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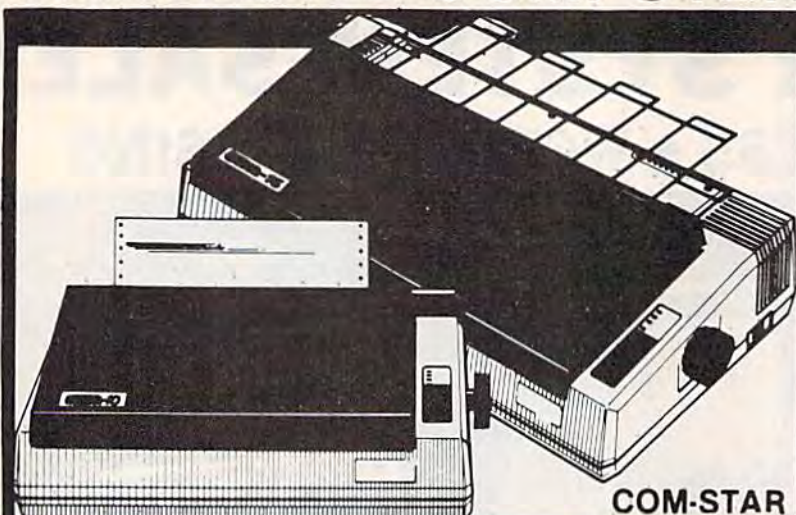
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COMMODORE 64

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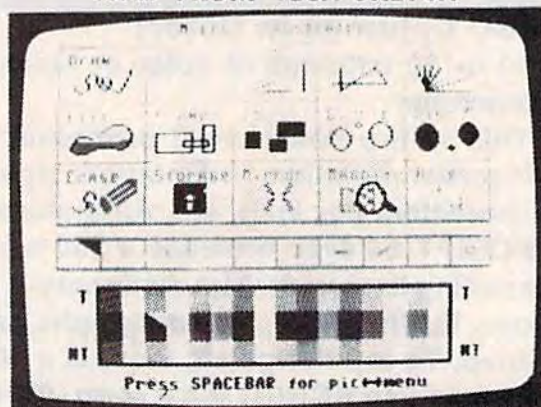
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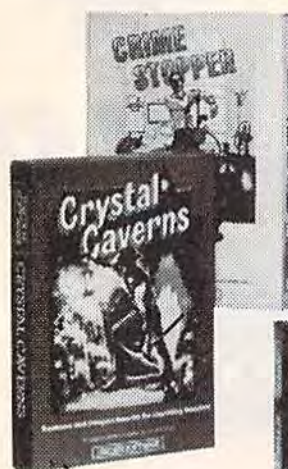
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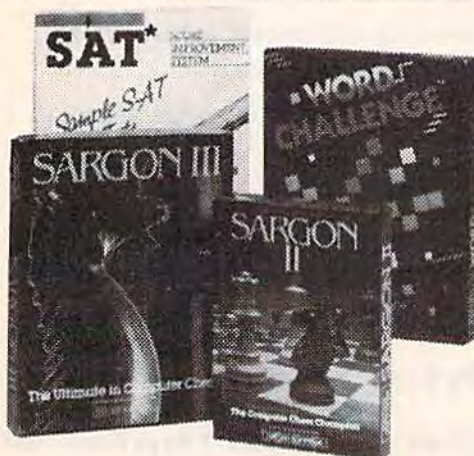
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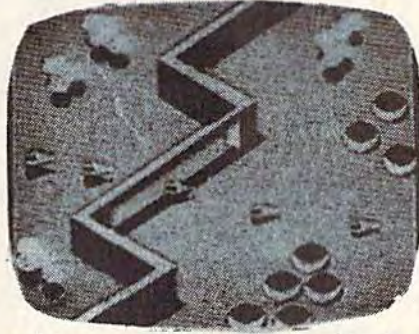
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Actual Screens

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then put a zero into the Y register. The Y register is like the Accumulator, but it is usually used the way `FOR I = 1 TO 200` would be in BASIC—it counts events and can also act as an offset for storage. Notice line 834. We are storing the 5 in the Accumulator at address 37888 (the start of color memory). However, since we have attached the Y to the end of this number, it means that we are using another special addressing mode. This mode will store what's in the Accumulator into the number given (37888 in this example) *plus* whatever number is in the Y register. At this point, zero is in the Y register, so a 5 is POKed into address 37888 + 0. This is how Y can be used as an offset.

Likewise, we also POKE the 5 into 38144 which is halfway up the color memory. In effect, we are going to fill color memory in two chunks, two stages. That's because the Y register can only count up as high as 255 and then it resets itself to zero. To fill an area like the color memory, which is larger than 256 bytes, we need to store twice, with the second storage address being 256 bytes higher than the first (see lines 834 and 837).

How Registers Reset Themselves

At this point, the Y register is decremented with the DEY command. It's the same as saying, in BASIC, `Y = Y - 1`, except that in ML a register cannot go below zero. Instead, it clicks down to 255 when you take it below zero. If you lower it through zero, it looks like this: 4,3,2,1,0,255,254, etc. (This also happens at the other end. If you add 1 to the Y register when it is holding 255, it will become a zero: 254,255,0,1,2, etc. The fact that the registers reset themselves like this is very useful in ML programming.)

In any case, we lower the Y register with the DEY command and then test to see if it has become a zero yet. BNE means Branch if Not Equal to zero. The first time through this loop, Y was pulled down from 0 to 255 so the computer is forced to branch back to line 834. 255 is not zero. This time around, the POKes will go into different addresses within color memory than they did the first time. Now Y (added to the 37888 or 38144) will produce a different target address for the POKE. By continuing through this loop until Y has been decremented to zero, we manage to fill the entire color memory with the number 5.

After going through the loop 256 times in this way, Y has finally counted down to zero and so we won't, for once, be forced to branch from line 841. Instead, we fall through to line 843 which puts a 0 into the X register, which acts much like the Y register. In the next loop, we're going to use the X register as an offset.

Making An Endless Loop

Now that color memory is set up, we create a second loop which is functionally identical to the first except that this time our purpose is to move sections of the computer's memory to the screen. We're going to send the 256 bytes which start at address 0 and another 256 bytes which start at address 512. This time we'll use a +X addressing mode to load the Accumulator as well as store the Accumulator (LDA and STA). Rather than use a branch instruction, however, this time we end the loop with a jump (JMP) which will always send us back up to the start of the loop. This endless loop will continually display memory on screen until you press RUN/STOP and RESTORE.

Using The Assembler

When you are using this assembler (Program 1) you should follow the addressing mode conventions which appear on screen whenever you run it (see lines 150-185). In a nutshell, you use no commas or \$ symbols. Not only is this easier to type, but also it allows the assembler to use a simple INPUT statement to receive your program lines. Many 6502 assemblers require that you separate numbers from symbols with a comma, as in: `STA 37888,Y`. They also require that you use hexadecimal numbers which are preceded by the \$ symbol. If you should want to use hexadecimal with this assembler, just change line 10 so that `H = 1`. If you don't know what hexadecimal is, it's just as well. That's a subject for a future lesson. You can program in ML without it anyway.

The disassembly examples above show the format for entering ML commands into the assembler. To make all this clear, let's type in and run the example ML program.

1. Load the assembler program (Program 1) and make sure line 10 says `H = 0` because we'll be typing in ordinary decimal numbers, just as they appear in the disassembly listing.

2. Run the assembler. After reminding you of its addressing conventions, it will ask you for the starting address. Answer 830 and press RETURN. That's the address where the ML program will be assembled in your computer's RAM memory. It's in the cassette buffer and will be safe there during assembly. When we've finished, you can type `SYS 830` and see the results of our efforts.

3. Now, if your assembler is working correctly, it will clear the screen and list the 830 address with a question mark. It's waiting for your first ML instruction. If you have a VIC, type in the first instruction in the VIC disassembly listing. (If you use a 64, type in the instructions

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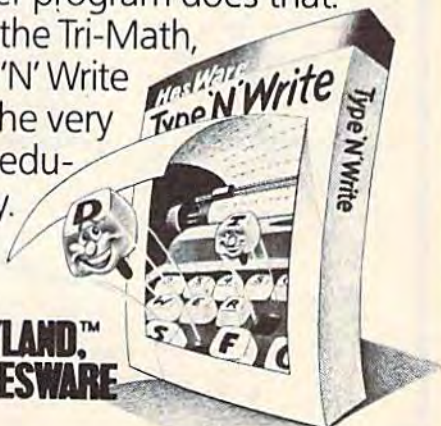
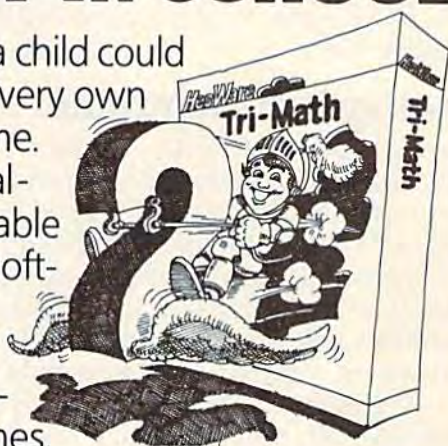
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from the 64 disassembly instead. Otherwise, follow the same process.) Type: LDA #5 and press RETURN. The assembler will pause briefly and then store two numbers (169 and 5) into memory as well as displaying them on screen. (169 is the computer's code for LDA # and 5 is, of course, 5. The purpose of an assembler is to take the commands like LDA which are easy for us to remember and turn them into numbers like 169 which the computer can obey. It's something like the way BASIC tokenizes the word PRINT into the number 153.)

Seeing Your Computer's Clock

After you press RETURN, the assembler will print the next available address and await your next input. Now you would type LDY #0 and press RETURN. Continue on down, typing in all the lines until you've finished with JMP 845. After that line is entered, type END and the assembler will return you to BASIC mode and report where your ML starts and ends in memory.

At this point, you have created a tiny, but complete, ML program which is waiting for you to test it. Just SYS 830 and you should see a screenful of odd characters. We've opened a window to the first 256 bytes in RAM as well as the BASIC keyboard buffer. The character which seems to be constantly rotating is your internal

clock. And if you type on the keyboard, you can see it coming into the keyboard buffer (up to a maximum of ten entries). To exit the program, press RUN/STOP and RESTORE. For a different view, type ?CHR\$(14) to set lowercase mode and SYS 830 again. Try holding down the SHIFT, Commodore, and function keys to see the effects. Since there is more room on the 64 screen, we have opened two extra windows, to show the video and interface chips, in the bottom half of the 64 screen.

Now, break out of the ML program again with RUN/STOP-RESTORE and type LIST. There's the assembler program, still in memory, unaffected by all the excitement. Let's assume you want a different color. Just type RUN. When the assembler fires up, give it 830 as your starting address again and then enter:

LDA #8

and press RETURN. Now type END to stop assembling. You have just caused the assembler to POKE over the previous LDA #5. The rest of the ML program remains the same. Try it. SYS 830 to see the effect.

Some Experiments To Try

If you want to observe different parts of your computer's memory, fiddle with the addresses given in lines 845 and 851 of the disassembly (lines 851, 856, 862, and 868 in the 64 version). What would happen if you had the contents of the screen sent to the screen? How about sending things from an address just slightly above or below the start of screen memory? What if you put different numbers into the Y registers with LDY? You can make any adjustments you like by just giving the assembler the starting address of where you want to write over something and typing END when you're finished.

Programs 2 and 3 are ordinary BASIC. They contain, in DATA statements, the VIC and 64 versions of this same program. If you have problems assembling, you could just type the loaders in, run, and then SYS 830 to see the same effects. Remember that the assembler changed our LDA #5 into 169 5 which it then POKEd into RAM memory? Notice the first two numbers in the DATA statements of Program 2. This should clarify how BASIC loader programs can create ML programs. A BASIC loader just holds a prewritten, freeze-dried ML program in DATA which it then POKEs into some spare RAM memory. There is no particular advantage to a BASIC loader except that on the VIC and 64, you can more easily save and load such programs to or from tape or disk.

See program listing on page 197. ☐

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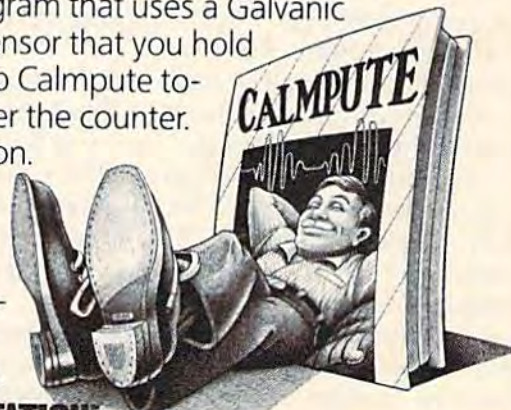
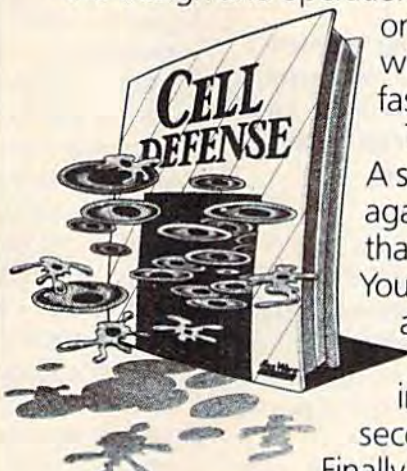
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Tom R. Halfhill
Staff Editor

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Each month, COMPUTE!'s GAZETTE will tackle some questions commonly asked by new Commodore 64/VIC-20 users and by people shopping for their first home computer.

If you have a question you'd like to see answered here, send it to this column, c/o COMPUTE!'s GAZETTE, P. O. Box 5406, Greensboro, NC 27403.

Q. *I've had some trouble getting my new modem to work with my computer. Sometimes the phone link disconnects for no reason, and other times everything I send or receive comes across as garbage. What's going on?*

A. Modems can be very finicky devices. Some people are lucky enough to get them working right away, while others struggle endlessly with all kinds of mysterious problems. We'll discuss some of the difficulties we've encountered in our own experience and suggest some possible solutions.

To begin with, make sure the modem, telephone line, and computer are all hooked up properly. Even if you're positive everything is correct, review the instructions and check again. One time we spent ten minutes trying to figure out why a modem wouldn't generate a carrier tone, only to discover that its power cord was plugged into a wall socket controlled by a light switch—and the switch was turned off. Another time we got a carrier tone, but couldn't understand why a file refused to upload—the sending modem wasn't plugged into the computer interface. You'd be surprised how many telecommunications troubles can be traced to such simple mistakes.

Another thing to watch for is whether you are *originating* or *answering*. If you own a Commodore modem, there should be a switch on the side labeled O/A. If you're calling a commercial bulletin board, you're originating the call and the switch should be set to O. If you're calling a

friend, one of you will be originating, the other answering.

Be certain the terminal program you're using is compatible with the modem. Then be sure you've adjusted the program correctly for the computer and modem at the *other end* of the phone line. Some computers require different parameters for parity, stop bits, word length, and so on. Any good terminal program lets you adjust the most important of these parameters. Be prepared to experiment for awhile to find just the right combination. If possible, find someone else with a similar setup who's already communicating with the remote computer and find out what settings they use.

If your program is adjusted properly and you're still sending or receiving garbage characters, it probably means there is "noise" on the line. Noise can be caused by anything from poorly fitting cables to the static of a weak long-distance telephone connection. Keep extension cables between the telephone socket, modem, and computer as short as possible. Keep the phone cables away from power transformers, color TV sets and monitors, and other devices emitting strong magnetic fields. If you hear static on the phone line when you hold a receiver to your ear, the connection may be too poor for reliable telecommunications.

If you're using an acoustic modem instead of a direct-connect, use a phone with a standard handset that fits tightly inside the rubber cups. Don't make any loud noises near an acoustic modem. Remember, modems transmit information over phone lines by sending audible tones. If either modem "hears" any extraneous sounds, it might interpret them as tones and attempt to translate them into characters. One time we were puzzled by occasional garbage characters in a file we were downloading from a distant computer. When we turned off the music playing in the same room, the garbage disappeared.

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possibility, you can have the lines checked by your local phone company. However, phone companies aren't always very cooperative in these cases. They don't certify standard residential lines for telecommunications purposes, so they may not feel obligated to check and repair your lines if they work for regular voice transmissions. Also, if they check your lines and find that something else is to blame, they might charge you for the service call.

If you've succeeded in establishing a link with the remote computer, but the connection is occasionally disrupted, two common problems are party lines and call-waiting services. You should lease a private line if you'll be doing much telecomputing. Otherwise your links will be interrupted everytime someone else on the party line picks up the phone to make a call. The same goes for call-waiting services: The audible click which is your signal that another caller is trying to reach you will confuse the modem and disrupt the link.

Sometimes a modem problem will be so mysterious that you'll never solve it. This happened to one of our editors. His new direct-connect modem on his home system refused to receive anything but garbage. Step by step we

eliminated the possibilities: Everything was hooked up properly; the software was compatible; the communications parameters were correct; and the modem even worked perfectly with the same computer and software on other people's phones around town. Therefore, it seemed that the phone lines were to blame. But when the local phone company finally agreed to check the lines, it declared nothing was wrong.

Then we discovered that another editor's old acoustic modem worked fine on the stubborn system. It didn't make sense—both modems were transmitting at 300 baud and were hooked up exactly the same way, except the new one was direct-connect and the old one was acoustic-coupled. Nobody could explain why one worked and the other didn't. Our final "solution": Since the direct-connect modem worked fine on the other editor's system, they simply traded modems.

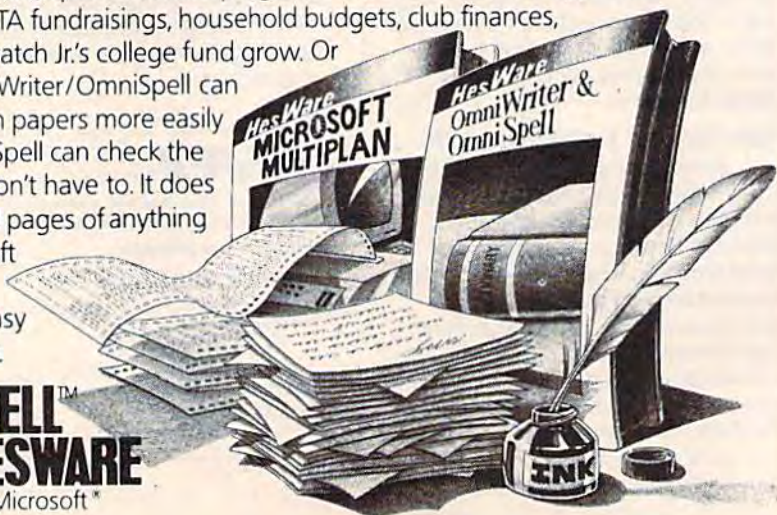
Another acquaintance with similar problems discovered that his 64 and modem worked on the telephone in the living room, but did not work on the extension in the family room (where the computer was originally set up). Since one phone line was apparently cleaner, the simple solution was to move the computer. ☐

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SLOWPOKE

Daniel R. Widyono

This very short machine language program, from a twelve-year-old author and programmer, allows you to control the speed of the PRINT command. We've added some suggestions for using this unique routine. For the VIC and 64.

When a Commodore 64 or VIC-20 is printing something or listing a program, you can slow it down by pressing the CTRL key. You have a choice of two speeds, regular and slow. If you've ever used an Apple II, you probably know that it gives you a wider choice; there are 256 printing speeds.

Can a similar feature be added to the VIC or 64? You could use a BASIC subroutine, although it would be rather complicated. You would have to define a string, do a FOR-NEXT loop for the length of the string, use MID\$ to pull out a character, print the character, use another FOR-NEXT loop for the delay, then continue until the message is done. The subroutine would work only as part of a program. You'd still have to press CTRL to slow down program listings.

A Better Way

There's a short, simple, and effective machine language alternative to the BASIC subroutine.

Enter and save the following program:

```
10 CK=0:POKE251,0
20 FORJ=679TO703:READA:CK=CK+A:POKEJ,A:NE
  XT
25 IFCK<>3615THENPRINT"CHECK DATA STATEME
  NTS":END
30 DATA72,138,72,152,72,8,166,251,240,8,1
  60,255,136,208,253,202,208,248,40
40 DATA104,168,104,170,104,76
50 IFPEEK(807)<>2THENPOKE704,PEEK(806):PO
  KE705,PEEK(807)
60 POKE806,167:POKE807,2
```

Now run the program and type LIST. It lists as you would expect. Type:

POKE 251,255:LIST

and you'll see a very slow listing. The program takes more than a minute to list (compared to less than a second at the regular speed). POKE a 0 into 251 and the computer returns to normal.

You now have 256 different printing speeds, from zero, the fastest, to 255, the slowest. There's no need to use a BASIC subroutine or to

SYS. Just POKE the speed you want into memory location 251. It works within programs and also in immediate mode. It even slows down error messages and the READY prompt. If you use a printer while "Slowpoke" is on, it will wait in between lines (but not between characters). You'll notice, however, that it does not affect your typing; the computer still reads the keyboard at the regular speed.

Pressing RUN/STOP-RESTORE disables Slowpoke. To get it back, you have to either RUN the loader program again or type:

POKE 806,167: POKE 807,2

(If you use these POKes, make sure you put them on the same line, separated by a colon.)

How It Works

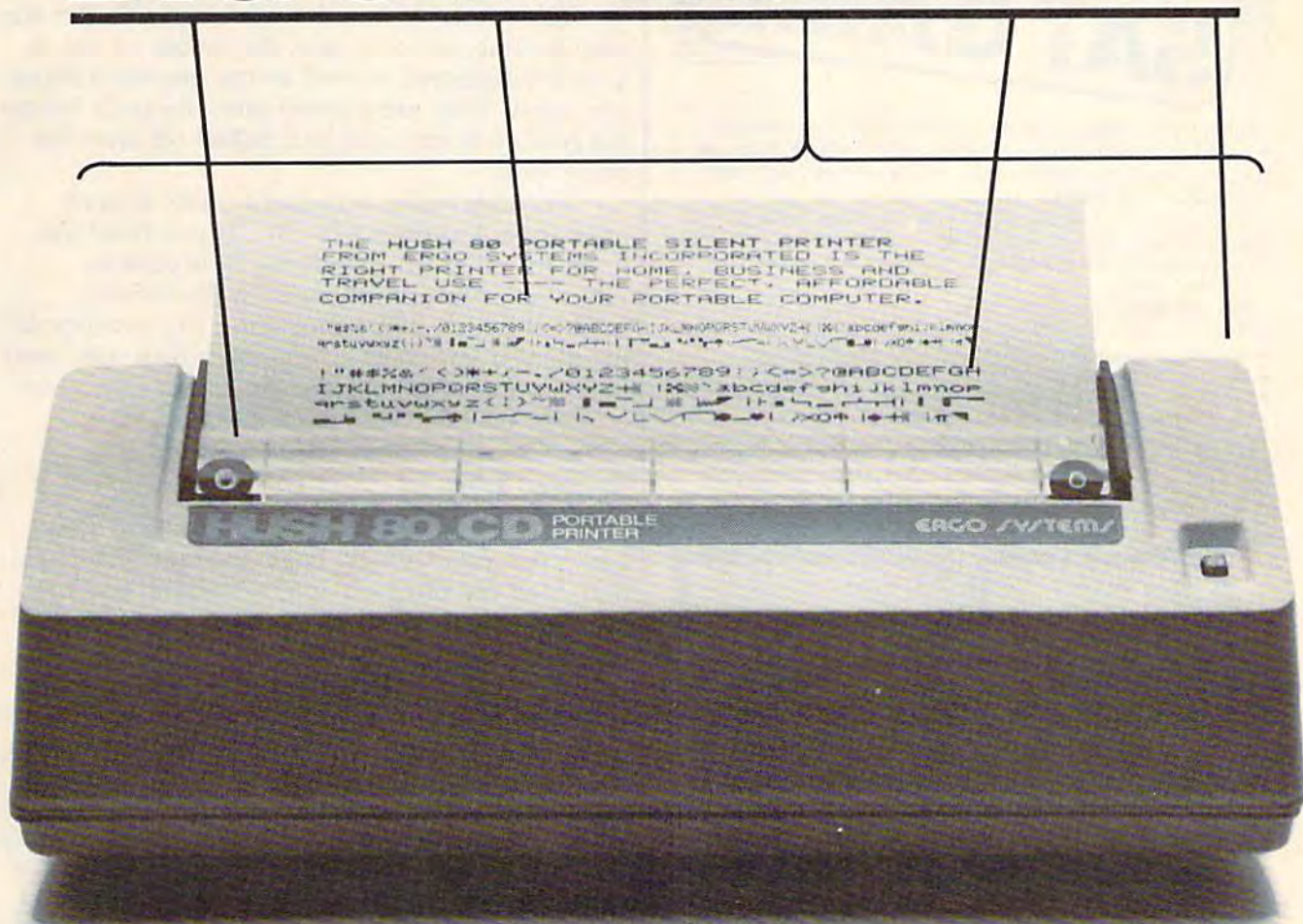
I was looking through a memory map and discovered a *vector* at 806-807 which points to the character out (CHROUT) routine in the operating system. The Kernal CHROUT vector (in ROM, which cannot be POKed) uses this vector (in RAM, where it can be changed) to find the routine which sends a character out to screen memory, to a printer, or to a tape or disk file.

When the computer gets an instruction to PRINT, it checks the Kernal vector, goes to this vector, and finally ends up at the instructions for printing. The computer has to look up the address for every character it prints, even if the characters are part of a long string. The address is stored in the usual low byte/high byte format.

Vectors are like highway signs pointing the way to a destination (in this case, the character out routine). By changing the numbers in memory locations 806 and 807, we can change the route, adding a slight detour, a machine language delay loop. When the computer tries to PRINT or LIST, the vector at 806-807 sends it to the delay loop, which is followed immediately by a jump to the usual CHROUT part of the operating system.

Since machine language is so fast, we need two delay loops, one inside the other. First, the X register is loaded from location 251. If 251 holds a zero, the rest of the loop is skipped (using BEQ, Branch if Equal to zero). Then the Y register is loaded with the number 255. Y is decremented (DEY) until it becomes zero. Next, X is decremented and a BNE instruction (Branch

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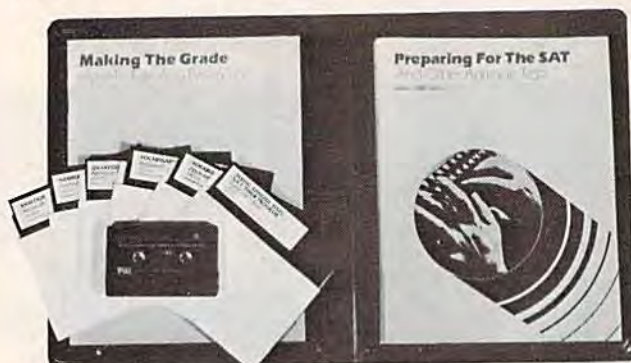
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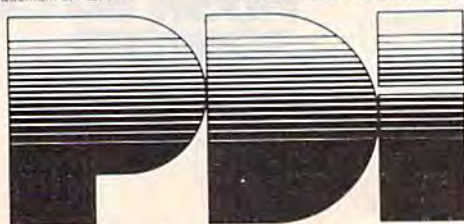
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if Not Equal) loops back to the DEY loop. The higher the number in 251, the longer the loops take. At the slowest printing speed, X has to be decremented 255 times, while Y is decremented 255×255 (over 65,000) times.

The values of X and Y are always 0 after the loop is done, so to be safe, the values of the A, X, and Y registers, as well as the processor status, are saved. They are pushed onto the stack before the routine is executed and pulled off after the delay loop.

The delay loop occupies a small area of memory at locations 679-767. If you need this RAM for other ML programs, Slowpoke is relocatable. You can move it to the cassette buffer (location 828 on) or other free sections of memory. If you have a program which uses zero page location 251, change the 251 in line 30 to another available zero page location.

Some Ideas

One useful application of Slowpoke is to slow down program listings. Load and run Slowpoke, then load the program you're working on. You can control the speed of the listing with a single POKE.

If you are working on a game and the rules take up a couple of screens, you can use this program to make them slowly scroll up, rather than the usual method of printing a screen and waiting for the user to press a key to get the next page. This same idea could be adapted to a story program; at the end of the story, roll the credits (just like at the movies). Many programs which put a lot on the screen could use a printing speed control.

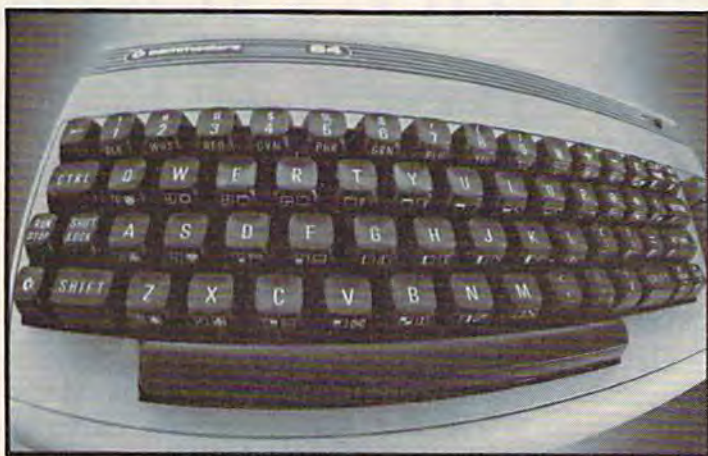
The program is a good debugging tool if you are having problems getting the screen graphics just right. You should note, though, that only the PRINT command is affected; POKEing to screen memory is not any slower than usual.

Slowpoke could be very useful with a program which examines tape or disk files. You would open the file, read an item, print it to the screen, then use a GET statement to see if a key has been pressed. If not, then continue with the next item. If f1 is pressed, speed up the printing; if f7 is pressed, make it slower. It might even be adapted to a speed reading program.

Finally, if you're familiar with machine language programming, you could make a slight modification to add sound effects. Just before the delay loop, turn on the noise generator and turn it off at the end of the loop. Each time you printed something, you would hear, say, the clicking of a typewriter. If you wanted to get really fancy, you could add a bell sound at the end of each line.

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HINTS & TIPS

Creating Program Listing Files

Richard N. Wilfong

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Did you know you can LIST programs on your VIC or 64 to tape or disk files? The results are completely different from using SAVE, and there are a variety of interesting applications for this technique.

The Problem: Adding Comments To ML Programs

Micromon is a good machine language monitor, but you end up short of good documentation. Micromon's assembly feature doesn't allow comments (which are similar to BASIC REMark statements). You can send a disassembled program listing to a printer, but if you want comments you have to write them out on paper.

It becomes a problem when you start to work on a machine language program written months earlier. The original notes might help a little, but you usually end up disassembling the program line by line. (Here's an FFD2, which means print. Next, there's an LDA indexed by Y—where did Y get its value?—and now a loop where the accumulator is rotated.) It can be a mess.

The problem can be solved with an unusual application of CMD. You may know how to print BASIC program listings using CMD (OPEN 4,4: CMD 4: LIST). This BASIC command diverts

output from the screen to a previously opened file. CMD 4 sends the program listing to logical device number 4 (in this case the printer) instead of the screen.

Now let's try the same thing, using a disk file to receive the disassembly of an ML program. First, load Micromon and your ML program. In the immediate mode (without a line number), enter:

```
OPEN 2,8,2,"DISKFILE,S,W": CMD 2: SYS 49152
```

First, a sequential file is opened for writing. CMD 2 then tells the computer to send everything to this file instead of the screen. The SYS enables Micromon (assuming you're using Micromon installed at location \$C000 on the 64). If you're using another machine language monitor—Supermon or VICMON, for example—change the SYS value accordingly. And, of course, you can call the file something other than *diskfile*.

If you have a tape drive, change the first part to `OPEN 2,1,1,"TAPEFILE"`.

Now use the D command, with a beginning and ending address, to disassemble your ML program. For example, if you have a program in the cassette buffer, you would enter `.D 033C 03FB`. Your disk or tape drive will run for a few moments. You now have to close the file. Exit from Micromon (using the X command) and type:

```
PRINT#2: CLOSE2
```

The newly created file contains an ASCII disassembly, which can be read (and edited) using *EasyScript*. If you use *SpeedScript* (or *WordPro*), you'll have to change the sequential ASCII file to *SpeedScript* format, using the conversion program in "SpeedScript Revisited" (COMPUTE's GAZETTE, May 1984). Choose option three: *Commodore ASCII to SpeedScript*.

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Listing BASIC Programs To A File

Although I originally used this technique to add comments to a Micromon disassembly, it also works on BASIC listings. Follow these steps:

1. LOAD the BASIC program
2. Enter OPEN2,8,2,"DISKFILE,S,W": CMD 2: LIST
3. Next, PRINT#2: CLOSE2

Tape users should change step 2 to OPEN2,1,1,"TAPEFILE": CMD 2: LIST.

A Few Suggestions

It's possible to read through a saved BASIC program by OPENING the file and using GET# to extract pieces of the program byte by byte. Unfortunately, the program will seem to be jumbled. The most confusing thing is that all BASIC commands are in token form. PRINT, for example, appears in program files as a 153 (you can test this by PEEKing a program when it is in memory).

Listing a program converts the tokens to the corresponding BASIC words. A 153 is translated to the five letters P, R, I, N, T. This same process of detokenization happens when you create a tape or disk file with the OPEN, CMD, LIST se-

quence. The one byte tokens are expanded to the full BASIC commands.

Once the program has been listed to tape or disk, you can do some interesting things.

Assuming you have a word processor and a printer, you can call up the program listing file and edit it as if it were a text file. To make a BASIC program more readable, add some blank lines in between the major routines and sub-routines. Believers in structured programming can indent all FOR-NEXT loops and clean up the format.

Machine language programmers using a monitor like Micromon can add (previously unavailable) comments, to clarify the logic of the program. With a SEARCH or HUNT function, you can find all instances of JSR \$FFD2 and replace it with the easier to understand JSR PRINT. You can label subroutines and tables.

With a multifont printer, you could add bold, italic, or expanded print headlines to your program.


You can also use program listing files to create much more readable listings on your printer. OPEN 4,4: CMD 4: LIST is the most common and simplest way to list to a printer. But certain characters are hard to understand—a reverse heart for "clear screen," a reverse Q for "cursor down," and so on.

Program listing files can help eliminate these difficult characters. First, load the program you want to list. Create a sequential listing file (using the technique described above). Type NEW and enter the following program:

```
1 OPEN1,8,2,"FILENAME,S,R"
2 GET#1,A$:IFA$="{CLR}"THENPRINT"[CLR]";:
  GOTO4
3 PRINTA$;
4 IF ST<>64THEN2
5 CLOSE1
```

Tape users should change line 1 to OPEN 1,1,1,"FILENAME". Make sure that when you type line 2, the first CLR is the SHIFT-CLR/HOME character (reverse heart) and the second CLR is spelled out, inside square brackets.

This program banishes the reverse heart from your program listings. Instead, you see [CLR]. As it is written, it lists to the screen. To adapt it to a printer, you'll have to OPEN a file to the printer and change PRINT to PRINT#. You can expand this lister program to replace inverse function key characters, cursor controls, color characters, and so on. Just add some more IF-THEN checks.

Line 4 is important because it checks the status variable (ST). When ST is 64, it means you've reached the end of the file. The file is then closed and the lister program ends. 

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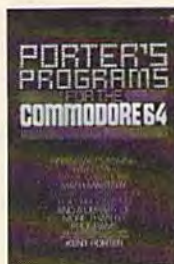
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Charles Brannon
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The nearest cousin to the 64 is Commodore's new Plus/4 computer. An evaluation model arrived recently, so let's take an in-depth look at this new machine. It might be well worth your time to compare the features of your 64 to those of this new "productivity" machine before deciding if the Plus/4 is a worthy replacement or significant addition.

Physically, the Plus/4 is tiny, with barely enough room for the keyboard. But packed inside this small box is a complete 64K computer with color graphics, sound, built-in BASIC, and "productivity software." The keyboard's layout is much like the 64's, with a few keys moved around and some extra functions added. The keys are half as high, with a shorter stroke, almost identical to the keyboard of the portable SX-64. The cursor keys are shaped like arrows and arranged in a special cursor pad. Four small rectangular buttons above the keyboard provide eight function keys, with function 8 labeled as HELP. A second CONTROL key replaces the RESTORE key found on the 64 and VIC.

Along the right side of the computer is a power switch and a chip reset button. The reset button performs a cold reset, wiping out your program as if you turned the power off and on. If you hold down the RUN/STOP key as you press the reset button, you call up the built-in machine language monitor, where you can type X to exit to your unharmed BASIC program. When you hold down RUN/STOP as you turn the power on, the Plus/4 goes straight into the ML monitor with BASIC mapped out, giving you a full 64K of memory. By the way, the Plus/4 uses a 6502-compatible microprocessor. Thanks to the Kernal, many useful ROM calls used on the VIC and 64 will also work unchanged on the Plus/4.

The left side of the computer reveals a TV connector and channel 3/4 switch (called H-L). On the back is a square power connector, a standard round serial bus port, a small round cassette port, a user port, a cartridge slot labeled "memory expansion," two small round joystick ports, and an eight-pin round video socket. The serial bus will accept any VIC/64 serial peripheral, so if you already have a 64, you can use your existing disk drive, printer, and most printer interfaces with

the Plus/4. The video socket works with a standard video monitor or the 1701/1702/1703 monitor via the rear connections.

Most irksome are the joystick and cassette ports. Even though the same circuitry is used, the connectors have been changed, so you can't just plug in your Datassette or any of dozens of joysticks. Printer interfaces that draw power from the 64's cassette board have no place to plug into the Plus/4. Commodore may well have chosen the smaller connectors to more easily pass FCC regulations (smaller, unexposed connectors may transmit less RF interference). It shouldn't be too hard to rig up an adaptor, if a plug for these strange sockets can be found.

A Powerful BASIC

The Plus/4 has a powerful BASIC, with features of disk BASIC 4.0 teamed with Super Expander graphics, and 60K available for BASIC programming. At last, you can access almost every graphics feature without resorting to PEEKs, POKEs, and machine language. SHIFT-RUN/STOP defaults to loading the first program from disk. No more LOAD "\$", 8 or OPEN 15. Commands like DIRECTORY, SCRATCH, and RENAME make disk operations smooth and easy. Additional disk commands are: DLOAD, DSAVE, HEADER (New), BACKUP (works only with dual drives), COLLECT (Validate), and COPY.

Missing is any command to initialize the drive. For this you'll need the old OPEN 15,8,15,"I". Unlike CBM BASIC 4.0, there are no DOPEN or DCLOSE commands.

BASIC has been enhanced with structured statements like DO:LOOP UNTIL and IF/THEN..ELSE. GETKEY waits for a keystroke. PRINT USING makes formatted printouts easy. Programming is much easier with KEY, which lets you redefine the function keys. Functions 1-7 can type out any stream of keys. Function 8 types HELP. When your program crashes on an error, you can press f8 to see where your program stopped, with the offending statement flashing. You can DELETE a range of lines, RE-NUMBER your program, or enter AUTOMATIC line-numbering mode. In TRON (TRace ON) mode, the line number is shown as the line executes. TROFF turns off the trace.

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Sound And Music

Once you've heard the SID chip, the Plus/4's sound is rather disappointing. Still, it has 10-bit resolution, two clear voices, and white noise capability—something of an improvement on the VIC-20 sound chip. It acts like the sound chip used in the TI-99/4A. VOL controls the volume, from 0 (off) to 8 (loud). SOUND x,y,z plays pitch y on voice x for z sixtieths of a second. Using VOL, you can simulate a crude ADSR envelope. It's a usable sound device, with no frills, and it's a lot easier to program than the mighty SID. For games, it should produce acceptable bleeps, blats, whirs, and explosions. The sound is good enough for music. If only we hadn't been spoiled by the SID chip.

121 Colors

The Plus/4 has almost the same text and graphics modes as the 64, but with a plus—121 colors. The basic 16 colors—except black, of course—can be displayed in any of eight brightness levels. This gives you eight grays, or a red ranging from a summer sunset to a flamingo pink; a muddy brown to a lemon-yellow. Since the three grays available on a 64 are replaced by the eight different shades of white, there are some new colors, including blue-green and yellow-green. You have all 121 colors available in text mode. In addition, text can be displayed in reverse color or flashing at the same rate as the cursor. All the Commodore graphics characters are supported, including upper/lowercase mode.

This BASIC is a graphics extravaganza. There are two bit-mapped modes: high resolution and multicolor. High resolution gives you 320×200 dots. Each 8×8 pixel zone (the same area as a single character) can have its own foreground color. When two colored lines intersect, the conflicting region is only one of the colors. You have much better color control but half the horizontal resolution in multicolor, with four non-interfering colors and 160×200 resolution. There are separate memory locations for each color, which you can set with the COLOR statement. Additionally, if you change the third color register, anything drawn in that color will instantly change, letting you make large areas of the screen flash and glow.

The GRAPHIC command selects whether you want high-resolution or multicolor. Two of the modes have a five-line text window at the bottom, so you can try out graphics in direct mode. A fault with the text window is that it's easy to move the cursor out of the window and "under" the graphic screen where you can't see it. You can also elect whether or not to clear the

screen when you change modes. After a GRAPHIC call, BASIC is moved above the graphics screen, and 10K of memory is lost from BASIC to be allocated to graphics. GRAPHIC CLR will return the memory after you are finished with graphics. The text mode is GRAPHIC 0.

Graphics Commands

The DRAW command lets you draw points and connected lines. CHAR is used to place text on either the text screen or on the graphics screen at any X,Y position. BOX can draw any rectangular shape at any angle. The CIRCLE command lets you draw round circles, ovals, arcs, or polygons, in color and at any angle of rotation. PAINT fills in any area of the screen. It can fill any strange shape, as long as it's completely enclosed.

There are no commands for sprites, simply because there are no sprites. How can you program games in BASIC without sprites? Well, you could draw and erase shapes in the graphics modes, which is what GSHAPE and SSHAPE seem to be for. SSHAPE stores a rectangular area of the screen into a string. Since a string can only hold 255 bytes, there is a limit to how big a shape you can grab. GSHAPE can then draw the shape anywhere on the screen. With the Exclusive-OR option of GSHAPE, you can move small objects without disturbing the background, but it's too slow for fast action games. Looks like we'll need turbo-coded machine language for game programming. Another option is character animation, which is fast, but coarse.

Productivity Software: 3 + 1

The built-in word processor, spreadsheet, data base, and bar charts are supposed to be the clincher. Who needs sprites when you have these? When you turn on the computer, pressing f1 switches on the software. It's a big package, with a huge manual. You'd think that easy-to-use software wouldn't need such a large manual. Having used this software, I can only say it's mediocre compared to the best commercial software for the 64.

The word processor comes up with yellow text on a black background, although you can change the colors to a more pleasing combination. It gives you a maximum of 99 lines, not a lot of text, which makes it more appropriate as a letter or memo processor. Horizontal scrolling gives you more than 40 characters per line. It has a lot of features and commands, but is very hard to learn and use. The command TS jumps to the spreadsheet. As spreadsheets go, this one isn't bad, but it is slow. You can split the screen and have the word processor in the top half and the

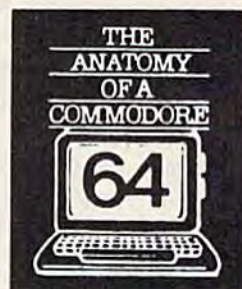
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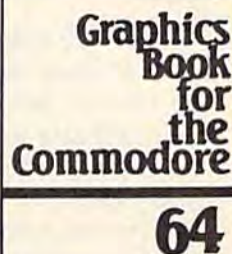
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spreadsheet at the bottom. You can move values from the spreadsheet to the word processor, or move text the other direction.

The so-called graphics option can turn a column of the spreadsheet into a scaled bar chart. The bar chart is several vertical lines made up of # signs, inserted into the word processor. You use the word processor to type in labels and values.

The file manager lets you create records with up to 17 lines, each holding up to 38 characters. The records are stored on their own disk. You must dedicate an entire disk to your data base. You can sort the data, even merge it with the word processor. A search command lets you quickly find a record or series of similar records. This is a minimal program, but it works.

In general, the built-in software is useful, but lacks flair. Instead of being menu driven or activated with keystrokes, the software is controlled in command mode, where you type several characters (the name of the command). Writing or calculating requires you to memorize a list of cryptic sequences. The word processor is clumsy. INST/DEL affects the entire document, not just one paragraph, unless you set a pointer to the current line. INST/DEL works up to a pointer, so you can set and clear pointers as needed, but you have to switch to command mode first. The horizontal scrolling can drive you crazy, since the cursor wraps around at the left margin. It's hard to write when you can't see half of what you've written. The horizontal scrolling is handy for business use, though, making it easier to set up 80-column charts and tables.

It's not clear who will buy this machine, though it may sell well. Software houses are concerned that they can't sell a word processor, spreadsheet, or data base to owners of this machine. They needn't worry. Only a little work is needed to improve on the built-in software. If the Plus/4 succeeds, a translation of *SpeedScript* would be a natural. With the new super-fast parallel disk drive, the SFS 481, which works only with the Plus/4, perhaps small businesses can use the machine. Even though it lacks many game features, the machine has an excellent BASIC and built-in machine language monitor, making it a good machine for teaching and learning programming. The built-in software will at least permit anyone to use the machine right out of the box. Finally, the price is fairly low, just under \$300.

What's intriguing is that this machine costs more than a 64, but *must* be cheaper to produce. In hardware, the most expensive parts are the chips. The Plus/4's single TED chip integrates a video chip, sound chip, a timer, and keyboard

circuitry. All you need is a microprocessor, memory, and a few support chips to make the Plus/4. The case is small, the keyboard probably is cheaper than the 64's, and it uses the less expensive sockets. All in all, Commodore could probably sell this machine for around \$100 and still do well. Perhaps this is their secret plan. The 64 first sold well at \$600, and gobbled up the home computer market like a voracious Pac-Man at \$200. And if the Plus/4 could sell for \$100, why give up your 64? Buy a Plus/4 and you have *two* computers, without re-investing in disk drives and printers.

You can't use much of your 64 software on this machine, except those BASIC programs that don't use POKes, PEEKs, or machine language. (Can you think of any that don't?) If you own both a VIC and a 64, you'll have some idea of the compatibility problems. But the Plus/4 is an interesting machine.

Warp Drive For Your Disk Drive?

You might be interested in a program that lets you load programs three times as fast from your 1541. First mentioned in our CES story, *Kwik-Load* is a simple and effective product. When you load *Kwik-Load* into memory, program LOADs proceed at a bearable pace. It really works. We loaded "Campaign Manager" in 7 seconds with *Kwik-Load* versus the normal 21 seconds. High-resolution screens come in a line at a time. It seems that this is the solution to 1541 "wait states."

But *Kwik-Load* has many limitations. It cannot load most commercial software or programs like *SpeedScript* which take over the entire machine. Apparently, *Kwik-Load* requires a little space at the tail end of the reserved block \$C000-\$CFFF, which isn't a very safe space after all.

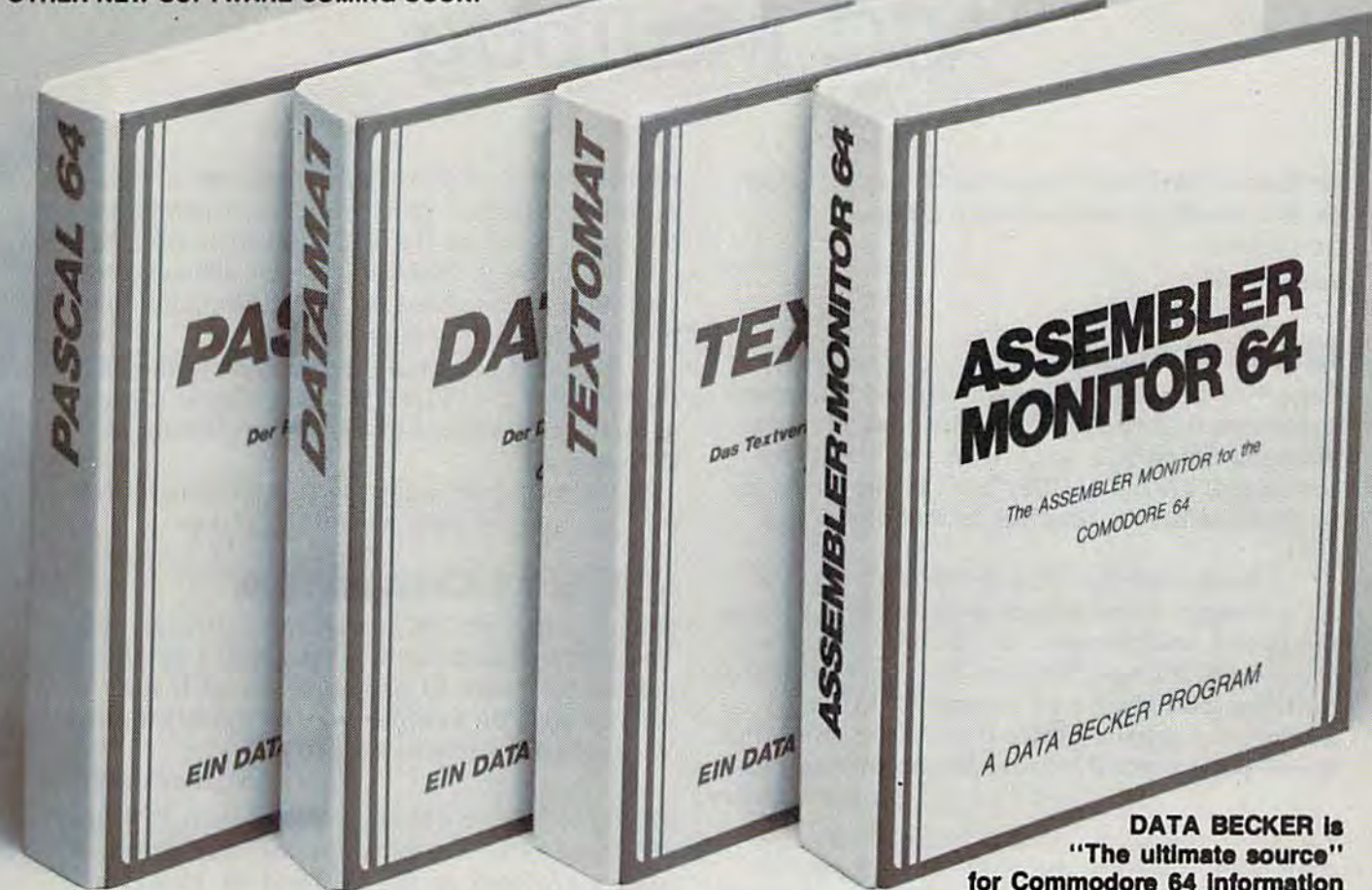
However, *Kwik-Load* includes a highly useful menu-driven disk program. You can copy disks three times as fast, and format disks at more than twice normal speed. You can scratch, rename, or validate a disk. Also included is a disk speed check. If a 1541 is having trouble, alignment, not speed, is the thing to check first, but a proper speed of 300 rpm is important, too. A disk sector editor that lets you read and write hexadecimal and ASCII data directly to the disk is a handy tool for learning about a disk, or recovering damaged files. Given this bonus, and despite the limitations, *Kwik-Load* is a good buy at \$19.95.

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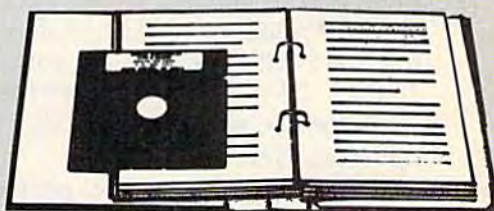
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VIC Mailbag

In this month's column, we'll take a look in the mailbag and answer a few questions.

Shifting Gears

Page 9 of the 1541 disk drive instruction manual states that the speed of the 1541 must be changed when it is used with the VIC. The command: `OPEN 15,8,15,"UI—"` is supposed to be entered before reading or writing to the 1541.

I have used the disk drive with my VIC on a number of occasions without first setting the speed, and it seems to perform fine. I am concerned, though, because the drive ended up quitting, and had to be returned to Commodore for repair. Could the failure to set the speed have been the cause of the breakdown?

Timothy Haley

The UI— and UI+ commands are used to change the speed of the 1541. They do not actually change the speed of the disk drive's motor, but instead change the speed at which the drive internally accepts or writes data.

Commodore recommends that before using the 1541 with the VIC-20, you type `OPEN 15,8,15,"UI—"`. This changes the speed of the 1541 for use with the VIC-20. However, this is optional. Here's why.

The disk drive model previous to the 1541, the 1540, was designed to operate with the VIC-20, and transferred data at a faster rate than the newer 1541.

The biggest misunderstanding of the UI—, UI+ command is that UI— (because of the minus sign) slows the speed of the 1541. In fact, it speeds up the rate of transfer, and emulates the faster speed of the 1540.

This is the reason the 1541 performs adequately with the VIC-20, even when the UI— command is not entered. On the other hand, the Commodore 64 is set to accept data at a slower rate (UI+), and might experience problems if it's used with a 1540 or a 1541 set at the faster speed. One of the main reasons that the 64 is

slightly slower is that it must maintain a thousand characters on its video display, compared to only about 500 for the VIC. This also explains why 64s have to blank the screen whenever cassette files are accessed, as timing is equally important in cassette operations.

It should be noted that initializing the 1541 (`OPEN 15,8,15: PRINT#15,"I0":CLOSE15`) will automatically reset it to the default setting of the slower speed.

Neglecting to enter the UI— command was not the cause of your hardware failure.

VIC to 64 Conversions

If I get a 64K or 32K expansion cartridge and a 40-column board for my VIC, will I be able to run Commodore 64 programs on it? If not, what would be another way of modifying my VIC programs to run on the 64?

Michael Scarola

BASIC programs which do not contain POKes, PEEKs, or other machine specific routines should run equally well on the VIC and 64. However, because most programs contain POKes and/or PEEKs, the answer is generally no.

It makes no difference if the VIC's memory is expanded or unexpanded. The lack of compatibility stems from the differences in memory locations, *not* memory size. For example, changing screen and border colors in the VIC is done with a single POKE to 36879, while in the 64 it takes two POKes to memory locations 53280 and 53281. Also, producing sound with the 64's sophisticated SID (Sound Interface Device) chip is more complicated and requires many more POKes than is necessary to produce sound on the VIC. This list of differences goes on.

The only way to convert VIC programs to run on the 64 is to go through them line by line, and change all the machine specific routines, POKes, and PEEKs.

Mysterious POKes

At the beginning of many programs for the VIC-20, I have seen two memory locations (36869 and 36879) POKed with different

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numbers. I'd like to know what these memory locations are used for.

Jim Walunas

Memory location 36879 is used to set the screen and border colors and to toggle the character set between the inverted and normal mode. By POKEing various values here you can change the screen and border colors or turn on/off the reversed character set. The first three bits (0-2) give you eight border colors, bit 3 turns the inverse screen on or off, and the top four bits control the sixteen available screen colors.

Memory location 36869 is used to control the screen and character memory addresses.

Bits 0-3 of this byte point the VIC (Video Interface Chip) chip to the character set. The normal value of these four bits is 0. Changing this value causes the VIC chip to look elsewhere for the character set information. This is done when, for example, you want to use a custom character set you have put in RAM.

Bits 4-7 in combination with bit 7 of memory location 36866 are used to determine the beginning address of screen memory. To change the location of screen memory, the value of these bits must be changed as well as the value of memory location 648, which tells the computer's operating system where to look for screen memory.

Adding Sound

I have a VIC-20 and a BMC monitor. I've figured out which pins are used to connect the monitor, but I am unsure how to hook up the sound. Is there a way to hook up a speaker at the same time?

David Grant

Yes. On the rear of your VIC, there is a 5-pin DIN plug that is used for audio/video connections. The wiring for the 5 pins is as follows:



1. +5 volts reg.
2. ground
3. audio
4. video low
5. video high

To hook up your sound, connect one speaker wire each to pins 2 and 3. It should be noted, however, that driving a speaker straight from the plug might damage the VIC chip. For this reason, you should connect the two pins to the input of an amplifier, and connect the speaker to the amplifier output.

You should be able to find a small utility amplifier at your local electronics dealer. Another suggestion might be to hook pins 2 and 3 up to your stereo amplifier. The auxiliary input jacks are good for this purpose.

When wiring to your stereo, be careful with the polarity of the connections.

The Incompatible 1526


My VIC-20 and Commodore 1526 printer don't seem to get along. I have not been able to print a program listing. When I enter the standard OPEN 4,4: CMD4: LIST commands, I only get about three lines of the program, then the printer shuts off. What am I doing wrong?

Bob Le Beau

According to Commodore, the latest versions of the 1526 are for use with the Commodore 64 only. A few problems have arisen with incompatibility between the VIC and this printer. These stem from serial bus allocation problems, especially when the tape drive is used with the VIC.

If you are using a 1526 and a tape drive, try this: Immediately after any cassette activity, including LOADs or SAVEs, type SYS64490. This Kernal routine clears the serial bus, and prepares it for use with the printer. ☺

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Programming Sound And Graphics With The *Super Expander 64*

Lee Noel, Jr., Assistant Editor, Art & Design

Tired of endless PEEKing and POKEing to get the sound and graphics you want on your 64? This cartridge offers some alternatives.

The programming capabilities of *Simons' BASIC* have drawn considerable attention from 64 owners. But Commodore's *Super Expander 64*, while less well known, is a powerful and flexible tool which offers several useful features not found in *Simons' BASIC*.

The *Super Expander 64* (which sells for about \$50) is a ROM cartridge—a program frozen in the memory of a computer chip.

Unlike the widely used *Super Expander* for the VIC-20, this cartridge does not provide any additional memory for the 64. In fact, it consumes some, leaving 30719 bytes free for BASIC programming. However, the many powerful features more than compensate for the lost memory.

Essentially, the *Super Expander 64* extends the 64's BASIC programming language, giving the user more direct control over the computer's sound and graphics. Among its features are ten different preprogrammed instrument sounds, a built-in sprite editor, and direct mode control of all its features—none of which are available in *Simons' BASIC*.

The Language Of The Expander

Since the *Super Expander 64* is a program in ROM, it's immediately and permanently available to you as soon as you turn on your computer. To use it, you have only to learn some new BASIC keywords and include them in your programs.

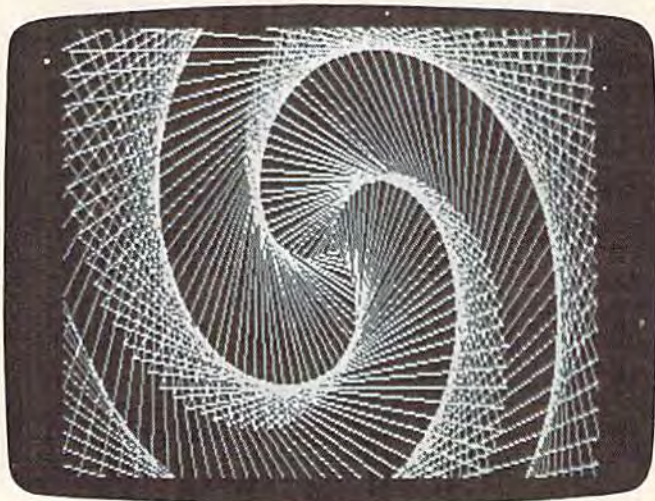


Figure 1

The expander adds 32 new words to BASIC: BOX, CHAR, CIRCLE, COLINT, COLOR, DRAW, FILTER, GRAPHIC, GSHAPE, KEY, LOCATE, MOVSPR, PAINT, RBUMP, RCLR, RDOT, RGR, RJOY, RPEN, RPOT, RSPCOL, RSPPOS, RSPR, SCALE, SCNCLR, SPRCOL, SPRDEF, SPRITE, SPRSAV, SSHAPE, TEMPO, and TUNE.

While this is a fairly lengthy list, it's still quite manageable by comparison to *Simons' BASIC's* 100-plus new words—more than 40 of which are needed to cover the sound and graphics features offered by the expander.

Many of the words are self-explanatory. For example, BOX draws a box, PAINT fills a shape with color, TEMPO sets the general speed for music and sound effects, and so on. Even the odd looking words were carefully devised. Words

starting with R return information to the program, GSHAPE (G for GET) puts a previously saved area of bitmap back on the screen, and SSHAPE is the command that saves a piece of bitmap. For the most part, the new words are readily comprehensible, and brief experiments tend to clear up any problems very quickly.

These keywords, termed *commands* and *functions*, are combined with additional elements, *parameters* and *arguments*, to form statements in the extended BASIC.

To help you master the expander, there is a 65-page manual that explains in relatively plain English how to use the program. But as often happens in documentation of this kind, there are a few minor errors. In the manual, each command or function is followed by a combination of numbers and punctuation marks in a set group—not unlike BASIC commands.

But for those using the manual, a word of warning is in order. Using the expander word CIRCLE, here's a sample of the way the manual charts a keyword and its attendant parameters.

```
CIRCLE[source],[X1,Y1]<,<X-rad>[,<Y-  
rad>][,<start>][,<end>][,<angle>][,<inc>]]]]]
```

This is difficult enough to type; let alone comprehend. Not surprisingly, the manual itself misses the occasional bracket. Just ignore this system—all you have to do is count the number of parameters and figure out what each of them does. You'll very quickly come to understand them on your own terms.

How does all this work in practice? Let's look at a graphics display generated with the aid of the expander. The complex shape shown in Figure 1 was drawn by the expander and the following program.

```
10 GRAPHIC2,1:COLOR0,7,,,0:SCNCLR  
20 FORI=0TO300STEP4  
30 CIRCLE1,160,100,I,I,,,I,120  
40 NEXT
```

To see how *Super Expander 64* BASIC works, let's take a brief look at this program. First, it clears the screen and makes it entirely black. Next, drawing in yellow, the program makes a small triangle near the center of the screen. (By choosing appropriate parameters, the CIRCLE command can be used to draw squares, ellipses, regular or irregular polygons, triangles, and even straight lines.) It then increases the size of the triangle and draws it again, but tilted slightly to the right. This process is repeated over and over again, until the triangle is much larger—parts of it don't even appear on the screen—and has been turned 300 degrees from its original position. That's all there is to this complex picture.

A Lot For A Little

The language of the expander is not only powerful, it's succinct. It's doubtful whether an equally brief program written in *Simons' BASIC* could produce identical results. On the other hand, once you had written a slightly longer version, *Simons' BASIC* structured programming would enable you to call it by name every time you wanted to use it as part of a longer program. With the expander, you'd be stuck with going to a numbered subroutine.

The expander offers another significant advantage over *Simons' BASIC*. All keywords and parameters may be entered in direct mode—directly from the keyboard, without being in a program. This feature, which can offer distinct advantages to the programmer, is not available in *Simons' BASIC*. As a matter of fact, the entire program we just looked at can be entered in direct mode: The three commands in line 10 are typed in as a unit, then the entire FOR/NEXT loop—all without the need for line numbers.

Graphics Made Easy

The expander's GRAPHIC command offers four types of screen display. In addition to the high-res screen used above, there's a multicolor bitmap mode, a mode for normal text, and a combination of high-res with a five-line text window.

SSHAPE and GSHAPE can pick up sections of the screen display and move them. This is accomplished by transferring the necessary visual information into a string variable and then retrieving it.

CHAR allows easy formatting of text display in all graphics modes. A simple column-row coordinate system allows characters to be placed without the usual trial-and-error methods.

There are many other graphics commands, but they all work in a similar way.

Of course, the *Super Expander 64* offers a lot more than graphics.

The KEY command allows easy programming of the function keys, especially useful considering that expander keywords cannot be abbreviated—they must be typed out in full. KEY can be used to assign any eight keywords to the function keys. There they'll be available at the touch of a key or two. When first turned on, the expander automatically provides one such group of useful words.

Three words, RJOY, RPEN, and RPOT, allow the easy reading of information from joysticks, lightpens, and game paddles. Not only does this considerably simplify the programming of games that use these devices, but also it opens up the possibility of writing serious programs for users

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who have an aversion to the keyboard. Many people, for example, find pressing the fire button on a joystick more understandable than pressing the RETURN key.

Simplified Sound

The *Super Expander 64* has only three sound keywords—TEMPO, TUNE, and FILTER—but they perform a variety of functions. Like most *Super Expander 64* words, these, too, must be accompanied by parameters. However, sound is so well arranged on the expander that there's initially no need to alter any parameters.

When the computer is first turned on, the expander has already set up ten instrument-like sound forms. These include piano, drum, flute, organ, and six other sounds. For those primarily interested in creating game sounds, the drum sound will be particularly useful.

Playing music and making sound becomes simple. First, the SID chip is turned on by either `PRINT CHR$(6);` or `PRINT "CTRL-F";`. Next, sound information is assigned to strings in much the same way that screen information is treated for `GSHAPE` and `SSHAPE`. In this case, though, the programmer makes up a string of control numbers and ordinary letters. The strings are then played by simply `PRINT`ing them. That's right, the normal BASIC `PRINT` command is used by the expander to play music.

To avoid confusion in *Super Expander 64* programs, it's a good idea to reserve the `PRINT` command for just music and sound, and to use the `CHAR` command to place characters or text on the screen.

The semicolons next to `CHR$(6)` and `CTRL-F` are extremely important. They indicate to the expander that the next suitable characters it finds in a `PRINT` string are to be treated as sound. Careful use of semicolons will mean that the SID chip needs only to be activated once in a program.

`PRINT`ing `CHR$(6)` or `CTRL-F` a second time will shut the SID off; and, of course, there's no need for semicolons when the synthesizer is not active.

Here's an example which illustrates what we've seen so far:

```
PRINT CHR$(6);PRINT "CDEFGABC":PRINT
CHR$(6)
```

This will play a familiar scale, and can be entered in program or direct mode. If you try it without the semicolon, you'll immediately see why the punctuation must be used.

Programming sound with the *Super Expander 64* is straightforward and a rewarding experience, far less complex than programming sound with *Simons' BASIC*.



Figure 2

Sprite Programming

The expander offers six keywords for creating sprites. These give complete but simple control over sprite programming. You can specify color, size, and priority, and detect and respond to sprite collisions easily. As usual, there is a string variable system for saving and transferring sprite information. About the only limitation on expander sprites is that they can't be used on a normal text screen.

One of the sprite keywords, `SPRDEF`, is a good sprite editing program which is built right into the expander. This keyword allows you to define all eight available sprites and put them into memory. You can even define many more than eight sprites and transfer them into strings for later use, filling up your 64 with hundreds of sprite definitions if you want to. And you can use `SPRDEF` in direct mode to define your sprites before you even start programming.

There is one drawback, though. `SPRDEF` offers no way to save the sprites it creates so easily. Since a sprite definition is a series of 63 numbers, there's no reason we can't save those numbers. Here's a short program that will display the 63 numbers making up a sprite designed by `SPRDEF`.

```
5 SN=0:REM SN (SPRITE NO.) MUST BE
  THE NO. YOU ENTER IN SPRDEF MODE.
10 SPRDEF
20 SPRSAVSN,A$
30 PRINT "{CLR}"
40 FOR I=1 TO 61 STEP 3
50 N$=MID$(A$,I,1):X=ASC(N$):PRINTX,
52 O$=MID$(A$,I+1,1):Y=ASC(O$):PRINTY,
54 P$=MID$(A$,I+2,1):Z=ASC(P$):PRINTZ
60 NEXT
```


To use this program, just type it in while the expander is in your computer. Then RUN it. When SPRDEF prompts you, type in 0 (see line 5 of the program). When you're happy with your sprite, press SHIFT RETURN to save it, and then press RETURN to go on with the program. Almost immediately, you'll see the 63 bytes of sprite data appear on your screen. (These numbers are arranged in a format that corresponds to the shape of the sprite.) If you wish, you can copy this information down and use it later. You can rerun this program as many times as you like, but always enter 0 when SPRDEF prompts you.

Once you have the numbers making up a sprite, they can be read back into the machine quite easily. This program shows how this can be done.

```
5 SN=0:TH$=CHR$(0)
10 FORI=1TO63
15 READN
20 TH$=TH$+CHR$(N)
30 NEXT
40 A$=RIGHT$(TH$,63)
50 SPRSAVA$,SN
60 SPRDEF
```

Sixty-three numbers from your own sprite definition can be appended (starting after line 60)

in the form of DATA statements. When RUN, the program will transfer your design into A\$ and then into sprite number zero. You'll then return to the SPRDEF mode. Once again, enter 0 and you'll see the sprite you designed.

These two programs could be used repeatedly, by changing sprite numbers and destination strings, to load a large number of sprites into a 64 with the expander inserted, obviously a time-consuming and cumbersome process. The programs are mainly given to show that it is possible to extract sprite data from the *Super Expander 64* environment.

The sprite commands and functions can be combined with the other expander keywords in various creative ways. Figure 2 is typical of results that can be easily achieved.

The *Super Expander 64* is a powerful device which frees the programmer from much of the tedium of creating sound and graphics on the 64. Although it invites comparison with *Simons' BASIC*, neither is really competing with the other.

Simons' BASIC performs well in a wide variety of situations, and the *Super Expander 64* is specialized in focus. But if your interest is in sound and graphics, the *Super Expander 64* may be a shortcut to some effective programming. ☐

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Function Key

Willie Brown

The function keys can be extremely useful if you know how to program them. This short utility program for the VIC and 64 allows you to define each function key and save your newly defined keyboard to tape or disk.

Turn your computer on, type some letters, and you'll see them appear on the screen. But press one of the function keys and you'll see nothing. They are mentioned almost in passing in a short paragraph in the User's Guide, which says they can be programmed to perform many different functions. The question is, how do you program them?

The most common method of using the function keys is to set up a GET statement followed by an IF-THEN. The keys can be used in a program to start a game, change the border color, or almost any other function you can think of, as long as you type them in quote mode.

It would be nice, though, if they could be used outside of a program, in direct (or immediate) mode. You might want f1 to LIST the program, f3 to RUN it, f5 to SAVE, and so on—a collection of eight one-stroke commands.

"Function Key" lets you decide how you want to define the keys and use them.

Defining New Functions

After entering the program and SAVEing it, type RUN. A short machine language program is then POKed into memory. To turn it on, type SYS 52115 (64 version). The entry point for the VIC

version will vary depending on how much additional memory you are using; the appropriate SYS number will appear on the screen.

The program is now activated. To assign a value to one of the function keys, type `fx=(BASIC command)`, where x is a number from one to eight and any legal BASIC statement follows the equal sign. Press RETURN and the computer should respond with OK. If you get a SYNTAX ERROR, check the logic of the BASIC line. For example, `f1=LIST` defines the f1 key as LIST. Any time you type f1, LIST will be printed on the screen. Of course, LIST won't be activated until you press RETURN. To simulate this, add a left arrow (the key directly above CTRL): `f1=LIST←`.

You can define all eight function keys with whatever commands you find most useful. But here are a few items to be noted. First, each key is limited to a maximum of 16 characters. If you exceed the limit, the extra letters will be ignored. Second, if you want a BASIC command to be executed, the last character has to be a left arrow. RUN/STOP-RESTORE resets the computer and will eliminate the function key definitions. Simply use the appropriate SYS to return to "Function Key." Finally, this utility is disabled whenever you run a program. It will work only in immediate mode. This allows you to use the function keys from within your program and still have your favorite commands available with one key-stroke while editing the program.

Note that "Function Key" will not work with other programming utilities which use the same locations in memory (in the 64 version, locations 52115 and up).

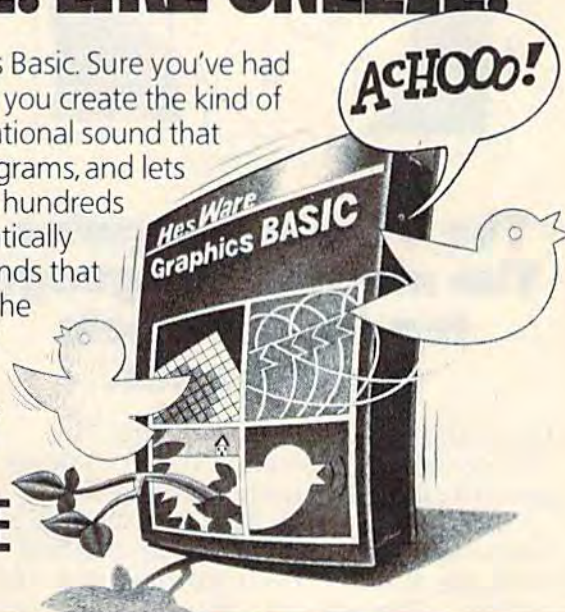
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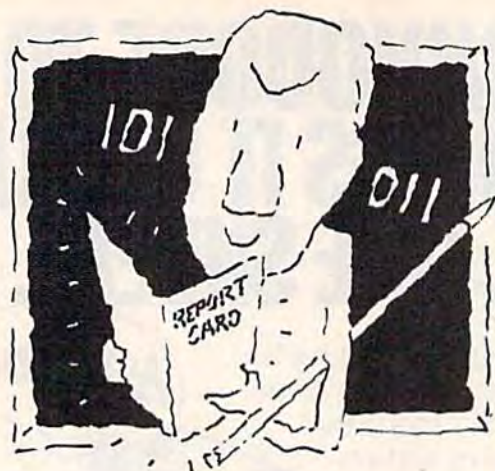
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Creating A Mini-Toolkit

It would be tedious to have to define all eight function keys every time you want to use this utility. You can create your own mini-toolkit with an f9 option, which allows you to save your function key definitions to tape or disk. You can then load your selected functions into memory at the beginning of a programming session.

When you have all the keys defined and want to keep them for future use, type `f9=filename,8` (for disk) or `f9=filename,1` (for tape), where *filename* is anything of your choice. But don't put *filename* in quotes. If you want to save another set of function definitions, be sure to use a different filename.

To load the functions back into memory, type `LOAD"filename",8,1` for disk or `LOAD"filename",1,1` for tape. The secondary address of 1 is crucial: It tells the computer to load the program into the same area of memory it originally occupied. After the program is loaded, type `NEW` and then the appropriate `SYS`. The eight functions you previously saved will be available for use whenever you need them.

See program listing on page 192. ☺

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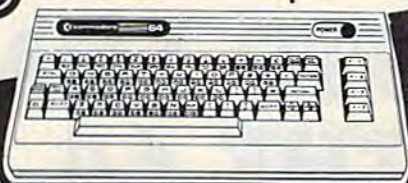
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DISK AUTO LOAD FOR THE 64

Dan Carmichael, Assistant Editor

Have you ever wanted to type LOAD""",8,1 and have your favorite program automatically load and run itself like commercial software packages do? "Disk Auto Load" for the 64 will create a program to do just that.

When using commercial programs, you've probably noticed that most automatically load and start the program running without having to enter RUN. The first program loaded into memory is known as a *boot program*. It's this program that loads and executes other programs on the disk.

There are a number of different techniques that can accomplish this, such as overwriting the stack or changing *vectors*. (A vector is a pointer to the starting location of a machine language subroutine.) "Disk Auto Load" uses the latter method.

Manipulating The Vectors

In the Commodore 64, there is an area of unused memory from locations 679 to 767 (\$02A7-\$02FF). Like the cassette buffer, this 89-byte area is perfect for holding small machine language programs.

Just past this area of memory is a table of important vectors. In the 64, these vectors are two bytes each, using the low-byte/high-byte format. By changing the values of these pointers, you can redirect the system to your own programs.

The vector we'll be using for Disk Auto Load is the *BASIC Warm Start Vector* at 770-771 (\$0302-\$0303), which points to the main BASIC program loop. This one loop is executed more often than any other routine of BASIC. It checks the keyboard again and again, waiting for input. When a key is pressed, the character is printed

on the screen. Pressing RETURN sends this routine into action. It looks at the beginning of the line for a number. If it finds one, it assumes you're writing a program and enters it as a BASIC line. When no line number is found, it executes the statement in immediate mode. After executing the program (or the statement, if there's no number), the computer goes back to the main BASIC program loop, waiting patiently for more from the keyboard.

This vector is also used when loading a program. After a program is loaded into the computer, the system returns to the BASIC program mode by looking at this pointer and going to the BASIC warm start program at 42115 (\$A483).

By changing the values in this vector, the computer can be directed to execute a machine language program other than the usual BASIC warm start. In Disk Auto Load, the pointer value is changed by loading a program (which includes the new pointer values) on top of it.

Disk Auto Load puts the automatic boot program into the area from 679-750 (\$02A7-\$02EE). Before the boot program is saved, the warm start vector is changed to point to the start of the autoboot program at 679 (\$02A7). Then the program and the pointer (locations 679-771, \$02A7-\$0303) are saved to disk as one module.

This becomes our autoboot program. Here's how it works:

The autoboot program (along with the vector with the changed values) is loaded into memory. If it's the first program in the disk's directory, it can be loaded with the LOAD """,8,1 format. After the LOAD is finished, the computer looks at the BASIC warm start vector. Because the vector now points to the start of the autoboot program (location 679), that program is executed instead of the normal BASIC warm start routine. The autoboot program, in turn, loads in and executes the program you have specified.

A Newly Created Program

Enter, save, and run Disk Auto Load. It's a BASIC program which POKES a machine language program into memory. The machine language program creates the autoboot program, and then saves it to disk.

If you wish to autoboot a program using the LOAD "*"8,1 syntax, format a new disk and don't save any files on it until after you've created the autoboot program. This will ensure that the autoboot program is the first entry in the disk directory.

The first prompt asks if the program you want to be automatically loaded and run is in BASIC or machine language. Press B or M. If you press M for machine language, you are asked to supply the beginning address of the ML program. This is the SYS address that starts the ML program running. Enter a number, then press RETURN.

Next, enter the name of the program you want to be automatically loaded. The program then instructs you to insert a newly formatted disk into the drive. Actually, the disk needs to be freshly formatted only if you wish to use the LOAD "*"8,1 syntax. Saving the autoboot program to a disk that contains other files is fine.

Enter the name you wish to give to the autoboot program you will be creating. For future reference, you might want to indicate in the filename that it's a boot program. For example, if you want to automatically load and run SPACEGAME, you could name the autoboot program SPACEGAME.BOOT.

After Disk Auto Load has run and created the autoboot program on the disk, turn off your 64 to reset the system. Be sure to then save a copy of the program you wish to have loaded and run on the same disk as the autoboot program. (It can't load and run a program that isn't there.) Be sure that you save the program with the same filename you told the autoboot program to look for.

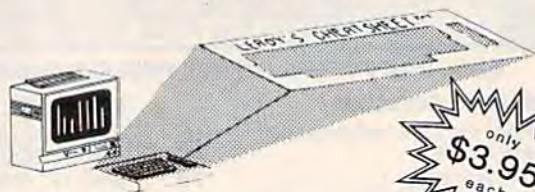
To use the autoboot program, type LOAD "filename"8,1 where filename is the name of the autoboot program you created, not the name of the program that autoboot is to load and run. For example, typing LOAD "SPACEGAME.BOOT"8,1 will automatically load and run "SPACEGAME". If everything is in order, the program you specified will automatically run.

If you wish to load and run more than one program, you can write your own boot program. Have Disk Auto Load load and run your program, and it, in turn, will load any programs you want.

See program listing on page 193. ☺

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MLX Machine Language Entry Program

For Commodore 64 And VIC-20

Charles Brannon, Program Editor

MLX is a labor-saving utility that allows almost failsafe entry of machine language programs published in COMPUTE!'s GAZETTE. You need to know nothing about machine language to use MLX—it was designed for everyone. There are separate versions for the Commodore 64 and expanded VIC-20 (at least 8K).

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

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

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

Using MLX

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

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

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

press either the SPACE bar or RETURN key to advance to the next number. The checksum automatically appears in inverse video for emphasis.

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

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

MLX Commands

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

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

MLX recognizes these commands:

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

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

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

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

See program listings on page 194.

How To Type In COMPUTE!'s GAZETTE Programs

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

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

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

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

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

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

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

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

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

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

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

The Automatic Proofreader

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

Preparing The Proofreader

1. Using the listing below, type in the Proofreader. The same program works on both the VIC-20 and Commodore 64. Be very careful when entering the DATA statements — don't type an l instead of a 1, an O instead of a 0, extra commas, etc.
2. SAVE the Proofreader on tape or disk at least twice before running it for the first time. This is very important because the Proofreader erases this part of itself when you first type RUN.
3. After the Proofreader is SAVED, type RUN. It will check itself for typing errors in the DATA statements and warn you if there's a mistake. Correct any errors and SAVE the corrected version. Keep a copy in a safe place — you'll need it again and again, every time you enter a program from *COMPUTE's Gazette*.
4. When a correct version of the Proofreader is RUN, it activates itself. You are now ready to enter a program listing. If you press RUN/STOP-RESTORE, the Proofreader is disabled. To reactivate it, just type the command SYS 886 and press RETURN.

Using The Proofreader

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

When you type in a line from a program listing and press RETURN, the Proofreader displays a number at the top of your screen. This checksum number must match the checksum number in the printed listing. If it doesn't, it means you typed the line differently than the way it is listed. Immediately recheck your typing. Remember, don't type the rem statement with the checksum number; it is published only so you can check it against the number which appears on your screen.

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

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

Special Tape SAVE Instructions

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

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

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

1. LOAD and RUN the Proofreader.
2. Disable it by pressing RUN/STOP-RESTORE.
3. Type the following three lines in direct mode (without line numbers):

```
AS="PROOFREADER.T":BS="{10 SPACES}":FO
RX=1TO4:AS=AS+BS:NEXTX
FORX=886 TO 1018:AS=AS+CHR$(PEEK(X)):N
EXTX
OPEN1,1,1,AS:CLOSE1
```

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

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

OPEN1:CLOSE1

You can now get into the Proofreader by typing SYS 886. To test this, PRINT PEEK (886) should return the number 173. If it does not, repeat the steps above, making sure that AS (PROOFREADER.T) contains 13 characters and that BS contains 10 spaces.

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

Automatic Proofreader For VIC And 64

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


Supertank

(Article on page 64.)

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 PRINT "{CLR}{HOME}":RESTORE:V=53248:POK
EV+32,0:POKEV+33,1:POKEV+17,PEEK(V+17)
AND247:rem 174
15 PRINTTAB(53)"{BLU}{RVS}W*E*L*C*O*M*E!":
PRINTTAB(59)"{RED}{RVS}TO":rem 147
17 PRINTTAB(55)"{RED}{RVS}SUPERTANK!":PRI
NT:rem 158
20 FORQ=1TO4:PRINTTAB(14)"{5}{N}":NEXT
:rem 50
22 PRINTTAB(14)"{N}{RVS}{8 SPACES}{*}":
PRINTTAB(14)"{RVS}{Q Q}{2 SPACES}QQQ
{SPACE}{*}{OFF}{2 I}{8 O}{3 I}":
:rem 209
24 PRINTTAB(13)"{RVS}{2 SPACES}Q Q
{3 SPACES}M{3 SPACES}{OFF}{2 U}{8 Y}
{3 U}":rem 207
26 PRINTTAB(13)"{RVS}{3 SPACES}QQQ
{2 SPACES}QQQ{2 SPACES}{OFF}":rem 79
28 PRINT "{3 SPACES}{RVS}{30 SPACES}{*}
{OFF}":rem 103
30 PRINT "{2 SPACES}{RVS}{32 SPACES}{*}
{OFF}":rem 96
```

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```
32 PRINT "{GRN}{2 +}{5}{RVS}{34 SPACES}
{OFF}{GRN}{3 +}":rem 236
34 PRINT "{3 +}{5}M W{RVS}{*}{OFF}W
{RVS}{*}{OFF}W{RVS}{*}{OFF}W
{RVS}{*}{OFF}W{RVS}{*}{OFF}W
{RVS}{*}{OFF}W{RVS}{*}{OFF}W
{GRN}{4 +}":rem 255
36 PRINT "{4 +}{5}M {RVS} Q {OFF} {RVS} Q
{SPACE}{OFF} {RVS} Q {OFF} {RVS} Q
{OFF} {RVS} Q {OFF} {RVS} Q {OFF}
{RVS} Q {OFF}N{GRN}{5 +}":rem 148
38 PRINT "{5 +}{5}M{*}{RVS} {OFF}{*}{*}
{RVS} {OFF}{*}{*}{RVS} {OFF}{*}{*}
{RVS} {OFF}{*}{*}{RVS} {OFF}{*}{*}
{RVS} {OFF}{*}{*}{RVS} {OFF}{*}{*}
{RVS} {OFF}{*}{*}{RVS} {OFF}{*}{*}
{6 +}":rem 31
40 PRINT "{6 +}{5}{26 Y}{GRN}{7 +}":
:rem 239
42 FORQ=1TO2:PRINT "{39 +}":NEXT:rem 175
43 GOSUB800:rem 127
48 S=54272:FORL=STOS+24:POKEL,0:NEXT
:rem 14
50 PRINT "{CLR}{HOME}{WHT}":POKEV+32,1:POK
EV+33,0:PRINTTAB(120):rem 187
52 GOSUB1000:rem 168
60 PRINT "{CLR}{HOME}{WHT}":PRINTTAB(90)"T
ANK SPECIFICATIONS":rem 192
62 PRINTTAB(49)"{RVS}{GRN} STRONG {OFF}
{3 SPACES}{RVS}{YEL} MEDIUM {OFF}
{2 SPACES}{RVS}{WHT} WEAK {OFF}":
:rem 65
64 PRINTTAB(40)"{GRN}{RVS}1.TIGER{OFF}
{4 SPACES}ARMOR{5 SPACES}{YEL}FIRE
{5 SPACES}{WHT}SPEED":rem 30
66 PRINTTAB(40)"{YEL}{RVS}2.T-34{OFF}
{5 SPACES}{GRN}SPEED{5 SPACES}{YEL}ARM
OR{4 SPACES}{WHT}FIRE":rem 44
68 PRINTTAB(40)"{WHT}{RVS}3.SHERMAN{OFF}
{2 SPACES}{GRN}FIRE{6 SPACES}{YEL}SPEE
D{4 SPACES}{WHT}ARMOR":PRINTTAB(120):
:rem 62
70 PRINT:INPUT "{HOME}{15 DOWN}{3 SPACES}W
HICH TANK DO YOU CHOOSE";TA:rem 214
72 IFTA<LORTA>3THEN80:rem 56
78 PRINT "{4 DOWN}{13 SPACES}GET READY !":
FORQ=1TO500STEP.5:NEXT:GOTO85:rem 10
80 PRINT "{HOME}{15 DOWN}{10 SPACES}YOU CA
N'T DO THAT!{4 SPACES}":GOSUB1300:GOTO
70:rem 210
85 V=53248:GOSUB1100:rem 130
90 PRINT "{CLR}{HOME}":POKEV+32,0:POKEV+33
,1:rem 56
92 PRINTTAB(7)"{RVS}{5}{*}{OFF}
{4 SPACES}{RVS}{*}{OFF}{7 SPACES}
{RVS}{*}{OFF}{4 SPACES}{RVS}{*}{*}
{OFF}{4 SPACES}{RVS}{BLK}SCORE":rem 1
94 PRINT "{2 SPACES}{RVS}{5}{*}{OFF}
{2 SPACES}{RVS}{2 SPACES}{OFF}
{3 SPACES}{RVS}{2 SPACES}{*}{OFF}
{5 SPACES}{RVS}{2 SPACES}{*}{OFF}
{2 SPACES}{RVS}{2 SPACES}{*}{OFF}
{2 SPACES}{BLK}";SC:rem 52
96 PRINT "{RVS}{5}{2 SPACES}{*}{*}
{3 SPACES}{*}{OFF}{2 SPACES}{RVS}
{4 SPACES}{*}{OFF}{2 SPACES}{RVS}{*}
{5 SPACES}{OFF}{RVS}{4 SPACES}{*}
{OFF}{2 SPACES}{RVS}{BLK}ARMOR":
:rem 171
98 PRINT "{RVS}{5}{9 SPACES}{*}{*}
{5 SPACES}{*}{6 SPACES}{6 SPACES}
{*}{OFF}{BLK}";AR:rem 29
```



```

100 FORQ=1TO17:PRINT "{RVS}{GRN}{39 +}":NE
    XT:rem 64
110 PRINT "{RVS}{5}{Q}CCCCCCCCC{W}{RIGHT}
    £{13 SPACES}{*}{RIGHT}{Q}CCCCCCCCC
    {W}" :rem 65
112 PRINT "{RVS}{5}{Q}CCCCCCCCC{W}
    {17 SPACES}{Q}CCCCCCCCC{W}" :rem 129
114 GOSUB420 :rem 172
120 CB=1:TI$="000000" :rem 34
150 POKEV+21,15:POKE2040,13:POKEV+39,0:PO
    KEV,170:POKEV+1,150:Y=170:X=150:SH=0
    :rem 27
151 POKE2042,193:POKEV+41,11:RF=0:UT=110:
    POKEV+42,0:POKE2043,195 :rem 206
152 POKE2041,14:POKEV+40,0:POKEV+2,X1:POK
    EV+3,Y1 :rem 109
180 S=NOTPEEK(56321)AND15:U=SAND1:D=SAND2
    :L=SAND4:R=SAND8:Y1=0:X1=0 :rem 165
182 POKEV+23,0:POKEV+29,0 :rem 189
185 IFUTHEX=X-M1:IFX<110THEX=X+M1
    :rem 253
187 IFDTHENX=X+M1:IFX>180THEX=X-M1
    :rem 247
189 IFRTHENY=Y+M1:IFY>245THEY=Y-M1
    :rem 14
191 IFLTHENY=Y-M1:IFY<90THEY=Y+M1
    :rem 205
200 POKEV,Y:POKEV+1,X :rem 59
210 J=NOTPEEK(56321)AND16:IFJ=16THENGOSUB
    245 :rem 189
230 BO=BO+.5:GOSUB310:GOTO180 :rem 220
245 SH=SH+1:X1=X:MR=Y:HH=Y/2:GOSUB400
    :rem 64
247 FORDD=DDTOHHSTEP5:POKEV+2,DD:POKEV+3,
    X1:GOSUB330:NEXT :rem 224
250 POKE2041,15:FORDD=DDTOMRSTEP5:POKEV+2
    ,DD:POKEV+3,X1:GOSUB330:NEXT :rem 171
251 IF(PEEK(V+30)AND4)>0THENIF(PEEK(V+30)
    AND4)>0THENGOSUB253 :rem 110
252 X1=0:DD=0:Y1=0:POKEV+2,X1:POKEV+3,MR:
    POKE2041,14:RETURN :rem 131
253 POKE2041,192:POKEV+23,2:POKEV+29,2
    :rem 184
254 POKEV+3,X1-10:POKEV+2,DD-12:GOSUB410:
    GOSUB495 :rem 204
258 FORRE=1TO500:NEXT:POKEV+23,0:POKEV+29
    ,0 :rem 152
260 X1=0:DD=0:Y1=0:POKEV+2,X1:POKEV+3,MR:
    POKE2041,14:RETURN :rem 130
310 RF=RF+5:IFRF>215THEN350 :rem 95
315 POKEV+4,RF:POKEV+5,UT:RETURN :rem 79
330 RF=RF+1.8:IFRF>215THENRF=0 :rem 48
333 IFRF=0THEN340 :rem 243
335 POKEV+4,RF:POKEV+5,UT:RETURN :rem 81
340 RF=0:UT=110:RS=INT(RND(0)*60):UT=UT+R
    S:GOTO330 :rem 61
350 F1=RF:F2=UT:POKE2042,194:POKEV+6,F1:P
    OKEV+7,F2:GOSUB400 :rem 77
355 FORQ=F2TO150STEP.4:POKEV+7,Q:NEXT:POK
    EV+29,8:POKEV+23,8:POKEV+6,F1-12
    :rem 55
360 F2=150:FORQ=F2TO230STEP.6:POKEV+7,Q:N
    EXT:GOSUB410 :rem 73
390 POKEV+6,0:POKEV+7,0:POKEV+4,0:POKEV+5
    ,0:RF=0:POKEV+23,0:POKEV+29,0:rem 235
391 POKE2042,193:GOTO499 :rem 118
400 S=54272:FORL=STOS+24:POKEL,0:NEXT:POK
    ES+5,9:POKES+6,16:POKES+24,15 :rem 70
405 POKES+4,129:POKES+1,34:POKES,75:RETUR
    N :rem 91
410 S=54272:FORL=STOS+24:POKEL,0:NEXT:POK
    ES+5,11:POKES+6,16:POKES+24,15
    :rem 112
415 POKES+4,129:POKES+1,54:POKES,111:RETU
    RN :rem 133
420 S=54272:FORL=STOS+24:POKEL,0:NEXT:POK
    ES+5,11:POKES+6,56:POKES+24,15
    :rem 117
425 POKES+4,129:POKES+1,51:POKES,97:RETUR
    N :rem 96
495 SC=SC+10:CB=0:RN=INT(RND(0)*15):CB=CB
    +RN:GOTO500 :rem 95
499 AR=AR-1 :rem 103
500 V=53248:PRINT "{HOME}":POKEV+32,0:POKE
    V+33,CB :rem 248
501 RF=0:UT=110:RS=INT(RND(0)*60):UT=UT+R
    S:RF=RF+1.5 :rem 211
502 PRINTTAB(7)"{RVS}{5}{£*}{OFF}
    {4 SPACES}{RVS}{£*}{OFF}{7 SPACES}
    {RVS}{£*}{OFF}{4 SPACES}{RVS}{£*}
    {OFF}{4 SPACES}{RVS}{BLK}SCORE"
    :rem 45
504 PRINT "{2 SPACES}{RVS}{5}{£*}{OFF}
    {2 SPACES}{RVS}{£2 SPACES}{OFF}
    {3 SPACES}{RVS}{£2 SPACES}{£*}{OFF}
    {5 SPACES}{RVS}{£2 SPACES}{£*}{OFF}
    {2 SPACES}{RVS}{£2 SPACES}{£*}{OFF}
    {2 SPACES}{BLK}";SC :rem 96
506 PRINT "{RVS}{5}{£2 SPACES}{£*}{£
    {3 SPACES}{£*}{OFF}{2 SPACES}{RVS}
    {4 SPACES}{£*}{OFF}{2 SPACES}{RVS}{£
    {5 SPACES}{OFF}{RVS}{£4 SPACES}{£*}
    {OFF}{2 SPACES}{RVS}{BLK}ARMOR"
    :rem 215
508 PRINT "{RVS}{5}{£9 SPACES}{£*}{£
    {5 SPACES}{£*}{£6 SPACES}{£6 SPACES}
    {£*}{OFF}{BLK}";AR :rem 73
509 IFAR=0THEN549 :rem 254
510 RETURN :rem 118
549 LL=18:BL=12:BB=15 :rem 169
550 PRINT "{HOME}":POKEV+32,0:POKEV+33,1
    :rem 214
558 FORQ=5TO7:PRINTTAB(Q)"{BLK}M"SPC(10)"
    M":NEXT :rem 41
560 PRINTTAB(7)"{BLK}N"SPC(11)"M"SPC(4)"N
    M" :rem 29
561 PRINTTAB(6)"N"SPC(13)"M"SPC(2)"N"SPC(
    2)"M" :rem 58
562 PRINTTAB(5)"{BLK}N"SPC(15)"{BLK}MN"SP
    C(4)"M" :rem 177
563 PRINTTAB(5)"M"SPC(21)"N"SPC(3)"NM"
    :rem 142
564 PRINTTAB(6)"M"SPC(6)"NM"SPC(11)"N"SPC
    (3)"N"SPC(2)"M" :rem 136
565 PRINTTAB(7)"M"SPC(4)"N"SPC(2)"M"SPC(1
    0)"M"SPC(2)"N"SPC(4)"M" :rem 52
566 PRINTTAB(8)"M"SPC(2)"N"SPC(4)"M"SPC(1
    0)"MN"SPC(6)"M" :rem 139
567 PRINTTAB(9)"MN"SPC(6)"M"SPC(17)"N"
    :rem 158
568 PRINTTAB(18)"M"SPC(15)"N":FORLB=1TO6:
    PRINTTAB(LL)"N"SPC(14)"N":LL=LL-1:NEX
    T :rem 60
570 FORQ=1TO5:PRINTTAB(BL)"N"SPC(BB)"M":B
    L=BL-1:BB=BB+2:NEXT :rem 187
580 RESTORE:POKEV+23,0:POKEV+29,0:POKEV+2
    1,0:GOSUB420:FORQ=1TO500STEP.1:NEXT
    :rem 66
585 S=54272:FORL=STOS+24:POKEL,0:NEXT:GOS
    UB1200 :rem 193
588 V=53248:BO=BO/10:XX=INT(BO):SC=SC+XX
    :IFSC>HSTHENHS=SC :rem 174

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589 PRINT "{HOME}{CLR}":POKEV+32,0:POKEV+3
3,1:POKE53281,1 :rem 62
590 PRINTTAB(85)"{RVS}{2}B*O*N*U*S ";XX;S
PC(3)"{RVS}SHOTS FIRED";SH:PRINTTAB(4
5)"{RVS}YOUR"; :rem 201
591 PRINT " SCORE";SC;SPC(3)"{RVS}HIGH SCO
RE ";HS:PRINTTAB(49)"{RVS}YOUR RANK I
S {BLK}";B$ :rem 36
592 PRINTTAB(43)"{RVS}{2}YOUR TOTAL SURVI
VING TIME ";TI$ :rem 114
593 PRINTTAB(86)"{RVS}WANT TO PLAY AGAIN?
(Y/N)" :rem 243
595 GETC$:IFC$=""THEN595 :rem 109
596 SC=0:B$="" :IFC$="Y"THEN599 :rem 168
597 IFC$="N"THENSYS64738 :rem 164
598 C$="" :GOTO595 :rem 164
599 SH=0:SC=0:BO=0:XX=0:POKEV+32,1:POKEV+
33,0:GOTO60 :rem 172
800 S=54272:FORL=STOS+24:POKEL,0:NEXT:POK
ES+5,9:POKES+6,0:POKES+24,15 :rem 19
801 READHF,LF,DR:IFHF=-1THENRETURN
:rem 196
804 POKES+1,HF:POKES,LF:POKES+4,33:FORL=1
TODR:NEXT:POKES+4,32:GOTO801 :rem 168
810 DATA18,209,1024,15,210,512,18,209,512
,16,195,1024,14,24,512,11,48,512
:rem 45
811 DATA18,209,200,16,195,200,15,210,200,
14,24,200,15,210,512,22,96,512
:rem 178
812 DATA16,195,1024,11,48,1024,15,210,512
,14,24,200,12,143,200,11,48,200
:rem 222
813 DATA10,143,200,11,48,200,12,143,200,1
1,48,512,16,195,512,14,239,512
:rem 185
814 DATA11,48,512,15,210,200,15,210,200,1
4,24,200,12,143,200,11,48,200:rem 105
815 DATA10,143,200,11,48,200,12,143,200,1
1,48,512,16,195,1024,22,96,512
:rem 186
816 DATA18,209,1024,15,210,512,18,209,512
,16,195,1024,14,24,512,11,48,512
:rem 51
817 DATA18,209,200,16,195,200,15,210,200,
14,24,200,15,210,512,22,96,512
:rem 184
818 DATA16,195,1024,11,48,1024,15,210,512
,14,24,200,12,143,200,11,48,200
:rem 228
819 DATA10,143,200,11,48,200,12,143,200,1
1,48,512,16,195,512,14,239,512
:rem 191
820 DATA11,48,512,15,210,200,15,210,200,1
4,24,200,12,143,200,11,48,200:rem 102
821 DATA10,143,200,11,48,200,12,143,200,1
1,48,512,11,48,1024,-1,0,0 :rem 210
900 DATA255,255,255,128,24,1,128,24,1,128
,24,1,128,24,1,128,24,1,128,24,1
:rem 35
905 DATA128,24,1,128,36,1,128,66,1,255,12
9,255,128,66,1,128,36,1,128,24,1,128
:rem 1
910 DATA24,1,128,24,1,128,24,1,128,24,1,1
28,24,1,128,24,1,255,255,255 :rem 93
915 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,31,254,0,49,255,192,96,255
:rem 88
920 DATA240,196,127,252,206,127,255,206,1
27,255,196,127,252,96,255,240,49,255
:rem 35
925 DATA192,31,254,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0 :rem 109
926 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,63,240,0,103,252,0,195,255
:rem 66
927 DATA0,219,255,192,195,255,0,103,252,0
,63,240,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
:rem 207
928 DATA0,0,0,0,0,0,0,0,0 :rem 113
930 DATA0,0,2,34,128,4,0,64,2,146,128,16,
0,16,10,73,32,64,0,4,17,140,96,64,0,4
:rem 2
935 DATA17,17,16,64,0,4,8,136,136,64,0,4,
17,17,16,32,0,8,8,136,128,16,0,16,2,7
2 :rem 80
940 DATA128,4,0,64,0,0,0 :rem 184
945 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,64,0,0,
64,0,0,64,0,0,64,0,0,126,0,0,255,255,
0 :rem 221
947 DATA255,0,63,255,252,127,255,254,255,
255,255,100,68,70,37,85,84,20,68,72
:rem 243
950 DATA15,255,240,0,0,0,0,0,0,0,0,0,0,0
:rem 228
955 DATA0,2,0,0,2,0,0,2,0,0,2,0,0,58,0,0,
70,0,0,186,0,0,130,0,0,254,0,1,255,0
:rem 128
960 DATA3,255,128,7,255,192,0,124,0,15,18
7,224,8,186,32,15,187,224,8,130,32,15
:rem 52
965 DATA131,224,0,0,0,0,0,0,0,0,0,0,0,0
:rem 83
970 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,60,0,0,126,0,0,255,0,0,255,0,0
:rem 41
975 DATA126,0,0,60,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
:rem 178
1000 FORA1=832TO894:READQ1:POKEA1,Q1:NEXT
:rem 22
1010 FORA2=896TO958:READQ2:POKEA2,Q2:NEXT
:rem 38
1015 FORA3=960TO1022:READQ3:POKEA3,Q3:NEX
T :rem 70
1020 FORA4=12288TO12350:READQ4:POKEA4,Q4:
NEXT :rem 226
1025 FORA5=12352TO12414:READQ5:POKEA5,Q5:
NEXT :rem 228
1030 FORA6=12416TO12478:READQ6:POKEA6,Q6:
NEXT :rem 239
1035 FORA7=12480TO12542:READQ7:POKEA7,Q7:
NEXT :rem 241
1090 RETURN :rem 170
1100 IFTA=1THENAR=5:IFTA=1THENM1=1
:rem 111
1105 IFTA=2THENAR=3:IFTA=2THENM1=2
:rem 117
1110 IFTA=3THENAR=1:IFTA=3THENM1=3
:rem 114
1150 RETURN :rem 167
1200 IFSC=0THENB$="TRAITOR" :rem 144
1201 IFSC>0ANDSC<51THENB$="SOLDIER"
:rem 138
1202 IFSC>52ANDSC<101THENB$="SERGEANT"
:rem 53
1204 IFSC>101ANDSC<201THENB$="LIEUTENANT"
:rem 3
1206 IFSC>201ANDSC<401THENB$="CAPTAIN"
:rem 15
1208 IFSC>401ANDSC<601THENB$="MAJOR"
:rem 142

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1210 IFSC>60LANDSC<801THENB$="COLONEL"
                                :rem 30
1212 IFSC>80LANDSC<1001THENB$="* GENERAL
    {SPACE}*"
                                :rem 145
1214 IFSC>1001THENB$="** MARSHAL **"
                                :rem 179
1216 RETURN
                                :rem 170
1232 GOTO500
                                :rem 150
1300 FORI=1TO1500:NEXT:RETURN
                                :rem 94

```

Jump!

(Article on page 62.)

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: Jump!—VIC Version

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3 GOTO2500 :rem 51
5 CLR:Q=7680:GOSUB1000:N=8:POKE36879,N:S
  1=36878:S4=36876:POKES1,15:S=0 :rem 175
10 POKE36879,N:W=3:PRINT"[CLR]" :rem 186
20 A=8131:B=A:M=1:AC=1:A1=7798:A2=7801:Q2
  =1000 :rem 5
22 PRINT"[CLR][HOME][GRN]SC=";L;"[WHT]A
  [GRN]=";W;"EN=";Q2 :rem 146
25 PRINT"[HOME][21 DOWN][22 +3]" :rem 47
30 FORX=8164TO8185:POKE3,99:NEXT :rem 3
40 POKEB,32:POKEA,65:B=A :rem 161
50 C=PEEK(197):D=PEEK(653):B=A:POKES1,15
                                :rem 68
51 PRINT"[HOME][23 SPACES]" :rem 74
52 Q2=Q2-2:IFQ2<=0THENQ2=0 :rem 29
53 PRINT"[HOME][PUR]SC=";L;"A=";W;"EN=";Q
  2;" :rem 221
54 IFQ2<0THEN480 :rem 178
55 IFC=34THENA=A+1:GOTO300 :rem 48
60 IFC=33THENA=A-1:GOTO300 :rem 45
65 IFC=32ORC=15ORC=26THENA=A-22:GOTO400
                                :rem 121
75 IFM>=5THEN90 :rem 144
80 K=INT(18*RND(0)+7727) :rem 38
85 POKEK,218:POKEK+1,223:POKEK-1,233
                                :rem 87
86 IFAC=5THENAC=1:RETURN :rem 46
87 M=5:GOTO500 :rem 6
90 O=0:O=INT(64*RND(0)+1) :rem 124
91 Z=K:M=5 :rem 69
92 IFK<7728THENA=1:GOTO200 :rem 150
93 IFK<7743THENA=1:GOTO200 :rem 195
94 IFO<P1THENQ=K+22:GOTO105 :rem 168
96 IFO>45THENK=K+1:POKEZ,32:POKEZ+1,32:PO
  KEZ-1,32:GOTO85 :rem 232
97 IFO>25THENK=K-1:POKEZ,32:POKEZ+1,32:PO
  KEZ-1,32:GOTO85 :rem 233
98 M=5 :rem 48
99 IFAC=5THENAC=1:RETURN :rem 50
100 GOTO500 :rem 47
105 S=128:FORX=QTO8119STEP22:QX=X+22:IFPE
  EK(QX)=65THENPOKEK+22,42:POKE30742+X,
  7:GOTO500 :rem 163
106 S=S+1:POKES4,S :rem 69
107 POKEK,93:NEXT :rem 48
108 POKES4,0:S=0:IFPEEK(QX)=90THENB=A:GOT

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O500 :rem 42
109 POKEQX,93 :rem 10
110 X=QX+22:T=PEEK(X):IFT=90THENFORX=QTO8
  141:POKEK,32:NEXTX:GOTO500 :rem 83
115 IFT=102THENPOKEK,230:POKEK-22,32
                                :rem 164
120 IFT=230THENPOKEK,104:POKEK-22,32
                                :rem 162
125 IFT=104THENPOKEK,32:POKEK-22,32:L=L-2
  5:IFL<=0THENL=0 :rem 192
130 IFT=32THENPOKEK,32:POKEK-22,32:FORF=1
  TO10:NEXT:POKEK,32:POKEK-22,32
                                :rem 202
155 FORX=QTO8119STEP22:POKEK,32:NEXT
                                :rem 73
160 IFAC=5THENAC=1:RETURN :rem 87
165 GOTO500 :rem 58
200 Z=K:K=K+AZ :rem 71
205 POKEZ,32:POKEZ+1,32:POKEZ-1,32:GOTO85
                                :rem 243
210 POKEK,218:POKEK+1,223:POKEK-1,233
                                :rem 125
215 M=5:GOTO500 :rem 47
300 IFD<=0ANDAC<8140THENA=A-22:GOTO325
                                :rem 185
301 AC=5:GOSUB75 :rem 176
302 IFA<8120THENA=A+1:GOTO75 :rem 149
303 IFA>8141THENA=A-1:GOTO75 :rem 157
305 G=PEEK(A+22) :rem 98
310 IFPEEK(A)<>32THEN500 :rem 125
315 IFG=32ORG=104ORG=100THENPOKEA+22,42:P
  OKE30742+A,7:POKEB,32:GOTO500:rem 189
320 Q2=Q2-4:GOTO400 :rem 16
325 IFA<8098THENA=A+23:GOTO500 :rem 213
326 IFA>8120THENA=A+20:GOTO500 :rem 199
328 Q2=Q2-9:AC=1:IFPEEK(A)<>32THEN500
                                :rem 149
329 POKEB,32:POKEA,65:B=A :rem 219
330 IFC=34THENA=A+24 :rem 139
331 IFC=33THENA=A+20 :rem 135
334 IFA<8120THENA=A+2 :rem 188
335 IFA>8141THENA=A-2 :rem 196
340 AC=5:GOSUB75:G=PEEK(A+22) :rem 183
345 IFPEEK(A)<>32THEN500 :rem 133
350 IFG=32ORG=104ORG=100THENPOKEA+22,42:P
  OKEA+30742,7:POKEB,32:GOTO500:rem 188
352 POKEB,32:POKEA,65:B=A :rem 215
355 GOTO90 :rem 63
400 S=255:FORFC=ETO7746STEP-22:S=S-1:POKE
  S4,S:POKEFC,93:NEXTFC :rem 170
402 POKES4,0 :rem 168
405 J=FC:H=PEEK(J):IFH=32THEN410 :rem 159
407 GOTO450 :rem 109
410 POKEJ,93:POKEJ-0,93 :rem 78
415 FORFC=ETO7724STEP-22:POKEFC,32:NEXTFC
                                :rem 85
420 GOTO75 :rem 59
450 POKEK,42:POKEK+1,42:POKEK-1,42
                                :rem 235
455 FORCR=1TO150:NEXT :rem 58
460 FORI=7724TO7745:POKEI,32:NEXT :rem 17
465 Q2=Q2+25:L=L+50:M=1:U=U+P1:P=INT(U)
                                :rem 45
470 IFP>25THENP=25 :rem 66
475 GOTO415 :rem 115
480 PRINT"[HOME][10 DOWN][3 RIGHT]OUT OF
  [SPACE]ENERGY !!":FORX=1TO2500:NEXT
                                :rem 228
485 PRINT"[CLR]" :rem 5
500 FORI=1TO900:NEXT:POKES4,0 :rem 52
502 POKEK,32:POKEK+1,32:POKEK-1,32
                                :rem 230

```



```

503 FORFC=QTO8119STEP22:POKEFC,32:NEXT      :rem 168
504 W=W-1:IFW>0THEN20                          :rem 1
505 IFL<10THEN509                              :rem 223
506 IFL>9ANDL<100THEN510                      :rem 158
507 IFL>99ANDL<1000THEN511                   :rem 9
508 IFL>999THEN512                             :rem 40
509 PRINT"{HOME}{9 RIGHT}0":GOTO513           :rem 195
510 PRINT"{HOME}{10 RIGHT}0":GOTO513          :rem 216
511 PRINT"{HOME}{11 RIGHT}0":GOTO513          :rem 246
512 PRINT"{HOME}{12 RIGHT}0"                  :rem 8
513 PRINT"{HOME}{10 DOWN}{6 RIGHT}GAME OV     :rem 76
    ER1"
515 FORI=1TO2500:NEXT                          :rem 28
517 PRINT"{CLR}"                              :rem 1
520 B$="BATTLE AGAIN ?"                       :rem 217
525 FORI=1TOLEN(B$):PRINT"{UP}"TAB(4)LEFT    :rem 230
    $(B$,I)
530 FORK=1TO125:NEXT:NEXT                     :rem 101
532 PRINT:PRINT:PRINT                         :rem 181
535 B1$="(Y/N)"                               :rem 220
540 FORI=1TOLEN(B1$):PRINT"{UP}";TAB(8)LE    :rem 132
    FT$(B1$,I)
545 FORK=1TO125:NEXT:NEXT                     :rem 107
550 FORV=1TO10:GETA$:NEXT                     :rem 65
551 GETYN$:IFYN$=""THEN551                    :rem 37
555 IFYN$="N"THENEND                          :rem 206
560 GOTO5                                      :rem 9
1000 PRINT"{CLR}DIFFICULTY LEVELS {DOWN}    :rem 133
    {18 LEFT}{18 T}{DOWN}"
1005 PRINT"{DOWN}1-BEGINNER"                  :rem 80
1010 PRINT"{DOWN}2-ROOKIE"                    :rem 204
1015 PRINT"{DOWN}3-PRO"                       :rem 250
1020 PRINT"{DOWN}4-EXPERT"                    :rem 222
1025 PRINT"{DOWN}5-RANDOM"                    :rem 205
1030 GETDF$:DF=VAL(DF$):IFDF=1THENP1=10      :rem 68
1035 IFDF=2THENP1=12                          :rem 161
1040 IFDF=3THENP1=14                          :rem 160
1045 IFDF=4THENP1=16                          :rem 168
1050 IFDF=5THENP1=RND(0)*16                   :rem 52
1055 IFDF<10RDF>5THEN1030                     :rem 226
1060 RETURN                                    :rem 167
2500 POKE36879,8:A$="{PUR}J{3 SPACES}U      :rem 129
    {3 SPACES}M{3 SPACES}P {GRN}"
2510 PRINT"{CLR}":FORI=1TOLEN(A$)             :rem 60
2512 FORK=1TO155:NEXT                         :rem 33
2515 PRINTTAB(4)"{UP}";LEFT$(A$,I):NEXT      :rem 185
2520 PRINT"{3 DOWN}{3 SPACES}READY TO BAT    :rem 43
    TLE?":PRINT"{2 DOWN}{8 SPACES}{RVS}Y
    {OFF} / {RVS}N{OFF}"
2575 GETY$:IFY$=""THEN2575                    :rem 249
2580 IFY$="N"THENEND                          :rem 176
2590 GOTO5                                      :rem 62
160 IF(C=12)AND(A-2*D>-1)THEN300:rem 73
170 IFC=23ORC=10RC=60THENQ2=Q2-20:GOTO530   :rem 241
180 BZ=AZ+INT(55*RND(0))-30:T1=SGN(BZ-AZ)    :rem 150
200 IF (AZ-BZ) > (29-P1) THEN 630 :rem 70
210 IF BZ<30ORBZ>310 THEN 180 :rem 52
220 IF T1=1THENAI=AZ:A2=BZ:GOTO240:rem 30
230 AI=BZ:A2=AZ :rem 101
240 FORI=ALTOA2STEPT1*6 :rem 172
250 IF I<256 THEN POKEV+16,PEEK(V+16)AND2   :rem 231
    54:POKEV,I:NEXT:AZ=BZ:GOTO120:rem 231
260 POKEV+16,PEEK(V+16)OR1:POKEV,I-256:NE   :rem 54
    XT:AZ=BZ:GOTO120
270 M=5:GOTO120 :rem 94
275 REM MOVE BASE SHIP :rem 8
280 IF D<>0THEN390 :rem 226
290 A=A+2:B1=BX+16:GOTO320 :rem 213
300 IF D<>0THEN460 :rem 217
310 A=A-2:B1=BX-16 :rem 202
320 Q2=Q2-5:T1=SGN(B1-BX):IFT1=1THENAI=BX    :rem 68
    :A2=B1:GOTO340
330 AI=B1:A2=BX :rem 60
340 FORI=ALTOA2STEPT1*4 :rem 171
350 IF I<256 THEN POKEV+16,PEEK(V+16)AND2   :rem 33
    53:POKEV+2,I:NEXT:BX=B1:GOTO370
360 POKEV+16,PEEK(V+16)OR2:POKEV+2,I-256:   :rem 101
    NEXT:BX=B1
370 IF PEEK(1904+A)<>32ANDPEEK(1905+A)<>3    :rem 227
    2THEN180
380 W=W-1:GOSUB 733:GOTO 120 :rem 65
385 REM JUMP RIGHT :rem 62
390 A=A+4:FORI=BXTOBX+16STEP2:Y=Y-2          :rem 192
400 IF I<256 THEN POKEV+16,PEEK(V+16)AND2   :rem 55
    53:POKEV+2,I:POKEV+3,Y:NEXT:GOTO420
410 POKEV+16,PEEK(V+16)OR2:POKEV+2,I-256:   :rem 127
    POKEV+3,Y:NEXT
420 FORI=BX+16TOBX+32STEP2:Y=Y+2 :rem 240
430 IF I<256 THEN POKEV+16,PEEK(V+16)AND2   :rem 61
    53:POKEV+2,I:POKEV+3,Y:NEXT:GOTO450
440 POKEV+16,PEEK(V+16)OR2:POKEV+2,I-256:   :rem 130
    POKEV+3,Y:NEXT
450 BX=BX+32:IF PEEK(1904+A)<>32ANDPEEK(1   :rem 29
    905+A)<>32THEN180
455 GOSUB 731:GOTO 120 :rem 191
458 REM JUMP LEFT :rem 236
460 A=A-4:FORI=BXTOBX-16STEP-2:Y=Y-2        :rem 239
470 IF I<256 THEN POKEV+16,PEEK(V+16)AND2   :rem 69
    53:POKEV+2,I:POKEV+3,Y:NEXT:GOTO490
480 POKEV+16,PEEK(V+16)OR2:POKEV+2,I-256:   :rem 134
    POKEV+3,Y:NEXT
490 FORI=BX-16TOBX-32STEP-2:Y=Y+2 :rem 40
500 IF I<256 THEN POKEV+16,PEEK(V+16)AND2   :rem 57
    53:POKEV+2,I:POKEV+3,Y:NEXT:GOTO520
510 POKEV+16,PEEK(V+16)OR2:POKEV+2,I-256:   :rem 128
    POKEV+3,Y:NEXT
520 BX=BX-32:IF PEEK(1904+A)<>32ANDPEEK(1   :rem 29
    905+A)<>32THEN180
525 GOSUB 731:GOTO 120 :rem 189
530 AI=106:POKES+4,33 :rem 139
540 II=0:FORI=1784TO1144STEP-40:POKEI+A,A   :rem 209
    1:POKEI+A+S,1:POKES+1,II:II=II+3
550 IFPEEK(V+31)=1THEN CR=1:NEXT:GOTO570    :rem 172

```

Program 2: Jump!—64 Version

```

100 GOSUB1160 :rem 217
110 CLR:S=54272:LO=54296:GOSUB940:rem 180
120 C=PEEK(197):D=PEEK(653) :rem 249
125 Q$=STR$(Q2)+"{2 SPACES}":IFQ2<=0THENQ   :rem 244
    $=""{3 SPACES}
130 PRINT"{HOME}{GRN}{3 SPACES}SC = ",L;"    :rem 23
    {2 SPACES}LIVES = ";WW;"{4 SPACES}EN
    {SPACE}="";Q$
140 IFQ2<=0THEN749 :rem 35
150 IF(C=20)AND(A+2*D<40)THEN280:rem 78

```



```

560 NEXT                                :rem 218
570 POKES+4,32:IF A1=32ANDCR<>1 THEN 180 :rem 198
                                           :rem 198
580 IF CR=1 AND A1=32 THEN 600          :rem 219
590 A1=32:CR=0:GOTO540                  :rem 250
600 POKEV+21,2:T1=INT((AZ-BX)/8)       :rem 89
610 FORI=1104+A+T1TO1104+A+T1+3:POKEI,42:
    POKEI+S,2:NEXTI:GOSUB740            :rem 178
615 FORI=1104+A+T1TO1104+A+T1+3:POKEI,32:
    POKEI+S,2:NEXTI:CR=0                :rem 157
620 L=L+50:Q2=Q2+45:POKEV+21,3:AZ=INT(RND
    (1)*200)+40:POKEV,AZ:GOTO 120      :rem 69
625 REM SHOOT AT BASE                   :rem 190
630 POKES+4,33:II=120:A1=106:T1=INT(AZ/8)
    -2                                   :rem 193
640 FORI=1144TO1864STEP40:POKEI+T1,A1:POK
    EI+S+T1,1:POKES+1,II:II=II-3       :rem 245
650 IF PEEK(V+31)=2THENCNCR=1:NEXT:GOTO670
                                           :rem 175
660 NEXT                                :rem 219
670 POKES+4,32:IF A1=32THEN 690         :rem 186
680 A1=32:GOTO 640                      :rem 191
690 IF CR=1 THEN GOSUB731:GOTO120:rem 129
710 W=PEEK(1904+T1):IFW=102THENPOKE1904+T
    1,230:GOTO120                       :rem 179
715 W=PEEK(1904+T1):IFW=230THENPOKE1904+T
    1,32:GOSUB740:GOTO120              :rem 223
720 W=PEEK(1944+T1):IFW=102THENPOKE1944+T
    1,32:GOSUB740:GOTO120              :rem 225
730 GOTO 800                            :rem 107
731 REM BASE DESTROYED                  :rem 77
733 POKEV+21,1:POKE1864+A,42:POKE1865+A,4
    2:POKE1864+A+S,2:POKE1865+A+S,2    :rem 139
734 POKES+4,129:POKES+1,90             :rem 244
735 FORI=1TO300:NEXT:POKES+4,128:IF WW=1
    {SPACE}THEN 800                     :rem 122
736 WW=WW-1:POKE1864+A,32:POKE1865+A,32:P
    OKEV+31,0:CR=0                      :rem 240
737 A=0:POKEV+16,PEEK(V+16)AND253:POKEV+2
    1,3                                   :rem 67
738 FORA=0TO32STEP2:IFPEEK(1904+A)<>102OR
    PEEK(1905+A)<>102THENNEXTA          :rem 65
739 BX=A*8+24:POKEV+2,BX:RETURN        :rem 170
740 POKES+4,129:POKES+1,30:FORI=1TO50:NEXT
    :POKES+4,128:RETURN                 :rem 21
749 PRINT"[HOME]{10 DOWN}{12 RIGHT}OUT OF
    ENERGY !!":FORX=1TO2500:NEXT:rem 241
750 PRINT"[CLR]"                        :rem 0
760 POKES+4,0                           :rem 175
800 POKE53269,0:PRINT"[HOME]{10 DOWN}
    {15 SPACES}GAME OVER"              :rem 74
810 FORI=1TO1500:NEXT                  :rem 25
820 PRINT"[CLR]"                        :rem 254
830 POKEV+21,0:PRINT"[CLR]":B$="
    {5 SPACES}BATTLE AGAIN ?":B1$="
    {3 SPACES}(Y/N)"                   :rem 157
840 FORI=1TOLEN(B$):PRINT"[UP]"TAB(8)LEFT
    $(B$,I)                             :rem 234
850 FORK=1TO125:NEXT:NEXT              :rem 106
860 PRINT:PRINT:PRINT                  :rem 185
870 B1$="{8 SPACES}(Y/N)"              :rem 222
880 FORI=1TOLEN(B1$):PRINT"[UP]";TAB(8)LE
    FT$(B1$,I)                          :rem 139
890 FORK=1TO125:NEXT:NEXT              :rem 110
900 FORV=1TO10:GETA$:NEXT              :rem 64
910 GETYN$:IFYN$=""THEN910             :rem 35
920 IFYN$="N"THENEND                   :rem 202
930 GOTO110                            :rem 103
940 PRINT"[CLR]DIFFICULTY LEVELS{DOWN}
    {17 LEFT}{17 T}{DOWN}"            :rem 33
950 PRINT"[DOWN]1-BEGINNER"           :rem 40

960 PRINT"[DOWN]2-ROOKIE"              :rem 169
970 PRINT"[DOWN]3-PRO"                 :rem 211
980 PRINT"[DOWN]4-EXPERT"              :rem 188
990 PRINT"[DOWN]5-RANDOM"              :rem 167
995 PRINT"{2 DOWN} CHOOSE 1-5"         :rem 238
1000 GETP1$:P1=VAL(P1$)                :rem 23
1040 IFP1=5THENP1=RND(0)*6             :rem 249
1050 IFP1<1ORP1>5THEN1000              :rem 200
1060 FORI=STOLO:POKEI,0:NEXTI:POKELO,15:P
    OKES+5,130:POKES+6,72              :rem 185
1070 V=53248:POKEV+21,7:POKE2040,13:POKE2
    041,14:POKE2042,14                 :rem 83
1080 POKEV+39,3                        :rem 68
1090 POKE V+28,1:POKEV+37,1:POKEV+38,5:PO
    KEV+39,2:POKEV+40,1:POKEV+4,150    :rem 231
1100 POKE53280,0:POKE53281,0:W=3:PRINT"
    {CLR}"                              :rem 182
1110 A=0:BX=24:B=A:M=1:AC=1:A1=1232:A2=12
    35:Q2=1000:CO=V:AZ=200:B1=BX:Y=205 :rem 18
                                           :rem 18
1120 WW=3:FORX=1904TO1983:POKEX,102:POKEX
    +S,5:NEXTX                          :rem 207
1130 FORX=1984TO2023:POKEX,99:POKEX+S,1:N
    EXT                                  :rem 245
1140 POKEV+16,0:POKEV,AZ:POKEV+1,60:POKEV
    +2,BX:POKEV+3,205                  :rem 46
1150 RETURN                            :rem 167
1160 POKE53281,0:POKE53280,0:A$="{PUR}J
    {3 SPACES}U{3 SPACES}M{3 SPACES}P
    {GRN}"                              :rem 51
1200 RESTORE:PRINT"[CLR]{3 DOWN}
    {8 SPACES}J";                      :rem 61
1210 FORK=0TO42:READQ:POKE832+K,Q:NEXT
                                           :rem 133
1220 PRINT"{6 SPACES}U";:FORK=43TO85:READ
    Q:POKE832+K,Q:NEXT                 :rem 95
1230 PRINT"{6 SPACES}M";:FORK=86TO127:REA
    DQ:POKE832+K,Q:NEXT:PRINT"{6 SPACES}
    P"                                  :rem 231
1250 PRINT"{4 DOWN}{11 SPACES}READY TO BA
    TTLE"                              :rem 177
1260 PRINT"{15 SPACES}{RVS}Y{OFF} / {RVS}
    N{OFF}"                             :rem 184
1280 GETY$:IFY$=""THEN1280             :rem 233
1290 IFY$="N"THENEND                   :rem 173
1300 RETURN                            :rem 164
1310 DATA000,000,000,000,000,000,000,000
                                           :rem 147
1320 DATA000,000,000,000,000,001,085,064,006
                                           :rem 178
1330 DATA190,144,026,190,164,085,085,085
                                           :rem 236
1340 DATA085,085,085,080,020,005,085,085
                                           :rem 230
1350 DATA085,085,085,085,031,235,244,007
                                           :rem 234
1360 DATA235,208,001,085,064,005,000,080
                                           :rem 209
1370 DATA020,000,020,080,000,005,000,000
                                           :rem 170
1380 DATA000,000,000,000,000,000,000,254
                                           :rem 165
1390 REM                                :rem 177
1400 DATA000,000,000,001,000,000,001,000
                                           :rem 149
1410 DATA000,001,000,000,003,128,000,003
                                           :rem 166
1420 DATA128,000,003,128,000,007,192,000
                                           :rem 193
1430 DATA015,224,000,031,240,000,127,252
                                           :rem 193

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1440 DATA000,227,142,000,227,142,000,127
      :rem 197
1450 DATA252,000,063,248,000,096,012,000
      :rem 202
1460 DATA220,118,000,159,242,000,220,118
      :rem 204
1470 DATA000,096,012,000,063,248,000,255
      :rem 207

```

Descent To Kaylon

(Article on page 66.)

BEFORE TYPING...

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

Program 1:

Descent To Kaylon—VIC Version

```

0 POKE56,28:POKE52,28:CLR :rem 225
1 POKE36869,255:POKE36879,25:PRINT" {BLK}
  {CLR}{RVS}{DOWN}WELCOME TO THE PLANET K
  AYLON":GOTO1202 :rem 240
6 CL=.:V=36878:POKEV,15:S1=V-1:SR=1
  :rem 90
10 PRINT" {CLR}{BLK}":BS=4 :rem 149
20 FORD=7424TO7424+63:READY:POKED,Y:NEXT
  :rem 253
22 FORD=1TO6:READNO%(D):NEXT :rem 252
30 LF=3:PO=7724+21:C=30720 :rem 147
31 TB$=" {RVS}*****"
  :rem 49
49 M$(1)=" ":M$(2)="$":CO=(LV+1)/50
  :rem 160
50 FORD=1TO3:MA$="":FORAS=1TO22 :rem 107
51 B=1:IFRND(TI)>.9-COTHENB=2 :rem 245
55 MA$=MA$+M$(B):NEXT :rem 179
56 IFD=1THENAS=MA$ :rem 47
57 IFD=2THENB$=MA$ :rem 50
58 IFD=3THENC$=MA$ :rem 53
59 NEXT :rem 173
98 PRINT" {HOME}{RED}{RVS}SCORE{8 SPACES}L
  EFT" :rem 42
99 PRINT" {RVS}HIGH{9 SPACES}LEVEL":PRINT"
  {BLK}{RVS}*****"
  :rem 248
* 100 PRINT" {HOME}{RED}{5 RIGHT}{RVS}"SC:PR
  INT" {HOME}{RVS}{RED}"TAB(17)LF:PRINT"
  {HOME}{DOWN}{RVS}{BLK}{5 RIGHT}"HI:PR
  INT" {HOME}{DOWN}{RVS}{RED}"TAB(18)LV+
  1 :rem 23
101 PRINT" {HOME}{BLK}{5 DOWN}"A$;:PRINT"
  {2 DOWN}"B$ :rem 142
103 PRINT" {PUR}{DOWN}1{3 SPACES}111
  {3 SPACES}111{3 SPACES}111111{BLK}"
  :rem 79
104 PRINT" {DOWN}"C$"{2 DOWN}"A$ :rem 169
105 PRINT" {GRN}111"SPC(16)"111111"SPC(14)
  )"11111111"SPC(12)"1111111111{PUR}
  {RVS}{P}{OFF}{GRN}1"; :rem 108
106 PRINT" {GRN}1{PUR}{RVS}{P}{OFF}{GRN}11
  {PUR}{RVS}{P}{OFF}{GRN}11{PUR}{RVS}
  {P}{OFF}{GRN}11111";:POKE8185,33:POKE
  8185+C,5 :rem 17

```

```

185 PRINT" {BLK}";:PO=7724+21 :rem 178
189 FORX=2TO20:POKEPO+X,34:POKEPO+C,CL
  :rem 164
190 PRINT" {HOME}{DOWN}{BLK}{DOWN}"LEFT$(T
  B$,X)" {OFF}{DOWN}{3 LEFT}" {RIGHT}&"
  :rem 91
191 FORD=1TO20:P=PEEK(197):IFP=32THEN200
  :rem 147
192 NEXT:NEXT:PRINT" {HOME}{2 DOWN}"TAB(X-
  2)" {RVS}*{DOWN}{2 LEFT}{3 SPACES}":GO
  TO189 :rem 233
200 PO=PO+X:PO=PO+22:POKEPO-22,228:POKEPO
  ,34:POKEPO+C,CL :rem 1
219 A$=RIGHT$(A$,21)+LEFT$(A$,1):B$=RIGHT
  $(B$,1)+LEFT$(B$,21) :rem 5
220 C$=RIGHT$(C$,1)+LEFT$(C$,21):PRINT"
  {HOME}{5 DOWN}"A$;:PRINT" {2 DOWN}"B$:
  PRINT" {4 DOWN}"C$"{2 DOWN}"A$:rem 215
226 M=M+1:IFM>SRTHENM=.:POKEPO,32:PO=PO+2
  2:ON-(PEEK(PO)<>32)GOTO500:POKEPO,34
  :rem 60
227 POKEPO+C,CL:OD=PEEK(PO):ON-(OD<>34)A
  ND(OD<>32)GOTO500 :rem 47
230 P=PEEK(197):IFP<>32THEN233 :rem 248
231 M=.:POKEP1,200:LS=PEEK(PO+22):CM=(PEE
  K(C+PO+22))AND7 :rem 39
232 POKEPO+22,35:POKEPO+22+C,2:POKEPO+22,
  LS:POKEPO+22+C,CM:POKEP1,.:GOTO219
  :rem 100
233 IFP>18THEN219 :rem 233
234 ON-(P=18)GOTO350 :rem 123
235 ON-(P=17)GOTO300:GOTO219 :rem 133
300 IFPEEK(PO-1)<>32THEN500 :rem 56
302 POKEPO,32:PO=PO-1:POKEPO,34:POKEPO+C,
  CL:GOTO219 :rem 226
350 IFPEEK(PO+1)<>32THEN500 :rem 59
352 POKEPO,32:PO=PO+1:POKEPO,34:POKEPO+C,
  CL:GOTO219 :rem 229
500 IFPEEK(PO)>128THEN600 :rem 215
502 POKEV,.:POKEP1,200:POKEPO-22+C,2
  :rem 134
503 FORD=15TO.STEP-.5:POKEV,D :rem 50
504 POKEPO-22,219:FORS=.:TO20:NEXT:POKEPO-
  22,214:FORS=.:TO20:NEXT:NEXT:POKEP1,.:
  POKEV,15 :rem 231
510 FORD=200TO150STEP-.5:POKEP1-2,D:NEXT:
  POKEP1-2,.:LF=LF-1 :rem 105
511 ON-(LF<=.)GOTO1200:PRINT" {RVS}{HOME}
  {RED}"TAB(17)LF" {BLK}":IFPEEK(PO)=34T
  HENPOKEPO,32 :rem 57
513 POKEPO-22,32:PRINT" {HOME}{DOWN}{BLK}
  {DOWN}"LEFT$(TB$,X)" {RVS}*{DOWN}
  {3 LEFT}{4 SPACES}":GOTO185 :rem 70
600 POKEPO,34:POKEPO+C,.:BS=BS-1:IFBS=.TH
  ENSC=SC+100:GOTO700 :rem 237
602 SC=SC+100:POKEP1-1,200:FORS=0TO200:NE
  XT:POKEP1-1,.:PRINT" {HOME}{RIGHT}
  {RVS}{2 RIGHT}{RED}{2 RIGHT}"SC
  :rem 109
603 PRINT" {HOME}{DOWN}{BLK}{DOWN}"LEFT$(T
  B$,X)" {RVS}*{DOWN}{3 LEFT}{4 SPACES}"
  :GOTO185 :rem 28
700 PRINT" {HOME}{RVS}{5 DOWN}{3 RIGHT}BON
  US LEVEL"LV+1" {LEFT}X":Q1=36876:Q2=36
  875:POKEV,15 :rem 206
702 FORX=1TO6:POKEQ1,NO%(X):POKEQ2,NO%(X)
  :rem 36
703 FORT=1TO150:NEXT:IFNO%(X)=235THENFORT
  =.TO200:NEXT :rem 131
704 NEXT:POKEQ1,.:POKEQ2,.: :rem 101
710 SC=SC+((LV+1)*100):LV=LV+1:BS=4:FORD=

```



```

10000 .TO1000:NEXT:PRINT"{CLR}":GOTO31
10001                                     :rem 0
10002 DATA,,,,,,,,,                                     :rem 15
10003 DATA170,255,255,255,255,255,255,255,170
10004                                     :rem 233
10005 DATA24,60,102,126,126,24,36,195
10006                                     :rem 18
10007 DATA24,36,66,66,36,24,24,0                                     :rem 33
10008 DATA24,60,126,254,127,60,8,0                                     :rem 127
10009 DATA0,0,0,0,0,0,126,255                                     :rem 101
10010 DATA170,255,255,255,255,254,252,248
10011                                     :rem 236
10012 DATA85,255,255,255,255,127,63,31
10013                                     :rem 88
10014 DATA215,225,231,235,231,235                                     :rem 78
10015 IFSC>HITTHENHI=SC:PRINT"{HOME}{DOWN}
10016 {5 RIGHT}{RVS}{RED}"HI                                     :rem 201
10017 PRINT"{CLR}{4 DOWN}{6 RIGHT}{RVS}
10018 {BLK}GAME OVER"                                     :rem 18
10019 PRINT"{DOWN}{RVS}PRESS:{DOWN}":PRINT
10020 "{RVS}(SPACE) TO RELEASE.{3 SPACES}T
10021 HEN (SPACE) TO FIRE"                                     :rem 242
10022 PRINT"{RVS}RETRO-ROCKETS"                                     :rem 125
10023 PRINT"{RVS}(A)-TO MOVE LEFT
10024 {6 SPACES}(D)-TO MOVE RIGHT":rem 136
10025 PRINT"{DOWN}{RVS}{2 RIGHT}PRESS ANY
10026 {SPACE}KEY..."                                     :rem 220
10027 POKE198,.:WAIT198,1:GETR$                                     :rem 241
10028 LV=.:SC=.:M=.:RESTORE:CO=.:GOTO6
10029                                     :rem 65

```

Program 2: Descent To Kaylon—64 Version

```

118 POKE53280,1:POKE53281,1 :rem 241
120 D$="||||| :rem 164
125 PRINT"{HOME}{RED}{RVS}SCORE{OFF}"TAB(
31){RVS}LEFT{OFF}":PRINT"{RVS}HIGH
{OFF}"TAB(31){RVS}LEVEL{OFF}":rem 18
130 PRINT"{BLK}*****
*****" :rem 245
135 PRINT"{HOME}{RED}"TAB(6)SCTAB(36)LF:P
RINT"{HOME}{DOWN}"TAB(6)HITAB(36)LV+1
:rem 93
140 PRINT"{HOME}{BLK}{5 DOWN}"A$"{2 DOWN
"B$ :rem 143
145 PRINT"{PUR}|||||{2 SPACES}|||||
||||{2 SPACES}||{2 SPACES}|||||
|" :rem 39
150 PRINT"{BLK}{DOWN}"C$"{2 DOWN}"A$:E$="
{HOME}{20 DOWN}" :rem 197
155 PRINTE$"[4]|||||"SPC(30)"|||||";
:rem 207
160 PRINT"[4]|||||"SPC(20)"|||||
|";:PRINT"[4]D$; :rem 240
165 POKE1915,100:POKE1915+C,5:POKE1921,10
0:POKE1921+C,5:POKE1925,100 :rem 79
170 POKE1925+C,5:POKE1930,100:POKE1930+C,
5 :rem 95
175 PRINT"{BLK}":PO=1144:X=1:D=0 :rem 201
180 X=X+1:IFX>38THEN205 :rem 114
185 POKEPO+C+X,CL:POKEPO+X,34:PRINT"
{HOME}{DOWN}{BLK}{DOWN}"LEFT$(TB$,X)"
{OFF}%{DOWN}{3 LEFT} '{RIGHT}&" :GOSUB
360 :rem 132
190 D=D+1:P=PEEK(197):IFP=60THEN210
:rem 23
195 IFD>38THEN180 :rem 227
200 GOTO190 :rem 101
205 PRINT"{HOME}{2 DOWN}"TAB(X-1)**{DOWN}
{2 LEFT}{5 SPACES}":GOTO175 :rem 218
210 PO=PO+X:PO=PO+40:POKEPO-40,100:POKEPO
,34:POKEPO+C,CL :rem 247
215 A$=RIGHT$(A$,39)+LEFT$(A$,1):B$=RIGHT
$(B$,1)+LEFT$(B$,39) :rem 19
220 C$=RIGHT$(C$,1)+LEFT$(C$,39) :rem 185
225 PRINT"{HOME}{5 DOWN}"A$;:PRINT"
{2 DOWN}"B$;:PRINT"{4 DOWN}"C$"
{2 DOWN}"A$ :rem 193
230 PK=PEEK(PO):IFPK=35THEN240 :rem 80
235 IFPK<>34ANDPK<>32THEN295 :rem 193
240 M=M+1:IFM>SRTHENM=:POKEPO,32:PO=PO+4
0:IFPEEK(PO)<>32THEN295 :rem 18
245 POKEPO,34:POKEPO+C,CL:GOSUB375
:rem 134
250 P=PEEK(197) :rem 59
255 IFP=60THENM=:LS=PEEK(PO+40):LC=PEEK(
PO+40+C)AND15:GOSUB380:GOTO215
:rem 112
260 IFP=64THEN215 :rem 229
265 ON-(P=18)GOTO285 :rem 134
270 ON-(P=10)GOTO275:GOTO215 :rem 132
275 IFPEEK(PO-1)<>32THEN295 :rem 78
280 POKEPO,32:PO=PO-1:POKEPO,34:POKEPO+C,
CL:GOSUB375:GOTO215 :rem 60
285 IFPEEK(PO+1)<>32THEN295 :rem 77
290 POKEPO,32:PO=PO+1:POKEPO,34:POKEPO+C,
CL:GOSUB375:GOTO215 :rem 59
295 PK=PEEK(PO):IFPK=100THEN325 :rem 136
300 IFPK=33THENPO=PO-40 :rem 155
305 POKEPO,91:POKEPO+C,0:POKEPO,86:POKEPO
+L,2:GOSUB365:POKED+24,15 :rem 191
310 LF=LF-1:ON-(LF=.)GOTO430:PRINT"{HOME}
{RED}"TAB(36)LF"{RED}" :rem 50

```



```

315 POKEPO,32 :rem 248
320 GOSUB355:GOTO175 :rem 194
325 POKEPO,34:POKEPO+C,.:BS=BS-1:IFBS=0TH
ENSC=SC+100:GOTO340 :rem 243
330 SC=SC+100:PRINT"{HOME}{RED}"TAB(6)SC
:rem 233
335 GOSUB355:GOTO175 :rem 200
340 SC=SC+((LV+1)*100):BS=4:PRINT"{HOME}
{RED}"TAB(6)SC :rem 244
345 PRINT"{HOME}{10 DOWN}{40 SPACES}"
:rem 42
346 PRINT"{HOME}{10 DOWN}{13 SPACES}{RVS}
BONUS LEVEL"LV+1:LV=LV+1 :rem 81
350 FORD=.TO1500:NEXT:PRINT"{CLR}":GOTO75
:rem 141
355 PRINT"{HOME}{DOWN}{BLK}{DOWN}"LEFT$(T
B$,X)"*{DOWN}{3 LEFT}{4 SPACES}":RETU
RN :rem 23
360 POKESD+4,17:POKEHF,INT(RND(0)*50)+50:
POKEFL,250:POKESD+4,16:RETURN:rem 255
365 POKESD+4,129:FORMU=15TO0STEP-1:POKEHF
,100:POKESD+24,MU:FORLL=1TO5:NEXT
:rem 233
370 NEXT:POKESD+4,128:RETURN :rem 25
375 POKESD+4,33:POKEHF,100:POKEFL,250:POK
ESD+4,32:RETURN :rem 210
380 POKEPO+40,35:POKEPO+40+C,2:POKEPO+40,
LS:POKEPO+40+C,LC:RETURN :rem 43
385 DATA,,,,, :rem 238
390 DATA170,255,255,255,255,255,255,170
:rem 194
395 DATA24,60,102,126,126,24,36,195
:rem 238
400 DATA24,36,66,66,36,24,24,0 :rem 238
405 DATA24,60,126,254,127,60,8,0 :rem 79
410 DATA0,0,0,0,0,0,126,255 :rem 56
415 DATA170,255,255,255,255,254,252,248
:rem 194
420 DATA85,255,255,255,255,127,63,31
:rem 40
425 DATA215,225,231,235,231,235 :rem 34
430 IFSC>HITHENHI=SC:PRINT"{HOME}{DOWN}
{BLK}"TAB(6)HI :rem 204
435 PRINT"{CLR}{9 DOWN}{3 RIGHT}
{12 SPACES}{RVS}{BLK}GAME OVER"
:rem 232
436 PRINT"{DOWN}{15 SPACES}{RVS}{BLK}SCOR
E"SC :rem 51
437 PRINT"{4 DOWN}{12 SPACES}PRESS {RVS}B
{OFF} TO BEGIN":POKE198,0:GOTO455
:rem 166
440 PRINT"{DOWN} PRESS (SPACE BAR) TO REL
EASE AND FIRE{3 SPACES}RETRO-ROCKETS.
" :rem 56
445 PRINT"{DOWN} PRESS (A)-TO MOVE LEFT A
ND (D)-TO MOVE{2 SPACES}RIGHT."
:rem 235
450 PRINT"{DOWN}{RIGHT}PRESS {RVS}B{OFF}
{SPACE}TO BEGIN...":POKE198,0 :rem 4
455 GETZ$:IFZ$<>"B"THEN455 :rem 16
460 LV=.:SC=.:M=.:RESTORE:CO=.:GOTO60
:rem 66
465 P=PEEK(197):PRINTP:GOTO465 :rem 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.

Bagdad

(Article on page 56.)

Program 1: Bagdad—VIC Version, Part 1

```

10 PRINT"{CLR}{2 DOWN}"SPC(8)"BAGDAD"
:rem 45
11 PRINT"{4 DOWN}IS THIS ON A {RVS}C{OFF}
OLOR TV OR {RVS}B{OFF}LACK AND WHITE?"
:rem 43
12 GETG$:IFG$<>"C"ANDG$<>"B"THEN12
:rem 179
13 POKE0,1:IFG$="B"THENPOKE0,0 :rem 1
14 PRINT"{CLR}{DOWN}YOU CONTROL THE GOOD"
:IFG$="C"THENPRINT"GREEN";:GOTO16
:rem 128
15 PRINT"GREY"; :rem 169
16 PRINT" GENIE THAT":PRINT"APPEARS AT TH
E BOTTOM OF THE SCREEN" :rem 105
17 PRINT"{DOWN}USE JOYSTICK CONTROL
{2 SPACES}TO MOVE LEFT AND RIGHT"
:rem 30
18 PRINT"PRESSING FIRE BUTTON{2 SPACES}WI
LL CAUSE YOUR GENIE TO FLY UPWARDS..."
:rem 69
19 PRINT"{DOWN}RELEASING FIRE BUTTON WILL
CAUSE YOUR GENIE TO FALL DOWNWARDS"
:rem 195
20 PRINT"{DOWN}PUSH THE JOYSTICK
{5 SPACES}FORWARD TO START A NEWGAME":
GOSUB29 :rem 133
21 PRINT"{CLR}{DOWN}YOUR OBJECTIVE IS TO
{2 SPACES}KNOCK THE BAD GENIES
{2 SPACES}OFF THEIR MAGIC" :rem 146
22 PRINT"CARPETS AND BACK INTO THEIR BOTT
LES" :rem 254
23 PRINT"{DOWN}YOU MUST THEN COLLECT THEI
R BOTTLES BEFORE{2 SPACES}THEY EMERGE
{SPACE}AGAIN" :rem 93
24 PRINT"{DOWN}YOU ONLY SCORE POINTS FOR
{SPACE}GETTING BOTTLES" :rem 246
25 PRINT"{DOWN}YOUR GENIE BEGINS WITHFOUR
LIVES.{2 SPACES}AN EXTRA LIFE IS ADDE
D FOR" :rem 233
26 PRINT"EVERY 4000 POINTS" :rem 101
27 GOSUB29:PRINT"{CLR}{DOWN}THESE CHARACT
ERS WILL CHANGE AS THE PROGRAM LOADS"
:rem 58
28 PRINT"{2 DOWN}{5 SPACES}PLEASE WAIT":G
OTO 32 :rem 36
29 PRINT"{HOME}{22 DOWN}{6 SPACES}HIT ANY
KEY{HOME}" :rem 142
30 GETG$:IFG$=" "THEN30 :rem 245
31 RETURN :rem 68
32 FORI=832TO989:READA:POKEI,A:NEXT:SYS83
2 :rem 193
33 DATA 162,255,154,160,0,185 :rem 144
34 DATA 83,3,153,64,1,200 :rem 193
35 DATA 192,180,208,245,76,66 :rem 161
36 DATA 1,66,67,169,1,162 :rem 211
37 DATA 64,160,1,32,189,255 :rem 53
38 DATA 169,1,162,8,160,0 :rem 202
39 DATA 32,186,255,169,0,170 :rem 106
40 DATA 160,16,32,213,255,169 :rem 143
41 DATA 1,162,65,160,1,32 :rem 189
42 DATA 189,255,169,1,162,8 :rem 60
43 DATA 160,0,32,186,255,169 :rem 100
44 DATA 0,170,160,24,32,213 :rem 30

```



```

45 DATA 255,120,169,0,133,236 :rem 144
46 DATA 133,237,133,238,133,239 :rem 252
47 DATA 133,208,133,209,133,234 :rem 244
48 DATA 169,111,141,15,144,169 :rem 202
49 DATA 255,141,5,144,169,0 :rem 51
50 DATA 141,27,145,169,255,141 :rem 198
51 DATA 20,145,141,21,145,165 :rem 135
52 DATA 162,9,192,133,162,160 :rem 146
53 DATA 1,132,184,132,185,132 :rem 140
54 DATA 186,165,0,240,7,200 :rem 41
55 DATA 200,132,185,200,132,186 :rem 237
56 DATA 160,0,185,0,30,153 :rem 242
57 DATA 0,2,185,0,31,153 :rem 143
58 DATA 0,3,136,208,241,76 :rem 254
59 DATA 30,2 :rem 73

```

Program 2:

Bagdad—Line Replacement For VIC Tape Users

```

32 FORI=832TO962:READA:POKEI,A:NEXT:SYS83
2 :rem 184
33 DATA162,255,154,160,128,185,80,3
:rem 238
34 DATA153,63,1,136,208,247,76,64:rem 144
35 DATA1,169,0,32,189,255,169,1 :rem 43
36 DATA170,160,0,32,186,255,169,0:rem 134
37 DATA170,160,16,32,213,255,169,0
:rem 181
38 DATA170,160,24,32,213,255,120,169
:rem 24
39 DATA0,133,236,133,237,133,238,133
:rem 26
40 DATA239,133,208,133,209,133,234,169
:rem 131
41 DATA111,141,15,144,169,255,141,5
:rem 226
42 DATA144,169,0,141,27,145,169,255
:rem 242
43 DATA141,20,145,141,21,145,165,162
:rem 15
44 DATA9,192,133,162,160,1,132,184
:rem 182
45 DATA132,185,132,186,165,0,240,7
:rem 185
46 DATA200,200,132,185,200,132,186,160
:rem 110
47 DATA0,185,0,30,153,0,2,185 :rem 179
48 DATA0,31,153,0,3,136,208,241 :rem 21
49 DATA76,30,2 :rem 225

```

Program 3:

Bagdad—VIC Version, Part 2

See instructions in article before beginning.

```

4096 :208,003,076,219,016,201,211
4102 :001,208,003,076,240,016,038
4108 :076,009,017,169,000,133,160
4114 :240,165,242,041,001,201,140
4120 :001,208,004,169,008,133,035
4126 :240,165,241,041,001,201,151
4132 :001,208,007,165,240,024,169
4138 :105,004,133,240,165,240,161
4144 :024,101,243,133,240,070,091
4150 :241,070,242,032,114,016,001
4156 :160,000,165,244,145,003,009
4162 :165,240,145,001,024,105,234
4168 :001,133,240,200,165,244,031
4174 :145,003,165,240,145,001,009
4180 :024,105,001,133,240,160,235
4186 :022,165,244,145,003,165,066

```

```

4192 :240,145,001,024,105,001,100
4198 :133,240,200,165,244,145,205
4204 :003,165,240,145,001,096,246
4210 :169,030,133,002,165,241,086
4216 :133,001,164,242,240,016,148
4222 :165,001,024,105,022,133,064
4228 :001,165,002,105,000,133,026
4234 :002,136,208,240,165,001,122
4240 :133,003,165,002,024,105,064
4246 :120,133,004,096,070,241,046
4252 :070,242,032,114,016,160,022
4258 :000,169,032,145,001,200,197
4264 :145,001,160,022,145,001,130
4270 :200,145,001,096,169,000,017
4276 :141,019,145,169,127,141,154
4282 :034,145,173,032,145,041,244
4288 :128,208,002,169,002,133,066
4294 :245,169,255,141,034,145,163
4300 :173,017,145,073,255,041,140
4306 :060,005,245,041,127,074,250
4312 :133,245,096,160,003,169,254
4318 :060,153,117,030,153,120,087
4324 :030,153,029,031,153,048,160
4330 :031,169,061,153,139,030,049
4336 :153,142,030,153,051,031,032
4342 :153,070,031,136,208,225,045
4348 :169,058,153,117,030,153,164
4354 :124,030,153,033,031,153,014
4360 :048,031,192,022,208,001,254
4366 :096,160,022,169,059,208,216
4372 :233,000,160,062,189,002,154
4378 :001,201,041,240,002,160,159
4384 :060,132,204,076,195,023,210
4390 :000,000,165,180,074,074,019
4396 :168,185,184,000,160,022,251
4402 :145,003,096,133,235,230,124
4408 :233,216,169,009,032,009,212
4414 :019,169,062,160,045,153,158
4420 :205,031,136,208,250,164,038
4426 :233,240,008,169,037,136,129
4432 :153,229,031,208,250,169,096
4438 :038,141,236,031,169,039,228
4444 :141,243,031,160,004,185,088
4450 :234,000,074,074,074,074,116
4456 :024,105,040,153,235,031,180
4462 :185,234,000,041,015,024,097
4468 :105,040,153,236,031,185,098
4474 :235,000,074,074,074,074,141
4480 :024,105,040,153,242,031,211
4486 :185,235,000,041,015,024,122
4492 :105,040,153,243,031,136,080
4498 :136,208,204,169,040,141,020
4504 :248,031,141,241,031,096,172
4510 :169,064,044,029,145,240,081
4516 :251,173,020,145,169,096,250
4522 :141,021,145,169,000,133,011
4528 :210,165,208,240,023,197,195
4534 :209,048,019,133,209,169,201
4540 :000,160,005,132,210,136,063
4546 :153,010,144,208,250,169,104
4552 :015,141,014,144,169,000,171
4558 :133,208,165,209,201,002,100
4564 :240,015,201,003,240,035,178
4570 :201,005,240,070,201,006,173
4576 :240,095,076,089,018,165,139
4582 :210,240,004,169,236,133,198
4588 :212,198,212,165,212,141,096
4594 :011,144,201,232,208,004,018
4600 :169,000,133,209,096,165,252
4606 :210,240,008,169,005,133,251

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4612 :212,169,232,133,213,165,104
 4618 :213,201,232,208,013,198,051
 4624 :212,208,005,169,000,133,231
 4630 :209,096,169,240,133,213,058
 4636 :198,213,165,213,141,012,202
 4642 :144,096,165,210,240,004,125
 4648 :169,210,133,212,165,212,117
 4654 :141,012,144,230,212,165,182
 4660 :212,141,010,144,201,240,232
 4666 :208,004,169,000,133,209,013
 4672 :096,165,210,240,004,169,180
 4678 :230,133,212,230,212,165,228
 4684 :212,141,012,144,201,250,012
 4690 :208,004,169,000,133,209,037
 4696 :096,201,007,240,019,201,084
 4702 :008,240,042,201,009,240,066
 4708 :124,201,010,240,058,201,166
 4714 :011,240,078,076,000,019,018
 4720 :165,210,240,009,169,015,152
 4726 :133,212,169,220,141,011,236
 4732 :144,165,212,141,014,144,176
 4738 :198,212,208,004,169,000,153
 4744 :133,209,096,165,210,240,165
 4750 :004,169,220,133,212,198,054
 4756 :212,165,212,141,013,144,011
 4762 :201,188,208,004,169,000,156
 4768 :133,209,096,165,210,240,189
 4774 :004,169,208,133,212,198,066
 4780 :212,165,212,141,013,144,035
 4786 :201,127,208,004,169,000,119
 4792 :133,209,096,165,210,240,213
 4798 :009,169,205,133,212,056,206
 4804 :233,010,133,213,230,213,204
 4810 :165,213,141,012,144,197,050
 4816 :212,240,001,096,230,212,175
 4822 :165,212,201,240,208,231,191
 4828 :169,000,133,209,096,165,224
 4834 :210,240,004,169,144,133,102
 4840 :212,230,212,165,212,041,024
 4846 :011,024,101,212,141,012,227
 4852 :144,165,212,201,240,208,134
 4858 :004,169,000,133,209,096,093
 4864 :160,005,136,153,010,144,096
 4870 :208,250,096,197,208,048,245
 4876 :002,133,208,096,230,160,073
 4882 :164,160,177,161,042,109,063
 4888 :017,145,042,229,212,042,199
 4894 :069,227,042,005,240,042,143
 4900 :109,004,144,234,096,133,244
 4906 :195,201,016,240,249,048,223
 4912 :051,230,193,165,193,201,057
 4918 :042,048,004,169,000,133,194
 4924 :193,074,133,241,165,194,036
 4930 :074,133,242,032,114,016,165
 4936 :160,001,177,001,201,051,151
 4942 :176,008,160,023,177,001,111
 4948 :201,050,144,011,169,014,161
 4954 :133,195,169,002,032,009,118
 4960 :019,198,193,096,198,193,225
 4966 :016,004,169,041,133,193,146
 4972 :165,193,074,133,241,165,055
 4978 :194,074,133,242,032,114,135
 4984 :016,160,000,177,001,201,163
 4990 :051,176,008,160,022,177,208
 4996 :001,201,050,144,011,169,196
 5002 :018,133,195,169,002,032,175
 5008 :009,019,230,193,096,133,056
 5014 :196,201,016,240,249,048,076
 5020 :042,230,194,165,193,074,030

5026 :133,241,165,194,074,133,078
 5032 :242,032,114,016,160,022,242
 5038 :177,001,201,051,176,007,019
 5044 :200,177,001,201,050,144,185
 5050 :011,169,014,133,196,169,110
 5056 :002,032,009,019,198,194,134
 5062 :096,198,194,048,028,165,159
 5068 :193,074,133,241,165,194,180
 5074 :074,133,242,032,114,016,053
 5080 :160,000,177,001,201,051,038
 5086 :176,007,200,177,001,201,216
 5092 :050,144,011,169,018,133,241
 5098 :196,169,002,032,009,019,149
 5104 :230,194,096,234,234,234,182
 5110 :165,224,240,003,076,197,127
 5116 :020,165,225,133,241,133,145
 5122 :193,165,226,133,242,133,070
 5128 :194,032,154,016,198,230,064
 5134 :208,071,165,227,032,041,246
 5140 :019,165,193,133,225,165,152
 5146 :195,133,227,032,178,016,039
 5152 :169,008,036,245,240,012,230
 5158 :164,227,192,012,048,006,175
 5164 :198,227,169,000,133,229,232
 5170 :169,001,036,245,240,012,241
 5176 :164,227,192,021,016,006,170
 5182 :230,227,169,016,133,229,042
 5188 :165,227,201,016,048,008,221
 5194 :169,023,056,229,227,076,086
 5200 :085,020,056,233,009,133,104
 5206 :230,198,231,208,060,165,154
 5212 :228,032,149,019,165,194,111
 5218 :133,226,165,196,133,228,155
 5224 :032,178,016,169,016,036,039
 5230 :245,240,011,164,228,192,166
 5236 :012,048,013,198,228,076,179
 5242 :132,020,164,228,192,021,111
 5248 :016,002,230,228,165,228,229
 5254 :201,016,048,008,169,023,087
 5260 :056,229,228,076,149,020,130
 5266 :056,233,009,133,231,165,205
 5272 :225,133,241,165,226,133,251
 5278 :242,165,229,133,243,169,059
 5284 :005,133,244,032,015,016,097
 5290 :169,016,036,245,240,005,113
 5296 :169,001,032,009,019,032,182
 5302 :080,026,144,003,076,200,199
 5308 :027,096,000,000,000,000,055
 5314 :000,000,000,198,224,165,013
 5320 :224,016,007,169,002,133,239
 5326 :225,133,226,096,201,127,190
 5332 :208,005,169,010,032,009,133
 5338 :019,165,224,201,122,048,229
 5344 :035,169,226,141,172,031,230
 5350 :169,251,141,173,031,169,140
 5356 :062,141,194,031,169,225,034
 5362 :141,195,031,169,001,141,152
 5368 :172,151,141,173,151,141,153
 5374 :194,151,141,195,151,096,158
 5380 :201,121,208,005,169,011,207
 5386 :032,009,019,041,001,024,136
 5392 :105,005,141,172,151,141,219
 5398 :173,151,141,194,151,141,205
 5404 :195,151,234,234,234,234,030
 5410 :160,008,140,172,031,200,233
 5416 :140,173,031,200,140,194,150
 5422 :031,200,140,195,031,165,040
 5428 :224,240,007,032,178,016,237
 5434 :041,025,240,030,169,000,051
 5440 :133,224,133,209,133,208,080

5446 :169,020,133,225,169,039,057
 5452 :133,226,169,016,133,227,212
 5458 :133,228,169,000,133,229,206
 5464 :169,001,133,230,133,231,217
 5470 :096,000,000,000,000,000,190
 5476 :000,000,000,000,151,169,164
 5482 :006,056,229,234,141,194,198
 5488 :151,141,195,151,076,189,247
 5494 :020,230,232,032,178,016,058
 5500 :041,025,208,003,076,189,154
 5506 :020,169,000,076,038,021,198
 5512 :000,000,000,162,000,134,176
 5518 :180,189,000,001,201,001,202
 5524 :240,003,076,029,022,165,171
 5530 :178,197,180,240,003,076,004
 5536 :195,023,165,179,240,005,199
 5542 :198,179,076,195,023,032,101
 5548 :016,019,041,003,133,176,048
 5554 :169,000,133,183,165,176,236
 5560 :010,168,185,248,027,133,187
 5566 :181,185,249,027,133,182,123
 5572 :160,000,169,032,209,181,179
 5578 :208,062,200,200,209,181,238
 5584 :208,056,200,200,209,181,238
 5590 :208,050,152,024,105,040,025
 5596 :168,192,132,208,229,160,029
 5602 :112,177,181,201,051,144,068
 5608 :033,165,176,010,168,185,201
 5614 :240,027,157,001,001,185,081
 5620 :241,027,157,002,001,254,158
 5626 :000,001,230,178,169,080,140
 5632 :133,179,169,005,032,009,015
 5638 :019,076,022,017,230,176,034
 5644 :165,176,041,003,133,176,194
 5650 :230,183,165,183,201,004,216
 5656 :208,156,076,195,023,201,115
 5662 :002,208,095,254,008,001,086
 5668 :189,001,001,133,241,189,022
 5674 :002,001,133,242,169,000,077
 5680 :133,243,165,180,074,074,149
 5686 :168,185,184,000,133,244,200
 5692 :032,015,016,169,007,145,188
 5698 :003,165,204,145,001,136,208
 5704 :145,001,169,007,145,003,030
 5710 :189,008,001,041,001,240,046
 5716 :003,076,195,023,222,002,093
 5722 :001,189,008,001,201,004,238
 5728 :208,243,254,000,001,169,203
 5734 :016,157,003,001,157,004,184
 5740 :001,032,016,019,041,016,233
 5746 :157,005,001,169,001,157,092
 5752 :006,001,157,007,001,076,112
 5758 :195,023,201,004,240,003,024
 5764 :076,109,023,189,001,001,019
 5770 :074,133,241,189,002,001,010
 5776 :074,133,242,198,242,032,041
 5782 :114,016,189,002,001,041,001
 5788 :001,240,021,160,022,169,001
 5794 :034,145,001,234,032,040,136
 5800 :017,160,044,145,003,169,194
 5806 :035,145,001,076,210,022,151
 5812 :160,000,177,001,201,034,241
 5818 :208,004,169,032,145,001,233
 5824 :160,022,169,033,145,001,210
 5830 :234,032,040,017,160,044,213
 5836 :177,001,201,051,176,013,055
 5842 :222,004,001,208,008,254,139
 5848 :002,001,169,005,157,004,042
 5854 :001,222,006,001,208,018,166
 5860 :222,007,001,208,013,169,080

5866 :007,032,009,019,254,000,043
 5872 :001,169,096,157,006,001,158
 5878 :160,003,165,229,240,002,021
 5884 :160,003,132,151,076,048,054
 5890 :027,176,015,234,234,234,154
 5896 :189,002,001,056,229,226,199
 5902 :144,004,201,003,144,003,001
 5908 :076,195,023,169,006,032,009
 5914 :009,019,169,000,157,000,124
 5920 :001,169,032,160,022,145,049
 5926 :001,160,044,177,001,201,110
 5932 :035,208,004,169,032,145,125
 5938 :001,169,037,032,059,023,115
 5944 :076,106,027,248,024,101,126
 5950 :239,133,239,165,237,105,156
 5956 :000,133,237,197,236,144,247
 5962 :016,208,006,165,239,197,137
 5968 :238,144,008,165,237,133,237
 5974 :236,165,239,133,238,165,238
 5980 :237,197,235,208,007,024,232
 5986 :105,004,032,053,017,234,031
 5992 :216,076,063,017,234,201,143
 5998 :005,208,078,189,001,001,080
 6004 :074,133,241,189,002,001,244
 6010 :074,133,242,198,242,032,019
 6016 :114,016,169,036,160,022,133
 6022 :145,001,165,180,074,074,005
 6028 :168,185,184,000,160,022,091
 6034 :145,003,032,080,027,176,097
 6040 :035,169,005,032,009,019,165
 6046 :222,002,001,222,002,001,096
 6052 :169,001,157,006,001,157,143
 6058 :007,001,169,016,157,003,011
 6064 :001,157,004,001,169,003,255
 6070 :157,000,001,076,195,023,122
 6076 :076,246,022,201,003,240,208
 6082 :024,138,024,105,016,170,159
 6088 :230,180,165,180,201,012,144
 6094 :240,003,076,143,021,096,017
 6100 :000,000,000,000,000,000,212
 6106 :000,189,005,001,133,145,179
 6112 :189,009,001,208,083,189,135
 6118 :002,001,197,226,176,004,068
 6124 :169,001,208,002,169,000,017
 6130 :133,144,189,002,001,056,255
 6136 :229,226,016,005,073,255,028
 6142 :024,105,013,013,013,013,179

Program 4:

Bagdad—VIC Version, Part 3

See instructions in article before beginning.

6144 :001,201,004,176,034,189,093
 6150 :001,001,197,225,176,004,098
 6156 :169,016,208,002,169,000,064
 6162 :197,229,208,017,165,180,246
 6168 :201,004,144,011,189,009,070
 6174 :001,208,006,165,229,073,200
 6180 :016,133,145,032,016,019,141
 6186 :201,250,144,007,189,005,070
 6192 :001,073,016,133,145,076,236
 6198 :247,024,201,001,208,008,231
 6204 :189,002,001,201,016,076,033
 6210 :234,023,201,002,208,073,039
 6216 :189,002,001,160,000,221,133
 6222 :011,001,016,003,234,160,247
 6228 :001,132,144,160,000,189,198
 6234 :003,001,048,002,160,016,064
 6240 :132,145,169,026,056,253,109
 6246 :003,001,133,176,189,001,093

6252 :001,201,010,208,010,169,195
 6258 :255,133,145,254,009,001,143
 6264 :076,247,024,048,007,197,207
 6270 :176,016,007,076,247,024,160
 6276 :197,176,016,111,165,145,174
 6282 :073,016,133,145,076,247,060
 6288 :024,201,003,208,098,169,079
 6294 :255,133,145,169,016,157,001
 6300 :003,001,189,002,001,197,037
 6306 :226,208,005,169,000,157,159
 6312 :009,001,016,004,169,001,112
 6318 :208,002,169,000,133,144,062
 6324 :208,065,189,001,001,056,188
 6330 :229,225,016,005,073,255,221
 6336 :024,105,001,201,004,016,031
 6342 :048,169,000,157,009,001,070
 6348 :076,247,024,000,056,233,072
 6354 :016,016,005,073,255,024,087
 6360 :105,001,133,240,096,000,023
 6366 :000,000,157,005,001,169,042
 6372 :000,157,012,001,076,028,246
 6378 :026,000,201,022,176,004,151
 6384 :198,148,230,149,096,000,037
 6390 :000,222,010,001,208,083,002
 6396 :189,009,001,201,001,240,125
 6402 :002,198,189,032,016,019,202
 6408 :009,192,157,010,001,032,153
 6414 :016,019,160,001,197,147,042
 6420 :144,053,165,189,197,190,190
 6426 :016,047,160,000,230,189,156
 6432 :165,180,010,010,133,176,194
 6438 :132,183,032,016,019,164,072
 6444 :183,197,176,176,026,160,194
 6450 :002,189,002,001,201,012,201
 6456 :176,004,169,004,208,006,111
 6462 :201,028,176,004,169,016,144
 6468 :208,002,169,036,157,011,139
 6474 :001,152,157,009,001,234,116
 6480 :189,001,001,133,193,189,018
 6486 :002,001,133,194,222,006,132
 6492 :001,208,092,189,003,001,074
 6498 :032,041,019,201,003,208,090
 6504 :003,254,012,001,032,142,036
 6510 :026,144,019,188,001,001,233
 6516 :132,193,165,195,073,031,137
 6522 :024,105,001,133,195,169,237
 6528 :032,157,012,001,164,145,127
 6534 :208,013,165,195,197,148,036
 6540 :144,007,198,195,169,000,085
 6546 :157,005,001,192,016,208,213
 6552 :013,165,195,197,149,176,023
 6558 :007,230,195,169,016,157,164
 6564 :005,001,165,195,157,003,178
 6570 :001,032,208,024,169,009,101
 6576 :056,229,240,234,234,234,123
 6582 :234,234,157,006,001,222,012
 6588 :007,001,208,077,189,004,162
 6594 :001,032,149,019,032,142,057
 6600 :026,144,014,189,002,001,064
 6606 :133,194,165,196,073,031,230
 6612 :024,105,001,133,196,164,067
 6618 :144,208,015,169,030,056,072
 6624 :229,180,074,197,196,176,252
 6630 :002,198,196,076,248,025,207
 6636 :169,034,024,101,180,074,050
 6642 :197,196,144,002,230,196,183
 6648 :165,196,157,004,001,032,035
 6654 :208,024,169,009,056,229,181
 6660 :240,234,234,234,234,234,134
 6666 :157,007,001,189,012,001,121

6672 :201,007,048,008,189,005,218
 6678 :001,073,016,076,224,024,180
 6684 :189,001,001,133,241,189,014
 6690 :002,001,133,242,032,154,086
 6696 :016,165,193,157,001,001,061
 6702 :133,241,165,194,157,002,170
 6708 :001,133,242,189,005,001,111
 6714 :133,243,165,180,074,074,159
 6720 :168,185,184,000,133,244,210
 6726 :032,015,016,076,195,023,171
 6732 :000,000,000,000,134,150,104
 6738 :160,000,185,000,001,201,117
 6744 :003,208,040,196,150,240,157
 6750 :036,185,001,001,056,229,090
 6756 :193,016,005,073,255,024,154
 6762 :105,001,201,003,176,019,099
 6768 :185,002,001,056,229,194,011
 6774 :016,005,073,255,024,105,084
 6780 :001,201,003,176,002,056,051
 6786 :096,152,024,105,016,168,179
 6792 :192,192,208,200,024,096,024
 6798 :165,224,208,190,234,234,117
 6804 :165,225,056,229,193,016,008
 6810 :005,073,255,024,105,001,105
 6816 :201,003,176,172,165,226,079
 6822 :056,229,194,016,005,073,227
 6828 :255,024,105,001,201,003,249
 6834 :176,156,165,226,197,194,012
 6840 :208,007,169,003,032,009,100
 6846 :019,056,096,016,008,032,161
 6852 :240,026,104,104,076,195,173
 6858 :023,169,255,133,224,165,147
 6864 :225,133,241,165,226,133,051
 6870 :242,032,154,016,169,008,067
 6876 :032,009,019,198,233,234,177
 6882 :234,032,063,017,056,096,212
 6888 :000,000,000,000,000,000,232
 6894 :000,000,254,000,001,189,170
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 6906 :001,133,242,024,105,001,244
 6912 :157,002,001,032,154,016,106
 6918 :169,008,032,009,019,189,176
 6924 :009,001,208,002,198,189,107
 6930 :169,001,157,004,001,157,251
 6936 :007,001,169,000,157,006,108
 6942 :001,169,014,133,228,169,232
 6948 :001,157,009,001,096,000,044
 6954 :000,000,000,000,000,000,042
 6960 :189,001,001,041,254,056,078
 6966 :229,225,144,005,197,151,237
 6972 :076,003,023,201,000,240,091
 6978 :004,201,255,208,003,024,249
 6984 :144,242,056,176,239,000,161
 6990 :000,000,222,006,001,240,035
 6996 :002,056,096,254,006,001,243
 7002 :189,001,001,133,193,189,028
 7008 :002,001,056,233,002,133,011
 7014 :194,076,080,026,198,252,160
 7020 :076,195,023,000,162,000,052
 7026 :032,245,003,138,041,001,062
 7032 :024,105,026,141,001,144,049
 7038 :138,041,003,024,105,012,193
 7044 :141,014,144,169,140,141,113
 7050 :013,144,141,010,144,232,054
 7056 :224,040,208,222,169,058,041
 7062 :133,247,169,059,133,246,113
 7068 :169,060,133,248,165,253,160
 7074 :032,000,016,162,013,032,161
 7080 :245,003,142,014,144,169,117
 7086 :156,141,013,144,141,010,011

7092 :144,202,208,239,169,032,150
 7098 :133,246,133,247,133,248,046
 7104 :032,245,003,076,226,003,009
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 7116 :221,002,001,208,017,169,054
 7122 :002,032,009,019,165,227,152
 7128 :073,031,024,105,001,133,071
 7134 :227,076,189,020,016,006,244
 7140 :032,240,026,076,189,020,043
 7146 :032,203,026,076,189,020,012
 7152 :021,009,021,041,003,025,104
 7158 :039,025,009,030,105,031,229
 7164 :176,030,193,030,007,007,183
 7170 :003,019,243,159,127,003,044
 7176 :128,192,192,128,128,128,136
 7182 :128,128,031,095,153,102,139
 7188 :000,000,000,000,128,160,052
 7194 :144,096,000,000,000,000,010
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 7206 :007,000,120,124,060,056,149
 7212 :056,248,248,056,001,005,146
 7218 :009,006,000,000,000,000,065
 7224 :248,250,153,102,000,000,041
 7230 :000,000,000,000,000,000,062
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 7242 :000,000,128,192,192,128,202
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 7254 :153,102,128,128,128,128,085
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 7290 :248,056,248,250,153,102,155
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 7308 :240,144,224,000,031,095,106
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 7320 :128,160,144,096,000,000,168
 7326 :000,000,001,003,003,001,166
 7332 :001,001,001,001,224,224,104
 7338 :192,200,207,249,254,192,184
 7344 :001,005,009,006,000,000,197
 7350 :000,000,248,250,153,102,167
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 7368 :000,000,000,000,000,000,200
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 7380 :031,095,153,102,240,144,209
 7386 :224,000,128,160,144,096,202
 7392 :000,000,000,000,001,003,228
 7398 :003,001,000,000,000,000,234
 7404 :224,224,192,200,001,001,054
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 7422 :153,102,000,000,000,000,253
 7428 :000,000,000,000,060,024,088
 7434 :024,060,126,255,255,126,088
 7440 :000,000,000,000,060,024,100
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 7452 :000,000,000,000,001,027,056
 7458 :027,061,126,255,255,126,116
 7464 :199,195,227,231,199,231,042
 7470 :069,131,255,089,087,027,192
 7476 :093,083,255,255,255,153,122
 7482 :119,183,215,057,255,255,118
 7488 :195,189,185,165,157,189,120
 7494 :195,255,247,231,215,247,180
 7500 :247,247,193,255,195,189,122
 7506 :253,243,207,191,129,255,080

7512 :195,189,253,227,253,189,114
 7518 :195,255,251,243,235,219,212
 7524 :129,251,251,255,129,191,026
 7530 :135,251,253,187,199,255,106
 7536 :227,223,191,131,189,189,238
 7542 :195,255,129,189,251,247,104
 7548 :239,239,239,255,195,189,200
 7554 :189,195,189,189,195,255,062
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 7566 :199,255,132,120,072,072,224
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 7584 :130,124,064,064,064,064,158
 7590 :064,080,128,120,068,066,180
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 7638 :254,124,056,056,056,056,048
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 7680 :032,050,051,052,053,051,033
 7686 :053,032,054,055,056,057,057
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 7698 :032,032,032,032,032,032,210
 7704 :032,032,032,032,032,000,184
 7710 :160,000,132,233,169,032,244
 7716 :153,000,030,153,000,031,147
 7722 :169,007,153,000,150,153,162
 7728 :000,151,136,208,237,169,181
 7734 :061,133,247,169,062,133,091
 7740 :246,169,063,133,248,032,183
 7746 :219,016,032,063,017,160,061
 7752 :007,185,000,002,153,183,090
 7758 :030,185,007,002,153,205,148
 7764 :030,185,014,002,153,245,201
 7770 :030,185,021,002,153,252,221
 7776 :030,136,208,229,169,003,103
 7782 :160,088,153,176,150,136,197
 7788 :208,250,076,162,003,032,071
 7794 :178,016,041,002,240,249,072
 7800 :169,003,133,233,169,004,063
 7806 :133,235,169,001,133,190,219
 7812 :169,128,133,147,169,001,111
 7818 :133,251,169,012,133,148,216
 7824 :169,021,133,149,160,088,096
 7830 :169,032,153,176,030,136,078
 7836 :208,250,169,000,133,237,129
 7842 :133,239,169,144,133,224,180
 7848 :032,063,017,169,001,133,071
 7854 :254,234,162,255,154,165,118
 7860 :251,133,252,010,010,010,078
 7866 :010,133,176,162,000,169,068
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 7878 :176,208,248,169,000,157,132
 7884 :000,001,232,224,193,208,038
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 7896 :189,169,128,133,179,032,022
 7902 :245,003,032,139,021,165,059
 7908 :233,016,003,076,030,002,076
 7914 :165,252,208,239,248,165,231
 7920 :254,024,105,001,133,254,243
 7926 :216,041,015,240,004,201,195

7932 :005,208,010,165,254,201,071
 7938 :022,176,004,198,148,230,012
 7944 :149,162,000,169,010,133,119
 7950 :205,160,000,185,212,003,011
 7956 :153,184,030,169,001,153,198
 7962 :184,150,200,192,004,208,196
 7968 :240,141,189,150,141,190,059
 7974 :150,165,254,201,015,144,199
 7980 :014,041,015,024,105,176,163
 7986 :141,190,030,165,254,074,136
 7992 :074,074,074,024,105,176,071
 7998 :141,189,030,169,064,044,187
 8004 :029,145,240,251,173,020,158
 8010 :145,169,096,141,021,145,023
 8016 :134,150,032,243,019,166,056
 8022 :150,189,192,003,141,012,005
 8028 :144,169,015,141,014,144,207
 8034 :141,010,144,141,011,144,177
 8040 :141,013,144,198,205,208,245
 8046 :160,232,224,017,208,151,078
 8052 :169,000,141,012,144,160,230
 8058 :008,169,032,153,183,030,185
 8064 :136,208,250,169,000,133,000
 8070 :208,133,209,165,251,201,021
 8076 :012,016,003,024,105,001,045
 8082 :133,251,201,003,048,003,017
 8088 :056,233,002,133,190,076,074
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 8106 :205,208,249,076,113,002,255
 8112 :000,000,000,000,000,000,176
 8118 :000,000,000,000,000,000,182
 8124 :000,000,000,000,227,228,131
 8130 :231,232,232,231,231,228,043
 8136 :228,227,228,231,232,237,047
 8142 :231,232,228,000,000,000,129
 8148 :151,129,150,133,032,000,039
 8154 :000,000,000,000,076,236,018
 8160 :024,000,169,000,141,010,056
 8166 :144,141,013,144,169,015,088
 8172 :141,014,144,165,253,076,005
 8178 :000,016,000,134,150,032,062
 8184 :243,019,032,158,017,166,115
 8190 :150,096,013,013,013,013,040

2169 :165,252,201,056,208,239,218
 2175 :165,001,009,004,133,001,184
 2181 :088,173,024,208,041,240,139
 2187 :009,012,141,024,208,169,190
 2193 :022,133,252,169,049,133,135
 2199 :251,160,000,132,253,169,092
 2205 :048,133,254,177,251,145,141
 2211 :253,200,208,249,230,252,019
 2217 :230,254,177,251,145,253,199
 2223 :200,192,080,208,247,032,110
 2229 :192,018,169,147,032,210,181
 2235 :255,169,000,141,033,208,225
 2241 :141,032,208,169,012,141,128
 2247 :134,002,169,000,141,046,179
 2253 :021,169,080,141,045,021,170
 2259 :169,001,141,040,208,141,143
 2265 :041,208,141,042,208,141,230
 2271 :043,208,169,005,141,039,060
 2277 :208,169,006,141,044,208,237
 2283 :141,045,208,169,004,141,175
 2289 :046,208,160,000,169,071,127
 2295 :133,251,169,020,133,252,181
 2301 :177,251,240,010,032,210,149
 2307 :255,200,208,246,230,252,114
 2313 :208,242,032,057,017,162,215
 2319 :000,138,157,000,208,232,238
 2325 :224,017,208,248,169,160,023
 2331 :141,231,007,169,012,141,216
 2337 :231,219,169,009,141,134,168
 2343 :002,169,004,141,000,021,120
 2349 :074,141,211,020,141,229,093
 2355 :020,169,000,141,031,008,164
 2361 :141,047,008,141,035,021,194
 2367 :169,002,141,036,021,032,208
 2373 :073,018,162,000,076,078,220
 2379 :009,162,001,169,013,157,074
 2385 :248,007,169,000,157,022,172
 2391 :008,157,212,020,157,024,153
 2397 :021,232,224,008,208,235,253
 2403 :169,000,162,017,157,003,095
 2409 :021,157,255,207,202,224,147
 2415 :002,208,245,169,255,141,107
 2421 :021,208,169,255,141,015,158
 2427 :212,169,128,141,018,212,235
 2433 :162,000,189,049,021,157,195
 2439 :064,003,232,224,192,208,034
 2445 :245,162,000,189,241,021,231
 2451 :157,192,002,232,224,064,250
 2457 :208,245,162,002,138,157,041
 2463 :047,008,232,224,016,208,126
 2469 :248,173,035,021,240,008,122
 2475 :032,063,015,162,001,076,008
 2481 :185,009,162,000,032,144,197
 2487 :011,232,189,212,020,201,024
 2493 :002,240,007,201,001,240,112
 2499 :008,076,207,009,169,002,154
 2505 :076,189,010,076,198,010,248
 2511 :165,162,041,031,240,009,087
 2517 :189,248,020,141,238,020,045
 2523 :076,109,010,173,212,020,051
 2529 :201,003,208,003,076,058,006
 2535 :010,173,027,212,201,065,151
 2541 :144,011,201,129,144,031,129
 2547 :201,193,144,067,076,098,254
 2553 :010,138,010,168,185,031,023
 2559 :008,048,008,169,008,141,125
 2565 :238,020,076,015,010,169,021
 2571 :004,141,238,020,076,103,081
 2577 :010,138,010,168,056,185,072
 2583 :004,021,237,004,021,141,195

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Translation by Kevin Martin, Editorial Programmer

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 2055 :048,054,049,000,000,000,158
 2061 :076,066,008,000,002,002,167
 2067 :045,002,002,000,000,000,068
 2073 :000,000,000,000,000,004,029
 2079 :252,000,013,000,000,000,040
 2085 :000,000,000,000,000,000,037
 2091 :000,000,000,000,003,000,046
 2097 :249,002,008,002,002,002,058
 2103 :002,002,002,002,002,002,067
 2109 :002,002,000,000,000,169,234
 2115 :000,141,063,008,141,064,228
 2121 :008,141,065,008,169,008,216
 2127 :032,210,255,169,142,032,151
 2133 :210,255,120,165,001,041,109
 2139 :251,133,001,169,048,133,058
 2145 :252,169,000,133,251,133,011
 2151 :253,169,208,133,254,160,000
 2157 :000,177,253,145,251,200,111
 2163 :208,249,230,252,230,254,002

2589 :019,008,185,022,008,237,252
 2595 :022,008,013,019,008,144,249
 2601 :008,169,004,141,238,020,109
 2607 :076,055,010,169,008,141,250
 2613 :238,020,076,103,010,138,126
 2619 :010,168,056,185,004,021,247
 2625 :237,004,021,141,019,008,239
 2631 :185,022,008,237,022,008,041
 2637 :013,019,008,176,008,169,214
 2643 :004,141,238,020,076,095,145
 2649 :010,169,008,141,238,020,163
 2655 :076,103,010,169,000,141,082
 2661 :238,020,173,238,020,157,179
 2667 :248,020,165,161,205,239,121
 2673 :020,240,009,141,239,020,014
 2679 :173,027,212,157,240,020,180
 2685 :173,212,020,201,003,240,206
 2691 :027,189,240,020,048,033,176
 2697 :138,010,168,185,005,021,152
 2703 :205,005,021,144,011,169,186
 2709 :002,013,238,020,141,238,033
 2715 :020,076,184,010,169,001,103
 2721 :013,238,020,141,238,020,063
 2727 :076,184,010,138,010,168,241
 2733 :185,005,021,205,005,021,103
 2739 :144,223,076,159,010,173,196
 2745 :238,020,041,015,142,228,101
 2751 :020,032,181,011,174,228,069
 2757 :020,232,236,211,020,240,132
 2763 :003,076,185,009,032,007,003
 2769 :015,032,104,015,032,122,017
 2775 :015,032,212,014,173,229,122
 2781 :020,201,001,240,050,173,138
 2787 :036,021,048,039,173,212,244
 2793 :020,201,003,208,011,169,077
 2799 :000,141,022,008,141,004,043
 2805 :021,141,005,021,173,141,235
 2811 :002,041,001,208,249,032,016
 2817 :225,255,240,003,076,166,198
 2823 :009,169,000,141,021,208,043
 2829 :096,032,228,014,076,183,130
 2835 :008,238,000,021,173,000,203
 2841 :021,201,017,144,002,169,067
 2847 :016,074,141,211,020,162,143
 2853 :011,160,017,024,032,240,009
 2859 :255,162,000,189,125,011,017
 2865 :240,006,032,210,255,232,000
 2871 :208,245,169,000,174,000,083
 2877 :021,202,202,202,032,205,157
 2883 :189,169,050,141,248,020,116
 2889 :032,089,018,162,000,032,150
 2895 :144,011,032,007,015,032,064
 2901 :104,015,032,212,014,206,156
 2907 :248,020,208,237,162,011,209
 2913 :160,017,024,032,240,255,057
 2919 :162,000,189,133,011,240,070
 2925 :006,032,210,255,232,208,028
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 2955 :069,070,069,070,000,189,094
 2961 :000,220,041,012,141,210,001
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 2973 :208,008,173,210,014,009,011
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 3027 :017,008,201,050,176,011,162
 3033 :169,000,056,253,047,008,238
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 3045 :005,021,169,002,141,018,073
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 3057 :021,024,109,017,008,201,109
 3063 :229,144,011,169,000,056,088
 3069 :253,047,008,157,047,008,005
 3075 :169,230,157,005,021,169,242
 3081 :001,141,018,008,076,087,084
 3087 :013,169,004,141,018,008,112
 3093 :138,074,168,189,004,021,103
 3099 :056,237,017,008,141,020,250
 3105 :008,185,022,008,233,000,233
 3111 :141,021,008,056,173,020,202
 3117 :008,233,024,141,019,008,222
 3123 :173,021,008,233,000,013,243
 3129 :019,008,176,010,169,001,184
 3135 :141,021,008,169,063,141,094
 3141 :020,008,173,020,008,157,199
 3147 :004,021,173,021,008,153,199
 3153 :022,008,076,087,013,169,200
 3159 :003,141,018,008,138,074,213
 3165 :168,189,004,021,024,109,096
 3171 :017,008,141,020,008,185,222
 3177 :022,008,105,000,141,021,146
 3183 :008,056,173,020,008,233,097
 3189 :064,141,019,008,173,021,031
 3195 :008,233,001,013,019,008,149
 3201 :144,010,169,000,141,021,102
 3207 :008,169,024,141,020,008,249
 3213 :173,020,008,157,004,021,012
 3219 :173,021,008,153,022,008,020
 3225 :076,087,013,032,217,012,078
 3231 :138,074,168,185,212,020,188
 3237 :208,003,076,016,013,096,065
 3243 :032,246,012,076,159,012,196
 3249 :032,217,012,138,074,168,050
 3255 :185,212,020,208,238,076,098
 3261 :050,013,032,246,012,076,106
 3267 :180,012,032,217,012,189,069
 3273 :031,008,240,005,016,088,077
 3279 :076,073,013,096,032,246,231
 3285 :012,076,200,012,189,047,237
 3291 :008,201,248,240,008,222,122
 3297 :047,008,189,047,008,016,028
 3303 :029,056,169,000,253,047,017
 3309 :008,074,074,141,017,008,047
 3315 :076,206,011,189,047,008,012
 3321 :201,008,240,008,254,047,239
 3327 :008,189,047,008,048,227,014
 3333 :189,047,008,074,074,141,026
 3339 :017,008,076,239,011,138,244
 3345 :074,168,169,013,153,248,074
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 3357 :240,008,254,031,008,189,247
 3363 :031,008,048,034,189,031,120
 3369 :008,074,074,141,017,008,107
 3375 :076,016,012,138,074,168,019
 3381 :169,014,153,248,007,189,065
 3387 :031,008,201,240,240,008,019
 3393 :222,031,008,189,031,008,042
 3399 :016,222,169,000,056,253,019
 3405 :031,008,074,074,141,017,166
 3411 :008,076,086,012,142,030,181
 3417 :008,138,074,168,185,212,106
 3423 :020,201,003,208,001,096,112

3429 :189,004,021,056,233,024,116
 3435 :141,020,008,185,022,008,235
 3441 :233,000,141,021,008,078,082
 3447 :021,008,110,020,008,078,108
 3453 :020,008,078,020,008,189,192
 3459 :005,021,056,233,047,074,055
 3465 :074,074,141,019,008,173,114
 3471 :019,008,010,168,185,021,042
 3477 :020,024,109,020,008,133,207
 3483 :251,185,022,020,105,000,226
 3489 :133,252,162,000,189,009,138
 3495 :020,168,177,251,201,032,248
 3501 :208,014,232,224,012,208,047
 3507 :241,032,099,016,176,007,238
 3513 :174,030,008,096,076,136,193
 3519 :014,172,021,008,240,011,145
 3525 :172,020,008,208,087,172,096
 3531 :021,008,076,211,013,172,192
 3537 :020,008,185,212,020,201,087
 3543 :001,208,003,076,101,014,106
 3549 :201,002,208,023,169,001,057
 3555 :153,212,020,185,220,020,013
 3561 :045,021,208,141,021,208,109
 3567 :206,229,020,032,181,015,154
 3573 :076,101,014,152,010,170,000
 3579 :189,005,021,205,005,021,185
 3585 :176,003,076,021,015,169,205
 3591 :002,153,212,020,169,015,066
 3597 :153,248,007,185,037,021,152
 3603 :153,024,021,152,010,168,035
 3609 :169,000,153,031,008,153,027
 3615 :047,008,173,020,008,010,041
 3621 :168,174,030,008,173,033,111
 3627 :021,048,021,169,000,056,102
 3633 :249,031,008,153,031,008,017
 3639 :169,000,056,253,031,008,060
 3645 :157,031,008,076,101,014,192
 3651 :140,034,021,173,030,008,217
 3657 :074,168,185,212,020,208,172
 3663 :021,172,034,021,169,000,240
 3669 :056,253,047,008,157,047,141
 3675 :008,169,000,056,249,047,108
 3681 :008,153,047,008,174,030,005
 3687 :008,173,018,008,201,001,000
 3693 :240,012,201,002,240,011,047
 3699 :201,003,240,010,201,004,006
 3705 :240,009,076,206,011,076,227
 3711 :239,011,076,021,012,076,050
 3717 :091,012,096,201,000,240,005
 3723 :024,201,005,144,020,173,194
 3729 :030,008,170,074,168,185,012
 3735 :212,020,208,009,169,000,001
 3741 :056,253,047,008,157,047,213
 3747 :008,076,101,014,169,000,019
 3753 :133,162,165,162,201,002,226
 3759 :208,250,096,202,011,196,114
 3765 :012,210,012,202,011,015,131
 3771 :013,155,012,170,012,202,239
 3777 :011,049,013,176,012,190,132
 3783 :012,202,011,202,011,202,071
 3789 :011,202,011,202,011,013,143
 3795 :000,169,019,056,237,229,153
 3801 :020,170,160,000,136,208,143
 3807 :253,202,208,250,096,162,114
 3813 :002,189,001,021,221,063,214
 3819 :008,240,005,176,009,076,237
 3825 :006,015,202,048,016,076,092
 3831 :230,014,162,000,189,001,075
 3837 :021,157,063,008,232,224,190

3843 :003,208,245,096,162,000,205
 3849 :189,004,021,157,000,208,076
 3855 :232,224,016,208,245,096,012
 3861 :169,003,141,212,020,169,223
 3867 :000,141,004,021,141,005,083
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 3879 :141,035,021,206,036,021,243
 3885 :048,009,174,036,021,232,053
 3891 :169,160,157,224,007,032,032
 3897 :221,018,174,030,008,096,092
 3903 :173,000,220,041,016,240,241
 3909 :014,238,039,208,206,035,041
 3915 :021,240,006,162,000,032,024
 3921 :127,017,096,169,005,141,124
 3927 :039,208,169,000,141,035,167
 3933 :021,141,212,020,141,031,147
 3939 :008,141,047,008,096,162,049
 3945 :008,169,000,029,022,008,085
 3951 :202,048,004,010,076,108,047
 3957 :015,141,016,208,096,162,243
 3963 :000,189,024,021,201,000,046
 3969 :240,043,222,024,021,208,119
 3975 :038,189,248,007,201,011,061
 3981 :208,021,169,013,157,248,189
 3987 :007,169,000,157,212,020,200
 3993 :138,010,168,169,015,153,038
 3999 :031,008,076,174,015,169,120
 4005 :011,157,248,007,169,100,089
 4011 :157,024,021,232,236,211,028
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 4029 :173,001,021,105,080,141,198
 4035 :001,021,173,002,021,105,006
 4041 :002,141,002,021,173,003,031
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 4065 :003,021,237,046,021,013,054
 4071 :047,021,144,037,173,036,177
 4077 :021,201,007,176,030,238,142
 4083 :036,021,169,000,174,036,167
 4089 :021,157,224,007,248,173,055
 4095 :045,021,024,105,080,141,159
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 4143 :157,200,007,173,002,021,095
 4149 :074,074,074,074,024,105,222
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 4161 :021,041,015,024,105,176,191
 4167 :157,202,007,173,001,021,120
 4173 :074,074,074,074,024,105,246
 4179 :176,157,203,007,173,001,032
 4185 :021,041,015,024,105,176,215
 4191 :157,204,007,096,160,000,207
 4197 :173,030,008,074,141,021,036
 4203 :008,140,020,008,204,021,252
 4209 :008,208,003,076,021,017,190
 4215 :152,010,170,185,212,020,100
 4221 :201,001,208,003,076,021,123
 4227 :017,189,004,021,141,208,199
 4233 :020,189,005,021,141,210,211
 4239 :020,185,022,008,141,209,216
 4245 :020,173,030,008,170,074,112
 4251 :168,056,173,208,020,253,009

4257 :004,021,141,019,008,173,015
 4263 :209,020,249,022,008,013,176
 4269 :019,008,176,022,056,189,131
 4275 :004,021,237,208,020,141,042
 4281 :208,020,185,022,008,237,097
 4287 :209,020,141,209,020,076,098
 4293 :218,016,056,173,208,020,120
 4299 :253,004,021,141,208,020,082
 4305 :173,209,020,249,022,008,122
 4311 :141,209,020,056,173,208,254
 4317 :020,233,025,141,019,008,155
 4323 :173,209,020,233,000,013,107
 4329 :019,008,176,040,189,005,158
 4335 :021,205,210,020,176,013,116
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 4383 :108,016,024,096,173,208,144
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 4395 :169,128,141,033,021,056,079
 4401 :096,169,000,141,033,021,253
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 4413 :133,251,169,018,133,252,249
 4419 :177,251,240,010,032,210,219
 4425 :255,200,208,246,230,252,184
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 4437 :001,021,173,064,008,141,237
 4443 :002,021,173,065,008,141,245
 4449 :003,021,162,019,032,026,104
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 4479 :072,138,010,168,185,005,193
 4485 :021,240,003,076,071,018,050
 4491 :224,000,240,111,165,162,017
 4497 :041,064,205,032,021,208,204
 4503 :003,076,047,018,141,032,212
 4509 :021,173,027,212,041,007,126
 4515 :201,004,144,030,201,004,235
 4521 :240,039,201,005,240,048,174
 4527 :201,006,240,062,169,040,125
 4533 :153,004,021,169,166,153,079
 4539 :005,021,169,001,157,022,050
 4545 :008,076,008,018,169,175,135
 4551 :153,004,021,169,118,153,049
 4557 :005,021,076,008,018,169,246
 4563 :045,153,004,021,169,078,169
 4569 :153,005,021,076,008,018,242
 4575 :169,040,153,004,021,169,011
 4581 :078,153,005,021,169,001,144
 4587 :157,022,008,076,008,018,012
 4593 :169,045,153,004,021,169,034
 4599 :166,153,005,021,076,008,164
 4605 :018,169,175,153,004,021,025
 4611 :169,222,153,005,021,140,201
 4617 :030,008,152,072,138,072,225
 4623 :032,099,016,008,104,141,159
 4629 :020,008,104,170,104,168,083
 4635 :173,020,008,072,040,144,228
 4641 :013,169,000,153,004,021,137
 4647 :157,022,008,153,005,021,149
 4653 :104,104,224,000,240,020,225
 4659 :173,027,212,048,005,169,173
 4665 :015,076,063,018,169,241,127

4671 :153,031,008,169,004,153,069
 4677 :047,008,104,096,173,000,241
 4683 :220,041,001,208,249,169,195
 4689 :147,032,210,255,032,057,046
 4695 :017,096,160,000,185,125,158
 4701 :018,240,022,141,000,212,214
 4707 :200,185,125,018,141,001,001
 4713 :212,200,185,125,018,170,247
 4719 :032,165,018,200,076,091,181
 4725 :018,141,000,212,141,001,118
 4731 :212,096,180,004,007,071,181
 4737 :005,007,152,005,011,071,124
 4743 :005,011,180,004,011,001,091
 4749 :000,003,180,004,007,071,150
 4755 :005,007,152,005,007,012,079
 4761 :007,007,071,005,007,152,146
 4767 :005,007,180,004,012,000,111
 4773 :152,072,142,048,021,162,250
 4779 :000,032,144,011,032,007,141
 4785 :015,032,104,015,032,212,075
 4791 :014,206,048,021,208,237,149
 4797 :104,168,096,169,024,141,123
 4803 :024,212,169,017,141,005,251
 4809 :212,169,240,141,006,212,157
 4815 :169,000,141,000,212,141,102
 4821 :001,212,169,033,141,004,005
 4827 :212,096,162,255,142,001,063
 4833 :212,160,000,200,208,253,234
 4839 :202,208,245,142,001,212,217
 4845 :096,019,013,013,013,013,148
 4851 :013,013,149,070,069,070,115
 4857 :069,070,069,070,065,066,146
 4863 :029,029,029,029,029,029,173
 4869 :029,029,029,029,029,029,179
 4875 :029,029,029,029,029,029,185
 4881 :029,029,029,029,065,066,008
 4887 :069,070,069,070,069,070,184
 4893 :069,072,071,072,071,072,200
 4899 :071,072,067,068,029,029,115
 4905 :029,029,029,029,029,029,215
 4911 :029,029,029,029,029,029,221
 4917 :029,029,029,029,029,029,227
 4923 :029,029,067,068,071,072,139
 4929 :071,072,071,072,071,017,183
 4935 :017,017,029,029,029,029,221
 4941 :029,029,029,029,029,029,251
 4947 :029,029,029,065,066,069,114
 4953 :070,069,070,069,070,069,250
 4959 :070,069,070,065,066,013,192
 4965 :029,029,029,029,029,029,019
 4971 :029,029,029,029,029,029,025
 4977 :029,067,068,071,072,071,235
 4983 :072,071,072,071,072,071,036
 4989 :072,067,068,013,013,013,115
 4995 :013,013,070,069,070,069,179
 5001 :070,069,070,065,066,029,250
 5007 :029,029,029,029,029,029,061
 5013 :029,029,029,029,029,029,067
 5019 :029,029,029,029,029,029,073
 5025 :029,029,029,065,066,069,192
 5031 :070,069,070,069,070,069,072
 5037 :072,071,072,071,072,071,090
 5043 :072,067,068,029,029,029,217
 5049 :029,029,029,029,029,029,103
 5055 :029,029,029,029,029,029,109
 5061 :029,029,029,029,029,029,115
 5067 :029,067,068,071,072,071,069
 5073 :072,071,072,071,013,013,009
 5079 :013,013,013,152,018,083,251

5085 :067,079,082,069,058,032,096
 5091 :048,048,048,048,048,048,003
 5097 :032,072,073,071,072,032,073
 5103 :083,067,079,082,069,058,165
 5109 :032,048,048,048,048,048,005
 5115 :048,032,146,064,064,018,111
 5121 :032,032,032,032,146,149,168
 5127 :019,000,000,001,002,003,032
 5133 :040,041,042,043,080,081,084
 5139 :082,083,000,004,040,004,232
 5145 :080,004,120,004,160,004,141
 5151 :200,004,240,004,024,005,252
 5157 :064,005,104,005,144,005,108
 5163 :184,005,224,005,008,006,219
 5169 :048,006,088,006,128,006,075
 5175 :168,006,208,006,248,006,185
 5181 :032,007,072,007,112,007,042
 5187 :152,007,192,007,019,005,193
 5193 :017,017,017,017,017,017,175
 5199 :029,029,029,029,029,029,253
 5205 :029,029,029,073,074,032,095
 5211 :032,075,076,032,032,077,159
 5217 :078,032,032,079,080,032,174
 5223 :032,075,076,032,032,079,173
 5229 :080,013,029,029,029,029,062
 5235 :029,029,029,029,029,081,085
 5241 :082,032,032,083,084,032,210
 5247 :032,085,086,032,032,087,225
 5253 :088,032,032,083,084,032,228
 5259 :032,087,088,013,029,029,161
 5265 :029,029,029,029,029,029,063
 5271 :029,089,090,032,032,091,002
 5277 :092,032,032,093,094,032,020
 5283 :032,095,033,032,032,091,222
 5289 :092,032,032,095,033,013,210
 5295 :029,029,029,029,029,029,093
 5301 :029,029,029,034,035,032,113
 5307 :032,036,037,032,032,038,138
 5313 :039,032,032,040,041,032,153
 5319 :032,036,037,032,032,040,152
 5325 :041,013,000,070,000,050,123
 5331 :003,000,000,002,000,000,216
 5337 :000,000,000,254,253,251,207
 5343 :247,239,223,191,127,002,228
 5349 :003,010,020,030,040,050,126
 5355 :060,070,080,009,217,000,159
 5361 :043,161,000,000,000,000,189
 5367 :000,000,008,008,000,000,007
 5373 :000,000,000,007,000,016,020
 5379 :000,150,217,130,050,060,098
 5385 :222,000,000,000,000,000,231
 5391 :000,000,000,000,000,000,015
 5397 :000,000,000,000,000,056,077
 5403 :000,000,000,000,000,064,091
 5409 :000,000,000,000,120,120,017
 5415 :120,120,120,090,090,070,137
 5421 :080,000,192,000,000,000,061
 5427 :000,000,000,000,000,000,051
 5433 :000,000,001,240,000,003,045
 5439 :248,000,003,248,000,007,057
 5445 :248,000,015,240,006,007,073
 5451 :192,254,007,192,195,255,146
 5457 :192,063,255,192,000,007,022
 5463 :192,000,007,192,000,007,229
 5469 :192,057,255,220,065,255,113
 5475 :194,129,255,193,071,024,197
 5481 :226,056,231,028,000,000,134
 5487 :000,184,000,000,000,000,039
 5493 :000,000,000,000,000,015,132

5499 :128,000,031,192,000,031,249
 5505 :192,000,031,224,000,015,079
 5511 :240,000,003,224,096,003,189
 5517 :224,127,003,255,195,003,180
 5523 :255,252,003,224,000,003,116
 5529 :224,000,003,224,000,059,151
 5535 :255,156,067,255,130,131,129
 5541 :255,129,071,024,226,056,158
 5547 :231,028,000,000,000,184,102
 5553 :000,000,000,000,000,000,177
 5559 :000,000,000,000,127,000,054
 5565 :000,062,000,000,028,000,023
 5571 :000,028,000,000,028,000,251
 5577 :000,028,000,000,062,000,035
 5583 :000,062,000,000,127,000,140
 5589 :000,127,000,000,255,128,211
 5595 :001,255,192,003,255,224,125
 5601 :007,255,240,007,255,240,205
 5607 :007,255,240,003,255,224,191
 5613 :000,255,128,000,000,000,108
 5619 :000,000,000,000,000,000,243
 5625 :000,000,003,000,000,003,255
 5631 :128,000,003,000,000,028,158
 5637 :000,000,028,000,000,028,061
 5643 :000,000,062,000,000,062,135
 5649 :000,000,127,000,000,127,015
 5655 :000,000,255,128,001,255,150
 5661 :192,003,255,224,007,255,197
 5667 :240,007,255,240,007,255,015
 5673 :240,003,255,224,000,255,250
 5679 :128,000,199,195,227,231,003
 5685 :199,231,069,131,001,007,179
 5691 :031,127,255,255,255,031,245
 5697 :128,224,248,254,255,255,149
 5703 :255,248,007,007,007,007,090
 5709 :007,007,031,031,224,224,089
 5715 :224,224,224,224,248,248,195
 5721 :255,255,252,240,224,224,003
 5727 :192,192,255,255,063,015,043
 5733 :007,007,003,003,128,128,121
 5739 :128,128,128,128,128,255,234
 5745 :001,001,001,001,001,001,119
 5751 :001,255,128,064,063,032,150
 5757 :032,032,032,032,004,008,009
 5763 :240,016,016,016,016,016,195
 5769 :003,004,008,008,008,008,176
 5775 :008,016,000,128,064,064,167
 5781 :064,064,064,032,128,064,053
 5787 :063,032,032,032,032,032,122
 5793 :004,008,240,000,000,000,157
 5799 :000,000,128,064,063,032,198
 5805 :032,032,032,032,000,000,045
 5811 :224,016,008,004,004,004,183
 5817 :032,032,032,032,032,032,121
 5823 :032,063,016,016,016,016,094
 5829 :016,016,032,192,016,016,229
 5835 :016,016,016,032,032,063,122
 5841 :032,032,032,032,032,016,129
 5847 :016,240,032,032,032,032,087
 5853 :032,032,032,032,000,000,093
 5859 :000,000,000,000,000,000,227
 5865 :032,032,032,032,032,032,169
 5871 :032,032,004,004,004,004,063
 5877 :004,004,004,004,032,032,069
 5883 :032,032,032,032,032,032,187
 5889 :032,016,016,016,016,016,113
 5895 :016,016,032,032,032,032,167
 5901 :032,032,032,032,016,016,173
 5907 :016,016,016,016,016,016,115


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5913 :032,032,032,032,032,032,217
5919 :032,032,112,016,016,016,255
5925 :016,016,016,016,032,032,165
5931 :032,032,032,032,032,032,235
5937 :000,000,000,000,000,000,049
5943 :000,000,004,004,004,004,071
5949 :004,004,004,004,032,032,141
5955 :032,032,032,063,064,128,162
5961 :016,016,016,016,016,240,137
5967 :008,004,032,032,032,032,219
5973 :032,032,064,128,016,016,117
5979 :016,016,016,016,008,004,167
5985 :032,032,032,032,032,063,064
5991 :064,128,016,016,016,016,103
5997 :016,240,008,004,032,032,185
6003 :032,032,032,063,064,128,210
6009 :004,004,004,008,016,224,125
6015 :000,000,013,013,013,013,179

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Budgeteer

(Article on page 76.)

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: Budgeteer—VIC Loader

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10 TS="{CLR}{2 SPACES}{GRN}{RVS} {OFF}*
   {RVS} {OFF} BUDGETEER {RVS} {OFF}*
   {RVS} {OFF}{BLU}" :rem 37
12 PRINTCHR$(14)TS:PRINT :rem 230
14 PRINT" USE THE PROGRAM TO{3 SPACES}REC
   ORD YOUR CHECKBOOK BALANCE AND ITS
   :rem 93
16 PRINT"ALLOCATION INTO ONE TOTEN ACCOUN
   TS SHOWING{2 SPACES}INTENDED USE.
   :rem 135
18 PRINT:PRINT" INCREASE BALANCE WITHDEPO
   SITS. :rem 100
20 PRINT:PRINT" WRITE CHECKS AGAINST ANY
   {SPACE}ACCOUNT. :rem 190
22 PRINT:PRINT" TRANSFER FUNDS FROM
   {2 SPACES}ONE ACCOUNT TO ANY{4 SPACES}
   OTHER. :rem 157
23 PRINT"{HOME}{19 DOWN}" :rem 140
24 PRINT"INSTRUCTIONS?{2 SPACES}Y/N
   :rem 95
26 GETAS:IFAS=""THEN26 :rem 243
28 IFAS="N"THEN118 :rem 246
30 IFAS<>"Y"THEN23 :rem 2
32 PRINTTS:PRINT" AVAILABLE ACCOUNTS:"PR
   INT :rem 215
34 PRINT" 1.HOUS-ING :rem 191
36 PRINT" 2.UTIL-ITIES :rem 97
38 PRINT" 3.INSU-RANCE :rem 80
40 PRINT" 4.BANK:PMT OR SVGS :rem 160
42 PRINT" 5.MC/V:BANK CARDS :rem 208
44 PRINT" 6.VACA-TION :rem 253
46 PRINT" 7.MEDI-CAL :rem 154
48 PRINT" 8.BOOK:ENTERTAINMENT :rem 196
50 PRINT" 9.CHGE:STORE ACCTS :rem 199
52 PRINT"10.MISC-ELLANEOUS":PRINT:rem 143

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54 PRINT"11.CHBK:TOTAL/BALANCE":PRINT
   :rem 124
56 PRINT"FOR THE DATE, USE ANY FORMAT WIT
   HOUT COMMAS.":GOSUB500 :rem 221
80 PRINT"DEPOSITS ARE ADDED TO THE CHECKB
   OOK BALANCE AND THE MISC ACCOUNT.":PRI
   NT :rem 35
82 PRINT"LEAVE THEM IN MISC OR TRANSFER T
   HEM TO OTHERACCOUNTS AS YOU WISH.":PRI
   NT :rem 147
84 PRINT"YOU GET PROMPTS ALONG THE WAY.":
   PRINT :rem 7
86 PRINT"YOU ARE PROTECTED MOSTOF THE TIM
   E AGAINST{3 SPACES}SLIP-UPS.":PRINT
   :rem 127
88 PRINT"NEGATIVE BALANCES ARE ALLOWED FO
   R TEMPORARY CONVENIENCE.":GOSUB500
   :rem 129
100 PRINT"WHEN YOU HAVE COMPLET-ED ALL YO
   UR TRANSACT- IONS, YOU WRITE NEW
   :rem 105
102 PRINT"FILE BALANCES.":PRINT :rem 178
106 PRINT"HAPPY CHECKBOOK AND{3 SPACES}BU
   DGET BALANCING!":PRINT :rem 232
108 PRINT:PRINT :rem 237
109 PRINT"{HOME}{9 DOWN}" :rem 23
110 PRINT"WOULD YOU LIKE TO RE- PEAT THE
   {SPACE}INSTRUCTIONS? :rem 212
112 GETAS:IFAS=""THEN112 :rem 75
114 IFAS="Y"THEN32 :rem 248
116 IFAS<>"N"THENPRINT:GOTO109 :rem 97
118 SS="LO"+CHR$(34)+"B2"+CHR$(34)+"1:"+
   CHR$(131) :rem 112
120 REM CHANGE 1 TO 8 IN LINE 118 IF YOU
   {SPACE}AREUSING A DISK DRIVE :rem 82
122 FORI=1TOLEN(SS):POKE630+I,ASC(MID$(SS
   ,I)):NEXT:POKE198,I:END :rem 140
500 PRINT:PRINT"MORE?...PRESS ANY KEY
   :rem 229
502 POKE36878,15:POKE36875,240:FORM=1TO30
   0:NEXT:POKE36878,0:POKE36875,0
   :rem 210
504 GETAS:IFAS=""THEN504 :rem 85
506 PRINT"{CLR}"TS:RETURN :rem 145

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Program 2:

Budgeteer—VIC Main Program

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2 X=0:REM MAKE X=0 FOR TAPE,OR X=1 TO USE
   DISK :rem 87
3 TS="{CLR}{2 SPACES}{GRN}{RVS} {OFF}*
   {RVS} {OFF} BUDGETEER {RVS} {OFF}*{RVS}
   {OFF}{BLU}":PRINTCHR$(14);:POKE36878,1
   5:S=36874 :rem 145
4 DIMA$(11),A(11),B$(11):DEF FNR(X)=INT(X
   *100+.5)/100:PRINTTS:PRINT:PRINT
   :rem 203
5 PRINT:PRINT:INPUT"TODAY'S DATE";DD$:PRI
   NT:GOTO20 :rem 51
6 PRINTTS:PRINT"DATE:"D$:PRINT"LAST AMT:$
   "A :rem 70
7 GOSUB12:PRINT:FORR=1TO9:PRINT"{RED}"R"
   {LEFT}..{GRN}"A$(R)"..${BLU}"TAB(B$(R))
   A(R):NEXT :rem 236
8 PRINT"{RED}10..{GRN}"A$(10)"..${BLU}"TA
   B(B$(10))A(10):PRINT :rem 245
9 PRINT"{RED}11..{GRN}"A$(11)"..${BLU}"TAB
   (B$(11))A(11):PRINT:RETURN :rem 230
10 POKES,212:FORM=1TO150:NEXT:POKES,0:FOR
   M=1TO100:NEXT :rem 211
11 POKES,201:FORM=1TO200:NEXT:POKES,0:RET
   URN :rem 95

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12 FORR=1TO11 :rem 15
13 IFABS(A(R))>1THENB%(R)=16-LEN(STR$(IN :rem 153
T(ABS(A(R)))) :rem 153
14 IFABS(A(R))<1THENB%(R)=15 :rem 72
15 NEXT:RETURN :rem 191
20 FORR=1TO11:READA$(R):NEXT :rem 229
21 DATA "HOUS", "UTIL", "INSU", "BANK", "MC/V" :rem 238
:rem 238
22 DATA "VACA", "MEDI", "BOOK", "CHGE", "MISC" :rem 178
, "CHBK" :rem 178
25 GOSUB250 :rem 126
28 IF X THEN OPEN1,8,2,"0:CHBKFILE,READ": :rem 126
GOTO 37 :rem 220
30 PRINT"INSERT DATA CASSETTE{2 SPACES}AN :rem 159
D REWIND TO READ{4 SPACES}BALANCES. :rem 159
31 POKES,240:FORM=1TO300:NEXT:POKES,0 :rem 75
:rem 75
32 PRINT:PRINT"READY?...PRESS Y :rem 127
33 GETA$:IFA$="Y"THEN33 :rem 239
34 IFA$="N"THENEND :rem 48
35 IFA$<>"Y"THEN30 :rem 5
36 OPEN1,1,0,"CHBKFILE" :rem 45
37 FORR=1TO11:INPUT#1,A(R):NEXT:INPUT#1,D :rem 80
$:CLOSE1 :rem 80
40 GOSUB6 :rem 26
50 PRINT"TRANSACTION?{2 SPACES}Y/N":POKES :rem 30
,245:FORM=1TO200:NEXT :rem 30
51 POKES,0:FORM=1TO100:NEXT:POKES,235:FOR :rem 241
M=1TO200:NEXT:POKES,0 :rem 241
52 GETA$:IFA$="Y"THEN52 :rem 241
53 IFA$="Y"THEN70 :rem 204
54 IFA$="N"THEN180 :rem 244
55 GOSUB10:FORR=1TO3 :rem 2
56 PRINT"{HOME}{17 DOWN}"SPC(14)" :rem 219
{3 SPACES}":FORM=1TO300:NEXT :rem 219
58 PRINT"{HOME}{17 DOWN}"SPC(14)"Y/N":FOR :rem 179
M=1TO300:NEXT :rem 179
59 NEXT:GOTO52 :rem 135
70 T=T+1:IFT=1THEND$=DD$ :rem 179
71 PRINT"{HOME}{17 DOWN}MENU: T=ACCT TRAN :rem 75
SFER :rem 75
72 PRINTSPC(6)"C=WRITE CHECK :rem 238
73 PRINTSPC(6)"D=MAKE DEPOSIT :rem 61
80 GETA$:IFA$="Y"THEN80 :rem 243
81 IFA$="C"THEN100 :rem 225
82 IFA$="D"THEN120 :rem 229
83 IFA$="T"THEN140 :rem 248
84 GOSUB10:FORR=1TO3 :rem 4
85 PRINT"{HOME}{17 DOWN}"SPC(6)" :rem 35
86 PRINTSPC(6)" ":PRINTSPC(6)" ":FORM=1TO :rem 175
300:NEXT :rem 175
88 PRINT"{HOME}{17 DOWN}"SPC(6)"T" :rem 250
:rem 250
89 PRINTSPC(6)"C":PRINTSPC(6)"D":FORM=1TO :rem 57
300:NEXT :rem 57
90 NEXT:GOTO80 :rem 131
100 PRINT"AMT OF CHECK,ACCT #:"INPUTA,L :rem 222
:rem 222
101 IFL>10ORL<10ORL-INT(L)>0THENGOSUB10:PR :rem 242
INT"{2 UP}";:GOTO100 :rem 242
102 A(11)=FNR(A(11)-A):A(L)=FNR(A(L)-A):G :rem 61
OTO122 :rem 61
120 PRINT"AMT OF DEPOSIT:"INPUTA :rem 56
121 L=10:A(11)=FNR(A(11)+A):A(L)=FNR(A(L) :rem 86
+A) :rem 86
122 GOSUB6:E=L:F=12:GOTO160 :rem 125
140 PRINT"AMT, FROM #, TO #:"INPUTA,A1,A2 :rem 191
:rem 191
141 XH=0:IFAL>10ORA2>10ORAL<10RA2<10RAL-I :rem 40
NT(A1)>0ORA2-INT(A2)>0THENXH=1:rem 40
142 IFXH=1THENGOSUB10:PRINT"{2 UP}";:GOTO :rem 40
140 :rem 180
143 A(A1)=FNR(A(A1)-A):A(A2)=FNR(A(A2)+A) :rem 166
:rem 166
144 GOSUB6:E=A1:F=A2 :rem 173
160 IFE>7THENPRINT"{HOME}"SPC(100)SPC(86+ :rem 150
E*22-100)"*":GOTO162 :rem 150
161 PRINT"{HOME}"SPC(86+E*22)"*": :rem 141
162 IFF>7THENPRINT"{HOME}"SPC(100)SPC(86+ :rem 156
F*22-100)"*":GOTO164 :rem 156
163 PRINT"{HOME}"SPC(86+F*22)"*": :rem 144
164 POKES,232:FORM=1TO200:NEXT:POKES,0:FO :rem 11
RM=1TO100:NEXT :rem 11
165 POKES,232:FORM=1TO150:NEXT:POKES,0 :rem 135
:rem 135
166 FORM=1TO750:NEXT:PRINT"{HOME} :rem 253
{16 DOWN}":GOTO50 :rem 253
180 IFT=0THEN200 :rem 170
181 Z=0:FORR=1TO10:Z=Z+A(R):NEXT :rem 249
182 IFABS(Z-A(11))>.01THEN220 :rem 153
183 GOSUB 6:PRINT"ACCT BAL=CHBK BAL":GOSU :rem 188
B 250 :rem 188
184 IF X THEN OPEN1,8,2,"@0:CHBKFILE,WRIT :rem 239
E":GOTO191 :rem 239
185 PRINT"REWIND CASSETTE TO{4 SPACES}WRIT :rem 93
E FILE.":POKES,240:FORM=1TO300:NEXT:P :rem 93
OKES,0 :rem 93
186 PRINT:PRINT"READY?...PRESS Y :rem 57
187 GETA$:IFA$="Y"THEN187 :rem 99
188 IFA$="N"THEN210 :rem 38
189 IFA$<>"Y"THEN184 :rem 121
190 OPEN1,1,1,"CHBKFILE" :rem 95
191 R$=CHR$(13):FORR=1TO11:PRINT#1,A(R);R :rem 122
$:NEXT :rem 122
192 PRINT#1,D$;R$;:CLOSE1 :rem 222
193 PRINTT$:PRINT"DATE:"D$:PRINT"HAD"T T :rem 132
RANS.":GOSUB7 :rem 132
194 PRINT"NEW FILE DONE.":POKE36878,0:END :rem 51
:rem 51
200 GOSUB6:PRINT"NO TRANSACTIONS.":PRINT" :rem 252
FILE NOT CHANGED.":END :rem 252
210 GOSUB6:PRINT"BALANCES HAVE CHANGED." :rem 73
:rem 73
211 PRINT"WRITE NEW FILE?" :rem 185
212 GETA$:IFA$="Y"THEN212 :rem 77
213 IFA$="N"THENEND :rem 95
214 IFA$<>"Y"THEN210 :rem 100
215 GOTO40 :rem 53
220 GOSUB6:PRINT"ERROR - NO BALANCE.":PRI :rem 169
NT"ACCT SUM="Z:PRINT"CHBK BALANCE="A( :rem 169
11) :rem 169
221 PRINT"DO YOU WISH TO":PRINT"CONTINUE? :rem 225
:rem 225
222 GETA$:IFA$="Y"THEN222 :rem 79
223 IFA$="N"THENEND :rem 96
224 IFA$<>"Y"THEN220 :rem 102
225 GOTO40 :rem 54
250 PRINT"INSERT DATA DISK OR{3 SPACES}TA :rem 81
PE. READY?(ANY KEY)" :rem 81
251 GETA$:IFA$="Y"THEN251 :rem 83
253 RETURN :rem 122

```

Program 3: Budgeteer—64 Version

```

100 X=1:REM MAKE X=0 FOR TAPE,OR X=1 TO U :rem 183
SE DISK :rem 183
105 POKE 53280,12:POKE 53281,11:PRINTCHR$( :rem 206
14) :rem 206
110 T$="{CLR}{RVS}{7}{13 SPACES}{OFF}{8} :rem 85
{2 SPACES}BUDGETEER{2 SPACES}{RVS}{7} :rem 85
{14 SPACES}{8}" :rem 85
115 S=54272:FOR Q=S TO S+23:POKE Q,0:NEXT :rem 66
:rem 66

```



```

120 DIM A$(11),A(11),B$(11):DEF FNR(X)=IN      :rem 219
    T(X*100+.5)/100:PRINT T$"{6 DOWN}"        :rem 70
130 PRINT"Today's DATE";:GOSUB1080:INPUT        :rem 54
    {SPACE}DD$:PRINT:GOTO230                    :rem 100
140 PRINT T$:PRINT"[8]{2 SPACES}DATE:[5]"      :rem 236
    D$:PRINT"[8]{2 SPACES}LAST AMOUNT:$"       :rem 231
    [5]"A"                                       :rem 253
150 GOSUB190:PRINT:FOR R=1TO9:PRINT"          :rem 112
    {2 SPACES}[8]"R"{LEFT}.."A$(R)"..$[5]      :rem 92
    "TAB(B$(R))A(R):NEXT                       :rem 91
160 PRINT"{2 SPACES}[8]10.."A$(10)"..$[5]      :rem 233
    "TAB(B$(10))A(10):PRINT                    :rem 228
170 PRINT"{2 SPACES}[8]11.."A$(11)"..$[5]      :rem 242
    "TAB(B$(11))A(11):PRINT:RETURN:rem 77
190 FOR R=1TO11                                :rem 70
200 IF ABS(A(R))=>1 THEN B$(R)=32-LEN(STR      :rem 91
    $(INT(ABS(A(R))))):rem 197
210 IF ABS(A(R))<1 THEN B$(R)=31:rem 116
220 NEXT:RETURN                                :rem 237
230 FOR R=1TO11:READ A$(R):NEXT               :rem 24
240 DATA"HOUSING.....","UTILITIES.....      :rem 193
    .":rem 193
243 DATA"INSURANCE.....","SERVICE CHARGE    :rem 177
    S":rem 177
247 DATA"CREDIT{SHIFT-SPACE}CARDS..."      :rem 205
    .":rem 205
250 DATA"VACATION.....","MEDICAL.....        :rem 219
    .":rem 219
253 DATA"BOOKS&MAGAZINES","STORE CHARGES.     :rem 145
    .":rem 145
257 DATA"MISCELLANEOUS..","TOTAL              :rem 130
    {SHIFT-SPACE}BALANCE.."":rem 223
270 GOSUB1050                                  :rem 223
280 IF X THEN OPEN1,8,2,"0:CHBKFILE,READ"      :rem 58
    :GOTO 350                                   :rem 58
290 PRINT"INSERT DATA CASSETTE AND REWIND      :rem 215
    TO READ BALANCES."                        :rem 173
300 PRINT:PRINT"READY?...PRESS Y"              :rem 75
310 GET A$:IF A$="" THEN310                    :rem 94
320 IF A$="N" THEN END                          :rem 107
330 IF A$<>"Y" THEN290                          :rem 91
340 OPEN1,1,0,"CHBKFILE"                      :rem 126
350 FOR R=1TO11:INPUT#1,A(R):NEXT:INPUT#1      :rem 174
    ,D$:CLOSE1                                :rem 225
360 GOSUB140                                    :rem 232
370 PRINT"[8]TRANSACTION?{2 SPACES}Y/N"        :rem 89
    .":rem 50
    .":rem 33
375 GOSUB1080                                  :rem 148
380 GET A$:IF A$="" THEN380                    :rem 23
390 IF A$="Y" THEN450                          :rem 238
400 IF A$="N" THEN740                          :rem 229
410 GOSUB1160:FOR R=1TO3                      :rem 229
420 PRINT"[HOME]{18 DOWN}"SPC(14)"            :rem 142
    {3 SPACES}":FOR M=1TO300:NEXT              :rem 32
430 PRINT"[HOME]{18 DOWN}"SPC(14)"Y/N":FO      :rem 111
    R M=1TO300:NEXT                            :rem 234
440 NEXT:GOTO380                               :rem 93
450 T=T+1:IF T=1 THEN D$=DD$                  :rem 26
460 PRINT"[HOME]{18 DOWN}MENU: T=ACCT TRA      :rem 22
    NSFER                                       :rem 42
470 PRINTSPC(6)"C=WRITE CHECK                  :rem 151
480 PRINTSPC(6)"D=MAKE DEPOSIT                 :rem 151
485 GOSUB1080                                  :rem 96
490 GET A$:IF A$="" THEN490                    :rem 96
500 IF A$="C" THEN590                          :rem 97
510 IF A$="D" THEN620                          :rem 105
520 IF A$="T" THEN650                          :rem 105
530 GOSUB1160:FOR R=1TO3                      :rem 105
540 PRINT"[HOME]{18 DOWN}"SPC(6)" "          :rem 105
550 PRINTSPC(6)" ":PRINTSPC(6)" ":FOR M=1
    TO300:NEXT                                :rem 219
560 PRINT"[HOME]{18 DOWN}"SPC(6)"T"          :rem 54
570 PRINTSPC(6)"C":PRINTSPC(6)"D":FOR M=1
    TO300:NEXT                                :rem 100
580 NEXT:GOTO490                              :rem 236
590 PRINT"[HOME]{21 DOWN}"                  :rem 231
591 PRINT"AMT OF CHECK,ACCT #":GOSUB1080
    :INPUT A,L                                :rem 112
600 IF L>10 OR L<1 OR L-INT(L)>0 THEN GOS
    UB1160:GOTO590                            :rem 2
610 A(11)=FNR(A(11)-A):A(L)=FNR(A(L)-A):G
    OTO640                                     :rem 70
620 PRINT:PRINT"AMT OF DEPOSIT":GOSUB108
    0:INPUT A                                :rem 136
630 L=10:A(11)=FNR(A(11)+A):A(L)=FNR(A(L)
    +A)                                       :rem 91
640 GOSUB140:E=L:F=12:GOTO690                :rem 233
650 PRINT"[HOME]{21 DOWN}"                  :rem 228
651 PRINT"AMT, FROM #, TO #":GOSUB1080:INP
    UT A,A1,A2                                :rem 74
653 IF A1>10 OR A1<1 OR A1-INT(A1)>0 THEN
    GOSUB1160:GOTO650                        :rem 159
660 IF A2>10 OR A2<1 OR A2-INT(A2)>0 THEN
    GOSUB1160:GOTO650                        :rem 161
670 A(A1)=FNR(A(A1)-A):A(A2)=FNR(A(A2)+A)
    :rem 171
680 GOSUB140:E=A1:F=A2                       :rem 17
690 IF E>6 THEN PRINT"[HOME]"SPC(255)SPC(
    198)SPC(E*40-255)"*":GOTO710            :rem 242
700 PRINT"[HOME]"SPC(198)SPC(E*40)"*"
    :rem 204
710 IF F>6 THEN PRINT"[HOME]"SPC(255)SPC(
    198)SPC(F*40-255)"*":GOTO730            :rem 239
720 PRINT"[HOME]"SPC(198)SPC(F*40)"*"
    :rem 207
730 FOR M=1TO750:NEXT:PRINT"[HOME]
    {17 DOWN}":GOTO370                      :rem 64
740 IF T=0 THEN870                             :rem 185
750 Z=0:FOR R=1TO10:Z=Z+A(R):NEXT:rem 251
760 IF ABS(Z-A(11))=>.01 THEN940:rem 164
770 GOSUB 140:PRINT"SUM OF ACCOUNTS=TOTAL
    BALANCE":GOSUB 1000                      :rem 202
780 IF X THEN OPEN1,8,2,"@0:CHBKFILE,WRIT
    E":GOTO840                                :rem 242
790 PRINT:PRINT"READY?...PRESS Y"            :rem 58
800 GET A$:IF A$="" THEN800                    :rem 83
810 IF A$="N" THEN880                          :rem 43
820 IF A$<>"Y" THEN780                        :rem 115
830 OPEN1,1,1,"CHBKFILE"                     :rem 96
840 R$=CHR$(13):FOR R=1TO11:PRINT#1,A(R);
    R$;NEXT                                  :rem 123
850 PRINT#1,D$;R$;:CLOSE1                     :rem 223
855 PRINT T$:PRINT"DATE:"D$:PRINT"HAD"T"
    {SPACE}TRANS.":GOSUB150                  :rem 232
860 PRINT"NEW FILE DONE.":END                 :rem 94
870 GOSUB140:PRINT"NO TRANSACTIONS.":PRIN
    T"FILE NOT CHANGED.":END                 :rem 104
880 GOSUB140:PRINT"BALANCES HAVE CHANGED.
    "                                         :rem 181
890 PRINT"WRITE NEW FILE?"                    :rem 198
900 GET A$:IF A$="" THEN900                    :rem 85
910 IF A$="N" THEN END                        :rem 99
920 IF A$<>"Y" THEN880                        :rem 117
930 GOTO360                                    :rem 110
935 GOSUB140:PRINT"ERROR - NO BALANCE.":P
    RINT"ACCT SUM="Z                          :rem 219
940 PRINT"CHBK BALANCE="A(11)                :rem 157
950 PRINT"DO YOU WISH TO CONTINUE?":rem 1
960 GET A$:IF A$="" THEN960                    :rem 97
970 IF A$="N" THENEND                          :rem 105
980 IF A$<>"Y" THEN940                        :rem 120

```



```

990 GOTO360                                :rem 116
1000 PRINT"INSERT DATA DISK OR TAPE"      :rem 247
                                           :rem 231
1002 PRINT"PRESSING 'STOP' WILL ABORT SES :rem 231
SION"
1005 PRINT" (TRANSACTIONS WILL BE LOST)    :rem 96
                                           :rem 96
1008 PRINT" ANY OTHER KEY WILL SAVE DATA. :rem 156
"
1009 GOSUB1080                             :rem 19
1010 GET A$:IF A$="" THEN1010              :rem 167
1030 RETURN                                :rem 164
1050 PRINT"INSERT DATA DISK OR TAPE"      :rem 252
                                           :rem 133
1055 PRINT"PRESS ANY KEY TO LOAD DATA."   :rem 23
                                           :rem 177
1058 GOSUB1080                             :rem 168
1060 GET A$:IF A$="" THEN1060              :rem 165
1070 RETURN                                :rem 181
1080 FOR Q=S TO S+22:POKE Q,0:NEXT         :rem 193
                                           :rem 103
1090 POKE S+5,0:POKE S+19,0               :rem 28
1095 POKE S+6,7:POKE S+20,7               :rem 82
1100 POKE S+24,15                         :rem 25
1110 POKE S+4,33:POKE S+18,19             :rem 33
1120 POKE S,0:POKE S+1,75                 :rem 30
1130 POKE S+14,1:POKE S+15,75             :rem 196
1135 POKE S+4,32:POKE S+18,18             :rem 164
1140 FOR Q=1TO150:NEXT                    :rem 25
1150 POKE S+1,0:POKE S+15,0:RETURN         :rem 150
                                           :rem 25
1160 FOR Q=S TO S+22:POKE Q,0:NEXT         :rem 150
                                           :rem 63
1170 POKE S+5,15:POKE S+12,15             :rem 42
1175 POKE S+3,4:POKE S+10,4               :rem 224
1180 POKE S+24,6                         :rem 29
1190 POKE S+4,65:POKE S+18,65             :rem 148
1200 POKE S+1,12:POKE S+8,14              :rem 29
1210 FOR Q=1TO250:NEXT                    :rem 148
1220 POKE S+1,0:POKE S+8,0:RETURN         :rem 148

```

Function Key

(Article on page 160.)

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:

Function Key—64 Version

```

10 I=51712:SH=INT(I/256):SL=I-SH*256      :rem 56
20 READ A:CK=CK+A:IF A=256 THEN 40:rem 53
25 IF A<0 THEN 100                         :rem 99
30 POKE I,A:I=I+1:GOTO 20                  :rem 130
40 IFCK<>28195THENPRINT"ERROR IN DATA":ST :rem 191
OP
50 PRINT"USE SYS"SH*256+SL+403"TO START": :rem 150
END
100 IF A<-255 THEN A=ABS(A+256)+SH:GOTO 3  :rem 223
0
110 A=ABS(A+1)+SL:GOTO30                   :rem 116

```



```

49542 DATA 0,1,65,17,81,33 :rem 1
49548 DATA 97,49,113,124,165,49 :rem 22
49554 DATA 234,162,-256,173,5,3 :rem 0
49560 DATA 201,-256,240,17,141,-145 :rem 182
49566 DATA -257,173,4,3,141,-144 :rem 45
49572 DATA -257,169,-211,141,4,3 :rem 42
49578 DATA 142,5,3,173,21,3 :rem 55
49584 DATA 201,-256,240,19,141,-147 :rem 192
49590 DATA -257,173,20,3,141,-146 :rem 90
49596 DATA -257,169,-130,120,141,20 :rem 190
49602 DATA 3,142,21,3,88,173 :rem 102
49608 DATA 144,2,201,-256,240,19 :rem 41
49614 DATA 141,-170,-256,173,143,2 :rem 136
49620 DATA 141,-169,-256,169,-168,120 :rem 39
49626 DATA 141,143,2,142,144,2 :rem 195
49632 DATA 88,96,256 :rem 246

Program 2:
Function Key—VIC Version

10 I=PEEK(55)+256*PEEK(56)-512:SH=INT(I/2
56):SL=I-SH*256 :rem 176
20 READ A:CK=CK+A:IF A=256 THEN 40:rem 53
25 IF A<0 THEN 100 :rem 99
30 POKE I,A:I=I+1:GOTO 20 :rem 130
40 IFCK<>28410THENPRINT"ERROR IN DATA":ST
OP :rem 181
50 PRINT"USE SYS"SH*256+SL+403"TO START":
POKE55,SL:POKE56,SH:END :rem 207
100 IF A<-255 THEN A=ABS(A+256)+SH:GOTO 3
0 :rem 223
110 A=ABS(A+1)+SL:GOTO30 :rem 116
49152 DATA 0,0,0,0,0,0 :rem 27
49158 DATA 0,0,0,0,0,0 :rem 33
49164 DATA 0,0,0,0,0,0 :rem 30
49170 DATA 0,0,0,0,0,0 :rem 27
49176 DATA 0,0,0,0,0,0 :rem 33
49182 DATA 0,0,0,0,0,0 :rem 30
49188 DATA 0,0,0,0,0,0 :rem 36
49194 DATA 0,0,0,0,0,0 :rem 33
49200 DATA 0,0,0,0,0,0 :rem 21
49206 DATA 0,0,0,0,0,0 :rem 27
49212 DATA 0,0,0,0,0,0 :rem 24
49218 DATA 0,0,0,0,0,0 :rem 30
49224 DATA 0,0,0,0,0,0 :rem 27
49230 DATA 0,0,0,0,0,0 :rem 24
49236 DATA 0,0,0,0,0,0 :rem 30
49242 DATA 0,0,0,0,0,0 :rem 27
49248 DATA 0,0,0,0,0,0 :rem 33
49254 DATA 0,0,0,0,0,0 :rem 30
49260 DATA 0,0,0,0,0,0 :rem 27
49266 DATA 0,0,0,0,0,0 :rem 33
49272 DATA 0,0,0,0,0,0 :rem 30
49278 DATA 0,0,0,173,-1,-256 :rem 87
49284 DATA 240,30,166,198,224,11 :rem 51
49290 DATA 176,24,168,185,-1,-256:rem 103
49296 DATA 240,15,157,119,2,230 :rem 255
49302 DATA 198,238,-1,-256,173,-1 :rem 88
49308 DATA -256,41,15,208,3,141 :rem 246
49314 DATA -1,-256,108,-146,-257,32 :rem 180
49320 DATA 72,235,173,-1,-256,208 :rem 88
49326 DATA 34,165,157,240,30,165 :rem 51
49332 DATA 212,208,26,166,198,202:rem 101
49338 DATA 189,119,2,201,133,144 :rem 51
49344 DATA 16,201,141,176,12,56 :rem 250

49350 DATA 233,133,10,10,10,10 :rem 174
49356 DATA 9,1,141,-1,-256,96 :rem 152
49362 DATA 166,122,189,0,2,201 :rem 199
49368 DATA 70,208,68,232,189,0 :rem 220
49374 DATA 2,201,49,144,60,201 :rem 197
49380 DATA 57,176,59,41,15,168 :rem 224
49386 DATA 185,-135,-257,168,232,189 :rem 11
49392 DATA 0,2,201,61,240,5 :rem 40
49398 DATA 162,11,108,0,3,232 :rem 149
49404 DATA 189,0,2,201,13,240 :rem 140
49410 DATA 15,201,95,208,2,169 :rem 203
49416 DATA 13,153,-1,-256,200,152 :rem 77
49422 DATA 41,15,208,233,169,0 :rem 200
49428 DATA 153,-1,-256,160,107,32 :rem 86
49434 DATA 230,241,108,2,3,108 :rem 193
49440 DATA -144,-257,208,251,232,189 :rem 247
49446 DATA 0,2,201,61,208,202 :rem 139
49452 DATA 232,138,72,160,0,189 :rem 3
49458 DATA 0,2,201,44,240,8 :rem 47
49464 DATA 232,200,192,15,208,243 :rem 95
49470 DATA 240,182,192,0,208,4 :rem 201
49476 DATA 162,8,208,176,232,189 :rem 70
49482 DATA 0,2,201,49,240,8 :rem 49
49488 DATA 201,56,240,4,162,9 :rem 161
49494 DATA 208,160,41,15,170,152 :rem 48
49500 DATA 72,160,0,138,32,186 :rem 200
49506 DATA 255,104,168,104,170,152 :rem 147
49512 DATA 160,2,32,189,255,162 :rem 0
49518 DATA -1,134,251,169,-256,133 :rem 144
49524 DATA 252,160,-257,169,251,162 :rem 202
49530 DATA -227,32,216,255,169,13 :rem 97
49536 DATA 32,210,255,76,116,196 :rem 58
49542 DATA 0,1,65,17,81,33 :rem 1
49548 DATA 97,49,113,124,165,49 :rem 22
49554 DATA 234,162,-256,173,5,3 :rem 0
49560 DATA 201,-256,240,17,141,-145 :rem 182
49566 DATA -257,173,4,3,141,-144 :rem 45
49572 DATA -257,169,-211,141,4,3 :rem 42
49578 DATA 142,5,3,173,21,3 :rem 55
49584 DATA 201,-256,240,19,141,-147 :rem 192
49590 DATA -257,173,20,3,141,-146 :rem 90
49596 DATA -257,169,-130,120,141,20 :rem 190
49602 DATA 3,142,21,3,88,173 :rem 102
49608 DATA 144,2,201,-256,240,19 :rem 41
49614 DATA 141,-170,-256,173,143,2 :rem 136
49620 DATA 141,-169,-256,169,-168,120 :rem 39
49626 DATA 141,143,2,142,144,2 :rem 195
49632 DATA 88,96,256 :rem 246

Disk Auto Load For
The 64
(Article on page 164.)

5 PRINT"[CLR] PLEASE WAIT..." :rem 18
10 B=679:C=767:TT=0 :rem 51
20 FORA=BT0C:READD:TT=TT+D:POKEA,D:NEXT :rem 82

```



```

25 IFTT<>8554THENPRINT"CHECK DATA STATEME
   NTS";B;"TO";C:END :rem 156
30 B=7168:C=7623:TT=0 :rem 147
40 FORA=BT0C:READD:TT=TT+D:POKEA,D:NEXT
   :rem 84
45 IFTT<>42577THENPRINT"CHECK DATA STATEM
   ENTS";B;"TO";C:END :rem 209
50 PRINT "{CLR}{DOWN} AUTO-LOAD A {RVS}B
   {OFF}ASIC OR {RVS}M{OFF}ACHINE LANGUAG
   E{3 SPACES}PROGRAM?" :rem 124
70 GETA$:IFA$=""THEN70 :rem 241
80 IFA$="M"THENGOSUB300 :rem 108
299 SYS7168:END :rem 138
300 PRINT "{CLR}{DOWN} ENTER STARTING ADDR
   ESS OF MACHINE LANG. PROGRAM." :rem 24
330 INPUTN:IFN<0ORN>65535THEN300 :rem 238
340 NN=INT(N/256):POKE722,N-(NN*256):POKE
   723,NN:POKE721,32 :rem 134
345 POKE693,1 :rem 202
350 POKE718,32:POKE719,66:POKE720,166:POK
   E724,76:POKE725,116:POKE726,164:RETUR
   N :rem 184
679 DATA169,131,141,2,3,169,164,141
   :rem 245
687 DATA3,3,169,8,170,160,0,32 :rem 245
695 DATA186,255,169,2,162,239,160,2
   :rem 255
703 DATA32,189,255,169,0,166,43,164
   :rem 250
711 DATA44,32,213,255,32,231,255,165
   :rem 25
719 DATA174,133,45,133,47,165,175,133
   :rem 93
727 DATA46,133,48,234,169,82,141,119
   :rem 47
735 DATA2,169,213,141,120,2,169,13
   :rem 180
743 DATA141,121,2,169,3,133,198,96
   :rem 195
751 DATA0,0,0,0,0,0,0,0 :rem 107
759 DATA0,0,0,0,0,0,0,0 :rem 207
7168 DATA162,0,189,171,28,32,210,255
   :rem 38
7176 DATA232,224,98,208,245,162,0,32
   :rem 38
7184 DATA207,255,201,13,240,8,157,239
   :rem 87
7192 DATA2,232,224,16,208,241,142,186
   :rem 80
7200 DATA2,162,0,189,13,29,32,210:rem 123
7208 DATA255,232,224,59,208,245,162,0
   :rem 86
7216 DATA160,0,232,234,208,252,200,208
   :rem 116
7224 DATA249,165,197,201,64,240,250,169
   :rem 195
7232 DATA0,133,198,162,0,189,74,29
   :rem 198
7240 DATA32,210,255,232,224,85,208,245
   :rem 128
7248 DATA162,0,32,207,255,201,13,240
   :rem 19
7256 DATA8,157,200,29,232,224,16,208
   :rem 36
7264 DATA241,142,111,28,169,167,141,2
   :rem 82
7272 DATA3,169,2,141,3,3,169,0 :rem 241
7280 DATA162,200,160,29,32,189,255,169
   :rem 143
7288 DATA8,170,160,255,32,186,255,169
   :rem 106
7296 DATA167,133,251,169,2,133,252,169
   :rem 149
7304 DATA251,162,4,160,3,32,216,255
   :rem 229
7312 DATA32,231,255,169,131,141,2,3
   :rem 226
7320 DATA169,164,141,3,3,162,0,189
   :rem 188
7328 DATA159,29,32,210,255,232,224,41
   :rem 84
7336 DATA208,245,96,147,17,32,69,78
   :rem 12
7344 DATA84,69,82,32,78,65,77,69 :rem 129
7352 DATA32,79,70,32,13,80,82,79 :rem 102
7360 DATA71,82,65,77,32,84,72,65 :rem 110
7368 DATA84,32,73,83,32,84,79,32 :rem 114
7376 DATA66,69,13,65,85,84,79,77 :rem 134
7384 DATA65,84,73,67,65,76,76,89 :rem 136
7392 DATA32,66,79,79,84,69,68,46 :rem 135
7400 DATA13,17,32,77,65,88,73,77 :rem 107
7408 DATA85,77,32,76,69,78,71,84 :rem 128
7416 DATA72,32,61,32,49,54,13,67 :rem 97
7424 DATA72,65,82,65,67,84,69,82 :rem 122
7432 DATA83,46,17,17,13,147,17,80:rem 147
7440 DATA76,65,67,69,32,78,69,87 :rem 131
7448 DATA76,89,32,70,79,82,77,65 :rem 130
7456 DATA84,84,69,68,13,32,68,73 :rem 122
7464 DATA83,75,32,73,78,32,68,73 :rem 117
7472 DATA83,75,32,68,82,73,86,69 :rem 125
7480 DATA44,13,84,72,69,78,32,80 :rem 109
7488 DATA82,69,83,83,32,70,49,46 :rem 123
7496 DATA17,13,147,17,32,69,78,84:rem 167
7504 DATA69,82,32,78,65,77,69,32 :rem 120
7512 DATA79,70,32,66,79,79,84,13 :rem 117
7520 DATA80,82,79,71,46,32,157,84:rem 158
7528 DATA72,69,78,32,80,82,69,83 :rem 124
7536 DATA83,13,82,69,84,85,82,78 :rem 125
7544 DATA46,17,13,32,77,65,88,73 :rem 112
7552 DATA77,85,77,32,76,69,78,71 :rem 130
7560 DATA84,72,32,61,32,49,54,13 :rem 96
7568 DATA32,67,72,65,82,65,67,84 :rem 124
7576 DATA69,82,83,46,17,17,13,147:rem 165
7584 DATA17,32,18,84,85,82,78,32 :rem 115
7592 DATA67,79,77,80,85,84,69,82 :rem 138
7600 DATA32,79,70,70,47,79,78,13 :rem 108
7608 DATA84,79,32,82,69,83,69,84 :rem 131
7616 DATA32,86,69,67,84,79,82,83 :rem 130

```

MLX

(Article on page 167.)

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: MLX—VIC Version

```

10 REM LINES CHANGED FROM VIC MLX VERSION
   2.00 ARE 581,582,765 :rem 166
100 PRINT "{CLR}{PUR}";CHR$(142);CHR$(8);
   :rem 181
101 POKE 788,194:REM DISABLE RUN/STOP
   :rem 174

```



```

110 PRINT"[RVS]{14 SPACES}" :rem 117
120 PRINT"[RVS]{RIGHT}[OFF]{*}[RVS]
[RVS]{RIGHT}[RIGHT]{2 SPACES}*}[OFF]{*}
[RVS]{RVS}" :rem 191
130 PRINT"[RVS]{RIGHT}[G]{RIGHT}
{2 RIGHT}[OFF]{RVS}*}[OFF]{*}
[RVS]" :rem 232
140 PRINT"[RVS]{14 SPACES}" :rem 120
200 PRINT"[2 DOWN]{PUR}[BLK]MACHINE LANGU
AGE":PRINT"EDITOR VER 2.02{5 DOWN}"
:rem 192
210 PRINT"[BLK]{3 UP}STARTING ADDRESS":IN
PUTS:F=1-F:C$=CHR$(31+119*F) :rem 97
220 IFS<256ORS>32767THENGOSUB3000:GOTO210
:rem 2
225 PRINT:PRINT:PRINT:PRINT :rem 123
230 PRINT"[BLK]{3 UP}ENDING ADDRESS":INPU
TE:F=1-F:C$=CHR$(31+119*F) :rem 158
240 IFE<256ORE>32767THENGOSUB3000:GOTO230
:rem 234
250 IFE<STHENPRINTC$;"[RVS]ENDING < START
{2 SPACES}":GOSUB1000:GOTO 230
:rem 176
260 PRINT:PRINT:PRINT :rem 179
300 PRINT"[CLR]";CHR$(14):AD=S :rem 56
310 A=1:PRINTRIGHT$( "0000"+MID$(STR$(AD),
2),5);":": :rem 33
315 FOR J=A TO 6 :rem 33
320 GOSUB570:IFN=-1 THENJ=J+N:GOTO320
:rem 228
390 IFN=-211 THEN 710 :rem 62
400 IFN=-204 THEN 790 :rem 64
410 IFN=-206 THENPRINT:INPUT"[DOWN]ENTER N
EW ADDRESS";ZZ :rem 44
415 IFN=-206 THENIFZZ<SORZZ>ETHENPRINT"
[RVS]OUT OF RANGE":GOSUB1000:GOTO410
:rem 225
417 IFN=-206 THENAD=ZZ:PRINT:GOTO310
:rem 238
420 IF N<>-196 THEN 480 :rem 133
430 PRINT:INPUT"DISPLAY:FROM";F:PRINT,"TO
";:INPUTT :rem 234
440 IFF<SORF>EORT<SORT>ETHENPRINT"AT LEAS
T";S;"[LEFT], NOT MORE THAN";E:GOTO43
0 :rem 159
450 FORI=FTOTSTEP6:PRINT:PRINTRIGHT$( "000
0"+MID$(STR$(I),2),5);":": :rem 30
455 FORK=0TO5:N=PEEK(I+K):IFK=3THENPRINTS
PC(10); :rem 34
457 PRINTRIGHT$( "00"+MID$(STR$(N),2),3);"
,"; :rem 157
460 GETA$: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$(18);:GOSUB570:PRINTCHR$(146
); :rem 94
511 IFN=-1 THENA=6:GOTO315 :rem 254
515 PRINTCHR$(20):IFN=CKSUM THEN530
:rem 122
520 PRINT:PRINT"LINE ENTERED WRONG":PRINT
"RE-ENTER":PRINT:GOSUB1000:GOTO310
:rem 129
530 GOSUB2000 :rem 218
540 FORI=1TO6:POKEAD+I-1,A(I):NEXT:rem 80
550 AD=AD+6:IF AD<E THEN 310 :rem 212
560 GOTO 710 :rem 108
570 N=0:Z=0 :rem 88
580 PRINT"[+]" :rem 79
581 GETA$:IFA$=" THEN581 :rem 95
582 AV=- (A$="M")-2*(A$="," )-3*(A$="." )-4*
(A$="J")-5*(A$="K")-6*(A$="L"):rem 41
583 AV=AV-7*(A$="U")-8*(A$="I")-9*(A$="O"
):IFA$="H" THENA$="0" :rem 134
584 IFAV<0 THENA$=CHR$(48+AV) :rem 134
585 PRINTCHR$(20);:A=ASC(A$):IFA=13ORA=44
ORA=32 THEN670 :rem 229
590 IFA>128 THENN=-A:RETURN :rem 137
600 IFA<20 THEN 630 :rem 10
610 PRINTCHR$(146);:GOSUB690:IFI=1ANDT=44
THENN=-1:PRINT"[LEFT] [LEFT]";:GOTO69
0 :rem 155
620 GOTO570 :rem 109
630 IFA<48ORA>57 THEN580 :rem 105
640 PRINTA$;:N=N*10+A-48 :rem 106
650 IFN>255 THEN A=20:GOSUB1000:GOTO600
:rem 229
660 Z=Z+1:IFZ<3 THEN580 :rem 71
670 IFZ=0 THENGOSUB1000:GOTO570 :rem 114
680 PRINT",";:RETURN :rem 240
690 S$=PEEK(209)+256*PEEK(210)+PEEK(211)
:rem 149
692 FORI=1TO3:T=PEEK(S%-I) :rem 68
695 IFT<>44ANDT<>58 THENPOKES%-I,32:NEXT
:rem 205
700 PRINTLEFT$("[3 LEFT]",I-1);:RETURN
:rem 7
710 PRINT"[CLR]{RVS}*** SAVE ***{3 DOWN}"
:rem 236
720 F$="":INPUT"[DOWN] FILENAME";F$:IFF$=
"" THEN310 :rem 128
730 PRINT:PRINT"[2 DOWN]{RVS}T[OFF]APE OR
[RVS]D[OFF]ISK: (T/D)" :rem 228
740 GETA$:IFA$<>"T"ANDAS$<>"D" THEN740
:rem 36
750 DV=1-7*(A$="D"):IFDV=8 THENF$="0:"+F$:
OPEN15,8,15,"S"+F$:CLOSE15 :rem 212
760 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
):POKE782,ZK/256 :rem 3
762 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
T$):SYS65469 :rem 109
763 POKE780,1:POKE781,DV:POKE782,1:SYS654
66 :rem 69
765 K=S:POKE254,K/256:POKE253,K-PEEK(254)
*256:POKE780,253 :rem 17
766 K=E+1:POKE782,K/256:POKE781,K-PEEK(78
2)*256:SYS65496 :rem 235
770 IF(PEEK(783)AND1)OR(191ANDST) THEN780
:rem 111
775 PRINT"[DOWN]DONE.":GOTO310 :rem 96
780 PRINT"[DOWN]ERROR ON SAVE.{2 SPACES}T
RY AGAIN.":IFDV=1 THEN720 :rem 171
781 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTEL$
;E2$:CLOSE15:GOTO720 :rem 103
782 GOTO720 :rem 115
790 PRINT"[CLR]{RVS}*** LOAD ***{2 DOWN}"
:rem 212
800 F$="":INPUT"[2 DOWN] FILENAME";F$:IFF
$="" THEN310 :rem 144
810 PRINT:PRINT"[2 DOWN]{RVS}T[OFF]APE OR
[RVS]D[OFF]ISK: (T/D)" :rem 227
820 GETA$:IFA$<>"T"ANDAS$<>"D" THEN820
:rem 34
830 DV=1-7*(A$="D"):IFDV=8 THENF$="0:"+F$:
:rem 157
840 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
):POKE782,ZK/256 :rem 2

```



```

841 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    TS):SYS65469 :rem 107
845 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66 :rem 70
850 POKE780,0:SYS65493 :rem 11
860 IF(PEEK(783)AND1)OR(191ANDST)THEN870
    :rem 111
865 PRINT"[DOWN]DONE.":GOTO310 :rem 96
870 PRINT"[DOWN]ERROR ON LOAD.{2 SPACES}T
    RY AGAIN.{DOWN}":IFDV=1THEN800
    :rem 172
880 OPEN15,8,15:INPUT#15,E1$,E2$:PRINT E1$
    ;E2$:CLOSE15:GOTO800 :rem 102
1000 REM BUZZER :rem 135
1001 POKE36878,15:POKE36874,190 :rem 206
1002 FORW=1TO300:NEXTW :rem 117
1003 POKE36878,0:POKE36874,0:RETURN
    :rem 74
2000 REM BELL SOUND :rem 78
2001 FORW=15TO0STEP-1:POKE36878,W:POKE368
    76,240:NEXTW :rem 22
2002 POKE36876,0:RETURN :rem 119
3000 PRINTC$;"{RVS}NOT ZERO PAGE OR ROM":
    GOTO1000 :rem 89

```

Program 2: MLX—64 Version

```

10 REM LINES CHANGED FROM MLX VERSION 2.0
    0 ARE 750,765,770 AND 860 :rem 50
20 REM LINE CHANGED FROM MLX VERSION 2.01
    IS 300 :rem 147
100 PRINT"[CLR]{6}";CHR$(142);CHR$(8);:PO
    KE53281,1:POKE53280,1 :rem 67
101 POKE 788,52:REM DISABLE RUN/STOP
    :rem 119
110 PRINT"[RVS]{39 SPACES}"; :rem 176
120 PRINT"[RVS]{14 SPACES}{RIGHT}{OFF}{*}
    {RVS}{RIGHT}{RIGHT}{2 SPACES}{*}
    {OFF}{*}{RVS}{14 SPACES}";
    :rem 250
130 PRINT"[RVS]{14 SPACES}{RIGHT}{G}
    {RIGHT}{2 RIGHT}{OFF}{RVS}{*}
    {OFF}{*}{RVS}{14 SPACES}"; :rem 35
140 PRINT"[RVS]{41 SPACES}" :rem 120
200 PRINT"[2 DOWN]{PUR}{BLK} MACHINE LANG
    UAGE EDITOR VERSION 2.02{5 DOWN}"
    :rem 238
210 PRINT"[5]{2 UP}STARTING ADDRESS?
    {8 SPACES}{9 LEFT}"; :rem 143
215 INPUTS:F=1-F:C$=CHR$(31+119*F)
    :rem 166
220 IFS<256OR(S>40960ANDS<49152)ORS>53247
    THENGOSUB3000:GOTO210 :rem 235
225 PRINT:PRINT:PRINT :rem 180
230 PRINT"[5]{2 UP}ENDING ADDRESS?
    {8 SPACES}{9 LEFT}";:INPUTE:F=1-F:C$=
    CHR$(31+119*F) :rem 20
240 IFE<256OR(E>40960ANDE<49152)ORE>53247
    THENGOSUB3000:GOTO230 :rem 183
250 IFE<STHENPRINTC$;"{RVS}ENDING < START
    {2 SPACES}":GOSUB1000:GOTO 230
    :rem 176
260 PRINT:PRINT:PRINT :rem 179
300 PRINT"[CLR]";CHR$(14):AD=S :rem 56
310 A=1:PRINTRIGHT$("0000"+MID$(STR$(AD),
    2),5);":": :rem 33
315 FORJ=ATO6 :rem 33
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$(146
    ); :rem 94
511 IFN=-1THENA=6:GOTO315 :rem 254
515 PRINTCHR$(20):IFN=CKSUMTHEN530
    :rem 122
520 PRINT:PRINT"LINE ENTERED WRONG : RE-E
    NTER":PRINT:GOSUB1000:GOTO310:rem 176
530 GOSUB2000 :rem 218
540 FORI=1TO6:POKEAD+I-1,A(I):NEXT:POKE54
    272,0:POKE54273,0 :rem 227
550 AD=AD+6:IF AD<E THEN 310 :rem 212
560 GOTO 710 :rem 108
570 N=0:Z=0 :rem 88
580 PRINT"[*]"; :rem 81
581 GETA$:IFA$="THEN581 :rem 95
582 AV=-(A$="M")-2*(A$="")-3*(A$=".")-4*
    (A$="J")-5*(A$="K")-6*(A$="L"):rem 41
583 AV=AV-7*(A$="U")-8*(A$="I")-9*(A$="O"
    ):IFA$="H"THENA$="0" :rem 134
584 IFAV>0THENA$=CHR$(48+AV) :rem 134
585 PRINTCHR$(20);:A=ASC(A$):IFA=13ORA=44
    ORA=32THEN670 :rem 229
590 IFA>128THENN=-A:RETURN :rem 137
600 IFA<>20 THEN 630 :rem 10
610 GOSUB690:IFI=1ANDT=44THENN=-1:PRINT"
    {OFF}{LEFT}{LEFT}";:GOTO690 :rem 62
620 GOTO570 :rem 109
630 IFA<48ORA>57THEN580 :rem 105
640 PRINTA$;: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
715 PRINT"[2 DOWN]{PRESS {RVS}RETURN{OFF}
    ALONE TO CANCEL SAVE}{DOWN}":rem 106

```


Machine Language For Beginners

(Article on page 116.)

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.

VIC/64 Assembler

```

10 H=0:REM IF H = 1 THEN ASSEMBLY IS IN H
   EX                                     :rem 32
50 HES="0123456789ABCDEF":SZ=1:ZO$="000"
                                           :rem 166
100 PRINT"[3 SPACES]SIMPLE[3 SPACES]ASSEM
    BLER[2 SPACES]CONVENTIONS:"       :rem 90
110 DIMM$(56),TY(56),OP(56)           :rem 181
120 FORI=1TO56:READM$(I)               :rem 160
122 ROP$=MID$(M$(I),4,1):TY(I)=VAL(ROP$)
                                           :rem 5
124 OP$=RIGHT$(M$(I),3):OP(I)=VAL(OP$)
                                           :rem 155
126 M$(I)=LEFT$(M$(I),3)               :rem 235
140 NEXTI:PRINT                        :rem 228
150 PRINT"IMMEDIATE[5 SPACES]LDA #15
                                           :rem 46
155 PRINT"ABSOLUTE[6 SPACES]LDA 1500
                                           :rem 64
160 PRINT"ZERO PAGE[5 SPACES]LDA 15
                                           :rem 218
165 PRINT"ACCUMULATOR[3 SPACES]ASL
                                           :rem 107
170 PRINT"INDIRECT X[4 SPACES]LDA (15X)
                                           :rem 209
175 PRINT"INDIRECT Y[4 SPACES]LDA (15)Y
                                           :rem 216
177 PRINT"ZERO PAGE X[3 SPACES]LDA 15X
                                           :rem 146
179 PRINT"ZERO PAGE Y[3 SPACES]LDX 15Y
                                           :rem 173
180 PRINT"ABSOLUTE X[4 SPACES]LDA 1500X
                                           :rem 238
185 PRINT"ABSOLUTE Y[4 SPACES]LDA 1500Y
                                           :rem 245
189 PRINT:PRINT"[4 SPACES]ENTER ALL NUMBE
    RS IN ";                             :rem 127
190 IFH=1 THENPRINT"HEX":GOTO200       :rem 201
195 PRINT"DECIMAL"                     :rem 95
200 PRINT:PRINT"PLEASE INPUT STARTING ADD
    RESS FOR ML PROGRAM":INPUT SA$:rem 0
210 IFH=1THENH$=SA$:GOSUB5000:SA=DE:GOTO2
    20                                     :rem 130
215 SA=VAL(SA$)                         :rem 85
220 TA=SA:PRINT"[CLR]":REM CLEAR THE SCRE
    EN                                     :rem 190
230 IFH=1THENDE=SA:SZ=3:GOSUB4000:PRINTH$
    ;:GOTO240                             :rem 175
235 PRINTSA" ";                         :rem 58
240 INPUTMN$:PRINT"[UP]"SPC(20);:REM GO U
    P ONE LINE AND OVER 20 SPACES:rem 232
241 REM ADD NEW PSEUDO-OPS HERE         :rem 65
242 IFRIGHT$(MN$,7)="FORWARD"THENFB=SA
                                           :rem 90

```

```

720 F$="":INPUT"[DOWN] FILENAME";F$:IFF$=
    "THENPRINT:PRINT:GOTO310           :rem 71
730 PRINT:PRINT"[2 DOWN]{RVS}T[OFF]APE OR
    {RVS}D[OFF]ISK: (T/D)"           :rem 228
740 GETA$:IFA$<>"T"ANDAS$<>"D"THEN740
                                           :rem 36
750 DV=1-7*(A$="D"):IFDV=8THENF$="0:"F$:
    OPEN15,8,15,"S"+F$:CLOSE15       :rem 212
760 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$)
    ):POKE782,ZK/256                   :rem 3
762 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                       :rem 109
763 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                                 :rem 69
765 K=S:POKE254,K/256:POKE253,K-PEEK(254)
    *256:POKE780,253                 :rem 17
766 K=E+1:POKE782,K/256:POKE781,K-PEEK(78
    2)*256:SYS65496                   :rem 235
770 IF(PEEK(783)AND1)OR(191ANDST)THEN780
                                           :rem 111
775 PRINT"[DOWN]DONE.{DOWN}":GOTO310
                                           :rem 113
780 PRINT"[DOWN]ERROR ON SAVE.{2 SPACES}T
    RY AGAIN.":IFDV=1THEN720          :rem 171
781 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO720             :rem 103
790 PRINT"[CLR]{RVS}*** LOAD ***{2 DOWN}"
                                           :rem 212
795 PRINT"[2 DOWN]{PRESS {RVS}RETURN{OFF}
    ALONE TO CANCEL LOAD)"           :rem 82
800 F$="":INPUT"[2 DOWN] FILENAME";F$:IFF
    $="THENPRINT:GOTO310             :rem 144
810 PRINT:PRINT"[2 DOWN]{RVS}T[OFF]APE OR
    {RVS}D[OFF]ISK: (T/D)"           :rem 227
820 GETA$:IFA$<>"T"ANDAS$<>"D"THEN820
                                           :rem 34
830 DV=1-7*(A$="D"):IFDV=8THENF$="0:"F$:
                                           :rem 157
840 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$)
    ):POKE782,ZK/256                 :rem 2
841 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                     :rem 107
845 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                                 :rem 70
850 POKE780,0:SYS65493                :rem 11
860 IF(PEEK(783)AND1)OR(191ANDST)THEN870
                                           :rem 111
865 PRINT"[DOWN]DONE.":GOTO310         :rem 96
870 PRINT"[DOWN]ERROR ON LOAD.{2 SPACES}T
    RY AGAIN.{DOWN}":IFDV=1THEN800
                                           :rem 172
880 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO800             :rem 102
1000 REM BUZZER                         :rem 135
1001 POKE54296,15:POKE54277,45:POKE54278,
    165                               :rem 207
1002 POKE54276,33:POKE 54273,6:POKE54272,
    5                                   :rem 42
1003 FORT=1TO200:NEXT:POKE54276,32:POKE54
    273,0:POKE54272,0:RETURN         :rem 202
2000 REM BELL SOUND                     :rem 78
2001 POKE54296,15:POKE54277,0:POKE54278,2
    47                                 :rem 152
2002 POKE 54276,17:POKE54273,40:POKE54272
    ,0                                   :rem 86
2003 FORT=1TO100:NEXT:POKE54276,16:RETURN
                                           :rem 57
3000 PRINTC$;"{RVS}NOT ZERO PAGE OR ROM":
    GOTO1000                           :rem 89

```



```

243 IFRIGHT$(MN$,7)="RESOLVE"THENFR=SA-FB
:POKEFB+1,FR-2:PRINT"[2 SPACES]OK":GO
TO230 :rem 72
244 IFRIGHT$(MN$,4)="POKE"THENPRINT"ADDR,
NUMBER(DEC)":;INPUTADR,NUM:POKEADR,NU
M:GOTO230 :rem 116
250 IFMN$="END"THENPRINT:PRINT"[6 SPACES]
PROGRAM IS FROM"TA"TO"SA:END :rem 13
260 L=LEN(MN$):L$=LEFT$(MN$,3) :rem 181
270 FORI=1TO56:IFL$=M$(I)THEN300 :rem 136
280 NEXTI :rem 34
290 GOTO850 :rem 113
300 REM PRIMARY OPCODE CATEGORIES :rem 59
301 TY=TY(I):OP=OP(I) :rem 20
305 IFFB=SATHENTN=0:GOTO2010 :rem 244
310 IFTY=0THENGOTO1000 :rem 102
320 IFTY=3THENTY=1:IFL=3THENOP=OP+8:GOTO1
000 :rem 81
330 R$=RIGHT$(MN$,L-4):IFH=1THENGOSUB6000
:rem 200
340 LR$=LEFT$(R$,1):LL=LEN(R$):IFLR$="#T
HEN480 :rem 184
350 IFLR$="( "THEN520 :rem 88
360 IFTY=8THEN600 :rem 15
370 IFTY=3THENOP=OP+8:GOTO1000 :rem 135
380 IFRIGHT$(R$,1)="X"ORRIGHT$(R$,1)="Y"
HEN630 :rem 210
390 IFLEFT$(L$,1)="J"THEN820 :rem 44
400 TN=VAL(R$):IFTN>255THEN430 :rem 40
410 IFTY=1ORTY=3ORTY=4ORTY=5THENOP=OP+4
:rem 133
420 GOTO2000 :rem 145
430 H$=TN/256:L$=TN-256*H$:IFTY=2ORTY=7TH
ENOP=OP+8:GOTO470 :rem 92
440 IFTY=1ORTY=3ORTY=4ORTY=5THENOP=OP+12:
GOTO470 :rem 197
450 IFTY=6ORTY=9THEN470 :rem 214
460 GOTO850 :rem 112
470 GOTO3000 :rem 151
480 TN=VAL(RIGHT$(R$,LL-1)) :rem 58
490 IFTY=1THENOP=OP+8:GOTO2000 :rem 137
500 IFTY=4ORTY=5THENGOTO2000 :rem 44
510 GOTO850 :rem 108
520 IFRIGHT$(R$,2)="Y"THEN540 :rem 184
530 IFRIGHT$(R$,2)="X"THEN570 :rem 187
540 TN=VAL(MID$(R$,2,LL-3)) :rem 243
550 IFTY=1THENOP=OP+16:GOTO2000 :rem 181
560 GOTO850 :rem 113
570 TN=VAL(MID$(R$,2,LL-3)) :rem 246
580 IFTY=1THENGOTO2000 :rem 113
590 GOTO850 :rem 116
600 TN=VAL(R$):TN=TN-SA-2:IFTN<-128ORTN>1
27THENPRINT"TOO FAR":;GOTO850 :rem 154
610 IFTN<0THENTN=TN+256 :rem 172
620 GOTO2000 :rem 147
630 IFRIGHT$(R$,2)="Y"THEN540 :rem 186
640 IFRIGHT$(R$,1)="X"THEN720 :rem 144
650 REM *ZERO Y :rem 66
660 TN=VAL(LEFT$(R$,LL-1)):IFTN>255THEN68
0 :rem 249
670 IFTY=2ORTY=5THEN730 :rem 209
675 IFTY=1THEN760 :rem 24
680 GOSUB770:IFTY=1THENOP=OP+24:GOTO710
:rem 230
690 IFTY=5THENOP=OP+28:GOTO710 :rem 151
700 GOTO850 :rem 109
710 GOTO3000 :rem 148
720 TN=VAL(LEFT$(R$,LL-1)):IFTN>255THENG
O
SUB770:GOTO780 :rem 136
730 IFTY=2THENOP=OP+16:GOTO760 :rem 145
740 IFTY=1ORTY=3ORTY=5THENOP=OP+20:GOTO76
0 :rem 10
750 GOTO850 :rem 114
760 GOTO2000 :rem 152
770 H$=TN/256:L$=TN-256*H$:RETURN:rem 187
780 IFTY=2THENOP=OP+24:GOTO810 :rem 145
790 IFTY=1ORTY=3ORTY=5THENOP=OP+28:GOTO81
0 :rem 19
800 GOTO850 :rem 110
810 GOTO3000 :rem 149
820 TN=VAL(R$) :rem 35
830 GOSUB770 :rem 185
840 GOTO710 :rem 109
850 PRINT"[RVS] ERROR ":GOTO230 :rem 18
1000 REM 1 BYTE INSTRUCTIONS :rem 191
1010 POKESA,OP:SA=SA+1:IFH=1THEN 1030
:rem 189
1020 PRINTOP:GOTO230 :rem 247
1030 DE = OP:GOSUB4000:PRINTH$:GOTO230
:rem 226
2000 REM 2 BYTE INSTRUCTIONS :rem 193
2005 IFTN>256THENPRINT" INCORRECT ARGUMEN
T. (#5 IN HEX IS #05)":GOTO230
:rem 94
2010 POKESA,OP:POKESA+1,TN:SA=SA+2:IFH=1T
HEN2030 :rem 231
2020 PRINTOP,TN:GOTO230 :rem 213
2030 DE = OP:GOSUB4000:PRINTH$":;rem 90
2040 DE = TN:GOSUB4000:PRINTH$:GOTO230
:rem 231
3000 REM 3 BYTE INSTRUCTIONS :rem 195
3010 POKESA,OP:POKESA+1,L$:POKESA+2,H$:SA
=SA+3:IFH=1THEN3030 :rem 172
3020 PRINTOP,L$:H$:GOTO230 :rem 77
3030 DE = OP:GOSUB4000:PRINTH$":;rem 91
3040 DE = L$:GOSUB4000:PRINTH$":;rem 46
3050 DE = H$:GOSUB4000:PRINTH$:GOTO230
:rem 180
4000 REM[2 SPACES]DECIMAL TO HEX (DE TO H
$) :rem 8
4010 H$="":FORM=SZTO0STEP-1:N$=DE/(16↑M):
DE=DE-N$*16↑M:H$=H$+MID$(HE$,N$+1,1)
:rem 179
4020 NEXT:SZ=1:RETURN :rem 116
5000 REM[2 SPACES]HEX TO DECIMAL (H$ TO D
E) :rem 9
5010 D=0:Q=3:FORM=1TO4:FORW=0TO15:IFMID$(
H$,M,1)=MID$(HE$,W+1,1)THEN5030
:rem 221
5020 NEXTW :rem 93
5030 D1=W*(16↑(Q)):D=D+D1:Q=Q-1:NEXTM:DE=
INT(D):RETURN :rem 41
6000 REM ACCEPT HEX OPCODE INPUT AND TRAN
SLATE IT TO DECIMAL :rem 57
6010 IFLEFT$(R$,1)="#"THENH$="00"+RIGHT$(
R$,2):GOSUB5000:R$="#"+STR$(DE):RETU
RN :rem 234
6020 LS=LEN(R$):AZ$=LEFT$(R$,1):ZA$=MID$(
R$,LS,1):IFAZ$<>"("THEN6050 :rem 126
6030 IFZA$="Y"THENH$="00"+MID$(R$,2,2):GO
SUB5000:R$="("+STR$(DE)+")Y":RETURN
:rem 30
6040 IFZA$=")"THENH$="00"+MID$(R$,2,2):GO
SUB5000:R$="("+STR$(DE)+")X":RETURN
:rem 238
6050 IFZA$="X"ORZA$="Y"THEN6070 :rem 40
6060 H$=LEFT$(ZA$,4-LS)+R$:GOSUB5000:R$=S
TR$(DE):RETURN :rem 30
6070 IFLS=5THENH$=LEFT$(R$,4):GOTO6090
:rem 253
6080 H$="00"+LEFT$(R$,2) :rem 186

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6090 GOSUB5000:R$=STR$(DE)+ZA$:RETURN
:rem 252
20000 DATAADC1097,AND1033,ASL3002,BCC8144
,BCS8176,BEQ8240,BIT7036,BMI8048
:rem 96
20010 DATABNES208,BPL8016,BRK0000,BVC8080
,BVS8112,CLC0024,CLD0216,CLI0088
:rem 114
20020 DATACLV0184,CMP1193,CPX4224,CPY4192
,DEC2198,DEX0202,DEY0136,EOR1065
:rem 184
20030 DATAINC2230,INX0232,INY0200,JMP6076
,JSR9032,LDA1161,LDX5162,LDY5160
:rem 200
20040 DATALSR3066,NOP0234,ORA1001,PHA0072
,PHP0008,PLA0104,PLP0040,ROL3034
:rem 185
20050 DATAROR3098,RTI0064,RTS0096,SBC1225
,SEC0056,SED0248,SEI0120,STAL129
:rem 216
20060 DATASTX2134,STY2132,TAX0170,TAY0168
,TSX0186,TXA0138,TXS0154,TYA0152
:rem 79

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Telecommunications Software

(Article on page 38.)

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.

C/G Term For VIC And 64

(NOTE: VIC users must replace the last three lines of this listing as noted in the corresponding article.)

```

4609 :011,008,010,000,158,052,240
4615 :054,050,049,000,000,000,160
4621 :032,231,255,162,000,142,067
4627 :255,043,169,000,133,251,102
4633 :169,044,133,252,172,255,026
4639 :043,169,000,145,251,032,159
4645 :251,029,174,255,043,224,245
4651 :204,208,239,166,252,224,056
4657 :046,144,233,162,000,142,008
4663 :255,043,032,110,041,169,193
4669 :006,141,147,002,173,239,001
4675 :043,201,022,208,008,169,206
4681 :032,141,018,145,076,085,058
4687 :018,169,032,141,003,221,151
4693 :169,002,162,002,160,255,067
4699 :032,186,255,169,001,162,128
4705 :147,160,002,032,189,255,114
4711 :032,192,255,032,246,040,132
4717 :032,204,255,169,163,141,049
4723 :098,039,169,043,141,099,192
4729 :039,032,086,039,169,000,230
4735 :141,131,044,032,204,255,166
4741 :032,128,041,174,131,044,171
4747 :224,000,208,013,032,204,052
4753 :255,032,228,255,201,000,092

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4759 :240,228,141,131,044,173,084
4765 :131,044,201,003,208,006,238
4771 :032,076,041,076,029,019,180
4777 :174,239,043,224,022,208,055
4783 :006,173,016,145,076,185,008
4789 :018,173,001,221,041,016,139
4795 :201,000,208,234,173,239,218
4801 :043,141,131,044,032,246,062
4807 :021,032,214,021,173,131,023
4813 :044,201,002,208,008,169,069
4819 :001,141,049,043,076,229,238
4825 :018,201,019,208,003,076,230
4831 :229,018,201,022,208,218,095
4837 :032,204,255,032,228,255,211
4843 :201,000,208,246,173,239,022
4849 :043,141,131,044,032,246,110
4855 :021,032,076,041,076,029,010
4861 :019,032,246,040,032,204,058
4867 :255,174,118,044,224,000,050
4873 :240,018,169,158,141,098,065
4879 :039,169,044,141,099,039,034
4885 :032,086,039,162,000,142,226
4891 :118,044,032,193,020,162,084
4897 :000,142,198,044,142,131,178
4903 :044,032,204,255,032,128,222
4909 :041,174,131,044,224,000,147
4915 :208,010,032,228,255,141,157
4921 :131,044,201,000,240,051,212
4927 :162,001,142,198,044,173,015
4933 :131,044,201,028,176,036,173
4939 :201,013,240,032,201,020,014
4945 :240,028,201,020,144,006,208
4951 :032,000,021,076,018,022,000
4957 :201,017,176,014,201,014,204
4963 :240,010,201,005,240,006,033
4969 :032,000,021,076,018,022,018
4975 :076,148,019,032,204,255,077
4981 :162,002,032,198,255,032,030
4987 :228,255,201,000,240,159,182
4993 :141,131,044,032,238,020,223
4999 :174,189,044,224,000,208,206
5005 :228,032,204,255,076,068,236
5011 :019,173,131,044,201,147,094
5017 :208,008,169,000,141,131,042
5023 :044,076,037,020,174,198,196
5029 :044,224,000,240,123,173,201
5035 :131,044,201,134,208,024,145
5041 :174,239,043,224,022,208,063
5047 :006,032,175,041,076,193,194
5053 :019,238,032,208,169,000,087
5059 :141,131,044,076,037,020,132
5065 :201,138,208,024,174,239,161
5071 :043,224,022,208,006,032,230
5077 :200,041,076,221,019,238,240
5083 :033,208,169,000,141,131,133
5089 :044,076,037,020,201,139,230
5095 :208,013,169,001,141,117,112
5101 :044,169,000,141,131,044,254
5107 :076,037,020,201,135,208,152
5113 :014,234,234,234,234,234,153
5119 :234,169,000,141,131,044,206
5125 :076,037,020,201,136,208,171
5131 :011,234,234,234,234,234,168
5137 :234,169,000,141,131,044,224
5143 :201,140,208,010,162,001,233
5149 :142,114,044,169,000,141,127
5155 :131,044,032,224,020,173,147
5161 :131,044,201,000,208,003,116
5167 :076,136,020,173,198,044,182
5173 :201,001,208,031,032,204,218

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 5185 :173,131,044,032,210,255,142
 5191 :032,238,020,174,189,044,000
 5197 :224,000,208,240,174,049,204
 5203 :043,224,001,240,042,173,038
 5209 :131,044,201,004,208,015,180
 5215 :174,198,044,224,000,208,175
 5221 :028,169,000,141,131,044,102
 5227 :076,205,030,032,204,255,141
 5233 :173,131,044,032,210,255,190
 5239 :173,131,044,201,034,208,142
 5245 :004,169,000,133,212,234,109
 5251 :234,234,234,234,234,174,195
 5257 :117,044,224,000,240,016,010
 5263 :162,000,142,117,044,032,128
 5269 :204,255,169,147,032,210,142
 5275 :255,076,190,020,174,011,113
 5281 :044,224,000,240,011,162,074
 5287 :000,142,011,044,032,000,140
 5293 :021,076,126,035,174,114,207
 5299 :044,224,000,240,006,032,213
 5305 :000,021,076,252,023,076,121
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 5317 :024,165,210,109,240,043,220
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 5329 :073,128,145,209,177,243,160
 5335 :141,191,044,173,134,002,132
 5341 :145,243,096,164,211,177,233
 5347 :209,073,128,145,209,173,140
 5353 :191,044,145,243,096,032,216
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 5365 :044,096,032,183,255,041,128
 5371 :064,141,189,044,096,032,049
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 5413 :010,010,010,141,151,044,147
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 5425 :032,204,255,169,000,032,229
 5431 :144,255,169,128,032,144,159
 5437 :255,169,003,162,008,160,050
 5443 :000,032,186,255,169,007,204
 5449 :162,020,160,043,032,189,167
 5455 :255,169,000,162,060,160,117
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 5467 :039,174,118,044,224,000,178
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 5527 :145,044,206,145,044,206,173
 5533 :145,044,174,145,044,189,130
 5539 :060,045,141,000,044,238,179
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 5551 :060,045,141,001,044,096,050
 5557 :173,150,044,201,058,144,183
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 5569 :141,150,044,076,204,021,061
 5575 :041,015,141,150,044,173,251
 5581 :150,044,013,151,044,141,236
 5587 :150,044,096,032,183,255,203

5593 :032,204,255,162,002,032,136
 5599 :198,255,032,207,255,201,091
 5605 :000,240,249,141,131,044,010
 5611 :032,238,020,174,189,044,164
 5617 :224,000,208,225,096,032,002
 5623 :183,255,032,204,255,162,058
 5629 :002,032,201,255,173,131,023
 5635 :044,032,210,255,032,238,046
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 5647 :208,229,096,173,131,044,128
 5653 :201,021,208,037,174,049,199
 5659 :043,224,000,208,020,174,184
 5665 :198,044,224,000,240,100,071
 5671 :162,001,142,011,044,169,056
 5677 :004,141,131,044,076,037,222
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 5689 :240,080,076,126,035,174,020
 5695 :198,044,224,001,240,070,072
 5701 :201,023,208,003,076,251,063
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 5725 :016,174,049,043,224,001,088
 5731 :208,006,032,204,255,076,112
 5737 :205,030,076,219,030,201,098
 5743 :007,208,010,174,049,043,090
 5749 :224,001,208,018,076,152,028
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 5767 :044,076,029,019,162,000,209
 5773 :142,198,044,169,000,141,067
 5779 :131,044,076,114,019,032,051
 5785 :214,021,173,131,044,201,169
 5791 :048,208,019,174,239,043,122
 5797 :224,022,208,006,032,033,178
 5803 :042,076,197,022,032,015,043
 5809 :042,076,197,022,174,239,159
 5815 :043,224,022,208,006,032,206
 5821 :042,042,076,197,022,032,088
 5827 :024,042,032,214,021,174,190
 5833 :239,043,224,022,208,006,175
 5839 :032,215,041,076,221,022,046
 5845 :173,131,044,041,015,141,246
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 5857 :239,043,224,022,208,006,199
 5863 :032,227,041,076,245,022,106
 5869 :173,131,044,041,015,141,014
 5875 :033,208,032,204,255,076,027
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 5887 :147,032,210,255,032,057,220
 5893 :040,162,000,142,145,044,026
 5899 :032,228,255,240,251,201,194
 5905 :020,208,014,174,145,044,110
 5911 :240,242,206,145,044,032,164
 5917 :210,255,076,011,023,201,037
 5923 :013,240,074,201,032,240,067
 5929 :008,201,048,144,221,201,096
 5935 :058,176,035,032,210,255,045
 5941 :174,190,044,224,000,240,157
 5947 :003,076,179,023,174,145,147
 5953 :044,157,017,044,238,145,198
 5959 :044,174,145,044,224,026,216
 5965 :208,188,032,142,042,076,253
 5971 :251,022,201,065,144,178,176
 5977 :201,091,144,213,201,097,012
 5983 :144,170,201,123,144,205,058
 5989 :201,193,144,162,201,219,197
 5995 :144,197,076,011,023,032,078
 6001 :210,255,174,190,044,224,186

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 6013 :174,145,044,169,027,157,073
 6019 :017,044,238,145,044,162,013
 6025 :000,142,143,044,174,145,017
 6031 :044,169,009,157,017,044,071
 6037 :238,145,044,174,145,044,171
 6043 :169,000,157,017,044,032,062
 6049 :068,041,032,071,040,162,063
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 6073 :238,145,044,174,145,044,207
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 6139 :035,032,246,040,174,114,124
 6145 :044,224,000,240,013,169,179
 6151 :219,141,098,039,169,043,204
 6157 :141,099,039,032,086,039,193
 6163 :032,193,020,169,000,141,062
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 6193 :228,141,131,044,173,131,129
 6199 :044,201,147,240,218,201,082
 6205 :003,208,030,173,114,044,121
 6211 :201,000,032,000,021,240,049
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 6241 :008,169,001,141,157,044,105
 6247 :076,204,024,201,137,208,185
 6253 :008,169,001,141,115,044,075
 6259 :076,204,024,201,134,208,194
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 6301 :024,238,033,208,076,204,172
 6307 :024,201,135,208,008,169,140
 6313 :001,141,188,044,076,204,055
 6319 :024,201,139,208,008,169,156
 6325 :001,141,117,044,076,204,252
 6331 :024,201,136,208,003,076,067
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 6361 :043,144,007,198,214,169,224
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 6373 :044,224,000,240,018,162,149
 6379 :000,142,115,044,174,114,056
 6385 :044,224,000,208,006,032,243
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 6397 :188,044,224,000,240,006,187
 6403 :032,000,021,076,223,031,130
 6409 :174,117,044,224,000,240,040
 6415 :013,162,000,142,117,044,237

6421 :169,147,032,210,255,076,142
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 6439 :012,044,142,114,044,032,171
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 6499 :206,132,044,174,132,044,063
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 6511 :166,252,236,241,043,208,233
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 6529 :099,039,032,086,039,174,086
 6535 :188,044,224,000,240,003,066
 6541 :076,015,029,032,204,255,240
 6547 :162,002,032,201,255,169,200
 6553 :003,032,210,255,032,238,155
 6559 :020,174,189,044,224,000,042
 6565 :208,233,032,093,041,076,080
 6571 :254,018,174,243,043,232,111
 6577 :142,120,044,173,242,043,173
 6583 :141,121,044,032,018,040,067
 6589 :032,232,040,032,089,035,137
 6595 :032,089,035,032,018,040,185
 6601 :173,244,043,141,123,044,201
 6607 :169,000,141,132,044,141,066
 6613 :133,044,141,255,043,141,202
 6619 :122,044,174,239,043,224,041
 6625 :022,208,011,169,000,133,000
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 6637 :247,025,169,000,133,253,040
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 6655 :126,044,169,000,141,127,094
 6661 :044,173,244,043,141,128,010
 6667 :044,174,125,044,134,251,015
 6673 :174,126,044,134,252,173,152
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 6697 :000,208,005,169,048,076,035
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 6721 :006,032,249,041,076,080,037
 6727 :026,173,032,208,041,015,054
 6733 :141,131,044,173,131,044,229
 6739 :009,048,172,255,043,145,243
 6745 :251,032,251,029,173,239,040
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 6757 :002,042,076,114,026,173,022
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 6769 :044,173,131,044,009,048,050
 6775 :172,255,043,145,251,032,249
 6781 :251,029,174,188,044,224,011
 6787 :001,240,058,162,000,142,222
 6793 :132,044,174,132,044,189,084
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 6805 :172,255,043,145,251,032,023
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 6817 :139,026,162,000,142,132,250
 6823 :044,174,132,044,189,077,059
 6829 :044,201,000,240,014,172,076

6835 :255,043,145,251,032,251,132
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 6847 :026,173,239,043,201,022,127
 6853 :208,009,032,002,042,173,151
 6859 :131,044,076,213,026,173,098
 6865 :033,208,041,015,141,124,003
 6871 :044,141,136,044,169,000,237
 6877 :141,132,044,173,127,044,114
 6883 :133,251,173,128,044,133,065
 6889 :252,172,245,043,177,251,093
 6895 :201,032,240,042,169,001,156
 6901 :141,010,044,169,000,141,238
 6907 :133,044,024,173,122,044,023
 6913 :109,246,043,141,122,044,194
 6919 :173,123,044,105,000,141,081
 6925 :123,044,173,247,043,141,016
 6931 :138,044,169,255,141,134,132
 6937 :044,076,158,027,169,000,243
 6943 :141,133,044,172,133,044,186
 6949 :177,251,201,032,208,057,195
 6955 :238,133,044,173,133,044,040
 6961 :205,246,043,208,236,169,132
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 6985 :000,141,123,044,173,125,167
 6991 :044,133,251,173,126,044,082
 6997 :133,252,172,255,043,169,085
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 7033 :238,133,044,173,133,044,118
 7039 :141,134,044,169,255,141,243
 7045 :138,044,024,173,122,044,166
 7051 :109,246,043,141,122,044,076
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 7087 :136,044,240,035,205,124,191
 7093 :044,240,030,170,189,051,137
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 7105 :044,134,251,174,126,044,198
 7111 :134,252,172,255,043,145,176
 7117 :251,032,251,029,165,252,161
 7123 :141,126,044,172,133,044,103
 7129 :204,134,044,208,028,173,240
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 7183 :196,044,173,197,044,024,181
 7189 :010,144,035,173,129,044,044
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 7243 :251,173,126,044,133,252,030

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 7261 :044,173,133,044,205,138,062
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 7273 :173,125,044,133,251,173,236
 7279 :126,044,133,252,184,024,106
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 7327 :158,027,173,122,044,205,120
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 7363 :021,172,255,043,174,125,217
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 7405 :134,252,172,255,043,177,246
 7411 :251,141,147,044,032,204,038
 7417 :255,162,003,032,201,255,133
 7423 :173,147,044,032,210,255,092
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 7435 :201,026,208,224,032,204,138
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 7615 :131,044,201,017,208,246,014
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 7627 :134,252,162,000,142,255,124
 7633 :043,172,255,043,177,251,126
 7639 :141,131,044,032,246,021,062
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 7753 :208,006,032,042,042,076,223
 7759 :084,030,032,024,042,032,067
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 7771 :255,032,207,255,141,131,088
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 7789 :119,030,173,131,044,041,135
 7795 :015,141,032,208,032,204,235
 7801 :255,162,003,032,198,255,002
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 7813 :174,239,043,224,022,208,019
 7819 :006,032,227,041,076,154,163
 7825 :030,173,131,044,041,015,067
 7831 :141,033,208,032,204,255,000
 7837 :162,003,032,198,255,032,071
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 7855 :173,147,044,032,210,255,012
 7861 :076,154,030,032,204,255,164
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 7915 :041,076,029,019,032,214,134
 7921 :021,173,131,044,141,152,135
 7927 :044,032,214,021,173,131,094
 7933 :044,141,153,044,032,214,113
 7939 :021,173,131,044,141,154,155
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 8047 :032,246,021,032,254,018,202
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 8113 :000,142,145,044,174,145,059
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 8155 :039,032,086,039,032,018,209
 8161 :040,032,204,255,169,238,139
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 8173 :099,039,032,086,039,032,052
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 8191 :255,201,000,208,246,032,173
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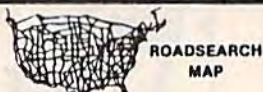
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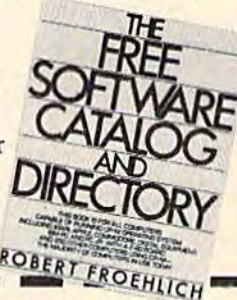
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Commodore 64 Benchmark (Sieve of Eratosthenes)

	PROMAL	BASIC	COMAL	FORTH	PASCAL
Execution Time (secs.)	30	630	490	51	55
Object Code Size (bytes)	128	255	329	181	415
Program Load Time (secs.)	3.2	3.8	6.3	11.2	23.5
Compile Time (secs.)	8.5	—	—	3.9	108

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Compiler I/O from/to disk or memory

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Function key definitions
Program abort and pause
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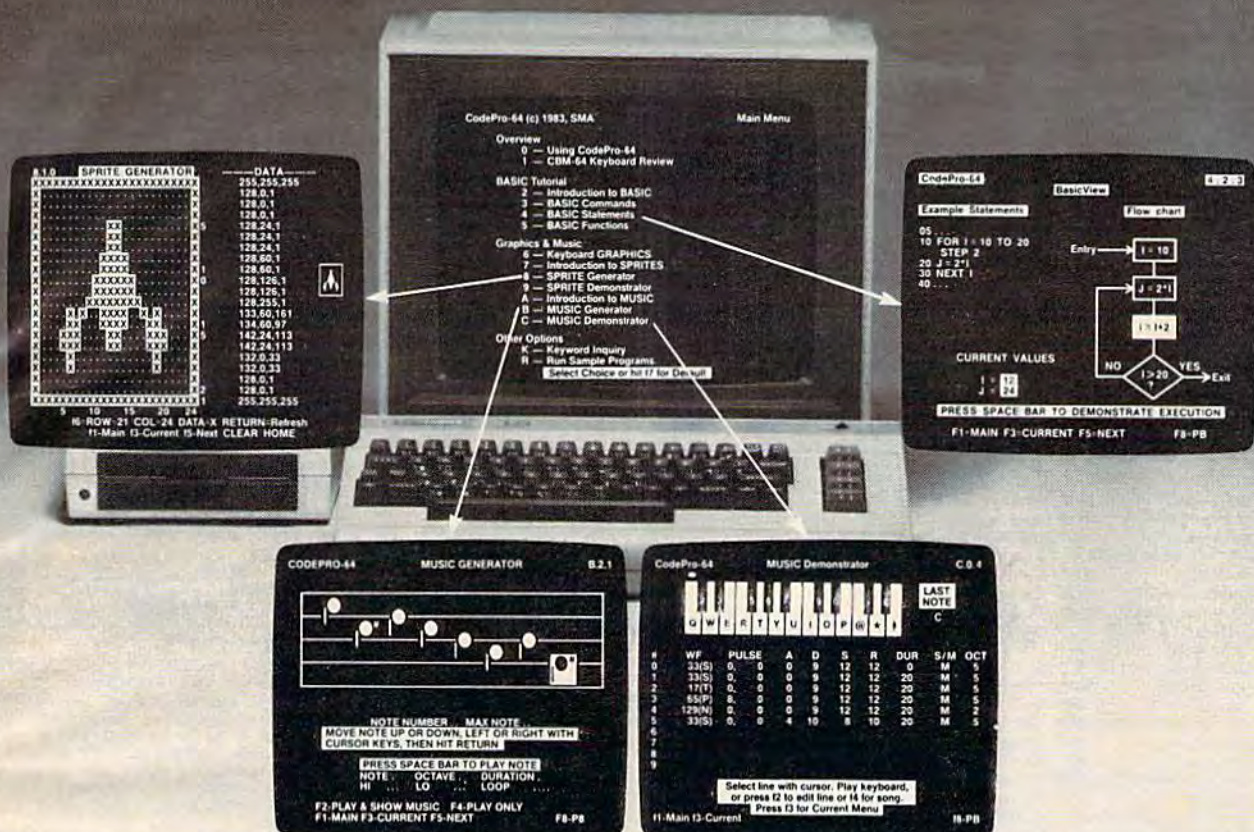
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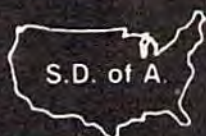
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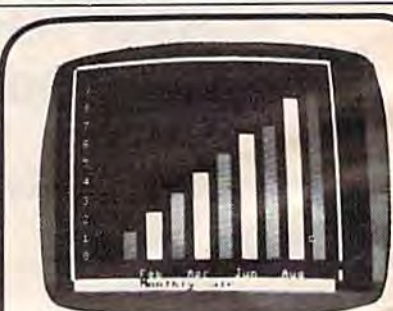
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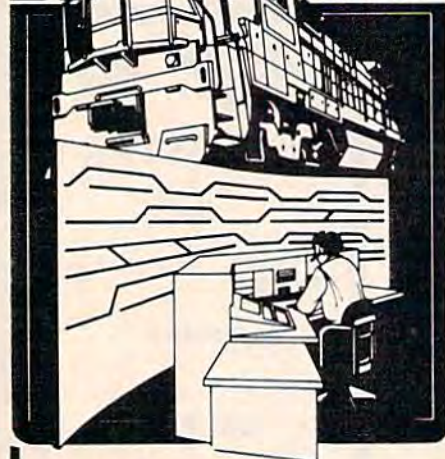


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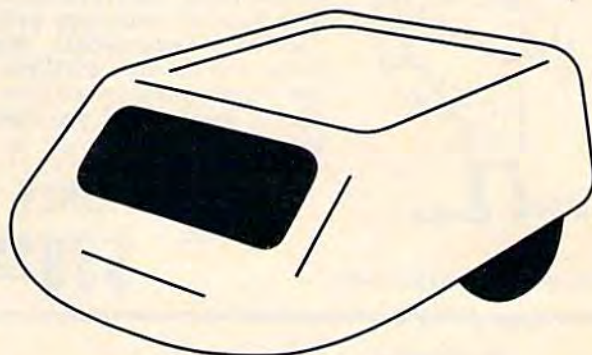
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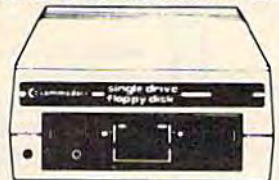
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Bug-Swatter:

Modifications And Corrections

• Programs 3 and 4 from "Disk Tricks" (September) were designed to scratch and unscratch (recover) files from a disk. Several readers have informed us that it is essential to use the Validate command after using either of these programs. OPEN 15,8,15: PRINT#15, "V0":CLOSE 15 properly validates the disk and updates the Block Allocation Map (BAM). You can validate in direct mode or from within the program, but it should be noted that this command can destroy random files (program, sequential, and relative files are safe). See the 1541 User's Manual for more information about validating.

Without this line, the scratch program will scratch a file, but not free up the disk space used by the program. More seriously, if a program is unscratched without validating the disk, subsequent SAVES can overwrite the disk space used by the program.

For corrections to program 2 (Change Disk ID) see last month's Bug-Swatter.

• "Screen-80" (September) works as listed with a 64 and disk drive. However, tape users have had problems reloading the program after using MLX. This is not a flaw in Screen-80; it happens because MLX saves ML programs as *absolute* files, the equivalent of SAVE "program",1,1. Screen-80 is created at memory location 49152 but is meant to be relocated to the beginning of BASIC.

If you've typed in Screen-80 and saved it to

tape, however, you won't have to retype it. Just load MLX and change line 763. The third POKE (POKE 782,1) should be changed to POKE 782,0. Change line 763 and enter RUN. Use the same starting address (49152) and ending address (52811). Use SHIFT-L to load Screen-80 from tape. Then SHIFT-S to save it to tape. The modification to line 763 will cause the newly saved program to be relocatable. You can then turn your 64 off and on, and load Screen-80. If you LIST it, you should see one line with a SYS command. Type RUN and you'll have 80 columns. We regret any inconvenience this error has caused our readers.

• Reader Ina Neiman uses the 64 version of "Spelling Critter" (June) in her classroom and has discovered that vocabulary words which are contractions (can't, won't, and so on) are not accepted by the program. The program allows only letters between A and Z. To include apostrophes, add the following line:

```
885 IF ASC(Z$)=39 THEN A=39:GOTO 920
```

• The 64 version of "Mystery At Marple Manor" (September) works as listed, but there are two minor corrections.

First, in line 27 the Automatic Proofreader number is correct, but the line is not. The last English pound sign (£) should have been underlined, to indicate a SHIFTed character. This typo affects only part of the graphics on the title screen.

Second, if you choose to stay in a room and type a letter which is not on the menu, the screen may go blank (although further input will be accepted). To reprint the menu after typing an incorrect letter, change lines 390 and 400, replacing all 387s and 398s in these lines with a 375 (the beginning of the routine which prints the menu). ☺

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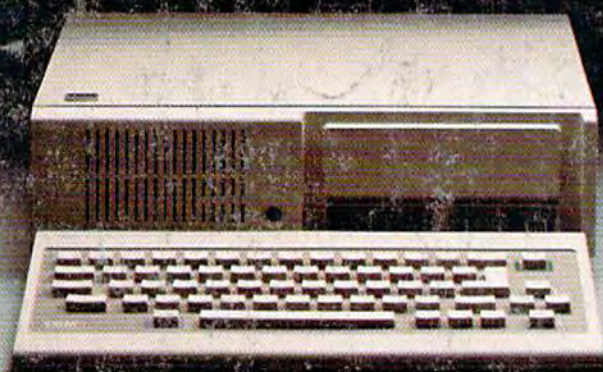


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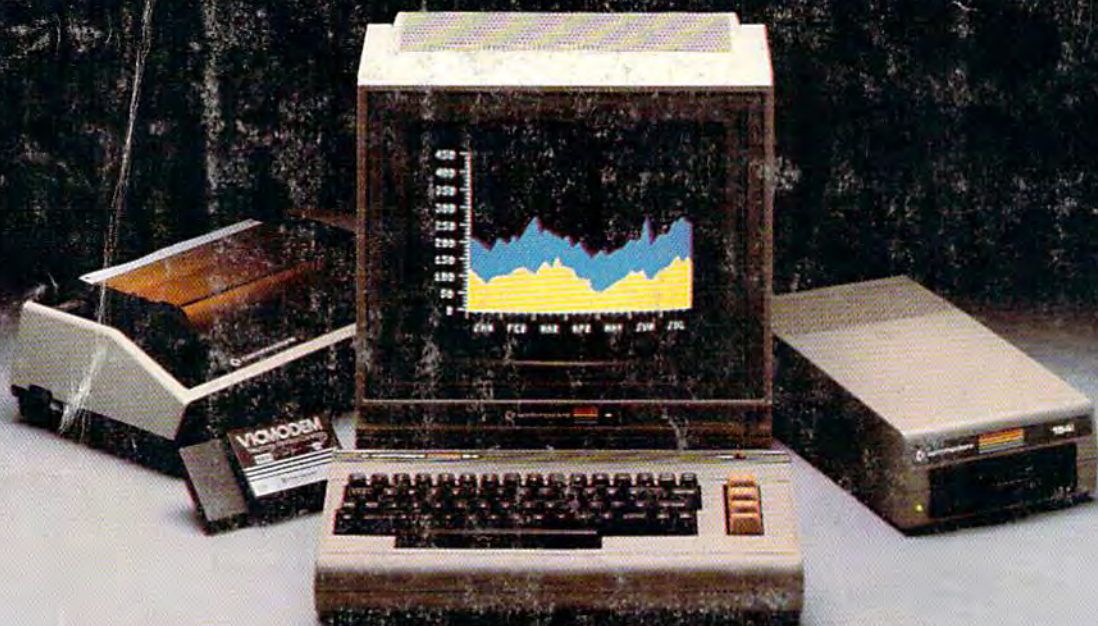
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