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numbers for you forever—unless you turn it off or pull out its plug. Or else you can type NEW. The NEW command erases all the old commands in the computer's memory. Then you can feed the computer a new program and teach it something new.

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What kinds of new programs?

Anything you want. There is no limit to what you can teach the computer. What would you like to teach the computer? What can you imagine?

Kids have taught computers to do all sorts of things. A boy I know named Larry teaches computers to play games. A girl named Claudia loves music, so she teaches her computer to play the songs she hears on the radio.

You can program the computer to teach you the alphabet, quiz you about the presidents of the United States, give you a spelling bee, or draw pictures of triangles and circles on the TV screen.

You can teach the computer to act like a simple calculator and spit out numbers. Or you can teach it to imitate other machines.

The computer is a great pretender! For example, some computers have been taught how to act like airplanes. The computer pretends it is an airplane, and you pretend that you are the pilot. To fly the "plane" you push buttons on its keyboard. The TV screen is the cockpit window.

Or you can teach the computer to do biology experiments and breed hundreds of honeybees. The computer speeds up the bees' lifetimes until they live just a few seconds. You get to see how the bee parents' colors, shapes, and abilities are passed on to their children. And their children's children.

Or you can play mad scientist and teach the computer to pretend it is your laboratory. You can conduct experiments with different chemicals. But, watch out! If you mix the wrong chemicals together, your "lab" might blow up. The computer might flash an explosion on the TV screen. From the TV speakers might come a loud "BOOM!"

But all is not lost. It's all just pretend. The computer is ready for more. On the TV screen it types: WHAT EXPERIMENT SHOULD WE TRY NEXT?

Personal computers are good at experiments. But they can do a lot more, too. You can teach them to play games such as tic-tac-toe, checkers,

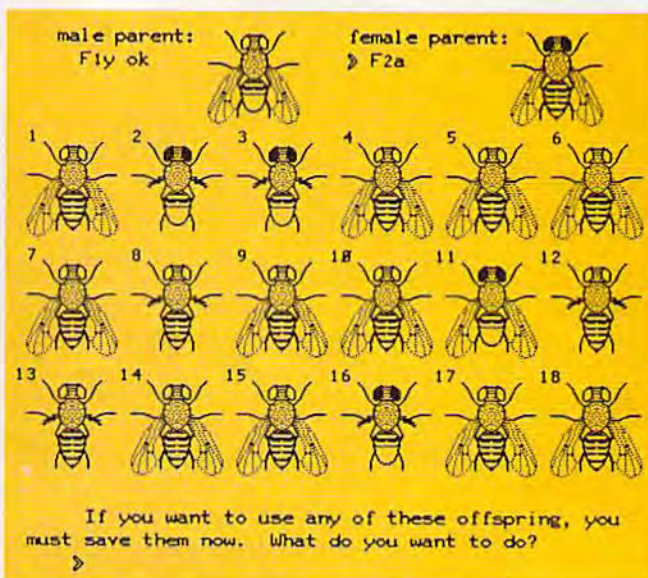


Claudia Napfel and her father built one of the first home computers. Claudia uses the computer to do her homework and to play music. (Photo by Charlotte Knadle/courtesy Claudia Napfel.)

backgammon, and chess.

Or you can teach them to take you on an adventure game to a make-believe faraway planet. There are fabulous treasures on the planet. But the treasures are guarded by a fierce dragon. To win the treasures you must fight the dragon. The computer plays the part of the dragon. One warning: Computer dragons can be very, very tricky.

Or, if you are tired of playing games, why not teach the computer to draw pictures? Computers can draw pictures in all the colors of the rainbow. And the pictures move — just like in cartoons!



Would you like to become a famous bee breeder? This computer program lets you pretend you are breeding honeybees. (Courtesy PLATO Project, University of Illinois and Control Data Corporation.)

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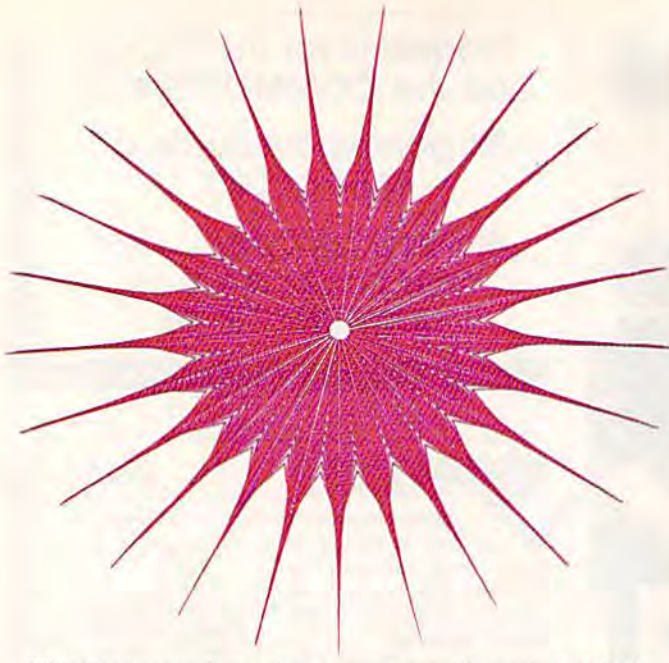


Illustrations: Elizabeth Hauck

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This figure was drawn by a computer with a printer/plotter, following a program by the artist. (Courtesy of computer artist Joe Jacobson/idea by Christian Huebler.)

Kids are teaching computers to draw pictures of zooming race cars, running horses, and pictures of spaceships blasting off from the earth. What would you like your computer to do? ☺

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The VOICE BOX speaks directly into the computers user port, comes with built-in speaker, Volume and Pitch controls and lots of instructions from The Alien Group, the people who got Atari® and Apple® to speak!

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FAMILY PLAY

You can play (and learn) with other family members or friends in any of these programs. Or you can practice against the computer.

ARCHON

by Free Fall from Electronic Arts

Abacadabra! In this original strategy game you move your mythical players, like wizards, on an ever changing board. Things are quiet until you attack an opponent's piece. Then you move instantly to a battlefield where the powers of your piece and your skill fight the opponent. (It's a hit in our office.)

- #19404 C-64 Disk \$39.95

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M.U.L.E.

by Ozark Softcape from Electronic Arts

A strategy, trading game in which four players attempt to settle a distant planet with the help of a machine they learn to hate: Multiple Use Labor Element. If you don't have four the program will gladly take the other positions. There are three game variations and handicaps available. Though it may be hard to imagine, this simulation is played entirely with joysticks, no keys. It is so popular around here that we have had many after work games!

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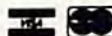
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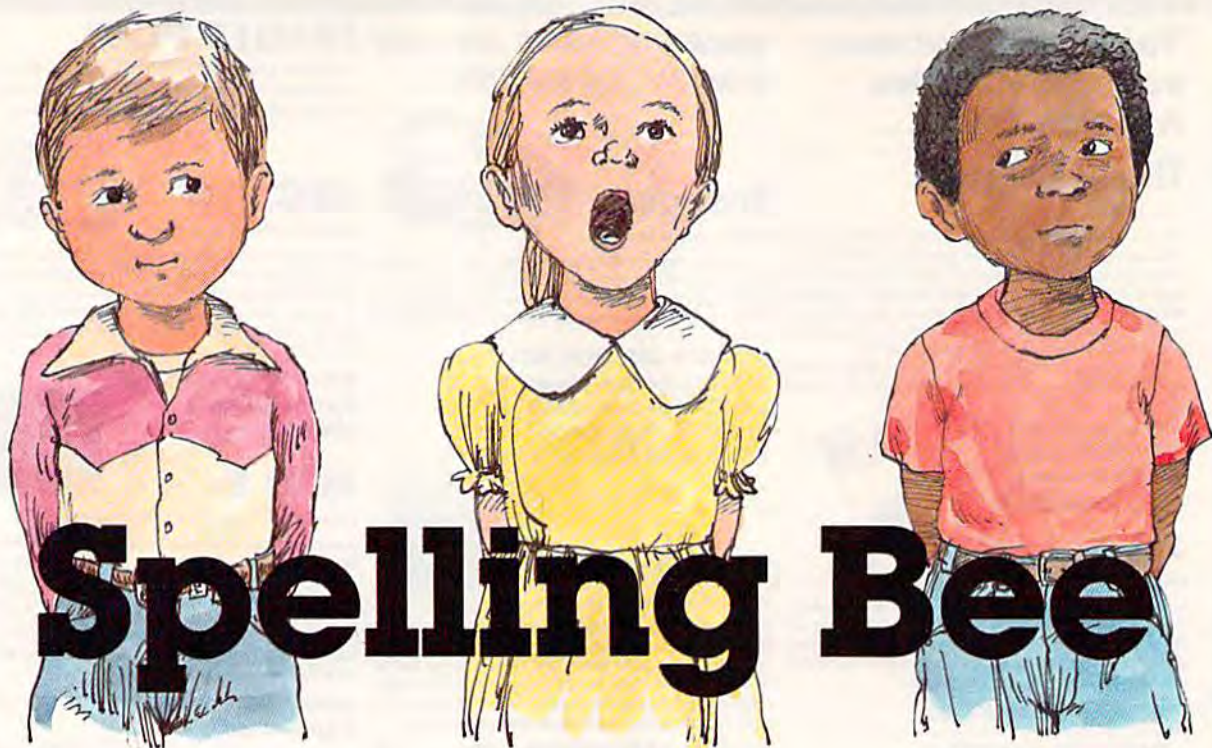
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Harry Blair

Daniel Bonachea

"Spelling Bee" is an educational spelling game for the Commodore 64 and VIC-20. It requires a joystick and at least 8K of memory expansion on the VIC.

Remember using flash cards in spelling? The teacher flipped the card, let you glance at the word, and asked you to spell it correctly. It happened so quickly, the word appearing for only a moment or two. But it was good practice. You had to concentrate and think quickly. More importantly, you had to imagine the word in your mind, trying to visualize its letters as you spelled it aloud.

"Spelling Bee" is a game for the VIC-20 and Commodore 64 which handles the flash cards just as that teacher did long ago. A practice game for young children, it makes spelling entertaining while it educates. And because it uses a joystick instead of the keyboard, it eliminates some of the fear young children may have of typing in answers.

How To Use Spelling Bee

The program is easy to set up and play. After entering and saving the program, plug a joystick into port 2 (into the single port of the VIC) and type RUN. You can read the directions to younger children and let older children follow the directions themselves.

The computer will ask for your child's name; except for prompts in the instructions, this is the only time the keyboard is used. Throughout the rest of the game your child's name appears each time a message is displayed. Most children will delight in seeing their name shown on the screen. It's almost like a teacher talking to them!

Several screen displays appear, one after the other, with the instructions. Finally, the level of difficulty is set by entering 1 for easy words, 2 for medium-level words, or 3 for harder words. Choose the level you think best for your child's skills.

As soon as the skill level is chosen, a word appears on the screen. It will show for only two seconds, much like a teacher's flash card, and then it is replaced by a row of symbols and letters near the bottom of the screen. You'll see a pointer beneath these characters.

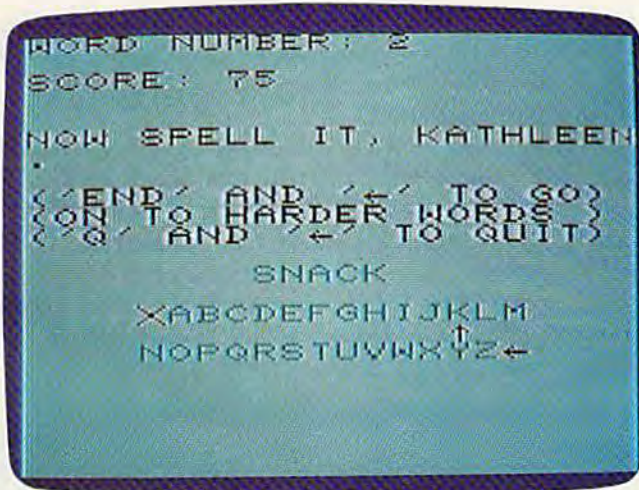
To spell a word, move the joystick left or right until it is directly under the letter you want. Pressing the fire button moves the letter above the alphabet row. It's important that you choose the letters in the right order, just as when you spell a word yourself. If you're satisfied with the spelling, move the joystick so that it's beneath the back-arrow symbol at the far right of the row. This enters your spelling, and the computer tells you whether it's correct or incorrect. To begin spelling the same word again (perhaps you changed your mind), just move the arrow under the red X at the

Variables Used In Spelling Bee

L\$(L) = WORD TO BE SPELLED
NAS = NAME OF PLAYER
S = SCORE
N = MISTAKE COUNTER
D\$ = PLAYER'S SPELLING OF WORD
R = REVERSE FLASH REPETITION
SC = SCREEN LOCATION OF ALPHABET
CO = SCREEN COLOR OF LETTERS
CN = SCREEN CODE OF LETTERS
S1 = POSITION OF POINTER ON SCREEN
C1 = COLOR OF POINTER
B\$ = EACH LETTER INPUT BY STUDENT
JV = VALUE READ FROM JOYSTICK
FR = FIRE BUTTON VALUE

other end of the row and press the fire button. The computer won't give you a second look at the word, though.

If a word is misspelled three times, the computer spells it correctly, flashes it several times,

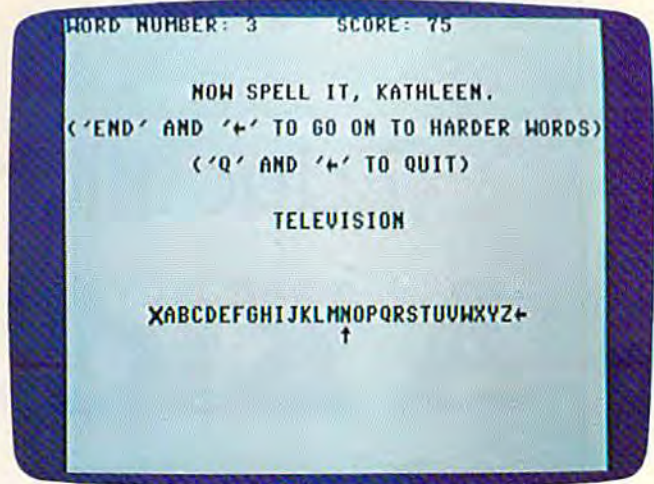


Spelling a medium-level word in the VIC version of "Spelling Bee."

and shows you the next word. The score is always displayed on the screen, and one point is subtracted for each word missed. A perfect score for a round is 75, the number you begin with.

You can quit the game at any time by entering Q with the joystick. If the present level is too easy, typing END lets you choose another level of words.

Moving the arrow with the joystick was easier for my daughter than typing on the keyboard. She was eager to spell the words when she could pick the letters herself, making them appear sud-



Spelling a hard-level word in the 64 version of "Spelling Bee."


denly as she pressed the fire button. It became more of a game to her, and she played it longer.

A Word To Programmers

There are a number of program alterations you can make. If you want to shorten the time the word is flashed on the screen, you can change the delay in line 1180. Altering it to FORY = 1 TO 500, for example, makes the words show for only a half-second.

I slowed down the joystick routine because my five-year-old daughter found it hard to stop the arrow on the correct letter. Older children may be able to handle a more responsive joystick. You can eliminate these delays by removing the FORT = 1 to 25:NEXT T in both lines 1500 and 1510.

New words can be inserted in the DATA statements in lines 230-300, as long as there is always a total of 75 words (25 in each level). This will be something you'll want to do once your child has played the game a number of times and mastered the existing words.

See program listings on page 224. 

MANUAL

or

AUTOMATIC?

Don't wrestle with the Manual!

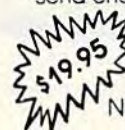
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Educational Games: **A Kid's View**

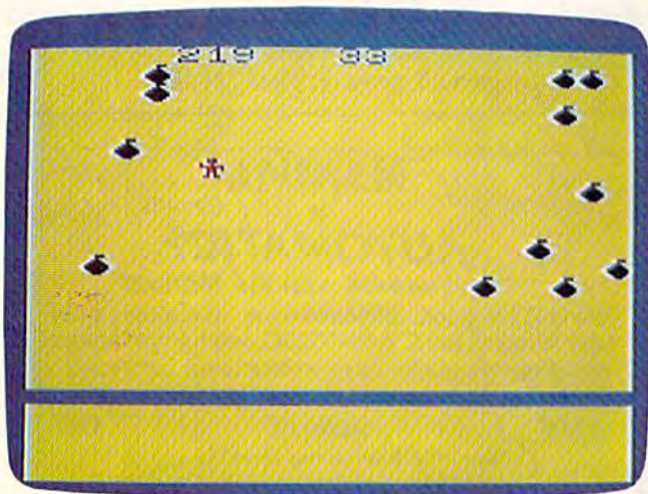
Kevin Dewey

Here's a kid's-eye view of educational computer games—what they should do, how they should teach, and why they should entertain. The writer concludes his article by presenting "BLAM!," a game for the unexpanded VIC-20 that demonstrates his concepts. We've added a version for the Commodore 64. A joystick is required.

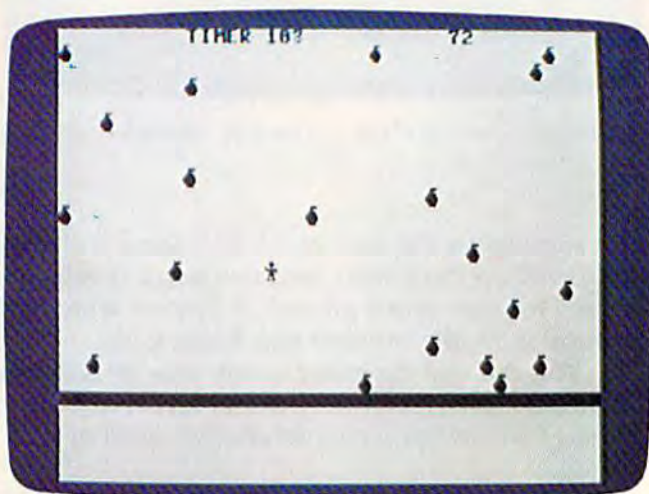
Have you ever tried to write an educational game? If you have, chances are you found it pretty hard. Sure, it's easy to make a simple addition and subtraction program, but education doesn't stop there.

There are many other areas to cover. I know. I'm only 12 and in the seventh grade. We have computers in our school and a variety of educational games. But, unfortunately, some of the games aren't too good. The main flaw that I see in them (and a lot of my classmates agree) is that they are too easy.

Take, for instance, a math program we had last year. There was only one skill level, and it was just basic multiplication with zeros on the end of the numbers to make it seem harder. The game itself had a very good concept but didn't teach you a thing (unless you're in the third grade, and the game was supposed to be sixth-grade level).



Defusing bombs to solve subtraction problems in a game of "Blam!" (VIC-20 version).



The player is surrounded by ticking bombs in "Blam!" (Commodore 64 version).

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Educational Guidelines

Now, if that is what comes from experts, how are ordinary people supposed to write good educational games? Programmers should keep in mind the following things:

1. You should make your game one that teaches someone something. After you've thought of your idea, ask yourself, "Is this *truly* educational or just a near miss?" This will help very much.

2. Your game should have varying skill levels. It should have levels to challenge the slowest to the fastest student.

3. Use good graphics so your game will be appealing to look at.

4. Have good sound effects. It is good for the player to get a rewarding sound or song if he or she is correct.

5. Most of all, make your game interesting and fun. How many kids want to sit and play a boring game, no matter how educational it is? Not very many. It is good, in some cases, to make your game half-arcade and half-education.

Those are five basic steps in making educational games. Try to follow them when writing one.

Now, here is a game I have made. I call it "BLAM!" It is educational and fun, and I hope you enjoy it.

Game Description

BLAM! is a half-arcade and half-educational game. You must maneuver your player around a building filled with bombs, while trying to disarm all the explosives. You move your player with the joystick and, once you've run into a bomb, disarm it with the keyboard.

You disarm bombs as follows: there is a number at the top of the screen next to the time clock. When you run into a bomb, another number appears at the bottom of the screen (under the blue line). You subtract this number from the one at the top and type your answer. If you are correct, the bomb disappears and you have one less bomb to disconnect. But if you subtract wrong, the bomb explodes! You can survive the explosions, but after three, the whole place falls apart. When you give a wrong answer, the computer also prints the correct answer at the top of the screen.

You get only five minutes to clear each story of bombs, because they are time bombs. When you clear a story, you go on to the next (which has ten more bombs than the one before). There are six stories in the building and, if you clear them all, you win the game.

There are also variable skill levels. At the beginning of the game, you choose a skill level from 1 to 100. Skill level one uses only numbers through 100, level two uses numbers through

200, and so on. Only very, very smart people should play on level 100.

Ways To Change BLAM!

You can raise the possible skill levels by changing the 100s in lines 5 and 6. You can vary the number of stories in the building by changing the 70 in line 131 to the number of stories you want multiplied by ten, plus ten. For example, to make a four-story building, change the 70 to 50.

See program listings on page 231. ☺

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Disk File Manager

Philip Dale

"Disk Manager" works on both the Commodore 64 and expanded VIC-20. At least 8K memory expansion is recommended for the VIC—the more memory, the larger files you can copy.

It's own microprocessor, 2K RAM, and 170K disk format make the Commodore 1541 disk drive unusually flexible and economical. However, the 1541 has a number of limitations.

First, it's awkward to use, especially in direct mode, since it takes several statements for basic disk operations such as formatting, reading the error channel, and renaming and erasing files.

Second, some useful and needed functions have not been included. For instance, there's no built-in routine to copy a file from one disk to another. The COPY command can be used only to create a duplicate file on the same disk.

"Disk Manager" provides an easy-to-use, menu-driven system for managing program and data files on disk. You can select any of the basic disk commands just by typing in the operation number from the menu. In addition, three new functions are provided. The first copies any file (program, sequential, or random) from one disk to another disk. The second copies the DOS wedge program(s) onto a new disk in a single pass. And the third writes a copy of Disk Manager onto a new disk for backup.

Disk Manager Commands

To use any of the Disk Manager commands, just enter the number of the function you want and

press RETURN.

1. Disk Directory. This function reads the directory without overwriting the BASIC program. If you want your own program to read the directory, you can use the techniques in the routine from lines 250 to 284. Press RETURN to get back to the menu.

2. Format New Disk. Your computer can't do anything with a new disk straight out of the box. First the disk has to be set up in a format that the 1541 can read. Part of formatting is naming the disk. This routine asks you for the name and name extender you want the disk to have. You should never give two disks the same name, and if you trade disks with friends, you should make sure that you aren't using the same disk name.

After you assign a name and extender, Disk Manager calls the built-in formatting routine (OPEN 15,8,15, "disk name") and then returns to the menu.

3. Initialize Disk. Use this command if a disk error is keeping you from performing a needed operation. It does not write to or alter the disk in any way. Instead, it resets the disk drive, as if you had just turned on the power.

4. Copy File on Same Disk. Use this command to create a backup copy of a file on the same disk. You will be asked for the source filename—the file you will be copying *from*. Then you'll be asked for the object filename—the name you want to give the new copy.

If the disk light is flashing when this function ends, the copy was unsuccessful. Use Command 11, *Error Status*, to find out why. The most common error is asking for a source file that doesn't exist. It's a good idea to write down filenames, so you don't forget you named the file "SOUNDS" instead of

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"SOUND" and get repeated error messages. Another likely error is asking for an object filename that already exists. This routine won't erase an existing file, which means you're protected against accidentally deleting something you want to save. If you *want* to overwrite a file, first use Command 8, *Erase File(s)*, to delete the file; then use Command 4 to make a new copy with the now unused name.

5. Copy File on New (Formatted) Disk. This function reads the file from the source disk and stores it in the computer's memory. The file is then written from RAM to the new disk. You have the option of making several copies of the same file.

There is a maximum file size of 66 blocks for the Commodore 64; maximum file sizes for the VIC are likely to be smaller, depending on how much memory is available. This command tells you how much memory is available. Sometimes garbage will have built up in the computer, wasting memory. Lines 7 and 8 test for the amount of free memory (and for the memory configuration in the VIC version). If garbage is tying up some of the available memory, so that you have less than the maximum possible memory for your machine configuration, you will be notified. The garbage can be eliminated by turning off the machine, *LOADing* and *RUNning* Disk Manager, and selecting Command 5 again.

After you have entered the filename, you will be asked to state what type of file it is—program, sequential, user, or relative. Then you are asked to put the source disk in the drive and press RETURN (if it is already in the drive, simply press RETURN). When the file has been loaded into memory, you will be asked to put the destination disk in the drive and press RETURN.

When the operation is over, you are asked if you want to make another copy of the *same file* on still another disk. If your answer begins with the letter Y, you will be prompted to insert the new destination disk and press RETURN. This allows you to make as many copies as you want on different disks without having to read the file from the original disk each time.

This routine is *not* fast. It takes about a minute to copy a six-block file. And be sure to format the new disk before attempting to copy files on it. Attempting to write to an unformatted disk will cause an error.

6. Copy DOS Wedge Program(s). You will be prompted to insert a disk containing the DOS wedge program(s). (For the VIC, the wedge program is the "VIC-20 Wedge," while the 64 wedge programs are "C-64 Wedge" and "DOS 5.1".) When you press RETURN, the wedge(s) is loaded into a buffer. Then you are prompted to insert the destination disk—a formatted disk that does not contain the wedge program(s)—and press RETURN; the routine puts the wedge file(s) on the new disk.

7. Rename File. You will be asked for the old

filename. After you press RETURN, you will be asked for the new filename. After entering the new name, the routine executes the change.

8. Erase File(s). You are asked for the name of the file(s) you want to delete. You can erase more than one file at a time by using wild cards.

The wild card ? stands for any character in a particular position in the filename. For instance, if you erase *????TEST?*, you will erase the files *BYTETEST1*, *BYTETEST2*, and *DISKTEST5*—but *not* the files *NEWTTEST5* (only three letters before *TEST*) or *SOUNDTESTEDITOR* (more than one character after *TEST*).

The wild card * stands for any number or combination of characters to the end of the filename. For example, if you say to erase *NEW**, you will erase the files *NEWGAME1*, *NEWGAME2*, *NEW*, and *NEWCOMER*, but not the files *NEVER* and *RENEW*.

After running this routine, if you select Command 11, *Error Status*, the error number will contain the number of files deleted (it *won't* be a genuine error, even if *Error Status* says it is).

9. Validate Files. This is a housecleaning routine. It reorganizes the disk directory, cleaning up any isolated, unused blocks, and closing any files inadvertently left open.

10. Write Disk Manager. This routine simply saves the Disk Manager program then in memory. If Disk Manager is already on the disk, the version presently in memory will be saved over it.

11. Error Status. This routine checks to see what error is currently being reported. If no error is reported, you'll get error number 0 and the OK message. Remember that getting the error status changes it—if you run this routine twice in a row, the result the second time will always be 0 and OK.

12. Exit to BASIC. This ends the program in an orderly fashion, after *PRINTing* the message *NOTE: DISKMANAGER PROGRAM IS STILL RESIDENT*. This is to remind you that the program is still in memory. You can then *LIST* it, alter it, or get rid of it with a *NEW* command.

Tracing The Program

If you want to use some of these disk techniques in your own programs, it's easy to trace the way the program logic works. Check line 200. The starting line numbers of the subroutines are listed right after *GOSUB*, in the same order as the function numbers. Thus line 250 is the beginning of Command 1, *Disk Directory*; line 700 is the beginning of Command 12, *Exit to BASIC*.

The subroutine from 1000 to 1020 reads from a disk file into a buffer. The subroutine from 1050 to 1068 writes from the buffer to a disk file. Both subroutines are called by Commands 5 and 6.

See program listings on page 222. 📖

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VIC Music Writer

Robert D. Heidler

This flexible music-composition utility works on the unexpanded VIC-20. With it, you can compose and play songs, edit your music, and add the tunes to your own programs.

Music can be a welcome addition to a computer program, particularly if the program is educational or recreational in nature. (Who wouldn't like to have the theme from *Close Encounters of the Third Kind* playing softly in the background as your flying saucer glides across the screen?) Unfortunately, adding music to a program can be a long and complex task that many new programmers hesitate to attempt. That's where "VIC Music Writer" comes in.

VIC Music Writer is a program designed to make composing at your VIC keyboard *easy*. Here are some of its features:

1. VIC Music Writer allows you to easily enter any combination of notes from a two-octave range, and to hold each note for any duration.
2. It allows you to hear each note played as you enter it.
3. It allows you to hear your entire song played back at any time while you are composing.
4. It allows you to insert, delete, or change notes anywhere in the song at any time.
5. When your song is complete, VIC Music Writer will display the data necessary to reproduce your song in a program.

With this brief overview of the program's capabilities, let's explore in detail how to use VIC Music Writer.



Try entering this sample tune with "VIC Music Writer."

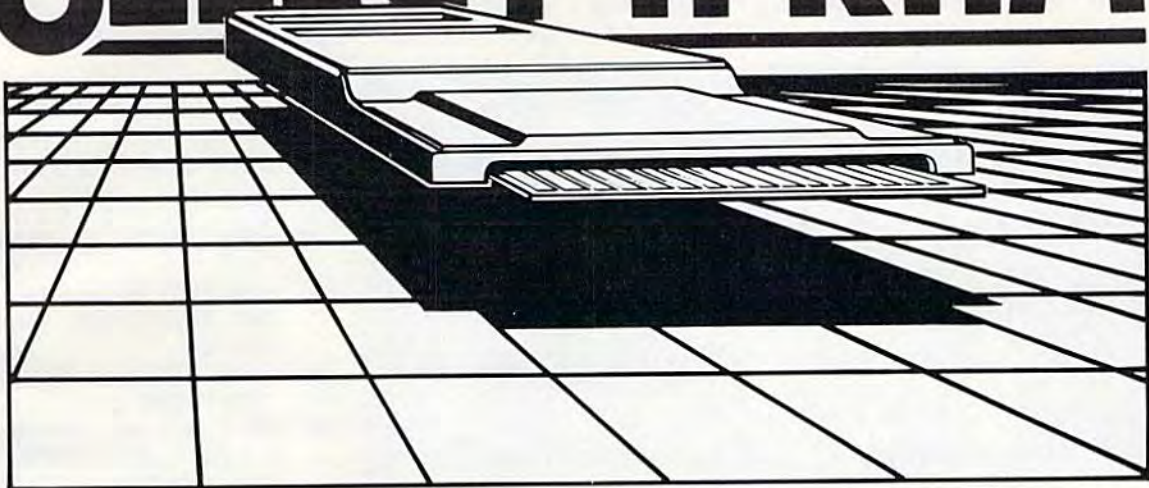
Entering Notes

When you run the program, the words Please Enter Notes appear at the top of the screen. To enter a note, simply press any valid note key from A through G. The VIC will respond by sounding the corresponding note and displaying its letter name on the screen in blue.

To move to a higher octave, press the f1 special function key. Now, pressing any key A through G plays the note one octave higher. The note's name is printed on the screen in red. To return to the lower octave, press f3.

This program requires you to convert all flats to sharps (B-flat becomes A-sharp, etc.). To play a

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sharped note, hold down the SHIFT key while pressing the key of the desired note. For example, to enter a C-sharp, hold down SHIFT and hit the C. The VIC will play a C-sharp note and the symbols C# are displayed on the screen.

If you aren't sure what note to use, press f5. This puts you in the search mode. You can now strike any combination of keys in either octave. The notes will sound as before, but no new notes will be added to the screen. When you have found the combination of notes you want, press f7. This returns you to the write mode.

Figure 1:
The Range Of Notes Possible With VIC Music Writer.



Duration

A note's duration is determined by the number of times the note is entered. Normally, I count each keystroke as one beat. Thus, pressing the C once plays and holds a C note for one beat. Pressing the C twice plays and holds the C for two beats. If you want to play two notes of the same pitch but you don't want the VIC to run them together, enter the first note, press the up-arrow key (next to RESTORE), and enter the second. The up-arrow key places a momentary break between the notes—just long enough to distinguish between them.

Sometimes you will want to count each keystroke as one-half beat and double the playback speed in your program. (This allows you to use eighth notes in a song written in 4/4 time, etc.)

If you want to place a rest in your song, press R. The duration of rests is handled in the same way as the duration of notes.

Any time you want the VIC to play back what you have written, press P. The computer plays your song, momentarily illuminating the symbol of each note as it is played.

Editing Your Song

To insert, delete, or change a note anywhere in your song, use the left-right cursor key to move the cursor back to where you wish to make the change. (While the cursor itself is invisible, the color of the notes will change as the cursor passes over them.) To change a note, simply position the cursor over the old note and press the key for the

desired note. Insertions and deletions are made with the INSERT/DELETE key.

To clear a song from the screen, press the left-arrow key at the upper-left corner of the keyboard and then press the S key.

Data Display

When your song is complete, press the left-arrow key. This clears the screen and displays the data necessary to reproduce the song in your program. Simply copy these numbers off the screen and include them in DATA statements in your own program.

To make your program play your song exactly as you have written it, use the following subroutine:

```
10 POKE 36878,15:READA
      :rem 201
20 FOR B=1 TO A:READ C:IF
   C=0 THEN POKE 36876,0:G
   OTO 40      :rem 142
30 POKE 36876,C:FOR D=1 TO
   250:NEXT D      :rem 217
40 NEXT B:POKE 36876,0:POK
   E 36878,0:RETURN
      :rem 167
```

The value 250 in line 30 controls the playback speed. You can substitute your own number here. I suggest starting with 250 and then increasing or decreasing the tempo to suit your taste. If you want to synchronize any kind of graphics on the screen while the song is playing, you will want to decrease the value of 250 and place the instructions for the screen display between lines 30 and 40.

If you want to play a song several times in a program, you may want to include a RESTORE statement at the beginning of line 10.

Figure 2:
Sample Songs For VIC Music Writer.

"Mary Had A Little Lamb"

E D C D E ↑ E ↑ E E D ↑ D ↑ D D E
G ↑ G G E D C D E ↑ E ↑ E ↑ E D ↑
D E D C C P

"London Bridge"

f1 A B A f3 G F# G f1 A R f3 E F# G R F#
G f1 A R A B A f3 G F# G f1 A R f3 E E
f1 ↑ A A f3 F# D P

Typing The Program

When you are typing VIC Music Writer, leave out line 5 until you have tested your program to be sure you have typed it correctly. Line 5 disables the RUN/STOP key, preventing you from acci-

dentally destroying your work. To exit the program without turning off the power you must hit the left-arrow key.


Since this program uses a good deal of memory, I would advise typing it in without any spaces, apart from those within quotation marks.

If you want to save yourself a lot of typing, I would be glad to make a copy of the program for you. Send a blank cassette tape, a stamped, self-addressed tape mailer, and \$3 to:

Robert D. Heidler
3409 Kingfisher Lane
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While this program was written primarily to aid in writing programs, it is also a lot of fun to play around with. It is very user friendly, and the editing features make it a lot of fun to experiment with, as you change notes and durations to get different effects.

My seven-year-old daughter mastered the program in about ten minutes and now enjoys typing in the songs she learns at school and hearing the computer play them back. My two-year-old son isn't quite ready for serious composition, but he enjoys playing the keys like a piano to hear the music. I hope you find this program as useful and enjoyable as we have.

See program listing on page 234. 

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THINKING

Andy VanDuyne

"Thinking"—and its advanced version, "Thinking Harder"—is a game of pattern recognition and memory that tests your ability to think logically. Originally written for the unexpanded VIC, we've added a version for the Commodore 64.

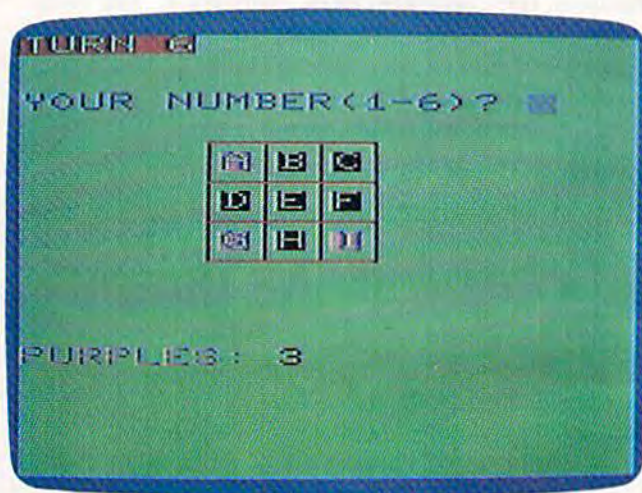
You have nine black boxes labeled from A to I in front of you. Your job is to make them all light up with a purple glow.

The trouble is, you can't get to them directly. Instead, you have a set of six switches, numbered from one to six. Each switch controls *three* of the boxes. When you choose switch 1, for example, boxes A, D, and H might change condition. If they were all dark, then they'll all glow; if they were all glowing purple, then they'll all go dark. And if A and D were purple and H was black, then A and D will go dark and H will glow purple.

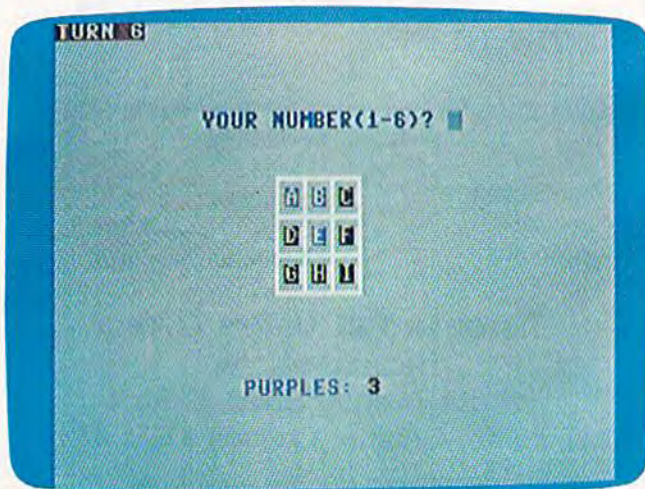
The trouble is figuring out which switches control certain boxes. You know that there is a correct combination—three of the switches, toggled at once, will make all nine boxes glow. But which three? That's where luck and genius combine. It's possible to guess right with your first three choices. But if you aren't concentrating, it's also possible to get such a mishmash of purple and black boxes that it could take a hundred tries before the puzzle is solved.

How To Play "Thinking"

After you have typed in "Thinking" and SAVED it on tape or disk, RUN it and the game will begin. A



Solving a puzzle in "Thinking," VIC version.



"Thinking," Commodore 64 version.

title screen and two screens of instructions appear first. Press any key to go on.

Nine black boxes lettered from A to I appear in the center of the screen. Below the boxes you can see the number of purple boxes, which is 0 at the beginning of the game. At the top of the screen is the number of turns you have taken, which is 1 at the start of the game.

The input line just above the black boxes asks you for a number from 1 to 6. Enter a number and press RETURN. Three boxes will immediately turn purple. The turn number will change to 2 and the count of purple boxes will change to 3.

Suppose you enter the number 5, and the A, B, and I boxes glow purple. You don't know about any of the other numbers, but you know that from then on, in that game, number 5 will toggle boxes A, B, and I. The pattern for each switch is randomly assigned at the beginning of each game, so that each time you play there'll be a new set of patterns. But the pattern for a particular switch will never change during a game.

If you choose a number and don't like what it did, choosing the same number again toggles the same three boxes and restores them to the way they were originally. In fact, in order to choose the same number, all you have to do is press RETURN without entering anything. Your last choice will be repeated. It will cost you a turn each time, though, just as if you had entered a new number.

When all nine boxes turn purple, the computer congratulates you, tells you how many turns you took, and asks if you want another game. If you choose to play again, a new set of patterns is randomly created.

Strategy And Frustration

At the beginning of every game there are always two perfect solutions. The puzzle can always be solved. Winning in three or five tries is entirely a matter of luck. Students in my school average between 9 and 25 turns—slightly better than the teachers. If you become totally lost, however, it can take dozens or even a hundred tries to solve the puzzle.

But if you think logically, you should soon become quite good at the game. I won't give away the whole strategy, but you might keep in mind that any two patterns that overlap (that change the condition of the same box) cannot possibly be in the same winning combination. And in the last turn before you win, you must always have exactly six purple boxes and three black ones.

Is It Too Easy?

If you become a master at Thinking, you might want to try Thinking Harder. In this version of the game, you have *nine* possible patterns instead of six.

This makes it possible to get much more confused, and getting it right by luck alone is much less likely.

To play Thinking, type in Program 1 for the VIC-20 or Program 2 for the Commodore 64. To play Thinking Harder, remove the REM in line 2 and change the 6 in line 132 to a 9.

If Thinking Harder is too difficult, you can always reverse the changes and go back to Thinking again.

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If you don't want to type the program, I'll make a copy for you on tape (VIC version only). Send a blank cassette, self-addressed stamped mailer, and \$3 to:

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See program listings on page 218. @

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527	Artillery War. This is a long range war in the desert. A fort, oasis, and sand dunes are your cover. Can you beat back the tank? Keyboard.
962	Autocross. Only those with the finest skills and nerves of steel will be able to negotiate this toughest of master courses. If you succeed, the world championship is yours!! Keyboard.
809	Black Hole Disaster. Does the "Black Hole" exist? You better believe it...and you're being pulled towards it!! Only your aim can save you. 3K Exp.* Keyboard.
947	Bombs Away. You are commander of an aircraft. Can you avoid the missiles and flatten the alien city defenses? Joystick/Keyboard.
531	Clowneries. Help the clowns burst the balloons by bouncing them on the see-saw. The clowns go higher every time. 8/16K Exp.* Keyboard.
606	Dam Busters. Navigate bombers and helicopters behind enemy lines on a top secret mission to destroy a major dam. Joystick/Keyboard.
842	Dangers of the Deep. You're out for a nice dip on a Sunday afternoon. Then suddenly they come from everywhere...sharks and octopi. They're all out to get you!! Will you survive? Joystick/Keyboard.
594	Downhill Racer. The gold medal is on the line. The course is icy and the dangers are everywhere. One mistake and you're out of it. Will you have the winning time? Keyboard.
572	Drunken Driver. Guide the intoxicated driver through traffic avoiding the obstacles, pink elephants and police helicopter. 3K Exp.* Joystick.
638	Escape. Your star ship is caught in a deadly meteorite shower. Escape by exploding the drifting meteors before you are destroyed. Hyperwarp through space to bring your crew safely home. 3K Exp.* Joystick.
831	Evader. Work through the maze without being consumed by the monsters. Joystick.
802	Evil Ghost Train. This train is bound for glory...or are you? There are passengers aboard with you...they've been on this run many times before. They're coming from every angle...ghosts, evil spirits, monsters and demons!! Now, it's you or them. 3K. Exp.* Joystick.
571	Explorer. As captain of a star ship, it is your mission to seek out new peoples and planets. You will go where no person has ever gone before. Adventure and danger are your constant companions. 16K Exp.* Keyboard.
881	Friend or Foe. You have only a microsecond to decide. Shoot too soon, and you may disintegrate a friend. 3K Exp.* Joystick.
723	Intruder. They come from outer space, strange creatures threatening our planet. Who are they? What do they want? No time for questions now, only action will save you from the intruders. 3K Exp.* Joystick.

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923	Killer Torpedos. A giant tanker is under attack!! The cargo is priceless. One torpedo and it's on its way to Davy's Locker. Watch out for the mines and iceberg. 3K Exp.* Joystick.
504	Labyrinthe. Find your way through the underground maze. A mathematical-three-dimensional puzzle game. 3/8/16K Exp.* Keyboard.
610	Laser Battle. You are under attack from the Plyonytes. Can you fend off the attack before your force field shields are disintegrated and you are destroyed? Joystick/Keyboard.
680	Mars Attack. You are counterattacking Mars in your star ship. Destroy the fortin fireballs before they explode and destroy you. Joystick/Keyboard.
551	Moonlanding. You are landing on the moon for exploration. Suddenly you are attacked by Zurkons. Will you be destroyed? 16K Exp.* Keyboard.
908	Nightcrawler. Quick movement and rapid fire will protect you from the attacking nightcrawler, spider and bugs. A centipede type game. Joystick.
599	Nuclear Attack. Nuclear war has been declared and you have been designated to destroy with your missiles the enemy silos. You have 30 rockets and 6 silos to destroy. Good Luck! Keyboard.
991	Olympic Champion. You're representing your country in the Olympic Equestrian event. Take your trusty steed through the speed, jumping and cross country competition to take home the coveted gold. 3K Exp.* Joystick.
724	Othello. Master all your skill and concentration and try to beat the computer. 3K Exp.* Joystick.
730	Pari-Mutuals. Race your mighty steed in the sport of kings. Come home a winner or suffer the agony of defeat!! 3K Exp.* Joystick.
556	Raid on New York. Bomb the city of New York to provide a landing strip on which to land, repair and refly your bomber. 8/16K Exp.* Joystick.
851	Rabbit. Cross the highway and canal avoiding the hazards. 8/16K Exp.* Joystick.
689	Road Demon. You are one of California's finest—a California Highway Patrolman, "CHIPS". Apprehend the highway menace before he becomes another statistic, or makes you one! Joystick.
658	Shooting Gallery. Run up points as you shoot the birds and animals. Hit the musical notes and music begins. Hit the numbers to earn extra bullets. Careful, watch the clock. 3K Exp.* Keyboard.
829	Space Fight. You are the pilot of a spaceship. You must destroy the enemy machines if you can, without being destroyed yourself. Joystick/Keyboard.
822	They Come From Space. The year is 2020 and you're on space patrol. Suddenly, you are attacked by alien invaders!! Joystick.

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VIC Billboard

Andy VanDuyne

This program takes advantage of a little-used technique — doubling the height of the VIC-20's characters — to turn any TV screen into a repeating message display board. For the unexpanded VIC.

One of the interesting features of the VIC-20 is the large 8 by 16 (pixels) character size mode. The *VIC-20 Programmer's Reference Guide* says this normally would be used for high-resolution graphics. But it can also be used very effectively for text.

Possible uses include programs for very young children, people with vision problems, or situations in which you want larger, eye-catching text displays, such as window displays in stores.

"Billboard," the program accompanying this article, displays up to four messages beneath a main heading, all in the double-height, 8 by 16 text mode. It's a great attention-getter for small businesses, or for bazaars and fairs, parent-teacher nights, and other occasions.

Using Billboard

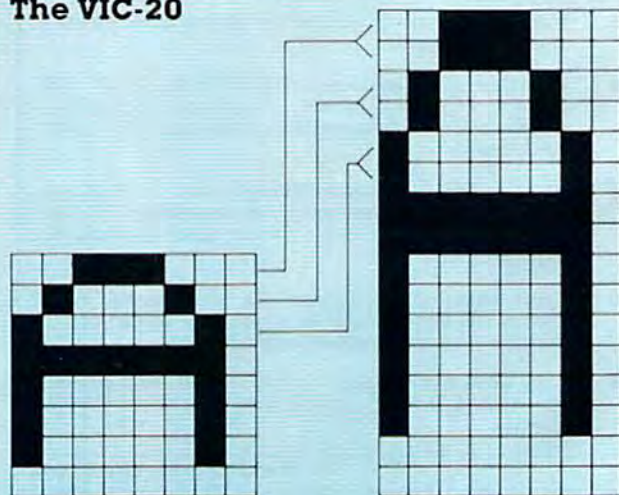
The program itself is very easy to use, with prompts for all the input. After you enter all the messages and colors you want displayed, it switches to the double-height text mode and begins endlessly repeating the messages.

When you first run Billboard, it asks you for the heading or title. This will be automatically centered at the top of the screen and must be limited to 22 characters or less (the VIC-20's screen width). Then you choose the color in which you

want the heading to appear. When choosing colors, be sure to pick a contrasting combination; if the text color is the same as the background color, the text will be invisible. Another caution: If you are entering text in all capitals with the SHIFT LOCK key, you must release SHIFT when typing a space. The character set for the large-size text mode has no shifted space character.

Next the program asks you to choose a screen/border color combination (please remember to contrast your text colors). Refer to the VIC owner's manual to find an interesting color combination for your display. To keep the screen/border combination included with the program, just press RETURN.

Double-Height Characters On The VIC-20



Now the program asks you to enter up to four messages. Each message can be up to four screen lines long. All the rules for entering strings apply, including no commas, colons, and, in this case, shifted spaces. Each message can be a different color.

Finally, after entering the last message, press any key to activate Billboard. One by one, your messages are spelled out beneath the heading in king-size characters.

You can edit your messages at any time by pressing the back-arrow key (at the upper-left corner of the keyboard) while a message is being displayed. Just follow the prompts; you can enter as many as four additional messages or change any previous message.

To end the program and restore text to normal, press RUN/STOP—RESTORE.

A Memory-Hungry Mode

One of the problems with the 8 by 16 text mode is the amount of memory the character set uses. Each 8 by 16 character needs 16 bytes of memory (as opposed to eight bytes in the standard mode), and since these are custom characters, they must be stored in Random Access Memory (RAM). Each character is moved down from the standard character set in Read Only Memory (ROM); and to achieve the double height, each ROM character must be stored twice.

While writing Billboard, I decided I wanted both upper- and lowercase letters. These include characters 0 through 90 in the ROM character table that begins at memory address 34816 (some editions of the *Programmer's Reference Guide* erroneously list this address at 33816). Since each double-height character uses 16 bytes, this adds up to 1456 bytes! The free memory ceiling would have to be lowered to address 6224. However, the VIC cannot be adjusted to find a character set at that address. There's another address in the neighborhood, though — 6144 — where the VIC can find a character set, if address 36869 is set to 254. Unfortunately, using this address means the new character set burns up even more memory — 1536 bytes — almost half the free memory available in an unexpanded VIC.

So you can see why memory has to be conserved in every way possible. That's why there aren't an abundance of REM statements to explain what's going on.

If you want to experiment with the large text mode without using Billboard, enter this program:

```
10 POKE 56,24:CLR
20 Z=0
30 FOR N=6144 TO 7678 STEP 2
40 POKE N,PEEK(34816+Z):POKE N+1,PEEK
(34816+Z)
50 Z=Z+1:NEXT
```

Now RUN. Nothing will seem to happen for about half a minute. Be patient; the character set is being moved from ROM to RAM. Soon you'll see the usual READY message; again, it will look as though nothing has happened.

Next, type this line in direct mode (without a line number) and press RETURN:

```
POKE 36869,254:POKE 36867,PEEK(36867) OR 1
```

Double-height characters! You will notice that the bottom of the screen has disappeared, and the cursor may not be visible. Both are there, but they are below the screen limits of your TV or monitor. The number of visible rows has changed from 23 standard-size ones to 11½ big ones. Try pressing the CLR/HOME key to clear the screen. Now the flashing cursor is visible, though it looks a little strange. Try typing some characters — everything appears twice as tall. You can even LIST a program and enter new lines.

To bring things back to normal, press RUN/STOP—RESTORE. You can erase the short character set-relocating program from memory by typing NEW, but the character set itself will remain. Enter the POKE statements above to switch back to large characters.

Remember: These programs are for the unexpanded VIC. You'll have to modify Billboard to use it on expanded VICs.

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If you don't want to type Billboard, I will make you a copy on tape. Please send a blank cassette, self-addressed stamped mailer, and \$3 to:

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See program listing on page 231.



Up to four repeating messages can be displayed with "VIC Billboard."

Tricks

For Saving Memory

John Stilwell

Writing programs to fit in an unexpanded VIC-20 is not easy — there's only 3.5K of free memory to work with. You should find the following tricks very useful. They also work on the Commodore 64, although with about 39K of free memory space available, the need is less acute.

Trick 1

Always use keyword abbreviations when entering a program (example: P-SHIFT-O for POKE). See your manual for a list of these abbreviations. This won't save any memory because of the abbreviations, but it will allow you to cram more statements into a line. This is important because every line takes up five bytes, then you start counting the statements. The only problem with this trick is that if the line, when listed, exceeds 88 characters on the VIC or 80 on the Commodore 64, you can't edit it. If something needs to be changed, you will have to retype the entire line. Also, if you submit the program to a magazine which publishes the listing, other people won't be able to enter your program without also using the abbreviations — something they may not know.

Trick 2

If the last thing on a line is an ending quotation

mark of a PRINT statement, leave it off. It won't hurt anything as long as it's the last thing on the line. Besides less typing for you, it saves one byte for each quote you leave off. This may not seem like much, but everything adds up. Remember, the average line statement is 40 bytes long.

Trick 3

This one will save the greatest amount of memory. Use cursor controls whenever possible. Here are some examples:

```
10 PRINT
20 PRINT
30 PRINT
40 PRINT"HI MOM"
```

This program uses 34 bytes of memory. If the PRINT statements are replaced by down-cursor controls, there is a significant saving.

```
10 PRINT"{3 DOWN}HI MOM"
```

This accomplishes the same thing but uses 19 bytes, so we save a whole 15 bytes. Now we are getting somewhere. Look through your program and see how many times you can do this. You may be amazed. Oh, don't forget to leave the ending quotation mark off.

```
10 PRINT "{3 DOWN}HI MOM
```

This saves one extra byte.

Trick 4

This is a modification on Trick 3. Always use TABs instead of cursor controls if there are a lot of cursor controls. However, with TABs you are limited to moving from left to right and down.

To move to the right five columns, use TAB(5). To move down, add 22 for every row. For example, we will move to the right five columns and down ten rows:

$(10 \text{ rows} * 22) + 5 \text{ columns} = 225$, so use TAB (225).

Unfortunately, the TAB number must be less than 256. If you need to TAB further than 255, it is legal to stack TABs — TAB(255)TAB(25).

Instead of this:

```
10 PRINT "{10 DOWN}{5 SPACES}HI MOM"
```

Memory usage is 31 bytes. Try it this way:

$(10 \text{ rows} * 22) + 5 \text{ columns} = 225$

```
10 PRINT TAB(225)"HI MOM"
```

This now only uses 22 bytes. In comparison to Trick 3, nine bytes may not seem like much, but if the above program were written with ten PRINT statements, it would use approximately 77 bytes. So we would have saved 56 bytes by using TABs.

To know when to use TABs instead of cursor controls, you must look at the memory requirements. Cursor controls take one byte each. TABs take two bytes plus one byte for each digit in the TAB number.

Trick 5

If something looks strange with the TAB above, you are right. There is no semicolon between the TAB and the quote. It is not necessary. Since it doesn't affect the spacing, why use it? After all, it uses up one byte. You can also eliminate the semicolon between quotes and variables.

```
10 PRINT "A=";A can be written as 10 PRINT"A="A
```

Note that the semicolon must be used if the PRINT was changed to an INPUT.

```
10 INPUT"A=";A
```

Trick 6

This trick is frowned upon by traditional programmers. Nevertheless, you can number a program by ones. You won't want to do this unless you have a renumber program. If you renumber the program by ones, starting with zero as the first line number, the program will take up less space. This is because all branching commands such as GOTO take one byte plus one for every digit of the address.

This trick has on occasion saved me a couple of hundred bytes. Unfortunately, modifying this program will be hard, since you can't insert any lines without renumbering.

Trick 7

Trick 7 does not hold for most computers. But with the VIC and 64, use PRINT statements instead of POKEs whenever possible. This is for three reasons.

First of all, POKE statements are so amazingly slow that it isn't funny. I recently rewrote the graphics in a program, changing the POKEs into PRINT statements. I was amazed. You would think that it was written in machine language. The speed difference is that great.

Second, POKE statements take up more memory than PRINT statements (in most cases). A POKE takes two bytes plus one for every digit of the numbers that go with it. That's an average of eight bytes for every character POKed on the screen. In contrast, it takes one byte for the PRINT and one for each of the quotes and characters in-between. So, if you are creating graphics, you might save a lot of memory by using PRINT statements.

Third, when POKing directly into screen memory on the VIC and late-model 64s, a corresponding POKE to color memory is necessary to make the character appear on the screen. This then requires two POKE statements for each character. It will be more economical (memory-wise) to use PRINT, which automatically takes care of color memory. ☺

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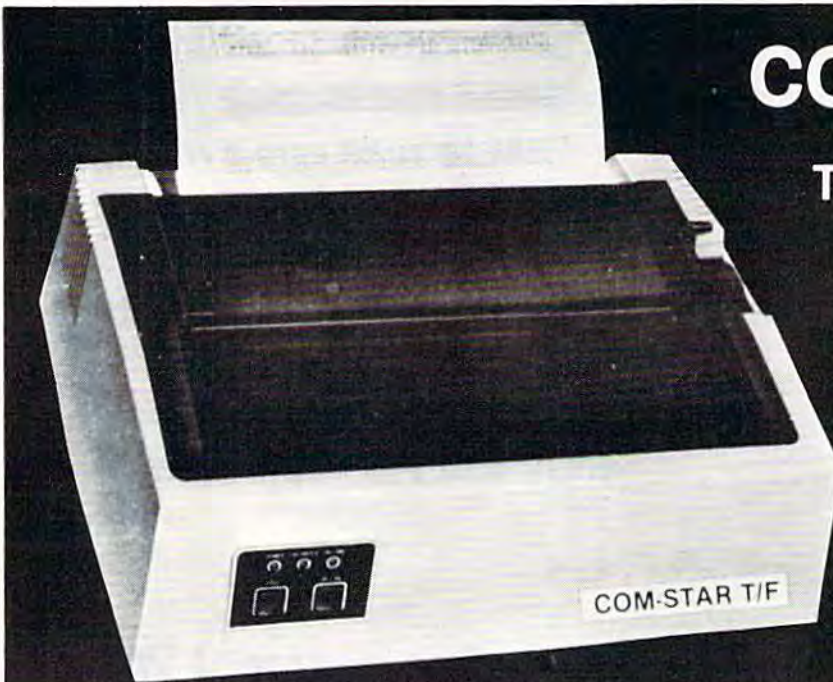
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MACHINE LANGUAGE FOR BEGINNERS

RICHARD MANSFIELD, SENIOR EDITOR

Safe Places

This month we'll start constructing a game. It will be written entirely in machine language (ML). After each small section is written, we'll test it and combine it with other modules until the game is complete. Along the way, we'll learn the meaning of the commands available to us in ML, as well as how to build a program from start to finish.

But first we've got to clear up an important issue: where do you put an ML program? BASIC programs always start in the same address in the computer's memory. An unexpanded VIC starts them at address 4096. VIC-20s with memory expansion start them at 4608. Commodore 64s start them at 2048. ML programmers, however, must decide where they want to put their programs. When you fire up the Assembler (see last month's column), the first thing it wants to know is the starting address. The choice is yours.

Nevertheless, there are some places you clearly can't put an ML program. ROM memory can't be POKEd or changed, so you can't store something there. Likewise, roughly the first 500 addresses are heavily used by the computer to keep track of the screen location of the cursor, current variable addresses, and many other things. The cassette buffer is safe enough (addresses 828-1019) *if you use a disk drive*. If you use cassettes, you will destroy what's in this buffer whenever you use the cassette drive.

Another consideration is that you will often want to have an ML program and a BASIC program coexist inside the computer. For example, many BASIC programs can be significantly speeded up by replacing slow sections, usually loops, with an ML program. SYS within BASIC

sends control to the ML and RTS sends it back — similar to the way you use GOSUB within BASIC. Also, when we use the Assembler, we're creating an ML program, but the Assembler itself is in BASIC — they've got to be in the computer at the same time.

Where's the best place to put ML? On the 64, it's easy: you've got a block of memory from 49152 to 53247 (4096 cells, or 4K) which isn't disturbed by BASIC or the computer's operating system. We'll locate everything there from now on.

On the VIC, it's a bit more tricky. For one thing, the Assembler itself would use up all the available memory in an unexpanded VIC. And, when you add expansion memory to a VIC, several key memory locations shift around. For our purposes, we'll assume that you've added at least 8K of expansion memory. We'll set aside a zone at the top of your memory expansion (from 12288 on) which will give us a good amount of protected space for our ML programs.

Since BASIC uses up some RAM memory to build its arrays and variables, we've got to protect our ML zone from being overwritten while BASIC is active. In fact, the Assembler builds an array. If you want to assemble something with it, you've got to protect the newly created ML program from the Assembler itself. We can do this by fooling BASIC into thinking that its available RAM memory is less than it really is. This forces BASIC to build its variables below the zone we set aside. This is done by POKeIng location 56 with a 48. When you've done that, your computer will not disturb RAM memory above address 12287.

To summarize, 64-users should always answer

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49152 when their assembler or disassembler asks for the Starting Address. VIC users should have an expansion memory of at least 8K attached to their computer and should protect a zone of memory at the start of every ML programming session by typing: POKE 56,48. VIC users can then answer 12288 as the starting address of an assembly or disassembly.

Starting The Game

We're about ready to start putting together a game, but first let's add a convenience feature to the Assembler. Enter the line in Program 3 and you can then type XX if you've made a mistake when entering a line of ML. Give the address and you can then type the line in correctly. This is most useful if you notice an error after you've hit RETURN. You can correct it without having to restart assembly. Of course, you could also restart the Assembler by giving the address of the error as the Starting Address, but that's somewhat clumsy.

Now type in your version of the first part of our all-ML game (Program 1 or 2). Don't forget to tell the Assembler you're finished by typing the word END when you hit RETURN after typing RTS.

As we talk about the meaning of the ML commands within a program, we'll refer to the leftmost numbers (see Program 1 or 2) as *line numbers* since that's how they function. They are really addresses in memory, but it's fine to think of them the same way you think of BASIC's line numbers.

Let's briefly look at the ML. Both versions need to first set color memory by filling it with a color that will show up when something is POKED into it. We load the Y register (registers are like variables) with a zero so it can count for us. The A register is then loaded with our color code (6 for the VIC, 8 for the 64, but you can select which color you want by changing these). Then we store the A value into color memory. On the VIC, we are storing into 37888 *plus* the value of Y. We raise Y by one (INY) each time through the loop created by the BNE (Branch Not Equal to zero) instruction. Y can only go as high as 255 so it eventually resets to zero, and we fall through the branch. For the VIC, we need to fill only two, 256-cell large blocks of memory (starting at 37888 and 38144). The 64 has twice as large a screen, so we fill four, 256-cell blocks (they're called *pages*.)

That accomplished, we can now put things on screen by using the STA command (like BASIC's POKE). Lines 12301 for the VIC and 49171 for the 64 are the start of our drawing loop. It's similar to the loop we used to fill color memory, but this time we want to draw a bar across the top and bottom of the screen. This will be part of a frame to contain the visual action of our game.

This time we load A with 224, a solid square character, and proceed to store it as two lines. On the VIC we count up with Y until Y=22 (the number of characters on the VIC screen line); on the 64 we count up to 40. The RTS sends us back to BASIC.

After you've typed in your version, test it by typing SYS 12288 (for VIC) or SYS 49152 (for 64). You should see a top and bottom border appear across your screen. If you don't, you've made a mistake in typing and you should try again with the Assembler. Or, you could load in your Disassembler (September 1983) and compare your ML against Program 1 or 2.

If the program works correctly, you'll want to SAVE it so you don't have to reassemble it next month when we add to it. To do this, we'll make a BASIC loader out of our ML by using the "Datamaker" program (October 1983). Simply LOAD in Datamaker, change line 1 to read:

```
1 S=12288: F=12316: L=9 (for the VIC)
1 S=49152: F=49186: L=9 (for the 64)
```

and change line 800 in the same fashion. Then RUN. Datamaker will create your loader and then remove itself. (You might need to hit RETURN a few times when Datamaker stops.) You can SAVE the loader and, whenever you want to recreate your ML, just LOAD it and RUN it. Programs 4 and 5 are examples of the finished loaders.

ML Mailbag

Here are a couple of letters I received recently:

I would suggest the following line changes to your August RAMtest program to include VICs with expansion RAM. Problems with RAM, though rare, are more likely to be with RAM expansion than with the internal RAM. Also, it would be useful to have the capability to test out new RAM packs. The following changes to Program 1: RAMtest, August 1983, p. 125, will allow testing on VICs with any memory configurations:

VIC With 3K RAM Expansion:

```
882 DATA 69, 32, 169, 4, 133, 58
```

VIC With 8K RAM Expansion:

```
882 DATA 69, 32, 169, 18, 133, 58
894 DATA 24, 141, 0, 16, 145, 57
936 DATA 230, 58, 165, 58, 201, 64
```

VIC With 16K RAM Expansion:

```
Lines 882 and 894 same as for 8K
936 DATA 230, 58, 165, 58, 201, 96
```

VIC With 24K RAM Expansion:

```
Lines 882 and 894 same as for 8K
936 DATA 230, 58, 165, 58, 201, 128
```

Allan Wheeler

Many thanks for this useful table of modifications.

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STILL CONFUSED

We found we were confused about music programming, color graphics, and sprites. On both the VIC-20 and the CBM-64 templates we carefully organized and summarized the essential reference data for **music** programming and put it across the top—showing notes and the scale. All those values you must POKE and where to POKE them are listed.

Then to clarify **color graphics** we laid out screen memory maps showing character and color addresses in a screen matrix. (We got this idea from the manuals.)

For the VIC-20 we added a complete memory address map for documenting where everything is in an expanded or unexpanded VIC.

For the Commodore 64 we came up with a really clever summary table for showing almost everything you ever need to know for **sprite** graphics.

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In reference to your column on dis-assembly (September 1983), how do you load in Program 2 without erasing Program 1 (RAMtest)?

Harry Metz

Disk users will have no problem since RAMtest is designed to reside in the cassette buffer. If you use cassette, however, anything coming into the computer from the cassette drive will cover up the buffer and destroy RAMtest. There were several letters asking about this, and the first part of this month's column deals with this issue. The solution is to change line 800 in Programs 1 and 2 (August 1983) to send the ML to the safe areas described above.

If you have any questions or suggestions, please write to me c/o COMPUTE!'s Gazette. Next month we'll build onto the all-ML game and talk some more about addressing modes.

See program listing on page 222. ☺

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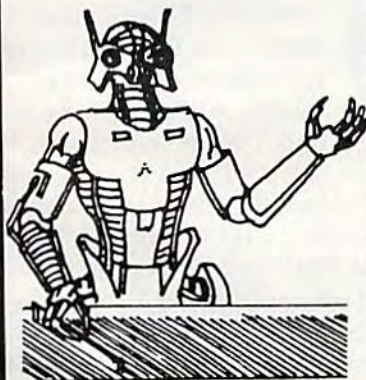
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Easy Screen Formatting



Edward Zobel

Here is an easy way to position text on the screen. This method works on both the VIC-20 and Commodore 64. It avoids the often cumbersome typing of cursor movements within the quotes of a PRINT statement. You simply set the X and Y (horizontal and vertical) screen coordinates and then direct the program to the accompanying subroutine. After RETURN, the next PRINT statement is positioned at the chosen spot.

Remember that the Commodore 64 screen has 40 horizontal positions numbered 0 to 39 (the VIC has 22, numbered 0 to 21). These are the X coordinates. There are also 25 vertical or Y coordinates numbered 0 to 24 on the Commodore 64, and 23 Y coordinates numbered 0 to 22 on the VIC.

Wherever the cursor is currently positioned, the next PRINT statement is executed. So the trick is to move the cursor. There are two memory locations that will help us with this. Address 214 holds the Y position, and 211 holds the X position. POKEing values into these spots will put the cursor where we want it. There is just one catch. The POKE to 214 works only *after* something is PRINTed. We want it to work *before*. Let's look at the program to see how to get around this.

This routine makes screen formatting easy — without dozens of cursor controls.

POKEing The Cursor Position

Lines 100-270 are an example of a BASIC program with some PRINT statements. At line 150 the X and Y coordinates are set, and then the subroutine is called.

The first line of the subroutine is 60000. Here the HOME command is PRINTed. This puts the cursor in the upper-left corner of the screen where both X and Y equal zero. In the next line, if Y is not set to zero, then its value minus one is POKEd into 214. The following PRINT command activates this POKE and moves the cursor down one line. This yields the proper Y value, since we subtracted one from Y when we POKEd into 214. If Y was set to zero, then none of this would happen and the cursor would stay at the top line of the screen.

Be sure to include the semicolon in line 60000 or the subroutine will not work properly. In line 60020 the X position is POKEd into 211. Nothing special is required here.

Type in the program and RUN it (the same version works on both the VIC and 64). You should see the word HELLO printed three times at the defined positions. This subroutine should be helpful in formatting menus and instructions in your own programs.

See program listing on page 240. 📄

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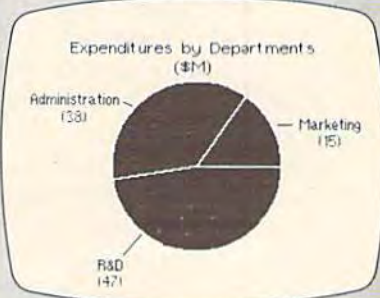
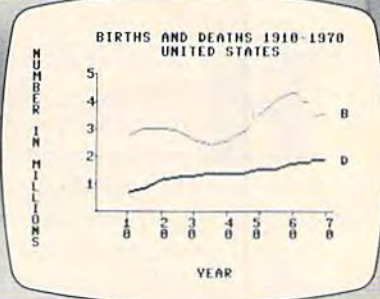
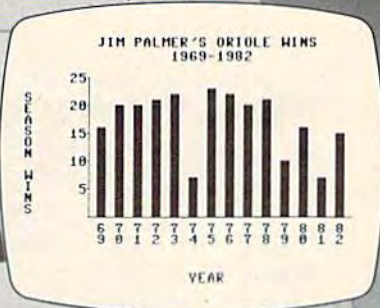


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MLX

Machine Language Entry Program For Commodore 64

Charles Brannon, Program Editor

MLX is a labor-saving utility that allows virtually foolproof entry of all-machine-language programs published in COMPUTE!'s Gazette. You need to know nothing about machine language to use MLX—it was designed for everyone. Important: MLX is required to type in the machine language games in this issue, such as "Spike" and the 64 version of "Space Duel."

Have you ever typed in a long machine language program? Chances are you typed in hundreds of DATA statements, numbers, and commas. You're never sure if you've typed them in right. So you go back, proofread, try to run the program, crash, go back and proofread again, correct a few typing errors, run again, crash, recheck your typing.... Frustrating, isn't it?

Until now, though, that has been the best way to enter machine language into your computer. Unless you happen to own an assembler and are willing to wrangle with machine language on the assembly level, it is much easier to enter a BASIC program that reads the DATA statements and POKES the numbers into memory.

Some of these BASIC loaders, as they are known, check to see if you've typed the numbers correctly with a *checksum*. The simplest checksum is just the sum of all the numbers in the DATA statements. If you make an error, your checksum will not match up. Some programmers make the task easier by calculating checksums every ten lines, so you can zero in on your errors. The Au-

tomatic Proofreader introduced in the October issue of COMPUTE!'s Gazette is a more sophisticated variation of the checksum concept.

But now there's an even better way than the Automatic Proofreader to enter programs written completely in machine language. "MLX" lets you type in long machine language listings with almost foolproof results. Using MLX, you enter the numbers from a special list that looks similar to BASIC DATA statements. MLX checks your typing on a line-by-line basis. It won't let you enter illegal characters when you should be typing numbers, such as an I for a 1 or an O for a 0. It won't let you enter numbers greater than 255 (which are not permitted in ML DATA statements). It *will* prevent you from entering the wrong numbers on the wrong line. In short, MLX should make proofreading obsolete!

In addition, MLX will generate a ready-to-use tape or disk file: You can then use the LOAD command to read the program into the computer, just like with any program. Specifically, you enter:

```
LOAD "program",1,1 (for tape)
```

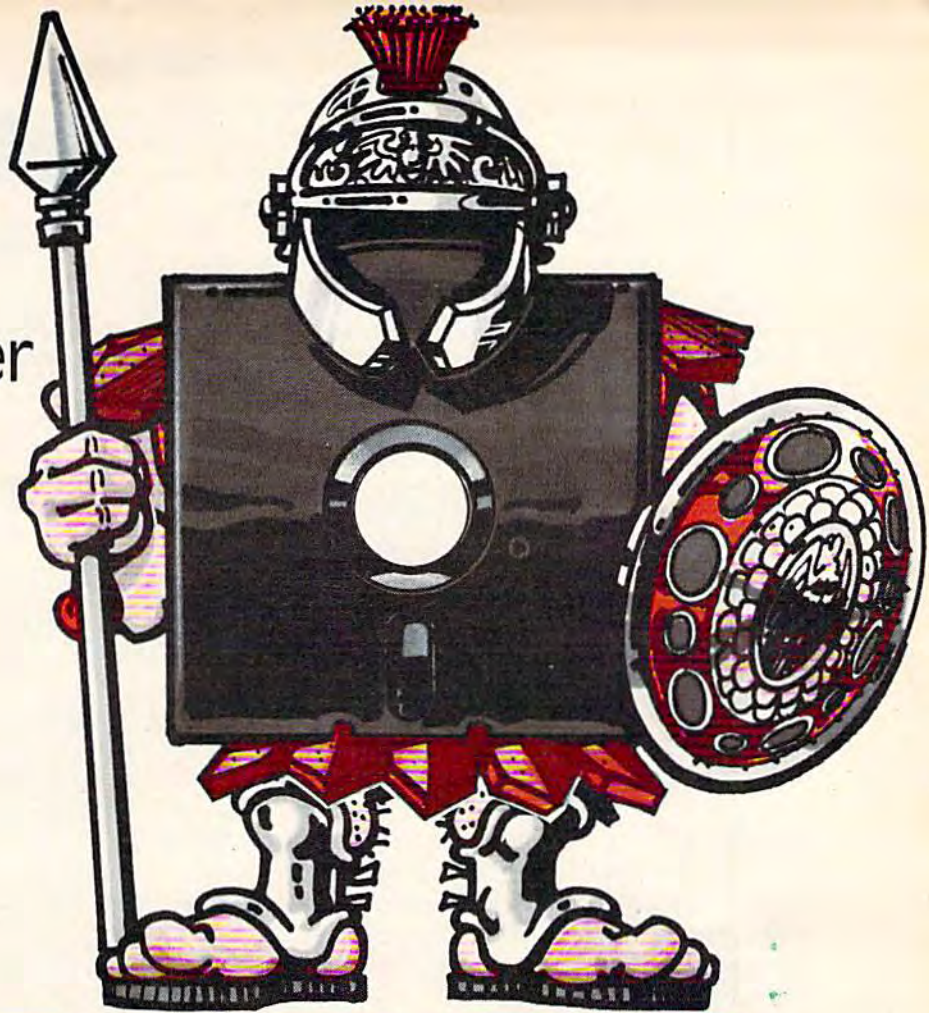
or

```
LOAD "program",8,1 (for disk)
```

To start the program, you need to enter a SYS command that transfers control from BASIC to machine language. The starting SYS will always be given in the article accompanying the machine language program.

To get started, type in and save MLX (you'll need it for future ML programs published in COM-

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PUTE!'s Gazette). Be sure to use the Automatic Proofreader to make sure you've typed in MLX correctly—MLX can't check itself. When you're ready to type in the ML program, such as the "Spike" game in this issue, run MLX. The program will ask you for two numbers: the starting address and the ending address. These vital numbers can be found in the article accompanying the ML program. The Spike article, for example, gives a starting address of 32768 and an ending address of 37295.

Next you'll see a prompt. The prompt is the current line you are entering from the listing. Each line is six numbers plus a checksum. If you enter any of the six numbers wrong, or enter the checksum wrong, the Commodore 64 will ring a buzzer and prompt you to reenter the line. If you enter it correctly, a pleasant bell tone will sound and you proceed to the next line.

You are not using the normal Commodore 64 screen editor with MLX. For example, it will accept only numbers as input. If you need to make a correction, 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 will automatically print the comma and prepare to accept the next number. If you enter less than three digits, by omitting beginning zeros, you can press either the comma, space bar, or RETURN key to advance to the next number. The checksum will automatically appear in inverse video; don't worry, it's highlighted for emphasis.

When testing MLX, we've found that it makes entering long listings extremely easy. With the audio cues provided, you don't even have to look at the screen if you're a touch-typist. We have tested MLX with people lacking any computer background whatsoever. No one has ever managed to enter a listing wrong with it.

When you finish typing, assuming you type the entire listing 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 made a typo when entering the MLX program. (Remember, it can't check itself, though the Proofreader can.)

What if you don't want to enter the whole program in one sitting? MLX lets you enter as much as you want, save the whole schmeer, and then reload the file from tape or disk when you want to continue. MLX recognizes these few commands:

SHIFT-S: SAVE
SHIFT-L: LOAD
SHIFT-N: New Address
SHIFT-D: Display

MLX

A FAILSAFE MACHINE LANGUAGE EDITOR

STARTING ADDRESS? 32768

ENDING ADDRESS? █

With "MLX," typo-proof entry of machine language listings is virtually guaranteed.

Hold down SHIFT while you press the appropriate key. You will jump out of the line you've been typing, so I recommend you execute these commands at a new prompt. Use the SAVE command to save what you've been working on. It will write the tape or disk file 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 on.* 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 file into memory. You'll then use the New Address command to resume typing.

Here's how the New Address command works. After you press SHIFT-N, 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 match up.

You can use the Display command to 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.

The special commands may seem a little confusing, but as you work with MLX, they will become valuable. What if you forgot where you stopped typing, for instance? Use the Display command to scan memory from the beginning to the end of the program. When you see a bunch of 170s, stop the listing by pressing a key and continue typing where the 170s start. Some programs contain many sections of 170s. To avoid typing them, you can use the New Address command to skip over the blocks of 170s. Be careful, though, you don't want to skip over anything you *should* type.

You can use the MLX SAVE and LOAD com-

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mands to make copies of the completed ML program. Use LOAD to reload the tape or disk, then insert a new tape or disk and use the SAVE command to make a new copy.

One quirk about tapes made with the SAVE command: when you load them, the message "FOUND program" may appear twice. The tape will load just fine, however.

(Programmers will find MLX to be an interesting program in terms of protecting the user from mistakes. There is also some screen formatting. Most interesting is the use of ROM Kernal routines for LOADING and SAVEing blocks of memory. Just POKE the starting address [low byte/high byte] into 251 and 252, and POKE the ending address into 254 and 255. Any error code can be found in location 253—an error would be a code less than ten.)

We hope you will find MLX to be a true labor-saving utility. Since it has been thoroughly tested by entering actual programs, you can count on it as an aid for generating bug-free machine language. And be sure to save MLX; it will be used for future all-machine-language programs in COMPUTE!'s Gazette.

See program listing on page 229. @

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HINTS & TIPS

Using The Period For Extra Speed

Mike Roth

If you've discovered a clever, time-saving technique, or a brief but effective programming shortcut, send it in to "Hints & Tips," c/o COMPUTE!'s Gazette. If we use it, we'll pay you \$35.

As you may know, variables are faster than regular numbers, but they take up memory. What you may not know is that Commodore computers have a built-in "variable" that is always equal to zero and cannot be changed. It is even faster than regular variables and doesn't take a bite out of memory (sorry). It's the period (.).

$X = \text{INT}(\text{RND}(1) * 506)$

Look at the above statement. It could be made much more efficient, but many programmers leave it like that. Now look at the next example:

$X = \text{INT}(\text{RND}(\cdot) * 506)$

It doesn't look very different from the first example, but it is about 29 percent faster. Even if a zero were used in the RND statement in the first example, the period still would be about six percent faster.

This wonderful, but overlooked feature can be used for more than random numbers, however. The period (.) can be used in place of the zero anytime that the zero is used as the entire number. This means that if you want the variable X to equal zero,

$X = \cdot$

is correct. If you want X to equal 160, though,

$X = 16\cdot$

would *not* be correct. In the latter case, X would equal 16.

You now have a wonderful and easy-to-use trick which should significantly speed up many programs. Try going through a few programs and replacing the zeros with periods. You might be pleasantly surprised. ☺

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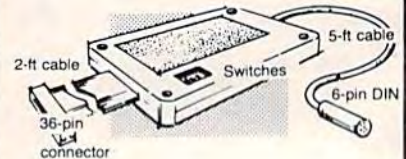


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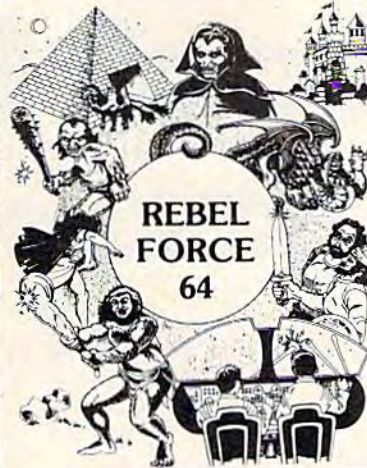


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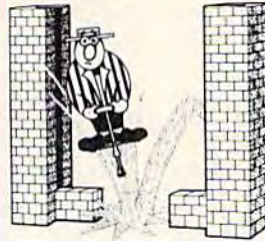
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Foolproof INPUT

For VIC And 64

Charles Brannon, Program Editor

This month's "Power BASIC" — a continuing series of useful utilities and routines — overcomes some of the problems of the INPUT statement. The program included is a short machine language routine that requires no special knowledge of machine language. Easy to use, it reprograms BASIC's own INPUT routine on either the VIC-20 or Commodore 64.

Problems With INPUT

You are probably familiar with some of the problems with the INPUT statement. First, it will not properly handle input with commas and colons. If you entered the previous sentence, the computer would accept only the word "First" and ignore the rest of the line (as the computer warns you with ?EXTRA IGNORED). This is because the comma is used to separate multiple INPUTs on the same line, as in this example:

```
INPUT "ENTER NAME: FIRST, LAST"; AS, BS
```

The colon, too, triggers an ?EXTRA IGNORED message. Yet it cannot be used to separate INPUT items, so it appears to be some kind of a bug (error) in the BASIC language itself.

You can get around these problems somewhat, but they become especially annoying when you are trying to read a file on tape or disk containing these characters. In a mailing list program, for instance, you need commas for address fields such as "Greensboro, NC, 27403".

There are other difficulties with the INPUT statement as well. Quotation marks are not handled correctly. Leading and trailing spaces are stripped away. INPUT also allows people to use all the cursor and color control keys. Theoretically, you can place the cursor anywhere on the screen

where there is something you want to INPUT, and press RETURN. In effect, this is what happens when you edit a program (the same INPUT routine is used by both the system and BASIC). But it just makes no sense to allow cursor moves all over the screen when you simply want the user to answer a question. If the user accidentally presses a cursor key and then tries to move the cursor back, the entire line, including any prompts, is read.

This can also be a problem when you have carefully laid out a screen format with blanks or boxes into which the user is supposed to enter information. You have no way to control how many characters the user can type, so if your blank space is only ten characters long, there is nothing to prevent someone from typing more. Not only that, but also with the standard INPUT routine, someone can move the cursor out of the box you want them to use, clear the screen entirely, or otherwise destroy your carefully planned screen format.

Improving On INPUT

What we need, then, is a new INPUT routine that will not allow cursor moves. The DEL key should still let the user delete characters to make corrections, however. Additionally, the ideal INPUT routine should let your program limit the number of characters typed, and allow commas and colons.

The usual solution is to write your own INPUT routine using the GET statement, which fetches one key at a time from the keyboard. With such a simple statement as GET, however, you have to reinvent the wheel anytime you need such a protected INPUT routine. And it certainly isn't as easy to use as a simple INPUT statement.

Well, I certainly wouldn't bring such gloom to the scene without a solution. The accompanying program is the key. It works on both the VIC-20 and Commodore 64, and is a machine language routine that replaces the standard Commodore INPUT with a protected INPUT such as described above. The beauty of it is that after you GOSUB 60000, all INPUT (and INPUT#) statements are redefined. You don't have to understand how the machine language works in order to use it, and you don't have to rewrite any existing programs, other than to insert the GOSUB. You still have all the flexibility of the standard INPUT statement. Just add the subroutine to the end of your program.


The machine language program has a couple of niceties. After you GOSUB 60000, you can change the maximum number of characters allowed by POKEing memory location 252 with the length (don't POKE with zero, or more than 88). The cursor is an underline by default, but you can change the character used for the cursor by POKEing the ASCII value of the character you want into memory location 2. For example, to change the cursor into an asterisk, enter:

```
POKE 2,ASC("***")
```

When you use the routine to INPUT data from files, just remember that it strips away all

control characters, from CHR\$(0) to CHR\$(31) and CHR\$(128) to CHR\$(159). This includes all special codes such as cursor controls, function keys, color codes, etc. You'll rarely write these to a standard data file, anyway.

You may be intrigued to find that this special INPUT routine even works in direct mode. You can still LIST and RUN, but cursor controls remain disabled. If you want the special INPUT routine out of your way, just press RUN/STOP-RESTORE.

See program listing on page 209. 

*** ! BREAK AWAY FROM BASIC ! ***

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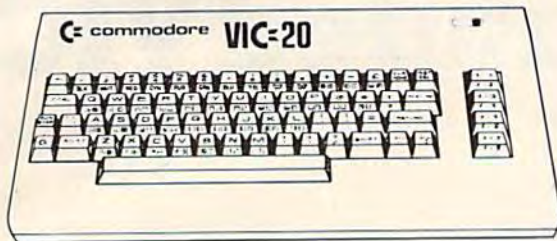
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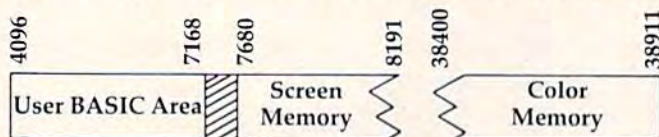
Custom Characters On The Expanded VIC

In this month's column, we'll show you how to set up the expanded VIC (8K or more) for custom characters.

The *VIC-20 Programmer's Reference Guide* has an entire section on creating custom characters on the unexpanded VIC. However, it only briefly touches upon how to set up the *expanded* VIC for custom characters. If you want to program custom characters on the expanded VIC, there are some important differences to learn.

Using custom characters in the unexpanded VIC is easy. The way memory is laid out is perfect for it. With BASIC programming memory running from 4096 to 7679, you can partition off, or "reserve," 512 bytes from the top of BASIC (7168 to 7679), enough for up to 64 custom characters. This, plus the fact that memory is neatly laid out (see Figure 1), makes the task easy.

Figure 1:
Memory Map Of The Unexpanded VIC-20

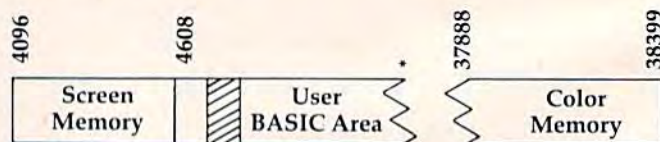


▨ = Custom Character Area

However, getting the (8K or more) expanded VIC-20 set up for custom characters takes a little more work. As you can see in Figure 2, adding an 8K or larger memory expander to the VIC-20

moves things around a bit. The start of BASIC programming memory moves from 4096 to 4608, and the area where BASIC was in the unexpanded VIC (4096 - 4607) is now screen memory. The color memory starting address also moves from 38400 to 37888.

Figure 2:
Memory Map Of The Expanded (8K Or More) VIC-20



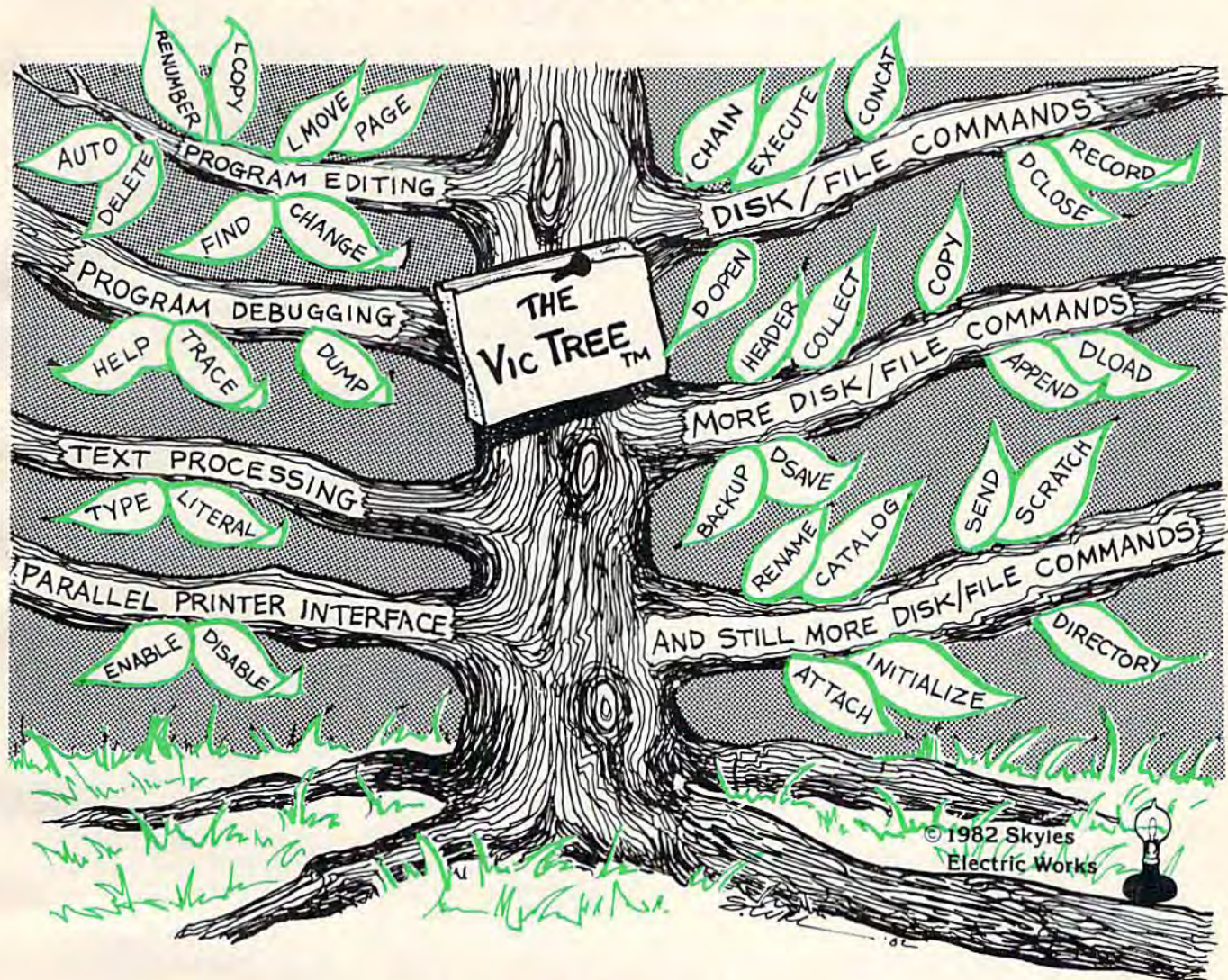
▨ = Custom Character Area = 5120 to 5632

*Depending on the size of memory expansion

Making custom characters in the expanded configuration should be easy. Just reserve 512 or more bytes at the top of BASIC memory as we did in the unexpanded VIC and go, right? Unfortunately, it's not that easy. The problem is that the VIC chip, the chip which determines where the VIC-20 gets its character information, cannot "see" expansion memory. Because of this limitation, we cannot put our custom characters anywhere in the VIC's expansion RAM.

The answer is to put the custom characters underneath the user BASIC area, in an area of memory accessible to the VIC chip. This is accomplished by moving BASIC memory up and reserving a block of memory for the custom characters.

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Moving BASIC

The first part of our task is moving BASIC memory up a page or two (a *page* is a block of 256 bytes in memory). This is done with a few easy POKES. First we'll POKE memory locations 43 and 44, which signal to the operating system where the *start of BASIC* is. When you add 8K or more expansion to the VIC, the values in 43 and 44 change to 1 and 18, respectively. This signals the system that the start of BASIC is at 4608. To make room for the custom characters, we'll POKE 43,1 and POKE 44,22. This tells the operating system that we now want the start of BASIC to begin at 5632.

Next we'll POKE memory locations 45 and 46. These two bytes tell the system where the *start of variables* is. The start of variables always stays a few bytes just past the end of your BASIC program, no matter how large the program grows. We'll POKE 45,3 and POKE 46,22.

Now we have to tell the operating system where we moved things. Bytes 641 and 642 signal where the *start of memory for the operating system* is. We'll POKE 641, 0 and POKE 642, 22.

The last thing we have to do is POKE zeros into the beginning of BASIC to signal the operating system that it's ready. We'll POKE 5632, 5633, and 5634 with zeros. These three zeros tell the system that this is the end of the BASIC program. Because there is no BASIC program in memory, the end *is* the beginning.

These POKES will reserve 512 bytes (from 5120 to 5631) for our custom characters. This is enough memory to hold up to 64 characters.

Using The Program

Program 1 POKES a short machine language routine into memory that sets all the necessary parameters in the expanded VIC for custom characters. The program simply performs all the POKES we just discussed.

Program 1: Memory Setup

```
1 FORA=8192TO8224:READB:POKEA,B:NEXT
                                     :rem 6
2 PRINT"{CLR}{WHT}SYS8192:CLR{BLU}":POKE6
  31,19:POKE632,13:POKE198,2      :rem 62
5 DATA169,0,141,129,2,141,0,22,141,1,22,1
  41,2,22,169,1,133,43,169,3,133,45,169,2
  2,133                             :rem 97
6 DATA44,133,46,141,130,2,96,234  :rem 81
```

When you run Program 1, make sure no BASIC programs are in memory. You could lose all or part of the other program. Line 2 of Program 1 starts the machine language routine. It does this by PRINTing SYS8192:CLR at the top of the screen. Then, by POKEing CHR\$(19) (cursor home) and CHR\$(13) (carriage return) into the keyboard buffer (bytes 631-640), it fools the VIC into thinking you typed these commands from the keyboard. POKEing 198,2 tells the operating system to read

the characters in the keyboard buffer, starting the machine language routine. This programming technique, known as the *dynamic keyboard*, is a very useful tool and will be discussed in a future column.

Type in Program 1, verify it carefully, and SAVE it. Be sure to SAVE it first, because after running, it will seem to disappear. Also check your DATA statements carefully, because an error in a machine language program can lock up your VIC.

Now enter RUN. After running, you are ready to LOAD in your BASIC program and create your custom characters.

To switch to the custom characters, POKE 36869,205. To switch back to standard character ROM, POKE 36869,192. If you wish to copy the first 64 characters from standard character ROM into your custom character area, add this line to your program:

```
10000 FOR P=5120 TO 5631:POKE P,PEEK
(P+27648):NEXT
```

You can then change or delete them at will.

More Custom Characters

If 64 custom characters are not enough for you, you can enter Program 2. Program 2 works basically the same except it sets aside enough memory for 128 custom characters. They will reside from 5120 to 6143. With Program 2, the start of BASIC will move from 5632 to 6144, giving us the extra memory we need for 64 more characters.

Program 2: Extra Memory Setup

```
1 FORA=8192TO8224:READB:POKEA,B:NEXT
                                     :rem 6
2 PRINT"{CLR}{WHT}SYS8192:CLR{BLU}":POKE6
  31,19:POKE632,13:POKE198,2      :rem 62
5 DATA169,0,141,129,2,141,0,24,141,1,24,1
  41,2,24,169,1,133,43,169,3,133,45,169,2
  4,133                             :rem 105
6 DATA44,133,46,141,130,2,96,234  :rem 81
```

In Program 2, if you want to copy the first 128 characters from ROM into your custom character area, add this line to your BASIC program:

```
10000 FOR P=5120 TO 6143:POKE P,PEEK
(P+27648):NEXT
```

Creating Custom Characters

Creating your custom characters is up to you. We won't go into the details here, but there are many good resources available, including the *VIC-20 Programmer's Reference Guide* and articles in last month's issue of COMPUTE!'s Gazette.

If you use Program 1, the 64 characters will go into memory between 5120 and 5631, and will correspond to screen POKE characters 0 (@) to 63 (?). If you use Program 2, the 128 characters will go into 5120-6143, and will correspond to characters 0 (@) to 127 (▣). ▣

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Tricky Business

After working with your computer for a while, you will begin to discover certain tricky techniques. I'll take the opportunity here to assemble some of my favorite tricks and review some others you may have overlooked.

Abbreviations

You may already know that you can use abbreviations to enter BASIC commands. The abbreviation consists of enough letters to distinguish it from any other command, then a shifted character of the command. The most common abbreviation is ? for PRINT. Another is L SHIFT-I for LIST. See the table accompanying this article for other common abbreviations. A complete list can be found in Appendix D of the user's guide that came with your computer.

Just as the question mark expands out to PRINT when you LIST the program, the other abbreviations also appear in their unabbreviated form. The abbreviations are convenient when entering programs, but some programmers use them to save memory.

You may wonder why you need to worry about memory conservation with 64K (38K for BASIC, of course) of RAM to work with. First of all, you always want to make your programs easy to type in if you intend to publish them (and shorter is better). Second, there is a programming maxim that states that a complex program will always expand to fill available memory, no matter how much you have. There is much truth in this, especially when you have a lot of data to hold in RAM.

Every new line of BASIC has five bytes of overhead beyond the programming on that line. So every time you fit another statement on the same line, you save four bytes. This can make quite a difference in a long program.

Unfortunately, if the programmer has really "crunched" a line, it will LIST out to be longer than 80 characters. The computer doesn't mind; internally, it can hold up to 255 characters (each keyword uses only one byte). But since the screen

editor can work with up to only 80 characters, these lines cannot be easily edited. You usually have to reabbreviate and retype the part of the line that spills over 80 characters. This is hard for many beginners, so if you submit a program to COMPUTE!'s Gazette or COMPUTE!, try to keep your line length under 80 characters.

Instant RUN

You know that SHIFT-RUN/STOP will LOAD, then automatically RUN the next program from tape. It does this by feeding the letters LOAD <RETURN>, then RUN <RETURN> into the keyboard buffer. The computer then displays and executes these two commands as if you typed them in. One novelty is to prevent the LOAD from executing, then using the RUN to run your program. For example, type the letter A first, then press SHIFT-RUN/STOP. The computer will display:

```
ALOAD
?SYNTAX ERROR
READY.
RUN
```

[the program starts]

The ALOAD caused a syntax error, but the RUN is still in the keyboard buffer, so the program runs. This may be more trouble than it's worth, but there is another application for disk users. Just type the LOAD command for disk, type a colon, and press RUN/STOP, like this:

```
LOAD "PROOFREADER",8:<SHIFT-RUN/STOP>
```

The computer ignores any command after a LOAD (the second LOAD generated by RUN/STOP), but since the RUN is still in the keyboard buffer, your program will automatically run after a load. This is handy: you can run some errand while you're waiting for the program to load, then come back with the program ready to use.

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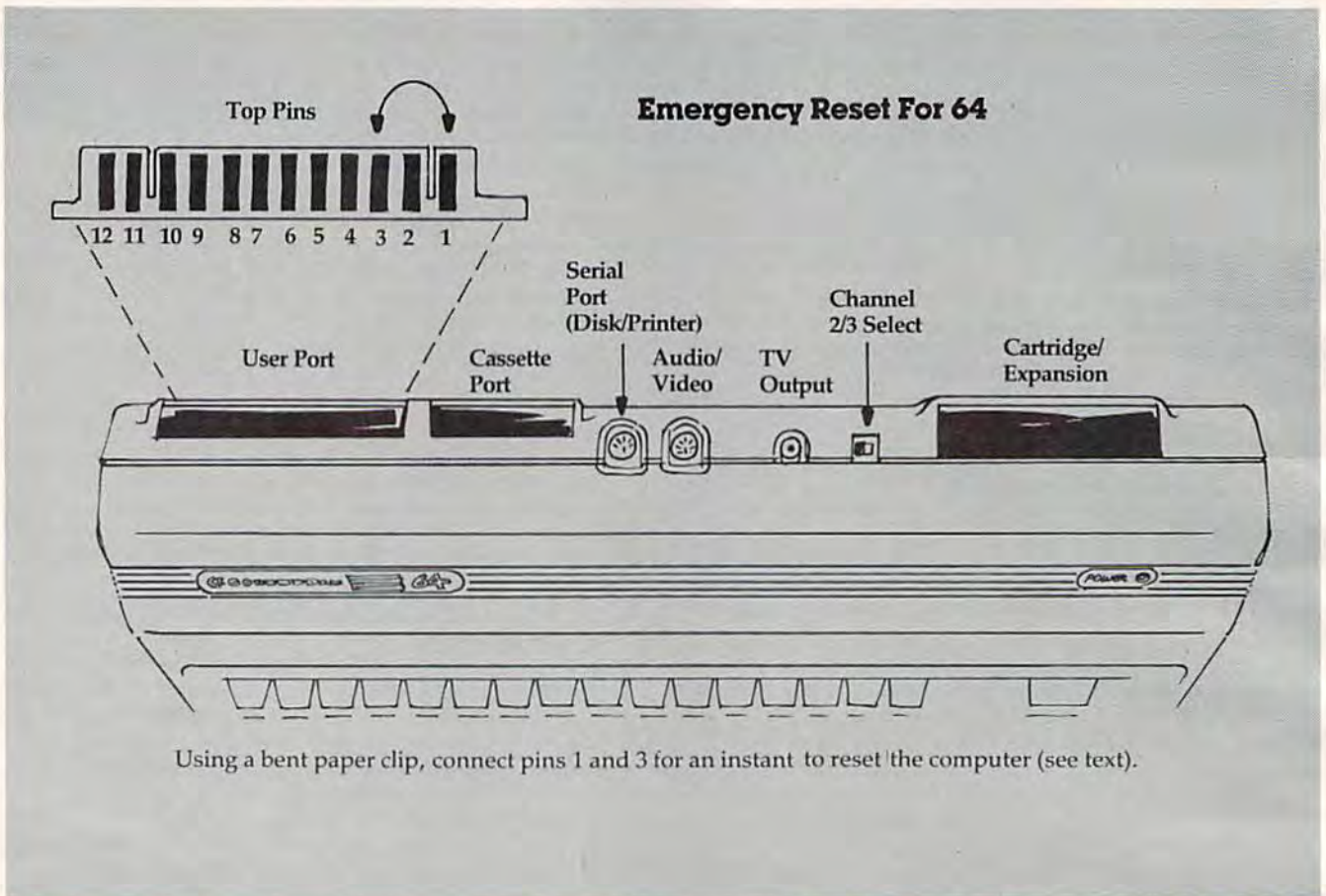


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chance. There are two pins on the user port (the one the modem plugs into, not the cartridge slot) that you can *briefly* connect to reset your Commodore 64 (see figure). When you ground pins 1 and 3 together, the machine hiccups, then gives you the `*** COMMODORE BASIC V2 ***` message, implying your program is gone. And it is.

When you type LIST, there is nothing to be seen. I'm not playing a cruel trick on you, however. If you have previously typed in the "Program Lifesaver" from the November issue of COMPUTE!'s Gazette, you can LOAD "UNNEW",1,1 from tape or LOAD "UNNEW",8,1 from disk, SYS 525, and CLR to recover your program. This *warm reset* or *warmstart* does not clear memory; it just resets BASIC's pointers and variables. The Program Lifesaver unNEWS the program. You can then SAVE your resurrected program to tape or disk. If the lock-up was caused by memory being scrambled, you will get back only a garbled version of your program. This technique is useful only if the program in memory was left untouched by the lock-up.

Note: If you ground the incorrect pins when attempting to reset the computer, there is a chance you could blow a fuse within the 64. Replacing the fuse is simple enough, but it involves opening the case, which voids the warranty. It is highly unlikely that grounding the wrong pins will per-

manently damage the computer, but if you have any doubts about this procedure, do not try it.

Case Closed

You probably know that SHIFT-COMMODORE (press both SHIFT and the Commodore logo key) switches the machine from upper- to lowercase and vice versa. You can also do this from within a program by PRINTing either CHR\$(14) for lowercase or CHR\$(142) for uppercase. You can also lock and unlock either mode by disabling the SHIFT-COMMODORE sequence. This prevents confusion if the keys are accidentally pressed. Just PRINT CHR\$(8) to lock the switch, and PRINT CHR\$(9) to reenable SHIFT-COMMODORE.

Faster BASIC

There are many tricks to speed up program execution, such as packing many statements on one line, deleting extra spaces and REMs, etc. You should know that GOTO and GOSUB do not jump directly to the target line, but must search for the line from the top of the program. Therefore, you can gain speed by placing much-used subroutines at the top of a program (use GOTO to skip over the subroutines when the program is run).

Other techniques seem obvious when you examine them. For example, this line will POKE asterisks to screen memory to form a line going

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Common Keyword Abbreviations

Keyword	Abbreviation
AND	A-SHIFT-N
ASC	A-SHIFT-S
CHRS	C-SHIFT-H
CLOSE	CL-SHIFT-O
CLR	C-SHIFT-L
CMD	C-SHIFT-M
DATA	D-SHIFT-A
DEF	D-SHIFT-E
DIM	D-SHIFT-I
FOR	F-SHIFT-O
GET	G-SHIFT-E
GOSUB	GO-SHIFT-S
GOTO	G-SHIFT-O
LEFT\$	LE-SHIFT-F
LIST	L-SHIFT-I
LOAD	L-SHIFT-O
MID\$	M-SHIFT-I
NEXT	N-SHIFT-E
NOT	N-SHIFT-O
OPEN	O-SHIFT-P
PEEK	P-SHIFT-E
POKE	P-SHIFT-O
PRINT	?
READ	R-SHIFT-E
RESTORE	RE-SHIFT-S
RETURN	RE-SHIFT-T
RIGHT\$	R-SHIFT-I
RND	R-SHIFT-N
SAVE	S-SHIFT-A
SPC(S-SHIFT-P
STEP	ST-SHIFT-E
STOP	S-SHIFT-T
STR\$	ST-SHIFT-R
SYS	S-SHIFT-Y
TAB(T-SHIFT-A
THEN	T-SHIFT-H
TIME	TI
TIMES	TI\$
VERIFY	V-SHIFT-E

down the left side of your screen:

```
FOR I=0 TO 24:POKE 1024 + I*40,42:POKE 55296 + I*40,1:NEXT
```

Each screen line is 40 bytes long, so the row number (0-24) is multiplied by 40 to reach each line. But addition is faster than multiplication in BASIC, so range the loop from 0 to 24*40 (960) with a STEP size of 40. The STEP, which defaults to one, is added to I when NEXT is executed. NEXT then checks to see if the variable I is greater than the number after TO in the FOR statement. So this line is faster:

```
FOR I=0 TO 960 STEP 40:POKE 1024 + I,42:POKE 55296 + I,1:NEXT
```

Techniques like these can speed up your program, but there is no better way to speed up a loop than to use variables in place of constants. For example, notice the difference in speed between this line:

```
FOR I=0 TO 999:POKE 1024 + I,1:POKE 55296 + I,1:NEXT
```

and:

```
SC=1024:CM=55296:FOR I=0 TO 999:POKE SC + I,1:POKE CM + I,1:NEXT
```

(By the way, NEXT by itself is faster than NEXT with a variable, such as NEXT I)

Finally, you can speed up a program by turning off the VIC-II chip, which steals time away from the 6510 microprocessor. Of course, when this happens, the TV screen goes blank. You can turn the VIC-II chip (and the screen) back on when you need to display again. In tests I've tried, the speed-up is about seven percent, not significant unless we're talking about a really long loop.

Disable VIC-II Chip: POKE 53265,PEEK(53265) AND 239
Enable VIC-II Chip: POKE 53265,PEEK(53265) OR 16

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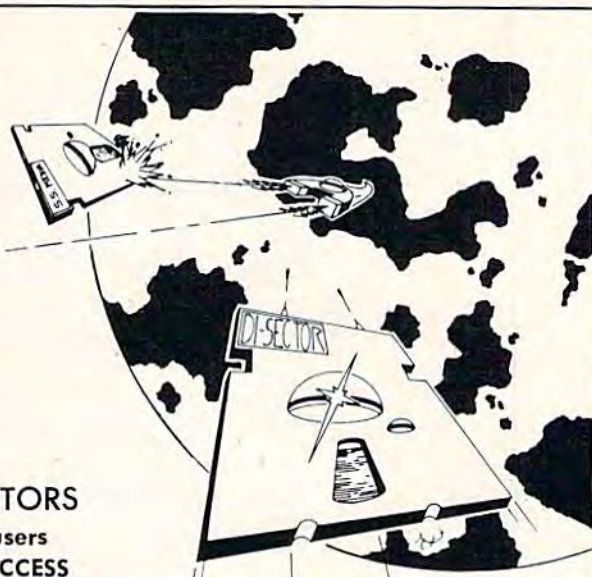
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SPRITES

Made Easy

by Paul F. Schatz

If you've always wanted to create sprites on your Commodore 64, but have been put off by all the complicated POKEs, this article is your answer. It lets you modify BASIC to add three new sprite commands to make the job much easier. An accompanying side article also explains the rudiments of sprite design.

One of the most powerful features of the Commodore 64 is its sprite animation ability. Sprites, also called MOB's (for Movable Object Blocks), are in effect graphics blocks which you can sculpt into any shape and move about the screen. Since they move independently of the screen image and move more smoothly than custom characters, they are often used when creating games or demonstrating animation.

Sprites are accessed from BASIC by a series of POKEs. The Video Interface Controller (VIC-II chip) holds several registers which you manipulate to create and move sprites on your screen. Manipulating these VIC-II registers can get complicated, however, especially for the beginning programmer, because the routines require numerous POKEs for each sprite. Turning on and off various sprite functions can become confusing. Crossing the invisible *seam* on the 64's screen is especially cumbersome.

A solution is to add some new commands to BASIC to control the sprites. This article provides a method for adding three new commands to BASIC which will allow you to control sprites more easily.

If you're unfamiliar with the methods used to

design and create sprites on the 64, refer to the accompanying article, "Sprite Creation," before you continue.

Modifying BASIC

The Commodore 64 is a flexible computer and it's possible to use the Random Access Memory (RAM) under the BASIC Read Only Memory (ROM) for a modified BASIC. You make a duplicate of BASIC, place it in RAM, and then modify "RAM BASIC" to suit your needs. The technique was outlined by Jim Butterfield in his article "Commodore 64 Architecture," which appeared in the January 1983 issue of COMPUTE! Magazine. It was also used in my article "Commodore 64 Hi-Res Graphics Made Simple," which appeared in the August 1983 issue of COMPUTE!'s Gazette. Refer to these two articles for other uses of this same process.

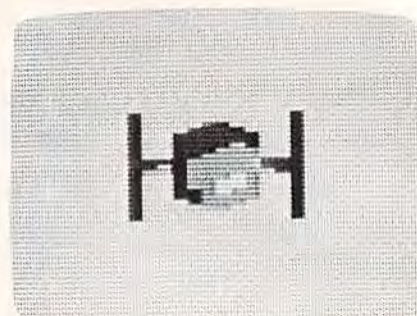
"Sprite BASIC," which I'll call my BASIC modification program, replaces three old keywords, LET, WAIT, and VERIFY, with three new keywords, OFF, MOVE, and SPRITE. Notice that the new keywords are the same length as the ones they replace. A new keyword has to be mapped exactly into the old keyword's spot in the keyword lookup table. Program 1 is the BASIC program which moves the BASIC ROM code to RAM, modifies it, and loads the new machine language routines into a safe area of memory. Machine language is an excellent method of programming sprite movements, since it is both very fast and very efficient. (Sprite BASIC extends from \$C000 to \$C0E2 in the machine language buffer.)



A close-up screen photo of the "butterfly" sprite created by Program 2.



Program 3 creates a "tie fighter" that can be maneuvered around the screen with a joystick.



Close-up of the tie fighter. Note how multicolor sprite graphics is used to simulate 3-D.

Sprite BASIC is loaded into the Commodore 64 by typing in and running Program 1. When typing it in, be as accurate as possible, since an incorrect number may cause the computer to crash when you type RUN. To clear this, you'd have to switch it off and on again, erasing anything you'd already entered. To be safe, SAVE the program before running it for the first time, and use the Automatic Proofreader.

It will take the computer a minute or so to run the program. Be patient. When the READY prompt appears again, type in:

```
POKE 1,54
```

This switches on Sprite BASIC. If you want to return to Commodore (your original) BASIC, simply type in:

```
POKE 1,55
```

Since you can switch from the old BASIC to Sprite BASIC within programs with these POKES, your program can contain both the old and new BASIC command words.

Sprite BASIC is also switched off by pressing the RUN/STOP and RESTORE keys simultaneously. Because the new BASIC tokenizes the new keywords, make sure you have Sprite BASIC turned on as you enter your own program. The old keywords that were replaced cannot be used unless the old BASIC is switched back on.

The New Commands

After you've entered and switched on Sprite BASIC, you'll have three new commands available while you program sprites.

```
OFF <number>
```

This statement disables (turns off) the sprite designated by the number. Sprites are numbered from 0 to 7, so a number 8 or greater will give an ILLEGAL QUANTITY ERROR.

```
MOVE <number>, <number>, <number>
```

This new keyword enables (turns on) a sprite and places it at the desired location on the screen. The first number is the sprite's number (0-7). The next two numbers are the X and Y coordinates, respectively, of the sprite's upper-left corner. Because the sprite display area is larger than the screen area, the X coordinate must be 24 or greater, while the Y coordinate must be 50 or greater for the sprite to be fully visible. Allowed values for the X coordinate range from 0 to 511, although those greater than 344 are totally off the screen. Y values can range from 0 to 255, but numbers greater than 250 are completely off the screen. Any number greater than the accepted range will cause an ILLEGAL QUANTITY ERROR message.

```
SPRITE <number>, <number>, <number>, <number>
```

This new statement defines a sprite. The first number is the number of the sprite being defined. The second number is the 64-byte data block where the values used to actually draw the sprite are stored. This number can have values from 0 to 255. For example, sprite data stored in memory locations 832 to 895 (cassette buffer) is block 13 ($832/64 = 13$). The third number in this command is the color of the sprite. The color codes are:

0 Black	4 Purple	8 Orange	12 Med Gray
1 White	5 Green	9 Brown	13 Light Green
2 Red	6 Blue	10 Light Red	14 Light Blue
3 Cyan	7 Yellow	11 Dark Gray	15 Light Gray

The fourth number determines the size of the sprite. If the number is 0, the sprite is normal size. A 1 entered here doubles the sprite's width. If the number is 2, the sprite is doubled in height. Entering a 3 doubles both the width and the height.

Some Sample Programs

You're now ready to enter and run a couple of simple programs using Sprite BASIC. Both demonstrate how this new BASIC can be used for easy animation. The first program animates a sprite

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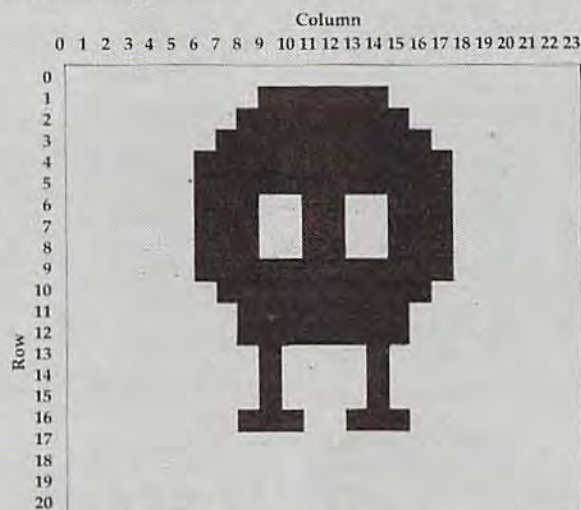
Gregg Keizer, Assistant Book Editor

Drawing Sprites

Creating a sprite is much like creating a custom character—it must be drawn. The 64 does not do this for you; you have to place the data information within a program for the computer to look at, and then *draw* the sprite on the screen.

A sprite is much larger than a custom character, consisting of a graphics block 24 pixels wide by 21 pixels high. A custom character is only an 8-by-8 pixel block. The information to draw a sprite uses more memory than a custom character because of its size, so fewer sprites can be displayed at a time. Eight sprites are available to you on the Commodore 64.

Just as when you create custom characters, you can use graph paper to design your sprites. Take a piece of graph paper and outline an area 24 blocks wide by 21 high. Simply fill in the blocks in the pattern to create a sprite. Figure 1 shows a sample sprite drawn in this way.



The blocks that are filled in will be *on*, or displayed in the color you later select for your sprite, while the empty blocks will be *off*, or shown in the screen's background color.

Drawing sprites is not enough for the computer, however. It cannot just look at something and display it on the screen.

Instead, it needs numbers it can refer to which *tell* it what to create. You have to do this.

Bit Values

To come up with the numbers the 64 needs to draw your sprites, you'll have to do some addition. As when creating custom characters, to show some of a sprite's pixels *on* and others *off*, bits have to be set. It's not as hard as it sounds. Figure 2 shows you how it's done.

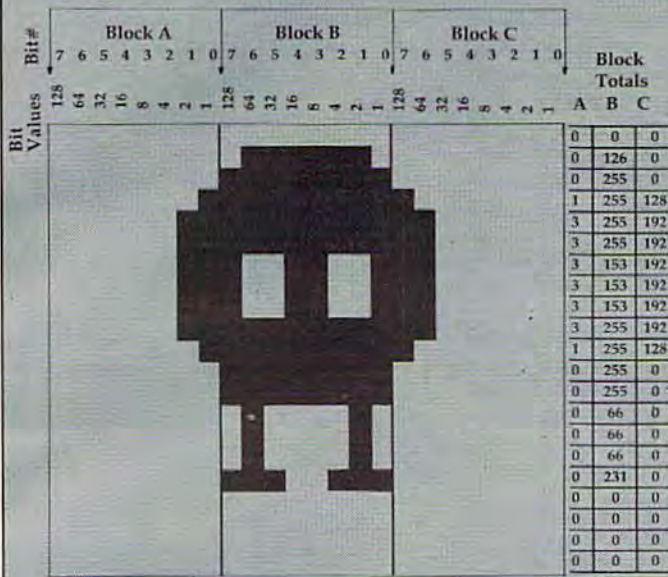
Bit#	Block A								Block B								Block C								Block Totals		
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	A	B	C
128																											
64																											
32																											
16																											
8																											
4																											
2																											
1																											
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This is similar to the graph paper you used to design your sprite, only bit values have been assigned to each pixel. As in Figure 1, there are 24 columns and 21 rows. Each box represents one pixel in your sprite.

The similarity with custom characters ends here. Instead of only one eight-bit block in each row, a sprite has three. These have been named Block A, Block B, and Block C in Figure 2. When the 64 looks at the numbers to create a sprite, it starts with the eight-bit block in the upper-left corner, moves across the first row, and then jumps down to the left-most block on the next row. The last number it reads to create a sprite represents the bottom right corner of Block C.

Calculating the bit values to show a sprite is only a matter of adding together the values of

the bits you want on. Figure 3 shows the same sample sprite, but with its bit values computed.



The first row has none of its pixels on, so the bit value for all three bytes is 0. Row 2, however, has six bits in the Block B byte turned on. These bits, numbers 1 through 6, have a total bit value of 126 (2 + 4 + 8 + 16 + 32 + 64). The other two bytes, represented by Blocks A and C, are 0, since neither has any bits on.

Each byte is calculated in this same way. Remember that each row of a sprite consists of three bytes, and that each must be figured separately. Figure 2 makes this simple, for each

byte has its own total column at the far right.

When you've finished computing the bit values for a sprite, you should have 63 numbers. These are the numbers the Commodore 64 will look at to display your sprite. Normally, you would insert them in a program in several DATA statements and have the computer READ from this table. For instance, using the numbers for the sample sprite, the DATA statements would look like this:

```
DATA 0,0,0,0,126,0,0,255,0
DATA 1,255,128,3,255,192,3,255,192
DATA 3,153,192,3,153,192,3,153,192
DATA 3,255,192,1,255,128,0,255,0
DATA 0,255,0,0,66,0,0,66,0
DATA 0,66,0,0,231,0,0,0,0
DATA 0,0,0,0,0,0,0,0,0, - 1
```

(The -1 is used to fill up the 64-byte block each sprite occupies in memory. Without that additional number, you may get an error message.)

Every sprite you design is created like this. But once you have it designed, you have to POKE other values into the 64 to make it appear.

Normally, you would have to POKE values into the computer to do such things as enable the sprite (turn it on), locate the sprite's DATA in an available memory address, set its color, and finally, place it on the screen. This is where sprite creation becomes tedious. By modifying BASIC, you can get the Commodore 64 to do much of this for you. "Sprites Made Easy" gives a detailed description on how to make sprite control easier.

which appears as a butterfly by moving it as it changes its shape. Actually two sprites are used. The program displays first one, then the other, to simulate movement. To see this, LOAD and RUN SPRITE BASIC, type NEW, switch on the new BASIC, and enter Program 2. Before you RUN it, SAVE it on tape or disk.


A peculiarity of the Commodore 64 concerning sprites is that there are actually two separate sections of the screen for the X, or horizontal, coordinates. An invisible seam runs all the way down the screen immediately after the 255th X coordinate. Normally, you would have to POKE a value into an additional register each time a sprite moved across this seam. Notice, however, that you don't have to do this when you use Sprite BASIC. After you enter Program 2 and type RUN, it moves the sprite smoothly across the seam from left to right. This is one of the advantages of using something like SPRITE BASIC, for the computer does as much as possible for you.

To see a joystick-driven sprite, type in NEW and enter Program 3. Plug a joystick into port 2 and you'll be able to maneuver the tie fighter-shaped sprite across the screen.

Just Starting

Using Sprite BASIC, you can create and move your own sprites with much more ease than if you had to POKE each register on your own. All you really have to do is design a sprite, calculate the DATA numbers, which allows the 64 to display it properly, and the new BASIC does all the rest.

This lets you concentrate on creating unique sprites, or in using them to your program's advantage. A game, for example, would be much easier to program, with sprites, using this new programming tool. Try some of your own sprites, perhaps simply replacing the DATA numbers in the sample programs with your own sprite information.

See program listings on page 240. 

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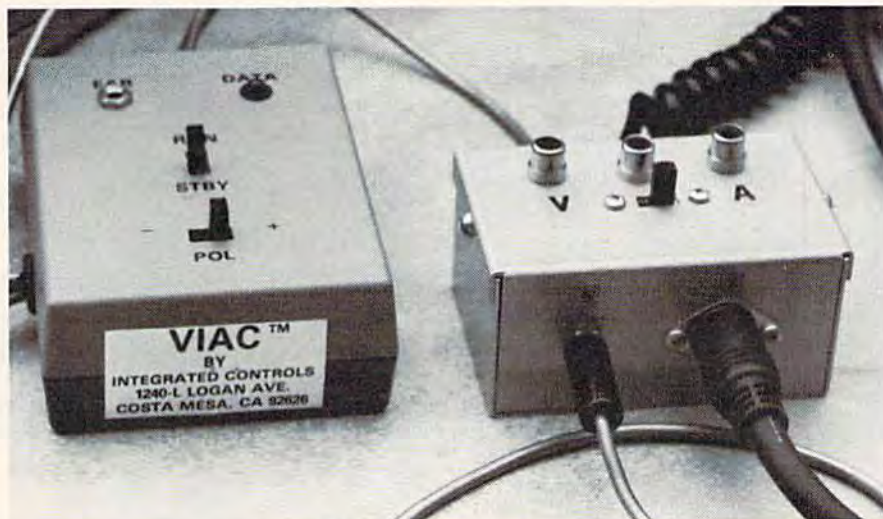
The program is designed as a home accounting system and check writer. Account data can be printed on screen or a printer, or saved to tape. No special checks are required if your printer can pull double 18-pound paper.

Bill Writer/Summary is available for the Commodore 64 or VIC-20 with 16K expansion for \$29.95. An 80-column printer and cassette drive are required.

A more sophisticated version of the program is available for business use. *Business Billwriter/Summary* allows accounts to be separated into credit and debit categories. The business version, at \$39.95, requires a Commodore 64 or a VIC-20 with 24K expansion, an 80-column printer, and a tape drive.

Also available from U.H.L. is *Home Math Analyzer*, which analyzes home loans, savings, and simple statistical data. The program, which sells for \$19.95, is available for the 64 or VIC with 8K expansion.

U.H.L. Research Associates, Inc.
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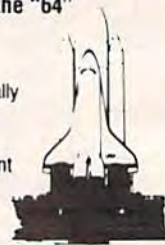
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24 Munroe St.
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Electronic Lab Industries has produced a trio of programs to make use of the Commodore 64's sound capabilities.

Note Pro II allows you to control the pitch of each of the 64's three voices. The program offers high-speed play (up to 450 notes per second), eight-measure treble clef display, eight-octave range, ADSR control, and arrangement capabilities. The program sells for \$46.95 on tape, or \$49.95 on disk.

Note Pro I is a similar, but less sophisticated program. *Note Pro I* has a four-octave range, and it creates files that are compatible with *Note Pro II*. The program is available for \$24.95 on tape, or \$27.95 on disk.

Note Pro Bridge provides a machine language subroutine which lets you play *Note Pro* songs or sound effects from within your own programs. *Note Pro Bridge* sells for \$24.95 on tape, \$27.95 on disk.

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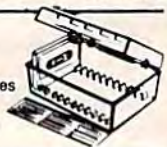


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Flight Simulator

An IFR flight simulator is among the three new products introduced by Fantasy Computerware for the Commodore 64.

Flight 64 is an IFR simulator that turns your screen into a flight panel with displays including radar, altimeter, artificial horizon, and vertical speed indicator. The topography changes with every flight in this \$15.95 program.

Datafile is a data base management program designed for address lists, collections, and general record keeping. Up to 200 five-field records can be managed by the program which includes tape and disk output routines. *Datafile* sells for \$15.95.

Spellathon, a spelling tutor for all ages, sells for \$19.95. The program includes a letter-scramble game and lets you

build and save your own word lists.

For disk versions of the above programs, add \$2.

Fantasy Computerware, Inc.
 P.O. Box 451
 Sioux Falls, SD 57101
 (605) 335-7684

Two-Player Space Game

Stellar Triumph, a machine language space-wars game for the Commodore 64, pits two players against each other amid asteroids, aliens, and mysterious force fields.

The playing environment — gravity, thrust, missile configurations, space objects, fuel, ammunition, and aliens — can be preselected by the players.

The screen display uses

sprite and bitmapped graphics. *Stellar Triumph* is available on tape or disk for \$25.

H.A.L. Labs
 4074 Midland Road, Suite 23
 Riverside, CA 92505

CP/M For The 64

A CP/M interface card for the Commodore 64 is available from Estes Engineering.

The card, which plugs into the expansion port, is sold in a variety of formats; the interface card with an 8-inch disk drive is available for \$599; the interface card with a 5 1/4-inch disk drive is available for \$499; and the interface card alone is available for \$349.

Estes Engineering, Inc.
 P.O. Box 753
 Salina, KS 67402
 (913) 827-0629

Numbers By Computer

The *Math Teacher* is a math tutorial program for students from first grade through junior high school. The program, for the Commodore 64, presents 25 math problems per session.

The *Math Teacher*, which sells for \$39.95, covers addition, subtraction, multiplication, and division, and offers four skill levels.

CompuTech
P.O. Box 7000-309
Redondo Beach, CA 90277

Manage The Mail

The *Mail Management* program from Avastar Software combines mail file maintenance, letter processing, and custom letters into one program for the Commodore 64.

The menu-driven program includes flexible data entry routines and comes with a guide outlining sample transactions, a field dictionary, and an error message section.

The program's report section allows for custom selection and sorting, and the program

can maintain 600 records and five letters on one disk. It is available for \$34.95.

Avastar Software Products
Box 203
Hasbrouck Heights, NJ 07604
(201) 592-5857

Language Translator

Household Spanish is a program designed to simplify communication between English- and Spanish-speaking people. It runs on the VIC-20.

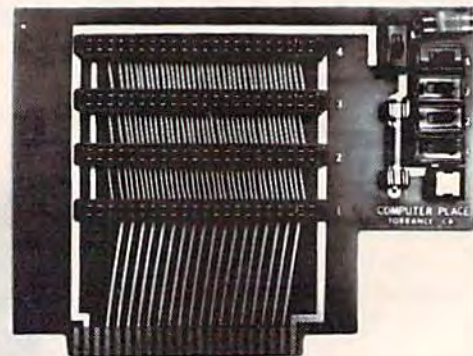
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New product releases are selected from submissions for reasons of timeliness, available space, and general interest to our readers. We regret that we are unable to select all new product submissions for publication. Readers should be aware that we present here some edited version of material submitted by vendors and are unable to vouch for its accuracy at time of publication. 



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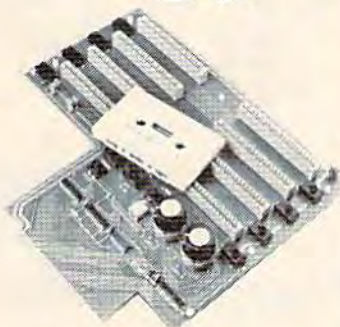
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A Beginner's Guide To Typing In Programs

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.

Brackets And Special Characters

The exception to this typing rule is when you see the curved bracket, such as "{DOWN}". Anything within a set of brackets 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 brackets 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 bracketed words 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, {}, 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:
{CLEAR}	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}	F1	
{DOWN}	↓ CRSR ↓		{BLU}	CTRL 7		{F2}	F2	
{LEFT}	SHIFT ← CRSR →		{YEL}	CTRL 8		{F3}	F3	
{RIGHT}	→ CRSR →		{1}	CTRL 1		{F4}	F4	
{RVS}	CTRL 9		{2}	CTRL 2		{F5}	F5	
{OFF}	CTRL 0		{3}	CTRL 3		{F6}	F6	
{BLK}	CTRL 1		{4}	CTRL 4		{F7}	F7	
{WHT}	CTRL 2		{5}	CTRL 5		{F8}	F8	
{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.

Replace Original Proofreader

If you typed in the original version of the Proofreader (October 1983 issue), you should replace it with the improved version below. We added a POKE to the original version to protect it from being erased when you LOAD another program from tape. The POKE does protect the Proofreader, and the Proofreader itself was not affected. However, a quirk in the VIC-20's operating system means that programs typed in with the Proofreader and SAVED on tape cannot be LOADED properly later. If you LOAD a program SAVED while the Proofreader was in memory, you see ?LOAD ERROR. This applies only to VIC tape SAVES (disk SAVES work OK, and the quirk was fixed in the Commodore 64).

If you have a program typed in with the original Proofreader and SAVED on tape, follow this special LOAD procedure:

1. Turn the power off, then on.
2. LOAD the program from tape (disregard the ?LOAD ERROR).
3. Enter: POKE 45,PEEK(174):POKE 46,PEEK(175):CLR
4. ReSAVE the program to tape.

The program will LOAD fine in the future. We strongly recommend that you type in the new version of the Proofreader and discard the old one.

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
```



```

[DOWN]DDDDDDDDDDDDDDDDDDDDDDDDDDDDDD":ON-(A=1) 554 IFPEEK(N)<>81THEN595 :rem 166
GOTO138 :rem 152 558 Q2=N:GOSUB610 :rem 1
134 PRINT" DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD":ON-(A=2) 560 POKEV1,150:POKEN-1,32:POKEN+CO,0-(PEE
)GOTO138 :rem 87 566 K(SC)=10:POKEN,81:POKEV1,0 :rem 73
136 PRINT" DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD :rem 93 562 FORW=1TO3 :rem 31
138 PRINTLEFT$(C$,11)+A$(1)": :rem 78 566 IFPEEK(N-21*W)=81THENQ2=N-21*W:GOSUB6
146 IFA>1THENPRINTTAB(10)+"{RIGHT}{UP}"+A :rem 74
$(2)": :rem 205 569 IFPEEK(N+23*W)=81THENQ2=N+23*W:GOSUB6
150 IFA>2THENPRINTA$(3)": :rem 249 10 :rem 77
154 PRINTLEFT$(C$,11)+"{2 DOWN}{BLU}FFFFFFF 572 NEXT :rem 221
FFFFFFFFFFFFFFFF{DOWN}{RIGHT}{8 DOWN}E 595 H=H+1:POKEV1,150:POKEN-1,32:POKEN+CO,
EEEEEEEEEEEEEEEEEEEE{2 UP} :rem 94 0-(PEEK(SC)=10):POKEN,81:POKEV1,0
160 FORQ=1TO10 :rem 65 :rem 180
166 FORZ9=1TOA:POKESC,SC(Z9) :rem 14 597 IFH=18THEN612 :rem 234
167 FORX=1TO10:READV:POKEV,81:POKEV+CO,6: 600 FORSS=1TO50:NEXT:GOTO550 :rem 31
NEXT:RESTORE :rem 4 610 J=J+1:POKEV1,210:POKEQ2,32:FORK=1TO50
169 J=0:G=0 :rem 69 :NEXT:POKEV1,0:FORK=1TO40:NEXT:RETURN
170 GOSUB430:GOSUB550:P=L(Z9):GOSUB1000:L :rem 11
(Z9)=P :rem 108 612 H=0:POKEN,32:POKEN-1,32:RETURN:rem 86
172 GOSUB1200 :rem 221 882 PRINTC$;"{LEFT}{DOWN}{2 LEFT}{2 DOWN}
174 ON -(L(Z9)/2=INT(L(Z9)/2))GOTO169 {PUR}FINAL SCORES{DOWN}{BLU}" :rem 36
:rem 43 883 PRINT"{5 RIGHT}"A$(1);T(1):IFA>1THENP
175 IF(PEEK(L(Z9)-1)=47ANDQ=10)=0THEN195 RINT"{RIGHT}{DOWN}{4 RIGHT}"A$(2);T(2
) :rem 38 884 IFA=3THENPRINT"{DOWN}{5 RIGHT}";A$(3)
178 PRINTLEFT$(C$,11)+"{7 DOWN}"+A$(Z9)+" :rem 75 ;T(3) :rem 189
,THROW" :rem 168 887 PRINT"{DOWN}{3 RIGHT}AGAIN(Y/N)?"
179 PRINT"ONE MORE!" :rem 37 :rem 166
180 FORX=1TO3000:NEXT :rem 37 894 GETA$:IFAS$=""THEN{5 SPACES}894
182 PRINTLEFT$(C$,11)+"{7 DOWN}"+ :rem 109
{13 SPACES}" :rem 18 895 IFA$="Y"THENRUN :rem 152
183 PRINT"{13 SPACES}" :rem 109 896 PRINT"{CLR}":POKE36879,27:END :rem 43
184 FORX=1TO10:READV:POKEV,81:POKEV+CO,6: 1000 G=J:IFP/2<>INT(P/2)THENG=G+176
NEXT:RESTORE :rem 3 {5 SPACES} :rem 51
190 J=0:GOSUB430:GOSUB550:T(Z9)=T(Z9)+J:P 1002 IFG=186THENG=152 :rem 192
RINTC$(Z9);T(Z9) :rem 215 1004 IFP/2=INT(P/2)THENG=G+48{11 SPACES}
192 K=J+48:IFJ+PEEK(L(Z9)-1)-224=10THENK= :rem 192
47 :rem 204 1006 IFG+PEEK(P-1)-224=10THENG=47:rem 109
193 IFK=58THENK=152 :rem 112 1012 POKEP,G:POKEP+CO,4:IFG=152THENP=P+1:
194 POKEL(Z9),K:POKEL(Z9)+CO,4:GOTO225 G=0 :rem 199
:rem 54 1100 P=P+1:RETURN :rem 21
195 U=0:IF(PEEK(L(Z9)-2)=152ANDQ=10)=0THE 1200 REM ** SCORING * :rem 58
N225 :rem 76 1201 T(Z9)=T(Z9)+J :rem 230
198 PRINTLEFT$(C$,11)+"{7 DOWN}"+A$(Z9)+" 1205 T(Z9)=T(Z9)-J*(PEEK(L(Z9)-2)=47)
,THROW" :rem 77 :rem 20
199 PRINT"TWO MORE!" :rem 194 1210 T(Z9)=T(Z9)-10*(PEEK(L(Z9)-3)=47ANDP
202 FORX=1TO3000:NEXT :rem 32 EEK(L(Z9)-2)=152) :rem 213
203 PRINTLEFT$(C$,11)+"{7 DOWN}"+ 1220 IFL(Z9)=7746ORL(Z9)=7790ORL(Z9)=7834
{13 SPACES}" :rem 12 THEN1290 :rem 93
205 PRINT"{13 SPACES}" :rem 104 1225 T(Z9)=T(Z9)-J*(PEEK(L(Z9)-4)=152)
206 L(Z9)=L(Z9)-1 :rem 147 :rem 69
207 FORX=1TO10:READV:POKEV,81:POKEV+CO,6: 1227 T(Z9)=T(Z9)-J*(PEEK(L(Z9)-3)=152)
NEXT:RESTORE :rem 255 :rem 70
209 J=0:GOSUB430:GOSUB550:T(Z9)=T(Z9)+J:P 1228 T(Z9)=T(Z9)-J*((PEEK(L(Z9)-5)=152AND
RINTC$(Z9);T(Z9) :rem 216 PEEK(L(Z9)-3)=152)) :rem 72
210 K=J+176:IFK=186THENK=152 :rem 109 1230 T(Z9)=T(Z9)-J*(PEEK(L(Z9)-6)=152 AND
211 POKEL(Z9),K:POKEL(Z9)+CO,4:L(Z9)=L(Z9 PEEK(L(Z9)-4)=152ANDPEEK(L(Z9)-2)=1
)+1 :rem 83 52) :rem 159
213 IFPEEK(L(Z9)-1)=152THENFORX=1TO10:REA 1290 PRINTC$(Z9);T(Z9) :rem 23
DV:POKEV,81:POKEV+CO,6:NEXT:RESTORE :rem 164
:rem 147 1300 RETURN :rem 164
214 U=U+1:ONUGOTO209,225 :rem 159 2200 DATA 8007,8028,8049,8051,8070,8072,8
225 NEXTZ9:NEXTQ :rem 53 093,8095,8116,8139 :rem 157
230 GOTO882 :rem 112
430 N=8123:I=22 :rem 20
440 POKEN,32:N=N+I:IFN<7988ORN>8124THENI= :rem 135
-I :rem 135
460 POKEN+30720,0-(PEEK(SC)=10):POKEN,81: 10 L(1)=1193:L(2)=1273:L(3)=1353:C$(1)="
GETA$:ON-(A$="")GOTO440:RETURN :rem 179 [HOME]{11 DOWN}{8 RIGHT}" :rem 186
550 N=N+1:GETA$ :rem 78 11 C$(2)=C$(1)+"{13 RIGHT}":C$(3)=C$(2)+"
{13 RIGHT}":C$=C$(1) :rem 85

```

Program 2: Bowling Champ — 64 Version

```

10 L(1)=1193:L(2)=1273:L(3)=1353:C$(1)="
[HOME]{11 DOWN}{8 RIGHT}" :rem 186
11 C$(2)=C$(1)+"{13 RIGHT}":C$(3)=C$(2)+"
{13 RIGHT}":C$=C$(1) :rem 85

```



```

1100 P=P+1:RETURN :rem 21
1200 REM ** SCORING * :rem 58
1201 T(Z9)=T(Z9)+J :rem 230
1205 T(Z9)=T(Z9)-J*(PEEK(L(Z9)-2)=47) :rem 20
1210 T(Z9)=T(Z9)-10*(PEEK(L(Z9)-3)=47ANDP
EEK(L(Z9)-2)=152) :rem 213
1220 IFL(Z9)=1272ORL(Z9)=1352ORL(Z9)=1432
THEN1290 :rem 57
1225 T(Z9)=T(Z9)-J*(PEEK(L(Z9)-4)=152) :rem 69
1227 T(Z9)=T(Z9)-J*(PEEK(L(Z9)-3)=152) :rem 70
1228 T(Z9)=T(Z9)-J*((PEEK(L(Z9)-5)=152AND
PEEK(L(Z9)-3)=152)) :rem 72
1230 T(Z9)=T(Z9)-J*(PEEK(L(Z9)-6)=152 AND
PEEK(L(Z9)-4)=152ANDPEEK(L(Z9)-2)=1
52) :rem 159
1290 PRINTC$(Z9);T(Z9) :rem 23
1300 RETURN :rem 164
2200 DATA 1661,1700,1739,1741,1778,1780,1
819,1821,1860,1901 :rem 129
58 SYS6772 :rem 66
60 GOTO50 :rem 4
80 A=PEEK(0)+33+3 :rem 123
82 B=INT(A/8)-1:D=(A-B*8)+2 :rem 166
84 POKE7566+D,255 :rem 170
90 IFD<7THENPRINTLEFT$(B$,B);A$:SYS6832:P
RINTLEFT$(B$,B);D$:POKE7566+D,0 :rem 117
91 H=PEEK(2)-1:IFH>-1THENPOKE2,H:GOTO93 :rem 133
92 H=0 :rem 32
93 IFD>7THENPRINTLEFT$(B$,B+1);C$:SYS6832
:PRINTLEFT$(B$,B+1);D$:POKE7566+D,0 :rem 52
94 IFPEEK(7432+PEEK(0)+3)<>0THENGOSUB120 :rem 93
95 RETURN :rem 78
100 A=PEEK(1)+33+3 :rem 165
102 B=INT(A/8)-1:D=(A-B*8)+2 :rem 207
103 POKE7566+D,255 :rem 210
104 H=PEEK(3)-1:IFH>-1THENPOKE3,H:GOTO106 :rem 221
105 H=0 :rem 75
106 IFD<7THENPRINTLEFT$(B$,B);A$:SYS6832:
PRINTLEFT$(B$,B);D$:POKE7566+D,0 :rem 163
107 IFD>7THENPRINTLEFT$(B$,B+1);C$:SYS683
2:PRINTLEFT$(B$,B+1);D$:POKE7566+D,0 :rem 96
109 IFPEEK(7168+PEEK(1)+3)<>0THENGOSUB140 :rem 147
110 RETURN :rem 114
120 POKE36878,15 :rem 100
121 FORI=255TO130STEP-2:POKE36877,I:POKE3
6879,INT(RND(1)*7)+8:NEXT :rem 225
122 POKE2,PEEK(2)+10 :rem 86
123 IFPEEK(2)=>FTHEN150 :rem 83
124 POKE36879,8:POKE36877,0:RETURN:rem 41
140 POKE36878,15 :rem 102
141 FORI=255TO130STEP-2:POKE36877,I:POKE3
6879,INT(RND(1)*7)+8:NEXT :rem 227
142 POKE3,PEEK(3)+10 :rem 90
143 IFPEEK(3)=>FTHEN150 :rem 86
144 POKE36879,8:POKE36877,0:RETURN:rem 43
150 PRINT"{HOME}{RVS}{WHT}SCORE:" :rem 71
152 PRINT"{HOME}{6 RIGHT}{RVS}{CYN}"PEEK(
2);TAB(18);"{YEL}"PEEK(3):POKE36877,0 :rem 233
154 POKE36879,8 :rem 62
156 PRINT"{HOME}{2 DOWN}{RVS}{GRN}GAME OV
ER!" :rem 73
157 POKE198,0:WAIT198,1:RUN :rem 103
200 POKE36879,8:POKE36869,240:PRINT"{CLR}
" :rem 15
210 PRINT"{RVS}{YEL}{23 SPACES}{OFF}
{4 SPACES}{CYN}SPACE{2 SPACES}DUEL
{4 SPACES}{YEL}{RVS}{OFF}"; :rem 88
220 PRINT"{RVS}{YEL}{22 SPACES}" :rem 21
240 PRINT"{4 DOWN}{BLU}{2 SPACES}HIT ANY
{SPACE}KEY TO PLAY" :rem 89
250 POKE198,0:WAIT198,1:RETURN :rem 76
260 DATA173,8,144,74,133,0,234,170,169,24
0,157,0,28,232,169,252,157,0,28,232 :rem 208
262 DATA169,14,157 :rem 174
265 DATA0,28,232,169,59,157,0,28,232,
169,59,157,0,28,232,169,14,157,0,28,2
32,169,252 :rem 116
270 DATA157,0,28,232,169,240,157,0,28,173
,9,144,74,133,1,170,169,15,234,157,8,

```

Space Duel

(Article on page 80.)

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: Space Duel For VIC-20

```

0 PRINT"{CLR}":FORI=6656TO6891:READA:POKE
I,A:NEXT :rem 188
1 GOSUB200:PRINT"{CLR}" :rem 225
3 POKE4,0:POKE2,0:POKE3,0 :rem 225
4 FORI=7167TO7600:POKEI,0:NEXTI:POKE36869
,255 :rem 247
7 FORI=1TO8:POKE7662,0:NEXT :rem 195
8 A$="{2 RIGHT}{PUR}2222222222222222
{2 RIGHT}" :rem 178
9 C$="{2 RIGHT}{PUR}3333333333333333
{2 RIGHT}" :rem 199
10 B$="{HOME}{22 DOWN}" :rem 209
11 D$="{2 RIGHT}{BLK}{18 SPACES}{2 RIGHT}
":POKE36879,8:F=80 :rem 82
30 FORI=7747TO8099STEP22:POKEI,J:J=J+1:NE
XT :rem 206
35 FORI=7747+30720TO8099+30720STEP22:POKE
I,3:NEXT :rem 163
40 J=33:FORI=7766TO8118STEP22:POKEI,J:J=J
+1:NEXT :rem 239
45 FORI=7766+30720TO8118+30720STEP22:POKE
I,7:NEXT :rem 161
46 PRINT"{HOME}{RVS}{WHT}SCORE:" :rem 27
53 SYS6656 :rem 59
52 PRINT"{HOME}{6 RIGHT}{RVS}{CYN}"PEEK(2
){LEFT}";TAB(17);"{YEL}"PEEK(3)"
{LEFT}" :rem 165
54 PORT=1TO30:NEXT :rem 145
55 SYS6811 :rem 57
56 ONPEEK(4)GOSUB80 :rem 154
57 SYS6864:ONPEEK(5)GOSUB100 :rem 214

```



```

29                                     :rem 161
275 DATA 232,169                       :rem 27
280 DATA63,157,8,29,232,169,112,157
,8,29,232,169,220,157,8,29,232,169,22
0,157,8,29,232                       :rem 221
290 DATA169,112,157,8,29,232,169,63,1
57,8,29,232,169,15,157,8,29,96,251,4,
24,66,252                             :rem 84
300 DATA166,0,169,0,160,0,157,0,28,232,20
0,192,9,208,247,166,1,169,0,160,0
                                     :rem 82
305 DATA157,8,29,232                 :rem 13
310 DATA200,192,9,208,247,96,3,255,179,
252,81,119,1,111,174,17,145,224,110,2
40,5,169,0                             :rem 183
320 DATA133,4,96,169,1,133,4,96,253,162,2
24,56,169,14,141,14,144,162,255,142
                                     :rem 211
325 DATA11,144,202                   :rem 155
330 DATA160,0,200,192,74,208,251,224,128,
208,241,169,0,141,11,144,96,119,111,1
59                                       :rem 135
335 DATA163,169                       :rem 27
340 DATA127,141,34,145,174,32,145,169,255
,141,34,145,224,119,240,5,169,0,133
                                     :rem 205
345 DATA5,96,169,1                   :rem 175
350 DATA133,5,96,219                 :rem 13

```

Program 2: Space Duel For Commodore 64

```

49152 :169,055,141,000,208,169,230
49158 :002,141,016,208,169,032,062
49164 :141,002,208,032,070,196,149
49170 :169,147,032,210,255,169,232
49176 :012,141,033,208,169,192,011
49182 :141,248,007,169,193,141,161
49188 :249,007,169,193,141,249,020
49194 :007,169,003,141,021,208,079
49200 :169,000,141,134,002,169,151
49206 :000,141,039,208,169,002,101
49212 :141,040,208,169,000,160,010
49218 :000,145,000,200,192,024,115
49224 :208,249,169,015,141,024,110
49230 :212,169,017,141,005,212,066
49236 :169,246,141,006,212,169,003
49242 :050,141,000,212,141,001,123
49248 :212,169,000,160,000,153,022
49254 :060,003,200,192,060,208,057
49260 :248,169,000,170,168,024,119
49266 :109,025,212,144,004,200,040
49272 :140,060,003,202,208,243,208
49278 :169,000,170,168,024,109,254
49284 :026,212,144,004,200,140,090
49290 :062,003,202,208,243,169,001
49296 :000,205,060,003,240,007,147
49302 :144,005,169,000,141,060,157
49308 :003,169,180,205,060,003,008
49314 :176,005,169,180,141,060,125
49320 :003,169,000,205,062,003,098
49326 :144,005,169,000,141,062,183
49332 :003,169,180,205,062,003,034
49338 :176,005,169,180,141,062,151
49344 :003,024,173,060,003,105,048
49350 :050,141,001,208,024,173,027
49356 :062,003,105,050,141,003,056
49362 :208,056,173,060,003,074,016
49368 :074,074,024,105,001,141,123
49374 :090,003,056,173,062,003,097
49380 :074,074,074,024,105,001,068
49386 :141,092,003,169,000,141,012
49392 :091,003,173,090,003,010,098
49398 :046,091,003,010,046,091,021
49404 :003,010,141,072,003,173,142
49410 :091,003,141,073,003,173,230
49416 :072,003,010,046,091,003,233
49422 :010,046,091,003,024,109,041
49428 :072,003,141,090,003,173,246
49434 :091,003,109,073,003,141,190
49440 :091,003,024,173,090,003,160
49446 :105,005,141,090,003,173,043
49452 :091,003,105,004,141,091,223
49458 :003,169,000,141,093,003,203
49464 :173,092,003,010,046,093,217
49470 :003,010,046,093,003,010,227
49476 :141,074,003,173,093,003,043
49482 :141,075,003,173,074,003,031
49488 :010,046,093,003,010,046,032
49494 :093,003,024,109,074,003,136
49500 :141,092,003,173,093,003,085
49506 :109,075,003,141,093,003,010
49512 :024,173,092,003,105,005,250
49518 :141,092,003,173,093,003,103
49524 :105,004,141,093,003,173,123
49530 :090,003,133,251,173,091,095
49536 :003,133,252,173,092,003,016
49542 :133,253,173,093,003,133,154
49548 :254,173,001,220,041,004,065
49554 :240,003,076,077,194,160,128
49560 :000,169,067,145,251,024,040
49566 :165,252,105,212,133,252,253
49572 :169,002,145,251,056,165,184
49578 :252,233,212,133,252,200,172
49584 :192,030,208,229,056,165,032
49590 :251,233,080,141,064,003,186
49596 :165,252,233,000,141,065,020
49602 :003,024,165,251,105,040,014
49608 :141,066,003,165,252,105,164
49614 :000,141,067,003,056,173,134
49620 :064,003,229,253,141,068,202
49626 :003,173,065,003,229,254,177
49632 :013,068,003,176,061,056,089
49638 :173,066,003,229,253,141,071
49644 :068,003,173,067,003,229,011
49650 :254,013,068,003,144,042,254
49656 :032,121,195,024,173,078,103
49662 :003,105,010,141,078,003,082
49668 :173,079,003,105,000,141,249
49674 :079,003,056,173,078,003,146
49680 :233,244,141,068,003,173,110
49686 :079,003,233,001,013,068,163
49692 :003,144,003,076,015,195,208
49698 :162,255,160,015,136,208,202
49704 :253,202,208,248,173,078,178
49710 :003,013,079,003,240,014,142
49716 :173,078,003,208,003,206,211
49722 :079,003,206,078,003,032,203
49728 :149,195,160,030,169,032,031
49734 :145,251,136,192,000,016,042
49740 :247,173,001,220,041,008,254
49746 :240,003,076,012,195,160,000
49752 :000,169,067,145,253,024,234
49758 :165,254,105,212,133,254,193
49764 :169,006,145,253,056,165,126
49770 :254,233,212,133,254,200,112
49776 :192,030,208,229,056,165,224
49782 :253,233,080,141,064,003,124
49788 :165,254,233,000,141,065,214
49794 :003,024,165,253,105,040,208
49800 :141,066,003,165,254,105,102

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49806 :000,141,067,003,056,173,070
 49812 :064,003,229,251,141,068,136
 49818 :003,173,065,003,229,252,111
 49824 :013,068,003,176,060,056,024
 49830 :173,066,003,229,251,141,005
 49836 :068,003,173,067,003,229,203
 49842 :252,013,068,003,144,041,187
 49848 :032,121,195,173,076,003,016
 49854 :105,010,141,076,003,173,186
 49860 :077,003,105,000,141,077,087
 49866 :003,056,173,076,003,233,234
 49872 :244,141,084,003,173,077,162
 49878 :003,233,001,013,084,003,039
 49884 :144,003,076,068,195,162,100
 49890 :255,160,015,136,208,253,229
 49896 :202,208,248,173,076,003,118
 49902 :013,077,003,240,014,173,246
 49908 :076,003,208,003,206,077,049
 49914 :003,206,076,003,032,149,207
 49920 :195,160,030,169,032,145,219
 49926 :253,136,192,000,016,247,082
 49932 :076,109,192,169,147,032,225
 49938 :210,255,169,000,141,021,046
 49944 :208,160,012,162,010,032,096
 49950 :240,255,160,000,185,236,082
 49956 :195,200,032,210,255,192,096
 49962 :044,208,245,165,197,201,078
 49968 :064,240,250,165,197,201,141
 49974 :025,240,008,165,197,201,122
 49980 :039,208,238,096,096,076,045
 49986 :000,192,169,147,032,210,048
 49992 :255,169,000,141,021,208,098
 49998 :160,012,162,010,032,240,182
 50004 :255,160,000,185,025,196,137
 50010 :200,032,210,255,192,044,255
 50016 :208,245,165,197,201,064,152
 50022 :240,250,165,197,201,025,156
 50028 :240,008,165,197,201,039,190
 50034 :208,238,096,096,076,000,060
 50040 :192,162,255,238,032,208,183
 50046 :202,208,250,169,129,141,201
 50052 :004,212,162,255,160,115,016
 50058 :136,208,253,202,208,248,113
 50064 :169,128,141,004,212,160,190
 50070 :011,162,000,024,032,240,107
 50076 :255,169,032,032,210,255,085
 50082 :160,012,162,000,024,032,040
 50088 :240,255,169,032,032,210,082
 50094 :255,160,026,162,000,024,033
 50100 :032,240,255,169,032,032,172
 50106 :210,255,160,027,162,000,232
 50112 :024,032,240,255,169,032,176
 50118 :032,210,255,160,010,162,003
 50124 :000,024,032,240,255,174,161
 50130 :078,003,173,079,003,032,066
 50136 :205,189,160,025,162,000,189
 50142 :024,032,240,255,174,076,255
 50148 :003,173,077,003,032,205,209
 50154 :189,096,080,076,065,089,061
 50160 :069,082,032,049,032,087,079
 50166 :073,078,083,013,013,032,026
 50172 :032,032,032,032,032,032,188
 50178 :032,032,072,073,084,032,071
 50184 :089,032,084,079,032,080,148
 50190 :076,065,089,032,065,071,156
 50196 :065,073,078,032,032,080,124
 50202 :076,065,089,069,082,032,183
 50208 :050,032,087,073,078,083,179
 50214 :013,013,032,032,032,032,192
 50220 :032,032,032,032,032,072,020
 50226 :073,084,032,089,032,084,188
 50232 :079,032,080,076,065,089,221

50238 :032,065,071,065,073,078,190
 50244 :032,032,160,000,185,084,049
 50250 :196,153,000,048,200,192,095
 50256 :147,208,245,096,001,255,008
 50262 :000,000,003,192,000,003,028
 50268 :240,000,063,248,000,063,194
 50274 :252,000,063,254,015,255,169
 50280 :254,000,063,255,063,255,226
 50286 :255,000,063,255,255,255,169
 50292 :255,000,063,255,063,255,239
 50298 :255,000,063,255,015,255,197
 50304 :254,000,063,254,000,063,250
 50310 :252,000,063,248,000,003,188
 50316 :240,000,003,192,000,255,062
 50322 :000,255,000,127,252,000,012
 50328 :015,248,001,255,240,000,143
 50334 :063,224,007,255,192,000,131
 50340 :255,128,031,245,192,003,250
 50346 :228,224,007,213,127,015,216
 50352 :142,048,255,255,240,015,107
 50358 :142,048,007,213,127,003,210
 50364 :228,224,031,245,192,000,084
 50370 :255,128,007,255,192,000,007
 50376 :063,224,001,255,240,000,215
 50382 :015,248,000,127,252,255,079
 50388 :255,013,013,013,013,013,020

Power Basic

(Article on page 170.)

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.

```
60000 IF PEEK(830)=133 THEN 60020:rem 145
60010 FORI=828TO977:READA:POKEI,A:NEXT
:rem 127
60020 SYS 828:RETURN :rem 179
60030 DATA 169,000,133,252,169,080
:rem 135
60040 DATA 133,251,169,164,133,002
:rem 131
60050 DATA 169,083,141,036;003,169
:rem 142
60060 DATA 003,141,037,003,096,152
:rem 127
60070 DATA 072,138,072,165,252,208
:rem 144
60080 DATA 007,032,116,003,169,000
:rem 123
60090 DATA 133,253,166,253,189,000
:rem 143
60100 DATA 002,133,254,198,252,230
:rem 129
60110 DATA 253,104,170,104,168,165
:rem 133
60120 DATA 254,096,160,000,132,252
:rem 127
60130 DATA 165,002,032,210,255,169
:rem 130
60140 DATA 157,032,210,255,032,228
:rem 131
60150 DATA 255,240,251,164,252,133
:rem 135
60160 DATA 254,169,032,032,210,255
:rem 135
```



```

60170 DATA 169,157,032,210,255,165
:rem 145
60180 DATA 254,201,013,240,043,201
:rem 119
60190 DATA 020,208,013,192,000,240
:rem 120
60200 DATA 211,136,169,157,032,210
:rem 129
60210 DATA 255,076,118,003,041,127
:rem 132
60220 DATA 201,032,144,196,196,251
:rem 137
60230 DATA 240,192,165,254,153,000
:rem 131
60240 DATA 002,032,210,255,169,000
:rem 120
60250 DATA 133,212,200,076,118,003
:rem 123
60260 DATA 230,252,153,000,002,169
:rem 125
60270 DATA 032,032,210,255,096,013
:rem 129

```

```

142 DATA8000,78,8021,119,8020,119,8019,11
9,8018,78,8040,101,8062,117,8061,76
:rem 247
144 DATA8039,101,8016,77
:rem 218
150 POKES,0:POKES,183
:rem 248
160 FOR I=1 TO 6:READP,C:POKEP,C:NEXT:GOS
UB830
:rem 25
165 DATA7973,78,7994,78,8015,78,8037,101,
8059,117,8058,76
:rem 129
170 POKES,170
:rem 222
180 FOR P=7948 TO 8036 STEP 22:POKEP,101:
NEXT:POKE7926,79:GOSUB830
:rem 31
190 POKES,147:GOSUB820
:rem 56
210 POKES,201:GOSUB825
:rem 45
230 POKES,207
:rem 220
240 POKE7891,81:POKE7891+F,0:POKE7892,81:
POKE7892+F,0:POKE7935,74:POKE7935+F,2
:rem 18
245 POKE7936,75:POKE7936+F,2:GOSUB820
:rem 160
250 POKES,201:GOSUB825
:rem 49
270 POKES,195:GOSUB825
:rem 63
290 POKES,191:GOSUB825
:rem 61
310 POKES,183:GOSUB825
:rem 55
330 POKES,201:GOSUB820:GOSUB820
:rem 127
350 POKES,191:GOSUB825
:rem 58
370 POKES,195:GOSUB825
:rem 64
390 POKES,201
:rem 221
400 POKE7846,223:POKE7845,233:POKE7867,10
5
:rem 107
405 POKE7849,233:POKE7850,223:POKE7872,95
:GOSUB820
:rem 151
410 POKES,191:GOSUB825
:rem 55
430 POKES,175:GOSUB825
:rem 59
450 POKES,170:GOSUB825
:rem 56
470 POKES,175:GOSUB825
:rem 63
490 POKES,183
:rem 231
500 POKE7925,74:POKE7903,93:POKE7881,93:P
OKE7859,85:POKE7860,64:POKE7861,73:GO
SUB820
:rem 187
510 POKES,170:GOSUB825
:rem 53
530 POKES,147:GOSUB820
:rem 54
550 POKES,201:GOSUB825
:rem 52
570 POKES,207:GOSUB820
:rem 55
590 POKES,201:GOSUB825
:rem 56
610 POKES,195:GOSUB825
:rem 61
630 POKES,191:GOSUB825
:rem 59
650 POKES,183:GOSUB825
:rem 62
670 POKES,175:GOSUB820:GOSUB820
:rem 144
800 POKES,0:POKE36878,0
:rem 75
810 GOTO 810
:rem 107
820 FOR D=1 TO 200:NEXT
:rem 225
825 FOR D=1 TO 100:NEXT
:rem 229
830 FOR D=1 TO 100:NEXT:RETURN
:rem 251
840 END
:rem 115

```

The Beginner's Corner

(Article on page 40.)

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: Dog — VIC Version

```

1 REM DOG
:rem 239
10 POKE36878 ,15
:rem 50
20 S=36876
30 POKES,201
:rem 164
40 PRINT"[CLR]":POKE36879,106:F=30720:GOS
UB820
:rem 18
50 POKES,191
:rem 174
60 FOR I=1TO12:READP,C:POKEP,C:NEXT:GOSUB
830
:rem 21
65 DATA7868,79,7847,111,7848,111,7871,80,
7893,106,7915,106,7937,78,7958,119,795
7,119
:rem 239
66 DATA7934,77,7912,101,7890,101
:rem 118
70 POKES,175
:rem 178
80 FOR P=7959 TO 8047 STEP 22:POKEP,101:N
EXT:GOSUB820
:rem 20
90 POKES,170
:rem 175
100 POKE8069,117:POKE8068,76:POKE8046,101
:POKE8024,101
:rem 34
105 POKE8001,111:POKE8023,101:POKE8045,10
1
:rem 57
107 POKE8067,117:POKE8066,76:POKE8044,101
:POKE8022,101:GOSUB830
:rem 118
110 POKES,175
:rem 221
120 FORP=7933 TO 7926 STEP -1:POKEP,99:NE
XT:GOSUB830
:rem 23
130 POKES,183
:rem 222
140 FOR I=1 TO 10:READP,C:POKEP,C:NEXT:GO
SUB830
:rem 66

```

Program 2: Dog — 64 Version

```

1 REM DOG
:rem 239
10 POKE54296,15:POKE54277,17:POKE54278,13
0
:rem 101
20 SH=54273:SL=54272:W=54276
:rem 47
30 POKESH,37:POKESL,162:POKEW,17
:rem 228
40 PRINT"[CLR]":POKE53281,3:POKE53280,2:F
=54272:GOSUB820
:rem 113
50 POKESH,31:POKESL,165:POKEW,17
:rem 227
60 FOR I=1 TO 12:READ P,C:POKEP,C:NEXT:GO
SUB830
:rem 21
65 DATA1366,79,1327,111,1328,111,1369,80,
1409,106,1449,106
:rem 115
66 DATA1489,78,1528,119,1527,119,1486,77,

```



```

1446,101,1406,101 :rem 131
70 POKESH,25:POKESL,30:POKEW,17 :rem 175
80 FOR P=1529 TO 1689 STEP 40:POKEP,101:N
EXT:GOSUB820 :rem 12
90 POKESH,23:POKESL,181:POKEW,17 :rem 230
100 POKE1729,117:POKE1728,76:POKE1688,101
:POKE1648,101 :rem 36
105 POKE1607,111:POKE1647,101:POKE1687,10
1 :rem 72
107 POKE1727,117:POKE1726,76:POKE1686,101
:POKE1646,101:GOSUB830 :rem 120
110 POKESH,25:POKESL,30:POKEW,17 :rem 218
120 FOR P=1485 TO 1478 STEP -1:POKEP,99:N
EXT:GOSUB830 :rem 15
130 POKESH,28:POKESL,49:POKEW,17 :rem 233
140 FOR I=1 TO 10:READP,C:POKEP,C:NEXT:GO
SUB830 :rem 66
142 DATA1606,78,1645,119,1644,119,1643,11
9,1642,78,1682,101 :rem 174
144 DATA1722,101,1721,76,1681,101,1640,77
:rem 24
150 POKESH,28:POKESL,49:POKEW,17 :rem 235
160 FOR I=1 TO 6:READP,C:POKEP,C:NEXT:GOS
UB830 :rem 25
165 DATA1561,78,1600,78,1639,78,1679,101,
1719,117,1718,76 :rem 96
170 POKESH,23:POKESL,181:POKEW,17 :rem 21
180 FOR P=1518 TO 1678 STEP 40:POKEP,101:
NEXT:POKE1478,79:GOSUB830 :rem 19
190 POKESH,18:POKESL,209:GOSUB820 :rem 28
210 POKESH,37:POKESL,162:GOSUB825 :rem 25
230 POKESH,42:POKESL,62:POKEW,17 :rem 225
240 POKE1407,81:POKE1407+F,0:POKE1408,81:
POKE1408+F,0 :rem 246
245 POKE1487,74:POKE1487+F,2:POKE1488,75:
POKE1488+F,2:GOSUB820 :rem 120
250 POKESH,37:POKESL,162:GOSUB825 :rem 29
270 POKESH,33:POKESL,135:GOSUB825 :rem 27
290 POKESH,31:POKESL,165:GOSUB825 :rem 30
310 POKESH,28:POKESL,49:GOSUB825 :rem 238
330 POKESH,37:POKESL,162:POKEW,17 :rem 23
340 FOR D=1 TO 200:NEXT:GOSUB820 :rem 50
350 POKESH,31:POKESL,165:GOSUB825 :rem 27
370 POKESH,33:POKESL,135:GOSUB825 :rem 28
390 POKESH,37:POKESL,162:POKEW,17 :rem 29
400 POKE1326,223:POKE1325,233:POKE1365,10
5 :rem 68
405 POKE1329,233:POKE1330,223:POKE1370,95
:GOSUB820 :rem 112
410 POKESH,31:POKESL,165:GOSUB825 :rem 24
430 POKESH,25:POKESL,30:GOSUB825 :rem 228
450 POKESH,23:POKESL,181:GOSUB825 :rem 27
470 POKESH,25:POKESL,30:GOSUB825 :rem 232
490 POKESH,28:POKESL,49:POKEW,17 :rem 242
500 POKE1477,74:POKE1437,93:POKE1397,93:P
OKE1357,85 :rem 165
505 POKE1358,64:POKE1359,73:GOSUB 820
:rem 85
510 POKESH,23:POKESL,181:GOSUB825 :rem 24
530 POKESH,18:POKESL,209:GOSUB820 :rem 26
550 POKESH,37:POKESL,162:GOSUB825 :rem 32
570 POKESH,42:POKESL,62:GOSUB820 :rem 232
590 POKESH,37:POKESL,162:GOSUB825 :rem 36
610 POKESH,33:POKESL,135:GOSUB825 :rem 25
630 POKESH,31:POKESL,165:GOSUB825 :rem 28
650 POKESH,28:POKESL,49:GOSUB825 :rem 245
670 POKESH,25:POKESL,30 :rem 145
680 POKEW,17:FORD=1TO200:NEXT:GOSUB820
:rem 141
800 POKESH,0:POKESL,0:POKE54296,0:rem 241
810 GOTO 810 :rem 107
820 POKEW,17:FOR D=1 TO 200:NEXT :rem 53
825 POKEW,17:FOR D=1 TO 100:NEXT :rem 57
830 FOR D=1 TO 100:NEXT:POKEW,16:RETURN
:rem 78
840 END :rem 115

```

Program 3: Merry Christmas — VIC Version

```

1 REM MERRY CHRISTMAS :rem 82
5 POKE36878,15:S=36876:POKE36879,26:GOTO1
0 :rem 192
6 FORD=1TO200:NEXT :rem 125
7 FORD=1TO200:NEXT:RETURN :rem 152
10 PRINT"[CLR]{BLK}":PRINT"[2 SPACES]COMP
UTE!'S GAZETTE[DOWN]" :rem 61
15 POKES,159:GOSUB6 :rem 163
20 PRINTTAB(10);"{YEL}UI":PRINTTAB(10);"J
K" :rem 151
25 POKES,183:GOSUB6 :rem 161
27 POKES,0:POKES,183:GOSUB6 :rem 187
30 PRINTTAB(10);"{GRN}{RVS}{f}*}"
:rem 176
35 POKES,191:GOSUB7 :rem 162
40 PRINTTAB(9);"{RVS}{f}[2 SPACES]{*}"
:rem 107
45 POKES,183:GOSUB7 :rem 164
50 PRINTTAB(9);"{RVS}{f}[2 SPACES]{*}"
:rem 108
55 POKES,179:GOSUB7 :rem 170
60 PRINTTAB(8);"{RVS}{f}[4 SPACES]{*}"
:rem 108
65 POKES,167:GOSUB6 :rem 167
70 PRINTTAB(8);"{RVS}{f}[4 SPACES]{*}"
:rem 109
75 POKES,0:POKES,167:GOSUB6 :rem 192
80 PRINTTAB(7);"{RVS}{f}[6 SPACES]{*}"
:rem 109
85 POKES,0:POKES,167:GOSUB6 :rem 193
90 PRINTTAB(7);"{RVS}{f}[6 SPACES]{*}"
:rem 110
95 POKES,191:GOSUB6 :rem 167
100 PRINTTAB(6);"{RVS}{f}[8 SPACES]{*}"
:rem 149
105 POKES,0:POKES,191:GOSUB7 :rem 232
110 PRINTTAB(6);"{RVS}{f}[8 SPACES]{*}"
:rem 150
115 POKES,199:GOSUB7 :rem 217
120 PRINTTAB(5);"{RVS}{f}[10 SPACES]{*}"
:rem 150
125 POKES,191:GOSUB7 :rem 210
130 PRINTTAB(5);"{RVS}{f}[10 SPACES]{*}"
:rem 151
135 POKES,183:GOSUB7 :rem 212
140 PRINTTAB(4);"{RVS}{f}[12 SPACES]{*}"
:rem 151
145 POKES,179:GOSUB6 :rem 217
150 PRINTTAB(10);"{BLK}{f}[2 +}" :rem 7
155 POKES,159:GOSUB6 :rem 216
160 PRINTTAB(10);"{f}[2 +}" :rem 120
165 POKES,0:POKES,159:GOSUB6 :rem 241
166 POKES,199:GOSUB6 :rem 222
167 POKES,0:POKES,199:GOSUB7 :rem 248
168 POKES,201:GOSUB7 :rem 209
169 POKES,199 :rem 241
170 PRINTTAB(4);"{RED}MER"; :rem 59
172 GOSUB7:POKES,191 :rem 212
174 PRINT"RY "; :rem 83
175 GOSUB7:POKES,183 :rem 216
176 PRINT"CHRIST"; :rem 119

```



```

177 GOSUB6:POKES,167 :rem 219
178 PRINT"MAS{DOWN}" :rem 99
179 GOSUB6:POKES,159:GOSUB7 :rem 207
180 POKES,0:POKES,159:GOSUB7 :rem 239
182 POKES,167 :rem 231
184 PRINTTAB(4);"HAP"; :rem 25
186 GOSUB6:POKES,191 :rem 216
188 PRINT"PY "; :rem 86
190 GOSUB6:POKES,179 :rem 217
192 PRINT"NEW "; :rem 146
194 GOSUB6:POKES,183 :rem 216
196 PRINT"YEAR!" :rem 195
200 POKE7844,170 :rem 92
201 POKE7890,170 :rem 94
202 POKE7909,170 :rem 96
203 POKE7933,170 :rem 94
204 POKE7974,170 :rem 100
205 POKE7979,170 :rem 106
206 POKE7998,170 :rem 108
207 POKE8017,170 :rem 92
208 POKE8024,170 :rem 91
209 POKE8041,170 :rem 91
210 POKE8044,170 :rem 86
220 GOSUB6:GOSUB6 :rem 58
230 POKE36878,0:POKES,0 :rem 72
240 B=36879 :rem 38
250 POKEB,29 :rem 159
255 GOSUB6 :rem 82
260 POKEB,26 :rem 157
265 GOSUB6 :rem 83
270 GOTO250 :rem 105
300 END :rem 106
85 POKEW,16:POKESH,28:POKESL,49:GOSUB6 :rem 157
90 PRINT TAB(16);"{RVS}␣{6 SPACES}[*]" :rem 177
95 POKESH,37:POKESL,162:GOSUB6 :rem 139
100 PRINT TAB(15);"{RVS}␣{8 SPACES}[*]" :rem 197
105 POKEW,16:POKESH,37:POKESL,162:GOSUB7 :rem 7
110 PRINT TAB(15);"{RVS}␣{8 SPACES}[*]" :rem 198
115 POKESH,42:POKESL,62:GOSUB7 :rem 128
120 PRINT TAB(14);"{RVS}␣{10 SPACES}[*]" :rem 198
125 POKESH,37:POKESL,162:GOSUB7 :rem 182
130 PRINT TAB(14);"{RVS}␣{10 SPACES}[*]" :rem 199
135 POKESH,33:POKESL,135:GOSUB7 :rem 179
140 PRINT TAB(13);"{RVS}␣{12 SPACES}[*]" :rem 199
145 POKESH,31:POKESL,165:GOSUB6 :rem 180
150 PRINT TAB(19);"{BLK}␣2 +}" :rem 16
155 POKESH,25:POKESL,30:GOSUB6 :rem 127
160 PRINT TAB(19);"␣2 +}" :rem 129
165 POKEW,16:POKESH,25:POKESL,30:GOSUB6 :rem 211
166 POKESH,42:POKESL,62:GOSUB6 :rem 133
167 POKEW,16:POKESH,42:POKESL,62:GOSUB7 :rem 138
168 POKESH,44:POKESL,193:GOSUB7 :rem 191
169 POKESH,42:POKESL,62:POKEW,17 :rem 236
170 PRINTTAB(4);"{2 DOWN}{RED}M E R {SHIFT-SPACE}"; :rem 253
172 GOSUB8:POKESH,37:POKESL,162:POKEW,17 :rem 13
174 PRINT "R Y{3 SPACES}"; :rem 83
175 GOSUB8:POKESH,33:POKESL,135:POKEW,17 :rem 12
176 PRINT "C H R I S T "; :rem 119
177 GOSUB6:POKESH,28:POKESL,49:POKEW,17 :rem 228
178 PRINT "M A S I{DOWN}" :rem 132
179 GOSUB6:POKESH,25:POKESL,30:GOSUB7 :rem 118
180 POKESH,25:POKESL,30:GOSUB7 :rem 126
182 POKESH,28:POKESL,49:POKEW,17 :rem 240
184 PRINT TAB(5);"H A P "; :rem 26
186 GOSUB6:POKESH,37:POKESL,162:POKEW,17 :rem 16
188 PRINT "P Y {2 SHIFT-SPACE}"; :rem 150
190 GOSUB6:POKESH,31:POKESL,165:POKEW,17 :rem 8
192 PRINT "N E W{3 SPACES}"; :rem 146
194 GOSUB6:POKESH,33:POKESL,135:POKEW,17 :rem 11
196 PRINT "Y E A R !" :rem 195
200 POKE1284,170 :rem 84
201 POKE1363,170 :rem 83
202 POKE1405,170 :rem 81
203 POKE1442,170 :rem 83
204 POKE1484,170 :rem 90
205 POKE1521,170 :rem 83
206 POKE1526,170 :rem 89
207 POKE1563,170 :rem 91
208 POKE1600,170 :rem 84
209 POKE1606,170 :rem 91
210 POKE1642,170 :rem 83
211 POKE1647,170 :rem 89
212 POKE1679,170 :rem 95
213 POKE1685,170 :rem 93

```

Program 4: Merry Christmas — 64 Version

```

1 REM MERRY CHRISTMAS :rem 82
2 FORL=54272TO54296:POKEL,0:NEXT :rem 221
4 POKE54277,9:POKE54278,128:W=54276 :rem 225
5 POKE 54296,15:SH=54273:SL=54272:POKE532 :rem 151
81,1:POKE53280,2:GOTO10 :rem 124
6 POKEW,17:FORD=1TO200:NEXT:GOTO8 :rem 81
7 POKEW,17 :rem 153
8 FORD=1TO200:NEXT:RETURN :rem 2
10 PRINT"{CLR}{BLK}":PRINTTAB(11);"COMPUT :rem 74
E!'S GAZETTE{DOWN}" :rem 169
15 POKESH,25:POKESL,30:GOSUB6 :rem 128
20 PRINT TAB(19);"{YEL}UI":PRINT TAB(19); :rem 214
"JK" :rem 185
25 POKESH,33:POKESL,135:GOSUB6 :rem 134
27 POKEW,16:POKESH,33:POKESL,135:GOSUB7 :rem 155
30 PRINT TAB(19);"{GRN}{RVS}␣[*]" :rem 131
35 POKESH,37:POKESL,162:GOSUB7 :rem 156
40 PRINT TAB(18);"{RVS}␣{2 SPACES}[*]" :rem 133
45 POKESH,33:POKESL,135:GOSUB7 :rem 157
50 PRINT TAB(18);"{RVS}␣{2 SPACES}[*]" :rem 157
55 POKESH,31:POKESL,165:GOSUB7 :rem 176
60 PRINT TAB(17);"{RVS}␣{4 SPACES}[*]" :rem 92
65 POKESH,28:POKESL,49:GOSUB6 :rem 157
70 PRINT TAB(17);"{RVS}␣{4 SPACES}[*]" :rem 176
75 POKEW,16:POKESH,28:POKESL,49:GOSUB6 :rem 176
80 PRINT TAB(16);"{RVS}␣{6 SPACES}[*]" :rem 176

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220 GOSUB6:GOSUB6           :rem 58
230 POKE54296,0:POKESH,0:POKESL,0:rem 238
240 B=53280                 :rem 23
250 POKEB,5                 :rem 105
255 GOSUB6                  :rem 82
260 POKEB,2                 :rem 103
265 GOSUB6                  :rem 83
270 GOTO 250                :rem 105
300 END                      :rem 106

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Spike

(Article on page 74.)

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.

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32768 :169,005,141,190,207,169,113
32774 :072,141,180,207,032,019,145
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32822 :255,141,015,212,141,182,232
32828 :207,169,128,141,018,212,167
32834 :169,064,141,136,002,169,235
32840 :001,141,246,207,169,019,087
32846 :032,210,255,169,000,141,117
32852 :032,208,173,014,220,041,004
32858 :254,141,014,220,165,001,117
32864 :041,251,133,001,160,000,170
32870 :185,000,208,153,000,080,216
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32882 :185,000,210,153,000,082,232
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32906 :185,000,214,153,000,086,008
32912 :185,000,215,153,000,087,016
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32924 :004,133,001,173,014,220,189
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32942 :141,024,208,032,183,128,122
32948 :076,219,128,120,169,127,251
32954 :141,013,220,169,001,141,103
32960 :026,208,169,000,141,018,242
32966 :208,173,017,208,041,127,204
32972 :141,017,208,169,119,141,231
32978 :020,003,169,140,141,021,192
32984 :003,088,096,032,225,128,020
32990 :076,249,128,169,089,133,042
32996 :252,160,000,133,251,169,169
33002 :000,145,251,200,208,251,009
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33014 :208,243,096,169,016,160,114
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33026 :065,153,000,066,153,000,183
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33062 :043,129,076,187,129,032,122
33068 :133,139,169,001,133,002,109
33074 :169,050,141,255,207,172,020
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33086 :139,232,224,151,240,005,029
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33128 :247,173,255,207,024,105,091
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33164 :243,173,255,207,056,233,027
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33176 :176,225,169,020,141,255,114
33182 :207,174,255,207,160,030,167
33188 :032,239,139,200,232,224,206
33194 :151,208,247,173,255,207,131
33200 :024,105,020,141,255,207,160
33206 :201,151,144,229,096,169,148
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33320 :207,076,173,130,173,252,027
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33344 :240,107,173,254,207,201,222
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33362 :141,249,207,076,173,130,034
33368 :173,252,207,041,004,208,205
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33398 :254,207,206,253,207,173,138
33404 :252,207,141,249,207,076,232
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33422 :240,003,032,186,138,173,146
33428 :253,207,201,200,240,019,244
33434 :173,254,207,201,150,240,099
33440 :012,238,254,207,238,253,082
33446 :207,173,252,207,141,249,115
33452 :207,032,155,139,162,255,098
33458 :160,000,200,208,253,232,207
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33476 :029,135,032,030,139,208,001

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33494	:076,247,129,173,030,208,053	33914	:064,208,247,169,007,141,190
33500	:041,001,208,001,096,206,005	33920	:046,208,173,254,067,141,249
33506	:199,207,104,104,032,200,048	33926	:255,067,162,039,169,032,090
33512	:143,174,199,207,232,169,076	33932	:157,120,064,202,224,007,146
33518	:032,157,040,064,076,212,051	33938	:208,248,160,006,185,216,145
33524	:140,173,241,207,010,141,132	33944	:132,153,055,138,185,223,014
33530	:207,207,176,008,169,000,249	33950	:132,153,062,138,136,192,203
33536	:141,206,207,076,011,131,004	33956	:255,208,239,032,145,143,162
33542	:169,001,141,206,207,173,135	33962	:173,205,207,056,042,141,226
33548	:207,207,024,105,013,141,197	33968	:021,208,032,166,135,169,139
33554	:014,208,173,206,207,105,163	33974	:000,174,201,207,157,080,233
33560	:000,024,106,106,141,206,095	33980	:064,238,201,207,076,212,162
33566	:207,173,016,208,041,127,034	33986	:140,159,019,017,017,017,051
33572	:013,206,207,141,016,208,059	33992	:029,029,029,029,029,029,118
33578	:173,240,207,024,105,041,064	33998	:029,029,029,018,066,079,200
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33590	:046,208,169,023,141,255,128	34010	:040,060,080,110,130,040,166
33596	:067,162,254,154,173,021,123	34016	:080,170,050,090,140,160,146
33602	:208,141,205,207,169,129,101	34022	:142,217,207,140,216,207,079
33608	:141,021,208,032,081,143,186	34028	:200,032,055,134,201,003,093
33614	:032,081,143,032,081,143,078	34034	:240,093,232,032,055,134,004
33620	:169,000,141,202,207,169,204	34040	:201,002,208,085,202,202,124
33626	:004,141,203,207,173,203,253	34046	:032,055,134,201,002,208,118
33632	:207,074,144,008,169,010,196	34052	:076,173,216,207,024,105,037
33638	:141,204,207,076,113,131,206	34058	:019,168,032,055,134,201,107
33644	:169,020,141,204,207,173,254	34064	:002,208,062,232,232,032,016
33650	:203,207,141,245,207,169,006	34070	:055,134,201,002,208,053,163
33656	:010,141,244,207,032,252,238	34076	:173,217,207,024,105,009,251
33662	:135,172,242,207,174,204,236	34082	:170,173,216,207,024,105,161
33668	:207,204,240,207,208,008,182	34088	:009,168,032,055,134,201,127
33674	:236,241,207,208,003,076,085	34094	:002,208,032,200,200,032,208
33680	:154,131,032,055,134,208,090	34100	:055,134,201,002,208,023,163
33686	:003,238,202,207,173,204,153	34106	:173,217,207,056,233,009,185
33692	:207,024,105,020,201,160,105	34112	:170,032,055,134,201,002,146
33698	:240,010,201,150,240,006,241	34118	:208,009,136,136,032,055,134
33704	:141,204,207,076,113,131,016	34124	:134,201,002,240,001,096,238
33710	:238,203,207,172,203,207,124	34130	:174,217,207,172,216,207,251
33716	:192,020,208,166,160,000,158	34136	:236,241,207,208,012,152,120
33722	:185,195,132,032,210,255,171	34142	:024,105,010,205,240,207,117
33728	:200,192,021,208,245,169,203	34148	:208,003,076,245,130,162,156
33734	:000,174,202,207,032,205,250	34154	:011,032,035,134,169,003,234
33740	:189,169,032,032,210,255,067	34160	:133,002,169,255,141,246,034
33746	:169,042,032,210,255,169,063	34166	:207,141,214,207,172,216,251
33752	:032,032,210,255,169,000,146	34172	:207,200,238,246,207,173,115
33758	:174,200,207,032,205,189,205	34178	:246,207,201,019,240,044,063
33764	:169,032,032,210,255,169,071	34184	:201,010,144,006,206,214,149
33770	:061,032,210,255,169,032,225	34190	:207,076,149,133,238,214,135
33776	:032,210,255,173,200,207,037	34196	:207,173,217,207,024,109,061
33782	:141,245,207,173,202,207,141	34202	:214,207,141,215,207,173,031
33788	:141,244,207,032,252,135,239	34208	:217,207,056,237,214,207,018
33794	:174,242,207,173,243,207,224	34214	:170,202,232,032,239,139,156
33800	:032,205,189,169,032,032,155	34220	:236,215,207,208,247,076,081
33806	:210,255,169,146,032,210,012	34226	:125,133,096,172,253,207,140
33812	:255,173,200,207,201,070,102	34232	:174,254,207,192,040,240,011
33818	:240,006,024,105,005,141,035	34238	:016,192,030,240,012,224,136
33824	:200,207,173,242,207,056,093	34244	:150,240,008,152,056,233,011
33830	:233,010,141,242,207,141,244	34250	:020,168,032,230,132,172,188
33836	:221,207,173,243,207,233,048	34256	:253,207,174,254,207,192,215
33842	:000,141,243,207,013,221,107	34262	:030,240,021,224,000,240,201
33848	:207,240,020,144,018,162,079	34268	:017,224,010,240,013,152,108
33854	:253,160,000,200,208,253,112	34274	:056,233,010,168,138,056,119
33860	:232,208,250,162,011,032,195	34280	:233,010,170,032,230,132,015
33866	:035,134,076,034,132,234,207	34286	:172,253,207,174,254,207,225
33872	:169,000,141,021,208,169,020	34292	:192,030,240,021,224,150,077
33878	:096,133,252,169,032,133,133	34298	:240,017,224,140,240,013,100
33884	:254,160,000,133,251,133,255	34304	:152,056,233,010,168,138,245
33890	:253,177,253,145,251,200,097	34310	:024,105,010,170,032,230,065
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		34322	:207,192,200,240,011,192,036

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34490 :207,076,168,134,104,170,021
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34526 :219,207,106,141,218,207,040

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34562 :144,009,173,218,207,141,126
34568 :219,207,076,208,134,173,001
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34580 :208,134,173,220,207,141,079
34586 :218,207,096,173,241,207,144
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34622 :207,173,243,207,141,237,246
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34838 :096,096,162,006,032,086,244
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34916 :141,251,207,076,085,139,231
34922 :189,055,138,056,253,062,091
34928 :138,144,011,141,250,207,235
34934 :169,000,141,251,207,076,194
34940 :085,139,189,062,138,056,025
34946 :253,055,138,141,250,207,150

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34988 :138,201,030,208,003,076,060
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35024 :138,201,200,240,073,189,225
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35036 :254,062,138,222,055,138,065
35042 :076,030,137,189,183,207,024
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35090 :055,138,201,150,240,006,040
35096 :254,055,138,254,062,138,157
35102 :202,224,255,208,128,096,119
35108 :162,006,169,128,141,247,121
35114 :207,189,055,138,010,176,049
35120 :059,105,014,008,072,138,188
35126 :010,170,104,157,002,208,193
35132 :138,074,170,040,173,247,134
35138 :207,073,255,045,016,208,102
35144 :144,003,013,247,207,141,059
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35162 :104,157,003,208,138,074,006

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35174 :255,208,194,076,134,137,082
35180 :024,105,014,072,138,010,215
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35192 :074,170,173,016,208,013,006
35198 :247,207,141,016,208,076,253
35204 :080,137,206,246,207,208,192
35210 :035,169,010,141,246,207,178
35216 :173,248,207,201,021,240,210
35222 :008,169,021,141,248,207,176
35228 :076,164,137,169,020,141,095
35234 :248,207,162,006,157,249,167
35240 :067,202,224,255,208,248,092
35246 :173,141,002,201,001,240,164
35252 :249,096,162,006,169,007,101
35258 :157,040,208,169,020,157,169
35264 :249,067,202,224,255,208,117
35270 :241,162,036,169,003,157,198
35276 :120,216,202,224,255,208,149
35282 :248,162,039,169,032,157,249
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35294 :120,064,157,080,064,202,141
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35306 :185,069,138,032,210,255,099
35312 :200,192,011,208,245,160,232
35318 :000,185,088,138,032,210,131
35324 :255,200,192,043,208,245,115
35330 :160,007,185,080,108,153,213
35336 :000,080,136,192,255,208,111
35342 :245,200,185,131,138,032,177
35348 :210,255,200,192,040,208,101
35354 :245,160,000,185,170,138,156
35360 :032,210,255,200,192,016,169
35366 :208,245,160,000,185,080,148
35372 :142,153,000,069,200,208,048
35378 :247,173,030,208,096,010,046
35384 :030,040,060,080,110,130,250
35390 :040,080,170,050,090,140,120
35396 :160,158,019,017,017,017,200
35402 :083,079,078,065,082,058,007
35408 :126,126,126,126,096,096,008
35414 :096,096,154,019,017,017,229
35420 :076,069,086,069,076,058,014
35426 :032,032,032,032,032,032,034
35432 :032,032,032,032,032,032,040
35438 :032,032,032,032,032,032,046
35444 :032,032,032,032,032,032,052
35450 :032,032,032,032,032,032,058
35456 :032,032,032,005,019,083,075
35462 :067,079,082,069,058,032,009
35468 :048,048,048,048,048,048,172
35474 :032,032,032,032,032,032,082
35480 :072,073,071,072,032,083,043
35486 :067,079,082,069,058,032,033
35492 :048,048,048,048,048,048,196
35498 :153,019,017,083,084,065,079
35504 :077,073,078,065,058,032,047
35510 :218,218,218,218,173,249,196
35516 :207,041,001,208,009,238,124
35522 :254,207,206,253,207,076,117
35528 :247,138,173,249,207,041,231
35534 :002,208,009,238,253,207,099
35540 :206,254,207,076,247,138,060
35546 :173,249,207,041,004,208,076
35552 :009,206,254,207,206,253,079
35558 :207,076,247,138,173,249,040
35564 :207,041,008,208,006,238,176
35570 :254,207,238,253,207,032,153
35576 :155,139,162,255,160,000,095
35582 :200,208,253,232,208,250,069

35588 :032,024,136,032,144,136,252
35594 :032,036,137,032,217,130,082
35600 :032,030,139,208,165,032,110
35606 :050,139,208,160,032,181,024
35612 :133,096,173,254,207,024,147
35618 :109,253,207,141,250,207,177
35624 :008,104,041,001,141,251,074
35630 :207,076,085,139,173,254,212
35636 :207,056,237,253,207,144,132
35642 :011,141,250,207,169,000,068
35648 :141,251,207,076,085,139,195
35654 :173,253,207,056,237,254,226
35660 :207,141,250,207,169,000,026
35666 :141,251,207,173,250,207,031
35672 :056,233,010,141,250,207,217
35678 :173,251,207,233,000,141,075
35684 :251,207,048,028,173,250,033
35690 :207,013,251,207,240,020,020
35696 :173,250,207,056,233,020,027
35702 :141,250,207,173,251,207,067
35708 :233,000,141,251,207,076,008
35714 :102,139,096,169,002,133,003
35720 :002,162,159,160,031,032,170
35726 :239,139,200,192,200,208,040
35732 :248,202,224,150,208,241,141
35738 :096,173,254,207,010,176,046
35744 :029,105,015,141,000,208,146
35750 :173,016,208,041,254,144,234
35756 :002,009,001,141,016,208,037
35762 :173,253,207,024,105,041,213
35768 :141,001,208,076,207,139,188
35774 :024,105,015,141,000,208,171
35780 :173,016,208,009,001,141,232
35786 :016,208,076,178,139,169,220
35792 :002,133,002,174,254,207,212
35798 :172,253,207,032,055,134,043
35804 :201,001,208,005,162,012,041
35810 :032,035,134,174,254,207,038
35816 :172,253,207,032,239,139,250
35822 :096,072,152,072,138,072,072
35828 :169,096,133,252,169,000,039
35834 :133,251,138,072,074,074,224
35840 :170,152,072,074,074,074,104
35846 :168,202,224,255,240,014,085
35852 :165,251,024,105,008,133,186
35858 :251,144,242,230,252,076,189
35864 :007,140,136,192,255,240,226
35870 :016,165,251,024,105,064,143
35876 :133,251,165,252,105,001,175
35882 :133,252,076,026,140,104,005
35888 :041,007,168,136,192,255,079
35894 :240,009,230,251,208,247,215
35900 :230,252,076,051,140,104,145
35906 :041,003,170,169,063,141,141
35912 :247,207,165,002,010,010,201
35918 :010,010,010,010,202,224,032
35924 :255,240,012,074,074,056,027
35930 :110,247,207,110,047,207,194
35936 :076,082,140,200,072,173,071
35942 :247,207,049,251,145,251,228
35948 :104,017,251,145,251,104,212
35954 :170,104,168,104,096,173,161
35960 :025,208,141,025,208,041,000
35966 :001,240,077,169,012,160,017
35972 :059,162,024,142,022,208,237
35978 :141,033,208,140,017,208,117
35984 :141,024,208,173,018,208,148
35990 :201,081,144,016,169,000,249
35996 :141,018,208,173,017,208,153
36002 :041,127,141,017,208,076,004

36008 :206,140,169,000,141,033,089
36014 :208,169,200,141,022,208,098
36020 :169,027,141,017,208,169,143
36026 :004,141,024,208,169,081,045
36032 :141,018,208,173,017,208,189
36038 :041,127,141,017,208,076,040
36044 :049,234,104,168,104,170,009
36050 :104,064,169,070,141,254,244
36056 :207,169,120,141,253,207,033
36062 :162,039,169,032,157,120,133
36068 :064,202,224,007,208,248,157
36074 :032,155,139,032,029,135,244
36080 :173,199,207,201,007,240,243
36086 :057,032,248,141,032,024,012
36092 :136,032,144,136,032,036,000
36098 :137,162,255,160,000,200,148
36104 :208,253,232,208,250,162,041
36110 :249,160,000,200,208,253,060
36116 :232,208,250,173,000,220,079
36122 :041,016,208,220,162,013,174
36128 :169,032,157,040,064,232,214
36134 :224,039,208,248,173,030,192
36140 :208,076,247,129,162,039,137
36146 :169,013,157,040,216,202,079
36152 :224,255,208,248,160,000,127
36158 :162,000,189,041,064,157,163
36164 :040,064,232,224,037,208,105
36170 :245,185,037,142,141,077,133
36176 :064,152,072,160,000,162,178
36182 :000,200,208,253,232,208,163
36188 :250,104,168,173,000,220,239
36194 :041,016,240,010,200,192,029
36200 :043,208,211,160,000,076,034
36206 :062,141,162,000,189,007,159
36212 :064,221,031,064,240,018,242
36218 :144,021,162,005,189,007,138
36224 :064,157,031,064,202,224,102
36230 :255,208,245,076,145,141,180
36236 :232,224,006,208,225,162,173
36242 :005,189,031,064,157,192,016
36248 :207,202,224,255,208,245,213
36254 :173,000,220,041,016,240,080
36260 :249,032,073,145,032,182,109
36266 :137,162,005,189,192,207,038
36272 :157,031,064,202,224,255,085
36278 :208,245,169,096,133,252,005
36284 :169,032,133,254,160,000,168
36290 :133,251,133,253,177,253,114
36296 :145,251,200,208,249,230,203
36302 :252,230,254,166,252,224,048
36308 :127,208,239,177,253,145,081
36314 :251,200,192,064,208,247,100
36320 :032,145,143,169,007,141,093
36326 :021,208,141,201,207,169,153
36332 :040,141,200,207,169,012,237
36338 :141,199,207,076,212,140,193
36344 :162,000,189,006,142,032,011
36350 :210,255,232,224,032,208,135
36356 :245,096,005,019,017,029,159
36362 :029,029,029,029,029,029,184
36368 :029,029,029,029,029,029,190
36374 :029,029,029,080,082,069,084
36380 :083,083,032,066,085,084,205
36386 :084,079,078,135,129,141,168
36392 :133,160,143,150,133,146,137
36398 :032,046,046,032,016,018,236
36404 :005,019,019,032,002,021,150
36410 :020,020,015,014,032,020,179
36416 :015,032,016,012,001,025,165
36422 :032,001,007,001,009,014,134
36428 :032,046,046,032,000,000,232

36434 :000,000,000,000,000,000,082
36440 :000,000,000,000,000,000,088
36446 :000,000,000,000,000,000,094
36452 :000,000,048,000,000,048,196
36458 :000,000,252,000,000,252,098
36464 :000,000,048,000,000,048,208
36470 :000,000,000,000,000,000,118
36476 :000,000,000,000,000,000,124
36482 :000,000,000,000,000,000,130
36488 :000,000,000,000,000,000,136
36494 :000,000,000,000,000,000,142
36500 :000,000,000,000,000,000,148
36506 :000,000,000,000,000,000,154
36512 :000,000,000,000,000,001,161
36518 :140,000,000,216,000,000,010
36524 :112,000,000,112,000,000,140
36530 :216,000,001,140,000,000,023
36536 :000,000,000,000,000,000,184
36542 :000,000,000,000,000,000,190
36548 :000,000,000,000,000,000,196
36554 :000,000,000,000,000,000,202
36560 :000,000,000,000,000,000,208
36566 :000,000,000,000,000,000,214
36572 :000,000,000,000,000,000,220
36578 :000,000,000,000,096,000,066
36584 :000,240,000,001,248,000,209
36590 :000,240,000,000,096,000,062
36596 :000,000,000,000,000,000,244
36602 :000,000,000,000,000,000,250
36608 :000,000,000,000,000,000,000
36614 :000,000,000,000,000,000,006
36620 :000,000,000,000,000,000,012
36626 :000,000,000,000,000,000,018
36632 :000,000,000,000,015,255,038
36638 :255,023,224,049,016,000,085
36644 :001,035,102,051,102,219,034
36650 :051,075,108,103,199,254,064
36656 :102,128,000,014,255,255,034
36662 :252,255,255,248,000,000,040
36668 :000,000,000,000,000,000,060
36674 :000,000,000,000,000,000,066
36680 :000,000,000,000,000,000,072
36686 :000,000,165,162,007,169,069
36692 :000,157,000,212,202,224,111
36698 :255,208,248,169,141,141,228
36704 :024,212,169,005,141,005,140
36710 :212,169,218,141,006,212,036
36716 :169,150,141,001,212,169,182
36722 :139,141,000,212,169,017,024
36728 :141,004,212,160,140,162,171
36734 :000,232,208,253,200,208,203
36740 :250,169,016,141,004,212,156
36746 :232,208,253,200,208,250,209
36752 :096,160,000,169,000,153,210
36758 :000,212,200,192,008,208,202
36764 :246,169,143,141,024,212,067
36770 :169,008,141,005,212,169,098
36776 :243,141,006,212,169,129,044
36782 :141,004,212,162,255,142,066
36788 :001,212,202,160,255,136,122
36794 :192,001,208,251,224,001,039
36800 :208,241,169,128,141,004,059
36806 :212,096,162,000,169,000,069
36812 :157,000,212,232,224,008,013
36818 :208,248,169,143,141,024,119
36824 :212,169,017,141,005,212,204
36830 :169,213,141,006,212,169,108
36836 :002,141,003,212,169,100,087
36842 :141,002,212,169,005,141,136
36848 :001,212,169,135,141,000,130
36854 :212,169,065,141,004,212,025


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36860 :169,252,160,000,162,000,227
36866 :200,208,253,232,208,250,073
36872 :024,105,001,208,245,169,248
36878 :064,141,004,212,096,162,181
36884 :000,142,033,208,142,032,065
36890 :208,189,206,144,240,007,252
36896 :032,210,255,232,076,027,096
36902 :144,234,173,190,207,105,067
36908 :048,032,210,255,169,157,147
36914 :032,210,255,032,228,255,038
36920 :208,010,173,000,220,041,196
36926 :016,208,244,076,091,144,073
36932 :201,013,240,019,201,049,023
36938 :144,233,201,058,176,229,091
36944 :072,056,233,048,141,190,052
36950 :207,104,032,210,255,162,032
36956 :000,160,000,232,208,253,177
36962 :200,208,250,173,000,220,125
36968 :041,016,240,249,189,050,121
36974 :145,240,007,032,210,255,231
36980 :232,076,108,144,173,180,005
36986 :207,032,210,255,169,157,128
36992 :032,210,255,032,228,255,116
36998 :208,010,173,000,220,041,018
37004 :016,208,244,076,167,144,227
37010 :201,013,240,017,201,069,119
37016 :240,007,201,072,240,003,147
37022 :076,131,144,141,180,207,013
37028 :032,210,255,234,056,169,096
37034 :010,237,190,207,010,073,129
37040 :255,024,105,002,141,177,112
37046 :130,141,251,138,141,004,219
37052 :141,173,180,207,056,233,154
37058 :069,074,073,001,141,181,221
37064 :207,169,001,133,204,096,242
37070 :014,147,017,017,159,018,066
37076 :029,029,029,029,029,029,130
37082 :029,032,032,032,032,032,151
37088 :032,032,017,157,157,157,008
37094 :157,157,157,157,032,211,077
37100 :208,201,203,197,032,146,199
37106 :032,045,032,005,032,194,070
37112 :089,032,197,082,073,067,020
37118 :032,194,082,065,078,068,005
37124 :079,078,013,029,029,029,005
37130 :029,029,029,029,159,018,047
37136 :032,032,032,032,032,032,208
37142 :032,013,013,013,013,013,119
37148 :029,029,029,029,029,029,202
37154 :158,211,080,069,069,068,177
37160 :032,040,049,045,057,041,048
37166 :063,032,159,000,013,013,070
37172 :013,029,029,029,029,029,210
37178 :029,158,197,065,083,089,167
37184 :047,200,065,082,068,063,077
37190 :032,159,000,120,173,013,055
37196 :220,009,129,141,013,220,040
37202 :169,000,141,026,208,169,027
37208 :234,141,021,003,169,049,193
37214 :141,020,003,088,169,021,024
37220 :141,024,208,169,027,141,042
37226 :017,208,169,199,141,000,072
37232 :221,169,004,141,136,002,017
37238 :169,000,141,021,208,032,177
37244 :019,144,169,064,141,136,029
37250 :002,169,198,141,000,221,093
37256 :169,008,141,024,208,169,087
37262 :216,133,252,160,000,132,011
37268 :251,169,006,145,251,200,146
37274 :208,251,230,252,166,252,233
37280 :224,220,208,243,032,183,246

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37286 :128,169,255,141,182,207,224
37292 :096,253,208,232,162,140,239

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Thinking

(Article on page 138.)

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: Thinking — VIC Version

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1 PRINT"{CLR}{10 DOWN}{7 RIGHT}{BLK}{RVS}
  THINKING{OFF}":G=6:B1=2:B2=17 :rem 253
2 REM PRINT"{DOWN}{8 RIGHT}{RVS}HARDER
  {OFF}":G=9:B1=3:B2=26 :rem 161
3 X=RND(0):FORP=1TO2000:NEXT:GOSUB2001:G$
  =STR$(G):GOTO1005 :rem 55
6 PRINT"{CLR}"SPC(225)"THINKING...."
  :rem 240
7 O=30720:S=36876:V=S+2:POKES,0:POKEV,15:
  POKEV+1,190 :rem 94
10 FORN=1TOG:CH$(N)=0:NEXT:FORN=1TO9:C$(N)
  =0:NEXT:CO=0:Q=0 :rem 110
12 FORN=1TOG :rem 240
13 Z=INT(RND(1)*G)+1:IFCH$(Z)<>0THEN13
  :rem 203
14 CH$(Z)=N:NEXT :rem 196
25 FORB=1TOB1 :rem 20
30 FORN=1TO9 :rem 226
32 Z=INT(RND(1)*9)+1:IFZ$(Z)<>0THEN32
  :rem 142
34 Z$(Z)=N:NEXT :rem 149
36 FORN=1TO9:X=Z$(N):X$=RIGHT$(STR$(X),
  1):P$(B)=P$(B)+X$:NEXT :rem 212
38 FORN=1TO9:Z$(N)=0:NEXT :rem 40
40 NEXTB :rem 229
50 P$=P$(1)+P$(2):IF G=9 THEN P$=P$(1)+P$
  (2)+P$(3) :rem 207
100 PRINT"{CLR}" :rem 245
105 FORN=1TOB2STEP3 :rem 191
110 P$(INT(N/3)+1)=MID$(P$,N,3):NEXT
  :rem 241
112 RESTORE:FORN=1TO9:READSQ$(N):NEXT:GOS
  UB 3000 :rem 37
113 DATA7819,7821,7823,7863,7865,7867,790
  7,7909,7911 :rem 158
114 FORN=1TO9:POKESQ$(N),N+128:POKESQ$(N)
  +0,C$(N):POKES,150+10*N: NEXT:POKES,0
  :rem 183
115 FORN=1TO9:IFC$(N)=4THENCO=CO+1:rem 67
116 NEXT:PRINT"{HOME}{16 DOWN}{PUR}PURPLE
  S:{BLK}"CO :rem 40
117 IF CO=9 THEN 200 :rem 241
118 CO=0:Q=Q+1 :rem 14
130 PRINT"{HOME}{RVS}{RED}TURN"Q :rem 64
132 INPUT"{HOME}{3 DOWN}{BLU}YOUR NUMBER(
  1-6){6 SPACES}{6 LEFT}":SE$ :rem 113
135 SE=VAL(SE$):IF(SE>G)OR(SE<1)THEN132
  :rem 81
136 SE=CH$(SE) :rem 8
140 FORN=1TO3 :rem 14
150 W=VAL(MID$(P$(SE),N,1)) :rem 225
160 IFC$(W)=0THENC$(W)=4:GOTO180 :rem 95

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170 IFC%(W)=4THENC%(W)=0 :rem 84 )=0:NEXT:CO=0:Q=0 :rem 110
180 NEXTN :rem 38 12 FORN=1TOG :rem 240
188 GOTO114 :rem 112 13 Z=INT(RND(1)*G)+1:IFCH%(Z)<>0THEN13 :rem 203
200 REM WIN :rem 100 14 CH%(Z)=N:NEXT :rem 196
205 FORN=1TO50 :rem 66 25 FORB=1TOB1 :rem 20
210 POKES,INT(RND(1)*100)+150:POKEV+1,PEE :rem 226
K(S):NEXT:POKES,0:POKEV+1,204:rem 221 30 FORN=1TO9 :rem 226
215 PRINT"{CLR}"SPC(48)"THAT'S IT!!!!"SPC :rem 90
(115)"YOU TOOK"Q"TURNS." :rem 142
220 PRINT"{3 DOWN}WANT ANOTHER?(Y/N) :rem 149
:rem 39 36 FORN=1TO9:X=Z%(N):X$=RIGHT$(STR$(X)),
225 GETA$:IFA$="Y"THEN6 :rem 75 1):P$(B)=P$(B)+X$:NEXT :rem 212
230 IFA$="N"THENPRINT"{CLR}{BLU}":POKEV+1 :rem 40
,27:CLR:END :rem 230 38 FORN=1TO9:Z%(N)=0:NEXT :rem 229
235 GOTO225 :rem 108 40 NEXTB :rem 229
1000 REM INSTRUCTIONS :rem 90 50 P$=P$(1)+P$(2):IF G=9 THEN P$=P$(1)+P$
1005 PRINT"{CLR}{BLK}YOU WILL SEE 9 BLACK :rem 207
{2 SPACES}{DOWN}BLOCKS. BY ENTERING :rem 134
{SPACE}A :rem 117 100 PRINT"{CLR}":POKESC,15 :rem 134
1010 PRINT"{DOWN}NUMBER BETWEEN 1 AND"G$" :rem 191
{DOWN}YOU CAN CHANGE SOME OF{DOWN}TH :rem 241
EM TO {PUR}PURPLE{BLK}.{DOWN}" :rem 142
:rem 158 112 RESTORE:FORN=1TO9:READSQ%(N):NEXT:GOS
1012 PRINT"{RED}BUT, SOME {PUR}PURPLE :rem 37
{RED} ONES {DOWN}MIGHT TURN BACK TO :rem 59
{3 SPACES}{DOWN} {BLK}BLACK{RED}!" :rem 199
:rem 131 114 FORN=1TO9:POKESQ%(N),N+128:POKESQ%(N)
1015 PRINT"{DOWN}{BLU}EACH NUMBER YOU ENT :rem 19
ER {DOWN}WILL CHANGE THE COLORS :rem 50
{DOWN}IN ITS OWN WAY. :rem 72
1020 GOSUB2000 :rem 5
1025 PRINT"{CLR}TRY TO CHANGE ALL THE :rem 212
{DOWN}BLOCKS TO {PUR}PURPLE{BLU} IN :rem 246
{SPACE}AS{DOWN}FEW TRIES AS YOU CAN. :rem 14
" :rem 64
1030 GOSUB2000:GOTO6 :rem 181
2000 REM GET KEYPRESS :rem 252 135 SE=VAL(SE$):IF(SE>G)OR(SE<1)THEN132
2001 PRINT"{HOME}{22 DOWN}"TAB(9)"{RVS} :rem 81
{BLU}TOUCH A KEY{OFF}"; :rem 8
:rem 109 136 SE=CH$(SE) :rem 14
2002 POKE198,0 :rem 241 140 FORN=1TO3 :rem 14
2005 GETA$:IFA$=""THEN2005 :rem 177 150 W=VAL(MID$(P$(SE),N,1)) :rem 225
2010 RETURN :rem 163 160 IFC%(W)=0THENC%(W)=4:GOTO180 :rem 95
3000 PRINT"{4 DOWN}"TAB(6)"{RED}{A}* :rem 84
[R]*[R]*[S]" :rem 152 170 IFC%(W)=4THENC%(W)=0 :rem 38
3010 PRINTTAB(6)"- - - -" :rem 112
3020 PRINTTAB(6)"[Q]*+*+*[W]" :rem 100
:rem 72
3030 PRINTTAB(6)"- - - -" :rem 105
3040 PRINTTAB(6)"[Q]*+*+*[W]" :rem 74
:rem 107
3050 PRINTTAB(6)"- - - -" :rem 4
3060 PRINTTAB(6)"[Z]*[E]*[E]* :rem 170
[X]" :rem 170
3070 RETURN :rem 170

```

Program 2: Thinking — 64 Version

```

1 PRINT"{CLR}":POKE53281,1:PRINT"
{10 DOWN}"TAB(15)"{BLK}{RVS}THINKING
{OFF}":G=6:B1=2:B2=17 :rem 216
2 REM PRINT"{DOWN}"TAB(16)"{RVS}HARDER
{OFF}":G=9:B1=3:B2=26 :rem 140
3 BO=53280:SC=53281:X=RND(0):FORP=1TO2000
:NEXT:GOSUB2001:G$=STR$(G):GOTO1005 :rem 81
6 PRINT"{CLR}":POKEBO,14:POKESC,13:PRINT"
{10 DOWN}"TAB(14)"{GRN}THINKING....." :rem 154
7 O=54272:FORT=OTOO+24:POKET,0:NEXT:POKEO
+24,15:POKEO+5,17:POKEO+6,167 :rem 71
10 FORN=1TOG:CH%(N)=0:NEXT:FORN=1TO9:C%(N)

```



```

1012 PRINT" {RED}BUT, SOME {PUR}PURPLE          320 FOR J=1TOMX                               :rem 124
      {RED} ONES MIGHT TURN BACK" :rem 148      330 TA=TA+AE(J)                               :rem 73
1014 PRINT"{DOWN}TO {BLK}BLACK{RED}I"         340 NEXTJ                                       :rem 32
      :rem 117                                   399 RETURN                                      :rem 133
1015 PRINT"{2 DOWN} {BLU}EACH NUMBER YOU      400 REM LOAD FILES                             :rem 11
      {SPACE}ENTER WILL CHANGE THE"          410 INPUT"FILE NAME";F$                       :rem 79
      :rem 237                                   420 IFF$="*END"THENGOSUB6000:RETURN
1017 PRINT"{DOWN}COLORS IN ITS OWN WAY."      :rem 160
      :rem 23                                   450 OPEN1,1,0,F$                             :rem 75
1025 PRINT"{2 DOWN} {GRN}TRY TO CHANGE AL    455 PRINT"{RVS}{GRN}FOUND{OFF}{BLK}";F$
      L THE BLOCKS TO {PUR}PURPLE{GRN}      :rem 226
      :rem 172                                   460 INPUT#1,MX                               :rem 79
1030 PRINT"{DOWN}IN AS FEW TRIES AS YOU C    470 FORJ=1TOMX                                 :rem 130
      AN.":GOSUB2000:GOTO6                    :rem 240                                   480 INPUT#1,Y,A$(J),AE(J)                   :rem 126
2000 REM GET KEYPRESS                          :rem 252                                   490 NEXTJ                                       :rem 38
2001 PRINT"{HOME}{23 DOWN}"TAB(14)"{RVS}    495 CLOSE1                                      :rem 73
      {BLU}TOUCH A KEY{OFF}";                :rem 170                                   499 RETURN                                      :rem 134
2002 POKE198,0                                 :rem 241                                   500 REM SORT BY NAME                         :rem 125
2005 GETA$:IFA$=""THEN2005                    :rem 177                                   505 IFMX=1THENGOTO599                       :rem 75
2010 RETURN                                    :rem 163                                   510 PRINT"{2 DOWN}{5 RIGHT}{RVS}SORTING
3000 PRINT"{7 DOWN}"TAB(15)"{WHT}{A}C      {OFF}"
      {R}C{R}C{S}" :rem 237                    520 FORJ=1TOMX-1                             :rem 220
3010 PRINTTAB(15)"B B B B"                    :rem 43                                   530 FORK=J+1TOMX                             :rem 245
3020 PRINTTAB(15)"{Q}C+C+C{W}"              :rem 129
      :rem 45                                   540 IFA$(K)>A$(J)THENGOTO590
3030 PRINTTAB(15)"B B B B"                    :rem 131                                   550 SM$=A$(K):SM=AE(K)                       :rem 213
3040 PRINTTAB(15)"{Q}C+C+C{W}"              :rem 45
      :rem 131                                   560 A$(K)=A$(J):AE(K)=AE(J)                 :rem 147
3050 PRINTTAB(15)"B B B B"                    :rem 47                                   570 A$(J)=SM$:AE(J)=SM                       :rem 213
3060 PRINTTAB(15)"{Z}C{E}C{E}C{X}"          :rem 61
      :rem 170                                   590 NEXTK                                       :rem 40
3070 RETURN                                    :rem 170                                   595 NEXTJ                                       :rem 44
      :rem 135                                   599 RETURN                                      :rem 135
      :rem 187                                   1000 REM DISPLAY                             :rem 187
      :rem 92                                   1010 IF(I<1)OR(I>MX)THENI=1
      :rem 102                                1020 PRINT"{CLR} #TAB(5)"{CYN}EXPENSES
      {BLK}"TAB(16)"{PUR}AMT{BLK}":rem 102
      :rem 252
      :rem 189
      :rem 196
      :rem 24
      :rem 220
      :rem 244
      :rem 82
      :rem 173
      :rem 132
      :rem 123
      :rem 1
      :rem 188
      :rem 89
      :rem 213
      :rem 157
      :rem 226
      :rem 168
      :rem 143
      :rem 25
      :rem 127
      :rem 148
      :rem 186
      :rem 148
      :rem 132
      :rem 99
      :rem 166
      :rem 192
      :rem 167

```

Budget Planner

(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.

```

10 REM DEF VARIABLES                          :rem 173
20 SZ=100:I=-19                              :rem 52
30 R$=CHR$(13):TA=0                          :rem 8
40 DIM A$(SZ),AE(SZ)                         :rem 81
50 DEFFNRN(X)=INT(X*100+.5)/100              :rem 235
200 REM MAINROUTINE                          :rem 193
210 GOSUB6000                                 :rem 217
220 Z$="":GETZ$:IFZ$=""THENGOTO220
      :rem 239
230 IFZ$=CHR$(133)THENI=I+20:GOSUB1000
      :rem 206
235 IFZ$=CHR$(134)THENGOSUB3000              :rem 64
240 IFZ$=CHR$(135)THENGOSUB5000              :rem 63
245 IFZ$=CHR$(136)THENGOSUB7000              :rem 71
250 IFZ$=CHR$(137)THENGOSUB2000              :rem 63
255 IFZ$=CHR$(138)THENGOSUB4000              :rem 71
260 IFZ$=CHR$(139)THENGOSUB6000              :rem 70
265 IFZ$=CHR$(140)THENGOSUB8000              :rem 69
270 IFZ$=CHR$(17)THENI=I-1:GOSUB1000
      :rem 116
275 IFZ$=CHR$(145)THENI=I+1:GOSUB1000
      :rem 169
299 GOTO220                                   :rem 113
300 REM ACCUM TOTALS                         :rem 183
310 TA=0                                       :rem 150

```



```

2999 GOSUB500:GOSUB300:GOSUB6000:RETURN      5125 IFDE>MXTHENDE=MX                        :rem 98
                                                :rem 217
3000 REM UPDATE                               :rem 106
3010 PRINT "{CLR}{BLU}EXPENSE "; "{RVS}UPD   5130 IFDE=>DSTHENGOTO5200                    :rem 34
ATE{OFF}{BLK}"                               :rem 213
                                                5135 PRINT"{2 DOWN}{2 RIGHT}{RVS}{PUR}0 O
3020 INPUT"{DOWN}ITEM # ";PI$                :rem 220
                                                R NUMBER GREATER"
3025 IFPI$="*END"THENGOTO3999                :rem 198
                                                5140 PRINT"{2 DOWN}{2 RIGHT}THAN{OFF}
3026 IF(VAL(PI$)=0)OR(VAL(PI$)<1)THENPRIN   :rem 34
T"{2 DOWN}{4 RIGHT}{PUR}{RVS}INPUT E      :rem 209
RROR{OFF}{BLK}":GOTO3020                    :rem 216
                                                5200 IFDE=0THENDE=DS
3027 P=INT(VAL(PI$))                         :rem 110
                                                5205 TM=DE-DS+1
3030 N$="":EI$=""                             :rem 14
                                                5207 DT=DT+TM
3040 IFP>SZTHENPRINT"MAX EXCEEDED":P=SZ:M   :rem 249
X=P                                           :rem 201
                                                5220 A$(J)="[9 B]":AE(J)=0
3050 IFP>MXTHENMX=P                          :rem 83
                                                5230 NEXTJ
3060 PR$=STR$(AE(P)+.001):PR$=MID$(PR$,2,   :rem 83
(LEN(PR$)-2))
                                                5240 GOTO5010
3065 IFAE(P)=0THENPR$="0.00"                :rem 202
                                                5900 GOSUB500
3070 PRINTP;TAB(4)A$(P)TAB(21-LEN(PR$))PR   :rem 227
$                                              :rem 27
3080 INPUT"{DOWN}ITEM NAME";N$              :rem 141
                                                5999 GOSUB300:GOSUB6000:RETURN
3090 IFN$="*END"THENGOTO3999                :rem 11
6010 PRINT"{CLR}{7 RIGHT}{PUR}OPTIONS:
3100 IFN$<>" THENA$(P)=N$                   :rem 136
                                                {BLK}"
3105 IFLEN(A$(P))>10THENA$(P)=LEFT$(A$(P)  6020 PRINT"{7 RIGHT}{YEL}====={BLK}"
,10)                                          :rem 122
                                                6030 PRINT"{DOWN}{RVS}{PUR}F1{OFF}{BLK}-D
3110 INPUT"AMT ";EI$                         :rem 80
ISPLAY EXPENSES"
3120 IFEI$="*END"THENGOTO3999              :rem 160
                                                6040 PRINT"{DOWN}{RVS}{PUR}F2{OFF}{BLK}-A
3125 IFEI$="GOTO3010                         :rem 183
DD NEW EXPENSES"
3130 IF(VAL(EI$)=0)AND(EI$<>"0")THENPRINT  :rem 63
"{2 DOWN}{3 RIGHT}{RVS}{PUR}INPUT ER
ROR{OFF}{BLK}":GOTO3110                    :rem 58
                                                6050 PRINT"{DOWN}{RVS}{PUR}F3{OFF}{BLK}-U
3135 IFVAL(EI$)=0THENA$(P)=0:GOTO3800      :rem 168
                                                PDATE EXPENSE LIST"
3140 AE(P)=FNRN(VAL(EI$))                   :rem 74
                                                6060 PRINT"{DOWN}{RVS}{PUR}F4{OFF}{BLK}-S
3150 IFAE(P)>9999.99THENA$(P)=9999.99      :rem 21
PTIONS SCREEN"
                                                :rem 21
                                                6090 PRINT"{DOWN}{RVS}{PUR}F7{OFF}{BLK}-L
3800 GOTO3010                                :rem 88
OAD/MERGE FILES"
3999 GOSUB500:GOSUB300:GOSUB6000:RETURN   :rem 93
                                                6100 PRINT"{DOWN}{RVS}{PUR}F8{OFF}{BLK}-E
                                                ND"
4000 REM SAVE FILE                           :rem 251
4010 PRINT"{CLR}{3 RIGHT}SAVE EXPENSE LIS  :rem 193
T"                                           :rem 106
7000 REM LOAD/MERGE
4020 INPUT"{2 DOWN}FILE NAME";F$           :rem 153
7010 PRINT"{CLR}{6 RIGHT}LOAD/MERGE"
4030 IFF$="*END"THENGOSUB6000:RETURN       :rem 199
7020 PRINT"{DOWN}{5 RIGHT}EXPENSE FILES"
4050 OPEN1,1,1,F$                           :rem 124
7030 INPUT"LOAD OR MERGE (L/M)";AN$
4060 PRINT#1,MX                             :rem 214
7040 IFAN$="L"THENMX=0:GOSUB400:GOTO7999
4070 FORJ=1TOMX                             :rem 190
7050 IFAN$="*END"THENGOSUB6000:RETURN
4080 PRINT#1,J;R$;A$(J)R$;AE(J);R$        :rem 31
7060 IFAN$<>"M"GOTO7030
4090 NEXTJ                                   :rem 86
7070 PRINT"{DOWN}{4 RIGHT}MERGE"
4100 CLOSE1                                 :rem 108
7077 INPUT"{DOWN}FILE NAME";F$
4999 GOSUB6000:RETURN                       :rem 63
7080 INPUT"{DOWN}FILE NAME";F$
5000 REM DELETE                             :rem 92
7090 IFF$="*END"THENGOSUB6000:RETURN
5005 DT=0:TM=0                              :rem 23
7120 OPEN1,1,0,F$
5010 PRINT"{CLR}{8 RIGHT}DELETE"           :rem 197
7130 INPUT#1,T1
5020 S1$=""                                  :rem 240
7140 FORT2=1TOT1
5030 INPUT"{2 DOWN}START AT";S1$           :rem 196
7150 INPUT#1,Y,T3$,T4
5040 IFS1$="*END"THENGOTO5900              :rem 184
7160 FORJ=1TOMX
5050 DS=INT(VAL(S1$))                      :rem 182
7170 IFA$(J)=T3$THENA$(J)=INT(((AE(J)+T4
5060 S1$=""                                  :rem 244
/2)*100)/100:T3$=""
5070 IFDS=0THENPRINT"{DOWN}{6 RIGHT}{RVS}  :rem 218
{PUR}INPUT ERROR{OFF}{BLK}":GOTO5020
7180 NEXTJ
5080 S1$=""                                  :rem 246
7190 IFT3$<>" THENMX=MX+1:A$(MX)=T3$:AE(M
5090 INPUT"{2 DOWN}END AT";S1$            :rem 19
X)=T4
5100 IFS1$="*END"THENGOTO5900              :rem 181
7200 NEXT
5110 IFS1$="ORS1$="0"THENDE=0:GOTO5200     :rem 216
7210 CLOSE1
5120 DE=INT(VAL(S1$))                      :rem 166
7999 GOSUB500:GOSUB300:GOSUB6000:RETURN
                                                :rem 222

```



```

8000 REM END OF JOB :rem 243
8010 PRINT"{CLR}[4 RIGHT]END OF PROGRAM
      {2 DOWN}" :rem 71
8020 PRINT"WOULD YOU LIKE TO SAVE (Y/N)":
      INPUT AN$ :rem 190
8030 IFAN$="*END"THENGOSUB6000:RETURN
      :rem 30
8040 IFAN$="N"THENGOTO8060 :rem 19
8050 GOSUB4000 :rem 17
8060 PRINT"{CLR}THANK YOU" :rem 165
8070 PRINT"[13 RIGHT]END" :rem 240
8080 END :rem 167

```

Machine Language For Beginners

(Article on page 154.)

Program 1: VIC Version

```

12288 LDY # 0
12290 LDA # 6
12292 STA 37888 ,Y
12295 STA 38144 ,Y
12298 INY
12299 BNE 12292
12301 LDY # 0
12303 LDA # 224
12305 STA 4096 ,Y
12308 STA 4580 ,Y
12311 INY
12312 CPY # 22
12314 BNE 12305
12316 RTS

```

Program 2: 64 Version

```

49152 LDY # 0
49154 LDA # 8
49156 STA 55296 ,Y
49159 STA 55552 ,Y
49162 STA 55808 ,Y
49165 STA 56064 ,Y
49168 INY
49169 BNE 49156
49171 LDY # 0
49173 LDA # 224
49175 STA 1024 ,Y
49178 STA 1984 ,Y
49181 INY
49182 CPY # 40
49184 BNE 49175
49186 RTS

```

Program 3: Assembler Convenience

```

245 IFMNS$="XX"THENPRINT"TO ADDRESS":INPUT
      DA:SA=DA:GOTO230

```

Program 4: VIC Loader

Remember to POKE 56,48

```

800 FOR ADRES=12288TO12316:READ DATTA:POK
      F ADRES,DATTA:NEXT ADRES
864 DATA 160, 0, 169, 6, 153, 0
870 DATA 148, 153, 0, 149, 200, 208
876 DATA 247, 160, 0, 169, 224, 153
882 DATA 0, 16, 153, 228, 17, 200
888 DATA 192, 22, 208, 245, 96

```

Program 5: 64 Loader

```

800 FOR ADRES=49152TO49186:READ DATTA:POK
      F ADRES,DATTA:NEXT ADRES
864 DATA 160, 0, 169, 8, 153, 0
870 DATA 216, 153, 0, 217, 153, 0
876 DATA 218, 153, 0, 219, 200, 208
882 DATA 241, 160, 0, 169, 224, 153
888 DATA 0, 4, 153, 192, 7, 200
894 DATA 192, 40, 208, 245, 96

```

Disk File Manager

(Article on page 130.)

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.

Disk Manager For VIC And 64

```

3 POKE 49152,10:IF PEEK(49152)<>10 THEN C
  Ø=1:GOTO6 :rem 204
5 CØ=2 :rem 23
6 DIM DOS$(65) :rem 215
7 FR=FRE(Ø):IF FR<Ø THEN FR=FR+65536
      :rem 7
8 S=(FR-400)/2:M2=INT(S/256)+1 :rem 128
9 DIM TEMP$(S) :rem 18
10 PRINT"{CLR}";
15 PRINT"{2 SPACES}*****"
      :rem 43
20 PRINT"{2 SPACES}*{2 SPACES}DISK MANAGE
  R{2 SPACES}*" :rem 173
25 PRINT"{2 SPACES}*****"
      :rem 44
50 PRINT:PRINT"1.DISK DIRECTORY" :rem 60
60 PRINT"2.FORMAT NEW DISK" :rem 117
70 PRINT"3.INITIALIZE DISK" :rem 182
80 PRINT"4.COPY FILE ON SAME DISK"
      :rem 228
85 PRINT"5.COPY FILE ON NEW (FORMATTED) D
  ISK" :rem 165
88 PRINT"6.COPY BOTH DOS WEDGE PROGRAMS"
      :rem 202
90 PRINT"7.RENAME FILE" :rem 119
100 PRINT"8.ERASE FILE(S)" :rem 252
110 PRINT"9.VALIDATE FILES" :rem 135
120 PRINT"10.WRITE DISK MANAGER" :rem 164
130 PRINT"11.ERROR STATUS" :rem 99
140 PRINT"12.EXIT TO BASIC":PRINT:rem 253
170 INPUT"CHOICE{4 SPACES}{4 LEFT}";CHOIC
  E :rem 113
180 IF (CHOICE<1)OR(CHOICE>12)THEN PRINT"
  {UP}";:GOTO 170 :rem 166
200 ON CHOICE GOSUB 250,300,350,400,800,1
  200,450,500,550,600,650,700 :rem 127
210 GOTO 10 :rem 45
250 REM *** DISPLAY DIRECTORY *** :rem 66
251 PRINT"{CLR}" :rem 252
252 OPEN 1,8,Ø,"$" :rem 80
253 GET #1,A$,B$ :rem 241
254 GET#1,A$,B$ :rem 242
256 GET #1,A$,B$ :rem 244
258 C=Ø:IF A$<>" "THEN C=ASC(A$) :rem 119
260 IF B$<>" "THEN C=C+ASC(B$)*256
      :rem 189

```



```

262 PRINT MID$(STR$(C),2);TAB(3); :rem 86
264 GET #1,B$:IF ST<>0 THEN 282 :rem 71
266 IF B$<> CHR$(34) THEN 264 :rem 145
268 GET #1,B$:IF B$<> CHR$(34) THEN PRINT
    B$;:GOTO 268 :rem 56
270 GET #1,B$:IF B$= CHR$(32) THEN 270
    :rem 74
272 PRINT TAB(18);:C$="" :rem 22
274 C$=C$+B$:GET #1,B$:IF B$<>"" THEN 274
    :rem 242
276 PRINT LEFT$(C$,3) :rem 146
280 IF ST=0 THEN 254 :rem 7
282 PRINT " BLOCKS FREE " :rem 77
284 CLOSE 1:PRINT:PRINT:PRINT"HIT ANY KEY
    TO RETURN" :rem 23
290 GET X$:IFX$=""THEN 290 :rem 135
295 RETURN :rem 128
300 REM *** FORMAT (NEW) DISK ***:rem 162
301 PRINT "{CLR}" :rem 248
305 PRINT "INSERT DISK TO BE":PRINT"FORMAT
    TED.":PRINT :rem 57
310 PRINT "INPUT DISK NAME":INPUT DISK$
    :rem 90
320 PRINT:PRINT"INPUT EXTENDER NAME":INPU
    T EXT$ :rem 28
325 MACRO$="N0:"+DISK$+",""+EXT$ :rem 190
330 OPEN 15,8,15,MACRO$ :rem 230
340 CLOSE 15:MACRO$="" :RETURN :rem 222
350 REM *** INITIALIZE DISK *** :rem 149
355 PRINT "{CLR}" :rem 1
360 PRINT "INSERT DISK TO BE":PRINT"INITIA
    LIZED.":PRINT :rem 202
370 PRINT "HIT <RETURN> TO":PRINT"INITIALI
    ZE":INPUT X$ :rem 144
380 OPEN 15,8,15,"I" :rem 226
390 CLOSE 15:RETURN :rem 146
400 REM *** COPY FILE ON SAME DISK ***
    :rem 189
405 PRINT "{CLR}":PRINT:PRINT :rem 139
410 PRINT "INPUT SOURCE FILE NAME":INPUT D
    ISK$ :rem 33
420 PRINT:PRINT"INPUT NEW FILE NAME":INPU
    T NWS$ :rem 207
425 MACRO$="C:"+NWS$+"="+DISK$ :rem 156
430 OPEN 15,8,15,MACRO$ :rem 231
440 CLOSE 15:MACRO$="" :RETURN :rem 223
450 REM *** RENAME FILE *** :rem 81
455 PRINT "{CLR}":PRINT :rem 201
460 PRINT "INPUT OLD FILE NAME":INPUT DISK
    $ :rem 52
470 PRINT:PRINT"INPUT NEW FILE NAME":INPU
    T NWS$ :rem 212
475 MACRO$="R:"+NWS$+"="+DISK$ :rem 176
480 OPEN 15,8,15,MACRO$ :rem 236
490 CLOSE 15:MACRO$="" :RETURN :rem 228
500 REM *** ERASE FILE *** :rem 5
505 PRINT "{CLR}":PRINT:PRINT :rem 140
510 PRINT "INPUT FILE NAME(S) TO DELETE":I
    NPUT DISK$ :rem 75
520 PRINT:PRINT:PRINT"HIT ANY KEY TO DELE
    TE" :rem 2
525 GET X$:IF X$="" THEN 525 :rem 137
530 MACRO$="S0:"+DISK$ :rem 230
535 OPEN 15,8,15,MACRO$ :rem 237
540 CLOSE 15:MACRO$="" :RETURN :rem 224
550 REM *** VALIDATE FILES *** :rem 55
555 PRINT "{CLR}":PRINT:PRINT :rem 145
560 PRINT "WARNING:OPEN FILES ":PRINT"WILL
    BE DELETED" :rem 34
570 PRINT:PRINT:PRINT"HIT ANY KEY TO VALI
    DATE" :rem 158
575 GET X$:IF X$="" THEN 575 :rem 147
580 OPEN 1,8,15,"V" :rem 188
590 CLOSE 1:RETURN :rem 95
600 REM ** WRITE DISKMANAGER PROGRAM **
    :rem 235
605 PRINT "{CLR}":PRINT:PRINT :rem 141
610 PRINT "INSERT DISK TO BE WRITTEN TO.":
    PRINT :rem 87
620 PRINT:PRINT:PRINT"HIT ANY KEY TO WRIT
    E DISK MANAGER" :rem 1
622 GET X$:IF X$="" THEN 622 :rem 133
625 OPEN 1,8,15 :rem 246
630 SAVE "@0:DISKMANAGER",8 :rem 64
635 CLOSE 1 :rem 69
640 RETURN :rem 122
650 REM *** DISPLAY ERROR STATUS ***
    :rem 255
655 OPEN 15,8,15 :rem 46
660 INPUT #15,A$,B$,C$,D$ :rem 255
670 PRINT "{CLR}":PRINT:PRINT :rem 143
680 PRINT "ERROR STATUS:{2 SPACES}"B$:PRIN
    T:PRINT "ERROR NUMBER:{2 SPACES}"A$
    :rem 65
690 PRINT:PRINT:PRINT"HIT ANY KEY TO RETU
    RN" :rem 55
695 GET X$:IF X$=""THEN 695 :rem 153
697 CLOSE 15:RETURN :rem 156
700 REM *** RETURN TO BASIC *** :rem 92
705 PRINT "{CLR}":PRINT:PRINT :rem 142
710 PRINT "NOTE:DISKMANAGER PROGRAM IS ST
    ILL RESIDENT" :rem 153
720 END :rem 112
800 REM *** COPY FILE ON NEW DISK ***
    :rem 133
801 PRINT "{CLR}" :rem 253
802 CLOSE 15 :rem 118
803 MAX=INT(S/256) :rem 25
804 PRINT "{2 SPACES}MAXIMUM SIZE OF FILE
    WHICH CAN BE COPIED IS "MAX" BLOCKS"
    :PRINT :rem 70
806 IF MAX>=M2 THEN GOTO 809 :rem 22
807 PRINT "{2 SPACES}FOR MAXIMUM COPY SIZ
    E OF "M2" BLOCKS,"; :rem 104
808 PRINT "TURN COMPUTER OFF/ON AND RELOA
    D PROG." :rem 192
809 PRINT:PRINT "{2 SPACES}READ/WRITE RATE
    IS APPROXIMATELY 6 BLOCKS/MINUTE"
    :rem 187
810 PRINT:PRINT "INPUT NAME OF FILE TO BE
    COPIED" :rem 117
820 INPUT FILE$ :rem 110
830 PRINT:PRINT "{3 SPACES}INPUT FILE TYP
    E:" :rem 95
840 PRINT "{5 SPACES}P PROGRAM" :rem 213
850 PRINT "{5 SPACES}S SEQUENTIAL"
    :rem 188
860 PRINT "{5 SPACES}U USER" :rem 3
870 PRINT "{5 SPACES}R RELATIVE" :rem 30
880 INPUT TYPE$ :rem 150
890 PRINT:PRINT "INSERT SOURCE DISK AND P
    RESS <RETURN>" :rem 196
900 GET W$:IF W$="" THEN GOTO 900:rem 186
910 GOSUB 1000:REM READ FILE INTO TEMP
    :rem 165
920 PRINT:PRINT "INSERT DESTINATION DISK
    {SPACE}AND PRESS <RET>" :rem 58
930 GET W$:IF W$="" THEN GOTO 930:rem 192
940 GOSUB 1050:REM WRITE FILE FROM TEMP$
    :rem 58
950 PRINT:PRINT "MAKE ANOTHER COPY";:INPU
    T W$ :rem 32

```



```

960 IF LEFT$(W$,1)="Y" THEN GOTO 920
:rem 131
970 GOTO 1100 :rem 155
980 REM - CHECK FOR GOOD OPEN :rem 82
985 INPUT#15,A$,B$,C$,D$ :rem 9
990 IF VAL(A$)=0 THEN RETURN :rem 70
995 PRINT A$,B$,C$,D$:CLOSE 15:STOP
:rem 232
1000 REM - READ FILE INTO TEMP% :rem 163
1002 I=1 :rem 122
1004 OPEN 15,8,15 :rem 83
1006 OPEN 5,8,5,"0:"+FILE$+", "+TYPE$+",R"
:rem 85
1008 GOSUB 980 :rem 234
1009 PRINT "{5 SPACES}NOW READING . . ."
:rem 19
1010 GET#5,A$ :rem 139
1012 TEMP%(I)=ASC(A$+CHR$(0)) :rem 48
1014 I=I+1 :rem 241
1016 IF ST=0 THEN 1010 :rem 92
1018 PRINT:PRINT "FILE=? ";FILE$,"ST=";ST,
"BYTES=";I:CLOSE 5:CLOSE 15 :rem 39
1020 RETURN :rem 163
1050 REM - WRITE FILE FROM TEMP% :rem 17
1052 OPEN 15,8,15 :rem 86
1054 OPEN 5,8,5,"0:"+FILE$+", "+TYPE$+",W"
:rem 93
1056 GOSUB 980 :rem 237
1057 PRINT "{5 SPACES}NOW WRITING . . ."
:rem 64
1058 J=1 :rem 134
1060 PRINT#5,CHR$(TEMP%(J)); :rem 91
1062 J=J+1 :rem 246
1064 IF J<I THEN 1060 :rem 31
1066 PRINT:PRINT "FILE=";FILE$,"BYTES=";
J:CLOSE 5:CLOSE 15 :rem 245
1068 RETURN :rem 175
1100 RETURN :rem 162
1200 REM ***COPY BOTH DOS PROGRAMS ***
:rem 92
1205 PRINT "{CLR}":PRINT "INSERT SOURCE D
ISK WITH WEDGE AND/OR DOS"; :rem 116
1210 PRINT " PROGRAM(S) AND PRESS <RETURN
>" :rem 11
1215 GET W$:IF W$="" THEN GOTO 1215
:rem 26
1218 TYPE$="P" :rem 3
1219 IF C0=1 THEN FILE$="VIC-20 WEDGE":GO
TO 1235 :rem 76
1220 FILE$="C-64 WEDGE":GOSUB 1000:rem 75
1225 FOR C=1 TO 64:DOS%(C)=TEMP%(C):NEXT
{SPACE}C:REM MOVE C-64 WEDGE TO SMAL
L BUFFER :rem 161
1230 FILE$="DOS 5.1" :rem 5
1235 GOSUB 1000:PRINT "INSERT DESTI
NATION DISK AND PRESS <RET>":rem 229
1240 GET W$:IF W$="" THEN GOTO 1240
:rem 22
1245 GOSUB 1050:IF C0=1 THEN RETURN
:rem 203
1250 FOR C=1 TO 64:TEMP%(C)=DOS%(C):NEXT
{SPACE}C :rem 46
1255 FILE$="C-64 WEDGE":I=64:GOSUB 1050:R
EM WRITE C-64 WEDGE :rem 113
1290 RETURN :rem 172

```

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: Spelling Bee For VIC-20

```

1 POKE36879,30:PRINT "{BLK}":REM WHITE SCR
EEN BLACK LETTERS :rem 122
2 DIML$(75) :rem 57
3 ::::REM SPELLING BEE :rem 41
4 PRINT "{CLR}"TAB(9)"{BLK}IU{YEL}":rem 9
5 PRINTTAB(8)"U**I" :rem 132
10 PRINTTAB(8)"_{BLK}WW{YEL}-" :rem 40
15 PRINTTAB(8)"_{BLK}JK{YEL}-" :rem 20
20 PRINTTAB(8)"J[S][A]K" :rem 134
25 PRINTTAB(7)"U*[X][Z]*I" :rem 31
30 PRINTTAB(6)"N-{BLK}{RVS}{4 SPACES}
{OFF}{YEL}-M" :rem 185
35 PRINTTAB(5)"N_{4 SPACES}-M" :rem 235
40 PRINTTAB(4)"N{2 SPACES}-{BLK}{RVS}
{4 SPACES}{OFF}{YEL}-{2 SPACES}M"
:rem 184
45 PRINTTAB(3)"N{2 SPACES}N_{4 SPACES}-M
{2 SPACES}M" :rem 133
50 PRINTTAB(3)"M N_{BLK}{RVS}{4 SPACES}
{OFF}{YEL}-M N" :rem 83
55 PRINTTAB(4)"[T]{2 SPACES}J*[2 R]
*K{2 SPACES}[T]" :rem 86
110 PRINT "{BLK}{3 DOWN}HELLO! MY NAME IS"
:rem 30
113 PRINT "{DOWN}{YEL}SPELLING BEE{BLK}."
:rem 253
115 PRINT "{DOWN}WHAT IS YOUR NAME? ":PRIN
T:GOSUB1630 :rem 67
120 PRINT "{CLR}{5 DOWN}{4 RIGHT}WOULD YOU
LIKE" :rem 109
122 PRINT "{DOWN}{5 RIGHT}INSTRUCTIONS"
:rem 189
123 PRINT "{DOWN}{7 RIGHT}(Y OR N)?"
:rem 27
125 GETA$:IFA$=""THEN125 :rem 83
130 IFA$="Y"THEN700 :rem 40
135 IFA$="N"THEN320 :rem 32
140 PRINT "{DOWN}YES OR NO ONLY PLEASE":FO
RT=1TO1500:NEXTT:GOTO120 :rem 193
143 : :rem 210
145 REM SPELL AND FLASH WORD :rem 123
147 : :rem 214
150 GOSUB1800:PRINT "{CLR}{BLK}{DOWN}THAT
{SPACE}IS INCORRECT." :rem 194
160 PRINT "{DOWN}THE CORRECT SPELLING"
:rem 202
170 PRINT "{DOWN}IS:{RED}":FORT=1TO2000:NE
XTT :rem 129
180 A$="{CLR}{RED}{9 DOWN}{6 RIGHT}":PRIN
TA$: :rem 220
190 FORI=1TOLEN(L$(L)):PRINTMID$(L$(L),I,
1):FORJ=1TO500:NEXTJ,I :rem 145
200 FORR=1TO20:PRINT "{CLR}";A$;"{RVS}";L$
(L);"{OFF}":FORI=1TO15:NEXTI:PRINT"
{CLR}";A$;L$(L) :rem 143
210 FORI=1TO15:NEXTI:NEXTR :rem 199
211 IFL$(L)=L$(25)THEN360:REM CATCH 3RD M
ISTAKE ON LAST EASY WORD :rem 244
212 IFL$(L)=L$(50)THEN360:REM CATCH 3RD M
ISTAKE ON LAST MEDIUM WORD :rem 130

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Spelling Bee

(Article on page 124.)


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213 IFL$(L)=L$(75)THEN360:REM CATCH 3RD M           :rem 174
    ISTAKE ON LAST HARD WORD           :rem 232
215 PRINT"{CLR}{10 DOWN}{2 RIGHT}HERE, TR        :rem 231
    Y ANOTHER.":FORT=1TO2000:NEXTT      :rem 97
                                           :rem 131
220 RETURN                                     :rem 116
222 :                                         :rem 208
225 :REM WORDS                               :rem 70
227 :                                         :rem 213
230 DATACAT, DOG, ANT, AND, ANY, AN, AM, CAN, CAP :rem 95
    , TOP, STOP, POT, TAP, PAT, CAR, CART, ART
240 DATAHAND, HAT, FOOT, BOOK, FLY, SKY, SAW, SE :rem 233
    E
250 DATASNAKE, SNACK, BOAT, MANY, LOOSE, LOSE,    :rem 169
    CHOOSE, CHOSE, CHASE, CHEESE, STOVE, STORE
                                           :rem 233
260 DATASTEAL, STAIRS, WHOLE, SCREW, WASHER, H   :rem 17
    ORSE, STEER, STONE, PLANT, RADIO, COUCH
                                           :rem 115
270 DATACHAIR, TABLE                       :rem 174
280 DATASTEREO, STATION, TELEVISION, CUSHION    :rem 68
    , CAUTION, FREEZER, WEATHER, WHETHER
290 DATAWHOEVER, HAMMOCK, COMMITTEE, COMPUTE   :rem 67
    R, LICENSE, MONITOR, DICTIONARY, RECEIVE
300 DATARECORD, SPEAKER, CURTAIN, PILLOW, WAT    :rem 240
    ERBED, WINDOW, THEATER, PIANO, LIVER
                                           :rem 206
310 :                                         :rem 185
313 :REM NO INSTRUCTIONS REQUESTED          :rem 211
                                           :rem 211
315 :                                         :rem 211
320 PRINT"{CLR}{4 DOWN}GREAT, ";NA$;".":P      :rem 104
    RINT"{4 DOWN}{6 RIGHT}LET'S GO!"
                                           :rem 27
330 PRINT:PRINT"{DOWN}{RIGHT}(PRESS {RVS}      :rem 159
    SPACE{OFF} BAR TO)"
                                           :rem 194
335 PRINT"{DOWN}{5 RIGHT}(CONTINUE.)"         :rem 36
                                           :rem 242
340 GETA$:IFA$<>" "THEN340                   :rem 142
350 GOTO990                                    :rem 115
355 :                                         :rem 215
360 PRINT"{CLR}{5}{5 DOWN}WASN'T THAT F        :rem 101
    UN?":GOTO1735
                                           :rem 58
365 :                                         :rem 216
685 :                                         :rem 221
690 :REM INSTRUCTIONS                       :rem 114
695 :                                         :rem 222
700 PRINT"{CLR}{4 DOWN}GREAT! NOW, ";NA$;      :rem 156
    ",":PRINT"{DOWN}ALL YOU HAVE TO DO"
                                           :rem 216
710 PRINT"{DOWN}IS FOLLOW THESE SIMPLE"        :rem 46
                                           :rem 44
715 PRINT"DIRECTIONS."                       :rem 144
720 PRINT"{4 DOWN}(PRESS THE {RVS}SPACE       :rem 82
    {OFF} BAR)"
725 PRINT"{DOWN}{3 RIGHT}(TO CONTINUE.)"      :rem 94
                                           :rem 148
730 GETA$:IFA$<>" "THEN730                   :rem 137
740 PRINT"{CLR}FIRST, THE ALPHABET, A"
                                           :rem 66
742 PRINT"{DOWN}RETURN ARROW (<), AND"
                                           :rem 153
745 PRINT"{DOWN}A {RED}RED V{BLK} WILL BE     :rem 136
    PLACED"
750 PRINT"ON THE LOWER HALF OF"              :rem 36
755 PRINT"{DOWN}THE SCREEN WITH A"
                                           :rem 161
760 PRINT"{DOWN}POINTER (↑) UNDER THE"
                                           :rem 174
765 PRINT"{DOWN}{RED}RED V{BLK}.
    {2 SPACES}THEN, A WORD"
                                           :rem 231
770 PRINT"{DOWN}WILL BE FLASHED ONTO":PRI      :rem 97
    NT"{DOWN}THE SCREEN."
775 PRINT"{2 DOWN}(PRESS THE {RVS}SPACE
    {OFF} BAR)"
                                           :rem 58
780 PRINT"{DOWN}{3 RIGHT}(TO CONTINUE.)"
                                           :rem 95
785 GETA$:IFA$<>" "THEN785                   :rem 168
790 PRINT"{CLR}{DOWN}USING A JOYSTICK, TY
    PE"
                                           :rem 186
795 PRINT"THE WORD BY PLACING"
800 PRINT"{DOWN}THE POINTER (↑) UNDER"
                                           :rem 169
810 PRINT"{DOWN}THE CORRECT LETTER AND"
                                           :rem 17
820 PRINT"PRESSING THE {RVS}FIRE{OFF}":PR
    INT"{DOWN}BUTTON."
                                           :rem 167
830 PRINT"{DOWN}WHEN THE WORD HAS BEEN"
                                           :rem 194
840 PRINT"SPELLED CORRECTLY,"
841 PRINT"{2 DOWN}(PRESS THE {RVS}SPACE
    {OFF} BAR)"
                                           :rem 52
842 PRINT"{DOWN}{3 RIGHT}(TO CONTINUE.)"
                                           :rem 94
843 GETA$:IFA$<>" "THEN843                   :rem 158
845 PRINT"{CLR}{DOWN}PLACE THE POINTER (↑
    )"
                                           :rem 44
850 PRINT"{DOWN}UNDER RETURN (<) AND"
                                           :rem 96
855 PRINT"{DOWN}PRESS THE {RVS}FIRE{OFF}
    {SPACE}BUTTON."
                                           :rem 198
860 PRINT"IF YOU MAKE A MISTAKE"
865 PRINT"{DOWN}BEFORE YOU FINISH, PUT"
                                           :rem 27
870 PRINT"THE POINTER (↑) UNDER"
875 PRINT"{DOWN}THE {RED}RED V{BLK} AND P
    RESS"
                                           :rem 36
880 PRINT"{DOWN}THE {RVS}FIRE{OFF} BUTTON
    ."
                                           :rem 55
883 PRINT"{3 DOWN}(PRESS THE {RVS}SPACE
    {OFF} BAR)"
                                           :rem 75
885 PRINT"{DOWN}{3 RIGHT}(TO CONTINUE.)"
                                           :rem 101
890 GETA$:IFA$<>" "THEN890                   :rem 162
895 PRINT"{CLR}YOU WILL THEN BE ABLE"
                                           :rem 9
898 PRINT"{DOWN}TO RE-SPELL THE WORD"
                                           :rem 143
900 PRINT"{DOWN}WITH NO PENALTY.
    {2 SPACES}YOU"
                                           :rem 156
903 PRINT"{DOWN}WILL BE GIVEN THREE"
                                           :rem 46
905 PRINT"{DOWN}CHANCES TO GET IT"
                                           :rem 149
908 PRINT"{DOWN}RIGHT.{2 SPACES}IF YOU HA
    VEN'T"
                                           :rem 168
910 PRINT"GOTTEN IT RIGHT BY"
913 PRINT"{DOWN}THEN, I WILL TELL YOU"
                                           :rem 137
915 PRINT"{DOWN}THE CORRECT SPELLING."
918 PRINT"{2 DOWN}(PRESS THE {RVS}SPACE
    {OFF} BAR)"
                                           :rem 57
920 PRINT"{DOWN}{3 RIGHT}(TO CONTINUE.)"
                                           :rem 91
923 GETA$:IFA$<>" "THEN923                   :rem 156
925 PRINT"{CLR}{DOWN}YOU WILL START WITH
    {SPACE}A"
                                           :rem 85
930 PRINT"{DOWN}SCORE OF 75 AND ONE"
                                           :rem 176

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935 PRINT"[DOWN]POINT WILL BE DEDUCTED"      1260 IFN=3THENGOSUB150:NEXTX      :rem 44
      :rem 14
940 PRINT"EACH TIME YOU MISSPELL"           :rem 20
945 PRINT"A WORD."                          :rem 30
950 PRINT"[2 DOWN]EASY, HUH?"              :rem 19
955 PRINT"[4 DOWN](PRESS THE {RVS}SPACE     1280 S=S+1                          :rem 10
      {OFF} BAR)"                          :rem 92
960 PRINT"[DOWN]{3 RIGHT}(TO CONTINUE.)"    1290 NEXTN                          :rem 89
      :rem 95
965 GETA$:IFA$<>" THEN965                  :rem 168
990 S=0:L=0:PRINT"{CLR}{DOWN}HOW HARD WOU  1300 GOSUB1810:PRINT"{RED}{5 DOWN}
      LD YOU"                              :rem 153
995 PRINT"[DOWN]LIKE YOUR WORDS,{DOWN}"    1305 PRINT"{7 RIGHT}ANOTHER.{BLK}":FORY=1
      :rem 201
1000 PRINTNA$;"?"                          :rem 191
1010 PRINTTAB(7)"{2 DOWN}{RED}1) EASY"     1310 NEXTX                          :rem 92
      :rem 188
1020 PRINTTAB(7)"{DOWN}{RED}2) MEDIUM"     1320 FORHT=1TO5:GOSUB1810:NEXTHT:PRINT"
      :rem 60
1030 PRINTTAB(7)"{DOWN}{RED}3) HARD{BLK}"  1330 NEXTX                          :rem 92
      :PRINT                               :rem 243
1040 PRINT"[2 DOWN]{5 RIGHT}('Q' TO QUIT)  1340 FORHT=1TO5:GOSUB1810:NEXTHT:PRINT"
      "                                     :rem 31
1060 GETA$:IFA$="" THEN1060                :rem 177
1070 IFA$="1" THENPRINT"{CLR}":FORX=1TO25:  1350 NEXTX                          :rem 92
      GOTO1130:REM EASY                    :rem 122
1080 IFA$="2" THENPRINT"{CLR}":FORX=26TO50  1360 FORHT=1TO5:GOSUB1810:NEXTHT:PRINT"
      :GOTO1130:REM MEDIUM                :rem 64
1090 IFA$="3" THENPRINT"{CLR}":FORX=51TO75  1370 NEXTX                          :rem 92
      :GOTO1130:REM HARD                  :rem 165
1100 IFA$="Q" THEN1735                      :rem 135
1110 PRINT"PLEASE TRY AGAIN, ";NA$; "." :PR  1380 RETURN                          :rem 172
      INT"YOU PRESSED ";A$:FORX=1TO2000:NEX  1385 REM PRINT ALPHABET AND POINTER
      TX:GOTO990                           :rem 100
1130 RESTORE:FORL=1TO75                    :rem 211
1133 :                                       :rem 2
1135 :REM READ THE WORDS                   :rem 116
1138 :                                       :rem 7
1140 READL$(L)                             :rem 239
1150 IFL=X THEN1170                        :rem 47
1160 NEXT                                   :rem 7
1170 FORN=1TO3:REM MISTAKE COUNTER         :rem 142
      :rem 142
1180 LL=(22-LEN(L$(L)))/2:PRINT"{CLR}
      {GRN}{10 DOWN}";TAB(LL);L$(L):FORY=1  1260 IFN=3THENGOSUB150:NEXTX      :rem 44
      TO2000:NEXTY                          :rem 231
1182 Z=L                                    :rem 175
1183 IFL>25 THENZ=L-25:IFL>50 THENZ=L-50
      :rem 79
1185 PRINT"{CLR}{PUR}WORD NUMBER:";Z:PRIN  1270 GOSUB1800:PRINT"[5 DOWN]TRY AGAIN, "
      T"{DOWN}SCORE:";75-S                 :rem 156
1190 PRINT"{RED}{2 DOWN}NOW SPELL IT, ";N   ;NA$:PRINT"THAT'S INCORRECT.":FORY=1
      A$; ".{BLK}"                          :rem 66
1200 PRINT"{DOWN}('END' AND '{RED}<{BLK}
      ' TO GO)"                             :rem 128
1203 PRINT"(ON TO HARDER WORDS )":rem 109
1205 PRINT>('Q' AND '{RED}<{BLK}' TO QUI  1280 S=S+1                          :rem 10
      T)"                                     :rem 155
1210 GOSUB1390:PRINTCHR$(13):IFD$="END"TH  1290 NEXTN                          :rem 89
      EN990                                  :rem 232
1220 IFD$="Q" THEN1735                      :rem 141
1230 IFD$="" THEN1260:REM CATCHES CARRIAGE  1300 GOSUB1810:PRINT"{RED}{5 DOWN}
      RETURN WITH EMPTY SET                :rem 36
1240 IFD$=L$(25) THEN1320:REM LAST EASY W  1305 PRINT"{7 RIGHT}ANOTHER.{BLK}":FORY=1
      RD                                    :rem 216
1241 IFD$=L$(50) THEN1320:REM LAST MEDIUM  1310 NEXTX                          :rem 92
      {SPACE}WORD                          :rem 102
1242 IFD$=L$(75) THEN1320:REM LAST HARD W  1320 FORHT=1TO5:GOSUB1810:NEXTHT:PRINT"
      RD                                    :rem 204
1250 IFD$=L$(L) THEN1300                   :rem 252
      :rem 252
1260 IFN=3THENGOSUB150:NEXTX              :rem 44
1270 GOSUB1800:PRINT"[5 DOWN]TRY AGAIN, "  1270 GOSUB1800:PRINT"[5 DOWN]TRY AGAIN, "
      ;NA$:PRINT"THAT'S INCORRECT.":FORY=1  ;NA$:PRINT"THAT'S INCORRECT.":FORY=1
      TO3000:NEXTY                          :rem 153
1280 S=S+1                                  :rem 10
1290 NEXTN                                  :rem 89
1300 GOSUB1810:PRINT"{RED}{5 DOWN}
      {3 RIGHT}CORRECT! NOW TRY"          :rem 7
1305 PRINT"{7 RIGHT}ANOTHER.{BLK}":FORY=1  1305 PRINT"{7 RIGHT}ANOTHER.{BLK}":FORY=1
      TO2000:NEXTY                          :rem 83
1310 NEXTX                                  :rem 92
1320 FORHT=1TO5:GOSUB1810:NEXTHT:PRINT"
      {3}{6 DOWN}CORRECT!{5}":FORT=1TO    :rem 27
      2000:NEXTT:GOTO360                    :rem 27
1380 RETURN                                  :rem 172
1385 REM PRINT ALPHABET AND POINTER        :rem 119
      :rem 119
1390 PRINT:PRINTTAB(7):D$="" :SC=4409:CO=S  1390 PRINT:PRINTTAB(7):D$="" :SC=4409:CO=S
      C+33792:CN=1                          :rem 140
1400 POKESC,CN:POKECO,5                    :rem 163
1410 SC=SC+1:CO=CO+1:CN=CN+1:IFSC=4422THE  1400 POKESC,CN:POKECO,5                    :rem 163
      NSC=4452:CO=SC+33792                :rem 130
1415 IFSC=4465 THEN1430                    :rem 247
1420 GOTO1400                               :rem 197
1430 POKESC,31:POKECO,2:POKESC-57,86:POKE  1410 SC=SC+1:CO=CO+1:CN=CN+1:IFSC=4422THE
      CO-57,2                               :rem 154
1440 S1=4430                                :rem 85
1450 IFS1<4430 THENS1=4487:REM MOVE POINTE  1415 IFSC=4465 THEN1430                    :rem 247
      R TO LEFT ARROW SYMBOL                :rem 80
1455 IFS1=4444 THENS1=4474                 :rem 178
1460 IFS1=4473 THENS1=4443                 :rem 172
1465 IFS1>4487 THENS1=4430:REM MOVE POINTE  1420 GOTO1400                               :rem 197
      R TO LETTER A                          :rem 221
1470 C1=S1+33792                           :rem 52
1480 POKES1,30:POKEC1,2                    :rem 74
1490 GOSUB1540                              :rem 24
1500 IFJV=8 THENS1=S1+1:C1=C1+1:POKES1-1,3  1430 POKESC,31:POKECO,2:POKESC-57,86:POKE
      2:FORT=1TO25:NEXTT:REM MOVE RIGHT     :rem 94
1510 IFJV=4 THENS1=S1-1:C1=C1-1:POKES1+1,3  1440 S1=4430                                :rem 85
      2:FORT=1TO25:NEXTT:REM MOVE LEFT     :rem 10
1520 IFJV=FR THENGOSUB1570:IFB$=CHR$(13)TH  1450 IFS1<4430 THENS1=4487:REM MOVE POINTE
      ENPRINT"{BLK}":RETURN                :rem 20
1530 GOTO1450                               :rem 204
1533 :                                       :rem 6
1535 :REM READ JOYSTICK                     :rem 120
1538 :                                       :rem 11
1540 POKE37154,127:REM DISABLE KEYBOARD    :rem 38
      :rem 38
1542 EW=PEEK(37152)AND128:POKE37154,255:R  1455 IFS1=4444 THENS1=4474                 :rem 178
      EM ENABLE KEYBOARD                    :rem 214
1545 WE=PEEK(37151)AND16:FB=PEEK(37151)AN  1460 IFS1=4473 THENS1=4443                 :rem 172
      D32                                    :rem 7
1548 JV=0:FR=16:IF WE=0 THEN JV=4          :rem 103
1550 IF EW=0 THEN JV=8                     :rem 167
1553 IF FB=0 THEN FR=0                     :rem 134
1560 RETURN                                  :rem 172
1570 H=PEEK(S1-22)                          :rem 221
1580 GETB$                                  :rem 20
1590 B$=CHR$(H+64)                          :rem 161
1600 IFS1=4430 THENPRINT"{CLR}{8 DOWN}":GO  1465 IFS1>4487 THENS1=4430:REM MOVE POINTE
      TO1390:REM START SAME WORD AGAIN WIT  R TO LETTER A                          :rem 221
      H NO PENALTY                          :rem 161
1605 IFB$="<" THENB$=CHR$(13):RETURN      1470 C1=S1+33792                           :rem 52
      :rem 67
1610 PRINT"{GRN}";TAB(LL);B$;              :rem 142
1620 D$=D$+B$:FORT=1TO180:NEXTT:RETURN    1480 POKES1,30:POKEC1,2                    :rem 74
      :rem 109
1624 :                                       :rem 7

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1625 REM NAME INPUT :rem 99 {SPACE}SPELLING BEE." :rem 126
1626 : :rem 9 115 PRINT"{DOWN}WHAT IS YOUR NAME? ";:GOS
1630 NAŞ="" :rem 254 UB1630 :rem 183
1635 PRINT"[@]{LEFT}"; :rem 28 120 PRINT"{CLR}{5 DOWN}{RIGHT}WOULD YOU L
1640 GETNŞ:IFNŞ=""THEN1640 :rem 211 IKE INSTRUCTIONS (Y OR N)?" :rem 163
1650 PRINTNŞ; :rem 6 125 GETAŞ:IFAŞ=""THEN125 :rem 83
1660 IFNŞ=CHRŞ(13)THENRETURN :rem 208 130 IFAŞ="Y"THEN700 :rem 40
1670 NAŞ=NAŞ+NŞ:GOTO1635 :rem 80 135 IFAŞ="N"THEN320 :rem 32
1671 : :rem 9 140 PRINT"{DOWN}{9 RIGHT}YES OR NO ONLY P
1675 REM ANSWER INPUT :rem 23 LEASE":FORT=1TO1500:NEXTT:GOTO120
1676 : :rem 14 :rem 198
1680 AŞ="" :rem 181 143 : :rem 210
1685 PRINT"[@]{LEFT}"; :rem 33 145 REM SPELL AND FLASH WORD :rem 123
1690 GETNŞ:IFNŞ=""THEN1690 :rem 221 147 : :rem 214
1700 PRINTNŞ; :rem 2 150 GOSUB1800:PRINT"[4]{5 DOWN}
1710 IFNŞ=CHRŞ(13)THENRETURN :rem 204 {11 RIGHT}THAT IS INCORRECT.":rem 185
1720 AŞ=AŞ+NŞ:GOTO1685 :rem 181 160 PRINT"{8 RIGHT}THE CORRECT SPELLING "
1730 : :rem 5 :rem 220
1735 REM DOUBLE CHECK :rem 205 170 PRINT"IS:[5]":FORT=1TO1000:NEXTT
1737 : :rem 12 :rem 235
1740 PRINT"{CLR}{BLK}{5 DOWN}{RIGHT}IF YO :rem 180 AŞ="{CLR}{3}{10 DOWN}{15 RIGHT}":PR
U WISH TO STOP," :rem 14 INTAŞ; :rem 108
1745 PRINT"{DOWN}{7 RIGHT}PRESS {RVS}Q :rem 46 190 FORI=1TOLEN(LŞ(L)):PRINTMIDŞ(LŞ(L),I,
{OFF}." :rem 3 FORJ=1TO500:NEXTJ,I :rem 145
1750 PRINT"{DOWN}{2 RIGHT}IF NOT, PRESS T :rem 200 FORR=1TO20:PRINT"{CLR}";AŞ;"{RVS}";LŞ
HE" :rem 3 (L);"{OFF}":FORI=1TO15:NEXTI:PRINT"
1755 PRINT"{DOWN}{6 RIGHT}{RVS}SPACE{OFF} :rem 143
BAR." :rem 117 {CLR}";AŞ;LŞ(L) :rem 199
1760 GETAŞ:IFAŞ=""OR AŞ<>" "AND AŞ<>"Q" T :rem 210 FORI=1TO15:NEXTI:NEXTR
HEN1760 :rem 202 211 IFLŞ(L)=LŞ(25)THEN360:REM CATCH 3RD M
1770 IFAŞ<>"Q"THEN990 :rem 163 ISTAKE ON LAST EASY WORD :rem 244
1780 PRINT"{CLR}{5 DOWN}THANK YOU FOR PLA :rem 212 IFLŞ(L)=LŞ(50)THEN360:REM CATCH 3RD M
YING." :rem 37 ISTAKE ON LAST MEDIUM WORD :rem 130
1785 IFL<>0THENPRINT"{DOWN}{BLK}( YOUR SC :rem 213 IFLŞ(L)=LŞ(75)THEN360:REM CATCH 3RD M
ORE WAS";75-S;)" :rem 168 ISTAKE ON LAST HARD WORD :rem 232
1790 PRINT"{DOWN}{BLK}{2 RIGHT}SEE YOU NE :rem 247 220 RETURN :rem 116
XT TIME!":END :rem 247
1800 POKE36878,15:FORZ=180TO145STEP-1:POK :rem 230 DATACAT,DOG,ANT,AND,ANY,AN,AM,CAN,CAP
E36876,Z:NEXT:POKE36878,0:RETURN :rem 95
:rem 39 240 DATAHAND,HAT,FOOT,BOOK,FLY,SKY,SAW,SE
1810 POKE36878,15:FORZ=220TO255:POKE36876 :rem 233 E
,Z:NEXT:POKE36878,0:RETURN :rem 139 250 DATASNAKE,SNACK,BOAT,MANY,LOOSE,LOSE,
CHOOSE,CHOSE,CHASE,CHEESE,STOVE,STORE
:rem 233
260 DATASTEAL,STAIRS,WHOLE,SCREW,WASHER,H
ORSE,STEER,STONE,PLANT,RADIO,COUCH
:rem 115
270 DATACHAIR,TABLE :rem 174
280 DATASTEREO,STATION,TELEVISION,CUSHION
,CAUTION,FREEZER,WEATHER,WHETHER
:rem 68
290 DATAWHOEVER,HAMMOCK,COMMITTEE,COMPUTE
R,LICENSE,MONITOR,DICTIONARY,RECEIVE
:rem 67
300 DATARECORD,SPEAKER,CURTAIN,PILLOW,WAT
ERBED,WINDOW,THEATER,PIANO,LIVER
:rem 240
320 PRINT"{CLR}{5 DOWN}{8 RIGHT}GREAT, ";
NAŞ;".{2 SPACES}LET'S GO." :rem 147
330 PRINT"{DOWN}{4 RIGHT}(PRESS {RVS}SPAC
E{OFF} BAR TO CONTINUE.)" :rem 229
340 GETAŞ:IFAŞ<>" "THEN340 :rem 142
350 GOTO990 :rem 115
360 PRINT"{CLR}{5}{5 DOWN}WASN'T THAT F
UN?":GOTO1735 :rem 58
700 PRINT"{CLR}{8 DOWN}{5 RIGHT}GREAT! NO
W, ";NAŞ;" , ALL YOU":PRINT"{DOWN}
{2 RIGHT}HAVE TO DO IS "; :rem 190
710 PRINT"FOLLOW THESE SIMPLE":PRINT"
{DOWN}{2 RIGHT}DIRECTIONS." :rem 247
720 PRINT:PRINT"{3 DOWN}{2 RIGHT}(PRESS T

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Program 2: Spelling Bee For Commodore 64

```

1 POKE53281,1:PRINT"[5]":POKE788,52:REM
WHITE SCREEN,GRAY LETTERS,IGNORE STOP
{SPACE}KEY :rem 6
2 DIMLŞ(75) :rem 57
3 ::::REM SPELLING BEE :rem 41
4 PRINT"{CLR}"TAB(18)"{BLK}IU{YEL}"
:rem 57
5 PRINTTAB(17)"U**I" :rem 180
10 PRINTTAB(17)"-{BLK}WW{YEL}-" :rem 88
15 PRINTTAB(17)"-{BLK}JK{YEL}-" :rem 68
20 PRINTTAB(17)"J[S]{A}K" :rem 182
25 PRINTTAB(16)"U{X}{Z}*I" :rem 79
30 PRINTTAB(15)"N-{RVS}{BLK}{4 SPACES}
{OFF}{YEL}-M" :rem 233
35 PRINTTAB(14)"N-{4 SPACES}-M" :rem 27
40 PRINTTAB(13)"N{2 SPACES}-{RVS}{BLK}
{4 SPACES}{OFF}{YEL}-{2 SPACES}M"
:rem 232
45 PRINTTAB(12)"N{2 SPACES}N-{4 SPACES}-M
{2 SHIFT-SPACE}M" :rem 245
50 PRINTTAB(12)"M N-{RVS}{BLK}{4 SPACES}
{OFF}{YEL}-M N" :rem 131
55 PRINTTAB(13)"T{2 SPACES}J*{2 R}
*K{2 SPACES}T" :rem 134
110 PRINT"[5]{3 DOWN}HELLO! MY NAME IS

```



```

HE {RVS}SPACE{OFF} BAR TO CONTINUE.)" 1030 PRINTTAB(15)"[3]3) HARD[5]";"
:rem 120 :rem 126
730 GETA$:IFA$<>" "THEN730 :rem 148 1040 PRINTTAB(13);('Q' TO QUIT)" :rem 51
740 PRINT"{CLR}[5 DOWN]FIRST,THE ALPHABET 1060 GETA$:IFA$=" THEN1060 :rem 177
, A RETURN ARROW (<)," :rem 222 1070 IFA$="1"THENPRINT"{CLR}":FORX=1TO25:
741 PRINT"AND A RED X WILL BE PLACED ON T 1080 IFA$="2"THENPRINT"{CLR}":FORX=26TO50
HE" :rem 154 :GOTO1130:REM EASY :rem 122
750 PRINT"LOWER HALF OF THE SCREEN WITH A 1090 IFA$="3"THENPRINT"{CLR}":FORX=51TO75
" :rem 196 :GOTO1130:REM MEDIUM :rem 64
760 PRINT"POINTER (↑) UNDER THE [3]RED 1100 IFA$="Q"THEN1735 :rem 165
{SPACE}X[5].{2 SPACES}THEN," :rem 135 1110 PRINT"PLEASE TRY AGAIN, ";NA$; ".":PRI
770 PRINT"A WORD WILL BE FLASHED ONTO THE 1115 FORX=1TO2000:NEXTX:GOTO990 :rem 192
SCREEN." :rem 177 1130 RESTORE:FORL=1TO75 :rem 211
780 PRINT"{2 DOWN}USING A JOYSTICK PLUGGE 1140 READL$(L):REM READ THE WORDS:rem 153
D INTO" :rem 11 1150 IFL=XTHEN1170 :rem 47
790 PRINT"{RVS}CONTROL PORT 2{OFF} ON THE 1160 NEXT :rem 7
RIGHT SIDE OF THE" :rem 68 1170 FORN=1TO3:REM MISTAKE COUNTER
800 PRINT"COMPUTER, SPELL THE WORD BY PLA 1180 LL=(40-LEN(L$(L)))/2:PRINT"{CLR}
CING THE" :rem 27 {GRN}[10 DOWN]"TAB(LL);L$(L):FORY=1T
810 PRINT"POINTER (↑) UNDER THE CORRECT L 1182 Z=L :rem 172
ETTER" :rem 123 1183 IFL>25THENZ=L-25:IFL>50THENZ=L-50
820 PRINT"AND PRESSING THE {RVS}FIRE{OFF} 1185 PRINT"{CLR}{PUR}WORD NUMBER:";Z:PRIN
BUTON.":PRINT:PRINT :rem 236 T"{HOME}[20 RIGHT]SCORE:";75-S
821 PRINT"{2 RIGHT}(PRESS THE {RVS}SPACE 1190 PRINT"[3][3 DOWN][9 RIGHT]NOW SPEL
{OFF} BAR TO CONTINUE.)" :rem 128 L IT, ";NA$; ".[5]" :rem 218
822 GETA$:IFA$<>" "THEN822 :rem 152 1200 PRINT"{DOWN}('END' AND '[3]4[5]
830 PRINT"{CLR}[5 DOWN]WHEN THE WORD HAS ' TO GO ON TO HARDER WORDS)" :rem 135
{SPACE}BEEN SPELLED" :rem 162 1205 PRINT"{9 RIGHT}('Q' AND '[3]4
840 PRINT"CORRECTLY, PLACE THE POINTER (↑ 1210 GOSUB1390:PRINTCHR$(13):IFD$="END"TH
) UNDER" :rem 228 EN990 :rem 232
850 PRINT"RETURN (<) AND PRESS THE {RVS} 1220 IFD$="Q"THEN1735 :rem 141
FIRE{OFF} BUTON." :rem 19 1230 IFD$="" THEN1260:REM CATCHES CARRIAGE
851 PRINT"{2 DOWN}IF YOU MAKE A MISTAKE B 1240 IFD$=L$(25)THEN1320:REM LAST EASY WO
EFORE YOU" :rem 58 RD :rem 216
852 PRINT"FINISH, PUT THE POINTER (↑) UND 1241 IFD$=L$(50)THEN1320:REM LAST MEDIUM
ER THE" :rem 102 {SPACE}WORD :rem 102
853 PRINT"[3]RED X[5] AND PRESS THE 1242 IFD$=L$(75)THEN1320:REM LAST HARD WO
{RVS}FIRE{OFF} BUTON.{2 SPACES}YOU" :rem 228 RD :rem 204
854 PRINT"WILL THEN BE ABLE TO RE-SPELL T 1250 IFD$=L$(L)THEN1300 :rem 252
HE WORD" :rem 120 1260 IFN=3THENGOSUB150:PRINT"{CLR}
855 PRINT"WITH NO PENALTY.":PRINT:PRINT {10 DOWN}";TAB(10);"HERE, TRY ANOTHE
:rem 37 R." :rem 116
860 PRINT"{2 RIGHT}(PRESS THE {RVS}SPACE 1265 IFN=3THEN FORT=1TO2000:NEXTT:NEXTX
{OFF} BAR TO CONTINUE.)" :rem 131 :rem 246
870 GETA$:IFA$<>" "THEN870 :rem 158 1270 GOSUB1800:PRINT"[4][6 DOWN]
880 PRINT"{CLR}[5 DOWN]YOU WILL BE GIVEN [2 RIGHT]THAT IS INCORRECT, ";NA$; ".
{SPACE}3 CHANCES TO GET IT" :rem 214 TRY AGAIN." :rem 31
890 PRINT"RIGHT. IF YOU HAVEN'T GOTTEN IT 1275 FORY=1TO2000:NEXTY :rem 180
RIGHT" :rem 131 1280 S=S+1 :rem 10
900 PRINT"BY THEN, I WILL TELL YOU THE CO 1290 NEXTN :rem 89
RRECT" :rem 2 1300 GOSUB1850:PRINT"[3][6 DOWN]
910 PRINT"SPELLING OF THE WORD.{2 SPACES} {8 RIGHT}CORRECT! NOW TRY ANOTHER":F
YOU WILL START" :rem 108 ORY=1TO2000:NEXTY :rem 87
920 PRINT"WITH A SCORE OF 75 AND 1 POINT 1310 NEXTX :rem 92
{SPACE}WILL BE" :rem 179 1320 GOSUB1850:PRINT"[3][6 DOWN]";TAB(1
930 PRINT"DEDUCTED EACH TIME YOU MISSPELL 5);"CORRECT![5]":FORT=1TO2000:NEXT
A WORD." :rem 87 T:GOTO360 :rem 79
940 PRINT"{2 DOWN}EASY, HUH?":PRINT:PRINT 1380 RETURN :rem 172
:rem 160 1385 REM PRINT ALPHABET AND POINTER
950 PRINT"{2 RIGHT}(PRESS THE {RVS}SPACE :rem 119
{OFF} BAR TO CONTINUE.)" :rem 131 1390 PRINT:PRINT:PRINTTAB(15):D$="" :SC=16
960 GETA$:IFA$<>" "THEN960 :rem 158 71:CO=SC+54272:CN=1 :rem 124
990 S=0:L=0:PRINT"{CLR}[6 DOWN][2 RIGHT]H
OW HARD WOULD YOU LIKE YOUR WORDS,"
:rem 87
1000 PRINTTAB(8);"{DOWN}";NA$;"?":PRINT
:rem 177
1010 PRINTTAB(15)"[3]1) EASY" :rem 67
1020 PRINTTAB(15)"[3]2) MEDIUM":rem 212

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1400 POKESC,CN:POKECO,5 :rem 163
1410 SC=SC+1:CO=CO+1:CN=CN+1:IFSC=1697THE
N1430 :rem 225
1420 GOTO1400 :rem 197
1430 POKESC,31:POKECO,10:POKESC-27,86:POK
ECO-27,10 :rem 242
1440 S1=1710 :rem 83
1450 IFS1<1710THENS1=1737:REM MOVE POINTE
R TO LEFT ARROW SYMBOL :rem 73
1460 IFS1>1737THENS1=1710:REM MOVE POINTE
R TO LETTER A :rem 209
1470 C1=S1+54272 :rem 48
1480 POKES1,30:POKEC1,10 :rem 121
1490 GOSUB1540 :rem 24
1500 IFJV=8THENS1=S1+1:C1=C1+1:POKES1-1,3
2:FORT=1TO25:NEXTT:REM MOVE RIGHT
:rem 94
1510 IFJV=4THENS1=S1-1:C1=C1-1:POKES1+1,3
2:FORT=1TO25:NEXTT:REM MOVE LEFT
:rem 10
1520 IFJV=FRTHENGOSUB1570:IFB$=CHR$(13)TH
ENPRINT"[5]":RETURN :rem 28
1530 GOTO1450 :rem 204
1540 JV=PEEK(56320):REM CONTROL PORT 2
:rem 211
1545 FR=JVAND16:REM FIRE BUTTON :rem 158
1550 JV=15-(JVAND15):REM GET DIRECTION
:rem 4
1560 RETURN :rem 172
1570 H=PEEK(S1-40) :rem 221
1580 GETB$ :rem 20
1590 B$=CHR$(H+64) :rem 161
1600 IFS1=1710THENPRINT"[CLR]{7 DOWN}":GO
TO1390:REM SAME WORD AGAIN WITH NO P
ENALTY
1605 IFB$="<"THENB$=CHR$(13):RETURN
:rem 67
1610 PRINT"[GRN]";TAB(LL);B$; :rem 142
1620 D$=D$+B$:FORT=1TO180:NEXTT:RETURN
:rem 109
1624 : :rem 7
1625 REM NAME INPUT :rem 99
1626 : :rem 9
1630 NA$="" :rem 254
1635 PRINT"[@]{LEFT}"; :rem 28
1640 GETN$:IFN$=""THEN1640 :rem 211
1650 PRINTN$; :rem 6
1660 IFN$=CHR$(13)THENRETURN :rem 208
1670 NA$=NA$+N$:GOTO1635 :rem 80
1671 : :rem 9
1675 REM ANSWER INPUT :rem 23
1676 : :rem 14
1680 A$="" :rem 181
1685 PRINT"[@]{LEFT}"; :rem 33
1690 GETN$:IFN$=""THEN1690 :rem 221
1700 PRINTN$; :rem 2
1710 IFN$=CHR$(13)THENRETURN :rem 204
1720 A$=A$+N$:GOTO1685 :rem 181
1730 : :rem 5
1735 REM DOUBLE CHECK :rem 205
1737 : :rem 12
1740 PRINT"[CLR]{5 DOWN}{5 RIGHT}IF YOU W
ISH TO STOP, PRESS {RVS}Q{OFF}."
:rem 162
1750 PRINT"{DOWN}{5 RIGHT}IF NOT, PRESS T
HE {RVS}SPACE{OFF} BAR." :rem 109
1760 GETA$:IFAS$=""OR AS$<>" "AND AS$<>"Q" T
HEN1760 :rem 202
1770 IFAS$<>"Q"THEN990 :rem 163
1780 PRINT"[CLR]{5 DOWN}{10 RIGHT}THANK Y

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OU FOR PLAYING." :rem 71
1785 IFL<>0THENPRINT"[DOWN]{10 RIGHT}
{BLK}( YOUR SCORE WAS";75-S;)"
:rem 202
1790 PRINT"[DOWN]{12 RIGHT}{5}SEE YOU N
EXT TIME!" :rem 16
1795 POKE788,49:END:REM RESTORES STOP KEY
:rem 26
1800 SD=54272:FORZ=SDTOSD+28:POKEZ,0:NEXT
:rem 87
1805 POKE54296,15:POKE54277,18:POKE54278,
242 :rem 215
1810 POKE54276,33:POKE54273,4:POKE54272,4
8 :rem 102
1815 FORZ=1TO700:NEXTZ:POKE54276,32:FORZ=
1TO400:NEXT :rem 38
1820 FORZ=SDTOSD+28:POKEZ,0:NEXTZ:RETURN
:rem 187
1850 SD=54272:FORZ=SDTOSD+28:POKEZ,0:NEXT
Z :rem 182
1855 POKE54296,15:POKE54277,42:POKE54278,
250 :rem 216
1860 POKE54276,33:POKE54273,23:POKE54272,
181 :rem 202
1865 FORZ=1TO200:NEXT:POKE54276,32:FORZ=1
TO1250:NEXT
1870 FORZ=SDTOSD+28:POKEZ,0:NEXT:RETURN
:rem 102

```

MLX—Machine Language Entry Program For Commodore 64

(Article on page 162.)

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.

```

100 PRINT"[CLR]{RED}";CHR$(142);CHR$(8);:
POKE53281,1:POKE53280,1 :rem 198
101 POKE 788,52:REM DISABLE RUN/STOP
:rem 119
110 PRINT"{RVS}{40 SPACES}"; :rem 176
120 PRINT"{RVS}{15 SPACES}{RIGHT}{OFF}
[*]{RVS}{RIGHT}{RIGHT}{2 SPACES}
[*]{OFF}{[*]{RVS}{RVS}
{13 SPACES}"; :rem 250
130 PRINT"{RVS}{15 SPACES}{RIGHT} [G]
{RIGHT}{2 RIGHT}{OFF}{RVS}{[*]
{OFF}{[*]{RVS}{13 SPACES}"; :rem 35
140 PRINT"{RVS}{40 SPACES}" :rem 120
150 V=53248:POKE2040,13:POKE2041,13:FORI=
832TO894:POKEI,255:NEXT:POKEV+27,3
:rem 223
160 POKEV+21,3:POKEV+39,2:POKEV+40,2:POKE
V,144:POKEV+1,54:POKEV+2,192:POKEV+3,
54 :rem 51
170 POKEV+29,3 :rem 18
180 FORI=0TO23:READA:POKE679+I,A:POKEV+39

```



```

, A: POKEV+40, A: NEXT :rem 188
185 DATA169, 251, 166, 254, 164, 255, 32, 216, 25
5, 133, 253, 96 :rem 125
187 DATA169, 0, 166, 251, 164, 252, 32, 213, 255,
133, 253, 96 :rem 14
190 POKEV+39, 7: POKEV+40, 7 :rem 202
200 PRINT"{2 DOWN}{PUR}{BLK}{3 SPACES}A F
A ILSAFE MACHINE LANGUAGE EDITOR
{5 DOWN}" :rem 130
210 PRINT"{5}{2 UP}STARTING ADDRESS?
{8 SPACES}{9 LEFT}";:INPUTS:F=1-F:C$=
CHR$(31+119*F) :rem 215
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:POKEV+21,0
:rem 225
310 PRINTRIGHT$( "0000"+MID$(STR$(AD),2),5
);":":FORJ=1TO6 :rem 234
320 GOSUB570:IFN=-1THENJ=J+N:GOTO320
:rem 228
390 IFN=-211THEN 710 :rem 62
400 IFN=-204THEN 790 :rem 64
410 IFN=-206THENPRINT:INPUT"{DOWN}ENTER N
EW ADDRESS";ZZ :rem 44
415 IFN=-206THENIFZZ<SORZZ>ETHENPRINT"
{RVS}OUT OF RANGE":GOSUB1000:GOTO410
:rem 225
417 IFN=-206THENAD=ZZ:PRINT:GOTO310
:rem 238
420 IF N<>-196 THEN 480 :rem 133
430 PRINT:INPUT"DISPLAY:FROM";F:PRINT,"TO
";:INPUTT :rem 234
440 IFF<SORF>EORT<SORT>ETHENPRINT"AT LEAS
T";S;"{LEFT}, NOT MORE THAN";E:GOTO43
0 :rem 159
450 FORI=FTOTSTEP6:PRINT:PRINTRIGHT$( "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$>" THENPRINT:PRINT:GOTO310
:rem 25
470 NEXTK:PRINTCHR$(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$(18);:GOSUB570:PRINTCHR$(20)
:rem 234
515 IFN=CKSUMTHEN530 :rem 255
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 79
581 GETA$:IFA$=" THEN581 :rem 95
585 PRINTCHR$(20);:A=ASC(A$):IFA=13ORA=44
ORA=32THEN670 :rem 229
590 IFA>128THENN=-A:RETURN :rem 137
600 IFA<>20 THEN 630 :rem 10
610 GOSUB690:IFI=1ANDT=44THENN=-1:PRINT"
{LEFT} {LEFT}";:GOTO690 :rem 172
620 GOTO570 :rem 109
630 IFA<48ORA>57THEN580 :rem 105
640 PRINTA$;:N=N*10+A-48 :rem 106
650 IFN>255 THEN A=20:GOSUB1000:GOTO600
:rem 229
660 Z=Z+1:IFZ<3THEN580 :rem 71
670 IFZ=0THENGOSUB1000:GOTO570 :rem 114
680 PRINT",";:RETURN :rem 240
690 S%=PEEK(209)+256*PEEK(210)+PEEK(211)
:rem 149
691 FORI=1TO3:T=PEEK(S%-I) :rem 67
695 IFT<>44ANDT<>58THENPOKES%-I,32:NEXT
:rem 205
700 PRINTLEFT$( "{3 LEFT}",I-1);:RETURN
:rem 7
710 PRINT"{CLR}{RVS}*** SAVE ***{3 DOWN}"
:rem 236
720 INPUT"{DOWN} FILENAME";F$ :rem 228
730 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
{RVS}D{OFF}ISK: (T/D)" :rem 228
740 GETA$:IFA$<>"T"ANDAS$<>"D"THEN740
:rem 36
750 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
:rem 158
760 OPEN 1,DV,1,F$:POKE252,S/256:POKE251,
S-PEEK(252)*256 :rem 137
765 POKE255,E/256:POKE254,E-PEEK(255)*256
:rem 37
770 POKE253,10:SYS 679:CLOSE1:IFPEEK(253)
>9ORPEEK(253)=0THENPRINT"{DOWN}DONE."
:END :rem 24
780 PRINT"{DOWN}ERROR ON SAVE.{2 SPACES}T
RY AGAIN.":IFDV=1THEN720 :rem 171
781 OPEN15,8,15:INPUT#15,DS,DS$:PRINTDS;D
S$:CLOSE15:GOTO720 :rem 161
790 PRINT"{CLR}{RVS}*** LOAD ***{2 DOWN}"
:rem 212
800 INPUT"{2 DOWN} FILENAME";F$ :rem 244
810 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
{RVS}D{OFF}ISK: (T/D)" :rem 227
820 GETA$:IFA$<>"T"ANDAS$<>"D"THEN820
:rem 34
830 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
:rem 157
840 OPEN 1,DV,0,F$:POKE252,S/256:POKE251,
S-PEEK(252)*256 :rem 135
850 POKE253,10:SYS 691:CLOSE1 :rem 173
860 IFPEEK(253)>9 OR PEEK(253)=0 THEN PRI
NT:PRINT:GOTO310 :rem 92
870 PRINT"{DOWN}ERROR ON LOAD.{2 SPACES}T
RY AGAIN.{DOWN}":IFDV=1THEN800
:rem 172
880 OPEN15,8,15:INPUT#15,DS,DS$:PRINTDS;D
S$:CLOSE15:GOTO800 :rem 160
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

```



```

35 FORF=1TO30:READFF:POKEE-2,FF:FORT=1TO5
  0:NEXTT:POKEE-2,0:POKEE-3,FF:FORT=1TO5
  0:NEXTT :rem 79
36 POKEE-3,0:NEXTF:TI$="000000" :rem 244
37 I=INT(RND(1)*B) :rem 254
38 POKEC,0:POKED,4 :rem 70
40 POKEDD,127:P=PEEK(P2)AND128:J0=-(P=0)
  :rem 58
42 POKEDD,255:P=PEEK(P1):J1=-((PAND8)=0):
  J2=-((PAND16)=0):J3=-((PAND4)=0)
  :rem 108
44 KD=C :rem 119
45 IFJ1=1THENPOKEKD,32:C=C+22:D=D+22
  :rem 121
46 IFJ2=1THENPOKEKD,32:C=C-1:D=D-1:rem 25
47 IFJ3=1THENPOKEKD,32:C=C-22:D=D-22
  :rem 129
48 IFJ0=1THENPOKEKD,32:C=C+1:D=D+1:rem 21
49 DV=DV+1:IFDV=10THENPOKEE-2,135:POKEE-2
  ,0:DV=0 :rem 172
52 IFPEEK(C)=7THENC=C-88:D=D-88 :rem 78
53 IF C<7702 THEN C=C+22:D=D+22 :rem 85
54 IFPEEK(C)=1THEN9 :rem 135
55 PRINT"{HOME}{5 RIGHT}";RIGHT$(TI$,3);"
  {2 SPACES}";I :rem 48
56 IFTI$>"000500"THEN200 :rem 35
60 GOTO38 :rem 10
80 POKEC,4:FORT=15TO0STEP-1:POKEE-1,220:P
  OKEE,T:POKED,2:FORTT=1TO20:NEXTTT:POKE
  D,5 :rem 47
81 FORTT=1TO50:NEXTTT:NEXTT:PRINT"{HOME}
  {RVS}CORRECT{OFF} EF!{RVS} NO.=";I-J:N
  N=NN+1 :rem 252
82 IFNN=3THEN200 :rem 198
83 FORT=1TO4000:NEXTT:PRINT"{HOME}
  {20 SPACES}":POKEE,15:POKEE-1,0:rem 14
84 M=M+1:IFM=HTHEN110 :rem 251
85 FORN=8098TO8163:POKEN,32:NEXTN:GOTO38
  :rem 26
90 .67/7.31 :rem 252
110 POKE36869,240:PRINT"{CLR}{2 DOWN}
  {6 SPACES}GOOD WORK!!":M=0 :rem 245
120 POKEE-4,241:FORT=1TO1000:NEXT:POKEE-3
  ,241:FORT=1TO1500:NEXT:POKEE-2,241
  :rem 81
130 FORT=1TO3000:NEXT:H=H+10:POKEE-3,0:PO
  KEE-4,0:POKEE-2,0 :rem 237
131 IFH=70THEN600 :rem 213
132 PRINT"{3 DOWN}{RIGHT}YOU GOT ALL THE
  {SPACE}BOMBOUT OF THAT STORY, BUTTHE
  TERRORISTS PUT" :rem 60
133 PRINT"EVEN MORE IN THE NEXT!":PRINT"
  {2 DOWN}{3 RIGHT}GET READY AGAIN!!":F
  ORT=1TO3000:NEXTT :rem 50
134 POKEE-4,241:FORT=1TO1000:NEXT:POKEE-3
  ,241:FORT=1TO1500:NEXT:POKEE-2,241
  :rem 86
135 FORT=1TO3000:NEXT:POKEE-3,0:POKEE-4,0
  :POKEE-2,0:GOTO30 :rem 53
200 FORT=15TO0STEP-1:POKEE-1,220:POKEE,T:
  POKEE+1,47:FORTT=1TO50:NEXTTT:rem 216
205 POKEE+1,138:FORTT=1TO50:NEXTTT:NEXTT
  :rem 92
210 POKEE-1,0:POKEE+1,8:POKE36869,240:PRI
  NT"{CLR}{WHT}THE PLACE BLEW UP!
  {4 SPACES}GAME OVER!" :rem 186
215 PRINT"{7 DOWN}PLAY AGAIN?" :rem 181
220 GOTO612 :rem 102
395 REM SOUND DATA :rem 40
400 DATA220,220,220,220,210,210,210,210,2
  20,220,220,220,230,229,228,227,226,22
  5,224,223 :rem 169
405 DATA222,221,220,219,219,219,219,135,1
  35,135 :rem 57
500 PRINT"{CLR}{9 DOWN}{4 RIGHT}A FEW MOM
  ENTS..." :rem 214
505 POKE52,28:POKE56,28:CLR:FORI=7168TO76
  79:POKEI,PEEK(I+25600):NEXT :rem 134
510 FORF=1TO30:READX:NEXT :rem 94
520 FORY=7168TO7168+64:READX:POKEY,X:NEXT
  Y:GOTO5 :rem 102
524 REM CHAR DATA :rem 183
525 DATA56,56,144,254,58,56,40,108,28,16,
  56,124,254,254,124,56 :rem 52
530 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
  :rem 70
535 DATA215,254,124,255,255,223,147,161,0
  ,0,232,168,232,168,238,0 :rem 177
540 DATA0,0,234,174,238,170,170,0,255,255
  ,255,255,255,0,0,0,0,0 :rem 245
600 PRINT"{2 DOWN}YOU CLEARED THE BUILD-I
  NG OF BOMBS.YOU ARE AVERY GREAT PERSO
  N." :rem 220
605 FORT=135TO241STEP5:POKEE-2,T:FORTT=1T
  O50:NEXT:NEXT :rem 21
610 POKEE-2,0:PRINT"{3 DOWN}{4 RIGHT}PLAY
  AGAIN?" :rem 77
612 GETA$=IFA$=""THEN612 :rem 85
620 IFA$="Y" THEN5 :rem 202
630 PRINT"{CLR}":POKE36879,27:END :rem 29

```

Program 2: BLAM!—64 Version

```

2 POKE53281,4:POKE53280,14 :rem 192
3 GOTO500 :rem 1
4 SC=53281:BO=53280:POKESC,1:POKEBO,10:PR
  INT"{CLR}{9 DOWN}"TAB(15)"{RVS}{RED}SKI
  LL LEVEL" :rem 37
5 PRINT"{DOWN}"TAB(15)"(1-100) ";:INPUT A
  :rem 111
6 IFA<10RA>100THEN4 :rem 135
7 PRINT"{2 DOWN}"TAB(11)"USE JOYSTICK POR
  T 2":FORT=1TO2000:NEXT:Y=RND(0):B=A*100
  :H=10 :rem 151
8 W=54272:FORT=WTOW+24:POKET,0:NEXT:POKEW
  +24,15:POKEW+5,17:POKEW+6,241:GOTO25
  :rem 75
9 J=INT(RND(1)*I):PRINT"{HOME}{22 DOWN}
  {9 RIGHT}(";J;) BLAM NO. "; :rem 229
10 POKE198,0:INPUTK$:K=VAL(K$) :rem 44
11 IFK+J=ITHENPRINT"{RVS}{DOWN}{15 RIGHT}
  CORRECT!!{OFF}"; :rem 46
12 IFK+J<>ITHENPRINT"{DOWN}{16 RIGHT}
  {RVS}WRONG..." :GOTO80 :rem 149
13 POKEC,32:M=M+1:IFM=HTHEN110 :rem 48
14 FORT=1TO25:POKEW,71:POKEW+1,71:POKEW+4
  ,33:FORQ=1TO50:NEXT:POKEW+4,32:NEXT
  :rem 87
15 FORN=1910TO2015:POKEN,32:NEXTN :rem 29
16 GOTO38 :rem 11
25 C=1524:D=55796 :rem 126
27 PRINT"{CLR}":POKEBO,4:POKESC,1:FORT=1T
  OH :rem 67
28 G=INT(RND(1)*760)+40:V=PEEK(G+1024):IF
  (V<>32)OR(G=500)THEN28 :rem 85
29 POKEG+55296,0:POKEG+1024,66 :rem 173
30 NEXTF:PRINT"{HOME}{20 DOWN}{BLU}DDDDDD
  DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD";
  :rem 84
34 RESTORE :rem 139
35 FORF=1TO30:READL,Q:POKEW,L:POKEW+1,Q:P
  OKEW+4,17:FORT=1TO50:NEXT:POKEW+4,16
  :rem 194

```



```

36 POKEW+1,L-20:POKEW,Q:POKEW+4,17:FORT=1      204 NEXT:POKEW+4,128      :rem 187
   TO50:NEXT:POKEW+4,16:NEXT      :rem 209
37 TI$="000000":I=INT(RND(1)*B):PRINT"          210 PRINT"{CLR}":POKEBO,0:POKESC,0:PRINT"
   {HOME}{9 RIGHT}TIMER"          :rem 62      [5 DOWN]{11 RIGHT}{WHT}THE PLACE BLEW
38 POKED,4:POKEC,65                :rem 129      UPI" :rem 130
40 JS=PEEK(56320):JS=15-(JSAND15):JS=JS+1      215 PRINTTAB(14)"GAME OVER!!" :rem 142
   :REM READ JOYSTK                :rem 173      218 PRINT"[7 DOWN]"TAB(11)"PLAY AGAIN (Y/
41 KD=C:ONJSGOTO51,42,43,51,44,45,46,51,4      N)?" :rem 173
   7,48,49                          :rem 87      220 GETA$:IFA$=""THEN220      :rem 75
42 POKEKD,32:C=C-40:D=D-40:GOTO51:REM NOR      225 IF A$="Y" THEN M=0:GOTO4   :rem 247
   TH                                :rem 85      230 SYS2048                      :rem 98
43 POKEKD,32:C=C+40:D=D+40:GOTO51:REM SOU      400 DATA50,50,50,50,50,50,50,50,50,50,
   TH                                :rem 90      50,50,50,50,50,50,50,50,50,50
44 POKEKD,32:C=C-1:D=D-1:GOTO51:REM WEST      :rem 248
   :rem 169                          403 DATA50,50,50,50,50,50,50,50 :rem 13
45 POKEKD,32:C=C-41:D=D-41:GOTO51:REM NW      404 DATA70,70,70,70,70,70,70,70,70,70,
   :rem 116                          70,70,70,68,66,64,62,60,58,56,54
46 POKEKD,32:C=C+39:D=D+39:GOTO51:REM SW      :rem 67
   :rem 132                          405 DATA52,50,48,46,44,42,40,38 :rem 38
47 POKEKD,32:C=C+1:D=D+1:GOTO51:REM EAST      500 PRINT"{CLR}{11 DOWN}"TAB(11){WHT}A F
   :rem 146                          EW MOMENTS....." :rem 179
48 POKEKD,32:C=C-39:D=D-39:GOTO51:REM NE      505 POKE52,48:POKE56,48:CLR:POKE56334,PEE
   :rem 115                          K(56334)AND254 :rem 210
49 POKEKD,32:C=C+41:D=D+41:GOTO51:REM SE      506 POKE1,PEEK(1)AND251:FORN=0TO2047:POKE
   :rem 103                          N+12288,PEEK(N+53248):NEXTN :rem 84
50 POKEKD,32:C=C-40:D=D-40:REM NORTH          510 FORF=1TO60:READX:NEXT:FORF=0TO31:READ
   :rem 123                          X:POKEE+12808,X:NEXT :rem 196
51 DV=DV+1:IFDV=10THENPOKEW+4,129:POKEW+4    520 POKE 1,PEEK(1)OR4:POKE56334,PEEK(5633
   ,128:DV=0                          4)OR1 :rem 134
52 IFPEEK(C)=68THENC=C-160:D=D-160          523 POKE 53272,(PEEK(53272)AND240)+12
   :rem 211                          :rem 185
53 IF C<1064 THEN C=C+40:D=D+40 :rem 80      525 DATA56,56,144,254,58,56,40,108,28,16,
54 IFPEEK(C)=66THEN9 :rem 194              56,124,254,254,124,56 :rem 52
55 T$=RIGHT$(TI$,3):PRINT"{HOME}          535 DATA215,254,124,255,255,223,147,161
   {15 RIGHT}";T$;"{10 RIGHT}";I :rem 219      :rem 184
56 IFT$>"500"THEN200 :rem 74              540 DATA255,255,255,255,255,255,0,0
60 GOTO38 :rem 10                          :rem 239
80 POKEC,67:FORT=100TO1STEP-2:POKEW+1,T:P      560 GOTO4 :rem 8
   OKEW+4,129:POKED,2 :rem 179              600 REM YOU WIN! :rem 134
81 POKED,5:NEXTT:FORTT=1TO50:NEXTTT:PRINT      605 PRINT"{6 DOWN}{3 RIGHT}YOU CLEARED TH
   "{HOME}{RVS}{2 RIGHT}CORRECT{OFF} BLAM      E BUILDING OF BOMBS." :rem 123
   1{RVS} NO.=";I-J:NN=NN+1 :rem 213      610 PRINT"{DOWN}{3 RIGHT}YOU ARE A VERY G
82 POKEW+4,128:IFNN=3THEN200 :rem 172      REAT PERSON.":PRINT"{3 DOWN}"TAB(13)"
83 FORT=1TO4000:NEXTT:PRINT"{HOME}          PLAY AGAIN?" :rem 135
   {31 SPACES}" :rem 102                  612 GETA$:IFA$=""THEN612 :rem 85
84 M=M+1:IFM=HTHEN110 :rem 251              620 IF A$="Y" THEN PRINT"{CLR}":M=0:GOTO4
85 FORN=1910TO2015:POKEN,32:NEXTN:GOTO37      :rem 148
   :rem 1 :rem 102                      630 SYS 2048 :rem 102
110 PRINT"{CLR}{DOWN}{14 RIGHT}GOOD WORK!    500 REM YOU WIN! :rem 134
   1":M=0 :rem 63                          605 PRINT"{6 DOWN}{3 RIGHT}YOU CLEARED TH
119 ER=28 :rem 217                          E BUILDING OF BOMBS." :rem 123
120 FORU=0TO3:POKEW+1,ER*U:POKEW,49:POKEW      610 PRINT"{DOWN}{3 RIGHT}YOU ARE A VERY G
   +4,17:FORT=1TO1000:NEXT:NEXT :rem 181      REAT PERSON.":PRINT"{3 DOWN}"TAB(13)"
130 POKEW+4,16:H=H+10 :rem 159              PLAY AGAIN?" :rem 135
131 IFH=70THEN600 :rem 213                  612 GETA$:IFA$=""THEN612 :rem 85
132 PRINT"{6 DOWN}{3 RIGHT}YOU GOT ALL TH      620 IF A$="Y" THEN PRINT"{CLR}":M=0:GOTO4
   E BOMBS OUT OF THAT" :rem 246          :rem 148
133 PRINT"STORY, BUT THE TERRORISTS PUT E      630 SYS 2048 :rem 102
   VEN MORE" :rem 124
135 PRINT"IN THE NEXT.":PRINT"{4 DOWN}
   {13 RIGHT}SEE YA AGAIN!" :rem 15
139 ER=28 :rem 219
140 FORU=0TO3:POKEW+1,ER*U:POKEW,49:POKEW      1 GOTO6000 :rem 48
   +4,17:FORT=1TO1000:NEXT:NEXT :rem 183      5 PRINT"{CLR}":POKE36879,10:POKE38862,0
145 POKEW+4,16 :rem 18                      :rem 112
150 FORI=1TO3000:NEXT:GOTO25 :rem 237
200 FORT=100TO0STEP-2:POKEW+1,T:POKEW+4,1    10 FORI=7168TO7263:READX:POKEI,X:NEXT:FOR
   29 :rem 140                          I=7264TO7679:POKEI,PEEK(I+25600):NEXT
202 POKESC,INT(RND(1)*16):POKEBO,INT(RND(    :rem 174
   1)*16):PRINT"{CLR}" :rem 175          15 FORI=38400TO38421:POKEI,1:POKEI+66,1:N
   EXT :rem 165

```

Saucer Shooter For VIC-20

(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 GOTO6000 :rem 48
5 PRINT"{CLR}":POKE36879,10:POKE38862,0      :rem 112
10 FORI=7168TO7263:READX:POKEI,X:NEXT:FOR    :rem 174
   I=7264TO7679:POKEI,PEEK(I+25600):NEXT
15 FORI=38400TO38421:POKEI,1:POKEI+66,1:N    :rem 165
   EXT

```



```

20 POKE52,28:POKE56,28:CLR:POKE36869,255: 520 IFL3<8120THENPOKEL3,B:GOTO100:rem 251
   GOTO40 :rem 43 530 P2=0:IFPEEK(L3)=32THENPOKEL3,4:GOTO10
25 POKEZ1,15:POKEZ-1,220:POKEZ-1,0:POKEZ1 0 :rem 40
   ,0 :rem 97 540 IFPEEK(L3)=4THENPOKEL3,5 :rem 204
30 IFHI<SCTHENHI=SC :rem 232 550 IFPEEK(L3)=32THEN100 :rem 128
35 PRINT"[UP]"TAB(3)SCTAB(13)HI:P1=0:RETU 560 POKEL3,5:P2=0 :rem 211
   RN :rem 26 2000 REM DESTRUCT :rem 200
40 L=8131:D=0:L1=7763:L2=L-22:S=0:D1=1:L3 2030 POKEL,5:N=N-1:N1=N1+1 :rem 227
   =L1+22+D1:B=2:P2=1 :rem 16 2040 POKEZ,220:FORI=15TO0STEP-1:POKEZ1,I:
50 T=1:P=3:A=30720:P1=0:X=0:SC=0:Z=36877: FORJ=1TO50:NEXTJ:NEXTI :rem 88
   Z1=Z+1:N=4:N1=8181 :rem 146 2050 POKEZ,0:POKEZ1,0:FORI=1TO2000:NEXT
60 POKE37139,0:POKE37154,127:JA=37137:JB= :rem 178
   37152 :rem 55 2060 POKEN1,32:IFN>0THENPOKEL,T:GOTO200
65 FORI=7680TO7701:POKEI,32:NEXT :rem 219 :rem 187
70 I=7680:POKEI,6:POKEI+1,7:POKEI+2,8:POK 2065 PRINT:PRINT"[RVS]GAME OVER--PRESS FI
   EI+10,9:POKEI+11,10:POKEI+12,11:GOSUB3 RE" :rem 218
   0 :rem 20 2070 IF(PEEK(JA)AND32)=0THENPOKEL,32:POKE
75 FORI=1TO3:POKEN1+I,T:POKEN1+I+A,5:NEXT L1,32:POKEL2,32:POKEL3,32:PRINT"
   :rem 94 {CLR}":GOTO40 :rem 103
80 FORI=38840TO38861:POKEI,4:NEXT:FORI=81 2080 GOTO2070 :rem 204
   20TO8141:POKEI,32:NEXT :rem 179 5000 DATA0,153,189,231,189,153,0,0,8,28,2
90 FORI=38488TO38839:POKEI,7:NEXT:POKEL,T 8,54,107,93,127,54 :rem 139
   :rem 90 5010 DATA0,64,32,24,28,15,7,7,8,8,28,28,8
100 POKEL1,32:IFL1=7746ORL1=7767THEND1=-D ,0,0,0 :rem 35
   1 :rem 226 5020 DATA0,0,0,0,16,56,124,0,18,64,1,128,
110 IFP2=1THEN130 :rem 212 0,65,0,18 :rem 161
120 IFL-L1=368ORL-L1=391THENL3=L1+23:P2=1 5030 DATA5,226,162,128,231,37,164,231,117
   :rem 137 ,85,119,0,57,41,41,57 :rem 29
125 IFL-L1=390ANDL1=7746THENL3=L1+22:P2=1 5040 DATA96,64,64,12,201,76,137,76,0,164,
   :rem 124 164,164,228,228,164,164 :rem 148
130 L1=L1+D1:IFPEEK(L1)=PTHEN240 :rem 121 5050 DATA0,229,133,133,167,167,229,229,0,
140 POKEL1,S :rem 192 0,0,64,0,64,0,0 :rem 221
200 IFP1=0THEN300 :rem 209 6000 PRINT"[CLR]{4 DOWN}{4 RIGHT}{RED}SAU
210 POKEL2,32:L2=L2-22:IFL2<7746THENP1=0: CER SHOOTER" :rem 229
   GOTO300 :rem 83 6010 PRINT"[4 DOWN]{RIGHT}{BLU}PRESS FIRE
220 IFPEEK(L2)=32THENPOKEL2,P:GOTO300 TO BEGIN" :rem 211
   :rem 23 6020 POKE37139,0:POKE37154,127:JA=37137:J
230 IFPEEK(L2)=2THENPOKEL2,5:SC=SC+100:GO B=37152:HI=0 :rem 209
   SUB25:POKEL2,32:P2=0:GOTO300 :rem 235 6030 N1=230:N2=225:FORI=1TO1000:NEXT:X=36
240 POKEL2,5:SC=SC+500:L1=7747+INT(RND(1) 878:Y=X-4:POKEX,15 :rem 26
   *10):P2=0:GOSUB30 :rem 114 6040 FORI=1TO3:POKEY,N1:POKEY+1,N1:POKEY+
250 POKEZ,220:FORI=15TO0STEP-1:POKEZ1,I:P 2,N1:FORJ=1TO70:NEXTJ:POKEY,0 :rem 2
   OKE36879,I+10:FORJ=1TO50:NEXTJ:NEXTI :rem 164 6050 POKEY+1,0:POKEY+2,0:FORJ=1TO50:NEXTJ
260 POKEZ,0:POKEZ1,0:POKEL2,32:POKEL3,32 :NEXTI:POKEY,N2:POKEY+1,N2 :rem 36
   :rem 190 6060 POKEY+2,N2:FORI=1TO1400:NEXT:POKEY,0
300 IF(PEEK(JA)AND16)=0THEND=-1:GOTO340 :POKEY+1,0:POKEY+2,0 :rem 41
   :rem 51 6070 IFN1=230THENN1=228:N2=221:FORI=1TO16
310 IF(PEEK(JB)AND128)=0THEND=1:GOTO330 00:NEXT:GOTO6040 :rem 184
   :rem 59 6080 IF(PEEK(JA)AND32)=0THEN5 :rem 184
320 GOTO360 :rem 103 6090 GOTO6080 :rem 214
330 IFL+D=8142THENPOKEL,32:L=8119:GOTO350
   :rem 200
340 IFL+D=8119THENPOKEL,32:L=8142:rem 190
350 POKEL,32:L=L+D:IFPEEK(L)=4THEN2030
   :rem 18
360 POKEL,T :rem 148
400 IF(PEEK(JA)AND32)=0THENPOKEL2,32:L2=L -22:P1=1:GOTO418 :rem 146
410 X=X+1:IFX=2THENX=0:GOTO500 :rem 106
415 GOTO200 :rem 101
418 IFPEEK(L2)=2THEN230 :rem 83
420 POKEL2,P:L2=L2-22:POKE36878,15:FORI=2 50TO210STEP-10:POKE36877,I :rem 249
430 NEXTI:NEXTI:POKE36878,0:POKE36878,0:POKEL2+ 22,32:IFPEEK(L2)=2THEN230 :rem 191
440 POKEL2,P :rem 193
500 IFP2=0THEN100 :rem 211
510 POKEL3,32:L3=L3+23:IFPEEK(L3)=PTHENPO KEL2,2:GOTO230 :rem 103

```

VIC Music Writer

(Article on page 134.)

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.

```

5 POKE808,100 :rem 193
50 DIMA%(209):PRINT"[CLR]":H%=1:POKE36878
   ,15 :rem 79
90 PRINT"[RED]{RVS}{UP}{24 SPACES}PLEASE
   {SPACE}ENTER NOTES{24 SPACES}{OFF}
   {BLU}" :rem 107

```



```

100 FORL=1TO200:NEXT:POKE36876,0 :rem 179
102 B%=PEEK(197):IFB%=64THEN102 :rem 231
103 IFB%=39THENPRINT"{RED}";:H%=2:GOTO100
:rem 164
104 IFB%=47THENPRINT"{BLU}";:H%=1:GOTO100
:rem 166
105 IFN>N%THENN%=N :rem 81
106 IFB%=55THEN600 :rem 249
108 IFPEEK(653)=1THEN200 :rem 107
112 IFB%=23THEN450 :rem 244
120 IFB%=13THEN300 :rem 236
130 IFB%=8THEN500 :rem 195
140 IFB%=7THEN375 :rem 205
145 IFN%=208THEN100 :rem 51
150 IFB%=35THENN=N+1:A%(N)=191:PRINT"B ";
:IFH%=2THENA%(N)=223 :rem 225
152 IFB%=34THENN=N+1:A%(N)=195:PRINT"C ";
:IFH%=2THENA%(N)=225 :rem 233
156 IFB%=18THENN=N+1:A%(N)=201:PRINT"D ";
:IFH%=2THENA%(N)=228 :rem 231
160 IFB%=49THENN=N+1:A%(N)=207:PRINT"E ";
:IFH%=2THENA%(N)=231 :rem 231
162 IFB%=42THENN=N+1:A%(N)=209:PRINT"F ";
:IFH%=2THENA%(N)=232 :rem 230
166 IFB%=19THENN=N+1:A%(N)=215:PRINT"G ";
:IFH%=2THENA%(N)=235 :rem 239
170 IFB%=17THENN=N+1:A%(N)=183:PRINT"A ";
:IFH%=2THENA%(N)=219 :rem 232
174 IFB%=10THENN=N+1:A%(N)=50:PRINT"{RVS}
R{OFF} "; :rem 177
176 IFB%=54THENN=N+1:A%(N)=0:PRINT"{RVS}↑
{OFF} "; :rem 146
178 POKE36876,A%(N) :rem 14
180 GOTO100 :rem 99
200 IFB%=23THEN425:REM *SHIFTED KEYS*
:rem 169
203 IFN%=208THEN100 :rem 46
204 IFB%=7THEN400 :rem 195
205 IFB%=34THENN=N+1:A%(N)=199:PRINT"C#";
:IFH%=2THENA%(N)=227 :rem 17
210 IFB%=18THENN=N+1:A%(N)=203:PRINT"D#";
:IFH%=2THENA%(N)=229 :rem 4
215 IFB%=42THENN=N+1:A%(N)=212:PRINT"F#";
:IFH%=2THENA%(N)=233 :rem 3
220 IFB%=19THENN=N+1:A%(N)=217:PRINT"G#";
:IFH%=2THENA%(N)=236 :rem 12
225 IFB%=17THENN=N+1:A%(N)=187:PRINT"A#";
:IFH%=2THENA%(N)=221 :rem 9
230 POKE36876,A%(N) :rem 3
250 GOTO100 :rem 97
300 FORL=1TON:REM *PLAYBACK* :rem 222
320 J=2*L+38486:J%=PEEK(J):POKEJ,5:POKEJ+
1,5 :rem 38
330 IFA%(L)=0THENPOKE36876,0:GOTO350
:rem 104
340 POKE36876,A%(L):FORQ=1TO250:NEXTQ
:rem 231
350 POKEJ,J%:POKEJ+1,J%:NEXTL :rem 27
360 GOTO100 :rem 99
375 IFN=N%ANDN=0THEN100:REM *DELETE*
:rem 159
376 IFN=N%THENN=N-1:N%=N:PRINT"{2 LEFT}
{2 SPACES}{2 LEFT}";:GOTO100 :rem 137
380 FORT=N+1TON% :rem 211
382 TP=2*T+7766:TC=2*T+38486 :rem 41
384 T1%=PEEK(TP+2):T2%=PEEK(TP+3):POKETP,
T1%:POKETP+1,T2% :rem 186
386 T3%=PEEK(TC+2)AND7:POKETC,T3%:POKETC+
1,T3% :rem 10
388 A%(T)=A%(T+1):NEXTT :rem 31
390 POKETP,32:POKETP+1,32:N%=N%-1:rem 131
395 GOTO102 :rem 109
400 FORT=N%TON+1STEP-1:REM *INSERT*
:rem 173
405 TP=2*T+7766:TC=2*T+38486 :rem 37
410 T1%=PEEK(TP):T2%=PEEK(TP+1):POKETP+2,
T1%:POKETP+3,T2% :rem 176
412 T3%=PEEK(TC)AND7:POKETC+2,T3%:POKETC+
3,T3% :rem 2
414 A%(T+1)=A%(T):NEXTT :rem 21
416 N%=N%+1:POKETP,32:POKETP+1,32:rem 178
420 GOTO102 :rem 98
425 IFN=0THEN100:REM *CURSOR LEFT*:rem 32
427 N=N-1:Y=2*N+38488:Y%=PEEK(Y)AND7:IFY%
=2THENPOKEY,7:POKEY+1,7 :rem 167
428 IFY%=6THENPOKEY,5:POKEY+1,5 :rem 181
430 FORL=1TO100:NEXTL:PRINT"{2 LEFT}";:GO
TO102 :rem 183
450 Y=2*N+7768:IFPEEK(Y)=32THEN100:REM *C
URSOR RIGHT* :rem 168
452 Y=2*N+38488:Y%=PEEK(Y)AND7:IFY%=5THEN
POKEY,6:POKEY+1,6 :rem 53
453 IFY%=7THENPOKEY,2:POKEY+1,2 :rem 174
455 FORL=1TO100:NEXTL:PRINT"{2 RIGHT}";:N
=N+1:GOTO102 :rem 45
500 PRINT"{CLR}[UP]DATA FOR SONG:";N;:REM
*PRINT DATA* :rem 217
520 FORL=1TON:PRINT"{LEFT},";A%(L);
:rem 118
525 IFL=70ORL=144THENPRINT:PRINT"{RVS}
{3 SPACES}PRESS ANY KEY TO{6 SPACES}C
ONTINUE{11 SPACES}{OFF}"; :rem 234
527 IFL=70ORL=144THENM=PEEK(197):IFM=64TH
EN527 :rem 58
530 NEXTL :rem 35
535 PRINT:PRINT"{RVS}{RED}PRESS D TO REPE
AT DATAPRESS S TO START AGAINPRESS X
{SPACE}TO STOP{7 SFACES}{BLU}{OFF}"
:rem 162
540 LL=PEEK(197):IFLL=41THENRUN :rem 172
545 IFL=18THEN500 :rem 47
547 IFL<>26THEN540 :rem 113
550 POKE198,0:POKE808,112:STOP :rem 16
600 FORL=1TO200:NEXT:POKE36876,0:REM *SEA
RCH MODE* :rem 5
602 B%=PEEK(197):IFB%=64THEN602 :rem 241
603 IFB%=39THENPRINT"{RED}";:H%=2:GOTO600
:rem 174
604 IFB%=47THENPRINT"{BLU}";:H%=1:GOTO600
:rem 176
606 IFB%=63THEN100 :rem 248
608 IFPEEK(653)=1THEN650 :rem 121
610 IFB%=35THENSE%=191:IFH%=2THENSE%=223
:rem 91
612 IFB%=34THENSE%=195:IFH%=2THENSE%=225
:rem 98
614 IFB%=18THENSE%=201:IFH%=2THENSE%=228
:rem 93
616 IFB%=49THENSE%=207:IFH%=2THENSE%=231
:rem 99
618 IFB%=42THENSE%=209:IFH%=2THENSE%=232
:rem 97
620 IFB%=19THENSE%=215:IFH%=2THENSE%=235
:rem 94
622 IFB%=17THENSE%=183:IFH%=2THENSE%=219
:rem 100
624 POKE36876,SE%:GOTO600 :rem 203
650 IFB%=34THENSE%=199:IFH%=2THENSE%=227
:rem 106

```


COMPUTE! Back Issues

Here are some of the applications, tutorials, and games from available back issues of COMPUTE!. Each issue contains much, much more than there's space here to list, but here are some highlights:

Home and Educational COMPUTING! (Fall 1981 and Summer 1981 — count as one back issue): Exploring The Rainbow Machine, VIC As Super Calculator, Custom Characters On The VIC, Alternative Screens, Automatic VIC Line Numbers, Using The Joystick (Spacewar Game), Fast VIC Tape Locator, Window, VIC Memory Map.

May 1981: Named GOSUB/GOTO in Applesoft, Generating Lower Case Text on Apple II, Copy Atari Screens to the Printer, Disk Directory Printer for Atari, Realtime Clock on Atari, PET BASIC Delete Utility, PET Calculated Bar Graphs, Running 40 Column Programs on a CBM 8032, A Fast Visible Memory Dump, Cassette Filing System, Getting To A Machine Language Program, Epidemic Simulation.

June 1981: Computer Using Educators (CUE) on Software Pricing, Apple II Hires Character Generator, Ever Expanding Apple Power, Color Burst for Atari, Mixing Atari Graphics Modes 0 and 8, Relocating PET BASIC Programs, An Assembler In BASIC for PET, Quadra PET: Multitasking?, Mapping Unknown Machine Language, RAM/ROM Memory, Keeping TABs on a Printer.

July 1981: Home Heating and Cooling, Animating Integer BASIC Lores Graphics, The

Apple Hires Shape Writer, Adding a Voice Track to Atari Programs, Machine Language Atari Joystick Driver, Four Screen Utilities for the PET, Saving Machine Language Programs on PET Tape Headers, Commodore ROM Systems, Using TAB, SPC, And LEN.

August 1981: Minimize Code and Maximize Speed, Apple Disk Motor Control, A Cassette Tape Monitor for the Apple, Easy Reading of the Atari Joystick, Blockade Game for the Atari, Atari Sound Utility, The CBM "Fat 40," Keyword for PET, CBM/PET Loading, Chaining, and Overlaying, Adding A Programmable Sound Generator, Converting PET BASIC Programs To ASCII Files.

October 1981: Automatic DATA Statements for CBM and Atari, VIC News, Undeletable Lines on Apple, PET, and VIC; Budgeting on the Apple, Atari Cassette Boot-tapes, Atari Variable Name Utility, Atari Program Library, Train Your PET to Run VIC Programs, Interface a BSR Remote Control System to PET, A General Purpose BCD to Binary Routine, Converting to Fat-40 PET.

December 1981: Saving Fuel \$\$ (multiple computers), Unscramble Game (multiple computers), Maze Generator (multiple computers), Animating Applesoft Graphics, A Simple Atari Word Processor, Adding High Speed Vertical Positioning to Atari P/M Graphics, OSI Supercursor, A Look At SuperPET, Supermon for PET/CBM, PET Mine Maze Game, Replacing The INPUT# Command, Foreign Language Text on The Commodore Printer, File Recovery.

January 1982: Invest (multiple computers), Developing a Business Algorithm (multiple computers), Apple Addresses, Lowercase with Unmodified Apple, Cryptogram Game for Atari, Superfont: Design Special Character Sets on Atari, PET Repairs for the Amateur, Micromon for PET, Self-modifying Programs in PET BASIC, Tinymon: a VIC Monitor, VIC Color Tips, VIC Memory Map, ZAP: A VIC Game.

May 1982: VIC Meteor Maze Game, Atari Disk Drive Speed Check, Modifying Apple's Floating Point BASIC, Fast Sort For PET/CBM, Extra Atari Colors Through Artifacts, Life Insurance Estimator (multiple computers), PET Screen Input, Getting The Most Out Of VIC's 5000 Bytes.

August 1982: The New Wave Of Personal Computers, Household Budget Manager (multiple computers), Word Games (multiple computers), Color Computer Home Energy Monitor, A VIC Light Pen For Under \$10, Guess That Animal (multiple computers), PET/CBM Inner BASIC, VIC Communications, Keyprint Compendium, Animation With Atari, VIC Curiosities, Atari Substring Search, PET and VIC Electric Eraser.

September 1982: Apple and Atari and the Sounds of TRON, Commodore Automatic Disk Boot, VIC Joysticks, Three Atari GTIA Articles, Commodore Disk Fixes, The Apple Pilot Language, Sprites and Sound on the Commodore 64, Peripheral Vision Exerciser (multiple computers), Banish INPUT Statements (multiple computers),

COMPUTE! Back Issues

Charades (multiple computers), PET Pointer Sort, VIC Pause, Mapping Machine Language, Commodore User-defined Functions Defined, A VIC Bug.

January 1983: Sound Synthesis And The Personal Computer, Juggler And Thunderbird Games (multiple computers), Music And Sound Programs (multiple computers), Writing Transportable BASIC, Home Energy Calculator (multiple computers), All About Commodore WAIT, Supermon 64, Perfect Commodore INPUTs, VIC Sound Generator, Copy VIC Disk Files, Commodore 64 Architecture.

March 1983: An Introduction To Data Storage (multiple computers), Mass Memory Now And In The Future, Games: Closeout, Boggler, Fighter Aces, Letter And Number Play (all for multiple computers), VIC Music, Direct Atari Disk Access, Automatic Commodore Program Selector, PET Quickplot, A Commodore Gotcha, VIC and Atari Memory Management, Friendly VIC INPUTs.

April 1983: Selecting The Right Word Processor, Air Defense (multiple computers), Commodore Structure BASIC, Retirement Planner (multiple computers), Dr. Video For Commodore, Atari Filefixer, Video 80:80 Columns For The Atari, VIC-word, Magic Commodore BASIC, A BASIC Hex Editor For VIC, VIC Music Theory.

May 1983: The New Low Cost Printer/Plotters, Jumping Jack (multiple computers), Deflector (multiple computers), VIC Kaleidoscope, Graphics on the Sinclair/Timex, Bootmaker For

VIC, PET and 64, VICSTATION: A "Paperless Office," The Atari Musician, Puzzle Generator (multiple computers), Instant 64 Art, 64 Odds And Ends, Versatile VIC Data Acquisition, POP For Commodore.

June 1983: How To Buy The Right Printer, The New, Low-cost Printers, Astrostorm (multiple computers), The Hawkmen Of Dindrin (multiple computers), MusicMaster For The Commodore 64, Commodore Data Searcher, Atari Player/Missile Graphics Simplified, VIC Power Spirals, Un NEW For The VIC and 64, Atari Fast Shuffle, VIC Contractor, Commodore Supermon Q & A.

July 1983: Constructing The Ideal Computer Game, Techniques For Writing Your Own Adventure Game, SpeedSki And Time Bomb (VIC), Castle Quest And Roadblock (Atari), RATS! And Goblin (64), How To Create A Data Filing System (multiple computers), How To Back Up Disks For VIC And 64, Atari Artifacts, All About The Commodore USR Command, TI Mailing List.

August 1983: Weather Forecaster (multiple computers), First Math And Clues (multiple computers), Converting VIC And 64 Programs To PET, Atari Verify, Apple Bytechanger, VIC And 64 Escape Key, Banish Atari INPUT Statements, Mixing Graphics Modes On The 64, VICplot, VIC/64 Translations: Reading The Keyboard, Musical Atari Keyboard, VIC Display Messages.

September 1983: Games That Teach, Caves Of Ice, Diamond Drop, Mystery Spell, and Dots

(multiple computers), VIC Pilot, Ultrasort (VIC, 64, PET), Easy Atari Page Flipping, Computer Aided Design On The TI, Relative Files On The VIC/64, Atari Fontbyter, TI Sprite Editor, All About Interrupts (multiple computers), Cracking The 64 Kernal, Making Change On The Timex/Sinclair, Build Your Own Random File Manager (multiple computers).

October 1983: Computer Games By Phone, Coupon File (multiple computers), Dragon Master And Moving Maze (multiple computers), Merging Programs From Commodore Disks, Atari Master Disk Directory, Sprites In TI Extended BASIC, Commodore EXEC, Multicolor Atari Character Editor, High Speed Commodore Mazer, Apple Sounds, Extra Instructions (multiple computers), Commodore DOS Wedges, Invisible Disk Directory For VIC And 64.

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```

652 IFB%=18THENSE%=203:IFH%=2THENSE%=229      120 PRINT"[3 DOWN]{2 RIGHT}> ";           :rem 74
                                           :rem 98
654 IFB%=42THENSE%=212:IFH%=2THENSE%=233      125 GETGU$:IFGU$=""THEN125                 :rem 9
                                           :rem 92
656 IFB%=19THENSE%=217:IFH%=2THENSE%=236      130 IF (ASC(GU$)<65 OR ASC(GU$)>71) AND A
                                           :rem 106
658 IFB%=17THENSE%=187:IFH%=2THENSE%=221      0                                           :rem 26
                                           :rem 33
660 POKE36876,SE$:GOTO600                    135 PRINTGU$;                               :rem 124
                                           :rem 106
                                           140 IF GU$="Q" THEN160                       :rem 203
                                           145 IF GU$=N$(0,B) THEN GOSUB 500:rem 5
                                           150 IF GU$<>N$(0,B) THEN GOSUB 600:rem 5
                                           155 IFR+W<>0THENSC=INT((R/(R+W))*100+.5):
NEXT                                           :rem 159
160 PRINT"{CLR}{5 DOWN}{RIGHT}YOUR SCORE
{SPACE}WAS";SC;"{LEFT}%
165 PRINT"{3 DOWN}{2 RIGHT}WOULD YOU LIKE
TO":PRINT"{DOWN}{5 RIGHT}PLAY AGAIN"
;:INPUTY$                                     :rem 239
170 IF LEFT$(Y$,1)="Y" THEN RUN              :rem 159
175 PRINT"{CLR}":POKE36879,27:END           :rem 33
500 SD=36874:FORZ=SDTOSD+4:POKEZ,0:NEXT
                                           :rem 245
510 POKESD+4,15:PRINT"[2 DOWN]";           :rem 181
520 FOR Z=128TO255STEP2:PRINTTAB(8);"
{DOWN}{WHT}{RVS}CORRECT{OFF}":POKESD,
P                                             :rem 75
530 PRINTTAB(8);"{UP}CORRECT{2 UP}{BLU}":
POKESD+1,383-Z:NEXTZ                         :rem 104
540 R=R+1:POKESD+4,0:FORZ=1TO1000:NEXT:RE
TURN                                           :rem 113
600 SD=36874:FORZ=SDTOSD+4:POKEZ,0:NEXT
                                           :rem 246
610 POKESD+4,15:PRINT"[5 LEFT]{WHT}SORRY
{SPACE}THAT'S INCORRECT":PRINT"
{7 RIGHT}IT WAS ";N$(0,B)                 :rem 92
620 POKESD,158:FORZ=1TO750:NEXTZ           :rem 35
630 W=W+1:POKESD+4,0:FORZ=1TO950:NEXT:RET
URN                                           :rem 88
800 DATA 32,32,32,32,32,225,225,32,32,32
                                           :rem 152
801 DATA 32,32,32,32,255,32,32,127,32,160
                                           :rem 207
802 DATA 255,97,127,254,225,255,127,98,22
5,255                                         :rem 246
803 DATA 123,97,97,32,32,252,225,255,32,3
2                                             :rem 25
900 DATA32,118,32,32,32,32                 :rem 34
901 DATA255,32,127,32,32,226               :rem 143
902 DATA127,32,97,32,255,32                 :rem 102
903 DATA32,97,97,97,32,32                 :rem 17
1000 DATAE,F,G,A                             :rem 114
1010 DATAB,C,D,E                             :rem 110
1020 DATAF,G,A,B                             :rem 113
1030 DATAC,C,D,E                             :rem 113
1040 DATAF,G,A,B                             :rem 115
1050 DATAC,D,E,F                             :rem 118
1060 DATAG,A                                 :rem 149
1070 DATA207,209,215,219                     :rem 206
1080 DATA223,225,228,231                     :rem 201
1090 DATA232,235,237,239                     :rem 211
1100 DATA240,195,201,207                     :rem 193
1110 DATA209,215,219,223                     :rem 199
1120 DATA225,228,231,232                     :rem 196
1130 DATA235,237                             :rem 65
2000 SD=36874:FORZ=SDTOSD+4:POKEZ,0:NEXT
                                           :rem 34
2010 POKESD+2,VAL(N$(1,RN%+13)):POKESD+4,
15                                           :rem 171
2020 IFRN%=12THENPRINT"{2 UP}{12 SPACES}
***{DOWN}"                                   :rem 43
2030 FORI=1TO5                                 :rem 59

```

The Note Name Game

(Article on page 112.)

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: The Note Name Game — VIC Version

```

5 DIMN$(1,25),A$(9,3),B$(5,3):R=0:W=0:RO%
=13:SC=0                                     :rem 94
7 FORJ=0TO3:FORI=0TO9:READA$(I,J):NEXT:NE
XT                                           :rem 28
8 FORJ=0TO3:FORI=0TO5:READB$(I,J):NEXT:NE
XT                                           :rem 26
10 FORI=0TO25:READN$(0,I):NEXTI           :rem 136
15 FORI=0TO25:READN$(1,I):NEXTI           :rem 142
25 POKE36879,8:PRINT"{CLR}{2 DOWN}
{2 RIGHT}{BLU}{RVS}THE NOTE NAME GAME
{OFF}"                                       :rem 26
30 PRINT"{DOWN}{3 SPACES}I WILL PLAY A NO
TE":PRINT"{DOWN}FOR YOU AND THEN SHOW"
                                           :rem 182
35 PRINT"{DOWN}YOU THE NOTE ON A":PRINT"
{DOWN}STAFF.{2 SPACES}I WANT YOU TO"
                                           :rem 29
40 PRINT"{DOWN}TELL ME THE NAME OF":PRINT
"{DOWN}THE NOTE."                         :rem 1
50 PRINT"{3 DOWN}INPUT {RVS}B{OFF} FOR BA
SS,{RVS}T{OFF} FOR";"{DOWN}TREBLE, OR
{SPACE}{RVS}M{OFF} FOR MIXED" :rem 100
55 GETES$:IFES$=""THEN55                   :rem 255
60 IFES$<>"T"ANDES$<>"B"ANDES$<>"M"THEN55
                                           :rem 140
65 FORL=1TO10                                :rem 16
70 PRINT"{CLR}{WHT}{2 SPACES}WHAT NOTE IS
THIS?{BLU}"                                 :rem 108
75 PRINT"{HOME}{22 DOWN}{6 RIGHT}{WHT}
{RVS}SCORE{OFF} :";SC;"{LEFT}%
{2 SPACES}{BLU}{HOME}{4 DOWN}" :rem 91
80 RN%=INT(RND(0)*13)                       :rem 153
82 IFRN%=RO%THEN80                          :rem 88
83 RO%=RN%                                   :rem 51
85 CF%=INT(RND(0)*2)                       :rem 85
90 IFES$="B"THENCF%=0                       :rem 110
95 IFES$="T"THENCF%=1                       :rem 134
100 ON CF%+1 GOSUB 3000,2000                :rem 105
105 POKE8023-RN%*22,81:POKE8023+30720-RN%
*22,1                                       :rem 225
110 B=RN%:IFCF%=1THENB=RN%+13             :rem 189
115 FOR Z=1TO500: NEXTZ: POKE36878,0
                                           :rem 38

```