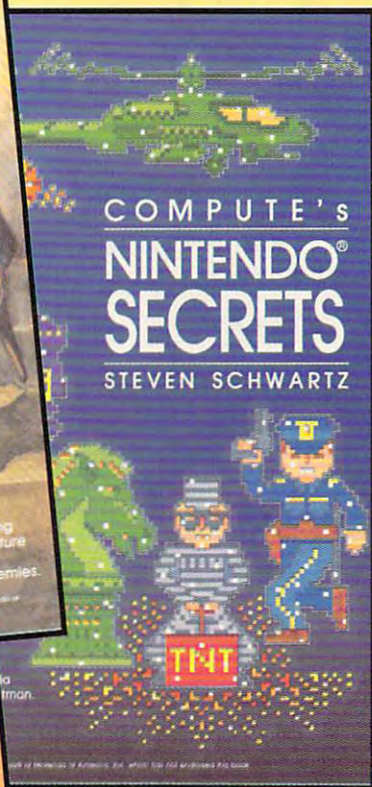
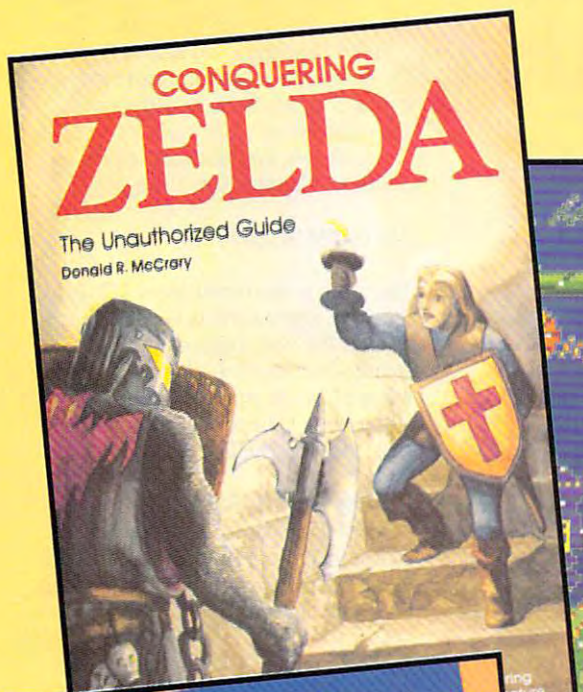


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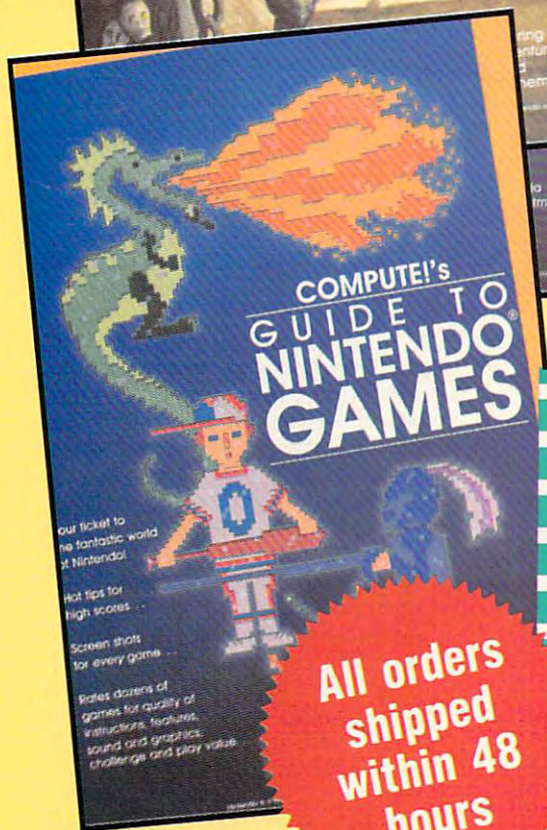
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Define Frequently Used Variables Early

The program will run even faster if you move the statement assigning a value to the Z variable from line 140 to an earlier point in the program, say line 90. When BASIC reads a variable name such as Z for the first time, it writes the name and its assigned value in a list. (A similar list is built up for string variables such as W\$).

The first variable encountered in the program is entered at the top of the list, followed by the next one, and so on. Z is the 27th variable in the list. When it appears in line 210, BASIC has to search through the other 26 variables until it finds the right one. Obviously, it's quicker to find a variable near the top of the list than it is to find one at the bottom. To test this, let's enter a new line.

```
90 Z=.00134796247
```

When the program is run, the variable Z will now be placed at the top of the list. The runtime will be reduced from 5.1 seconds to 4.1 seconds, the difference being the time taken by BASIC to search through the other 26 variable names in the list. Line 140 is now unnecessary, but its presence does not alter Z's position in the variable list.

Repeat the process with variable V by entering

```
95 V=22
```

This puts variable V in second place on the list. When the program is run, you'll find that the time is shortened to 2.7 seconds because both variables are now found quickly.

Omit the Count Variable from NEXT Statements

Whenever you have a single FOR loop, terminate it with the word NEXT instead of specifying the variable name, such as NEXTI. This saves time because BASIC does not bother to check that the count variable, I, is the same as that in the last FOR statement. To see how much difference this makes, change line 300 to

```
300 NEXTI
```

Running the program will show an increase in time from 2.7 seconds to 3.3 seconds.

If there's an inner loop nested inside an outer loop, it isn't always essential to specify the count variable. Enter the following lines, and note the differences in running times.

```
210 FOR J = 1 to 5
300 NEXTJ:NEXTI
```

With the count variable given for each loop, the time is 12.1 seconds. Line 300 can also be written this way:

```
300 NEXTJ,I
```

This cuts the running time by only 0.1 seconds. Now change line 300 again and notice the change.

```
300 NEXT:NEXT
```

At 8.3 seconds, this is decidedly faster than the alternatives NEXTJ,I and NEXTJ:NEXTI.

Multiplying a number by itself is faster than squaring it by exponentiation.

```
210 D=C*C
300 NEXT
```

This takes 3.8 seconds, but watch what happens when you square C.

```
210 D=C↑B
```

The processing time increases to 53.1 seconds.

Multiplying is faster than dividing.

```
210 A=B*C
```

This takes 3.5 seconds.

```
210 A=B/C
```

Now the computation takes 4.9 seconds. It's faster to multiply by 0.1 than it is to divide by 10.

Adding the same number twice is faster than multiplying by 2.

```
210 C=A+A
```

Adding the variables that represent 1 + 1 takes 2.4 seconds.

```
210 C=B*A
```

Multiplying the variables that represent 2 × 1 takes 3.5 seconds.

```
210 C=2*A
```

Using the number instead of a variable takes even longer: 3.8 seconds. Integer variables are faster than the integer function. If the number involved is less than 32,768, defining an integer variable takes less time than calculating an integer.

```
210 Y%=A
```

This takes 2.8 seconds.

```
210 Y=INT(A)
```

Writing it this way increases the time to 3.6 seconds.

Avoid Subroutines Within Loops

When you have a loop that repeats many times, try to avoid having a GOSUB inside the loop. Try the effect of adding the following statements.

```
400 RETURN
10000 RETURN
```

Then change line 210.

```
210 GOSUB400
```

Simply going to and returning from the empty sub 400 adds 1.7 seconds to the time. You can save this (at the expense of using up more memory) by copying the subroutine's instructions inside the loop.

Use low line numbers as far as possible. Change line 210 again.

```
210 GOSUB10000
```

The time is increased from 1.7 to 2.0 seconds. Extra time is needed simply to read the five digits of 10,000 instead of the three digits in 400. The same principle applies to GOTO statements. The fewer digits in the line number, the faster the program.

Remove REM Statements

While REM statements make it easier to follow a program and understand what's happening, programs will run faster if you eliminate them—particularly within loops. If you must include REM statements, keep them short.

```
210 REM
```

This adds 0.3 seconds to the loop without line 210.

```
210 REM THIS IS A TEST
```

Adding additional words to the REM statement doubles the time to 0.6 seconds.

You can use this test program to check the timing of other instructions and compare their speeds. You may be surprised at how different expressions and the way they're used affect running time.

When you write a program, do it in your usual way. Get all the bugs out and make sure it's running properly before you try to improve its speed. Then, take a look at it and see where you can make speed improvements. Start with the most-used and longest FOR-NEXT loops, replace constants with variables, and revise expressions, putting definitions of these variables early in the program. Reuse variable names for different purposes wherever possible. This keeps the variable list short and results in faster access times and more memory space. □

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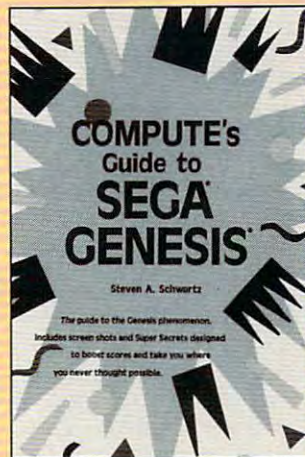


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FEEDBACK

EDITORS AND READERS

A Note from New Zealand

I enjoy your magazine, but it seems to cater more for the 64 than the 128, which is a much more versatile machine. I'm not really into games, so I would appreciate more utilities. More information on using the 128 as a controller of household functions would be of interest, as would a program that would let my printer print sideways.

Incidentally, I was struck with some problems with *Stars II* (COMPUTE!'s Gazette, August 1989). There was no way to produce a sky as seen from the southern hemisphere. Why is this?

NOEL RICKETTS
AUCKLAND, NEW ZEALAND

We try to supply a variety of programs for both computers in each issue, but we rely on submissions from our readers. Since we're always eager to publish good utility programs for both the 128 and the 64, we encourage programmers to send such programs to our submissions reviewer. Programmers have asked about resubmitting programs that we may have rejected in the past. If the program is fairly bug free and you feel it has merit, submit it again. It may have been rejected simply because it was similar to a program we had recently published. For example, in November 1990 we ran Right/Side, a printer program that does just what you ask. Therefore, if someone sends us a similar program tomorrow, chances are it won't get published. If a program is too large, that's also a strike against it—although we may offer it as a bonus program on disk only. Stars II had that problem. By including all the code needed to produce views in the northern skies, the program would've been much too large to offer as a type-in.

In response to your question about Stars II, author Robert A. Mulford says, "The east, south, and west views are calculated by the same subroutine. A north view would have required a separate one.

Since the planets are never seen in the northern sky by people in the northern hemisphere, I decided not to include a northern view to save a few lines of code." We apologize for the inconvenience this may have caused readers who live south of the equator; a new version of the program that should solve that problem is in the works.

Transformer Needed

My BMC monitor, model BM 919U, died recently, and a service technician told me it needs a new high-voltage flyback transformer. The schematic diagram with the monitor gives no information to help him in ordering a new one, and the company that sold me the monitor no longer handles computer hardware. Can anyone help me locate a replacement for this transformer?

KARL HALTNER
507 SMITHSON AVE.
ERIE, PA 16511

How about it, readers?

Anything but Games?

I have a 128 with a 1571 and an MPS-803 printer. I have noticed that Commodore software seems to be leaning more to games than to nongame programs. Do software companies plan on ignoring us nongame users? I would like to see more productivity programs such as *Fleet Systems*. Maybe they should survey us Commodore owners and ask us what we'd like to see in new releases.

ROLAND A. DUPONT
SUSANVILLE, CA

New software releases for the 64 or 128 have slowed dramatically, but software companies are still interested in what the market wants. That's one of the reasons why we published the readership survey in the February issue. In addition to helping us produce the kind of magazine you want, we share the results with software companies to help them in their marketing decisions.

So if you haven't responded yet, it's not too late to send it in and let your voice be heard. We'll also publish the survey results as soon as they are tabulated.

Some European software companies are introducing some of their hits to the U.S. market. One program that may interest you is from England's Database Software. Mini Office II is an integrated package for the 64 that contains a word processor, spreadsheet, database, graphics program, terminal program, and label maker—all in one package. We'll print a review of this product in an upcoming issue.

Fool Your 1571

I have a 128 with a 1571 disk drive. I have several programs that specify a 64 and a 1541 disk drive that are giving me problems. Is there some way I can fool the drive into thinking it's a 1541?

ROY N. KELLEY
HAMILTON, OH

After you've turned on your monitor and 1571, turn on your 128 while pressing the Commodore key. This boots the 128 in 64 mode, and it makes the 1571 think it's a 1541. Give this a try and see if it helps.

An Index and Show Schedule

I would like to see a yearly Gazette index in either the December or January issue. It would be helpful when looking for information on various subjects. Also, a column on future shows and seminars might be helpful. If it were published in a column, it would be quick and easy to review. That would give us a little advance notice, and I could possibly make plans to attend. I might have even made plans to vacation in Las Vegas to coincide with the Consumer Electronics Show.

FRED BLANCK
LANSING, MI

We do publish a Gazette Index on disk each year. It not only covers the year just past, but all the previous

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As for shows of interest to Commodore owners, we'd be happy to print such a listing for national or larger regional shows if we get the information in time. Our production deadlines require us to have the information three to four months prior to the event.

As for shows such as COMDEX or the Consumer Electronics Show, they are trade shows not open to the public. Entry is restricted to exhibitors, people in the industry, and the press, although there is some talk of opening such shows on at least one day to the public.

Missing SYS

I have a problem with one of my 64 programs. I have forgotten the SYS address needed to run it. How can I find it?

ELIUD CAMPOS RIVERA
ARECIBO, PUERTO RICO

The problem is simple to state, but the solution could be difficult. Begin, though, by assuming that the machine code loads to one of the common locations. They are the

cassette buffer at address 828 (\$33C), the upper 8K of BASIC RAM at 32768 (\$8000), the upper 4K of BASIC RAM at 36864 (\$9000), and the 4K RAM window at 49152 (\$C000). The most likely spot is the last listed. Simply load the machine code with a ,8,1 and SYS to these addresses. The computer may lock up, requiring you to turn it off and on again.

If none of these addresses produces results, either of two things are likely: The program doesn't load to that address, or the starting address of the load is not the starting address of the actual program.

In the first case, the disk itself must be examined for the load address. Several programs will do this for you, including MetaBASIC (COMPUTE!'s Gazette, February 1987). The alternative to running a load-address program is to use a disk editor to examine the directory for the starting track and sector of the program. You can then go to that sector and read the load address from the third and fourth bytes, where it will be in low-byte, high-byte order.

If the executable address isn't the load address, you'll need to examine the code with an assembler

program (once the location of the code has been determined). Sometimes the code resides beneath BASIC or Kernal ROM, and you'll need a separate machine code program to remove the ROM to run it. Less often, the code has a specific load address known only to a boot routine which, for whatever reason, you may not have. Occasionally, the program may make use of the CBM80 cartridge test during initialization. If so, a cold-start call may start the program. You can call the cold-start routine with a SYS 64738. Happy hunting!

Messed-Up Graphics

In 64 mode, I'm having problems with graphics in a lot of games on my 128. When I run a newer game, the graphics never show up, but a mess of characters fill the screen. The game works; the sound comes up; the demo still works. It's not the drive or the disk. Older games still work, though.

JASON FRITZ
LITTLETON, CO

From your description of the problem, it sounds as though your video interface chip (VIC) isn't creating a bitmapped screen. The "mess of characters" that you refer to are

symptomatic of a bad VIC because color information for bitmaps is stored in the same memory location as normal text. If the software thinks it's supplying color information to a bitmap, and the VIC actually hasn't left text mode, you wind up with a bunch of characters that make no sense. Go to 128 mode and type in the following program. When the program is run with a working VIC and a 40-column display, you will see a white spiral emerging from the center of a dark blue background. But with a bad VIC, the screen will instead be filled with strange characters.

```

10 POKE 53280,6:POKE 53281,6
20 GRAPHIC 1,1
30 COLOR 1,2
40 LX=160:LY=100
50 FOR X=0 TO 400
60 PX=160+X/4*COS(X/8):PY=
  100+X/4*SIN(X/8)
70 DRAW 1,LX,LY TO PX,PY
80 LX=PX:LY=PY
90 NEXT
100 GRAPHIC 0
    
```

To check the video interface chip in a 64, type in and run Chaos in the Program section of this issue. ☐

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D'IVERSIONS

F R E D D ' I G N A Z I O

Have you ever imagined what computers would be like if you lived inside them like rooms? You know what I'm talking about if you've been to a game arcade recently. It used to be that to play a game you'd walk up to a box, pop in a quarter or two, and stand in front of the box watching the display screen and pumping some buttons.

That's all changed. Now you don't walk up to a box, you climb inside! And when you do, you leave the game arcade behind, and you enter another world.

Recently my son, Eric, and I were in a shopping mall in Cheyenne, Wyoming. In the center of the mall was a vehicle that looked like a cross between a passenger van and an icebox. On closer inspection we discovered that this *box* was indeed a vehicle—a vehicle of the senses and the imagination, a vehicle without wheels.

Inside the vehicle were eight rows of seats, all equipped with shoulder harnesses. In the front was a projection screen that covered the entire wall. Spread evenly around the walls were surround-sound speakers. The motto of this vehicle was displayed on a sign hung over the narrow doorway. It read: "Swear You Are There!"

Eric and I were curious. We each paid our two-dollar entry fee and crawled into the vehicle. Once inside, we found two seats together and strapped ourselves in. We noticed that our armrests had handholds. All this seemed a little bit silly. After all, this vehicle had no wheels! It was stuck in the middle of a shopping mall. Where could we be going?

Suddenly the lights went out. We were in absolute darkness. Then the front screen lit up. It seemed to fill the room. We heard grinding noises, metallic scraping. Our seats began to rock.

We were on a roller coaster! Slowly, swaying side to side, the roller coaster left the station and began climbing a monster hill. It picked up speed. The people beside us began to moan in fear and anticipation. I found

myself clutching the handgrips as my seat tilted farther and farther back. Were we going straight up?

Inch by inch, foot by foot, we climbed that terrible hill. Finally we arced over the top and fell, down, down the other side, rapidly gaining speed. Now our seats were tilted forward. I felt like I was going to fall on my nose! Thank goodness for the security of my shoulder harness!



The wind whined past my ears. People screamed. I heard myself screaming. Beside me Eric sat, gritting his teeth, his eyes wide, a huge smile on his lips. "Awesome!" he said.

The roller-coaster box in Cheyenne was actually a NASA space-flight simulator that had been acquired secondhand by an entertainment company. The company converted the simulator into a ride that tours shopping malls around the far west. Eric and I went on the roller-coaster ride, but that was only one of the many "virtual experiences" that the simulator offered. At different times of the day you could ride dangerous white-water rapids, ski downhill, or jump out of an airplane with a dinky parachute in the middle of a typhoon. By playing a movie on the front

screen, immersing you in surround-sound, and tilting the box up to 45 degrees in any direction, the simulator could make your body and your imagination swear you were there. *There* was anywhere the game designer wanted to you be.

These days you hear how computers are getting smaller and smaller—so small, in fact, that pretty soon you won't even be able to see them. We all have visions of carrying around powerful laptop computers, pocket computers, and even wrist-top computers and playing games on increasingly powerful Game Boy-style arcade machines that fit into the palm of our hands.

Now take a second and turn this idea upside down. What if we don't end up carrying computers around? What if, instead, we go inside computer *rooms* where the entire room is a giant computer that can synthesize reality on walls covered with video wallpaper and surround-sound speakers that immerse us in a pine forest, a stormy sea, or a busy city street?

Computer *rooms* like the NASA simulator in the Cheyenne shopping mall aren't just science fiction. They're reality. The new theme parks now on the drawing boards for the twenty-first century will all have virtual reality environments controlled by multimedia computers.

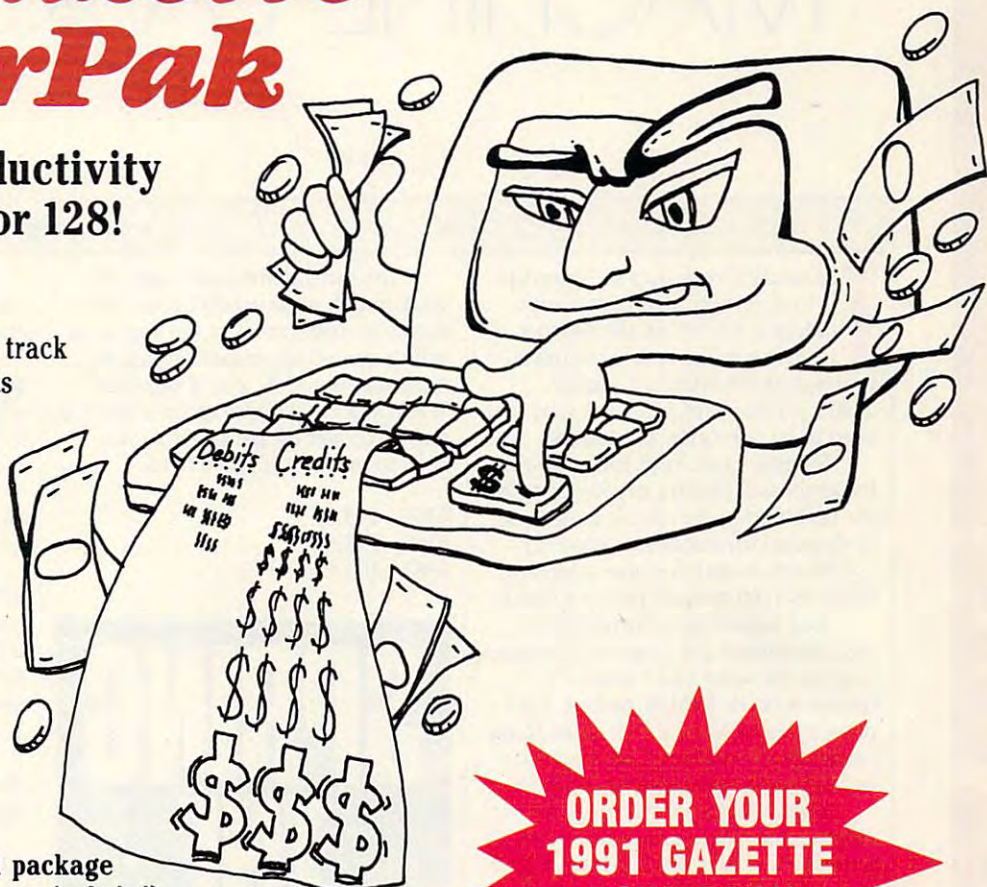
Classrooms, too, are under construction where the walls become the world. Students can watch wall-sized video projections of computer graphics and laser video and hear powerful micro-speakers recreate a moon launch, a civil rights march, a nuclear explosion, or a simulated voyage inside a DNA molecule. If your entire room is a computer vehicle, then you're inside a *Starship Enterprise* that can take you, via your senses and your imagination, to any place or any time. Classroom learning would no longer be a dry and dreary affair. Instead, you'd be an explorer, an eyewitness reporter, an adventurer. What you'd learn would seem so real, you'd swear you were there! □

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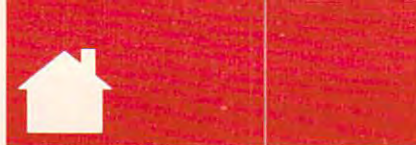
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MACHINE LANGUAGE

J I M B U T T E R F I E L D

The usual way to trap the interrupt is to divert the interrupt vector (address \$314/5 on the 64) to a task. When the task is complete, it jumps to the interrupt routine. That's *preinterrupt*, but work may need to be done after the routine.

Standard interrupt routines scan the keyboard, placing any keypress in the keyboard buffer. Some keys must be detected immediately. You may not be able to wait a whole interrupt interval (1/60 second) before a check.

You can set up a postinterrupt with a preinterrupt. Suppose you want to print the word *LIST* when F1 (character code \$85) is pressed. This program is for the 64. The same thing can be done on other 8-bit machines, but the addresses might be different.

First, write a routine to point the interrupt vector to your special preinterrupt code; then write a similar program to restore the interrupt vector, disabling the program.

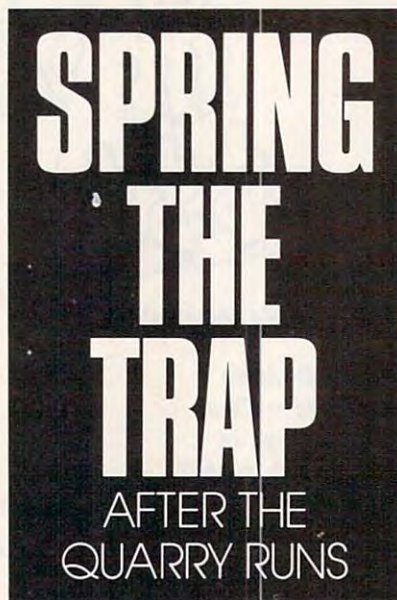
```
033C LDA #$56
033E LDX #03
0340 SEI
0341 STA $0314
0344 STX $0315
0347 CLI
0348 RTS
0349 LDA #$31
034B LDX #EA
034D SEI
034E STA $0314
0351 STX $0315
0354 CLI
0355 RTS
```

Next comes your preinterrupt program that sets up a postinterrupt. You'll fake an interrupt event on the stack to make the computer think it's executing a normal return from an interrupt: the postinterrupt program at \$0365 and a fake status register entry.

```
0356 LDA #03
0358 PHA
0359 LDA #65
035B PHA
035C LDA #00
035E PHA
```

The three items faked onto the stack match what would be put there during an interrupt, but the computer will then push three more things to the stack: the A, X, and Y registers. When a normal interrupt concludes, it pulls six bytes off the stack, so you need to push three more bytes.

```
035F PHA
0360 PHA
0361 PHA
```



Now give control to the interrupt sequences (at \$EA31). When complete, that code will perform an interrupt-return sequence. Instead of returning to the interrupt point, the program will be switched to address \$0365.

```
0362 JMP $EA31
```

The code at \$0365 will be run postinterrupt. If the buffer count (held in address \$C6) isn't exactly one character, skip to the exit at \$0380.

```
0365 LDX $C6
0367 BEQ $0380
0369 DEX
036A BNE $0380
```

If the character that's detected in the keyboard buffer isn't F1, skip to the exit.

```
036C LDA $0277
036F CMP #85
0371 BNE $0380
```

The X register has been set to 0 in earlier code, so we can copy the characters *LIST* into the keyboard buffer.

```
0373 LDA $0383,X
0376 STA $0277,X
0379 INX
037A CPX #04
037C BNE $0373
```

The X register now contains a 4. Put this into the buffer count at address \$C6.

```
037E STX $C6
```

Now go to the ROM code in the 64 that will do the *real* interrupt exit and include the characters *LIST*.

```
0380 JMP $EA81
0383 4C 49 53 54 ; ASCII "LIST"
```

Here's the whole routine placed in a BASIC program.

```
10 REM POSTINTERRUPT DEMO
20 REM JIM BUTTERFIELD
30 DATA 169,86,162,3,120,141
40 DATA 20,3,142,21,3,88,96
50 DATA 169,49,162,234,120,141
60 DATA 20,3,142,21,3,88,96
70 DATA 169,3,72,169,101,72
80 DATA 169,0,72,72,72,72,76
90 DATA 49,234,166,198,240,23
100 DATA 202,208,20,173,119,2
110 DATA 201,133,208,13,189
120 DATA 131,3,157,119,2,232
130 DATA 224,4,208,245,134,198
140 DATA 76,129,234,76,73,83
150 DATA 84
200 FOR J=828 TO 902
210 READ X
220 T=T+X
230 POKE J,X
240 NEXT J
250 IF T<>8211 THEN STOP
300 PRINT "TO ENERGIZE F1:"
310 PRINT "SYS 828"
320 PRINT "TO RESTORE:"
330 PRINT "SYS 841" □
```




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BEGINNER BASIC

L A R R Y C O T T O N

Let's take a new look at how to handle BASIC's multidimensional arrays. As you may recall from an earlier column, an array is a flexible way of expressing and manipulating variables. I compared multidimensional arrays to pigeonholes, where numbers which represent colors or names or musical pitches can be stored, ready to use.

We'll begin a program with which you'll be able to point to a name in a directory of up to 22 names and then press Return to get the computer to actually dial your telephone for you! (The program works only with telephones that generate the 12 standard tone-dialing frequency pairs, such as AT & T's touch-tone.)

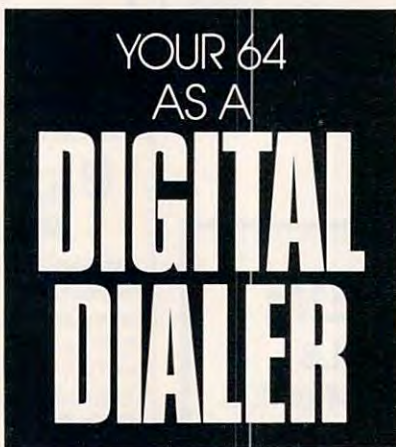
On a touch-tone telephone's keypad, each number key, when pressed, generates two accurately controlled tones. We can generate those same tones on the 64 by poking musical pitch values to each of the two frequency-control registers for the computer's first two voices. (See Figure 1.)

For example, when keypad 5 has been pressed, two tones with frequencies 770 and 1336 Hz (cycles per second) are "played" simultaneously by the phone. Equipment at the telephone company's central office decodes these tones and dials the phone you're calling.

These tones can be generated on the talented 64 by poking the numbers 87 and 49 into voice 1's frequency control registers and 156 and 85 into

voice 2's frequency control registers.

Where did these pokable values come from? As we've seen in previous columns, any tone—within limits—can be produced on the 64 as long as we know its decimal value. Appendix E of the *Programmer's Reference Guide* lists the decimal values (and pokable numbers) for a wide range of equal-tempered musical pitches, such as those produced by a piano.



Touch-tone frequencies, based on an internationally accepted standard, don't coincide with standard musical pitches. After a little detective work, I came up with a constant (slightly more accurate than recommended in the *Programmer's Reference Guide*) to calculate the decimal value for any musical frequency.

DECIMAL VALUE = FREQ IN HERTZ/.0609593

Round the result to the nearest whole number. The decimal value is then converted to pokable values as follows:

SECOND POKABLE VALUE = INT(DECIMAL VALUE/256)

FIRST POKABLE VALUE = DECIMAL VALUE - SECOND VALUE * 256

Continuing with our example, we convert 770 to the decimal value 12,631 by dividing it by the constant .0609593 and rounding. Next, we convert 12,631 to pokable values 49 and 87 by first dividing it by 256 and then dropping the remainder, resulting in 49. Then we multiply 49 by 256 to get 12,544, which we subtract from 12,631, yielding 87. Likewise, 1,336 is converted to decimal number 21,916, then converted to pokable values 85 and 156. These numbers are reversed in the table because of the order in which they're poked.

We begin the program by setting up the screen with blue printing on a white background.

```
10 PRINTCHR$(147):POKE646,6:POKE53280,1:POKE53281,1
```

Next, we dimension two arrays to correspond to the number of names the program can handle and the number of digits in the longest phone number.

```
20 DIMNUS(22),DS(14)
```

NU\$() will be the telephone number in string format. We'll use the first two of the 64's three voices to generate the tones. Define their frequency registers.

```
30 F(1)=54272:F(2)=54273:F(3)=54279:F(4)=54280
```

Define the memory registers that turn voices 1 and 2 on and off.

Figure 1.

Keypad Number	Frequency (Hertz)	Decimal Equivalents	Poke into Voice 1		Poke into Voice 2	
1	697 and 1209	11434 and 19833	170	44	121	77
2	697 and 1336	11434 and 21916	170	44	156	85
3	697 and 1477	11434 and 24229	170	44	165	94
4	770 and 1209	12631 and 19833	87	49	121	77
5	770 and 1336	12631 and 21916	87	49	156	85
6	770 and 1477	12631 and 24229	87	49	165	94
7	852 and 1209	13977 and 19833	153	54	121	77
8	852 and 1336	13977 and 21916	153	54	156	85
9	852 and 1477	13977 and 24229	153	54	165	94
0	941 and 1336	15437 and 21916	77	60	156	85

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40 G=54276:H=54283

The square waveform simulates the phone's dialing sounds. Define two constants to turn that waveform on and off.

50 VN=65:VF=64

Clear the sound chip, turn up the volume, and define the shape of the square wave.

60 FORL=54272TO54295:POKEL,0:NEXT
70 POKES4296,15 80 POKES4275,8:POKES4282,8

The envelope (how fast a sound begins and ends, among other things) was chosen by trial and error to emulate the sounds produced by a telephone.

90 POKES4277,20:POKES4284,20
100 POKES4278,192:POKES4285,192

Now for the tricky part. We'll fill a two-dimensional array with the pokable values from the chart above. The telephone keypad itself can help us fill the array: All of the three keys on any horizontal row share a common frequency, and all of the three keys on any vertical column share another common frequency. For example, the 1, 2, and 3 keys share frequency 697; the 1, 4, and 7 keys share frequency 1209.

Let's do the keypad rows first. Since phone keys 1, 2, and 3 share the first two pokable values 44 and 170, we can use a FOR-NEXT loop to simplify loading the array with charted values. N is the keypad number.

120 FORN=1TO3:W(1,N)=170:W(2,N)=44:NEXT

The two frequency-control registers for voice 1 are represented by the 1 and 2 inside the parentheses. After the FOR-NEXT loop has run, W(1,1), W(1,2), and W(1,3) will contain 170; W(2,1), W(2,2), and W(2,3) will contain 44.

Keys 4 through 9 are loaded similarly, but with another frequency.

130 FORN=4TO6:W(1,N)=87:W(2,N)=49:NEXT

140 FORN=7TO9:W(1,N)=153:W(2,N)=54:NEXT

The 0 key is a special case.

150 W(1,0)=77:W(2,0)=60

Now we'll load the frequencies that correspond to the columns of keypad numbers. The first column contains the keys 1, 4, and 7. Use STEP3 in the FOR-NEXT loop.

160 FORN=1TO7STEP3:W(3,N)=121:W(4,N)=77:
NEXT

The 3 and 4 inside the parentheses represent the third and fourth frequency-control values—the ones that control voice 2. The second and third keypad columns' frequency values are loaded into the array next.

170 FORN=2TO8STEP3:W(3,N)=156:W(4,N)=85:
NEXT

180 FORN=3TO9STEP3:W(3,N)=165:W(4,N)=94:
NEXT

Again, the 0 is a special case.

190 W(3,0)=156:W(4,0)=85

Figure 2 is a picture of the two-dimensional array, all loaded with pokable values.

Figure 2.

	W(1,1)	W(2,1)	W(3,1)	W(4,1)
1	170	44	121	77
2	170	44	156	85
3	170	44	165	94
4	87	49	121	77
5	87	49	156	85
6	87	49	165	94
7	153	54	121	77
8	153	54	156	85
9	153	54	165	94
0	77	60	156	85

Keypad No. { 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 }

W(1,0) To Voice 1 To Voice 2 W(4,0)

That's all we have space for this month. Next month we'll create the directory and dial the phone. □

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PROGRAMMER'S PAGE

R A N D Y T H O M P S O N

Did you know that the 64 doesn't care whether a number or a string is put between the parentheses in a PEEK function? Did you know that the test IF \$\$ will *not* produce a syntax error? Did you know that the INPUT statement can be used without an accompanying input variable?

Yes, it's time for more weird computer facts. All the following tips are not useful, but they are unusual.

DIM-Witted Programs

Did you know that you can dimension nonarray variables? The command DIM X, for example, is perfectly legal. So is DIM \$\$\$. In fact, you can sprinkle DIM X and DIM \$\$\$ all throughout your program without risking a REDIM'D error. The DIM statement doesn't affect the value of the variable being dimensioned.

Although it may appear as if nothing happens when you dimension a nonarray variable, BASIC does perform some elementary recordkeeping duties the first time a variable is used in a DIM statement (or any other statement, for that matter). Commodore BASIC keeps track of variable names and values using a table that's located just above the BASIC workspace. Every time you use a variable, BASIC searches this table for the specified variable. When BASIC can't find an entry for a variable, it creates one. This happens whenever a variable is referenced for the first time. So by placing the command DIM X as the first line in your program, you force BASIC to make room for the variable X in memory. Of course, you could just as easily use the command X = 0 to get the same results.

Now the obvious question: Why would you want to use DIM on anything other than arrays? There really is no good reason—unless your goal is to confuse anyone who might be peeking at your program listing.

REMLess Remarks

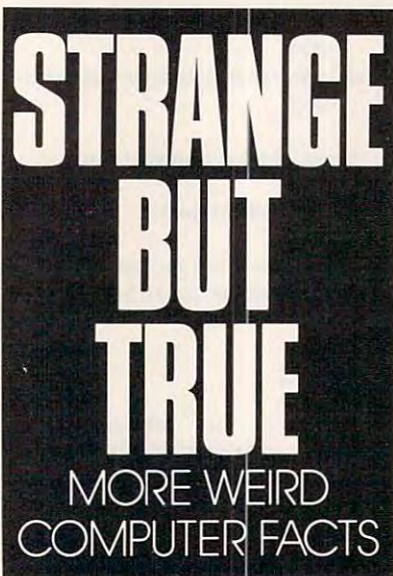
Not all program remarks have to be preceded by a REM statement. For example, you can type anything you

want after a GOTO command. Try it—BASIC won't mind. This little quirk comes in quite useful for inserting short comments about the destination of the preceding GOTO statement. For example,

90 GOTO 210 -> JUMP TO PRINT ROUTINE

makes for quite readable code.

The reason this works is simply because BASIC is never given the opportunity to evaluate the characters that follow a GOTO statement. For the same reason, you can dedicate an



entire BASIC line as a REMless remark as long as that line is never executed by the program. A good example of this would be a subroutine where the initial remarks appear in program lines that are skipped by the calling GOSUB statements.

Missing Parameter

The MID\$ function requires three parameters, or does it? Without the third parameter, MID\$ returns all the characters to the right of, and including, the character specified by the second parameter. In the example

```
LNS = MID$("WALTER HEGO",7)
```

LNS is set equal to the last name HEGO.

This shortened version of MID\$ is useful when you want to perform a RIGHT\$ and know only where in the string the characters begin, not how many characters you need.

Dead End

You've heard of the CONT statement: You use it to restart a BASIC program after a STOP command or after you've hit Run/Stop. As you might expect, CONT was designed to work from immediate mode only (that is, from the READY prompt). Surprisingly, you *can* use CONT from within a program, if you want to.

When used within a program, CONT is what you might call a *dead end* command. As soon as BASIC encounters this statement, the program hangs. It's the same as if you ran the line 10 GOTO 10. You can still press Run/Stop to abort the program, but if you then enter CONT to continue running it, your program will go right back into its blind alley.

Commodore Slang

If you learned BASIC by taking a class or reading a book, you probably use a lot of IF-THEN statements that look like this:

```
100 IF YN$="Y" THEN GOTO 10
```

There's an easier way to do this on the 64 and 128, however: Simply remove the THEN.

```
100 IF YN$="Y" GOTO 10
```

Or, if you prefer, put THEN back in and remove the GOTO. Now we're left with the following:

```
100 IF YN$="Y" THEN 10
```

By using one of the contracted forms of IF-THEN, your program is made shorter and slightly faster. □



PROGRAMS

D A N N Y E N G L I S H

The crew of the *Starship Explorer* has been stranded on a distant planet, and you're in charge of a rescue mission. You must pilot your ship beneath the planet's surface, through an underground alien stronghold. Try to rescue all nine crew members as you dodge lasers, crushers, and force fields.

That's only half the danger, however; you'll also have to deal with the aliens. You won't be able to find all the men and win the game until you've met the mother alien.

Getting Started

Stronghold is written entirely in machine language, so you'll need to use *MLX*, our machine language entry program, to type it in (see "Typing Aids" elsewhere in this section). When *MLX* prompts you, respond with the values given below.

Starting address: 0801
Ending address: 1D00

Although *Stronghold* is written in machine language, it loads and runs like a BASIC program. When you're ready to play, plug a joystick into port 2, load the program, and type RUN. The title and a list of options should appear in a few seconds.

The Options

Play options are displayed on the title screen. The first one allows you to choose normal, high, or low gravity. If you're a beginner, low gravity is recommended; for more of a challenge, try high gravity. Press f1 to change gravity conditions.

The second option is to choose the number of aliens you'll encounter; press f3 to make your selection. You can choose normal, fewer, or many aliens. You should choose fewer aliens until you gain more experience as a pilot.

After all the options have been set, you must press the fire button to start the game. At any time during the game, you can press f5 to pause and f7 to quit and start a new game.

The Fortress

You begin the game with four pilots. You'll lose one pilot every time you crash, and you'll restart from the beginning or from the last platform you landed on. Every 1000 points, you'll be awarded a bonus pilot. When all of your pilots have been lost, the game is over. Press the fire button at this point if you want to begin a new game.

STRONGHOLD

THIS RESCUE GAME
FOR THE 64 TAKES
YOU THROUGH
DANGEROUS
CAVERNS ON AN
ALIEN WORLD.
JOYSTICK REQUIRED.

The stronghold is a made up of two levels with 32 screens on each level. You must navigate through many tunnels and caverns and over rocky terrain. Maneuver your ship in all directions by using the joystick. Press the fire button to shoot.

When you fly to the edge of one screen, the next screen will appear. As you explore the stronghold, you'll encounter many objects. Some of these will be white platforms. These are the only places where you can land your ship. As explained earlier, it's a good idea to land on these from time to time as you move deeper into the fortress.

You'll also encounter lasers and crushers, which, respectively, fire and open and close at regular intervals. Watch their timing to pass by safely.

You'll also find colored security boxes. To take advantage of these color codes, gently touch the box with your ship. You'll notice a security dis-

play at the lower right side of your screen. This indicates your security clearance. Many times during the game, you'll find that your path is blocked by a colored security barrier. You may pass through a barrier only when the color of your security clearance matches that of the barrier. If you do not have the proper security clearance, you must search for a security box of that color.

The stranded crew members are scattered throughout the two levels of the stronghold. When you locate a man, gently touch him with your ship, and he'll be rescued. In the lower center of the screen, a display shows how many men are yet to be rescued. A rescued man gives you 250 points. If you accidentally shoot a man, no points will be awarded.

Sooner or later, you'll discover an alien that resembles a jellyfish digging through the ground beneath you. It may enter your cavern. If you shoot the alien, it will collapse and die, and you'll be awarded 50 points.

The Ice Stronghold

Complete the first level, and you'll enter the ice stronghold. Here, the graphics become more detailed and the maze of catacombs more complex. When you enter this level, your security clearance is reset. When you leave the ice level, it will be restored to its original color.

The ice level is very difficult to complete. The passageways are narrow, and the men are lost deep in the ice caves. When you've found all six security codes, you'll reach the final screen and possibly find the wreck of the *Starship Explorer*. The huge mother alien will be moving from side to side to side, guarding the last man. It will require careful timing to avoid her. You may find that violence is not always called for when dealing with aliens.

By this time, if you haven't located all nine men, you must go back and search for the rest. Once you've rescued them, fly back to the start of the first level and land on the platform to win the game. >



PROGRAMS

STRONGHOLD

```

0801:0B 08 70 17 9E 32 34 30 6E
0809:37 00 00 00 20 20 20 96
0819:3C 08 99 F8 00 B9 FD 08 F6
0821:99 33 03 88 D0 F1 A0 09 4C
0829:B9 0C 08 99 FF 03 88 D0 A1
0831:F7 A9 EF 85 2D A9 26 85 DF
0839:2E 4C 00 01 15 60 01 EF 9F
0841:26 73 1B B9 6E 09 99 E8 F3
0849:07 C8 D0 F7 EE 02 01 EE 19
0851:05 01 C6 F9 D0 ED A2 03 23
0859:20 34 03 F0 33 C9 07 D0 95
0861:16 A2 01 20 34 03 D0 0A A0
0869:A2 04 20 34 03 18 69 07 65
0871:10 05 A2 0A 20 34 03 85 1D
0879:A8 A5 A7 85 A9 A5 FE 85 FB
0881:F7 A5 FF 85 F8 20 6C 03 73
0889:A5 F8 85 FF A5 F7 85 FE 72
0891:E8 20 34 03 D0 1E A2 08 21
0899:20 34 03 A0 02 84 A8 85 2A
08A1:A6 18 A5 A7 85 A6 85 F7 5F
08A9:A5 FD 65 A7 85 F8 20 6C EF
08B1:03 4C 13 01 E8 20 34 03 FB
08B9:D0 1C A0 03 84 A8 E8 20 36
08C1:34 03 F0 08 A2 08 20 34 F4
08C9:03 4C 5C 01 A2 0B 20 34 BF
08D1:03 E6 A7 4C 5C 01 E8 20 AF
08D9:34 03 D0 0A E8 20 34 03 B2
08E1:18 69 04 A8 D0 D6 E8 20 37
08E9:34 03 D0 0A A2 02 20 34 21
08F1:03 18 69 06 A0 ED A2 08 A2
08F9:20 34 03 D0 E6 A9 00 85 F7
0901:A7 A4 FB F0 0C 06 FA 2A 37
0909:26 A7 C6 FB CA D0 F2 A8 D8
0911:60 48 B1 FE 85 FA A9 08 FE
0919:85 FB 68 A4 FE D0 02 C6 4A
0921:FF C6 FE C0 E7 D0 DE A4 B5
0929:FF C0 07 D0 D8 A9 37 85 BA
0931:01 58 4C 28 08 A4 A8 F0 FA
0939:22 A5 F7 38 E5 A8 B0 03 7E
0941:C6 F8 38 85 F7 A5 FC E5 8A
0949:A8 B0 02 C6 FD 85 FC B1 3A
0951:F7 88 91 FC 98 D0 F8 C4 72
0959:A9 F0 0A B1 F7 C6 ED C6 76
0961:F8 C6 A9 10 EC 60 78 E6 98
0969:01 4C 16 08 60 00 08 73
0971:0A 00 9E 32 30 38 38 00 53
0979:26 08 14 00 8F 20 44 41 E9
0981:4E 4E 59 20 31 31 2F 39 61
0989:1B 7C E4 20 20 20 20 20 C8
0991:20 E8 CF 0C 08 6A 85 FB 99
0999:69 85 85 25 A9 1E 85 FC 92
09A1:69 08 85 26 18 A9 EA 9F 5A
09A9:FB 85 27 A9 3C 65 FC 85 91
09B1:28 A2 FF C8 FD 01 08 8C 9D
09B9:02 08 F0 04 B1 25 91 27 99
09C1:C6 25 E4 25 4B F4 83 26 CA
09C9:C6 27 E4 27 D0 02 C6 28 5C
09D1:C6 FB E4 FB D0 E6 C6 FC 4F
09D9:E4 FC D0 E0 A5 28 C9 A0 C7
09E1:B0 0A 85 34 85 38 A5 27 42
09E9:85 33 85 37 4C BC 52 A2 4C
09F1:F0 26 1F 50 3E 02 64 22 D3
09F9:59 20 F9 C1 50 B1 8F 6A EE
0A01:55 6A AF 2B FF B6 56 88 13
0A09:9F 28 05 1F 01 19 89 65 BE
0A11:05 20 01 B0 0D 31 55 FA AD
0A19:A9 55 3F FF E8 00 1C 23 9D
0A21:C6 E3 20 04 48 8D 87 40 91
0A29:21 EE D0 A0 E4 97 F8 44 69
0A31:7D 78 C0 07 C9 A3 25 C3 95
0A39:FD C7 24 C6 03 21 8E 90 7A
0A41:42 A0 05 41 1E B1 70 E1 CD
0A49:51 10 87 40 01 7F C0 F7 7E

```

```

0A51:07 1C 0F 92 6B 9C B3 17 47
0A59:5B 2C 01 5A 21 CB 12 52 9A
0A61:30 3B 89 A8 22 0A 82 A0 F6
0A69:A2 33 28 03 08 8F 0B CD 33
0A71:56 23 04 02 85 15 55 B0 F5
0A79:16 21 B0 00 0B 14 11 C5 87
0A81:42 C6 15 38 14 08 02 4D A0
0A89:4E 21 50 A8 08 88 50 31 D5
0A91:20 C2 00 0C 03 A3 BF A0 ED
0A99:01 6F 00 4F A0 05 5B C0 8F
0AA1:1D 2C D8 10 15 56 F0 02 51
0AA9:22 68 23 A2 84 22 08 67 9B
0AB1:02 42 1C 08 88 00 0A 08 BB
0AB9:00 28 80 80 22 02 90 82 55
0ACL:80 40 80 0B 20 C0 80 C0 04
0AC9:F2 38 08 FD 79 8C FC 78 B6
0AD1:44 94 78 14 C4 51 10 87 90
0AD9:7E 80 04 15 3B 50 93 71 D2
0AE1:11 E3 B1 90 E1 51 10 87 B2
0AE9:40 21 20 D0 08 30 08 FC 85
0AF1:81 78 00 08 7C FF FF BC 06
0AF9:22 32 3C 16 8A 82 0E 00 0F
0B01:70 09 81 90 08 66 10 08 CC
0B09:18 92 3B 15 2E 23 15 55 06
0B11:54 7E 17 45 44 51 10 87 37
0B19:40 21 7A AA AD 7F FF FD FA
0B21:55 55 55 50 F1 C7 1D 8F 5F
0B29:9F 3A 78 7E E6 10 7C 28 2D
0B31:39 76 04 12 44 3C 40 04 BA
0B39:0A 01 78 11 B8 10 01 38 FA
0B41:11 28 04 28 44 6C 40 20 61
0B49:42 97 7C 3C 7E 3C 1E 42 1D
0B51:3C 0E EA 18 C8 08 00 00 4E
0B59:FF 4C 22 47 13 00 BE 90 E1
0B61:E1 51 10 C7 5F E5 53 43 B7
0B69:4F 52 45 65 80 00 30 30 4F
0B71:30 43 28 EA 89 9E 39 B5 13
0B79:50 C8 52 9E 34 AE B6 53 9B
0B81:45 43 55 52 B1 0E 20 8D 6E
0B89:A4 0E A2 00 CA D0 FD CE 2E
0B91:00 CF 84 1F 8A AD 21 29 94
0B99:FE A0 F7 A5 01 29 F9 92 DD
0BA1:A8 E0 FA 90 10 A9 D0 B2 28
0BA9:A9 38 A0 0F 28 B1 FA 91 37
0BB1:FC A1 06 FA 61 FA 68 24 F2
0BB9:80 A1 FB 18 A5 FC 69 01 6E
0BC1:85 FC A5 FD 69 00 85 FD C2
0BC9:A5 FB C9 D4 D0 DC ED 7F 8D
0BD1:B0 83 99 08 3A ED 80 9F FE
0BD9:FC 37 85 01 75 51 0E DC E6
0BE1:15 B7 88 BD D8 32 71 C5 95
0BE9:02 8D 22 53 08 8D 23 30 CA
0BF1:07 11 13 10 58 42 07 22 2F
0BF9:8F C0 88 1A 23 D6 1A DC 40
0C01:D1 FC 8D FF 23 FB 8D FE 16
0C09:B0 21 C0 B4 86 A3 35 08 5A
0C11:8D 8D 28 75 29 20 E3 2B 6C
0C19:39 91 2D 52 9F 91 A9 68 FB
0C21:8D 17 88 04 50 32 04 CC 37
0C29:44 72 D0 29 21 C0 03 40 FE
0C31:6A B1 47 8B 51 19 02 8E
0C39:08 CA E7 DB 0A 0B CF 8D 6C
0C41:0A 29 F7 A2 C1 1B 81 8D DC
0C49:12 D4 F2 D4 4B B0 80 A1 0B
0C51:48 C9 DC 20 AC 1D 78 96 FE
0C59:2A C4 24 83 41 AD F0 21 38
0C61:C9 F3 F0 0B A9 F3 B0 42 EA
0C69:06 08 8C F4 E4 38 14 1E B5
0C71:05 A2 01 4C 83 81 98 FA E7
0C79:8D FB F3 86 05 E8 CC E0 84
0C81:28 10 E2 A9 05 8D 2A D0 2C
0C89:8D 19 E0 F3 20 18 8A 04 84
0C91:C9 06 DA 08 1B CF AD 7C DB
0C99:62 80 00 0D 4D CD 30 26 FB
0CA1:F0 04 90 24 B0 08 AC CD 54
0CA9:D0 B4 B0 1A EE 5B 46 1C 9C

```

```

0CB1:30 18 39 19 69 4D C6 06 B4
0CB9:22 89 0C CE 11 AD 10 17 2A
0CC1:60 84 86 CE 87 AD 0C 97 8B
0CC9:25 E0 20 3A 41 CD 23 CF AB
0CD1:A6 CE 18 21 CF 26 8F 04 40
0CD9:86 DC 8D 05 C0 AA 8A 29 5D
0CE1:D0 AD 17 01 3A C1 38 AD B7
0CE9:22 E9 04 20 96 62 C0 1C EB
0CF1:CF D2 44 86 99 85 40 B9 B4
0CF9:88 99 85 40 C0 44 1C FF C0
0D01:00 60 0A 07 B9 2A CE 4A 43
0D09:68 60 44 83 EF 71 03 01 7C
0D11:AD 49 80 87 CA 7A 1E 40 99
0D19:AD 40 12 E0 A1 C9 1E 11 EB
0D21:10 AD 90 04 90 A8 C8 07 C0
0D29:20 CB 42 EE 5B AD 40 12 A1
0D31:C9 3A 28 37 30 8D C7 07 85
0D39:EE C6 FB A8 8C 8A 0A 20 49
0D41:64 42 AC FD 9F 98 12 F2 0A
0D49:AD 58 09 90 B9 91 47 62 7F
0D51:C8 4C 05 44 AD 42 0F C9 26
0D59:39 D0 6C EE DB 82 A6 8D 84
0D61:FE 9F C0 E1 02 43 91 C9 23
0D69:3C B0 60 E0 1E 3B 56 80 F2
0D71:C9 F9 D0 10 A9 F8 C0 0F CB
0D79:FD 39 0F F6 39 0F A9 F9 85
0D81:8D FD 99 04 FE 8D FC D6 54
0D89:F7 8D FA 07 8A 54 1B 84 33
0D91:1B 77 83 C3 A6 A2 1E CA 8A
0D99:23 11 3D F0 F0 05 C9 F1 61
0DA1:5C 6E 28 C9 38 4C 43 A0 41
0DA9:32 12 7C 00 39 05 D0 01 71
0DB1:D0 8D 03 52 FE F2 88 59 4B
0DB9:21 02 6B 73 4C 65 20 C5 87
0DC1:61 01 54 60 26 D1 0F 17 CE
0DC9:0A CE 02 12 FF 0F C8 1C E7
0DD1:40 00 92 31 14 07 CE 60 2C
0DD9:EE 96 AD 02 00 4D 90 38 75
0DE1:29 3E 32 62 03 4C B6 43 86
0DE9:51 A0 EE 91 1D 01 73 51 F0
0DF1:44 80 F9 8D B8 01 07 CF 0E
0DF9:AD 83 25 00 69 01 53 62 C8
0E01:08 CF 2C 81 CE 10 D0 2E 39
0E09:C3 A8 99 00 D4 C8 C0 18 C7
0E11:D0 F8 14 3F AB 46 66 31 BE
0E19:8A 0A FF 4F 67 31 9E 8A B9
0E21:A9 28 8D 0F 09 58 06 9C 11
0E29:C9 60 98 AA 20 3C 42 8A 01
0E31:A8 E2 F0 35 C0 C9 09 88 93
0E39:8A B2 DD AA 4C 0E 44 92 63
0E41:34 BD F5 45 C9 40 3A 2F EC
0E49:C0 07 B8 E6 C0 DB C8 E8 FC
0E51:C0 28 D0 E8 C5 F0 8F 59 EA
0E59:78 E4 88 4C 50 42 9D 9A 1C
0E61:E8 88 C0 B4 C1 11 BE C2 0A
0E69:E5 44 72 07 C8 A8 92 4C A2
0E71:52 44 60 43 2A 00 93 67 2B
0E79:C3 FA A7 70 09 9E 2C 46 37
0E81:78 1A E2 70 82 9C 1E 8D 14
0E89:22 BD 0E 0F 9C 9C 8D 12 6D
0E91:00 F0 09 E1 E5 9D 13 C9 BE
0E99:02 F0 1D 60 A9 D2 E1 00 06
0EA1:50 A0 05 F1 35 78 E4 34 57
0EA9:C4 56 A0 08 D7 90 32 8D 45
0EB1:23 CF A9 01 A2 5F A0 06 72
0EB9:4C 46 44 A9 06 D1 0B F1 30
0EC1:D9 99 41 4B 0E 89 16 D0 A1
0EC9:F5 60 05 75 05 46 CB 1C E5
0ED1:1D 9B 8D 54 98 0F 39 43 11
0ED9:42 97 E3 47 20 98 6B 6F 9F
0EE1:A0 9B 2B 61 44 32 05 2A CF
0EE9:40 DB 80 11 9E 4B E1 C2 E6
0EF1:23 E2 C2 4F 50 EB 0E 1A 0E
0EF9:BE 17 1E 68 50 93 81 9E 0F
0F01:11 31 23 31 9F CD 13 56 1C
0F09:49 54 59 C8 98 38 16 21 8B

```




PROGRAMS

0F11:66	C4	48	49	4B	1D	62	9A	5F	1171:A9	00	8D	15	D0	8D	10	D0	19	13D1:72	E6	A4	61	29	0C	0A	1A	3D
0F19:1A	83	5B	46	33	5D	D2	A5	4F	1179:F6	70	BF	13	11	21	00	F7	61	13D9:83	0B	78	64	9D	9A	15	2C	87
0F21:9F	B9	49	90	4D	53	3A	1A	F5	1181:5E	07	75	0C	64	04	00	FF	37	13E1:51	0A	13	B5	8C	89	E2	A5	E6
0F29:1F	91	03	46	45	57	53	D8	07	1189:9F	C1	8D	18	03	4C	12	52	E3	13E9:0B	79	22	69	60	D3	76	18	26
0F31:80	52	97	03	40	92	20	12	E5	1191:7A	E0	78	87	38	07	82	91	A7	13F1:36	60	E6	DF	4B	32	D8	0C	07
0F39:B2	EF	59	20	92	3C	F6	1C	69	1199:01	E8	7A	90	2A	C8	5A	B2	AA	13F9:81	08	69	52	0D	44	2F	83	90
0F41:1D	A2	50	1C	8A	A2	42	55	1B	11A1:78	A4	81	D0	78	BE	E2	75	60	1401:A2	D0	99	2D	47	27	03	1E	AF
0F49:54	C6	06	C0	AE	D8	45	47	BA	11A9:78	7A	7A	C8	AA	A5	13	A0	35	1409:86	0D	9D	0F	79	5A	0A	83	29
0F51:AB	14	81	6B	8E	28	49	53	2C	11B1:60	6A	70	00	C8	C9	41	5B	F7	1411:0E	C6	20	0F	1E	A1	5B	86	9B
0F59:53	A3	00	20	47	41	2E	8D	35	11B9:01	C8	82	81	6C	AC	12	07	38	1419:2E	45	64	CF	C5	FC	14	14	91
0F61:00	14	AA	52	05	02	72	32	46	11C1:50	03	DC	AA	1C	04	FF	B0	B4	1421:C5	CF	32	3C	3F	3E	F1	30	31
0F69:38	36	2A	E0	02	CE	20	2E	3E	11C9:82	80	05	28	51	14	EE	06	2F	1429:6C	FC	CC	4A	23	53	38	17	F2
0F71:C3	83	71	20	50	49	EF	1E	28	11D1:64	4A	83	70	07	A0	63	27	D8	1431:CF	AA	BD	0C	B4	62	C2	0E	27
0F79:DC	41	57	41	52	44	54	63	05	11D9:9C	08	7D	9B	C7	82	30	82	E0	1439:31	D8	08	81	2D	69	52	09	06
0F81:03	EA	8E	D0	8C	D4	22	B2	69	11E1:CD	2C	80	70	88	26	80	C0	AB	1441:C4	93	04	45	04	0E	0C	85	7B
0F89:0E	AC	E2	10	E2	52	64	09	69	11E9:3C	AA	30	70	8C	6D	04	08	0C	1449:A8	80	2A	09	C8	C8	C8	4C	03
0F91:4A	4D	9B	E8	8C	64	53	45	0C	11F1:79	82	52	06	CC	78	C9	88	80	1451:7E	50	86	CD	05	CF	F0	04	77
0F99:0B	B9	03	54	45	90	68	C1	CF	11F9:78	C0	7C	41	78	90	5A	B4	9B	1459:88	4C	8A	4C	2D	6E	B0	06	79
0FA1:B5	49	43	3A	CC	F0	90	DD	22	1201:6C	20	3C	50	02	09	25	78	E6	1461:63	10	07	D0	C8	B9	DF	49	63
0FA9:18	C8	28	29	2E	A0	27	53	33	1209:B4	C9	60	E6	7C	05	83	80	F3	1469:77	06	A9	DB	A9	05	12	99	E0
0FBL:07	54	4E	98	E2	A8	4E	13	25	1211:B0	AE	48	F8	90	87	C9	06	0E	1471:15	62	4E	87	C9	3E	F0	47	6F
0FB9:24	60	02	85	42	0D	F8	20	F2	1219:20	06	90	64	91	08	2C	DC	09	1479:93	71	4C	01	42	60	97	45	69
0FC1:55	42	36	8A	17	93	B9	CA	CF	1221:89	80	E0	E6	94	03	81	80	E8	1481:12	78	81	68	A2	69	A0	50	D3
0FC9:98	05	20	43	32	A2	52	66	D4	1229:F8	8D	F0	13	81	90	60	36	C1	1489:8E	52	10	8C	01	81	A1	02	AB
0FD1:55	4C	41	54	49	40	73	53	A0	1231:4C	00	AF	38	03	82	10	A0	D7	1491:21	63	68	18	69	6B	28	AD	A8
0FD9:A4	07	2E	20	48	41	56	4A	12	1239:68	05	82	40	60	65	02	82	46	1499:07	14	7A	08	C6	F0	8A	0E	37
0FE1:14	52	D9	55	68	38	41	4C	22	1241:70	AF	3A	04	82	B0	8C	36	37	14A1:4B	CA	DC	42	2C	38	B9	0D	44
0FE9:4C	3A	94	20	59	4F	55	12	16	1249:04	83	10	50	98	07	83	50	8F	14A9:99	D4	E0	24	71	4D	AD	2D	7B
0FF1:4D	45	4E	C6	4E	41	4E	E8	3B	1251:50	94	06	83	60	40	C2	CB	11	14B1:E9	92	E2	A9	FC	8D	FF	07	8F
0FF9:45	53	43	41	50	45	80	2B	CF	1259:04	08	40	50	01	B1	80	50	AE	14B9:AD	C1	0B	00	21	1D	67	04	DA
1001:C1	45	20	53	C6	42	60	A3	30	1261:90	43	80	A0	55	67	01	80	83	14C1:0A	38	E9	04	8D	17	B4	29	D5
1009:48	4F	4C	44	21	65	81	00	90	1269:D0	DD	94	C5	13	10	C8	C8	8F	14C9:04	43	91	00	A4	85	D8	2C	10
1011:11	11	72	4E	4F	57	2C	20	81	1271:81	40	AC	3A	00	81	A0	01	E7	14D1:0E	15	78	00	6F	0B	EE	A5	88
1019:46	4F	52	20	41	20	4C	4F	EE	1279:78	02	38	30	BE	65	18	50	70	14D9:10	DC	B0	0C	1F	2F	08	AD	8B
1021:4E	47	84	9E	52	49	50	20	2D	1281:8C	01	4D	82	A0	46	65	00	E6	14E1:04	D0	69	90	04	C5	02	4B	FC
1029:42	41	43	4B	20	54	4F	20	E8	1289:82	C0	C8	36	00	83	00	B4	5E	14E9:51	50	E8	2B	34	21	20	04	09
1031:45	41	52	54	48	2E	2E	2E	59	1291:36	01	83	30	F0	95	01	00	64	14F1:43	E0	11	8B	62	10	18	C5	18
1039:20	20	14	12	01	09	0E	05	62	1299:70	37	C9	FA	F1	C9	08	81	F4	14F9:10	39	81	92	35	02	0A	5C	F3
1041:12	A0	83	7F	00	85	A9	15	79	12A1:B4	E2	6A	06	8D	16	8F	01	6B	1501:36	84	4C	68	50	4C	53	50	22
1049:8D	18	E7	D7	21	70	B0	D0	AD	12A9:8D	17	C0	08	4F	E4	A7	C0	11	1509:4D	30	DB	4C	A8	50	EE	98	23
1051:CC	6C	16	0A	85	1A	2C	20	63	12B1:D8	D0	D9	60	02	1D	8D	0C	63	1511:AD	80	28	CD	22	CF	98	4B	E0
1059:50	56	30	50	02	0D	DB	A9	E7	12B9:3A	CA	90	9B	8D	0D	EA	81	71	1519:81	2F	0D	19	AD	30	12	00	55
1061:AA	2C	0B	5F	E0	30	00	0E	0F	12C1:A0	32	E6	C8	61	29	78	4D	E9	1521:0F	D9	E4	D4	81	B9	41	2C	D4
1069:67	03	03	38	1B	C0	06	D9	A3	12C9:A8	8D	08	10	4C	8D	07	81	CF	1529:9A	4D	20	13	43	EE	5A	00	B3
1071:00	C6	01	20	D5	B0	04	61	40	12D1:1D	80	88	48	8D	0B	D5	0F	8D	1531:0E	C9	03	AA	E2	0C	02	88	B3
1079:44	20	9B	44	D4	17	68	C7	17	12D9:8D	18	60	1A	20	71	82	A0	E4	1539:06	68	DC	C0	A1	30	02	69	63
1081:73	F2	20	E8	47	A5	C5	C9	D0	12E1:05	21	08	8D	06	B0	03	E8	8C	1541:EC	EF	4D	AB	B6	42	03	C2	C9
1089:16	0A	FE	77	04	F0	1A	8E	35	12E9:00	D4	8E	01	D4	A9	21	8D	42	1549:84	0F	C9	0E	B7	C9	0D	40	D2
1091:9C	2B	8C	0D	E8	E6	A9	93	F6	12F1:04	D4	60	86	FE	84	FF	A0	6C	1551:02	07	F0	31	C9	0B	F0	1F	EA
1099:20	D2	FF	8E	81	4C	00	49	ED	12F9:84	A2	30	86	FC	84	FD	AA	18	1559:4C	61	4E	E1	F8	41	09	3C	05
10A1:DE	3F	50	C0	02	50	54	00	11	1301:CA	E0	A2	C1	CF	11	8B	4A	59	1561:40	09	E2	9F	07	60	CE	57	F2
10A9:F8	50	EE	E4	08	40	CE	C9	2F	1309:3C	8E	4A	CA	4C	4A	9D	2E	0E	1569:CF	4E	50	19	87	4C	93	32	71
10B1:03	B4	65	97	38	28	44	CE	60	1311:70	30	FC	91	FE	D3	61	82	C0	1571:F1	93	86	CE	A6	A1	50	69	FC
10B9:4C	6F	C4	51	40	FF	9F	26	F0	1319:F7	A5	FE	BC	31	28	85	FE	84	1579:3D	10	58	F8	07	EE	E0	21	B7
10C1:D9	1B	47	99	10	04	B4	42	54	1321:A5	FF	28	43	FF	A5	FC	18	F8	1581:20	3F	10	06	47	EE	41	64	87
10C9:07	F2	4C	82	47	66	BB	71	98	1329:69	FC	A5	FD	D2	99	FD	E8	B9	1589:14	00	23	04	74	08	41	6D	16
10D1:FC	14	08	C9	C8	F0	00	B8	6D	1331:E0	06	D0	D6	D4	38	19	2B	B5	1591:FF	E3	2A	38	B2	60	77	72	F5
10D9:FC	9F	AD	DD	21	C9	F6	F0	03	1339:86	F8	84	F9	58	B1	FA	A6	37	1599:0D	C1	A4	82	15	11	01	0B	71
10E1:98	F6	86	14	A9	F7	64	F1	06	1341:F8	4A	F9	20	9E	4A	46	9C	95	15A1:A3	03	13	60	AA	20	63	A1	05
10E9:60	35	86	D8	45	C9	41	90	4A	1349:F8	69	0A	85	F8	A5	F9	01	33	15A9:23	59	C8	28	C8	07	4E	20	76
10F1:03	38	E9	40	A2	38	06	81	66	1351:38	43	F9	18	A5	FA	69	01	12	15B1:31	4E	4C	0F	E0	3C	C0	27	



PROGRAMS

G A Z E T T E COMMODORE 64/128

1631:E9	D2	05	CF	CE	0A	43	8A	54	1891:E4	30	CF	A9	0B	8D	86	02	72	1AF1:30	14	3A	30	00	56	F0	17	DF
1639:4E	A9	40	20	7D	34	01	9E	5E	1899:A9	93	20	D2	04	B9	1A	8B	7B	1AF9:C7	5D	06	C4	1C	37	19	0F	75
1641:F8	84	EE	E9	0C	52	4B	85	4D	18A1:08	3C	42	20	C5	E1	50	42	C7	1B01:19	1E	28	85	49	C6	53	1C	D0
1649:10	01	0F	A2	00	8E	82	25	2E	18A9:AE	25	CF	AC	26	CF	8E	04	D0	1B09:1A	04	0D	01	86	3C	C4	B1	5F
1651:86	50	60	EE	A2	87	82	01	09	18B1:CF	8C	05	CF	AD	29	91	74	34	1B11:53	10	64	3C	04	34	0F	75	C9
1659:46	04	1A	84	60	A9	08	8D	7C	18B9:04	18	CF	20	52	4B	AD	27	30	1B19:B8	02	04	04	04	09	B4	2E	C8
1661:20	CF	AD	1F	86	97	02	F0	C0	18C1:E0	05	00	D0	AD	28	CF	8D	EB	1B21:1B	03	02	0A	01	01	28	0A	EC
1669:1C	98	3B	88	01	01	F0	11	B8	18C9:01	D0	A9	FF	C6	3D	A9	00	62	1B29:0B	09	60	01	06	52	09	18	E6
1671:53	0D	6B	A4	09	1A	AD	05	53	18D1:8D	1E	D0	8D	1F	D0	20	D4	94	1B31:01	39	0D	09	C2	50	18	00	EF
1679:60	CE	05	D0	B6	CD	41	26	CC	18D9:3A	5E	AE	4D	20	68	43	20	B2	1B39:43	C6	08	08	00	0D	0C	0C	9C
1681:41	A1	20	01	B0	0D	85	0C	9B	18E1:48	00	5C	A1	41	20	DC	42	62	1B41:01	58	02	02	02	12	88	7D	55
1689:E9	3A	6E	AD	45	CD	0A	CF	27	18E9:A9	02	20	4A	40	20	F4	40	C4	1B49:85	82	C8	9C	99	89	B9	96	C2
1691:F0	05	B0	03	0C	78	71	D1	B4	18F1:B9	86	4F	20	D8	51	4C	99	CA	1B51:60	98	80	F4	2B	80	8A	69	17
1699:2C	D4	08	00	0A	07	0B	D0	65	18F9:52	FF	00	FF	00	72	08	50	7D	1B59:B8	55	BA	96	1A	30	90	84	39
16A1:A2	14	4C	4E	77	AD	1E	68	A9	1901:85	FB	69	19	85	25	A9	07	CE	1B61:E8	A9	1E	9A	A9	E9	3F	00	57
16A9:41	F0	4F	C9	81	F0	21	C9	15	1909:85	FC	69	53	85	26	18	A9	3E	1B69:BF	AF	B6	A5	D0	30	FE	FA	DC
16B1:21	F0	D2	C9	11	F0	61	C9	7A	1911:BC	65	FB	85	27	A9	7F	65	11	1B71:D0	42	5A	A5	A5	A5	AF	BF	29
16B9:12	F0	48	C9	09	F0	3E	C5	1F	1919:FC	85	28	A2	FF	A0	00	8C	69	1B79:7D	5A	5A	5A	5A	FE	00	00	C9
16C1:05	AF	0C	3D	C9	05	F0	A2	98	1921:A7	02	8C	A8	02	F0	04	B1	51	1B81:00	59	59	69	65	55	55	64	5F
16C9:C9	22	F0	A4	C9	0A	F0	AB	CF	1929:25	91	27	C6	25	E4	25	30	DA	1B89:54	18	18	14	2C	D0	76	10	D5
16D1:60	AD	A2	47	C9	F0	10	F5	F3	1931:FC	41	26	C6	27	E4	27	D0	4F	1B91:30	30	14	A5	4C	F4	05	50	59
16D9:8D	E7	DB	A2	64	CB	93	F0	D6	1939:02	C6	28	C6	FB	E4	FB	D0	CB	1B99:2B	80	00	90	98	28	AE	6D	BE
16E1:F3	D0	AD	0B	CF	80	0D	AE	EB	1941:E6	C6	FC	E4	FC	D0	E0	A5	19	1BA1:29	B8	00	01	06	10	01	29	46
16E9:18	CF	E0	20	B0	40	21	B8	C4	1949:28	C9	A0	B0	FA	35	34	85	75	1BA9:E6	84	96	20	F8	86	DC	10	F4
16F1:41	60	98	82	10	5A	5D	51	08	1951:38	A5	27	85	33	85	37	4C	B0	1BB1:10	60	4C	22	23	04	10	06	03
16F9:4C	9D	50	4C	A8	C0	53	20	91	1959:00	40	02	53	78	8B	0C	91	AC	1BB9:02	03	2A	FC	A0	46	DD	DD	7B
1701:E3	C3	A0	04	B8	A6	A2	C8	6B	1961:60	40	80	43	0B	3E	41	30	60	1BC1:00	15	42	CF	A3	22	18	19	71
1709:20	83	8C	FF	8D	FC	B3	1F	A0	1969:5E	83	07	07	87	87	B2	01	B9	1BC9:D0	51	54	CC	11	51	08	84	76
1711:20	08	12	22	09	09	82	50	77	1971:08	D2	D4	83	35	30	3A	E2	F0	1BD1:D0	4F	68	7E	0B	01	98	07	CD
1719:A9	FA	4C	53	22	AC	17	E2	6E	1979:78	00	49	60	DC	09	8E	DE	1E	1BD9:01	91	F1	05	4F	86	01	4D	67
1721:01	99	0C	CF	41	9E	CE	46	1D	1981:0C	EA	62	E2	8E	39	3A	DE	9D	1BE1:0C	1D	30	0A	0A	C8	8C	D9	72
1729:AD	40	06	20	A0	02	4C	05	AB	1989:E2	78	02	1C	33	45	0B	80	92	1BE9:0D	53	68	E0	C1	4E	94	C7	CE
1731:44	AD	19	07	77	87	5A	B0	BF	1991:78	40	03	38	C3	8E	39	10	CE	1BF1:01	64	6D	D4	14	05	19	01	A4
1739:B9	4F	A2	01	20	E0	43	A9	31	1999:21	20	EE	0A	50	C0	F1	1A	66	1BF9:4E	4F	4F	C6	B5	B1	BD	E4	56
1741:F5	8D	FA	2F	B9	50	A5	F0	6B	19A1:0D	85	E2	29	03	26	63	0C	2E	1C01:21	00	DF	C5	4C	A1	84	4E	62
1749:C4	04	23	05	20	B8	CF	A9	3B	19A9:74	F8	76	78	FC	76	78	28	85	1C09:37	27	75	4C	C4	71	06	C2	D4
1751:32	20	AB	60	A9	B6	43	4C	17	19B1:00	83	21	C3	21	3E	8F	3A	C1	1C11:0D	72	4C	41	48	0E	08	D6	6B
1759:26	42	A9	79	80	0F	A9	0A	95	19B9:7E	41	70	C4	A1	14	8C	47	93	1C19:8D	A3	4F	9C	84	3B	8C	A0	7F
1761:8D	27	95	12	02	C2	20	48	97	19C1:D8	31	1B	0C	F9	36	C0	41	26	1C21:4F	F3	5A	0C	64	BC	14	39	81
1769:4A	A9	96	D1	3E	14	02	45	A2	19C9:3F	87	50	1C	F0	01	08	5B	88	1C29:85	C5	41	4E	03	78	C0	C4	E2
1771:44	46	02	64	14	0C	19	19	F5	19D1:35	0A	42	16	62	23	8E	4B	D2	1C31:43	4E	43	83	14	44	34	02	5B
1779:40	EE	D1	30	82	5A	89	CE	20	19D9:10	92	00	0B	A1	1C	36	9E	33	1C39:45	46	95	03	14	14	02	42	BF
1781:68	22	A9	0C	8D	E6	90	0F	97	19E1:A1	31	00	6D	70	0D	39	1E	50	1C41:47	48	56	50	8C	65	44	14	95
1789:8D	25	D0	00	35	36	6E	31	72	19E9:EA	30	03	C6	02	88	C9	39	69	1C49:76	19	62	05	5D	46	14	4C	18
1791:51	B2	8A	80	9F	51	A9	27	2B	19F1:22	0B	86	0C	8D	38	A4	82	A2	1C51:41	57	44	A3	06	07	4A	22	C5
1799:03	A9	00	20	FB	72	4C	62	5A	19F9:21	17	38	1E	8E	70	2C	18	15	1C59:4D	4E	4E	D0	A5	40	C8	23	85
17A1:52	AD	FF	9F	C9	81	BB	80	AA	1A01:E6	A0	88	1D	BE	73	DC	07	38	1C61:01	38	1E	07	1B	76	4D	F2	9C
17A9:CE	82	08	AD	48	C9	2F	02	85	1A09:EE	4C	03	23	00	E6	32	5C	B6	1C69:5B	B4	65	54	14	09	90	9B	EF
17B1:09	30	8D	DB	07	A9	E8	8D	1E	1A11:E3	88	CC	D8	04	34	D0	E1	F4	1C71:01	06	35	A0	53	08	00	01	18
17B9:67	F0	5E	20	0F	48	33	DC	82	1A19:02	2A	81	F0	02	3A	7C	E3	ED	1C79:88	41	4B	D1	51	E1	B1	9B	DD
17C1:29	10	C9	00	D0	F7	01	4E	78	1A21:E0	2B	64	E7	F8	07	1C	78	30	1C81:E2	41	B0	11	50	50	50	60	67
17C9:AD	0D	D0	18	69	06	8D	5B	87	1A29:20	6E	A0	E1	97	71	90	F1	D0	1C89:60	45	00	04	42	08	58	A1	08
17D1:70	0D	AD	01	DE	AD	04	2A	21	1A31:0E	3A	30	22	C7	18	30	DE	01	1C91:73	C7	42	1D	19	49	30	9F	
17D9:00	62	AD	1F	8D	97	60	AD	AE	1A39:2B	3C	14	60	7F	8E	A5	82	9E	1C99:12	41	42	43	42	A7	05	5C	BE
17E1:00	2A	00	60	AD	01	52	84	3B	1A41:05	C4	EA	06	77	D1	3D	47	AB	1CA1:41	4D	01	E4	F5	14	2F	B0	4B
17E9:DF	01	26	A8	20	21	4A	AD	5F	1A49:43	1C	DA	1B	1A	19	0D	01	83	1CA9:41	20	03	4C	4D	A4	44	4C	81
17F1:D4	C9	04	A4	83	AD	D1	07	45	1A51:39	0C	B0	00	83	D0	78	C8	54	1CB1:4C	62	57	4D	F7	34	CD	4C	E0
17F9:C9	30	56	AD	4C	2D	48	8B	F1	1A59:C0	81	87	62	6F	8E	87	0D	37	1CB9:93	10	07	44	1C	39	19	10	EC
1801:03	6A	04	07	44	06	40	04	FC	1A61:BF	42	A0	78	03	47	10	6F	66	1CC1:41	4C	74	00	2C	4D	F2	43	FB
1809:02	44	08	40	04	1C	44	09	72	1A69:0B	39	03	0A	32	90	71	B7	E0	1CC9:44	43	4D	4E	4D	4C	41	58	F9
1811:40	04	17	44	19	40	04	21	7C	1A71:41	91	31	9A	A1	90	F1	93	41	1CD1:44	4D	80	3C	43	41			



PROGRAMS

K E I T H G R O C E

Devices to time and activate alarms for multiple events can be costly. Why buy one when your 64 can do the job, plus provide features to make things even easier?

AlarmCALC can monitor up to five events, each with different starting and stopping times. These times are displayed in a table along with the duration of each event. This program is a useful timer for general use, such as cooking or photographic processing.

The display table also contains a memo area where text may be entered to describe or name each event. Alarms can be enabled for the starting and/or stopping time for any event. Each alarm is announced by a bell and/or the flashing memo.

Getting Started

AlarmCALC consists of a BASIC program and a machine language subroutine. To help eliminate typing errors, enter the BASIC program with *The Automatic Proofreader* and the machine language program with *MLX* (see "Typing Aids" elsewhere in this section). When *MLX* prompts you, respond with the values given below.

Starting address: C083

Ending address: C47A

The BASIC program loads the machine language program, so be sure to save the latter with the filename *ALARMCALC.ML*.

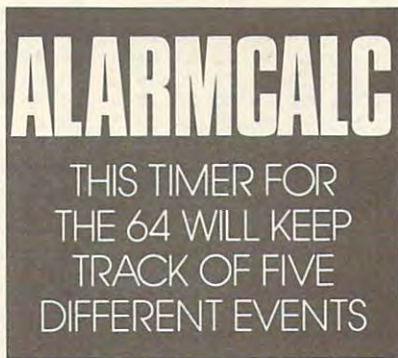
Using AlarmCALC

When you load and run *AlarmCALC*, you'll be asked to enter the current time. Enter the time in HH,MM,AM/PM format. For example, 10:35 in the evening would be entered as 10,35,PM. After the time has been entered, a table of alarm settings and memos will appear. The active cell in the table is highlighted in light green. Use the cursor keys to move the highlight.

Any of the three categories for an event (starting time, stopping time, or time difference) can be set. Use the plus (+) or minus (-) key to change

the minutes; press the plus or minus key while holding down the Shift key to change the hours.

Enable the alarms by moving to the asterisk (*) column next to the Start or Stop times. Press the F key to enable a flashing alarm, or press the B key to enable a flashing alarm with a bell. Type any short message you want in the memo column, and in any other column, press the Q key to stop the program.



AlarmCALC automatically sets the duration of an event whenever you set the starting and stopping times. Conversely, if you enter any two events, such as a stopping time and the duration, *AlarmCALC* will automatically calculate the third event. In this case, the starting time. This allows you to enter times in the most meaningful way. For example, suppose you want to have dinner at 6:18 p.m., and your roast needs to bake for an hour and 12 minutes. You would enter 6:18 p.m. for the stopping time and 1:12 for the time of duration. The starting time would be set automatically at 5:06 p.m. Enable the Start Alarm option and make a memo, and you'll be reminded to put the roast in on time. Enable the Stop Alarm option, and you'll be reminded when to take it out.

ALARMCLAC PROGRAM 1

KH 0 REM COPYRIGHT 1991 COMPUTE PUBLICATIONS INTL LTD - ALL RIGHTS RESERVED

```
AP 10 IFA=0THENA=1:LOAD"ALARMCALC.ML",8,1
KG 20 POKE53280,0:POKE53281,0
RB 30 TT$="{CLR}ALARMCALC (C)1991 COMPUTE PUBLICATIONS {DOWN}"
EP 40 PRINTCHR$(14);CHR$(154);TTS
FS 50 INPUT"hour,minute,am/pm";H,M,AS
DQ 60 H%=H/10:HH=H%*16+H-H%*10-128*(LEFT$(AS,1)="P"):IFH=12THENHH=164-HH
KQ 65 POKE56331,HH
EJ 70 M%=M/10:POKE56330,(M%*16+M-M%*10):POKE56329,0:POKE56328,0
PA 80 PRINTTTS:PRINTTAB(3);"USE CRSR KEYS TO MOVE HIGH LIGHT,{DOWN}"
SP 85 PRINT"Q TO QUIT/RESET, + - SHIFT TO SET TIMES {DOWN}"
GC 90 PRINTTAB(14);"{A}***** **{S}"
AM 100 PRINTTAB(14);"-00:00:00 A-"
HF 110 PRINTTAB(14);"{Z}***** **{X}"
FQ 120 PRINT"{A}*****{R}*** **{R}*****{R}***** **{S}"
RC 130 PRINT"- START *-TIME - {SPACE}STOP{2 SPACES}* - {4 SPACES}MEMO {5 SPACES}="
AC 140 PRINT"{Q}*****{R}***** **{R}***** **{W}"
RK 150 FORR=1TO9
ME 160 IF(RAND1)THENPRINT"-12:00A-X-00:00-12:00A-X- {13 SPACES}=":GOTO180
XC 170 PRINT"{Q}***** **{R}***** **{W}"
MR 180 NEXT
GJ 190 PRINT"{Z}*****{E}*{E}* **{E}*****{E}*{E}***** **{X}{DOWN}"
CG 200 PRINT"{2 SPACES}* X=OFF , F=FLASH, B=BELL AND F LASH"
DS 210 POKE650,128:SYS49365:POKE650,0
```

ALARMCLAC PROGRAM 2

```
C083:12 20 20 20 20 20 20 20 FD
C08B:20 20 20 20 20 5F 92 00 CE
C093:43 53 63 73 83 03 03 03 60
C09B:03 03 03 03 03 03 03 00 1A
C0A3:03 02 01 00 02 01 02 00 5F
C0AB:00 01 00 00 01 00 01 0C 83
C0B3:0E 10 12 14 01 08 0A 10 10
```




PROGRAMS

GAZETTE COMMODORE 64/128

C0BB:17 19 42 01 01 46 01 00 8A	C203:A4 FD C0 05 D0 02 A9 99 3E	C34B:BD C0 48 C8 B9 BD C0 48 06
C0C3:58 00 00 2B 2D DB DD 00 B8	C20B:20 D2 FF BD B2 C0 AA A0 BF	C353:A4 FE B9 CA C0 A8 E0 04 3F
C0CB:03 06 09 0C 91 12 01 11 1A	C213:19 18 20 F0 FF A4 FB B9 82	C35B:D0 01 C8 68 99 2D C0 68 96
C0D3:92 81 A2 4F A0 3F BD 43 09	C21B:93 C0 A0 C0 20 1E AB A6 32	C363:99 1E C0 4C 2E C2 A0 03 DC
C0DB:C0 99 43 C0 CA 88 10 F6 28	C223:FB E8 E0 05 90 D2 60 A9 87	C36B:D9 C6 C0 F0 04 88 10 F8 14
C0E3:A9 00 A2 3C 9D 00 C0 CA 8B	C22B:9A D0 02 A9 99 48 A6 FE 47	C373:60 84 FB BD A2 C0 85 FC C7
C0EB:10 FA A9 12 A2 00 9D 0F E9	C233:BD B2 C0 AA A4 FD B9 B7 4F	C37B:8D 3C C0 20 D2 C3 A4 FE E0
C0F3:C0 E8 9D 0F C0 E8 E8 E0 11	C23B:C0 A8 18 20 F0 FF 68 20 C8	C383:B9 98 C0 C5 FC D0 03 B9 6D
C0FB:0F 90 F3 A2 18 9D 00 D4 DD	C243:D2 FF A4 FE A6 FD E0 05 AA	C38B:9D C0 AA A8 B9 CA C0 18 84
C103:CA 10 FA A9 2A 8D 01 D4 48	C24B:D0 08 B9 93 C0 A0 C0 4C 02	C393:65 FC A8 B9 A6 C0 85 FC FD
C10B:A9 F7 8D 06 D4 A9 0F 8D 6C	C253:1E AB A4 FE B9 CA C0 A8 7A	C39B:E0 01 D0 06 A5 FB 49 01 FE
C113:18 D4 A9 01 8D 3E C0 A9 AD	C25B:E0 01 F0 05 E0 04 D0 16 CE	C3A3:85 FB A4 FE B9 98 C0 CD F0
C11B:00 8D 3D C0 85 FE 85 FD E6	C263:C8 B9 2D C0 D0 08 B9 1E A5	C3AB:3C C0 F0 99 99 9D C0 AD A2
C123:20 2E C2 20 34 C1 20 86 0C	C26B:C0 D0 06 A9 D8 2C A9 C2 6E	C3B3:3C C0 99 98 C0 20 D2 C3 36
C12B:C1 20 A2 C2 C9 FF D0 F3 FB	C273:2C A9 C6 4C D2 FF E0 02 71	C3BB:A6 FD 8E 3C C0 A6 FC BD 04
C133:60 A0 03 B9 08 DC 99 3F 31	C27B:D0 10 C8 C8 B9 0F C0 29 C7	C3C3:A2 C0 85 FD 20 2A C2 AE 3B
C13B:C0 88 10 F7 18 A2 07 A0 BC	C283:7F 20 74 C1 B9 0F C0 4C 17	C3CB:3C C0 86 FD 4C 2E C2 A4 97
C143:0F 20 F0 FF A9 9A 20 D2 3F	C28B:6D C1 E0 03 D0 01 C8 20 C0	C3D3:FE B9 CA C0 18 65 FC A8 A7
C14B:FF AD 42 C0 29 7F 20 74 8A	C293:7F C2 B9 0F C0 30 03 A9 28	C3DB:F8 A6 FB F0 7F CA F0 69 8A
C153:C1 AD 41 C0 20 6D C1 AD 3F	C29B:C1 2C A9 D0 4C D2 FF 20 1D	C3E3:CA F0 31 B9 0F C0 A6 FC 94
C15B:40 C0 20 6D C1 AD 42 C0 14	C2A3:E4 FF D0 01 60 C9 11 D0 E2	C3EB:E0 02 F0 1E A2 05 DD CF 19
C163:30 03 A9 C1 2C A9 D0 4C 07	C2AB:11 20 2A C2 A6 FE E8 E0 17	C3F3:C0 F0 10 CA E0 03 D0 01 7C
C16B:D2 FF 48 A9 3A 20 D2 FF F3	C2B3:05 90 02 A2 00 86 FE 4C AE	C3FB:CA E0 00 D0 F1 38 E9 01 73
C173:68 48 4A 4A 4A 4A 09 30 E8	C2BB:2E C2 C9 1D D0 11 20 2A 49	C403:4C 47 C4 CA BD CF C0 4C C4
C17B:20 D2 FF 68 29 0F 09 30 12	C2C3:C2 A6 FD E8 E0 06 90 02 E4	C40B:47 C4 38 E9 01 10 35 A9 6B
C183:4C D2 FF AE 3D C0 E8 8E 1A	C2CB:A2 00 86 FD 4C 2E C2 C9 BD	C413:23 4C 47 C4 B9 0F C0 A6 A8
C18B:3D C0 E0 2D B0 01 60 A9 C0	C2D3:91 D0 0F 20 2A C2 A6 FE E2	C41B:FC E0 02 F0 1E A2 00 DD 04
C193:00 8D 3D C0 AD 3E C0 49 5F	C2DB:CA 10 02 A2 04 86 FE 4C B9	C423:CF C0 F0 10 E8 E0 02 D0 83
C19B:01 8D 3E C0 A0 00 A2 00 21	C2E3:2E C2 C9 9D D0 0F 20 2A 71	C42B:01 E8 05 D0 F1 18 69 C3
C1A3:06 FC A9 00 85 FB BD 0F 85	C2EB:C2 A6 FD CA 10 02 A2 05 BB	C433:01 4C 47 C4 E8 BD CF C0 24
C1AB:C0 CD 42 C0 D0 16 BD 00 B1	C2F3:86 FD 4C 2E C2 A6 FD E0 36	C43B:4C 47 C4 18 69 01 C9 24 DD
C1B3:C0 CD 41 C0 D0 0E BD 1E 97	C2FB:05 D0 2D C9 20 90 08 C9 97	C443:D0 02 A9 00 99 0F C0 D8 4E
C1BB:C0 F0 09 85 FB BD 2D C0 47	C303:81 90 05 C9 A0 B0 01 60 D6	C44B:60 B9 00 C0 D0 08 A9 59 D2
C1C3:F0 02 85 FC E8 AD 3D C0 F9	C30B:48 A4 FE B9 93 C0 85 FB 02	C453:99 00 C0 4C E6 C3 38 E9 27
C1CB:49 01 8D 3D C0 D0 D7 A5 58	C313:A9 C0 85 FC A0 02 B1 FB 8C	C45B:01 4C 71 C4 B9 00 C0 C9 0C
C1D3:FB F0 08 AD 3E C0 F0 03 47	C31B:88 91 FB C8 C8 C0 0D 90 4B	C463:59 D0 08 A9 00 99 00 C0 90
C1DB:A9 12 2C A9 92 99 43 C0 1B	C323:F5 88 68 91 FB 4C 2E C2 1E	C46B:4C 17 C4 18 69 01 99 00 7D
C1E3:18 98 69 10 A8 E8 E0 0E 80	C32B:C9 51 D0 03 A9 FF 60 E0 25	C473:C0 D8 60 00 00 00 00 9F
C1EB:90 B8 A5 FC F0 05 AD 3E 9F	C333:04 F0 04 E0 01 D0 2F A0 D1	
C1F3:C0 09 10 8D 04 D4 A2 00 AD	C33B:00 D9 BD C0 F0 08 C8 C8 FE	
C1FB:86 FB A9 9A E4 FE D0 08 6D	C343:C8 C0 09 90 F4 60 C8 B9 FD	

M I L T O N J O H N S O N

Word Find 3D is a word puzzle-generator capable of creating two- and three-dimensional puzzles. These puzzles print the words horizontally, vertically and diagonally, hiding them within a matrix of random letters. They're in plain sight, but they're hard to spot.

Depending on the level of difficulty you select, *Word Find 3D* can handle between 15 and 150 words, with words up to 15 characters in length. You've probably seen this kind of puzzle in books or magazines.

At level 1 the program creates a puzzle 20 columns wide by 20 rows high and can handle up to 15 words. At this level words are stored in one of eight directions: up, down, left, right, and diagonally up and to the right, down and to the right, up and to the left, and down and to the left.

At level 2 you can create a three-dimensional puzzle consisting of ten separate 20 x 20 puzzle layers. The ten separate layers are stacked one on

WORD
FIND 3D

GENERATE WORD
PUZZLES WITH THIS
OUTSTANDING
PROGRAM FOR
THE 64

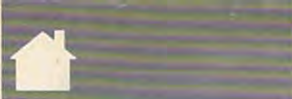
top of each other like a layer cake, with layer 1 on top and layer 10 on the bottom. Up to 150 words may be en-

tered. They'll be scattered across the ten layers in the eight directions mentioned above.

On level 3 the program creates a ten-layer puzzle similar to that on level 2, and it, too, can handle up to 150 words. Things get really tough here. Level 3 words are placed in the basic eight directions mentioned above plus two more directions, ascending and descending.

Words that are stored in the ascending direction start at a lower layer and work their way to an upper layer. For example, if the word *cake* were entered in an ascending direction on layer 10 (the bottom layer) with the letter *C* at column A, row A, then the letter *A* would be found at column A, row A on the next layer up (layer 9), and so on.

The descending direction is just the opposite; words start at an upper layer and work their way straight down. In all levels, the direction of each word is chosen randomly.



PROGRAMS

Getting Started

Word Find 3D is written entirely in machine language, but it loads and runs like a BASIC program. Enter the program with *MLX*, our machine language entry program; see "Typing Aids" elsewhere in this section. When *MLX* prompts you, respond with the values given below.

Starting address: 0801

Ending address: 1900

Be sure to save a copy of the program before exiting *MLX*.

When the program begins, the opening screen appears with the three difficulty levels explained. Select a difficulty level by pressing 1, 2, or 3. You'll then be prompted to enter a word. At this prompt, type in a word up to 15 letters in length, ending with a return. Words may contain only the letters A-Z, with no spaces or punctuation marks.

When you've entered all the words you want, press the Return key again. At this point, the screen will blank briefly while your puzzle is being generated.

Starting to Play

After your puzzle has been created, you'll be presented with the main screen. On the bottom two lines, you'll find the status of your puzzle, indicating the number of words you've entered, the number of words you've found, the current layer of the puzzle you're viewing, and the difficulty level you've chosen.

In the upper left corner of the screen, you'll see a list of eight options. More about these later.

In the upper right portion of the screen, you'll see a 20 x 20 matrix of letters in black. Surrounding this matrix will be the letters A-T in blue. These letters indicate the columns (across) and rows (down) and are used to solve the puzzle when you locate hidden words.

About Those Options

Access the first option, Print, by pressing P. This will send to the printer all ten layers of the puzzle followed by a complete list of the words you've entered. This listing will take two sheets of paper. Make sure your printer is on before you start to print. A number will be printed after each word. This

number indicates in which layer the word appears in the puzzle. Each layer is also numbered. *Word Find 3D* will always print a ten-layer puzzle, even on difficulty 1.

The second option, Give Up, may be accessed by pressing G. You'll be prompted to press G again if you really want the program to solve the puzzle for you. All the words in the puzzle will then be highlighted.

The third option, Help, may be accessed by pressing H. This prints a list of all the words that can be found on the current puzzle layer.

Press U to move up a layer. This option only works on levels 2 and 3 and is used to move up from a lower layer to an upper layer. For example, if you were currently on layer 6 and you pressed U, layer 5 would appear on the screen.

The fifth option, Layer Down, may be accessed by pressing D. This option moves you down a layer.

Access the sixth option, Solve Word, by pressing the S key. Use this option when you've located a hidden word. You'll be asked to enter the starting row of the word you've found. This is the letter on the right side of the puzzle. You'll then be asked to enter the starting column of the word. This is found at the bottom of the puzzle. If you're correct, the word will be highlighted in the puzzle. Also, words found in the status section will be incremented by 1. If you were not correct, the program will inform you. Press any key to continue.

The seventh option, Restart, may be accessed by pressing R. Use this to start the program over.

The last option, Quit, may be accessed by pressing Q. This option will reset the computer.

WORD FIND 3D

```

0801:0B 08 0A 00 9E 32 30 36 2E
0809:31 00 00 00 4C 6A 0A A9 7B
0811:80 85 FE A9 00 85 FD 85 D4
0819:83 85 74 85 79 A8 91 FD C2
0821:C8 D0 FB E6 FE A6 FE E0 29
0829:A0 F0 02 D0 F1 60 A0 00 65
0831:84 7A 20 E4 FF A4 7A C9 C5
0839:00 F0 F7 C9 0D F0 1B C9 4D
0841:14 F0 1A C9 41 30 EB C9 E3
0849:5B A4 7A 91 B4 20 D2 FF 64
0851:C8 84 7A C0 0F F0 03 4C D0
0859:33 08 84 7A 60 A4 7A C0 88
0861:00 F0 08 88 20 D2 FF A9 2D
0869:00 91 B4 84 7A 4C 33 08 30
0871:A9 00 85 B4 7A 80 85 B5 62
0879:A9 F8 85 FD A9 8E 85 FE BE
0881:A2 18 A0 26 18 20 F0 FF 82

```

```

0889:A9 C2 85 C3 A9 08 85 C4 49
0891:20 79 12 20 2F 08 C0 00 6F
0899:F0 26 98 A0 00 91 FD E6 F1
08A1:74 A5 74 C5 86 F0 19 A5 10
08A9:B4 18 69 10 85 B4 90 02 6A
08B1:E6 B5 A5 FD 18 69 01 85 25
08B9:FD 90 02 E6 FE 4C 89 08 DF
08C1:60 FE 30 14 0D 45 4E 54 77
08C9:45 52 20 41 20 57 4F 52 78
08D1:44 20 2D 3E 20 00 93 8E 4C
08D9:08 90 FF 10 D7 58 4F C6 98
08E1:58 4F 58 4F 0D FF 10 58 D2
08E9:CF 58 C9 58 4F B3 C4 0D 96
08F1:FF 10 58 4F D2 CE 58 4F D7
08F9:58 4F 0D FF 10 58 4F 58 84
0901:C4 58 4F 58 4F 0D FF 10 B9
0909:58 4F 58 4F 58 4F C2 4F EF
0911:0D FF 10 58 4F 58 4F 58 04
0919:D9 58 4F 0D FF 10 58 4F 29
0921:58 4F 58 4F 58 CA 0D FF 3B
0929:10 58 4F 58 4F 58 4F 58 9B
0931:CF 0D FF 10 58 4F 58 4F 6F
0939:58 4F 58 C8 0D FF 10 58 C3
0941:4F CD C9 C8 D4 CF CE 0D 05
0949:FF 10 58 4F 58 4F 58 4F 5F
0951:58 D3 0D FF 10 58 4F 58 FE
0959:4F 58 4F 58 CF 0D FF 10 5B
0961:58 4F 58 4F 58 4F 58 CE F2
0969:0D 0D FF 0B 1E 44 49 46 D0
0971:46 49 43 55 4C 54 59 20 3D
0979:4C 45 56 45 4C 53 0D FF EB
0981:12 1F 4C 45 56 45 4C 20 C2
0989:31 0D 1E 55 53 45 20 4F CF
0991:4E 4C 59 20 54 48 45 20 79
0999:54 4F 50 20 4C 41 59 45 15
09A1:52 20 4F 46 20 54 48 45 5B
09A9:20 50 55 5A 5A 4C 45 0D CB
09B1:FF 0A 28 4D 41 58 20 31 FC
09B9:35 20 57 4F 52 44 53 29 C1
09C1:0D FF 12 1F 4C 45 56 45 F7
09C9:4C 20 32 0D 1E 55 53 45 53
09D1:20 41 4C 4C 20 54 45 4E 0D
09D9:20 4C 41 59 45 52 53 20 87
09E1:42 55 54 20 4B 45 45 50 41
09E9:20 45 41 43 48 20 57 4F 7A
09F1:52 44 0D 20 4F 4E 20 4F 25
09F9:4E 45 20 4C 41 59 45 52 99
0A01:0D FF 12 1F 4C 45 56 45 39
0A09:4C 20 33 0D 1E 55 53 45 B4
0A11:20 41 4C 4C 20 54 45 4E FE
0A19:20 4C 41 59 45 52 53 20 48
0A21:41 4E 44 20 41 4C 4C 4F 17
0A29:57 20 57 4F 52 44 53 0D 28
0A31:20 54 4F 20 41 53 43 45 79
0A39:4E 44 20 41 4E 44 20 44 A5
0A41:45 53 43 45 4E 44 0D 1F 46
0A49:50 4C 45 41 53 45 20 53 98
0A51:45 4C 45 43 54 20 41 20 BD
0A59:4C 45 56 45 4C 00 A9 D7 91
0A61:85 C3 A9 08 85 C4 4C 79 30
0A69:12 20 10 08 A9 5B 8D 11 F7
0A71:D0 A9 01 85 84 8D 20 D0 3C
0A79:A9 0F 8D 21 D0 A9 0E 8D C0
0A81:23 D0 A9 FF 8D 06 DD A9 7A
0A89:01 8D 0F 2D 20 5F 0A 20 F3
0A91:E4 FF C9 00 F0 F9 38 E9 1B
0A99:30 C9 01 30 F2 C9 04 10 32
0AA1:EE 85 73 C9 01 F0 07 A9 1D
0AA9:96 85 86 4C B3 0A A9 0F 28
0AB1:85 86 A9 F0 85 C3 A9 0A 07
0AB9:85 C4 20 79 12 20 71 08 59
0AC1:20 DE 0C A5 73 C9 03 30 72
0AC9:07 A9 0B 85 85 4C D5 0A 98
0AD1:A9 09 85 85 20 9E 0C 20 B9
0AD9:F4 0C 20 1B 13 20 2B 0C 9C
0AE1:A9 0F 8D 21 D0 20 E9 0C 39

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0AE9:A9	FF 85 83 4C 9A 13 FE AD	0D51:AC	0E C9 04 D0 03 4C 26 10	0FB9:76	20 7B 0C 91 AA 20 E4 A7
0AF1:78	14 FE 50 14 FE 50 14 7D	0D59:0F	C9 05 D0 03 4C 9C 0F AC	0FC1:12	A0 00 B1 B4 F0 03 4C E7
0AF9:FE	50 14 FE 50 14 0D 00 01	0D61:C9	06 D0 03 4C 17 10 C9 D4	0FC9:2F	0D C6 7F F0 0E A5 B4 53
0B01:13	1F 57 4F 52 44 20 46 72	0D69:07	D0 03 4C 8F 10 C9 08 B8	0FD1:38	E9 13 85 B4 B0 02 C6 74
0B09:49	4E 44 20 33 44 FF 1A A6	0D71:D0	03 4C 0F 11 C9 09 D0 C1	0FD9:B5	4C C2 0F A5 7C 85 B4 0E
0B11:41	0D 05 20 4F 50 54 49 5B	0D79:03	4C 7F 11 4C F8 11 E6 78	0FE1:A5	7D 85 B5 A0 00 84 7F CB
0B19:4F	4E 53 FF 1E 1F 42 0D D3	0D81:7A	CA D0 AA 60 84 7A C8 23	0FE9:A4	7F B1 B2 F0 20 48 A5 D9
0B21:05	50 20 1F 50 52 49 4E 70	0D89:A9	F0 85 B2 A9 7F 85 B3 9A	0FF1:83	F0 06 68 09 80 4C FB 34
0B29:54	FF 1F 43 0D 05 47 20 AC	0D91:18	A5 B2 69 10 85 B2 A5 AF	0FF9:0F	68 A0 00 91 B4 E6 7F 7A
0B31:1F	47 49 56 45 20 55 50 DC	0D99:B3	69 00 85 B3 88 D0 F0 92	1001:A5	B4 38 E9 13 85 B4 B0 8F
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0B41:20	1F 48 45 4C 50 FF 20 50	0DA9:A4	7A B1 F9 A8 88 F0 12 E5	1011:D0	03 4C 80 0D 60 20 86 9C
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0B59:46	0D 05 44 20 1F 4C 41 12	0DC1:AE	0D A4 7A 60 20 86 0D 50	1029:20	7B 0C 91 A8 20 7B 0C 9B
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0B71:53	4F 4C 56 45 20 57 4F 9C	0DD9:76	20 7B 0C 91 AA 20 E4 C3	1041:F0	10 A5 B4 18 69 15 85 F3
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0BA9:FF	26 4D 0D FF 26 4E 0D 06	0E11:83	F0 06 68 09 80 4C 1B 70	1079:18	69 15 85 B4 A5 B5 69 0C
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0BB9:FF	26 51 0D FF 26 52 0D 9E	0E21:38	A5 B4 E9 14 85 B4 B0 C8	1089:D0	03 4C 80 0D 60 20 86 15
0BC1:FF	26 53 0D FF 26 54 0D EA	0E29:02	C6 B5 4C 09 0E A5 83 C2	1091:0D	A9 01 85 76 B1 FD 85 17
0BC9:FF	12 41 42 43 44 45 46 AC	0E31:D0	03 4C 80 0D 60 20 86 B8	1099:81	A9 15 38 E5 81 85 75 C0
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0BD9:4F	50 51 52 53 54 0D 05 06	0E41:75	20 7B 0C 91 A8 B1 FD 0E	10A9:75	B1 FD 85 76 20 7B 0C 4B
0BE1:FF	18 43 4F 4C 55 4D 4E FB	0E49:85	7F A9 15 38 E5 7F 85 6C	10B1:91	AA 20 E4 12 A0 00 B1 5C
0BE9:53	0D FF 26 0D 20 57 4F 36	0E51:75	20 7B 0C 91 AA 20 E4 BC	10B9:B4	F0 03 4C 2F 0D C6 7F 50
0BF1:52	44 53 20 45 4E 54 45 FF	0E59:12	A0 00 B1 B4 F0 03 4C 7D	10C1:F0	10 A5 B4 18 69 13 85 70
0BF9:52	45 44 FF 05 57 4F 52 89	0E61:2F	0D C6 7F F0 09 E6 B4 57	10C9:B4	A5 B5 69 00 85 B5 4C C8
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0C09:0D	20 43 55 52 52 45 4E 22	0E71:7C	85 B4 A5 7D 85 B5 A0 2C	10D9:85	B5 A0 00 84 7F A4 7F 29
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0C19:05	44 49 46 46 49 43 55 85	0E81:22	48 A5 83 F0 06 68 09 27	10E9:06	68 09 80 4C F1 10 68 03
0C21:4C	54 59 20 4C 45 56 45 0B	0E89:80	4C 8E 0E 68 A0 00 91 03	10F1:A0	00 91 B4 E6 7F A5 B4 15
0C29:4C	00 A9 01 85 C3 A9 0B 46	0E91:B4	E6 7F A5 B4 18 69 01 E5	10F9:18	69 13 85 B4 A5 B5 69 4C
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0C41:F0	FF A9 00 A6 74 20 CD 1C	0EA9:80	0D 60 20 86 0D B1 FD 21	1111:0D	B1 FD 18 69 01 85 76 38
0C49:BD	A2 17 A0 1F 18 20 F0 60	0EB1:85	7F A9 15 38 E5 7F 85 D4	1119:A9	15 85 75 20 7B 0C 91 F5
0C51:FF	A9 00 A6 79 20 CD BD E3	0EB9:75	A9 01 85 76 20 7B 0C AA	1121:A8	20 7B 0C 91 AA 20 E4 2C
0C59:A2	18 A0 0F 18 20 F0 FF F0	0ECL:91	A8 A9 15 85 75 20 7B 15	1129:12	A0 00 B1 B4 F0 03 4C 53
0C61:A9	00 A6 84 20 CD BD A2 C1	0EC9:0C	91 AA 20 E4 12 A0 00 58	1131:2F	0D C6 7F B0 0E A5 B4 BE
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0C71:00	A6 73 20 CD BD 20 44 8D	0ED9:7F	F0 0E A5 B4 18 69 14 FA	1141:B5	4C 2A 11 A5 7C 85 B4 86
0C79:13	60 38 AD 06 DD 85 A2 6A	0EEL:85	B4 90 02 E6 B5 4C CF 96	1149:A5	7D 85 B5 A0 00 84 7F 37
0C81:A5	78 65 77 85 78 A5 A2 AA	0EE9:0E	A5 7C 85 B4 A5 7D 85 1B	1151:A4	7F B1 B2 F0 20 48 A5 45
0C89:C5	76 30 07 C5 75 10 03 BF	0EFL:B5	A0 00 84 7F A4 7F B1 98	1159:83	F0 06 68 09 80 4C 63 07
0C91:85	77 60 E6 78 69 05 38 70	0EF9:B2	F0 22 48 A5 83 F0 06 97	1161:11	68 A0 00 91 B4 E6 7F E6
0C99:E5	78 4C 89 0C A9 A0 85 B2	0F01:68	09 80 4C 08 0F 68 A0 58	1169:A5	B4 38 E9 15 85 B4 B0 0A
0CA1:F9	A9 8C 85 FA A6 74 A0 07	0F09:00	91 B4 E6 7F A5 B4 18 A4	1171:02	C6 B5 4C 51 11 A5 83 5F
0CA9:00	A5 73 C9 01 D0 0A A9 3F	0F11:69	14 85 B4 A5 65 69 00 BB	1179:D0	03 4C 80 0D 60 20 86 07
0CB1:01	91 F9 C8 CA F0 25 D0 AF	0F19:85	B5 4C F6 0E A5 83 D0 3F	1181:0D	A9 01 85 76 A9 15 85 17
0CB9:F8	A9 01 85 76 A9 0B 85 27	0F21:03	4C 80 0D 60 20 86 0D 52	1189:75	20 7B 0C 91 A8 20 7B 89
0CC1:75	20 7B 0C A0 00 A6 74 93	0F29:A9	01 85 76 A9 15 85 75 96	1191:0C	91 AA 20 E4 12 A4 7A A8
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0CD1:C9	0B 30 04 A9 01 85 77 AB	0F39:FD	18 69 01 85 76 20 7B 5B	11A1:B1	B4 F0 03 4C 2F 0D C6 18
0CD9:C8	CA D0 EC 60 A9 01 8D 2B	0F41:0C	91 AA 20 E4 12 A0 00 D1	11A9:7F	F0 10 C6 B5 A5 B4 38 1C
0CE1:30	D0 A9 0B 8D 11 D0 60 DE	0F49:B1	B4 F0 03 4C 2F 0D C6 BB	11B1:E9	90 85 B4 B0 02 C6 B5 B9
0CE9:A9	00 8D 30 D0 A9 5B 8D FC	0F51:7F	F0 0E A5 B4 38 E9 01 E2	11B9:4C	9F 11 A5 7C 85 B4 A5 6F
0CF1:11	D0 60 A9 A0 85 F9 A9 2C	0F59:85	B4 B0 02 C6 B5 4C 47 8A	11C1:7D	85 B5 A0 00 84 7F A4 7A
0CF9:8C	85 FA A9 36 85 FB A9 1D	0F61:0F	A5 7C 85 B4 A5 7D 85 15	11C9:7F	B1 B2 F0 22 48 A5 83 7E
0D01:8D	85 FC A9 F8 85 FD A9 01	0F69:B5	A0 00 84 7F A4 7F B1 12	11D1:F0	06 68 09 80 4C DA 11 87
0D09:8E	85 FE A9 CC 85 A8 A9 BD	0F71:B2	F0 20 48 A5 83 F0 06 D0	11D9:68	A0 00 91 B4 E6 7F C6 78
0D11:8D	85 A9 A9 62 85 AA A9 4B	0F79:68	09 80 4C 80 0F 68 A0 94	11E1:B5	A5 B4 38 E9 90 85 B4 B3
0D19:8E	85 AB A9 0A 85 2D A9 56	0F81:00	91 B4 E6 7F A5 B4 38 3D	11E9:B0	02 C6 B5 4C C8 11 A5 66
0D21:8C	85 2E A0 00 84 7A A5 5F	0F89:E9	01 85 B4 B0 02 C6 B5 A9	11F1:83	D0 03 4C 80 0D 60 20 48
0D29:83	F0 01 60 A6 74 A5 85 3F	0F91:4C	6E 0F A5 83 D0 03 4C 5F	11F9:86	0D A9 01 85 76 A9 15 56
0D31:85	75 A9 01 85 76 20 7B 72	0F99:80	0D 60 20 86 0D B1 FD 13	1201:85	75 20 7B 0C 91 A8 20 1D
0D39:0C	A4 7A 91 FB C9 01 D0 C4	0FA1:18	69 01 85 76 A9 15 85 A8	1209:7B	0C 91 AA 20 E4 12 A9 2D
0D41:03	4C C6 0D C9 02 D0 03 94	0FA9:75	20 7B 0C 91 A8 A9 15 52	1211:0A	E5 84 85 81 A4 7A E6 17
0D49:4C	37 0E C9 03 D0 03 4C 63	0FBI:38	E5 76 85 75 A9 01 85 66	1219:81	B1 FD C5 81 10 06 A0 7F



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1221:00	B1 B4 F0 03 4C 2F 0D 0C	1489:31	85 C3 A9 15 85 C4 20 27	16F1:20	FF 16 A4 7A A9 01 91 49
1229:C6	7F F0 10 E6 B5 A5 B4 BD	1491:79	12 A2 00 BD 4E 15 95 36	16F9:2D	E6 79 4C B1 16 A4 7A 14
1231:18	69 90 85 B4 90 02 E6 F8	1499:F9	E8 E0 06 D0 F6 20 1C 34	1701:B1	FB C9 01 D0 03 4C FD 79
1239:B5	4C 20 12 A5 7C 85 B4 4F	14A1:18	A9 0D 20 D2 FF 20 A3 5E	1709:0D	C9 02 D0 03 4C 70 0E B5
1241:A5	7D 85 B5 A0 00 84 7F 31	14A9:18	A9 0D 20 D2 FF 20 E7 AA	1711:C9	03 D0 03 4C EA 0E C9 23
1249:A4	7F B1 B2 F0 22 48 A5 47	14B1:FF	20 CC FF 4C 16 18 13 79	1719:04	D0 03 4C 62 0F C9 05 8A
1251:83	F0 06 68 09 80 4C 5B F8	14B9:FE	16 11 1C 43 48 45 43 D3	1721:D0	03 4C DD 0F C9 06 D0 5C
1259:12	68 A0 00 91 B4 E6 7F 61	14C1:4B	20 50 52 49 4E 54 45 38	1729:03	4C 53 10 C9 07 D0 03 66
1261:E6	B5 A5 B4 18 69 90 85 73	14C9:52	2C 50 52 45 53 53 20 93	1731:4C	D3 10 C9 08 D0 03 4C EE
1269:B4	90 02 E6 B5 4C 49 12 3E	14D1:50	20 54 4F 20 50 52 49 D9	1739:45	11 C9 09 D0 03 4C BC FF
1271:A5	83 D0 03 4C 80 0D 60 72	14D9:4E	54 00 4C 41 59 45 52 4F	1741:11	4C 3D 12 60 13 FE 16 37
1279:A9	01 85 82 8A 48 A0 00 42	14E1:20	31 30 FF 16 4C 41 59 2A	1749:11	1C 45 4E 54 45 52 20 11
1281:B1	C3 F0 1D C9 FF F0 1C AB	14E9:45	52 20 39 FF 17 4C 41 17	1751:53	54 41 52 54 49 4E 47 37
1289:C9	FE F0 37 20 D2 FF 18 48	14F1:59	45 52 20 38 0D 00 FF 5A	1759:20	52 4F 57 20 28 41 2D DC
1291:A5	C3 69 01 85 C3 A5 C4 02	14F9:0A	00 4C 41 59 45 52 20 69	1761:54	29 20 00 13 FE 16 11 D9
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12A9:A9	20 20 D2 FF CA F0 03 EB	1511:52	20 35 0D 00 4C 41 59 F0	1779:4F	4C 55 4D 4E 20 28 41 66
12B1:4C	AB 12 A5 C3 18 69 02 D6	1519:45	52 20 34 FF 17 4C 41 F7	1781:2D	54 29 20 00 13 FE 16 E2
12B9:85	C3 A5 C4 69 00 85 C4 AD	1521:59	45 52 20 33 FF 17 4C A9	1789:11	4E 4F 20 4D 41 54 43 1B
12C1:4C	7F 12 C8 B1 C3 AA C8 75	1529:41	59 45 52 20 32 0D 00 FB	1791:48	20 20 20 20 50 52 66
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12D1:4C	C9 12 A5 C3 18 69 03 7F	1539:31	0D 00 10 9E 80 9C F0 61	17A1:4B	45 59 20 54 4F 20 43 57
12D9:85	C3 A5 C4 69 00 85 C4 CD	1541:9A	60 99 D0 97 40 96 B0 AC	17A9:4F	4E 54 49 4E 55 45 00 84
12E1:4C	7F 12 A4 7A B1 A8 A8 2D	1549:94	20 93 90 91 00 20 00 0E	17B1:A9	CD 85 C3 A9 17 85 C4 8E
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12F1:85	B4 A5 B5 69 00 85 B5 22	1559:15	85 C4 20 79 12 20 E4 43	17C1:F0	F9 C9 52 D0 03 4C 6A DA
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1301:E9	01 18 65 B4 85 B4 A5 80	1569:03	4C 16 18 20 F4 0C 84 DD	17D1:1C	50 52 45 53 53 20 52 3B
1309:B5	69 00 85 B5 A5 B4 85 EF	1571:7A	B1 2D D0 09 20 86 0D DA	17D9:20	54 4F 20 52 45 53 54 BB
1311:7C	A5 B5 85 7D B1 FD 85 22	1579:20	E4 12 20 FF 16 A4 7A 4D	17E1:41	52 54 00 A9 01 85 C3 EF
1319:7F	60 A9 41 85 76 A9 5B 15	1581:A9	01 91 2D C8 C4 74 D0 D8	17E9:A9	18 85 C4 20 79 12 20 1B
1321:85	75 A9 00 85 B4 A9 90 7F	1589:E6	F0 DE 13 FE 16 11 1C FE	17F1:E4	FF C9 00 F0 F9 C9 51 20
1329:85	B5 A0 00 20 7B 0C B1 4C	1591:50	52 45 53 53 20 47 20 20	17F9:0D	03 4C E2 FC 4C 16 18 66
1331:B4	D0 04 A5 77 91 B4 C8 F4	1599:54	4F 20 47 49 56 45 20 88	1801:13	FE 16 11 1C 50 52 45 5A
1339:D0	F2 E6 B5 A5 B5 C9 A0 F4	15A1:55	50 00 A9 A0 85 F9 A9 DD	1809:53	53 20 51 20 54 4F 20 E1
1341:D0	EA 60 4C 74 13 A2 00 90	15A9:8C	85 FA A0 00 84 7A A9 95	1811:51	55 49 54 00 20 00 0C 90
1349:86	7C A6 7C E0 14 10 22 08	15B1:01	85 C3 A9 16 85 C4 20 41	1819:4C	9A 13 A2 00 A0 B1 D6
1351:A0	12 18 20 F0 FF A0 00 1A	15B9:79	12 A4 7A B1 F9 C5 84 E6	1821:F9	20 87 18 C8 C0 14 D0 0B
1359:B1	C3 20 D2 FF C8 C0 14 33	15C1:D0	21 20 86 0D A5 B2 85 F2	1829:F6	A9 F8 85 C3 A9 14 85 29
1361:30	F6 E6 7C A5 C3 18 69 D7	15C9:C3	A5 B3 85 C4 20 79 12 B9	1831:C4	20 79 12 A0 00 B1 FB 80
1369:14	85 C3 90 02 E6 C4 4C FD	15D1:C6	82 A5 82 F0 08 A9 9D 75	1839:20	87 18 C8 C0 14 D0 F6 D9
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1379:AA	A9 70 85 C3 A9 8E 85 2D	15E1:20	D2 FF E6 7A A5 7A C5 64	1849:20	79 12 A0 00 B1 FD 20 17
1381:C4	A9 90 20 D2 FF E6 C4 B1	15E9:74	D0 CF A9 3C 85 C3 A9 40	1851:87	18 C8 C0 14 D0 F6 E8 2B
1389:A5	C3 18 69 90 85 C3 90 BF	15F1:16	85 C4 20 79 12 20 E4 5C	1859:FF	14 D0 06 A9 0D 20 D2 0E
1391:02	E6 C4 CA D0 F0 47 E1	15F9:FF	C9 00 F0 F9 4C 16 18 EA	1861:FF	60 A5 F9 18 69 14 85 12
1399:13	20 E4 FF C9 00 F0 F9 18	1601:13	05 11 FF 06 48 45 4C 42	1869:F9	90 02 E6 FA A5 FB 18 E7
13A1:C9	41 30 F5 C9 56 10 F1 1C	1609:50	0D FF 11 FE 11 9D 11 3A	1871:69	14 85 FB 90 02 E6 FC 23
13A9:38	E9 40 C9 10 D0 03 4C 21	1611:FF	11 FE 11 9D 11 FF 11 B4	1879:A5	FD 18 69 14 85 FD 90 D8
13B1:E7	13 C9 07 D0 03 4C 54 B9	1619:FE	11 9D 11 FF 11 FE 11 21	1881:02	E6 FE 4C 1E 18 48 29 1C
13B9:15	C9 08 D0 03 4C A4 15 92	1621:9D	11 FF 11 FE 11 9D 11 F9	1889:80	F0 05 A9 12 20 D2 FF 28
13C1:C9	15 D0 03 4C 5B 16 C9 22	1629:FF	11 FE 11 9D 11 FF 11 CC	1891:68	48 29 7F 20 D2 FF 68 D9
13C9:04	D0 03 4C 66 16 C9 13 7D	1631:FE	11 9D 11 FF 11 13 11 61	1899:29	80 F0 05 A9 92 20 D2 97
13D1:D0	03 4C 77 16 C9 12 D0 EE	1639:11	1F 00 13 FE 16 11 1C 75	18A1:FF	60 A0 00 84 7C 84 FB 19
13D9:03	4C B1 17 C9 11 D0 03 73	1641:50	52 45 53 53 20 41 4E F3	18A9:A9	80 85 FC A9 70 85 F9 24
13E1:4C	E5 17 4C 9A 13 A9 20 E3	1649:59	20 4B 45 59 20 54 4F 2B	18B1:A9	8C 85 FA A4 7C B1 F9 AE
13E9:85	FA A0 00 84 F9 91 F9 CE	1651:20	43 4F 4E 54 49 4E 55 E6	18B9:D0	01 60 A0 00 B1 FB D0 38
13F1:C8	D0 FB E6 FA A6 FA E0 E7	1659:45	00 A5 84 C9 01 F0 02 5B	18C1:02	A9 2E 20 D2 FF C8 C0 0E
13F9:22	D0 F3 A9 B8 85 C3 A9 8B	1661:C6	84 4C 16 18 A5 73 C9 05	18C9:FF	D0 F2 A9 28 20 D2 FF 16
1401:14	85 C4 20 79 12 20 E4 68	1669:01	F0 08 A5 84 C9 0A 10 1D	18D1:A4	7C B1 F9 C9 0A F0 08 A9
1409:FF	C9 00 F0 F9 C9 50 F0 3B	1671:02	E6 84 4C 16 18 20 F4 F3	18D9:4A	A9 00 AA 20 CD BD 68 5F
1411:03	4C A4 14 A9 01 A2 04 FE	1679:0C	A9 46 85 C3 A9 17 85 AF	18E1:AA	A9 00 20 CD BD A9 29 B5
1419:A0	00 20 BA FF A9 00 20 08	1681:C4	20 79 12 20 B7 16 85 F9	18E9:20	D2 FF E6 7C A9 20 20 38
1421:BD	FF 20 C0 FF A2 01 20 E4	1689:87	A9 65 85 C3 A9 17 85 61	18F1:D2	FF A5 FB 69 10 85 FB 92
1429:C9	FF A9 DC 85 C3 A9 14 DB	1691:C4	20 79 12 20 B7 16 85 0A	18F9:90	02 E6 FC 4C B5 18 00 09
1431:85	C4 20 79 12 A2 00 BD C1	1699:88	20 C6 16 B0 15 A9 86 FF		
1439:3C	15 95 F9 E8 E0 06 D0 BE	16A1:85	C3 A9 17 85 C4 20 79 21		
1441:F6	20 1C 18 A9 0D 20 D2 86	16A9:12	20 E4 FF C9 00 F0 F9 AD		
1449:FF	A9 FB 85 C3 A9 14 85 26	16B1:4C	16 18 4C E5 16 20 E4 FD		
1451:C4	20 79 12 A2 00 BD 42 07	16B9:FF	C9 41 30 F9 C9 55 10 35		
1459:15	95 F9 E8 E0 06 D0 F6 F6	16C1:F5	38 E9 40 60 A0 00 B1 6F		
1461:20	1C 18 A9 0D 20 D2 FF CC	16C9:F9	C5 84 F0 07 C8 C4 74 5D		
1469:A9	16 85 C3 A9 15 85 C4 4A	16D1:D0	F5 18 60 B1 A8 C5 87 30		
1471:20	79 12 A2 00 BD 48 15 11	16D9:D0	F3 B1 AA C5 88 D0 ED 2C		
1479:95	F9 E8 E0 06 D0 F6 20 97	16E1:84	7A 38 60 A4 7A B1 2D 9B		
1481:1C	18 A9 0D 20 D2 FF A9 B9	16E9:D0	11 20 86 0D 20 E4 12 F3		

Attention Software Programmers
 Gazette wants to buy your best games, utilities, and productivity programs for the 64 or 128. Submit them with the documentation on disk to our Greensboro office.



PROGRAMS

DAVID WILLIAMS

This popular pencil-and-paper game has been adapted several times for computers, but *Hangman 128* provides a few twists. It automatically keeps count of how many games you've won and how many the computer's won. You can easily update and increase its vocabulary, and it incorporates a large variety of background graphics that change with each game you play.

Typing It In

Hangman 128 is written entirely in BASIC 7. To avoid typing errors when entering the program, use *The Automatic Proofreader* (see "Typing Aids" elsewhere in this section). When you've finished typing in the program, be sure to save a copy of it.

Guess My Word

When you run the program, it picks a word at random from its vocabulary. An asterisk appears in the place of each letter in the word. Whenever you guess a correct letter, that letter takes the place of the asterisk representing it. Guess all the correct letters, and the complete word appears along with a message from the computer asking if you'd like to play again.

If you guess an incorrect letter, the hangman's gallows appears. Continue to guess incorrectly, and parts of the unfortunate victim appear. After eight incorrect guesses, you lose the game. When you've had enough, the computer announces how many games it won and how many times you cheated the hangman.

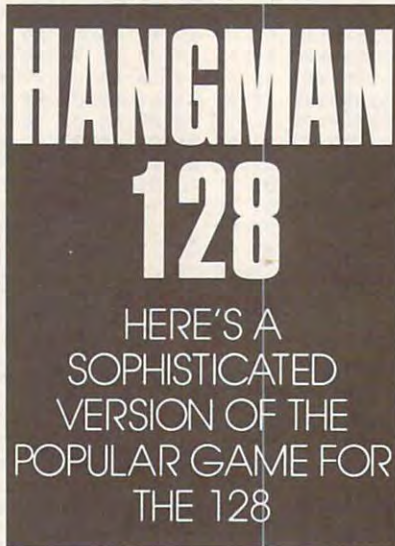
The program puts its more than 400 words into an array and selects them at random for each game. The program is dimensioned for 500 words (see DIMB\$ in line 20), but you can use more if you like. Simply increase this figure to a number higher than the actual number of words in your vocabulary. Continue to add words as DATA statements. Just be sure that your last piece of data is -999-.

If you don't wish to type in all the words in this listing, you can quit at any time, and the program will work

just as well. Just be sure that your last data statement is -999-.

If you examine the program, you may notice a few interesting items. For one thing, many CHAR and CIRCLE commands start with a comma. In line 70, for instance, you'll see CIRCLE,58,158,11,9. This is an accepted syntax. What I'm doing is leaving the first parameter unchanged. To leave it at its default value, you can either type the default or simply skip over it by entering a comma.

In line 20, however, you'll see COLOR.,12. Why the period? Well, I wanted COLOR 0,12. BASIC interprets a period or decimal point as a 0, but it does it slightly faster than with the number itself.



HANGMAN 128

```
DB 10 REM COPYRIGHT 1991 COMPU
TE PUBLICATIONS INTL LTD
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AG 20 COLOR4,14:COLOR.,12:CLR:
PRINT "{6}{CLR}PLEASE WAI
T!":DIMB$(500):I=0
RB 30 READ B$(I):IF B$(I)="-99
9-" THEN N=I-1:Z=RND(-TI
):ELSE I=I+1:GOTO 30
HQ 40 IF I=0 THEN PRINT "{CLR}
{5 DOWN}":A$="NO WORD DA
TA YET!":FOR X=1 TO (20-
```

```
LEN(A$)/2):PRINT " ";:NEX
T:PRINTA$:END
FS 50 E=.:XR=E:COLOR1,11:GRAPH
IC1,1:Z=INT(RND(1)*(N+1
)):X=INT(RND(1)*50):IFX=.
THENFORL=250TO1STEP-2:CI
RCLE1,160,100,L,L,0,360,
L,90:NEXT
FG 60 IFX>1THENI=INT(RND(1)*25
0)+1:A=INT(RND(1)*359)+1
:R=INT(RND(1)*9)+2:V=INT
(RND(1)*15):DOUNTILXR>10
0:XR=XR+R:A=A+V:CIRCLE1,
160,100,XR,,,,A,I:LOOP
PH 70 IFX=1THENBEGIN:CIRCLE,58
,158,11,9:CIRCLE,111,158
,11,9:CIRCLE,162,158,11,
9:DRAW,49,153TO180,60TO2
73,60TO151,154:DRAW,174,
160TO273,80TO273,60
FK 80 DRAW,70,160TO184,75TO234
,75TO123,160:DRAW,100,15
3TO184,90TO184,75:DRAW,1
84,90TO215,90:BEND
XB 90 COLOR1,16:Z$=B$(Z):CHAR,
0,0,"HANGMAN{8 SPACES}CO
MPUTE PUBLICATIONS 1991"
,1:A$=STR$(LEN(Z$))+ " LE
TTERS":CHAR,0,5,A$:FORA=
1TOLEN(Z$):CHAR,A-1,7,"*
":NEXT
JS 100 CHAR,0,23,"INCORRECT LE
TTERS USED":POKE208,.
BX 110 GETKEYA$:IFASC(A$)<65OR
ASC(A$)>90THEN110
GG 115 A=INSTR(B$(Z),A$):IFA=.
THENBEGIN:E=E+1:CHAR,AS
C(A$)-64,24,A$:ONEGOSUB
140,160,170,180,190,200
,210:IFE=8THEN220:ELSE1
0:BEND
SE 120 CHAR,A-1,7,A$:PRINT "{G
":MID$(Z$,A,1)="*":FORX
=1TOLEN(Z$):IFMID$(Z$,X
,1)<>"*"THEN130:ELSENEX
T:GOTO250
BE 130 A=INSTR(B$(Z),A$,A+1):I
FA=.THEN110:ELSE120
SF 140 COLOR1,1:FORA=3TO5:CHAR
,26,A," ",1:NEXT:CHAR,2
7,3,"{11 SPACES}",1:FOR
A=3TO18:CHAR,37,A," ",1
:NEXT
XK 145 CHAR,25,18,"{13 SPACES}
",1:V=32:FORA=18TO15STE
P-1:V=V+1:CHAR,V,A," ",
1:NEXT
RS 150 COLOR1,16:RETURN
DX 160 COLOR1,2:CHAR,25,6,"E
{SPACE}{*}",1:CHAR,25,7
,"{3 SPACES}",1:CHAR,25
,8,"{*} E":CHAR,26,8,"
",1:COLOR1,16:RETURN
PF 170 COLOR1,13:CHAR,26,9," "
,1:FORA=10TO12:CHAR,25,
A,"{3 SPACES}",1:NEXT:C
```




PROGRAMS

BS 180	OLOR1,16:RETURN COLOR1,13:FORA=.TO2:CHAR,22+A,8+A," ",1:NEXT:COLOR1,16:RETURN	SP 310	CROLL,NUMBER,ADDRESS,VERTICAL,HORIZONTAL,SUPPLY,PARTS,WALL,MEN DATADESTROY,DEEPER,LABEL,EXAMINE,INTERACTIVE,DISK,TAPE,OPTIONS,MENU,FILE,REPEAT,MESSAGE,INVERSE,PORTION,PERSON,PERSIAN,POUND,SCALE,SPACE,WA ASTE,FIELD	MQ 420	WORLD,GLOBE,PRESS,FOLLOW,STEPS,LADDER,BENCH,TABLE,WIDTH,PEN,LIGHT,DARKNESS,RESERVED,WORD,SENTENCE,PARAGRAPH,STORY,SHORT,TALL,LONG DATAAPPENDIX,LIVER,TYPEWRITER,ARTIST,AUTHOR,SERIAL,AUTOMOTIVE,INDUSTRY,TROUGH,TOUGH,BOAT,WRECKED,CRASHE D,SMASHED,BA SHED,BLUDGEONED,HIT,HURT,BANGED
ES 190	COLOR1,13:FORA=.TO2:CHAR,28+A,10-A," ",1:NEXT:COLOR1,16:RETURN	RR 320	DATAAUTOMATIC,MANLY,COWBOY,MANIAC,LEPER,CARDIAC,TALK,NEVER,DREAMED,DR ESSED,STRONG,WEAK,WARNI NG,WOMAN,OPENED,EDGE,EX ISTENCE,LAUGH,HAPPEN,DA NCED,SPEEDING	MJ 430	DATARETURN,ENTER,SHIFT,LOCK,RUN,STOP,CONTROL,DISPLAY,RESTORE,CLEAR,DELETE,INSERT,CAPITAL,COMPLETE,ILLUSTRATED,EDIT ON,PERSONAL,PRIVATE,CAP TAIN,MASSIVE
EP 200	COLOR1,5:CHAR,25,13,"{3 SPACES}",1:FORA=14TO16:CHAR,27,A," ",1:NEXT:FORA=.TO2:CHAR,25-A,14+A," ",1:NEXT:COLOR1,16:RETURN	DB 330	DATAIMAGINE,ENEMY,SAINTS,TELEVISION,DRILL,HOUSE,MANSION,HOMESTEAD,HUT,SHED,BOX,DESTRUCTION,M ORE,ROME,HAIR,GIRL,FOOD,PHONE,FARM,SHOT,HOUSE,GRASS,DATE,YOUNG	EG 440	DATALARGE,HEATER,COOLER,TECHNICAL,GIFTED,RESEARCH,GREAT,SOFT,HARD,EASY,GROUP,ULTIMATE,BEST,G REATEST,ATTENTION,CHANG ING,PERFECT,ELEMENT,ANI MATION,ROBOT
DA 210	COLOR1,13:CHAR,27,17,"{2 SPACES}",1:CHAR,22,16," ",1:CHAR,23,17," ",1:COLOR1,16:CHAR,0,3,"THIS IS YOUR LAST CHANCE!",1:RETURN	DM 340	DATATIE,THEATER,WATCH,VIEW,FOUND,POND,POUND,HO RSE,RADIO,DOOM,PAPER,NE WS,DEATH,KILL,CLASS,BUR N,HANDS,FEET,PRIZE,EDIT,PEEK,CHROMOSOME,DECOMP RESSION,NUMERICAL	GJ 450	DATAACCUMULATE,REGISTER,INDEX,LOGARITHM,TRIGONOMETRY,ABSEIL
MM 220	CHAR,0,19,"IT WAS "+BS(Z),1:Q=Q+1:CHAR,10,20,"TOO BAD - YOU DIED!!",1:CHAR,11,21,"PLAY AGAIN,{2 SPACES}(Y/N)?:POKE208,.:COLOR1,15:CHAR,19,4,"CHOKE!!	QJ 350	DATASECURITY,APPRECIATION,NUMERATE,HORIZONTAL,ENTERPRISE,REGISTRATION,CONVENTIONAL,BOOMERANG,RIFLE,SPRAY,TORCH,FIRE,MATCH,TILT,WILT,AMPLE,REALM	BF 460	DATA -999- <input type="checkbox"/>
JJ 230	GETKEYAS:IFAS<>"Y"ANDAS<>"N"THEN230	DC 360	DATAMOUSE,APPLE,JUICE,HOUSE,BANANA,POEM,VERSE,ROYAL,TURN,NORTH,SPINNING,SOUTH,WEST,EAST,UP,D OWN,COMPASS,PRINCE,KING,QUEEN,PRINCESS,SHRED,C ORNER,UNICORN		
PD 235	IFAS="Y"THEN50:ELSEGRAP HICCLR:PRINT"{CLR}YOU W ON"W"AND I WON"Q:PRINT" SO THAT MAKES ";:IFQ>WT HENPRINT"ME";:ELSEIFW>Q THENPRINT"YOU";	QX 370	DATASQUARE,CLIMATE,PARA GRAPH,ROSTER,RATIO,SOLI D,ISOLATE,TRIPOD,HYMN,B UTTON,PIGLET,COW,RAKE,S HOVEL,HOB,SPADE,BRANCH, TOUCH,SMASH,LAWN,FEASIB LE,MINUTE		
SB 240	IFQ=WTHENPRINT"IT A TIE!":NEW:ELSEPRINT"THE W INNER!"NEW	SM 380	DATACOMMA,CLUB,COMPRESS,REPLENISH,MINE,DIRT,CAR,COMPUTER,RISE,DAMP,SE COND,HOUR,FALL,SINK,DRY, WARM,DILUTE,SYSTEM,TER MINATE,MAP,BICYCLE,PUZZ LE,RULER,BOUGH		
EM 250	W=W+1:CHAR,13,20,"YOU A RE FREE!",1:CHAR,11,21, "PLAY AGAIN{2 SPACES}(Y/N)?:POKE208,.:GOTO230	AC 390	DATAJUDGE,MUSIC,HOSPITAL,VIOLIN,FILE,CASSETTE,AXIOM,BOOK,SUPERMARKET,REWARD,COVER,GRAPH,LINE,CIRCLE,SPIRAL,HANGMAN,ENCYCLOPEDIA,DICTIONARY,VERBOSE,AMUSE		
PA 260	DATAXAMPLE,CHAIR,HIPPO POTAMUS,ELEPHANT,TABLE, SOFT,STICK,DESK,POSTER, SHIRT,PANTS,HOSE,GRAPPL E,SHORT,SMART,SCOUT,CHI LDREN,CHEEK,GOOD,COUCH, TOYS,NOVEL,CHURN	CF 400	DATADRAW,RECORD,DISK,COMPACT,CUSTOMER,STATEMENT,BANK,WITHDRAWAL,DEPOSIT,INTEREST,COMMAND,VER SION,KEY,LOCK,RHYTHM,OP EN,CLOSE,ORGANIZATION,F ORMAT,STRUCTURE		
DQ 270	DATANOZZLE,ZEBRA,CHUNK, SLOW,SLIP,REST,WRETCH,O CTET,ODDS,INSIDE,HAND,H OOK,HOOKE D,PIPE,HOPE,FA T,FREE,FLASH,FLANK,FLAM E,FLARE,COIN,BLANK,META L,INSANE,FLOWER	XH 410	DATAWINDOW,MAP,COUNTRY,		
GQ 280	DATABEACH,COURT,BASKET, BEAM,DATA,AWFUL,AWOKE,S PEAK,AXIS,BABY,KNACK,NO TCH,NOTE,PARENT,ROCKET, SKATE,STRIKE,NECK,ROMAN ,RODENT,ROGUE,ROCK,MUTA NT,TRAUMA,TRAVEL				
RC 290	DATATRAPEZE,TREAD,TRAY, TRAWL,TRAIL,CIVIL,UNCIV IL,ETHICAL,DOUBT,UNDER, ATTACK,SUSTAIN,DECAY,RE LEASE,UNDO,WEATHER,WEEK ,WHALE,WHACK,WENCH,CELL ,WEPT,YOUR,YACHT				
GJ 300	DATALOCAL,TOURIST,LOADE D,SAVED,INTERIOR,EXTERI OR,HIGHER,LOWER,HIMSELF ,YODEL,DOUBLE,NOTHING,S				

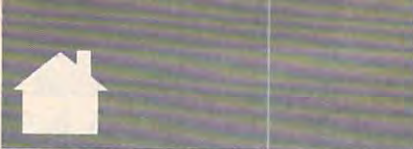
ONLY ON DISK

There's something new on the *Gazette Disk*. In addition to the type-in programs found in every issue of the magazine, we're putting more features and programs on the *Gazette Disk* each month. Often, these programs would be too large for readers to type in. Check out the original 64 and 128 artwork on display in "Gazette Gallery," and look for our bonus programs as well. These programs and their instructions appear only on disk. Here's a description of this month's bonus program.

Typing Tutor

David M. Williams

This useful tutorial for the 128 in 80-column mode is designed to help you improve your typing speed and accuracy. Try to type the sentences exactly as they are presented; a bell will alert you if you've made a mistake. Select from a variety of difficulty levels. The program also rates your typing speed.



PROGRAMS

R O B E R T C . T R A I N

What is the nature of the universe? We've all wondered about how we got here and what our purpose is. Is everything chaotic, or is there order in the universe?

Answers have been suggested by both science and religion, so don't expect your 64 or 128 to answer these for you. Whatever your particular preference, however, the recent theory of chaos suggests some interesting possibilities. Public television's critically acclaimed TV series "NOVA" recently ran a program about this theory and how it affects modern thought.

One of the more intriguing ideas presented on the program was that order and organization can be produced out of chaos by the repetition of a simple but constant rule. The implication is that our present universe may have arisen out of nothingness as a result of a few simple rules.

So far, our best scientific information to date indicates that our universe consists of chemical elements, each of which has certain properties predisposing it to behavior of one kind or another. Iron, for example, has an affinity or fondness for oxygen. Other elements have similar characteristics. At the beginning of our present universe, some rules prevailed over others, producing what we now know as the world around us.

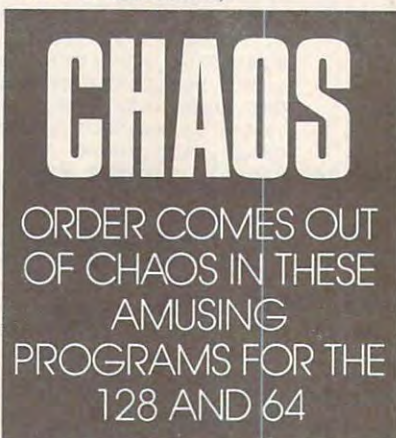
About the Program

To illustrate the above point, take a plain sheet of paper and place six dots on it anywhere you like. For best results, place them near the four edges of the paper. Then roll a die twice to select any two of the points. Place a ruler between them, and halfway between them draw another point. From that point roll a die to select any other point and repeat the process. Continue this for about 24 hours. What emerges is phenomenal to behold.

If you don't want to spend all that time drawing lines to illustrate this point, there is another way. Let your computer do the work for you.

Typing It In

Chaos is written entirely in BASIC for the 128. (There's also a version for the 64.) To help avoid typing errors, enter the program with *The Automatic Proofreader* (see "Typing Aids" elsewhere in this section).



For my program, I've set up the graphic screen on the 128 and then implemented the above procedure except I've used only three dots. The loop (lines 100-270) identifies the endpoints of a line, interpolates half the distance between them, and then draws a dot. As the program repeats, patterns will emerge from the seemingly random dots.

Feel free to experiment further by changing the number of dots or the position at which the dot is placed along the line.

This simple program demonstrates that order can come from a seemingly chaotic sequence. Now if I could just figure out a way to pick the correct six lottery numbers. . .

CHAOS 128

```
DB 10 REM COPYRIGHT 1991 COMPU
TE PUBLICATIONS INTL LTD
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RE 30 COLOR0,1
KK 40 POKE 53280,0
EJ 50 AX=1:AY=1:BX=319:BY=1:CX
=160:CY=199
EJ 80 COLOR1,2
JX 90 GRAPHIC1,1
BG 91 X=INT((RND(TI)*319)+1)
```

```
PR 92 Y=INT((RND(TI)*199)+1)
CK 100 FORI=1TO10000
SR 110 DRAW1,AX,AY:DRAW1,BX,BY
FB 130 DRAW1,CX,CY
MB 140 IFI>1THENX=KX
BE 150 IFI>1THENY=KY
HH 160 P=INT((RND(TI)*6)+1)
QB 190 IF P=1THENDX=AX:DY=AY
RB 200 IF P=2THENDX=AX:DY=AY
DQ 210 IF P=3THENDX=BX:DY=BY
XS 220 IF P=4THENDX=BX:DY=BY
RM 230 IF P=6THENDX=CX:DY=CY
PB 240 KX=(DX+X)/2:KY=(DY+Y)/2
HF 260 DRAW1,KX,KY
QX 265 IF I=10000THENEND
JH 270 NEXT I
```

CHAOS 64

```
KH 0 REM COPYRIGHT 1991 COMPUT
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PB 100 POKE 53280,0:POKE 53281
,0
SS 110 PRINT"{CLR}{8}{4 DOWN}"
:A$="CLEARING THE BITMA
P...":A=LEN(A$)
JQ 120 FOR X=1 TO 20-A/2:PRINT
" ";NEXT:PRINTAS
QC 130 FOR X=8192 TO 16192:POK
E X,0:NEXT
GA 140 AX=1:AY=1:BX=319:BY=1:C
X=160:CY=199
JM 150 POKE 53265,(PEEK(53265)
OR 32)
CC 160 POKE 53270,((PEEK(53270
) AND 223) OR 16)
CC 170 POKE 53272,((PEEK(53272
) AND 240) OR 8)
RE 180 PRINT"{CLR}":FOR X=1024
TO 2024:POKE X,255:NEX
T
FH 190 X=INT((RND(TI)*319)+1)
QS 200 Y=INT((RND(TI)*199)+1)
BS 210 FORI=1TO10000
QP 220 P1=AX:P2=AY:GOSUB360:P1
=BX:P2=BY:GOSUB360
EH 230 P1=CX:P2=CY:GOSUB360
FJ 240 IFI>1THENX=KX
QS 250 IFI>1THENY=KY
QJ 260 P=INT((RND(TI)*6)+1)
BR 270 IF P=1THENDX=AX:DY=AY
RX 280 IF P=2THENDX=AX:DY=AY
DM 290 IF P=3THENDX=BX:DY=BY
AM 300 IF P=4THENDX=BX:DY=BY
XH 310 IF P=6THENDX=CX:DY=CY
JQ 320 KX=(DX+X)/2:KY=(DY+Y)/2
JA 330 P1=KX:P2=KY:GOSUB360
ED 340 IF I=10000THENEND
PQ 350 NEXT I
AQ 360 BT=8192+INT(P2/8)*320+I
NT(P1/8)*8+(P2 AND 7)
SF 370 POKE BT,PEEK(BT) OR 2↑(
7-(P1 AND 7))
HS 380 RETURN
```


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How to Type In COMPUTE's Gazette Programs

Each month, Gazette publishes programs for the Commodore 128 and 64. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. All 64 programs run on the 128 in 64 mode. Be sure to read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

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

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

Special Characters

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

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

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

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

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

The Quote Mode

You can move the cursor around the screen with the Crsr keys, but you may want to move it under program control, as in examples like {LEFT} and {HOME} in the listings. The only way the computer can tell the difference between direct and programmed cursor control is the quote mode.

Once you press the quote key, you're in quote mode, which can be confusing if you mistype a character and cursor left to change it. You'll see a graphics symbol for cursor left. Use the delete key to back up and edit the line. Type another quotation mark to get out of quote mode. If things get too confusing, exit quote mode by pressing Return; then cursor up to the mistyped line and fix it. If the mistake involves cursor movement, you must press the quote key to reenter quote mode. □

When You Read:	Press:	See:	When You Read:	Press:	See:	When You Read:	Press:	See:
{CLR}	SHIFT CLR/HOME		{PUR}	CTRL 5		←	←	
{HOME}	CLR/HOME		{GRN}	CTRL 6		↑	SHIFT ↑	
{UP}	SHIFT ↑ CRSR ↓		{BLU}	CTRL 7				
{DOWN}	↑ CRSR ↓		{YEL}	CTRL 8				
{LEFT}	SHIFT ← CRSR →		{F1}	f1				
{RIGHT}	← CRSR →		{F2}	SHIFT f1				
{RVS}	CTRL 9		{F3}	f3				
{OFF}	CTRL 0		{F4}	SHIFT f3				
{BLK}	CTRL 1		{F5}	f5				
{WHT}	CTRL 2		{F6}	SHIFT f5				
{RED}	CTRL 3		{F7}	f7				
{CYN}	CTRL 4		{F8}	SHIFT f7				

For Commodore 64 Only		
[1]	COMMODORE	1
[2]	COMMODORE	2
[3]	COMMODORE	3
[4]	COMMODORE	4
[5]	COMMODORE	5
[6]	COMMODORE	6
[7]	COMMODORE	7
[8]	COMMODORE	8

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The *Automatic Proofreader* helps you type in program listings for the 128 and 64 and prevents nearly every kind of typing mistake.

Type in the *Proofreader* exactly as listed. Because the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy before running it.

Next, type RUN and press Return. When the program displays the message *Proofreader Active*, you're ready to type in a BASIC program.

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

When using the *Proofreader* with another utility, disable both programs before running a BASIC program.

```

0 CLR
10 VE=PEEK(772)+256*PEEK(77
3):LO=43:HI=44:PRINT"
{CLR}{WHT}AUTOMATIC PROO
FREADER FOR ";
20 IF VE=42364 THEN PRINT "
64"
30 IF VE=17165 THEN LO=45:HI
=46:WAIT CLR:PRINT"128"
40 SA=(PEEK(LO)+256*PEEK(HI
))+6:FOR J=SA TO SA+166:
READ B:POKE J,B:CH=CH+B:
NEXT
50 IF CH<>220570 THEN PRINT
{SPACE}"*ERROR* CHECK TY
PING IN DATA STATEMENTS"
:END
60 FOR J=1 TO 5:READ RF,LF,
HF:RS=SA+RF:HB=INT(RS/25
6):LB=RS-(256*HB)
70 CH=CH+RF+LF+HF:POKE SA+L
F,LB:POKE SA+HF,HB:NEXT
80 IF CH<>22054 THEN PRINT
{SPACE}"*ERROR* RELOAD P
ROGRAM AND CHECK FINAL L
INE":END
90 IF VE=17165 THEN POKE SA
+14,22:POKE SA+18,23:POK
ESA+29,224:POKESA+139,224
100 POKE SA+149,PEEK(772):P
OKE SA+150,PEEK(773):PR
INT"{CLR}PROOFREADER AC
TIVE"
110 SYS SA:POKE HI,PEEK(HI)
+1:POKE (PEEK(LO)+256*P
EEK(HI))-1,0:NEW
    
```

```

120 DATA20,169,73,141,4,3,
169,3,141,5,3,88,96,165
,20,133,167
130 DATA165,21,133,168,169,
0,141,0,255,162,31,181,
199,157,227
140 DATA3,202,16,248,169,19
,32,210,255,169,18,32,2
10,255,160
150 DATA0,132,180,132,176,1
36,230,180,200,185,0,2,
240,46,201
160 DATA34,208,8,72,165,176
,73,255,133,176,104,72,
201,32,208
170 DATA7,165,176,208,3,104
,208,226,104,166,180,24
,165,167
180 DATA121,0,2,133,167,165
,168,105,0,133,168,202,
208,239,240
190 DATA202,165,167,69,168,
72,41,15,168,185,211,3,
32,210,255
200 DATA104,74,74,74,74,168
,185,211,3,32,210,255,1
62,31,189
210 DATA227,3,149,199,202,1
6,248,169,146,32,210,25
5,76,86,137
220 DATA65,66,67,68,69,70,7
1,72,74,75,77,80,81,82,
83,88
230 DATA 13,2,7,167,31,32,1
51,116,117,151,128,129,
167,136,137
    
```

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REVIEWS

RELATE DATA • CONQUER KINGDOMS GET READY FOR THE KICKOFF

PERSONAL R:BASE

Fase of use and power in an inexpensive relational database? That's what *Personal R:Base* promises, but is that advertising hype or a home office dream come true?

Personal R:Base is, in fact, a powerful, functional program. It's got the features you'd expect any topflight database to have, including mouse support, a multitude of functions, and the ability to handle existing *R:Base*, *dBase*, or *Lotus 1-2-3* files. It's upwardly compatible to regular *R:Base*, too. And perhaps best of all, it's not impossibly difficult to use.

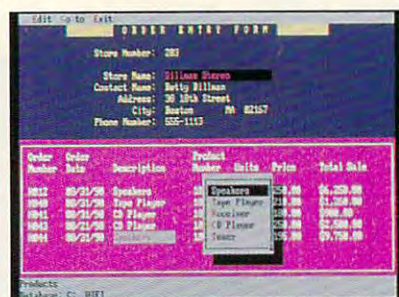
Databases come in two flavors, flat-file and relational. A flat-file database can be thought of as a giant blackboard; if you want to put something on a particular part of the board (that is, add something to the database), then you've got to write it there manually, by hand. A relational database, on the other hand, is like a stack of blackboards that can talk (and write) to one another. In practice, a relational database can eliminate a lot of duplicate inputting.

Take a simple example: filling in someone's address. With a flat-file database, you type the entire address every time you enter it. But with a relational database, you enter it once (in what's called a *table*) and then have the program look it up in the table whenever you need it.

Like its big brother regular *R:Base*, *Personal R:Base* is a relational database. It stores data in tables that can be linked (related) to one another. An interface with intuitive pull-down menus greatly simplifies use, and if you get lost, context-sensitive help is just a keypress away.

Installation involves not only transferring the program files but decompressing them, too. It went quickly on a 386 machine, but on an XT the decompression was slow. One oth-

er thing to keep in mind is the sheer size of the program. Although you can run it on machines with 640K of RAM, it takes up far more than 640K of your hard drive space. To install it all—the program, the tutorial, and the bundled applications—you need a whopping six megabytes of available space, four megabytes for just the program.



Pop-up windows make *Personal R:Base* forms easy to create and to use.

When you install *Personal R:Base*, you may notice some notable omissions on the printer setup list—no Panasonic printers, for instance. This won't trouble seasoned veterans, but the less-seasoned user may be thrown for a loop when the family printer doesn't show up in the list. Such unfortunates are advised to check their printer manuals or contact their printer manufacturers for compatibility details.

Once installed, *Personal R:Base* is fairly easy to use. You start by naming the database. Next, define each table that the database will include and assemble the columns that the table contains; each column gets a name and, if you desire, a description. Then you're prompted to enter the data type (currency, text, time, date, various numeric formats, and so on) or specify if the column is to be a computed column.

How big can your *R:Base* database be? There are limits—80 tables

and 800 columns—although for most personal or small business applications that's more room than you'll ever need.

How could I put this thing to use doing some real work? As it happened, I needed an invoicing application for a small home business. I had been preparing invoices on a word processor, creating each invoice manually. That involved not only manually typing every customer's name and address but also manually typing complete entries for each and every item ordered. Then I had to figure subtotals and sales tax. Could *Personal R:Base* make invoicing quicker and easier? I decided to give it a shot.

I first designed my database on paper. It would initially include three tables: one holding customer data, one holding pricing data, and one holding individual invoices.

I set up my database and defined the three tables. All went smoothly. My customer info table included columns for first and last names, addresses, phone numbers, and date of last order. The stock info table included product stock numbers, descriptions, and wholesale and retail prices. Then I set up the invoice table so it would look up info from the other two. It worked—and I found it remarkably satisfying to enter a customer name (or stock number) and then watch as the complete address (or product info) was automatically filled in. Using computed fields, I even convinced the program to figure sales tax and totals.

The last step was to design a report—that is, set up the invoice-printing routine. The so-called Quick Report option would've yielded a basic report with only a few keystrokes, but I opted for building a custom report instead. *Personal R:Base* allowed me to position various fields wherever I wanted, making it easy to create a truly custom invoicing form. In addition, its drawing option al-

MS-DOS

lowed me to include boxes and rules for further clarity and a nicely finished look.

Of course, I also needed mailing labels. *Personal R:Base* includes more than a dozen predesigned templates for a variety of labels, one of which I used. I could've easily customized my own format, however.

It worked fine, and now I'm thinking enhancements. An early project is to use *Personal R:Base's* sorting capabilities to create alphabetical and chronological customer-activity reports. Next will come scrolling data regions to simplify data entry, and I'd like to add autonumbering of invoices.

Except for the absence of explanations for the included applications, the documentation for *Personal R:Base* is lavish. It's divided into topical sections, with each section indexed and a glossary and appendices at the end of the book. There's an interesting onscreen tutorial, too.

Initially, being the determined sort, I spent only a few minutes with the manual and the tutorial before jumping into the program—and I was able to make a little progress anyway. But I'd have felt better (and made a heck of a lot faster progress) if I'd at least taken time to go all the way through the tutorial. For, despite its "personal" qualifier, *Personal R:Base* is a powerful package that you won't conquer in a day.

But as you work with it, you'll learn its features. You'll use it, and you'll like it. And once you do, your approach to data management may never be the same.

STEVE HUDSON

Ease of Use	★★★★
Documentation	★★★★
Features	★★★★
Innovation	★★★★

IBM PC and compatibles; 640K RAM for total package including tutorial and applications, 450K RAM for program alone; DOS 3.1 or higher for 5¼-inch version, DOS 3.2 or higher for 3½-inch version, DOS 3.3 for IBM PS/2; 6MB of hard disk space; color monitor recommended—\$149.95

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WILLPOWER 1.0

What will happen to your assets after you die? A good will can ensure that you control the disposition of your assets. And *WillPower* is designed to help you put your estate in order without spending megabucks on professional attorney's fees.

This program cuts through the legal mumbo jumbo, offering valuable advice on how to provide for your spouse, children, and other beneficiaries. There are provisions to name an executor for your estate, nominate a trustee to handle assets earmarked for a trust, and print a customized will that can be updated easily if circumstances change.



WillPower takes you step by step through the process of drawing up a will.

To prepare an accurate will, you enter information on five separate data screens: General Information, Valuing Your Estate, Leaving Your Property, Nominations, and Estate Liabilities. Each screen helps you gather data about yourself and your property. *WillPower* compiles data from each screen to generate a will.

For example, General Information asks where you live and if you're married. You also enter data about your living children, dependent children, and the living children of your deceased children (your grandchildren). Valuing Your Estate helps you calculate the net value of your estate in order to determine what you'll be left after you've subtracted liabilities. As you fill in the program's worksheet, *WillPower* automatically totals your assets, subtracts your liabilities, and comes up with a figure for your net estate. The program tailors its pro-

visions to the state in which you live.

To help you enter data more easily, every screen lists important keys and their functions. If you need more information than what appears on a particular screen, you'll find references to relevant pages in the text. Additional online help and an electronic glossary of important legal terms are accessible via the function keys.

WillPower is simple to use and quite straightforward. The manual is well written and easy to follow.

Despite the program's ease of use, keep in mind that *WillPower* is no substitute for professional legal advice. The program provides valuable background information, but it does not provide for all contingencies. For example, *WillPower* makes no provision for setting up a living will. Also, you may want to consider that generally the big dollar fees for lawyers come from handling the estate after you die, not from drafting your will.

WillPower is just a first step. It can't let you know if you've handled all the important details. To ensure that your affairs are in order and to guard against improper disposition of assets, you should consult a lawyer. Moreover, if your taxable estate is larger than \$600,000, you should also obtain the advice of a tax-planning advisor, who can help you deal with federal estate taxes. In some states, you should consult a tax advisor if your taxable income is much lower.

While *WillPower* cannot really replace a lawyer, it can help you ask the right questions and do the groundwork necessary to come up with a thorough and adequate will, saving you time and expense when you do consult a lawyer.

CAROL HOLZBERG

Ease of Use	★★★★
Documentation	★★★★
Features	★★★★
Innovation	★★★

IBM PC and compatibles, 512K RAM, comes with both 3½- and 5¼-inch disks, hard disk—installable—\$49.95

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MS-DOS

CARD GAMES

Computer card games tend to be odorless and tasteless. Not so with *Ante-Up at the Friday Night Poker Club*, *Video Poker a la Carte*, and *Edward O. Thorp's Real Blackjack*. These three games up the ante on computerized card playing and whet your appetite for challenging, instructive, and visually stimulating entertainment.

The most addictive of the trio is *Video Poker a la Carte*, which includes six video poker machines. The differences among them are stylistic, and it takes no effort at all to learn them. Deposit your bet, and you're dealt five cards from an antique deck so splendid that anything less than the required EGA graphics couldn't do it justice. You can discard up to all five cards, and the machine pays off after the draw. The better the hand, the richer the pot.

In addition to excellent graphics, effortless play, and seductive appeal, *Video Poker* is an effective trainer. Able to keep up to ten histories for each machine, it can help you develop profitable playing strategies. It's possible to win more than you lose; you'll learn, but it isn't easy.



In *Video Poker a la Carte*, you're dealt five cards from a splendid antique deck.

EGA graphics aren't necessary to enjoy *Ante-Up at the Friday Night Poker Club*. The text version plays well on any system. The graphics version offers both an appealing look and mouse support.

You're treated graciously at the *Friday Night Poker Club*. If you're new to poker, the club pro teaches the mechanics of draw poker, 5- and 7-card stud, and a game called Texas hold 'em. He can also coach you as

you play, but don't bank on his advice. I wager that an uncle on the club's board, not skill, got him his job.

When you're ready to play, four of the club's eight members join you. The game lasts till you go broke or they do, but if you lack a poker player's stamina, you can save a game in progress. Each player has his or her own personality, consistent throughout the game. Players' differences are more pronounced at the pot-limit table than at the \$5 table, and they play better when the stakes are higher, too.

Ante-Up at the Friday Night Poker Club is a great place to learn poker, practice, and sharpen your skills. The atmosphere is informal, the play is spirited, and the money isn't yours.

In contrast, blackjack is serious business to Edward O. Thorp, who made his reputation and several fortunes winning at cards and beating the stock market. So while *Edward O. Thorp's Real Blackjack* is as much the tireless dealer as a hundred other blackjack programs, it's also an instructor, a trainer, and a fascinating system for developing strategies for the game of 21.

Play up to six hands yourself or set any of them to play automatically. Five value tables control the way an automatic hand plays, another controls the way it bets, and you control every aspect of all six tables. In addition, you control the way the dealer plays and can vary the house rules to match your favorite casino.

Searching for the perfect blackjack strategy, you'll first try out your ideas by playing manually. The documentation includes descriptions of several card-counting schemes, and the program tracks details like the distribution of cards left to deal and your chances of improving your hand.

When you've found a strategy that may work, you can modify a set of tables and save it. To test your theories, assign different styles to automatic players and play enough hands to see a trend. The program can run through thousands of hands unattended and report the results in detail.

When you've discovered the ultimate blackjack system, you'll want to learn it. *Real Blackjack* becomes your coach. If you're unsure how to play, or think you've lost count, ask for help. When you're done, the program rates your performance within your system.



Test different blackjack systems in *Edward O. Thorp's Real Blackjack*.

Edward O. Thorp's Real Blackjack doesn't look as slick or play as simply as card games that focus on entertainment. It's substantial enough to take as lightly or seriously as you like.

HARRY BEE

Video Poker a la Carte

Playability ★★★★★
Documentation ★★★
Originality ★★★★★
Graphics ★★★★★

Ante-Up at the Friday Night Poker Club

Playability ★★★★★
Documentation ★★★
Originality ★★★★★
Graphics ★★★

Edward O. Thorp's Real Blackjack

Playability ★★★★★
Documentation ★★
Originality ★★★★★
Graphics N/A

Video Poker a la Carte: IBM PC and compatibles, 256K RAM, DOS 2.11 or higher, EGA or VGA, mouse optional—\$49.95

Ante-Up at the Friday Night Poker Club: IBM PC and compatibles, 256K RAM, DOS 3.0 or higher, 3 1/2-inch or 5 1/4-inch floppy drive with a hard drive; 512K, EGA or VGA, and mouse required for graphics version—\$39.95

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Edward O. Thorp's Real Blackjack: IBM PC and compatibles, 384K RAM, DOS 2.1 or higher, color monitor—\$49.95

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BANDIT KINGS OF ANCIENT CHINA

One of the earliest computer games was *Hamurabi*, which put you in charge of a kingdom and let you try to win your subjects' loyalty by balancing the resources in your land. *Bandit Kings of Ancient China* takes this concept several steps further. Based on a historical Chinese novel, *Shui Hu Zhuan*, *Bandit Kings* takes place in the twelfth century just as the Song Dynasty was on the verge of collapse. Imperial Minister Gao Qui has wrestled control from the Emperor. As one of the remaining heroes of the land, it's your job to build up strength and loyalty among your followers, awaiting the Emperor's edict to seek out and crush Gao Qui.



Can you take control of 49 prefectures and help the Emperor crush Gao Qui?

Before you get started, you must choose your character, called a *Good Fellow*. There are ten Good Fellows in the Dynasty, and you can choose to play from one to seven of them, depending upon which of the four scenarios you choose. As you settle a land, you can recruit Bandits residing in your territory, each of whom can direct up to 100 men. You can assign tasks to your Bandit and use him to defend or attack your enemies. In all there are 255 characters, each with different attributes, giving you a wide variety from which to choose.

Bandit Kings' main screen is divided into four sections. One section displays a picture of your Good Fellow, along with the amount of gold,

men, food, and a number of other statistics about your prefecture (province). Another displays a map of China divided into the 49 prefectures, all color-coded to show which Good Fellow is in control of that area. As the game progresses, prefectures will change owners several times. A small portion of the screen is devoted to messages, while humorous animations and pictures depicting moves and interactions with other characters are shown below your prefecture data. These animations can vary from hunting a boar to sending your men off to war. Several sampled sounds and many catchy tunes add to this already elaborate simulation.

Bandit Kings does have a few minor problems. Messages sometimes disappear before you have a chance to read them. An option in the menu allows you to set the delay time between messages, but even the longest delay time seems too fast. Occasionally the pull-down menus became transparent, making the menus difficult to read. Another annoyance is the manual. While it's well written and full of historical notes and character information, it's obviously not written for the Amiga. Instead, a six-page Amiga reference leaflet is provided.

These minor problems aside, *Bandit Kings of Ancient China* is still one of the most complete and entertaining role-playing simulations available. From the detailed drawings of each of the characters to the colorful hexagon battlefield, you'll be captivated for many hours. The game is sure to become another must-have among strategy game and role-playing game lovers. *Bandit Kings* isn't copy-protected and requires 1.6MB of hard disk space to install.

ROBERT DU GAUE

Playability:	★★★
Documentation:	★★
Originality:	★★★★
Graphics:	★★★★
Sound:	★★★★

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PROFESSIONAL DRAW 2.0

The first thing you notice about *Professional Draw 2.0* is that its interface looks virtually identical to the original *Professional Draw*, with the addition of some new menu items. These new selections are what brings *Professional Draw 2.0* in league with the midrange structured drawing programs available at much higher prices on other computers.

A major enhancement to *Professional Draw 2.0* is a separate program called *Trace*. *Trace* converts an IFF bitmap file into a structured clip suitable for import into *Professional Draw*. Experimentation is the key here, as it's easy to create absolutely enormous clips that take forever to load. (The updated *Professional Draw* is much faster than 1.0, but many operations are still sleep-inducing.) Simple IFFs using very few colors will convert best.

With *Professional Draw 2.0* you can take one object, say a circle or a square, and blend or *morph* it into another object. *Professional Draw* will calculate and display all the intermediate-step objects for you very quickly. Morphing objects will also blend their colors, if different, so a yellow star can be morphed into a blue planet over a number of steps, with each transitional object changing both shape and color along the way.

You can now control how *Professional Draw* operates on your particular display hardware. Depending on whether you have a flickerFixer board, you can choose between Smooth (best colors for flickerFixer and 3000 owners), Non-Interlace (for using the program in 640 × 200 mode), or Flicker-Free (a special palette designed to minimize interlace flicker) modes.

Professional Draw 2.0 now offers a menu item that easily aligns text with curves, a task that was sheer torture with the original program. This was a sorely needed feature. The program comes with two specially prepared outline fonts: Times (serif) and Triumvirate (sans serif). These typefaces can be treated as objects when typed onto the screen: Scale, twist,



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skew, rotate, and color them in a multitude of ways, and wrap letters or text on arbitrarily curved paths with ease. If you want a wider variety of outline fonts, you'll have to invest in one of Gold Disk's Compugraphic outline fonts packages, which come with a utility called *CreateFont* that converts Compugraphic into a format acceptable to *Professional Draw*.

Professional Draw 2.0 can import Encapsulated PostScript files and IFF bitmaps, and can output to Postscript and dot-matrix printers or plotters that speak HPGL. Gold Disk's *Professional Page* and Softlogik's *PageStream 2.1* software will both import clips created with *Professional Draw*.

The 158-page paperback manual does a decent job as both a tutorial guide and a working reference.

HARV LASER

Ease of Use	★★★★
Documentation	★★★
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64/128

MICROLEAGUE FOOTBALL

Have you ever sat in front of the television set, your feet sprawled on the coffee table and favorite beverage in hand, watching those sometimes brilliant and sometimes clownish National Football League coaches direct the awesome power of a professional football team? Have you ever questioned the coaching skills of these gridiron gurus? If you're like me, there are times when you're sure you could do a better job, if given the chance.

MicroLeague Sports has, once again, granted the wish of many sports fans. *MicroLeague Football, The Coach's Challenge* is a truly amazing and realistic sports simulation that places you in control of an NFL team.

This is the real thing. In *MicroLeague Football*, you'll experience the satisfying thrill of victory or suffer the heartrending humiliation of defeat, totally on the merit of your own coaching ability. When you take charge of any of the 20 available teams, the actual professional players are yours to command. Their athletic prowess and statistics are at your disposal for use to the team's advantage.

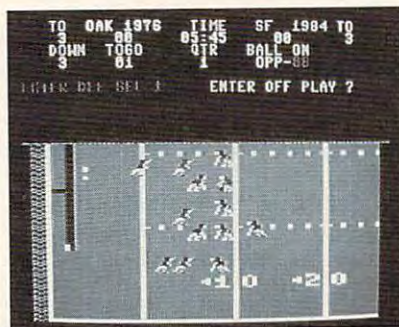
There is one situation missing from the program that real coaches must face. The realism stops short of your having to deal with an irate owner should your team find itself in a losing season.

Two coaches, in charge of opposing teams, may meet for judgment on the gridiron. Each may place his or her prime players in their most effective positions, determine strategy, and choose offensive and defensive postures. Once selected, the computer animates each play and displays the positive or negative gains on the field.

I found the game to be a great way to settle a longstanding dispute with my dad and brothers, regarding which of us possesses the coaching talent in the family. You can also go toe to toe with the computer as your side-

line nemesis across the field.

Picking offensive and defensive alignments and sending in plays from the bench are only part of this complex simulation. How will you react if the opposing team continues to blitz or an injury takes out one of your star players? The coach with the ability to think on his or her feet will be able to compensate for these surprises and adapt the game plan accordingly.



Put your coaching talents to the ultimate test with *MicroLeague Football*.

MicroLeague Football begins by asking the coaches to select 2 of 20 clubs as the home and visiting teams. The choices available are a who's who of championship ball clubs, past and present. If you've always wanted to coach Johnny Unitas and the 1958 Baltimore Colts, here's your chance. Or how about coaching the 1977 Dallas Cowboys, the 1986 Cleveland Browns, or the 1983 Miami Dolphins?

A single keystroke allows you to determine if the teams will be coached by a human (such as yourself) or the computer. Humans or computer can take charge of one or both of the selected teams. If you want to change the starting lineup, the team roster is displayed for your review.

The visiting coach inputs his or her plays on the right side of the keyboard, and the home-team coach uses the left side. The playbook is quite extensive on both sides of the line of scrimmage. The skill to use effectively all the defensive and offensive formations is what will separate the pros from the bush leaguers.

A Quik-Play option allows you to move quickly through a game for speedy results. This is particularly handy when the outcome of a game is obvious and a quick end is desired. It's also handy when the end result of

a certain game is needed for documentation or statistical purposes.

Knowing a lot about the game of football is not a requirement to play *MicroLeague Football*, but it helps to have a working knowledge of the sport if you want to win. This is because *ML Football* is a true simulation of the rather complex sport. Fortunately for novices—and for those who know the game well—the documentation is clear, concise, and written especially for the Commodore 64 and 128. Also included is a listing of football plays and terminology to provide a better understanding of the game.

After the game, a complete box score can be printed. This is where a coach can review the strengths and weaknesses of the ball club and adjust accordingly. The Stat Compiler manages and saves the statistics for you.

With the purchase of additional Specialty Disks from MicroLeague, you can become a General Manager/Owner and create your own teams. A Season Disk, also available for an additional price, gives you all the stats for players in the National Football League from 1986 through 1989.

Having played and coached a little oblong ball in my day, I can tell you from experience that there is nothing like a real football game when it comes to excitement. Nothing can emulate the sound of the players growling and their pads colliding when the ball is snapped. It's hard to bottle, package, or capture such ambience. However, when it comes to simulating the thrill and satisfaction of guiding a talented team and watching your plans unfold like clockwork before you, *MicroLeague Football, The Coach's Challenge* comes extremely close to the real McCoy.

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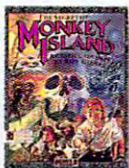
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