180
720 FORT=1TO200:POKEH,140:NEXT    :rem 98
725 POKE H,0                      :rem 113
730 RETURN                         :rem 122
810 PRINT "{HOME}{15 DOWN} **CONGRATULATI
    ONS**"                       :rem 161
815 POKEV,15                      :rem 181
820 FORVV=1TO2:FORT=1TO25:POKEH,210:NEXT
                                   :rem 70
825 POKEH,0:NEXT                  :rem 235
830 FORT=1TO100:POKEH,230:NEXT    :rem 99
835 POKEH,0                       :rem 115
850 RETURN                         :rem 125
880 PRINT"{CLR}{8 DOWN}{2 SPACES}W O R D
    {SPACE}- G U E S S"         :rem 124
890 PRINT:PRINT:PRINT"{2 SPACES}{DOWN}INS
    TRUCTIONS? (Y-N)"           :rem 42
895 GETAB$:IFAB$=""THEN895        :rem 243
897 IFAB$<>"Y"THEN990             :rem 198
910 PRINTCHR$(144);"{CLR}":PRINT :rem 235
915 PRINT"{3 SPACES}THE OBJECT OF WORD GU
    ESS IS TO DETERMINE THE LETTERS THAT
    {SPACE}MAKE"                 :rem 143
920 PRINT"UP A WORD. THE WORD{3 SPACES}CA
    N BE UP TO 10{7 SPACES}LETTERS LONG.
    {SPACE}YOU HAVE";           :rem 184
922 PRINT"5 MORE GUESSES THAN{3 SPACES}TH

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    E LENGTH OF THE WORDTO DETERMINE ALL
    {SPACE}THE"                 :rem 111
924 PRINT"LETTERS. YOU HAVE";GT :rem 184
926 PRINT"SECONDS TO MAKE A{5 SPACES}GUES
    S. IF THE LETTER"           :rem 120
927 PRINT"IS IN THE WORD, IT{4 SPACES}WIL
    L SHOW IN ITS"               :rem 140
928 PRINT"PROPER SLOT. ALL{6 SPACES}LETTE
    RS USED WILL BE{2 SPACES}DISPLAYED FO
    R"                           :rem 46
929 PRINT"{DOWN}{4 SPACES}{RVS}PRESS ANY
    {SPACE}KEY":POKE198,0:WAIT198,1
                                   :rem 203
930 PRINT"{CLR}{DOWN}REFERENCE. MULTIPLE
    {3 SPACES}OCCURENCES OF THE SAMELETTE
    R WILL BE SHOWN"             :rem 222
932 PRINT"IN ALL APPROPRIATE{4 SPACES}SLO
    TS.{19 SPACES}AFTER GUESSING A":rem 1
933 PRINT"WORD, PRESS:{DOWN}{12 SPACES}
    {RVS}F3{OFF} TO QUIT,OR{DOWN}
    {9 SPACES}{RVS}F5{OFF} TO GUESS ANOTH
    ER"                           :rem 235
952 PRINT:PRINTTAB(6);"GOOD LUCK!":rem 74
954 PRINT"{3 DOWN}{RVS}PRESS ANY KEY TO S
    TART":POKE198,0             :rem 174
956 GETAD$:IFAD$=""THEN956       :rem 243
990 RETURN                       :rem 130
1000 DATA DEGREE,DIVISION,SCROD,NAIVE,THI
    NKER                         :rem 159
1005 DATA WATER,LIGHT,REGIME,REVAMP,HYMN
                                   :rem 75
1010 DATA REGENCY,SYMPATHY,COUPON,PLANT,S
    POTLIGHT                     :rem 41
1015 DATA EXPRESS,AARDVARK,RUBBER,EMINENC
    E,BOOMERANG                 :rem 167
1020 DATA POETIC,EARTHQUAKE,MAIL,PARALYZE
    ,HEAT                       :rem 233
1025 DATA LAPSE,NITROGEN,GLASS,IDIOT,MEMO
    RY                           :rem 57
1030 DATA FLOWER,COMPUTER,LANDMARK,MESSAG
    E,CLARITY                   :rem 51
1035 DATA AMAZING,HARMONY,GALLON,JELLYFIS
    H,FLAME                     :rem 132
1040 DATA ENVIOUS,DOORBELL,DESTINY,DAISY,
    CORSAGE                     :rem 169
1045 DATA CANARY,BOYCOTT,OFFER,BENEFICIAL
    ,ARMADILLO                  :rem 63
1050 DATA ANGELIC,MONTH,MERRY,MARGARINE,L
    ODGE                         :rem 153
1055 DATA ORIGINAL,OXYGEN,SKIING,PLASMA,P
    REMATURE                    :rem 252
1060 DATA SPECIAL,REGARD,REFUGEE,SHAKE,WA
    TERCRESS                     :rem 185
1065 DATA SALOON,WASHABLE,WHATEVER,YOLK,W
    OOLLY                       :rem 52
1070 DATA ACTION,ZENITH,YELLOW,TRICYCLE,Y
    AM                          :rem 68
1075 DATA FETCH,PRICE,CHEMICAL,DOWNWIND,H
    IBERNATE                     :rem 166
1080 DATA COUNTERACT,CLOVERLEAF,FROG,FLEX
    IBLE,QUEEN                  :rem 101
1085 DATA PRECEDENT,ORANGE,CONSTRUCT,UNIC
    ORN,IMPORTANT               :rem 143
1090 DATA MEDALIST,YOURSELF,NOVICE,GEOGRA
    PHY,EXPENSIVE               :rem 129
1100 DATA MONITOR,HEADACHE,TELEVISION,TAX
    ,LANGUAGE                   :rem 10
2000 DATA A,B,C,D,E,F,G,H,I,J,K,L,M
                                   :rem 135
2010 DATA N,O,P,Q,R,S,T,U,V,W,X,Y,Z,-
                                   :rem 138

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COMPUTE!'s Gazette for Commodore

AUTHOR GUIDE

COMPUTE!'s Gazette for Commodore is looking for interesting, useful articles aimed at beginning to intermediate VIC-20 and Commodore 64 users. If you have an article idea or a good original program, we'd like to see it. Don't worry if you are not a professional writer. We are more concerned with the content of an article than its style. Simply try to be clear in your writing and check your program for any bugs.

COMPUTE!'s Gazette for Commodore is a consumer-oriented magazine for VIC-20 and Commodore 64 users who want to get the most out of their computers in a non-technical way. It is aimed primarily at home users, not all of whom necessarily want to become expert programmers. If your article covers a more advanced or technical topic, you may choose to submit it to our companion publication, **COMPUTE!**. If you submit an article to one of our magazines and we believe it would be more suitable to the other, we will transfer your submission to the right editors. The basic editorial requirements for publication are the same for both magazines; so are the payment rates.

The following guidelines will permit your good ideas and programs to be more easily edited and published. Most of these suggestions serve to improve the speed and accuracy of publication:

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

2. The following information should appear in the upper right corner of the first page. If your article is specifically directed to either the VIC-20 or Commodore 64, please state which one. In addition, please indicate the memory requirements of programs.

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

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

5. Short programs (under 20 lines) can easily be included within the text. Longer programs should be separate listings. *It is essential that we have a copy of the program, recorded twice, on a tape or disk.* The tape or disk should be labeled with your name and the title of the article. Tapes are fairly sturdy, but disks need to be enclosed within plastic or cardboard mailers (available at photography, stationery, or computer supply stores).

It is far easier for others to type in your program if you use CHR\$(X) values and TAB(X) or SPC(X) instead of cursor manipulations to format your output. For five carriage returns, FOR I=1 TO 5:PRINT:NEXT I is far more "portable" to other computers with other BASICs and also easier to type in. And, instead of a dozen right-cursor symbols, why not simply use PRINT SPC(12)? A quick check through your program –

making these substitutions – would be greatly appreciated by your editors and by your readers.

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

7. All lines within the text of the article should be spaced so that there is about 1/2 inch between them. A one-inch margin should be left at the right, left, top, and bottom of each page. No hyphens should be used at the ends of lines to break words. And please do not justify. Leave the lines ragged.

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

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

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

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

12. *COMPUTE!'s Gazette* for Commodore pays between \$75 and \$1000 for published articles. In general, the rate reflects the length and quality of the article. Payment is made upon acceptance of an article. Following submission (Editorial Department, *COMPUTE!'s Gazette* for Commodore, P.O. Box 5406, Greensboro, NC 27403) it will take from four to six weeks for us to reply. If your work is accepted, you will be notified by a letter which will include a contract for you to sign and return. Rejected manuscripts are returned to authors who enclose an SASE. We do not consider articles which are multiple submissions. If you wish to send an article to another magazine for consideration, please do not submit it to us.

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

14. If you want to include photographs, they should be 5x7, black-and-white glossies.

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Compile Time (secs.)	8.5	—	—	3.9	108

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I/O Re-direction to disk or printer
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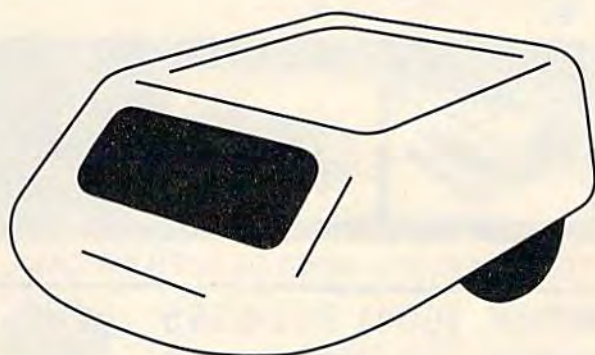
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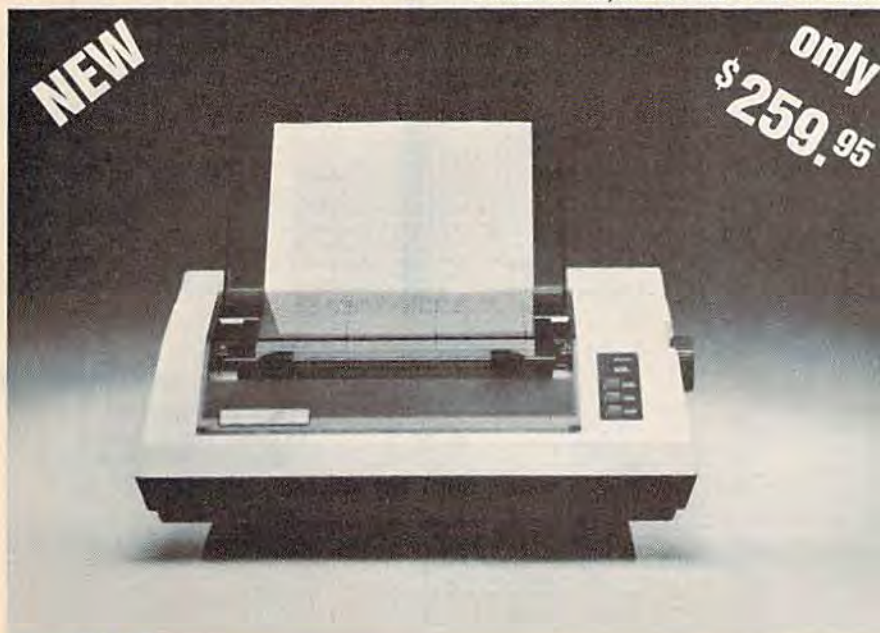
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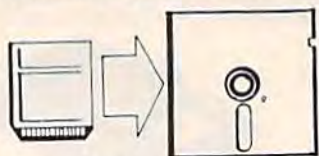
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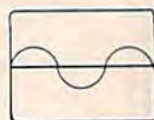
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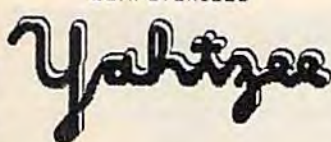
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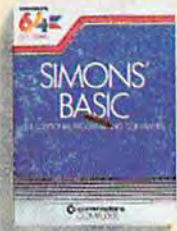
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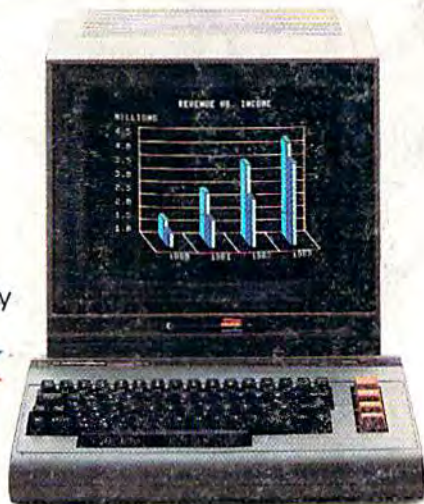
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