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and a "program" written on the label:

Tomato Soup

Water, tomatoes, salt,
monosodium glutamate,
red color #7, oleoresin.

1. Open carefully.
2. Empty contents into pan.
3. Add one can of water.
4. Heat to a simmer.

Steps one through four are clearly a program of sorts. One clue that these steps are program-like is that each item starts with a number, indicating the order in which the operations are to be performed. The ingredients – standing by themselves as raw data – are a file. And, just as the ingredients "file" in the example above is *acted upon* by the cooking instructions program, a computer program acts upon a data file.

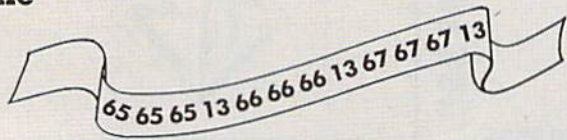
Here's a simple program which will create a tape file (there's a different format if you want to make a disk file: you change the device number in line 20 by typing OPEN 1,8,8,"0:FILE,S,W" – we'll get to the reason for the "0:" and the "S,W" later):

```
10 DATA AAA,BBB,CCC
20 OPEN 1,1,1,"FILE"
30 FOR I=1 TO 3
40 READ D$
50 PRINT#1,D$
60 NEXT I
70 CLOSE 1
```

PRINT# (usually pronounced "print-number") is an entirely different command from PRINT, and the punctuation, as always in programming, must be exact. Line 40 is interesting because we keep READING D\$ over and over to use it as a temporary holding place until we can PRINT# to a magnetic memory. D\$ isn't anything in itself (it varies, it's a *variable*). READ will pick out each datum from the DATA in line 10 in turn, keeping track of the last one that was READ.

In any case, after this program is RUN, the magnetic memory would contain a file. If we could look at that file on the tape the way we would look at a photograph, we would see a row of numbers. The number 65 stands for the letter A, and 13 represents a carriage return. Here's what the photograph would look like:

A Strip Of Tape Containing Our Example File



A data base manager is a program that manipulates data in files. Writing a large, flexible data base managing program is not a simple task – it

can involve sorting, searching, and other complex programming techniques. Nonetheless, handling Christmas card lists is not beyond beginning programming skills. Files do, though, represent something of a challenge. Your computer's manual contains information on the necessary punctuation and syntax for the BASIC commands which manipulate files. However, a brief overview might be of help.

OPEN, PRINT#, INPUT#, And CLOSE

While a program would be stored by the simple SAVE instruction, a file is stored by a combination of OPEN, PRINT#, and CLOSE. Likewise, a program is just LOADED, but a file is "loaded" into the computer with OPEN, INPUT#, and CLOSE. Files are a bit more complicated, but the trade-off is that you can do more manipulating with files, easier *appending* (adding to them), easier *merging* (making two files into one), and so on.

The command OPEN is generally used to communicate with a disk or tape drive. It's like pulling open a file cabinet drawer – once a file is OPENED, you can then get at the records inside. Here's what you would do to OPEN the file we created earlier. This time, instead of writing to it, we'll read from it.

OPENing Commodore Files

```
10 OPEN 1,8,8,"0:FILE,S,R"
```

The first number (1) means that this OPEN will hereafter be called #1. When you pull something out of it, you would use INPUT#1 (you can keep open up to ten files at one time). The second number (8) means disk drive (a 1 in this position would mean to open a file on the cassette drive). The second 8 is a secondary address which allows you to give additional instructions. With disk drives, just use 8.

The 0: specifies drive zero and the S means *sequential* file. The Commodore disks can create two other kinds of files: random and relative, but sequential is the simplest. Finally, the R means *read*, so you will be using INPUT# to get things out of this file. (A W here would mean *write*, and you would PRINT# to the file.) To make this "reading or writing" distinction for tape files, the secondary address is used: a 1 means write and a 0 means read. (10 OPEN 1,1,0,"FILE" would be the same as the example above, except it's for a cassette file. No drive number is specified, and the S is not necessary since cassette files can only be sequential files.)

Taking Something Out

Recall that we put things into a file with PRINT#. Going the other way, you get something out of an

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OPENed file by using INPUT# in combination with a string variable to "hold" whatever comes from the file (they come back to the computer in the order they were PRINT#ed in a sequential file). To get the AAA back:

```
20 INPUT#1,A$
```

Then you could print A\$ to see the data AAA it holds:

```
30 PRINT A$
```

To get the rest of the data we stored, you could:

```
40 INPUT#1,B$:PRINT B$  
50 INPUT#1,C$:PRINT C$
```

After you are finished INPUT#ing or PRINT#ing from a file which had been OPENed as file #1, you would close it:

```
60 CLOSE 1
```

When you've finally CLOSED the file, you are free to use that file number (#1 in these examples) for some other file, with a different name. CLOSE is essential, however. Without it you could permanently lose part or all of a file, or even damage other files. Don't leave files open after you're finished with them.

INPUT# And PRINT# Hints

The INPUT# and PRINT# work very similarly to the way INPUT and PRINT work from the keyboard and to the screen. The only catch is that PRINT# needs some special handling. It's best to give it a line all to itself:

```
20 PRINT#1,A$  
30 PRINT#1,B$
```

The reason for putting PRINT# on its own line is that this is an easy way to separate items in a file: with carriage returns. Just as:

```
20 PRINT A$  
30 PRINT B$
```

causes B\$ to be on the line below A\$ on the screen (since using a new line forces a carriage return to take place) – a separate program line puts a carriage return symbol onto the tape or disk and keeps the data from running into each other. This kind of "separator" symbol is called a *delimiter*.

Manipulating Files

Our example program above, which reads data from magnetic memory into the computer, does work, but it's cumbersome. Files are usually written to or read from within loops. Here's a simple program to write a file to tape:

```
10 DATA BILL, SANDY, KATIE, LARRY  
20 OPEN 1,1,1,"NAMES":REM (A TAPE FILE)  
25 PRINT#1,4  
30 FOR I=1 TO 4  
40 READ A$
```

```
50 PRINT#1,A$  
60 NEXT I  
70 CLOSE 1
```

Since there are four names in this file, the loop counts up to four, READING a new A\$ from the DATA line each time through. Since PRINT#1 is by itself on line 50, it will send carriage returns to the tape each time it PRINT#s, separating the names on tape with delimiters. This way, there will be no question of something like BILLSANDY being stored.

When this file is later read into the computer, it would be very useful to know when the entire file ends, how big it is. There are two ways to do this. You could add the word "END" to the DATA line and then change line 30 to read: FOR I=1 TO 5. Or, you could put the *count* (the number of records for this file) on the tape or disk itself, as part of the file. See line 25 above for an example of this.

Here's a "reader" program which first pulls the count out of the file and then brings the records into the computer:

```
10 OPEN 1,1,0,"NAMES":REM (A TAPE FILE)  
20 INPUT#1,COUNT:REM THIS IS THE FIRST ITEM ON THE FILE  
30 FOR I=1 TO COUNT  
40 INPUT#1,A$  
50 PRINT A$:REM (TO THE SCREEN)  
60 NEXT I  
70 CLOSE 1
```

If you use the "END" technique, the reader program would not use line 20 and would add line: 45 IF A\$="END" THEN GOTO 70. If you plan to do significant manipulations with the file data, you might want to call the items into an array so that they can be worked with easily.

One final note about something which might not be immediately obvious: if you update a file, you cannot put it back on a disk using the same name. Here's why: it's first read off the disk and into memory because you want to make some changes. Before you OPEN-PRINT#-CLOSE it back onto the disk, you must first *scratch* (remove) the original file (it's in the computer now) so you can replace it with the updated one. For obvious reasons, you can't have two files on disk with the same name. This *scratching* is unnecessary for tape files, because the recorder will write over the old file (if you rewind the tape).

There are numerous ways to manipulate files. We've been dealing with *sequential* files, the most straightforward type of files; using INPUT#, the most straightforward access command; and delimiting with carriage returns, the simplest punctuation. Your manual contains information about more complex, sophisticated filing techniques, including special types of disk files, using GET#, and delimiting with commas or even using semicolons between items. ☐

COMPUTE!'s Gazette introduces a new feature this issue – "Horizons: 64," a monthly column exclusively for Commodore 64 users. "Horizons: 64" replaces our previous Commodore 64 column, "64 Explorer," which is moving to our companion magazine, COMPUTE!. Our new columnist is Charles Brannon, Program Editor. Brannon's experience with Commodore computers dates back to the early days of the Commodore PET.

Commodore 64 Video – The Saga Continues

In the July issue of COMPUTE!'s Gazette, we brought you some of the latest information on Commodore 64 video. The article, "Commodore 64 Video Update," covered radio frequency interference, "sparkle," and revisions to the VIC-II chip (which is responsible for 64 video). It seems the story isn't finished, however.

Suppressing Sparkle

"Sparkle" appears on most early-model 64s to varying degrees, and even plagues some current owners. Sparkle appears as tiny flickering specks within screen characters, closely resembling TV "snow." Besides the obvious annoyance, sparkle can interfere with sprites (animated screen objects). When a sprite "bumps into" the transient flickers, the VIC-II chip thinks a collision has occurred with another screen object. In a game program, this can unjustly "zap" your spaceship. Worse, sometimes sparkle is invisible, and who's going to believe you collided with something invisible?

If you're a programmer, it's a relatively simple matter to avoid sparkle: just relocate the character set. Moving the character set out of the default area removes the conflict that causes sparkle. Many games use a custom character set anyway, so in practice you may not encounter many problems.

If you're not a programmer, you may be able to reduce sparkle by simply switching to lowercase. In most 64s, either the uppercase or lowercase character set has more sparkle than the other. Just press both SHIFT and the Commodore logo key simultaneously to switch. If you're playing a

game that uses graphics characters (most of which are not available in lowercase), then this is obviously not a good solution.

The New 64s

The latest Commodore 64s (and VIC-20s too) have changed quite a bit. Video quality is much improved. RF interference (which distorts the TV image) is almost gone, due to added shielding (aluminized cardboard covers the circuit board, and there is a metal plate underneath). The characters seem crisper, the colors brighter.

If you opened the case of the 64 (not recommended; it will void your warranty), you would find that the number of chips has been reduced dramatically. This makes the machine run cooler, but more important, it cuts Commodore's costs. This is a major reason why Commodore can continue selling 64s for under \$200, from a previous high of \$595. And the price may continue to drop. A price tag of \$100 may not be as radical as it seems. Strangely, though, this may not happen simply because Commodore now has less competition in the under-\$200 price range. Few competing machines at that price can boast the standard 64K of memory.

Other Changes

The latest 64s incorporate two other changes – the five-pin audio/video socket now has eight pins, the power supply is larger (some components inside the 64 were moved to the power supply, making the computer run cooler), and the power plug has only three pins, although the socket has room for seven. On previous 64s, it was possible to mistakenly plug the power cord into the audio/video socket (a tragic mistake), since both are five-pin sockets. On the latest 64s, it is impossible. According to sources at Commodore, however, there are no extra functions assigned to the additional pins on the audio/video plug, and the standard five-pin cables still work just fine.

How Computer Video Works

There is a way, however, to take best advantage of the 64's video output – attach it to a monitor. The price of quality color monitors has been dropping of late. Video monitors have the same picture tube as any high-quality television. TV

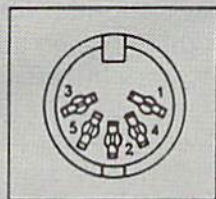
sets, of course, are designed to pick up only broadcast signals. To feed the 64's *composite video* signal into your set, it must be converted into a TV signal. In effect, you have a tiny television transmitting-station inside your 64 (the RF modulator). If the signal was much stronger, you wouldn't even have to make a physical connection. You (and your neighbors) would pick it up like any broadcast.

And there's the problem – the 64 has to convert its "pure" video signal into broadcast signals,

fordable alternative to TV sets and expensive color monitors. Discounted to under \$300, the Commodore 1701 Video Monitor has two connections, front and rear. The front connection is like any monitor, accepting composite video and audio (incidentally, the sound is excellent, with a decent-sized speaker). The rear connection, though, is special: there is circuitry to mix in the separate luminance signal.

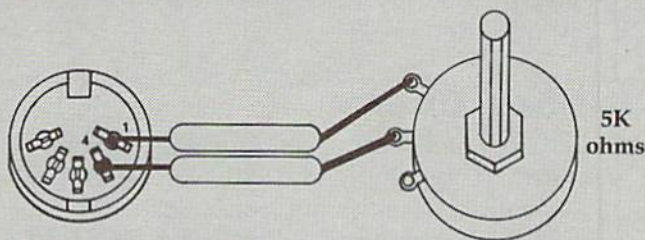
The result? Phenomenal. There really is no

Figure 1: Audio/Video Pinout (Rear of 64)



Pin 1: Luminance
Pin 2: Ground
Pin 3: Audio Out
Pin 4: Video Out
Pin 5: Audio In

Figure 2: Improved TV Connection:



From Pinout 4 to center terminal.
From Pinout 1 to any other.

which are fed into the TV's antenna through the switch box (which really doesn't do anything to the signal). The TV converts the signals with its tuner, and then controls the red, green, and blue electron guns that continually "paint" the TV image on the inside of your TV tube.

The tuner is susceptible to much interference, both from local stations, and stray signals from the computer (the tiny silicon switches within the chips work so fast, they generate a field with the same cycle rate as radio signals). You also lose clarity in the translation process. It's like recording a tape by placing the tape recorder near your stereo speakers. You get a much better recording by plugging your tape recorder directly into your stereo's output.

That's what the five-pin audio/video plug is for. Video monitors can accept the composite video signal directly, without having to go through a tuner. Without a tuner, the TV can't pick up any interference, and it doesn't have to translate the signal. The monitor then breaks down the composite video signal to control the electron guns.

There are two separate video outputs: chrominance and luminance. Luminance controls the brightness or darkness of a screen. It provides contrast. You can attach a monochrome (non-color) monitor with the luminance signal. Most color monitors use the composite video signal (which has a little luminance mixed in with it).

The Commodore 1701 Video Monitor

Thanks to a special deal with a Japanese TV manufacturer, Commodore is able to market an af-

fordable alternative to TV sets and expensive color monitors. Discounted to under \$300, the Commodore 1701 Video Monitor has two connections, front and rear. The front connection is like any monitor, accepting composite video and audio (incidentally, the sound is excellent, with a decent-sized speaker). The rear connection, though, is special: there is circuitry to mix in the separate luminance signal.

The result? Phenomenal. There really is no parallel. All the problems the 64 has suffered with "color smearing" and bad contrast are solved. Almost any color combination looks great. It won't fix sparkle, however (sparkle is a problem with the computer, not the video display).

Many people who already own the video monitor don't know how to use the rear connection, since the monitor is packaged with a cable for the front connections (for the VIC's sake). If you're handy with a soldering iron, you can make your own cable, using Figure 1. You can also obtain an "octopus cable" which has the five-pin plug on one end and four RCA jacks on the other (like stereo connectors). The color scheme varies; you can't hurt your equipment if you try hooking up the four plugs by trial and error. Remember to flip the switch behind the monitor which selects the rear hookup. With the cables we've used (generically called an "audio/video cable"), the black plug goes into Audio, the white into Chroma, and the red into Luminance.

Super TV

If you're using your 64 with a TV, you're in for a treat, too. If you can make your own cable, or can find someone who can do it for you, you can improve the 64's picture on your set (although it won't improve ordinary TV reception). It involves mixing a little luminance into the color signal to improve contrast. The simplest technique is to just attach a wire (or paper clip!) between pin-sockets 1 and 4 on the back of your 64 (see Figure 1). Unfortunately, this is too much for the ordinary TV set. It "overdrives," and you get an extremely bright, distorted picture. Some sets work just fine, though, after you've adjusted the color and

contrast. However, the overly strong video signal "drowns out" the computer's sound.

A better way is to reduce the amount of luminance you mix in. This is done by putting a potentiometer (variable resistor) between pins 1 and 4. If you twist the wires tightly, you don't even have to solder. Commodore recommends using a 5K potentiometer. The dealer at your local electronics parts store (such as Radio Shack) can help you find one. See Figure 2. Once you've hooked it up, you can turn the knob on the potentiometer to adjust how much luminance you want. Most people agree that the resulting picture is far better.


Odds And Ends

This handy tip comes from Programming Assistant Eric Brandon: if you would like to fill color memory on current model 64s with any color almost instantly, set the background color (POKE 53281) to the color you want to fill with, then clear the screen. The clear screen routine does the job. You can then set the background color to some contrasting color. Thereafter, POKEs to screen memory don't require the corresponding POKE to color memory. If you've been doing this already (older 64s always fill color memory with white), insert the extra code so the program will work on everyone else's 64.

For example, to fill color memory with white:

POKE 53281,1:PRINT CHR\$(147);:POKE 53281,6

It has come to our attention, though, that Commodore has made yet another revision to the Kernal ROM (the operating system). As mentioned, Revision 1 always filled color memory with white when the screen is cleared. In Revision 2, color memory was filled with the background color (to deprive sparkle of its color). Finally, Revision 3 fills color memory with the color of the cursor (set with CTRL 1-8 or COMMODORE key 1-8). Both Revisions 1 and 3 will allow POKEs to screen memory without the corresponding POKE to color memory, since color memory is set to a color which contrasts with the background color. To be safe, and allow your software to run on all 64s, you may want to fill color memory by setting both the background color and cursor color to white, clearing the screen, and then resetting the background color to whatever you want to use.

Be sure to tune in next month. We've got quite a few interesting topics in mind. In future columns, we'll briefly review significant new hardware and software for the 64. This way, you'll find out about these products faster than the time it takes to do an in-depth review (which usually follows). If there's anything you'd like us to discuss, or if you notice any interesting hardware or software products, write us. 

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Keeping Time With The VIC

The Commodore VIC-20 has a realtime clock. In this month's column, we'll show you how to program it to do everything from simply telling the time to creating timers for games.

The Jiffy Clock

The realtime clock that is standard with all VIC-20s can be a very useful tool for games, programs, etc. The clock, which occupies three memory locations, is called a *jiffy clock* and is located at bytes 160 through 162.

Before we talk further, let's take a look at the jiffy clock while it's running. Enter, then RUN the following short machine language program. We'll use machine language here so we can see the clock running at just about its real speed. The program will display the three jiffy clock bytes (162, 161, 160) in the center of your screen. To stop the clock, press RUN/STOP-RESTORE.

```
1 FORA=828TO846:READB:POKEA,B:NEXT
10 PRINT"[CLR]":TIS="000000":POKE38628,6:
   POKE38630,6:POKE38632,6
20 SYS828
828 DATA 165,162,141,228,30,165,161,141,2
   30,30
838 DATA 165,160,141,232,30,76,60,3,234
```

What you are seeing displayed is not actually the numbers running by in the clock, but the screen POKE values of the numbers. For example, the screen POKE value of @ is 0, the value of A is 1, etc.

As you can see, the clock runs very fast, and

the speed is not the same as for a standard clock (one "click" every second). The first byte you see displayed (the byte moving the fastest) is byte 162 – the low-order byte of the jiffy clock. This byte is actually counting from 0 to 255 by ones. It does this in 4.266666 seconds. That is, it takes 4.266666 seconds for it to count 1,2,3,...255, then back to zero to start the cycle again. It increments, or counts, 60 times every second. That's why it's called a jiffy clock – a "jiffy" is 1/60 of a second.

The VIC performs a number of operations at this speed. For instance, 60 times every second it checks the keyboard to see if any keys have been pressed and updates the keyboard buffer if necessary. It also takes care of the cursor blinking routine.

The jiffy clock is like a simple three-digit counter. Each time byte 162 goes through its cycle and returns to 0, it "clicks" or increments the next byte (byte 161) by one. And every time byte 161 runs through its 0 to 255 cycle, it increments the next byte (160).

Telling Time With The VIC

The VIC's TIS and TI (*time*) functions are translations of the jiffy clock. TIS and TI are built into the BASIC that is in both the VIC-20 and the Commodore 64. The TIS function returns a six-character string in the same format as a standard clock: hours, minutes, seconds. The TI function returns a value in tenths of seconds.

For a demonstration of these two functions, enter and run (separately) the two following short programs. When you enter the first demonstration

program (TI\$), enter the current time in the format HHMMSS, where HH=hours, MM=minutes, and SS=seconds. For example, to enter the time 3:30 a.m., enter "033000".

The second demonstration program emulates a stopwatch. Press F1 to start, F3 to stop and display elapsed time.

TI\$ Demo

```
10 PRINT "{CLR}{DOWN}ENTER CURRENT TIME":P
  RINT"IN FORMAT: HHMMSS":INPUTTI$:PRINT
  "{5 DOWN}"
20 PRINT "{8 RIGHT}";TI$"{UP}":GOTO20
```

TI Demo

```
10 PRINT "{CLR}{4 RIGHT}VIC STOPWATCH":PR
  NT"{DOWN}PRESS F1 TO START":PRINT"PRE
  S F2 TO STOP{2 DOWN}"
20 GETA$:IFA$="{F1}"THENTI$="000000":PRIN
  T"{2 DOWN}TIME IN SECONDS ={DOWN}":GOT
  O40
30 GOTO20
40 PRINT "{2 RIGHT}";TI/60"{UP}"
50 GETA$:IFA$="{F3}"THEN70
60 GOTO40
70 PRINT "{6 DOWN}PRESS A KEY TO REPEAT"
80 GETA$:IFA$=""THEN80
90 GOTO10
```

As you can see, when you use the VIC's TI\$ and TI functions, the jiffy clock is automatically converted into a realtime clock. We'll be using TI\$ and TI to create a nice clock display and to discuss the creation of timers for games. By the way, the time format the TI\$ function returns is that of a 24-hour clock. It's like military time, where 1400 hours would be 2:00 p.m. With the use of an IF/THEN statement or two, you can turn it into a standard 12-hour (a.m. - p.m.) clock.

Clocks And Timers

Enter the following program and RUN. The program will turn your VIC-20 into a colorful clock with sound. The program is very simple in that it does only two things: it POKes or PRINTs colors to the screen, and it displays the time. The colors that are POKed to the screen while the program is running are done with machine language. It could have been done with BASIC, but it would run much slower. If you would like to change the speed of the color as it is POKed to the screen, change variable SP in line 1 of the program, then RUN.

Program 1: Color Clock

```
1 POKE52,28:POKE56,28:CLR:SP=12:GOTO10
2 C=INT(RND(1)*N)+0:IFC=1THEN2
3 RETURN
10 GOSUB300:PRINT "{CLR}":SC=7680:CO=38400
  :POKE36879,25:N=8:O=160:Q=505:POKE7195
  ,SP
20 IF4*(PEEK(36866)AND128)+64*(PEEK(36869)
  )AND112)=4096THENSC=4096:CO=37888
```

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```
40 FORA=0TOQ:GOSUB2:IFA=226ORA=248ORA=270
  THENA=A+10
50 POKESC+A,O:POKECO+A,C:NEXT:PRINT "{BLK}
  {9 DOWN}"
60 SYS7168:PRINTTAB(7)LEFT$(TI$,2);":":MI
  D$(TI$,3,2);":":RIGHT$(TI$,2);"{UP}":G
  OTO60
300 FORA=7168TO7199:READB:POKEA,B:NEXT
305 PRINT "{CLR}{DOWN} ENTER TIME IN FORMA
  T":PRINT "{DOWN} HHMMSS"
310 PRINT "{2 DOWN} WHERE HH=HOURS":PRINTT
  AB(7)"MM=MINUTES":PRINTTAB(7)"SS=SECO
  NDS"
320 INPUTTI$:RETURN
7168 DATA 160,0,174,104,144,173,105,144
7176 DATA 157,0,150,157,0,151,169,0
7184 DATA 170,157,249,150,232,224,9,208
7192 DATA 248,200,192,12,208,228,96,234
```

You might also want to study line 60 of the program. Using the LEFT\$, MID\$, and RIGHT\$ commands to manipulate strings (used here to separate the hours, minutes, and seconds in the jiffy clock) can be a very useful programming technique, and is well worth learning.

This clock program could also be turned into an alarm clock with one easy IF/THEN. For instance:

```
10 IF TI$="XXXXXX" THEN POKE 36878,15:
  POKE 36876,200
```

"XXXXXX" here represents the time, in hours, minutes, and seconds, when you wish the alarm clock to ring.

Using the jiffy clock to create a "countdown timer," as is often found in games, is actually very easy. Because the jiffy clock is able to count or run forward only, it cannot be directly programmed to count down. However, you can program a countdown timer by subtracting the values of the clock from a constant (a number value that doesn't change), then using the difference as your counter. For example, enter this program and RUN.

Program 2: Countdown Timer - Whole Seconds

```
1 PRINT "{CLR}{2 DOWN}"
10 TI$="000000":A=30
20 PRINT"COUNTDOWN TO 0:"TAB(15)A-VAL(TI$
  );"{LEFT} {UP}"
30 IFA-VAL(TI$)<=0THEN50
40 GOTO20
50 PRINT "{2 DOWN} TIME EXPIRED!!!"
```

Here we set the jiffy clock to zero (line 10, TI\$="000000"). Then the variable A (which represents a constant value of 30) is subtracted from the value of the clock (VAL(TI\$)). As the clock value gets larger, the difference in subtraction gets smaller, causing the countdown effect. You can change the variable A in line 10 to create a timer of any value you wish. Because this timer uses the TI\$ variable as the subtrahend, it will

decrement by a value of whole seconds.


If you wish to create a countdown timer that will work with values in fractions of seconds, you can use the same programming technique with the TI function. Remember that to get a proper time display, TI must always be divided by 60 (TI / 60). Enter and RUN this program:

Program 3:

Countdown Timer - Fractions Of Seconds

```
1 PRINT "{CLR}{2 DOWN}"
10 TI$="000000":A=30
20 PRINT "COUNTDOWN TO 0:{2 DOWN}"
25 PRINTTAB(5)A-TI/60;"{LEFT} {UP}"
30 IFA-TI/60<=0THEN50
40 GOTO25
50 PRINT "{2 DOWN} TIME EXPIRED!!!"
```

Here, the technique is the same, except that TI was used as the subtrahend instead of TI\$, which returned a difference in fractions. In this program you can also change the variable A to any value you wish.

The built-in jiffy clock can be a very useful programming tool. You can program it to do everything from simple tasks like ringing an alarm when your favorite TV program is on to adding timers to your favorite games for added excitement and challenge. 

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Understanding Sound On The Commodore 64 Part 1

Gregg Peele, Programming Assistant

This series will explore the Commodore 64's versatile sound features – the best found on any home computer. This month, there's a utility program which makes it much easier to design sounds on the 64 and add them to your own programs. The author, an editorial programmer for *COMPUTE!'s Gazette*, also is a graduate student in music.

In the premiere issue of *COMPUTE!'s Gazette* ("Enlivening Programs With Sound"), I wrote of the many fascinating uses for sound effects in programs. Delving even deeper into the subject, let's now discuss the special sound features of the Commodore 64 and the ways you can use these features in your own BASIC programs.

The Amazing SID Chip

The Commodore 64 has three independent *voices* (sound channels), each having one of four possible *waveforms* (tone colors). These voices, produced by the MOS 6581 SID (Sound Interface Device) chip, can be set up to simulate almost any sound. In fact, the capability of the SID chip has been compared to music synthesizers costing more than the entire Commodore 64. To understand how to use the SID chip effectively, a brief discussion of the nature of sound is necessary.

Some Sound Theory

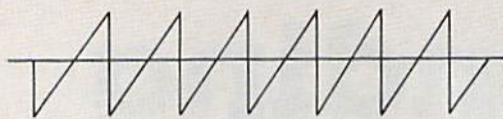
Most sounds in music and many sounds in nature have a defined *pitch*. Pitch is a way of describing how "high" or "low" a particular sound is.

The SID chip has a pitch range of nine octaves. This is about two octaves greater than a piano. When programming, these pitch values are formed from two *bytes* (a byte is a memory location which can hold a value of 0 to 255). This yields a range of more than 65,000 (256×256) possibilities of different pitch values for notes. The *pulse* waveform, one of the four waveforms available, allows an even broader range of pitch values.

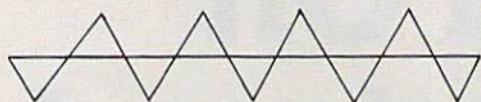
Waveforms

Since we've already mentioned waveforms a couple of times, maybe we should clarify exactly what a waveform is. Almost every sound consists of a pulsating motion generally referred to as vibration. Different materials vibrate in different patterns. This is one reason why the different instruments of the orchestra have unique tonal qualities. The SID chip is able to produce four different waveforms: triangle, sawtooth, pulse, and noise (see the figure). Each of these waveforms produces a unique sound and, along with pitch and envelope control, form the basis for sound synthesis on the Commodore 64.

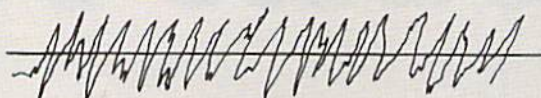
Commodore 64 Waveforms



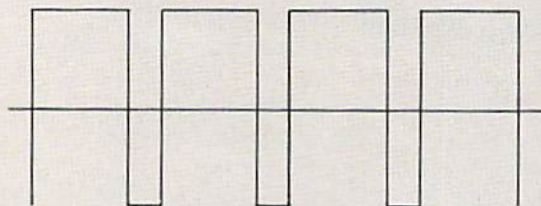
Sawtooth Waveform



Triangle Waveform



Noise Waveform



Pulse Waveform

A Stone's Throw

Sound waves, like waves from a stone thrown into a pond, constantly change. In fact, much of our ability to discern one sound from another is because of the unique pattern of change which "fingerprints" each sound. Some familiar examples are the different sounds produced when you strike something with a metal or rubber hammer. Much of the sound produced by the rubber hammer is absorbed within the hammer itself.

Envelopes

Most sounds follow a similar pattern through time. This pattern is the *envelope* (see photo of Program 1). First, the initial event which creates the sound sends the volume level rapidly upward. This section of the envelope, called the *attack*, may be the major defining factor of a sound. A hand clap consists almost entirely of the attack section.

After this initial attack, the volume level decreases during the *decay* section. After this decrease, the volume level stabilizes for a time in what is called the *sustain* section. The sound then begins its final descent which terminates in silence. This descent is the *release* portion of the sound.

The combination of attack, decay, sustain, and release is the envelope, sometimes called the

ADSR envelope. The SID chip provides a means to define the way a sound changes through time. This change is controlled with an *envelope generator*. The attack and decay sections are controlled within one byte – each using four bits (there are eight binary digits, or bits, in each byte). The values within this byte determine the rate that the volume changes through time. A low value for attack or decay indicates a short duration for that particular section. A larger value increases the duration of a particular section.

The sustain and release portions of the envelope also share one byte. However, sustain does not relate to a time value but to a volume level. The release section, like attack and decay, refers to a rate of change, and values for this section change the amount of time allocated for this change to occur.

Admittedly, all of this is not easy to understand at first. If you type in and run Program 1, you'll see and hear an animated demonstration of the ADSR envelope.

All Together Now

Producing sounds with the SID chip requires that certain *registers* (memory locations) within the chip contain values which represent the waveform, volume, and ADSR envelope. Also, there must be some provision for setting the length of the note. POKE commands in BASIC are used to place values for waveform, volume, and ADSR into their appropriate places.

The length of the sound is determined by using two BASIC FOR/NEXT loops as timers. The larger the value for the loops, the longer the length of the particular portion of the sound. The first loop determines the length of time allotted for the sustain portion of the sound, and the second loop determines the length of time allotted for the decay portion. The waveform byte turns the sound on. When turned off, it begins the decay, which ends the sound. One bit of that byte, referred to as the *gate bit*, is reserved for that purpose.

Here is the sequence of events: first the values for volume and ADSR are put in their proper places using the POKE command. Next, you turn on the sound by turning on the waveform byte with the gate bit set to 1. (This byte will always contain an odd value since the gate bit is the lowest bit in the byte.) Our FOR/NEXT loop is now used to provide a delay, which runs while the attack, decay, and sustain sections execute. When this loop finishes, we then replace the value that was in the waveform byte with an equivalent value minus one. This resets the gate bit and signals the release section to begin. The volume decreases until the sound is finally silent. Another FOR/NEXT loop allows the release section adequate time to execute.

An Example Program

Does all of this sound hopelessly complicated? To best illustrate the waveforms, pitches, and the envelope generator, I have included a program that allows you to manipulate all the parameters mentioned and actually create your own sound routine for use in other programs. To use Program 2, merely enter the values for volume, waveform, ADSR (attack, decay, sustain, release), and values for the length of the sustain and release. (Remember, within the range of values given, the lower values represent either low volumes or shorter lengths of time for each section.)

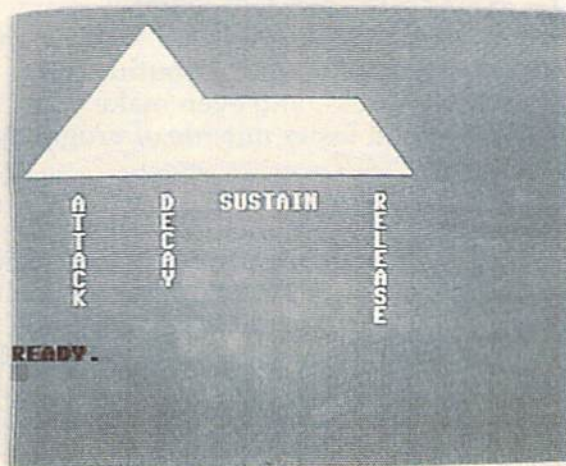
You also must enter two values to define the pitch of the tone. These pitch values can be derived from the table of values displayed on the screen or from the tables in the *Commodore 64 Programmer's Reference Guide* (pages 384-86).

When you are prompted with the word "Again?", press "N" if you are pleased with the sound that you have produced, or "Y" if you wish to continue altering the sound. If you press "N", a subroutine will be created that you can add to your own programs. You will be prompted for the starting line number and the increment that you wish to leave between lines for the subroutine.

SAMPLE DATA FOR PITCH VALUES			
PITCH	HIGH BYTE	LOW BYTE	WAVEFORM
C	33	135	TRIANGLE=17
CH	35	134	SANTOOH=33
D	37	162	NOISE=129
DE	39	223	
E	42	62	
F	44	193	
FE	47	187	
G	50	68	
GE	53	57	
A	56	99	
AE	59	198	
B	63	75	

ATTACK RATE 0-15? 8
DECAY RATE 0-15? 7
SUSTAIN VOLUME 1-15? 12
RELEASE RATE 0-15? 5
OVERALL VOLUME 1-15? 10
WAVEFORM 17, 33, OR 129? 17
SUSTAIN LENGTH (* .1 SECOND)? 30
RELEASE LENGTH (* .1 SECOND)? 25
HIGH BYTE? 33
LOW BYTE? 135

Program 1 visually and audibly demonstrates the "ADSR envelope" of a sound.



Program 2 makes it easier to experiment with sounds on the 64, and lets you add sounds to your own programs.

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Then your finished sound routine will appear on the screen. (Before you type "N", make sure you have saved the original program, because it will be erased.) You may now use this new sound routine in any program or save it on disk or tape for future use.

One Small Step

We have taken only the first step toward understanding the complexities and possibilities of the SID chip. The program uses only one of the Commodore 64's three voices, and we have yet to discuss some advanced applications of the SID chip's features. However, we have taken a large step in our quest to uncover the mechanics of sound synthesis on the Commodore 64.

See program listings on page 154. 

Speeding Up The VIC

Dan Carmichael, Assistant Editor

One animation technique frequently used in BASIC games is to repeatedly PRINT characters on the screen. This article shows how an easy-to-use machine language routine can speed up this process, and even make your keyboard respond faster *outside* of programs.

If you're writing games or programs which use the keyboard to move objects around the screen, the lack of speed may be your biggest complaint. However, if you're using the GET statement to move things about, there are ways to increase the speed greatly. This is done by manipulating the keyboard "controls" within the VIC-20 computer itself.

Keyboard Controls – How They Work

First, to make sure your VIC is set normally for this demonstration, you might want to turn it off and then on again to clear it.

Press the space bar, and continue to hold it down. The cursor will keep moving across the screen because the *operating system* – a control program inside the computer – tells the VIC to continue repeating this process, even though you pressed the space bar only once. Now press any alphabetical key, and continue to hold it down. We'll use the A key here (and from now on) for ease of reference. Even though you continue to hold it down, the A will not repeat itself. This is because the only keys that the VIC is programmed to repeat are the space bar, INSERT/DELETE, and the two cursor control keys.

Clear the screen by pressing SHIFT-CLR/HOME, and then enter POKE 650,128. Memory location 650 tells the operating system which keys to repeat. Normally it is set to 0, which allows

only the aforementioned keys to repeat. A value of 128 allows all the keys to repeat. Now if you press the A, it will repeat as the space bar did. Leave location 650 POKEd to 128 for now.

Speeding Up The Repeat

Press and hold the A key a few times, and notice that there is a pause of a fraction of a second before it starts to repeat. This pause is controlled by memory location 652, which is a *counter*. When you press the A key, this location contains a 15. Then it counts backward, in steps of ones, until it reaches 0, which signals the computer to begin the repeat process.

To shorten the pause, you might think you could simply POKE a number less than 15 into location 652. But because of the way the VIC's operating system works ("sweeping" through the computer 60 times every second resetting various parameters, etc.), location 652 will quickly be changed back to 15. However, you can use a program that will keep this location permanently loaded with a 0, thus eliminating the repeat pause. Enter Program 1 – a BASIC loader that will POKE a short machine language program into the cassette buffer (an area of usable memory). Verify it carefully, then run it by entering RUN 59998. Now the machine language program is POKEd into memory and ready to run. Enter SYS828 to start the machine language program.

Now if you press the A key, you will notice that it starts repeating immediately. With location 652 constantly reset to 0, there is no "countdown," and thus no pause.

By the way, if you make a mistake while entering one of the machine language programs and are forced to turn your VIC off/on to recover, remember to rePOKE 650,128 before continuing this article.

Another location which will help you speed up your program is memory address 651. This location is also a counter, and it determines the time delay between the printing of each character when repeating. Location 651 uses the same countdown technique that 652 does, except it starts at 4 instead of 15. While repeating, it counts down to 1, prints the character, and then cycles down again. In other words, it counts "4-3-2-1-PRINT character," "4-3-2-1-PRINT character," etc.

As with location 652, you cannot shorten the time delay by POKEing a value less than 4 into location 651. The operating system "sweeps" through 651 also, and restores it to 4 every sixtieth of a second. But again, we can load a program to circumvent this problem.

Type in Program 2, which is another machine language program. This program modifies both locations (651 and 652) and speeds up the whole repeat process. Verify your typing carefully, then enter RUN 59997 to POKE the machine language program into memory. Enter SYS828 to start the machine language program. Now press the letter A, and notice how much faster it repeats. Compare this to the normal speed by pressing the RUN/STOP and RESTORE keys simultaneously (to stop the machine language program) and then pressing the A key.

Program 2 can be added to your own BASIC programs and will help speed things up for you.

However, two things should be noted about this program. First, after the initial BASIC program has been run, and the machine language program has been successfully POKEd into memory, you may delete lines 59997-59999. They are not needed. Second, because the machine language program runs in the cassette buffer, you cannot use the cassette recorder while the machine language program is running. Press RUN/STOP-RESTORE to disable the program before using the recorder.

Program 3 is optional. It is a program that uses the GET statement to move the ball character (CHR\$(81)) around the screen. It is written to utilize the machine language speed-up routine. You can either add it to your existing BASIC program or build your own BASIC program around it.

How To Use Program 3


Carefully type in Programs 2 and 3. If you wish to save memory by changing the line numbers in Program 3, you may do so, but remember to change the *corresponding* GOTOs, etc. If you want to change the character that moves around the screen, this is controlled by the variable H in line 60000.

To run the program, first enter RUN 59997 to POKE the supporting machine language routine into memory, then enter RUN 60000 to execute

the BASIC program. These keys control the character's movement:

Key	Movement
W	←
R	→
P	↑
*	↓

Line 60050 is optional. Without it, the movement of the ball will increase in speed slightly, but the ball will blink, which you may or may not find desirable.

See program listings on page 155. 

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NEWS & PRODUCTS

Two-Keystroke Commands

Disk Support, a 1K machine language extension that adds 12 new commands to the VIC-20 or Commodore 64, is available from H & H Enterprises.

With the program, you can SAVE, SAVE WITH REPLACE, LOAD, VERIFY, DELETE, and RENAME disk files with two keystrokes. Other two-keystroke commands allow you to INITIALIZE, FORMAT, or RE-NAME a diskette, EXECUTE and program on the disk, print ERROR messages to the screen, and list the disk directory without affecting what's in memory.

Disk Support, which is compatible with memory expansion cartridges, works with single and dual disk drives. The program sells for \$14.95.

H & H Enterprises
5056 North 41st St.
Milwaukee, WI 53209

Detective Adventure

Shamus, a well-received Atari adventure program from Synapse Software, has been licensed by Human Engineered Software for the VIC-20.

In the game, *Shamus* battles hordes of robot henchmen while searching a series of treacherous

mazes for the keys that will lead him to the Shadow. The game, which is available on cartridge for \$39.95, requires an investment of time and practice to master.

HES also is introducing *Coco 2*, a game that teaches the fundamentals of computer game design, for the 16K VIC and 64. *Coco 2*, which introduces the user to control of color, sound, weapons, and objects, as well as scoring and game speed, is available for \$39.95 for the VIC version, and \$44.95 for the Commodore 64 version.

Human Engineered Software
71 Park Lane
Brisbane, CA 94005

The Magic Of Numbers

Arith-Magic, an interactive math study program that has been available for the PET, TRS-80, and Apple computers, is now available in a Commodore 64 version.

The package includes three programs that help students learn mathematical theory in a game-like setting. In *Diffy*, students work with the differences between successive pairs of numbers. In *Tripuz*, students learn the identity of three numbers hidden within a triangle. And *Magic Squares* produces nine-element squares in which the numbers in each row, column,

and diagonal add up to the same sum. In working with *Magic Squares*, the student develops an intuitive understanding of averages and arithmetic sequences.

Arith-Magic, produced by Quality Educational Designs, is available on tape and disk for \$35. Quality Educational Designs
P.O. Box 12486
Portland, OR 97212
(503)287-8137

Home Accounting, Auto Maintenance Software

Softsync, a company known for its Timex/Sinclair products, has jumped into the Commodore 64 market. Its first two products are *Personal Accountant* and *Computer Mechanic*.

Personal Accountant offers 144 user-defined accounts, including savings, checking, loans, mortgage payments, credit cards, and budgeting. The program also includes functions for detailed forecasting and the preparation of profit/loss statements. It is available for \$34.95 on disk, or \$29.95 on tape.

Computer Mechanic records service information for more than 20 makes and models of automobiles. The program

COMPUTE!'s First Book Of VIC

Authors: COMPUTE! Magazine contributors
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Finally, it's VIC's turn!

Users of other popular personal computers have been enjoying their **COMPUTE! Books**: *COMPUTE!'s First Book Of PET/CBM*, *Programming The PET/CBM*, and others.

Now, there's a book devoted exclusively to the Commodore VIC-20™ Computer: *COMPUTE!'s First Book Of VIC*.

The editors of **COMPUTE!** Magazine – the leading resource for the VIC-20 – gathered together the best VIC-20 articles published since the summer of 1981 and added some new material. The result is more than 200 pages of valuable information – information that goes beyond the instruction manuals. In the **COMPUTE!** tradition, it is carefully edited to be easily understood and useful for beginners and experts alike.

COMPUTE!'s First Book Of VIC is spiral-bound to lie flat, and includes ready-to-type program listings and articles such as "The Joystick Connection: Meteor Maze," "STARFIGHT3," "Train Your PET To Run VIC Programs," "Renumber BASIC Lines The Easy Way," "High Resolution Plotting," "Custom Characters For The VIC," "VIC Memory – The Uncharted Adventure," and "A Simple Monitor For The VIC."

At only \$12.95, less than most computer manuals, *COMPUTE!'s First Book Of VIC* is among the best resources a VIC user can own.

Available at computer dealers and bookstores nationwide. To order directly call TOLL FREE 800-334-0868. In North Carolina call 919-275-9809. Or send check or money order to **COMPUTE! Books**, P.O. Box 5406, Greensboro, NC 27403.

Add \$2 shipping and handling. Outside the U.S. add \$5 for air mail, \$2 for surface mail. All orders prepaid, U.S. funds only. VIC-20 is a trademark of Commodore Electronics Limited.

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teaches the basics of auto mechanics and allows you to record service information on as many as 100 cars. The program is available for \$26.95 on disk, or \$21.95 on tape.

Softsync plans to introduce game and utility programs for the 64 in the near future.

Softsync, Inc.
14 East 34 St.
New York, NY 10016
(212)685-2080

Business Utility Package

Superbyte Software has gathered several business applications and utility programs together on disk in a package called the *Business Pack*.

Included in the \$100 package are: The Accountant, a general ledger, income statement, and balance sheet; Accounts Receivable/Payable, a journal for current and paid accounts; The Editor, a word processor; Spread Sheet Calc, a spread sheet/calculating program; Business Inventory, an inventory control system; Checkbook Mate, a checkbook maintenance and check-writing program; The Mailman, an address file.

In addition, the package contains the following utilities: a profit margin calculator, a business calendar and data base, and programs for linear regression analysis, depreciation, and amortization.

Business Pack is available for the Commodore 64 and 8K VIC-20.

Superbyte Software
2 Chipley Run
West Berlin, NJ 08091
(609)346-3063

Learn Russian

A beginning Russian course for the unexpanded VIC-20 is available from Russian Software.

The \$23.95 program provides the user with a Russian screen typing font and introduces the beginner to the Russian alphabet and basic vocabulary.

Russian Software
Box 36, 1744 W. Devon
Chicago, IL 60660

Business And Pleasure

T & F Software has released a checkbook program for the Commodore 64 and VIC-20, as well as a space action game for the 64 and a series of word search games for the VIC-20 and 64.

CheckEase!, which requires an 8K VIC or 64, can be used with multiple accounts. Checks can be deleted or the amounts can be changed, and the program will update all balance figures. Printouts can be made by check number, category, or by tax deductible items.

CheckEase! is available for \$24.95 for the VIC-20 version, \$29.95 for the 64 tape version, and \$34.95 for the 64 disk version.

Another new T & F program is *Space Sentinel*. In the game,

you defend the planet Earth against a group of aliens who hurl heat missiles at our polar ice caps. If you fail, the melting ice caps flood the planet. The game is available on disk for \$29.95.

The company's Search Series consists of *Word Search*, *Sport Search*, and *Arcade Search*, all on cassette for \$19.95.

Each game puts 374 letters on the screen and gives you ten minutes to find the 20 hidden words. There are three categories for each game.

T & F Software Company
10902 Riverside Drive
North Hollywood, CA 91602
(213) 501-5845

Auxiliary Keyboard

Gosub International has developed a 20-key auxiliary keyboard for the Commodore 64 or expanded VIC-20. The system consists of the keypad and a 330-byte driver program.

The Flexikey System is designed to enhance data entry on Commodore computers. The system allows the user to define key values. Nineteen of the 20 keys can be programmed with up to three values. The 20th key, the PROG key, is used to switch among the three modes.

In the first two modes, each key can be defined as any single key on the Commodore keyboard. In the third mode, the programmed function mode, the definitions may be up to three bytes long. On initialization, mode one is defined to be useful

as a calculator; mode two is set up with definitions useful to machine language programmers.

Keyboard definitions for the Flexikey System, which sells for \$69.95, can be saved and reloaded.

Gosub International, Inc.
501 E. Pawnee, #430
Wichita, KS 67211

Expansion For VIC

Century Micro has produced a 64K expansion cartridge for the VIC-20. The cartridge includes

64K of RAM organized as two sets of blocks 1,2,3, and 5. Programs can be stored and accessed in either set, and all eight banks are software selectable.

Century Micro's cartridge is available for \$199.95.

Century Micro
1832 Tribute Road
Suite 213
Sacramento, CA 95815
(916) 920-3656

Pair Of Printers

Cardco has developed two new printers for the VIC-20 and Commodore 64.

The Cardprinter/LQ1 is a letter quality daisy-wheel printer. It prints at 14 characters per second in either red or black and includes bold, shadow, and underline printing in normal or proportional modes. The printer is expected to sell for \$599.95. Options for a tractor feeder, cut-sheet feeder, or keyboard for direct printing are available.

The Cardprinter/DM1 is a small dot matrix impact printer. It is capable of printing 40 columns of text on 3-inch adding machine paper. Cardprinter/DM1, which will sell for \$149.95, has a print speed of 50 characters per second, and can print full



VIC-20 and Commodore 64

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313 Mathewson Ave.
Wichita, KS 67214
(316)267-6525

VIC Games

Synapse Software, a producer of games for Atari computers, has established the Showcase Software line for the VIC-20.

The initial games produced are *Astro-Patrol*, a shoot-em-up game; *Squeeze*, a humorous game set on a farm; and *Salmon Run*. Each game sells for \$19.95.

Synapse Software
5221 Central Avenue, #200
Richmond, CA 94804

Beat The Dealer

M-R Information Systems has produced a blackjack game for the VIC-20. *MicRo Blackjack*, which requires at least 3K expansion, is available on cassette for \$14.95.

M-R Information Systems, Inc.
P.O. Box 73
Wayne, NJ 07470
(201)696-3296

Computer Hypnosis

The Hypnotist II for the Commodore 64 has been released by Psycom Software International.

The program contains five major modules: introduction

and vital data gathering; relaxation and stress reduction through biofeedback; trance induction; neural reprogramming and suggestion; and return to consciousness.

The Hypnotist II will sell for \$59.90 and includes a biofeedback device which can be used with other Psycom products.

Psycom Software International
2118 Forest Lake Drive
Cincinnati, OH 45244

VIC's Voice

Speakeasy is a voice synthesizer designed to allow voice to be added to adventure and cartridge games on the VIC-20. It comes in a cartridge that plugs into the VIC's expansion port.

Discover With Benji

Benji, the dog made famous in children's TV adventure movies, has been incorporated into a series of educational computer games by Human Engineered Software.

In *Benji - Space Rescue*, the dog is sent on a rescue mission in space. Children playing the program will be introduced to the solar system while helping Benji complete his mission.

The game is available for the VIC-20 and Commodore 64 for \$44.95. Versions for other computers are planned.

Human Engineered Software
71 Park Lane
Brisbane, CA 94005



Benji, the movie star dog, has become a computer game star.

The synthesizer, produced by Personal Peripheral Products, can be programmed from BASIC or machine language by POKE-ing to only one address. The package includes an editor that allows the user to append, insert, and delete phonemes in strings to create phrases and sentences.

The 256 phoneme buffer can be stored on tape or disk. The *Speakeasy* cartridge, including the editor tape, sells for \$79.

Personal Peripheral Products
P.O. Box 3423 Fox Valley Mall
Aurora, IL 60505

Mapping Memory

The *Master Memory Map*, a reference guide to computer memory, is available in VIC-20 and Commodore 64 versions from Educational Software.

The book includes sections on PEEKing and POKEing, paddles and joysticks, color locations, single and multiple sound registers, graphics registers, and sprites.

The VIC version is available for \$9.95; the 64 version is available for \$14.95.

Educational Software, Inc.
4565 Cherryvale Ave.
Soquel, CA 95073
(408)476-4901

Mailing List

Galactic Software has announced a mailing list program that can double as a small data base manager.

'20 *Mailing List* allows alphabetizing on entry, sorting and searching in all fields, printing labels or complete records. Each entry can contain name, address, and three comment fields.

The program, which is menu driven, requires at least 16K expansion. It is available on tape for \$25.95, or disk for \$27.95.

Galactic Software
P.O. Box 10516
San Jose, CA 95157
(408)247-4434

Extra VIC Port

MFJ Electro Enterprises has produced an add-on port to allow the VIC-20 to use a second joystick.

The port is available for \$21.50 and includes programming instructions and a sample two-player game. The sample game requires 3K or 8K expansion to run.

MFJ Electro Enterprises
P.O. Box 13076
Kanata, Ontario
Canada K2K 1X3

VIC Graphics

Hayden Book Company has published *VIC Graphics*, a detailed explanation of the high-resolution graphics capabilities of the VIC-20.

The book, written by Nick Hampshire, includes 38 BASIC program listings on applications from art and games to education

and business. The programs require the use of the VIC Super Expander cartridge.

VIC Graphics, a 192-page book, sells for \$12.95.

Hayden Book Company, Inc.
50 Essex St.
Rochelle Park, NJ 07662
(201)843-0550

COMPUTE!'s Gazette for Commodore welcomes announcements of new products for VIC-20 and Commodore 64 computers, especially products aimed at beginning to intermediate users. Please send press releases and photos well in advance to: Tony Roberts, Assistant Managing Editor, COMPUTE!'s Gazette, P.O. Box 5406, Greensboro, NC 27403.

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

Writers,
programmers...

COMPUTE!'s
Gazette
is looking for
articles on the
VIC and 64.

Bug-Swatter:

Modifications And Corrections

• Several problems with the Commodore 64 version of the "Skydiver" game in our Premier Issue have been brought to our attention by readers. When tracking down the cause of the problems, we discovered that the Commodore 64 listing was not the programmer's final version. Rather than reprint the entire listing, we are printing the lines which need to be changed or added. This way, readers who have already typed in the program don't have to compare their version line by line with the correct version.

To fix Commodore 64 Skydiver, change or add these lines:

```
12 A(1)=1191:A(2)=1200:A(3)=1210
16 PRINT"{HOME}{3 RIGHT}SCORE:{3 SPACES}";
200 B=1144+A:T=INT(RND(TI)*8+1):T=T+1
220 POKEB,CH:POKEB,32:B=B+40
3010 IFP=1THENIFB=1831ORB=1832ORB=1833ORB
=1834 THENPOKEB,CH:GOTO4000
3020 IFP=2THENIFB=1842ORB=1843ORB= 1844TH
ENPOKEB,CH:GOTO4050
3030 IFP=3THENIFB=1854ORB=1855ORB=1856ORB
=1857ORB=1858THENPOKEB,CH:GOTO4100
4000 PRINT"{HOME}{8 DOWN}{10 RIGHT}5 X";B
O;" ";5*BO
5040 FORI=1944TO2023:POKEI+T7,6:POKEI,160
:NEXT
5053 IFNJ>=NETHENBO=BO+50:PRINT"{HOME}
{5 RIGHT}{8 DOWN}{3 RIGHT}BONUS ADVA
NCE TO{RED}";BO:PRINT"{BLU}"
5056 PRINT"{HOME}{3 DOWN}{8 RIGHT}";"WIND
:";SD"TO ";D$:GOSUB50000
5057 FORK=1TO1000:NEXT:PRINT"{HOME}
{3 DOWN}{25 SPACES}"
5060 FORI=1104TO1904STEP40:POKEI,96:POKEI
+39,96:NEXT
10100 FOR P=1 TO VA/10:SC=SC+10:PRINT"
{HOME}{BLU}SCORE:{RED}";SC:NEXT
12000 PRINT"{HOME}{8 DOWN}{6 RIGHT}SORRY
NO BONUS!":BA=BA-1
50010 PRINT"{HOME}{6 RIGHT}{4 DOWN}{RED}
5X{7 SPACES}10X{7 SPACES}2X{BLU}":P
=1:Z=P
50025 POKEA(P),PEEK(A(P))+128AND255:PRINT
50028 PRINT"{HOME}{5 DOWN}{9 RIGHT}";
50029 PRINT"{7 RIGHT}{DOWN}{2 SPACES}";TA
B(10);"{2 SPACES}{3 LEFT}";TM:IFTM=
0THENP=INT(RND(TI)*3+1):GOTO50100
50035 IFFR= 0THEN50100
50120 PRINT"{HOME}{7 RIGHT}{13 DOWN} YOU
MUST LAND ON ";A$
60000 PRINT"{HOME}{7 DOWN}{10 RIGHT}GAME
OVER":IFSC>HITHENHI=SC
60100 POKE53281,1:POKE53280,6{3 SPACES}:
PRINT"{CLR}{4 DOWN}{11 SPACES}{BLK}
SKY DIVER"
```

Remember to consult last month's "Bug-Swatter" about proper spacing in line 100 for both

the 64 and VIC versions of Skydiver. Spacing is critical in this and many other game programs; some readers are mistakenly omitting the space immediately before the left-cursor symbol in line 120 of the VIC version. Also, the unexpanded VIC and 64 versions do not have sound effects – only the VIC Super Expander version.

• Speaking of proper spacing, our printer made it appear that quite a few spaces should be typed on line 6000 of the VIC-20 "Snake Escape," July issue. Actually, no spaces should be typed between the SHIFTed V's.

• There are several corrections to the Commodore 64 version of "The Viper," August issue. On lines 570 and 610, [LOWER] should be entered as CHR\$(14). This shifts the computer into lower-case mode. On line 690, the number 320 should be substituted for the open parens and CTRL-P. Here is the corrected version:

```
690 FORJ=1TODT:POKESC+80+I*320+MA(J)+C,3:
POKESC+MA(J)+80+I*320,160:NEXTJ
```

In some August issues, a tiny spec of dust introduced in the production process makes the SYS statement in line 1020 hard to interpret. The correct statement is SYS893. Finally, in line 1420, the printer apparently burped and threw a question mark into the DATA statement. The question mark should be omitted; the correct number is 197.

• In the September issue, there were two typographical errors in formulas in the "VICreations" column. The last whole sentence at the bottom of page 78 should read: "(RND(1)*A)+B is the main body of our random number generator." On page 79, the second random number formula in the first column should read: "X=INT(RND(1)*100)+100." In both cases, an equals sign was incorrectly substituted for the last plus sign in the formulas.

• Reader Kim Pugh suggests a change to improve the Commodore 64 version of "Snake Escape," published in the July issue. To modify the program to work with a joystick plugged into port one instead of the keyboard, Pugh suggests changing these lines:

```
190 K=PEEK(56321)AND15:POKE198,0
200 IF K=11 THEN DR=-1:GOTO 250:REM LEFT
210 IF K=7 THEN DR=1:GOTO 250:REM RIGHT
220 IF K=14 THEN DR=-40:GOTO 250:REM UP
230 IF K=13 THEN DR=40:GOTO 250:REM DOWN
```

Delete line 4030 and change line 4040 to the following:

```
4040 PRINT"{DOWN}{BLK}PUSH THE JOYSTICK
IN THE DIRECTION YOU WISH TO MOVE."
```

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

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

A Beginner's Guide To Typing In Programs

What Is A Program?

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

BASIC Programs

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

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

Brackets And Special Characters

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

About DATA Statements

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

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

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

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

Get To Know Your Machine

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

A Quick Review

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

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

How To Type In COMPUTE!'s Gazette Programs

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

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

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

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

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


































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

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

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

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

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

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

The Automatic Proofreader

BEFORE TYPING...

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

Program 1: The Automatic Proofreader For VIC

```
100 FOR I=828 TO 932:READ A:POKE I,A:NEXT
:PRINT"{CLR}{RVS}SYS 828{OFF} TO ACTI
VATE.{2 DOWN}"
110 POKE178,165:PRINT"SYS 828{HOME}":END
120 DATA169,75,141,36,3,169,3,141
130 DATA37,3,169,0,133,255,96,32
140 DATA14,242,133,252,134,253,132,254
150 DATA8,201,13,240,17,201,32,240
160 DATA5,24,101,255,133,255,165,252
170 DATA166,253,164,254,40,96,169,13
180 DATA32,210,255,165,214,141,165,3
190 DATA206,165,3,169,0,133,216,169
200 DATA19,32,210,255,169,18,32,210
210 DATA255,169,58,32,210,255,166,255
220 DATA169,0,32,205,221,169,0,133
230 DATA255,169,32,32,210,255,32,210
240 DATA255,173,165,3,133,214,76,98,3
```

Program 2: The Automatic Proofreader For The 64

```
100 FOR I=828 TO 932:READ A:POKE I,A:NEXT
:PRINT"{CLR}{RVS}SYS 828{OFF} TO ACTI
VATE.{2 DOWN}"
110 POKE178,165:PRINT"SYS 828{HOME}":END
120 DATA169,75,141,36,3,169,3,141
130 DATA37,3,169,0,133,255,96,32
140 DATA87,241,133,252,134,253,132,254
150 DATA8,201,13,240,17,201,32,240
160 DATA5,24,101,255,133,255,165,252
170 DATA166,253,164,254,40,96,169,13
180 DATA32,210,255,165,214,141,165,3
190 DATA206,165,3,169,0,133,216,169
200 DATA19,32,210,255,169,18,32,210
210 DATA255,169,58,32,210,255,166,255
220 DATA169,0,32,205,189,169,0,133
230 DATA255,169,32,32,210,255,32,210
240 DATA255,173,165,3,133,214,76,98,3
```

Oil Tycoon

Program 1: Oil Tycoon For VIC, Part I

```
10 REM OIL TYCOON :rem 5
20 PRINT"{CLR}":PRINT"{5 SPACES}INSTRUCTI
ONS":PRINT:PRINT"{PUR}JOYSTICK{BLU}:"
PRINT" RT & LT=MOVE RIG" :rem 138
30 PRINT" DOWN=DRILL":PRINT" UP=RETRACT P
IPE" :rem 80
40 PRINT:PRINT"{PUR}FIREBUTTON{BLU}:" W/ P
IPE;":PRINT" IN OIL OR SPACE=PUMP"
```

```
:rem 244
50 PRINT" IN DIRT=DROP DYNAMITE RETRACTED
=NEW MAN" :rem 110
60 PRINT:PRINT"WATCH OUT FOR {PUR}SHAPE,
{3 SPACES}{RED}GAS {BLU}IN {YEL}EMPTY
{SPACE}SPACES"," {BLU}AND {RED}DEVILS
{SPACE}{BLU}IN {BLK}OIL" :rem 145
70 PRINT:PRINT"{BLU}PLEASE WAIT FOR"," FU
RTHET INSTRUCTIONS" :rem 57
80 POKE52,28:POKE56,28:POKE45,248:POKE46,
26:CLR :rem 28
90 FORA=7168TO7375:READB:POKEA,B:NEXT
:rem 70
100 DATA2,138,164,73,74,52,20,8,64,81,37,
146,82,44,40,16,24,24,36,60,90,102,23
1,153 :rem 25
110 DATA20,42,42,20,62,73,20,20,136,34,13
6,34,136,34,136,34,148,22,148,34,136,
34,136,34 :rem 209
120 DATA148,22,148,22,148,34,136,34,148,2
2,148,22,148,22,148,22,136,62,188,62,
188,62,188,22 :rem 197
130 DATA170,170,170,170,170,170,170,170,1
50,150,150,170,170,170,170,150,150,150
:rem 134
140 DATA170,170,170,150,150,150,150,150,1
50,150,150,150,190,190,190,190,190,190
:rem 7
150 DATA0,0,0,0,0,0,0,0,20,20,20,0,0,0,0,
0,20,20,20,20,20,0,0,0,20,20,20,20,20
:rem 36
160 DATA20,60,60,60,60,60,60,20,0,60,60,6
0,60,60,60,0,0,0,0,255,255,0,0,0
:rem 233
170 DATA218,118,181,153,110,93,197,65,65,
82,150,85,121,181,150,173,2,106,129,2
0,64,162,129 :rem 137
180 DATA2,169,128,141,19,145,169,0,133,13
6,34,136,34,136,34,136,34 :rem 229
190 FORA=7424TO7640:POKEA,PEEK(25600+A):N
EXT :rem 114
200 FORA=7464TO7529:READB:POKEA,B:NEXT
:rem 111
210 DATA169,128,141,19,145,169,0,133,1,13
3,2,169,127,141,34,145,162,119,236,32
,145 :rem 242
220 DATA208,4,169,1,133,1,169,255,141,34,
145,162,118,236,17,145,208,4,169,22,1
33,1 :rem 238
230 DATA162,110,236,17,145,208,4,169,1,13
3,2,162,122,236,17,145,208,4,169,22,1
33,2,96 :rem 124
240 LOAD :rem 182
```

Program 2: Oil Tycoon For VIC, Part II

```
1 REM PROG 2 :rem 127
2 PRINT:PRINT" PRESS STOP ON TAPE"
:rem 100
3 IFPEEK(37137)<100THEN3 :rem 108
4 POKE36879,30:POKE36878,47:DIMA%(21):W=7
768 :rem 235
5 IFZ>B%(T)THENB%(T)=Z :rem 58
6 POKE36869,240:PRINT"{CLR}{RED}
{3 SPACES}"T,"$Z*100"{BLU}" :rem 81
7 PRINT:PRINT" LEVEL","HIGH SCORE":rem 83
8 FORA=1TO8:PRINT:PRINT"{3 SPACES}"A,"$B
%(A)*100:NEXT:PRINT:PRINT" DIFF.LEVEL?
{SPACE}12345678{GRN}":T=1 :rem 11
9 SYS7464:POKE38852+T,6:T=T+PEEK(1)-PEEK(
2):IFT<LORT>8THENT=1 :rem 13
```



```

10 POKE38852+T,7:L=3:IFT/2=INT(T/2)THENL=
  2 :rem 8
11 S=20:IFT=3ORT=4ORT>6THENS=30 :rem 210
12 N=24:IFT>4THENN=25:L=L+1 :rem 111
13 IFPEEK(37137)>100THEN9 :rem 165
14 POKE36869,255 :rem 108
23 PRINT"[CLR]":M=5:Z=0:K=0:GOSUB87
  :rem 222
24 POKEW+X,14:X=10:M=M-1:P=20:Y=L:GOSUB82
  :IFM<0THEN5 :rem 238
25 GOSUB61:GOTO34 :rem 40
26 A=((R*22)+W+X):C=PEEK(A):P=P-1:GOSUB67
  :rem 122
27 IFC=NORC=3ORA>8185THENFORA=1TO3:GOSUB9
  9:NEXT:GOTO30 :rem 38
28 IFRND(1)<.06ANDC=14THEN78 :rem 133
29 FORB=1TO3:POKEA,C+B:GOSUB99:NEXT:R=R+1
  :rem 122
30 SYS7464:IFPEEK(1)=22ANDP>0THEN26
  :rem 112
31 IFPEEK(2)=22THEN40 :rem 207
32 IFPEEK(37137)<100THEN46 :rem 213
33 GOTO30 :rem 2
34 SYS7464:A=PEEK(1):B=PEEK(2):IFA=22THEN
  R=1:GOTO26 :rem 112
35 IFB=22THEN34 :rem 112
36 IFPEEK(37137)<100THEN24 :rem 213
37 IFA>0ORB>0THENPOKEW+X,14:X=X+A-B:IFX>2
  1THENX=21 :rem 173
38 IFX<0THENX=0 :rem 178
39 POKEW+X,2:GOTO34 :rem 173
40 IFR=1THEN34 :rem 73
41 R=R-1:B=(R*22)+W+X:C=PEEK(B):FORA=1TO3
  :POKEB,C-A:GOSUB99:NEXT :rem 216
42 P=P+1:GOSUB67:IFR=1THEN44 :rem 230
43 GOTO30 :rem 3
44 FORA=W+44TO8185:IFPEEK(A)=9THEN34
  :rem 188
45 NEXT:M=M+1:FORC=1TO3:GOSUB82:NEXT:GOSU
  B87:GOSUB61:GOTO34 :rem 126
46 J=Z:Q=R-1:FORA=0TO21:A%(A)=0:NEXT:B=(Q
  *22)+W+X:A=PEEK(B):IFA=7THEN69 :rem 42
47 A%(X)=1:POKE36877,252:POKE36878,36:V=W
  +X-22:IFA=12THENPOKEB,17:Z=Z+Q:POKEV,0
  :rem 11
48 E=0:F=20:D=1:G=1:I=1:GOSUB52:POKEV,1:E
  =21:F=1:D=-1:G=D:I=D:GOSUB52 :rem 147
49 E=0:F=21:D=1:G=-22:I=0:GOSUB52:POKEV,0
  :IFC=6THEN85 :rem 193
50 IFH=0THENPOKEV,14:POKE36877,0:POKE3687
  8,47:GOSUB82:GOSUB61:GOTO30 :rem 237
51 Q=Q-1:GOTO48 :rem 130
52 IFC=6THENRETURN :rem 187
53 H=0:FORA=ETOFSTEPD:IFA%(A)=0THEN60
  :rem 45
54 B=(Q*22)+W+A+G:C=PEEK(B) :rem 234
55 IFC=9ORC=12THENPOKEB,C+5:H=1:Z=Z+(Q+(A
  BS(I)-1)):A%(A+I)=1:GOTO59 :rem 204
56 IFC=14ORC=17THENA%(A+I)=1:H=1:GOTO60
  :rem 58
57 IFC=3THENC=6:RETURN :rem 173
58 A%(A+I)=0:GOTO60 :rem 31
59 IFRND(1)<.02ANDC<>12THENC=6:RETURN
  :rem 33
60 NEXT:RETURN :rem 191
61 PRINT"[HOME]"SPC(13)"$Z*100 :rem 99
62 A=INT(Z/1000):IFA=K+1THENK=K+1:GOSUB82
  :GOSUB82:M=M+1 :rem 109
63 IFM<1THENPOKE7680,14:GOTO65 :rem 84
64 FORA=7680TO7679+M:POKEA,2:NEXT:POKEA,1
  4 :rem 88
65 IFY=0THENPOKE7687,14:GOTO67 :rem 107
66 FORA=7687TO7686+Y:POKEA,19:NEXT:POKEA,
  14 :rem 163
67 IFP<1THENPOKE7702,14:RETURN :rem 146
68 FORB=7702TO7701+P:POKEB,17:NEXT:POKEB,
  14:RETURN :rem 159
69 A=W+X:B=240:IFY<1THEN30 :rem 55
72 A=A+22:C=PEEK(A):POKEA,C+1:IFC=14ORC=9
  THENPOKEA,C+4 :rem 18
73 POKE36875,B:FORD=0TO200:NEXT:D=PEEK(A+
  22) :rem 149
74 IFD<>4ANDD<>NANDD<>3ANDA<8164THENB=B-5
  :POKEA,C:GOTO72 :rem 249
75 POKE36875,0:GOSUB93:POKEA+30742,15
  :rem 145
76 IFC<>14ANDC<>9THENR=R-1 :rem 85
77 Y=Y-1:GOSUB65:GOTO30 :rem 182
78 FORB=1TO2:POKEA,C+B:GOSUB99:NEXT:GOSUB
  93:B=150 :rem 123
79 R=R-1:POKE36878,36:IFR<1THENPOKE36878,
  47:GOTO81 :rem 38
80 POKE36877,B:A=(R*22)+W+X:C=PEEK(A):POK
  EA,C+1:FORD=0TO200:NEXT:POKEA,C-3:B=B+
  5:GOTO79 :rem 31
81 POKEW+X,23:GOSUB83:GOTO24 :rem 1
82 FORA=47TO32STEP-1:POKE36878,A:POKE3687
  6,237:FORB=1TO25:NEXTB,A:POKE36876,0:P
  OKE36878,47:RETURN :rem 1
83 POKE36877,220:FORD=47TO32STEP-1:POKE36
  878,D:POKE36879,26:FORE=1TO70:NEXT:POK
  E36879,31 :rem 112
84 NEXT:POKE36877,0:POKE36878,47:POKE3687
  9,30:RETURN :rem 178
85 Z=J:POKEB,3:POKEB+30720,2:POKEV,14:FOR
  A=0TO40:POKE36876,240:POKE36878,230:FO
  RB=1TO5:NEXT :rem 67
86 POKE36878,0:FORB=1TO5:NEXTB,A:POKE3687
  6,0:B=150:GOTO79 :rem 223
87 FORA=7790TO8185:POKEA,4:POKEA+30720,15
  :NEXT:B=220:C=7812:FORA=1TO2:FORD=1TO8
  0 :rem 102
88 E=(RND(0)*B)+C:IFPEEK(E)=9THEN88
  :rem 27
89 POKEE,9:POKEE+30720,8:NEXT:B=154:C=803
  2:NEXT:FORA=1TOS :rem 21
90 B=(RND(1)*374)+7812:C=PEEK(B):IFC=9ORC
  =NTHEN90 :rem 95
91 POKEB,N:NEXT:FORA=0TO109:POKE38400+A,0
  :NEXT:FORA=0TO21:POKE38444+A,3:POKE772
  4+A,20:NEXT :rem 67
92 FORA=0TO3:POKE38407+A,2:NEXT:RETURN
  :rem 162
93 POKEA,21:POKEA+22,22:GOSUB83:POKEA,14:
  POKEA+22,14:RETURN :rem 120
99 POKE36874,200:FORE=1TO10:NEXT:POKE3687
  4,0:RETURN :rem 167

```

Program 3: Oil Tycoon For 64

```

100 PRINT"[CLR]";IFPEEK(14336)=2ANDP
  EEK(14805)=24THEN195 :rem 250
105 POKE53280,6:POKE53281,6:POKE53270,8
  :rem 197
110 PRINTTAB(14)"INSTRUCTIONS"SPC(28)"
  [12 T]":PRINT"[DOWN]JOYSTICK:"
  :rem 244
115 PRINT"[DOWN] RIGHT AND LEFT = MOVE RI
  G" :rem 75
120 PRINT" DOWN = DRILL":PRINT" UP = RETR
  ACT PIPE" :rem 128
125 PRINT"[2 DOWN]{2 SPACES}WHEN YOU PUSH
  THE FIRE BUTTON AND THE :rem 111

```



```

130 PRINT"PIPE IS DOWN IN OIL OR IN SPACE
THE" :rem 147
135 PRINT"PUMP IS TRIGGERED.{2 SPACES}IF
{SPACE}THE PIPE IS DOWN" :rem 133
140 PRINT"IN DIRT, DYNAMITE IS DROPPED.
:rem 109
145 PRINT"{2 DOWN}WATCH OUT FOR SHALE AND
GAS IN EMPTY","SPACES AND DEVILS IN
{SPACE}OIL. :rem 116
150 PRINT"{2 DOWN}PLEASE {CYN}WAIT{7} F
OR FURTHER INSTRUCTIONS." :rem 155
155 POKE52,56:POKE56,56:CLR:AD=14336
:rem 75
160 FORA=ADTOAD+207:READB:POKEA,B:NEXT:PO
KE56334,PEEK(56334)AND254:POKE1,51
:rem 69
165 FORA=AD+256TOAD+471:POKEA,PEEK(38912+
A):NEXT:POKE1,55 :rem 165
170 POKE56334,PEEK(56334)OR1 :rem 69
175 PRINT"[UP]{2 SPACES}PRESS ANY KEY WHE
N READY TO BEGIN. " :rem 58
180 IFPEEK(197)=64ANDPEEK(653)=0ANDPEEK(5
6320)=127THEN180 :rem 34
185 : :rem 216
190 : :rem 212
195 PRINT"[CLR]":POKE53280,6:POKE54296,15
:DIMA%(40):W=1184:JS=56320 :rem 180
200 POKE53282,6:POKE53283,0:POKE53270,24:
POKE54291,0:POKE54292,240 :rem 232
205 FORI=0TO2:POKE54276+I*7,8:NEXT:POKE53
281,3 :rem 247
210 POKE54284,0:POKE54285,240:POKE54277,0
:POKE54278,240:IFZ>B%(T)THENB%(T)=Z
:rem 154
215 POKE53272,21:PRINT"[CLR]{DOWN}{RED}",
T,"{2 SPACES}$"MID$(STR$(Z*100),2)".0
0{BLU}" :rem 89
220 PRINTTAB(8)"[DOWN] LEVEL{6 SPACES}HIG
H SCORE{DOWN}" :rem 251
225 FORA=1TO8:PRINT,A,"{2 SPACES}$"MID$(S
TR$(B%(A)*100),2)".00":PRINT:NEXT
:rem 179
230 PRINT"[DOWN] DIFFICULTY LEVEL? 123456
78{GRN}":T=1 :rem 223
235 POKE56194+T,0:T1=T:T=T+(PEEK(JS)AND4)
/4-(PEEK(JS)AND8)/8:T=(7ANDT-1)+1
:rem 76
240 IFT<>T1THENPOKE56194+T1,6 :rem 241
245 POKE56194+T,1:L=3:IFT/2=INT(T/2)THENL
=2 :rem 59
250 S=20:IFT=3ORT=4ORT>6THENS=30 :rem 7
255 N=24:IFT>4THENN=25:L=L+1 :rem 168
260 GETA$:IF(PEEK(56320)AND16)=16ANDA$<>C
HR$(13)THEN235 :rem 124
265 POKE53272,31:PRINT"[CLR]":POKE53280,9
:POKE53281,1:M=4:Z=0:K=0:GOSUB590
:rem 217
270 POKEW+X,14:X=20:P=20:Y=L:R=1:GOSUB705
:GOSUB645:POKE198,0 :rem 185
275 : :rem 216
280 : :rem 212
285 REM MAIN LOOP OF PROGRAM :rem 143
290 A=PEEK(JS):IF(AAND4)=0ANDR=1THENPOKEW
+X,14:X=X+(X>0) :rem 192
295 IF(AAND8)=0ANDR=1THENPOKEW+X,14:X=X-(
X<39) :rem 58
300 POKEW+X,2:IF(AAND2)=0ANDP>0THEN340
:rem 30
305 IF(AAND1)=0ANDR>1THEN400 :rem 129
310 IF(AAND16)=0THEN435 :rem 39
315 GETA$:IFR=1ANDA$=" "THEN375 :rem 238
320 GOTO290 :rem 105
325 : :rem 212
330 : :rem 208
335 REM DRILLING AND GAS EXPLOSIONS
:rem 150
340 A=R*40+W+X:C=PEEK(A):P=P-1:GOSUB675
:rem 60
345 IFC=NORC=3ORA>2023THENFORA=1TO3:GOSUB
730:NEXT:GOTO290 :rem 170
350 IFRND(1)>.06ORC<>14THENFORB=1TO3:POKE
A,C+B:GOSUB730:NEXT:R=R+1:GOTO290
:rem 150
355 FORB=1TO2:POKEA,C+B:GOSUB730:NEXT:GOS
UB735:B=0 :rem 158
360 R=R-1:POKE54296,4:IFR<1THENPOKE54296,
15:POKEW+X,23:GOSUB715:GOTO375
:rem 106
365 POKE54273,B:POKE54276,129:A=R*40+W+X:
C=PEEK(A):PK=PEEK(A+54272):POKEA,C+1
:rem 244
370 POKEA+54272,15:FORD=0TO200:NEXT:POKEA
,C-3:POKEA+54272,PK:B=B+10:GOTO360
:rem 247
375 POKEW+X,14:X=20:M=M-1:P=20:Y=L:R=1:GO
SUB705:IFM<0THEN205 :rem 182
380 GOSUB645:GOTO290 :rem 200
385 : :rem 218
390 : :rem 214
395 REM DRILLING UP :rem 127
400 R=R-1:B=R*40+W+X:C=PEEK(B):FORA=1TO3:
POKEB,C-A:GOSUB730:NEXT :rem 222
405 P=P+1:GOSUB675:IFR<>1THEN290 :rem 190
410 FORA=W+80TO2023:IFPEEK(A)=9THEN290
:rem 14
415 NEXT:M=M+1:FORC=1TO3:GOSUB705:NEXT:GO
SUB590:GOSUB645:GOTO290 :rem 124
420 : :rem 208
425 : :rem 213
430 REM DYNAMITE, GUSHERS, DEVILS :rem 22
435 J=Z:Q=R-1:FORA=0TO21:A%(A)=0:NEXT:B=Q
*40+W+X:A=PEEK(B):IFA<>7THEN480
:rem 117
440 A=W+X:B=40:IFY<1THEN290 :rem 102
445 A=A+40:C=PEEK(A):POKEA,C+1:IFC=14ORC=
9THENPOKEA,C+4 :rem 70
450 POKE54273,B:POKE54276,33:FORD=0TO200:
NEXT:D=PEEK(A+40) :rem 191
455 IFD<>4ANDD<>NANDD<>3ANDA<1984THENB=B-
2:POKEA,C:GOTO445 :rem 96
460 POKE54276,8:GOSUB735:POKEA+54312,15
:rem 244
465 IFC<>14ANDC<>9THENR=R-1 :rem 135
470 Y=Y-1:GOSUB665:GOTO290 :rem 81
475 : :rem 218
480 A%(X)=1:POKE54273,40:POKE54276,129:PO
KE54296,4:V=W+X-40 :rem 91
485 IFA=12THENPOKEB,17:Z=Z+Q:POKEV,0
:rem 7
490 E=0:F=38:D=1:G=1:I=1:GOSUB530:POKEV,1
:E=39:F=1:D=-1:G=D:I=D:GOSUB530
:rem 56
495 E=0:F=39:D=1:G=-40:I=0:GOSUB530:POKEV
,0:IFC<>6THEN515 :rem 155
500 Z=J:POKEB,3:POKEB+54272,2:POKEV,14:FO
RA=0TO40:POKE54280,88:POKE54283,17
:rem 233
505 POKE53283,14:POKE54296,6:FORB=1TO5:NE
XT :rem 86
510 POKE54296,0:POKE53283,0:FORB=1TO5:NEX

```



```

TB,A:POKE54283,0:B=0:GOTO360 :rem 134
515 IFHTHENQ=Q-1:GOTO490 :rem 238
520 POKEV,14:POKE54276,8:POKE54296,15:POKE54283,2:GOSUB705:GOSUB645:GOTO290 :rem 17
525 : :rem 214
530 IFC=6THENRETURN :rem 236
535 H=0:FORA=ETOFSTEPD:IFA%(A)=0THEN570 :rem 152
540 B=Q*40+W+A+G:C=PEEK(B) :rem 201
545 IFC=9ORC=12THENPOKEB,C+5:H=1:Z=Z+Q+AB :rem 144
550 S(I)-1:A%(A+I)=1:GOTO565 :rem 144
555 IFC=14ORC=17THENA%(A+I)=1:H=1:GOTO570 :rem 159
565 : :rem 224
565 IFC=3THENC=6:RETURN :rem 131
560 A%(A+I)=0:GOTO570 :rem 131
565 IFRND(1)<.02ANDC<>12THENC=6:RETURN :rem 83
570 NEXT:RETURN :rem 245
575 : :rem 219
580 : :rem 215
585 REM INITIALIZE THE DISPLAY :rem 111
590 PRINT"{HOME}{5 DOWN}{8}";:FORA=1TO9 :rem 147
9:PRINT"DDDDDDDD";:NEXT:PRINT"DDDDDDDD" :rem 147
595 POKE2023,4:POKE56295,15:B=400:C=1264: :rem 82
FORA=1TO2:FORD=1TO40 :rem 82
600 E=INT(RND(0)*B/2)*2+C:IFPEEK(E)=9ORPE :rem 61
EK(E+1)=9THEN600 :rem 61
605 POKEE,9:POKEE+1,9:NEXT:B=360:C=1665:N :rem 121
EXT:FORA=1TOS :rem 121
610 B=INT(RND(1)*340)*2+1264:C=PEEK(B):IF :rem 246
C=9ORC=NTHEN610 :rem 246
615 POKEB,N:POKEB+54272,10:NEXT:FORA=0TO1 :rem 15
99:POKE55296+A,0:NEXT:FORA=0TO39 :rem 15
620 POKE55376+A,3:POKE1104+A,20:NEXT :rem 62
625 FORA=0TO3:POKE55337+A,2:NEXT:RETURN :rem 213
630 : :rem 211
635 : :rem 216
640 REM UPDATE SCREEN INFORMATION :rem 71
645 PRINT"{HOME}{GRN}"SPC(23)"$MID$(STR$(Z*100),2)".00" :rem 167
650 A=INT(Z/1000):IFA=K+1THENK=K+1:GOSUB7 :rem 4
05:GOSUB705:M=M+1 :rem 4
655 IFM<1THENPOKE1024,14:POKE55296,14:GOT :rem 184
O665 :rem 184
660 FORA=1024TO1023+M:POKEA,2:POKEA+54272 :rem 207
,0:NEXT:POKEA,14:POKEA+54272,0 :rem 207
665 IFY=0THENPOKE1031,14:POKE55303,0:GOTO :rem 132
675 :rem 132
670 FORA=1031TO1030+Y:POKEA,19:POKEA+5427 :rem 16
2,0:NEXT:POKEA,14:POKEA+54272,0 :rem 16
675 IFP<1THENPOKE1064,14:POKE55336,0:RETU :rem 141
RN :rem 141
680 FORB=1064TO1063+P:POKEB,17:POKEB+5427 :rem 23
2,0:NEXT:POKEB,14:POKEB+54272,0 :rem 23
685 RETURN :rem 131
690 : :rem 217
695 : :rem 222
700 REM MUSIC AND OTHER SUBROUTINES :rem 180
705 POKE54276,17:FORA=15TO0STEP-1:POKE542 :rem 196
96,A:POKE54273,86:FORB=1TO25:NEXTB,A :rem 196
710 POKE54276,8:POKE54296,15:RETURN :rem 82
715 POKE54276,8:POKE54276,129:POKE54273,9 :rem 205
1:FORD=15TO0STEP-1:POKE54296,D :rem 205
720 POKE53281,1:POKE53280,2:FORE=1TO70:NE :rem 142
XT:POKE53280,6:NEXT :rem 142
725 POKE54276,8:POKE54296,15:POKE53280,9: :rem 40
RETURN :rem 40
730 POKE54287,20:POKE54290,8:POKE54290,12 :rem 181
9:POKE54290,128:RETURN :rem 181
735 POKEA,21:POKEA+40,22:GOSUB715:POKEA,1 :rem 221
4:POKEA+40,14:RETURN :rem 221
740 : :rem 213
745 : :rem 218
750 REM CHARACTER DATA :rem 39
755 DATA2,138,164,73,74,52,20,8,64,81,37, :rem 188
146,82,44,40,16,24,24,36 :rem 188
760 DATA60,90,102,231,153,20,42,42,20,62, :rem 226
73,20,20,136,34,136,34,136,34,136,34 :rem 226
765 DATA148,22,148,34,136,34,136,34,148,2 :rem 128
2,148,22,148,34,136,34,148,22,148 :rem 128
770 DATA22,148,22,148,22,136,62,188,62,18 :rem 27
8,62,188,22,170,170,170,170,170 :rem 27
775 DATA170,170,170,150,150,150,170,170,1 :rem 73
70,170,170,150,150,150,150,170,17 :rem 73
780 DATA170,150,150,150,150,150,150,150,1 :rem 65
50,150,190,190,190,190,190,150,0, :rem 65
0 :rem 65
785 DATA0,0,0,0,0,0,20,20,20,0,0,0,0,0,20 :rem 94
,20,20,20,20,0,0,0,20,20,20,20,20,20 :rem 94
790 DATA20,20,20,60,60,60,60,60,60,20,0,6 :rem 14
0,60,60,60,60,60,0,0,0,0,255,255,0,0, :rem 14
0 :rem 14
795 DATA218,118,181,153,110,93,197,65,65, :rem 115
82,150,85,121,181,150,173,2,106,129,2 :rem 115
0 :rem 115
800 DATA64,162,129,2,169,128,141,19,145,1 :rem 7
69,0,133,136,34,136,34,136,34,136,34 :rem 7

```

Re-Beep

BEFORE TYPING...

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

Program 1: Re-Beep For VIC

```

20 A=240:B=225:C=195:D=135:S=36875:R=RND( :rem 248
-TI):POKE36878,9:POKE36879,10:W=1 :rem 199
30 PRINT"[CLR]" :rem 199
40 FORL=3TO7STEP2:POKE646,L:PRINTSPC(L+1) :rem 36
"[4 DOWN]{RVS}RE-BEEP":NEXT:FORM=1TO30 :rem 36
00:NEXT :rem 36
50 INPUT"[CLR]{WHT}{3 DOWN} PLAY LEVEL (1 :rem 145
-3)";LV:IFLV<1ORLV>3THEN50 :rem 145
60 INPUT"[CLR]{3 DOWN} 1 OR 2 PLAYERS";P :rem 175

```



```

70 IFP<>1ANDP<>2THEN60 :rem 85
80 IFP=2THENINPUT"[DOWN]NAME 1";N1$:INPUT :rem 85
  "[DOWN]NAME 2";N2$ :rem 75
89 REM CUT EXCESS NAME LENGTH :rem 239
90 IFLEN(N1$)>12THENN1$=LEFT$(N1$,12) :rem 77
100 IFLEN(N2$)>12THENN2$=LEFT$(N2$,12) :rem 120
110 PRINT"[CLR][CYN][RIGHT][RVS]***R E - :rem 160
  [SPACE]B E E P***[2 DOWN] :rem 160
120 PRINT"[RVS][GRN]HIT SPACE BAR TO BEGI :rem 160
  N :rem 251
130 WAIT197,32 :rem 251
140 PRINT"[2 UP][22 SPACES]";:POKE36879,1 :rem 1
  07 :rem 173
149 REM SET UP PLAY FIELD :rem 173
150 PRINT"[BLK]":FORL=1TO7STEP2:PRINT"F"L :rem 167
  "[3 DOWN]":NEXT :rem 204
160 PRINT"[HOME][4 DOWN][GRN]":FORL=1TO4: :rem 198
  PRINT"[4 RIGHT][RVS][2 SPACES] :rem 99
  [3 DOWN]":NEXT :rem 242
170 PRINT"[2 UP][9 RIGHT][BLK]TO RESTART :rem 246
  :rem 254
180 PRINT"[DOWN][9 RIGHT]PRESS '*':rem 254
189 REM PRINT NAMES AND POKE PLAYER NUMBE :rem 128
  R IF TWO PLAYERS :rem 172
190 IFP=2THENPRINT"[HOME][2 DOWN] :rem 82
  [9 RIGHT][RVS][CYN]"N1$:PRINT" :rem 221
  [9 DOWN][9 RIGHT][RVS]"N2$ :rem 242
200 IFP=2THENPOKE7788,177:POKE8008,178 :rem 246
  :rem 8
209 REM LIGHT APPROPRIATE PLAYER NUMBER :rem 190
  :rem 185
210 IFW=1THENPOKE38728,6:POKE38508,1 :rem 210
  :rem 210
220 IFW=-1THENPOKE38728,1:POKE38508,6 :rem 109
  :rem 125
229 REM RANDOM TONE STRING FORMATION :rem 125
  :rem 8
230 R=INT(RND(1)*4)+1 :rem 8
240 S$=S$+STR$(R) :rem 8
250 FORM=1TO750/LV↑2:NEXT :rem 8
259 REM VIC PLAYS IT'S STRING :rem 8
260 FORL=2TOLEN(S$)STEP2 :rem 8
270 Q=VAL(MID$(S$,L,1)) :rem 8
280 GETZ$:REM CLEARS EXTRANEIOUS CHARACTER :rem 190
  S :rem 185
290 ONQGOSUB480,540,600,660:FORM=1TO75/LV :rem 210
  ↑2:NEXT :rem 109
300 NEXT :rem 125
309 REM PLAYER ATTEMPTS A MATCH :rem 125
310 GETZ$:IFZ$=""THEN310 :rem 8
320 IFZ$="{F1}"THENGOSUB480:F$=F$+STR$(1) :rem 8
  :rem 8
330 IFZ$="{F3}"THENGOSUB540:F$=F$+STR$(2) :rem 8
  :rem 8
340 IFZ$="{F5}"THENGOSUB600:F$=F$+STR$(3) :rem 17
  :rem 17
350 IFZ$="{F7}"THENGOSUB660:F$=F$+STR$(4) :rem 117
  :rem 117
360 IFZ$=""THENRUN :rem 121
369 REM PLAYER TONE STRING/VIC TONE STRIN :rem 167
  G COMPARISON :rem 167
370 IFLEN(F$)<>LEN(S$)THEN310 :rem 62
380 IFF$<>S$ANDE=0THENF$="":E=1:PRINT" :rem 30
  [HOME][9 DOWN][9 RIGHT][YEL][RVS]TRY :rem 179
  [SPACE]AGAIN":GOSUB770:GOTO250:rem 62
390 PRINT"[HOME][9 DOWN][9 RIGHT] :rem 30
  [9 SPACES]" :rem 179
399 REM FAILS SECOND TRY :rem 179

400 IFF$<>S$ANDE=1THEN720 :rem 204
409 REM SCORING (W=-1 INDICATES PLAYER TW :rem 52
  O) :rem 52
410 E=0:F$="":IFW=1THENS1=S1+1:IFH1<S1THE :rem 53
  NH1=S1 :rem 88
420 IFW=-1THENS2=S2+1:IFH2<S2THENH2=S2 :rem 86
430 PRINT"[HOME]";:IFW=-1THENPRINT" :rem 249
  [10 DOWN]"; :rem 140
440 IFW=1THENPRINT"[4 DOWN][9 RIGHT][PUR] :rem 180
  [RVS]HIGH ="H1:PRINT"[DOWN][9 RIGHT] :rem 116
  [GRN]SCORE="S1 :rem 252
450 IFW=-1THENPRINT"[4 DOWN][9 RIGHT] :rem 120
  [PUR][RVS]HIGH ="H2:PRINT"[DOWN] :rem 242
  [9 RIGHT][GRN]SCORE="S2 :rem 138
460 FORM=1TO750/LV↑2:NEXT :rem 186
470 GOTO210 :rem 122
479 REM NOTE PLAYING SUBROUTINES :rem 254
480 POKE38514,1:POKE38515,1 :rem 126
490 POKES,A :rem 253
500 GOSUB780 :rem 136
510 POKES,0 :rem 183
520 POKE38514,5:POKE38515,5 :rem 119
530 RETURN :rem 9
540 POKE38602,1:POKE38603,1 :rem 123
550 POKES,B :rem 17
560 GOSUB780 :rem 143
570 POKES,0 :rem 189
580 POKE38602,5:POKE38603,5 :rem 125
590 RETURN :rem 20
600 POKE38690,1:POKE38691,1 :rem 120
610 POKES,C :rem 20
620 GOSUB780 :rem 120
630 POKES,0 :rem 20
640 POKE38690,5:POKE38691,5 :rem 20
650 RETURN :rem 120
660 POKE38778,1:POKE38779,1 :rem 17
670 POKES,D :rem 143
680 GOSUB780 :rem 189
690 POKES,0 :rem 125
700 POKE38778,5:POKE38779,5 :rem 20
710 RETURN :rem 120
720 POKE36874,159:FORM=1TO999:NEXT:POKE36 :rem 11
  874,135:FORM=1TO1500:NEXT:POKE36874,0 :rem 155
730 S1=0:S2=0:S$="":F$="":E=0:REM RESET :rem 155
740 PRINT"[HOME]";:IFW=-1THENPRINT" :rem 90
  [10 DOWN]"; :rem 90
750 PRINT"[6 DOWN][9 RIGHT][10 SPACES]":I :rem 183
  FP=2THENW=-W:REM SWITCH PLAYERS :rem 105
760 GOTO210 :rem 226
769 BUZZER/TIMING SUBROUTINES :rem 24
770 POKE36874,135:FORM=1TO250:NEXT:POKE36 :rem 110
  874,0:RETURN :rem 110
780 FORM=1TO600/LV↑2:NEXT:RETURN :rem 110

100 REM RE-BEEP[2 SPACES]64 :rem 191
110 S=54272:R=RND(-RND(0)):FORI=0TO4:READ :rem 89
  H(I),L(I):NEXT:S$="" :rem 59
120 FORI=0TO21:POKES+I,0:NEXT :rem 168
130 POKES+24,15:POKE53280,2:POKE53281,0:W :rem 249
  =1:D$="{HOME}[25 DOWN]" :rem 251
140 PRINT"[CLR]" :rem 251
150 FORL=3TO7STEP2:POKE646,L:PRINTSPC(L*2 :rem 251
  +5)"[4 DOWN][RVS][2 SPACES]RE-BEEP " :rem 251
  NEXT :rem 251

```

Program 2: Re-Beep For 64


```

160 FORM=1TO1500:GETA$:IFA$=""THENNEXT
      :rem 62
170 INPUT"{CLR}{WHT}{3 DOWN} PLAY LEVEL (
    1-3)":LV:IFLV<1ORLV>3THEN170:rem 247
180 INPUT"{CLR}{3 DOWN} 1 OR 2 PLAYERS":P
    :IFP<>1ANDP<>2THEN180:rem 61
190 IFP=2THENINPUT"{DOWN} NAME 1":N1$:INP
    UT"{DOWN} NAME 2":N2$:rem 125
200 N1$=LEFT$(N1$,12):N2$=LEFT$(N2$,12)
      :rem 50
210 PRINT"{CLR}"SPC(10)"{CYN}{RVS}
    {4 SPACES}R E ** B E E P{2 SPACES}
    {2 DOWN}:rem 139
220 PRINTSPC(9)"{RVS}{GRN}HIT SPACE BAR T
    O BEGIN":rem 51
230 WAIT197,32:POKE198,0:rem 99
240 PRINTSPC(9)"{UP}{22 SPACES}":POKE532
    80,3:POKE53281,6:rem 59
250 REM SET UP SCREEN:rem 204
260 PRINT"{BLK}":FORL=1TO7STEP2:PRINTSPC(
    15)"F"L"{2 DOWN}:NEXT:rem 53
270 PRINT"{HOME}{3 DOWN}{GRN}":FORL=1TO4:
    PRINTSPC(20)"{RVS}{3 SPACES}{2 DOWN}"
    :NEXT:rem 209
280 PRINTSPC(15)"{2 DOWN}{BLK}TO RESTART
      :rem 96
290 PRINTSPC(15)"{DOWN}PRESS '*' :rem 253
300 REM PRINT NAMES AND POKE PLAYER NUMBE
    R IF TWO PLAYERS:rem 185
310 IFP=2THENPRINT"{HOME}{2 DOWN}{RVS}
    {CYN}"SPC(18)N1$:PRINT"{12 DOWN}{RVS}
    "SPC(18)N2$:rem 56
320 IFP=2THENPOKE1120,177:POKE1640,178
      :rem 208
330 REM LIGHT APPROPRIATE PLAYER NUMBER
      :rem 207
340 IFW=-1THENPOKE55392,6:POKE55912,1
      :rem 172
350 IFW=1THENPOKE55912,6:POKE55392,1
      :rem 128
360 REM RANDOM TONE STRING FORMATION
      :rem 250
370 R=INT(RND(1)*4)+1:rem 133
380 S$=S$+STR$(R):rem 177
390 GOSUB760:rem 185
400 REM VIC PLAYS IT'S STRING:rem 209
410 FORL=2TOLEN(S$)STEP2:rem 239
420 NT=VAL(MID$(S$,L,1)):rem 68
430 FG=1:GOSUB630:FORA=1TO75/LV↑2:NEXT
      :rem 158
440 NEXT:POKE198,0:rem 62
450 REM PLAYER ATTEMPTS A MATCH:rem 106
460 GETZ$:IFZ$=""THEN460:rem 137
470 FORI=1TO4:IFZ$=MID$("{F1}{F3}{F5}{F7}
    ",I,1)THENNT=I:I=10:rem 139
480 NEXT:IFI>10THENFG=1:GOSUB630:F$=F$+ST
    R$(NT):GOTO510:rem 152
490 IFZ$=""THENRUN:rem 121
500 REM PLAYER TONE STRING/VIC TONE STRIN
    G COMPARISON:rem 108
510 IFLEN(F$)<>LEN(S$)THEN460:rem 169
520 IFF$=S$THEN570:rem 15
530 IFE=1THEN690:rem 168
540 IFE=0THENF$="":E=1:GOSUB760:PRINT"
    {HOME}{DOWN}"SPC(15)"{YEL}{RVS}TRY AG
    AIN":GOSUB740:rem 172
550 PRINT"{HOME}{DOWN}"SPC(15)"{9 SPACES}
    ":GOSUB750:POKE198,0:GOTO390:rem 60
560 REM SCORING:rem 148
570 E=0:F$="":IFW=1THENS1=S1+1:IFH1<S1THE
    NH1=S1:rem 60
580 IFW=-1THENS2=S2+1:IFH2<S2THENS2=S2
      :rem 95
590 IFW=1THENPRINT"{HOME}{2 DOWN}{PUR}
    {RVS}HIGH{2 SPACES}:"H1:PRINT"{GRN}SC
    ORE:"S1:rem 11
600 IFW=-1THENPRINTLEFT$(D$,16)"{PUR}
    {RVS}HIGH{2 SPACES}:"H2:PRINT"{GRN}SC
    ORE:"S2:rem 152
610 GOSUB760:GOTO340:rem 190
620 REM PLAY NOTES:rem 59
630 WF=32:IFFGTHENPRINTLEFT$(D$,NT*3+2)SP
    C(20)"{RVS}{WHT}{3 SPACES}":WF=16
      :rem 233
640 VC=VC+7:IFVC=21THENVVC=0:rem 162
650 POKES+VC+5,48:POKES+VC+6,170:POKES+VC
    ,L(NT):POKES+VC+1,H(NT):rem 172
660 POKES+VC+4,WF+1:GOSUB750:POKES+VC+4,W
    F:rem 100
670 IFFGTHENPRINTLEFT$(D$,NT*3+2)SPC(20)"
    {RVS}{GRN}{3 SPACES}{CYN}" :rem 177
680 RETURN:rem 126
690 FG=0:NT=0:GOSUB630:GOSUB760:NT=2:GOSU
    B630:GOSUB760:rem 129
700 S1=0:S2=0:S$="":F$="":E=0:rem 247
710 IFP=2THENW=-W:REM SWITCH PLAYERS
      :rem 61
720 GOTO340:rem 105
730 REM BUZZER/TIMING:rem 87
740 FG=0:NT=2:GOSUB630:RETURN:rem 77
750 IFFGTHENFORM=1TO600/LV↑2:NEXT:RETURN
      :rem 182
760 FORM=1TO400:NEXT:RETURN:rem 9
770 DATA 21,31, 14,24, 15,210, 16,195, 18
    ,209:rem 217

```

Aardvark Attack

```

10 GOSUB800
12 GOSUB995
14 PRINT"{CLR}{2 DOWN} INSTRUCTIONS (Y/N
    )?"
15 GETG$:IFG$=""THEN15
16 IFG$="Y"THENGOSUB1200
18 PRINT"{CLR}{2 DOWN}{RVS}{3 SPACES}AAR
    DVARK ATTACK{4 SPACES}{OFF}{DOWN}
19 PRINT"{DOWN} ALPHANUMERIC WEAPONS
    {2 DOWN}"
20 PRINT"{2 DOWN}{4 SPACES}WHICH LEVEL?
    {7 SPACES}{DOWN}(1=EXPERT{3 SPACES}9=
    NOVICE)"
22 GETHF$:IFHF$=""THEN22
23 IF(HF$>"9"ORHF$<"1")THEN22
24 HF=INT(2.5↑(VAL(HF$)-1))
25 SC=0:GOSUB900
30 GOSUB925:REM **** NEW LETTER
32 FORI=0TO3:FORJ=0TO3:C(I,J)=0:NEXTJ:NE
    XTI:REM *** CLEAR OLD LETTER
40 L=INT(RND(1)*26+1):B=32768+L*8:F=0
45 FORI=0TO3
48 F=ABS(F-1)
50 T=PEEK(B+2*I+1-F)
53 FORJ=0TO3
55 M=(TANDFN(M(J)))/(4↑J):C(I,J)=C(I,J)+IN
    T(M*(4↑F))
58 NEXTJ
60 IFFTHEN48
63 NEXTI
70 REM **** FLASHING
72 X=INT(RND(1)*101+20)

```



```

74 FORY=1TOX:Z=INT(RND(1)*10):ZZ=7682+Z:
   POKEZZ,32:POKEZZ,160:NEXTY
80 POKE36879,27:SYS828
82 FORI=0TO3:FORJ=0TO3
84 P=7722-J+22*I:Q=S(C(I,J)):POKEP,Q
86 NEXTJ:NEXTI
90 LF=0:NF=0:FH=0:SH=0:SYS833:POKE7680,L
98 POKEZZ,32
99 REM *** START ATTACK
100 FORX=1TO18
105 GETG$:IFG$=""THENFORY=1TOHF:NEXTY:GO
   TO190
110 IFLFTHEN140
120 IF(ASC(G$)-64)=LTHENLF=1:FH=X:GOTO14
   0
130 FORY=1TOHF:NEXTY:GOTO190
140 IFNFTHEN300
150 IF(VAL(G$)-1)=ZTHEN180
160 IF(G$=""ANDZ=9)THEN180
170 FORY=1TOHF:NEXTY:GOTO190
180 NF=1:SH=X:GOTO300
190 POKE(7682+Z+X*22),81+LF*128:POKE(384
   02+Z+X*22),0
200 NEXTX
210 REM *** LOSE ROUND
220 FORXX=0TO3
221 PB=(8100+Z+(22*XX))
222 IF(PEEK(PB)<>32)THEN240
223 NEXTXX
230 GOTO 320
240 IFLFTHEN260
250 POKE(PB+22),32
260 POKEPB,32
280 GOTO30:REM *** NEXT LETTER
299 REM *** SCORING
300 SC=SC+INT((500-5*FH-2*SH)/SQR(HF)):G
   OTO30
319 REM *** LOSE ROUTINE
320 FORY=1TO300:NEXT:PRINT"{CLR}*****
   *****{DOWN} SORRY, YOU LOST
   ."
321 PRINT"{2 DOWN} YOUR SCORE:";SC
322 PRINT"{DOWN} AT LEVEL ";HF$
323 PRINT"{2 DOWN} PLAY AGAIN (Y/N)?"
324 GETY$:IFY$=""THEN324
326 IFY$="N"THENPRINT"{CLR}":END
328 GOTO18
800 DIMS(15):DIMC(3,3)
801 REM *** HOUSEKEEPING
805 DEFFNM(X)=3*(4↑X)
810 FORX=0TO15:READS(X):NEXT
815 DATA32,108,123,98,124,225,255,254
820 DATA126,127,97,252,226,251,236,160
825 RETURN
898 END
899 REM *** SCREENS
900 PRINT"{CLR}{2 SPACES}*****
   {3 SPACES}{HOME}{DOWN}":FORX=1TO110:
   PRINT" ";:NEXT
910 PRINT"{HOME}{19 DOWN}{2 SPACES}12345
   67890{5 SPACES}L ";HF$;" ";
920 FORX=1TO3:PRINT"{2 SPACES}{Q}{RVS}
   {10 SPACES}{OFF}{W}{3 SPACES}
   {5 +}";:NEXT
925 PRINT"{HOME} {Q}*****{W}";
930 FORX=7696TO7806STEP22:FORY=0TO5:POKE
   X+Y,102:NEXTY:NEXTX
940 FORX=7719TO7785STEP22:FORY=0TO3:POKE
   X+Y,160:NEXTY:NEXTX
950 FORX=38400TO38531:POKEX,6:NEXT:FORX=

```

```

0TO17:FORY=0TO9:POKE(7704+Y+X*22),32
   :NEXTY,X
955 FORX=7681TO8165STEP22:POKEX,107:POKE
   X+11,115:POKEX+30720,6:POKEX+30731,6
   :NEXTX
960 PRINT"[HOME]{14 DOWN}{16 RIGHT}SCORE
   ";
961 PRINT"[HOME]{15 DOWN}{15 RIGHT}";SC;
970 RETURN
994 END:REM *** 828&33 SYS
995 FORX=828TO867:READY:POKEX,Y:NEXT
999 RETURN
1000 DATA169,1,76,67,3,169,6,160
1001 DATA39,140,77,3,162,0,160,0
1002 DATA157,39,150,232,224,4,208,248
1003 DATA238,77,3,200,192,22,208,248
1004 DATA172,77,3,192,127,208,229,96
1200 REM *** INSTRUCTIONS
1210 PRINT"[CLR]{DOWN} {20 +} {DOWN} A
   NDROMEDAN AARDVARKS{2 SPACES}ARE AT
   TACKING EARTH."
1220 PRINT"[DOWN] THEY HAVE 26 KINDS
   {4 SPACES}OF BOMBS AND THEY'RE
   {2 SPACES}ATTACKING 10 CITIES!"
1230 PRINT"[DOWN] YOUR ALPHANUMERIC
   {5 SPACES}RADAR CAN SAVE EARTH."
1240 PRINT" FIRST: RECOGNIZE{13 SPACES}T
   HE BOMB (A-Z)"
1250 PRINT"{2 SPACES}THEN: SAVE
   {18 SPACES}THE CITY (0-9)"
1260 PRINT"[DOWN] {RVS}HIT ANY KEY TO PL
   AY{OFF}";
1270 GETG$:IFG$=""THEN1270
1280 RETURN

```

Word Match

BEFORE TYPING...

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

Program 1: VIC Word Match

```

1 REM WORD MATCH
2 PRINT"{CLR}"SPC(247)"{PUR}WORD MATCH"
3 FORP=1TO2E3:NEXT:PRINTSPC(67)"{BLU}TOU
   CH A KEY..."
4 GETA$:IFA$=""THEN4
10 DIMN$(2):PRINT"{BLU}{CLR}NAMES, PLEAS
   E!"
12 PRINT"[HOME]{15 DOWN}TO PLAY AGAINST
   THE{4 SPACES}COMPUTER, ENTER
   {SHIFT-SPACE}'VIC' AS A PLAYER."
13 PRINT"[HOME]{DOWN}":FORN=1TO2:PRINT"
   {DOWN}PLAYER"N;:INPUTN$(N):NEXT:PRINT
   "{CLR}"
20 S=36876:V=S+2:BK=V+1:POKES,0:POKEV,15
   :POKEBK,156:O=30720
30 DIMW$(12),R$(28),W1$(6),C$(2),SQ$(12)
   ,BK$(2)
32 DATACAR,CAT,BOY,HAT,HIT,TOP,ATE,EAT,P
   IT,PAT,GOT,HIM,HER,WHY,HOW,TIN,ILL,WH
   O,RUN,YOU
33 DATAACE,BED,INK,AIM,ART,TOT,TIE,END

```



```

35 FORN=1TO28
36 Z=INT(RND(1)*28)+1:IFR%(Z)<>0THEN36
37 R%(Z)=N:NEXT
38 FORN=1TO6:FORQ=1TOR%(N):READW$:NEXT:W
1$(N)=W$:RESTORE:NEXT:FORQ=1TO28:READ
W$:NEXT
39 C%(1)=2:C%(2)=5:BK%(1)=172:BK%(2)=236
40 FORN=1TO12:R%(N)=0:NEXT
41 FORN=1TO11STEP2
42 Z=INT(RND(1)*12)+1:Y=INT(RND(1)*12)+1
43 IFR%(Z)<>0ORR%(Y)<>0ORZ=YTHEN42
44 R%(Z)=N:R%(Y)=N+1
45 NEXT
47 FORN=1TO12:R%(N)=INT((R%(N)-1)/2)+1:W
$(N)=W$(R%(N)):NEXT
50 FORN=1TO4
51 PRINT"[BLK] [RVS]{19 SPACES}"
52 FORZ=1TO3
53 PRINT"[RVS] {OFF}{5 SPACES}{RVS}
{OFF}{5 SPACES}{RVS} {OFF}{5 SPACES}
{RVS} {OFF}"
54 NEXTZ,N
55 PRINT"[RVS]{19 SPACES}"
56 PRINT"[HOME]{2 DOWN}{PUR}"
60 FORN=1TO9STEP3
62 PRINTTAB(3)NSPC(3)N+1SPC(3)N+2
64 PRINT"{2 DOWN}":NEXT
66 PRINT"{4 RIGHT}10{4 RIGHT}11{4 RIGHT}
12"
70 D$="[HOME]{18 DOWN}"
71 SP$="{21 SPACES}"
74 PRINTD$SP$SP$
80 FORN=1TO12:READSQ%(N):NEXT
81 DATA7726,7732,7738,7814,7820,7826,790
2,7908,7914,7990,7996,8002
100 REM GAME
105 X=1
110 PRINTD$"[RED]WHICH BLOCKS, "N$(X)"?"
115 POKEBK,BK%(X)
117 IFN$(X)="VIC"THENGOSUB1000
120 PRINTD$"[DOWN]"SP$D$"[DOWN]{PUR}
{RVS}BLOCK A?{BLK}{OFF}";
121 GETA$:IFA$=CHR$(13)THENI=VAL(AN$):AN
$="" :GOSUB400:ON(I>12)+2GOTO120,124
122 IFA$<"0"ORA$>"9"THEN121
123 PRINTA$;:AN$=AN$+A$:GOTO121
124 ON(R%(I)=0)+2GOTO120,132
125 PRINTD$"[2 DOWN]"SP$D$"[2 DOWN]{BLU}
{RVS}BLOCK B?{BLK}{OFF}";:
126 GETA$:IFA$=CHR$(13)THENJ=VAL(AN$):AN
$="" :GOSUB400:ON(J>12)+2GOTO125,129
127 IFA$<"0"ORA$>"9"THEN126
128 PRINTA$;:AN$=AN$+A$:GOTO126
129 ON(R%(J)=0)+2GOTO125,130
130 IFI=JTHEN125
131 PRINTD$SP$SP$SP$SP$;:GOTO137
132 FORN=1TO3
135 POKESQ%(I)+N+22+O,6:POKESQ%(I)+N+22,
ASC(MID$(W$(I),N,1))-64:NEXT
136 ON(N$(X)="VIC")+2GOTO1040,125
137 FORN=1TO3
138 POKESQ%(J)+N+22+O,6:POKESQ%(J)+N+22,
ASC(MID$(W$(J),N,1))-64
139 NEXT
140 IFR%(I)=R%(J)THEN200
150 PRINTD$SP$D$TAB(6)"[RED]{RVS}NO MATC
H-{OFF}"
151 FORN=1TO30:POKES,240:POKES,240-3*N:N
EXT:POKES,0
152 FORP=1TO2E3:NEXT:PRINTD$SP$
153 I$=STR$(I):I$=RIGHT$(I$,LEN(I$)-1):J
$=STR$(J):J$=RIGHT$(J$,LEN(J$)-1)
154 POKESQ%(I)+23,32:POKESQ%(J)+23,32:PO
KESQ%(I)+25,32:POKESQ%(J)+25,32
155 FORN=1TOLEN(I$):POKESQ%(I)+23+N,ASC(
MID$(I$,N,1)):POKESQ%(I)+23+N+O,4:NE
XT
156 FORN=1TOLEN(J$):POKESQ%(J)+23+N,ASC(
MID$(J$,N,1)):POKESQ%(J)+23+N+O,4:NE
XT
160 IFX=1THENX=2:GOTO110
162 X=1:GOTO110
200 REM RIGHTANS
205 PRINTD$SP$SP$D$"{6 SPACES}{BLK}{PUR}
{RVS}MATCH!!!!{OFF}"
210 FORN=1TO5:FORZ=200TO240:POKES,Z:NEXT
Z,N:POKES,0
211 IFX=1THENS1=S1+1
212 IFX=2THENS2=S2+1
215 FORP=1TO2E3:NEXT
220 Q=SQ%(I):R=SQ%(J)
225 FORN=1TO3
230 FORW=QTOQ+4:POKEW+O,C%(X):POKEW,160:
NEXT:Q=Q+22:NEXT
231 FORN=1TO3
232 FORW=RTOR+4:POKEW+O,C%(X):POKEW,160:
NEXT:R=R+22:NEXT
235 PRINTD$SP$
237 CR=CR+1:IFCR=6THEN300
238 R%(I)=0:R%(J)=0
240 GOTO110
300 FORN=1TO5:FORZ=250TO150STEP-2:POKES,
Z:NEXTZ,N:POKES,0
305 PRINTD$"THE GAME IS OVER-
306 FORP=1TO2E3:NEXT
307 IFS1>S2THENPRINTD$SP$D$N$(1)" WINS!!
!"
308 IFS2>S1THENPRINTD$SP$D$N$(2)" WINS!!
!"
309 IFS2=S1THENPRINTD$SP$D$"IT'S A TIE!!
!"
310 FORP=1TO2E3:NEXT:PRINTD$"[DOWN]WANT
ANOTHER?(Y/N)"
311 GETA$:IFA$="N"THENPRINT"[CLR]{BLU}":
POKEBK,27:END
312 IFA$="Y"THENRUN10
314 GOTO311
400 POKES,249:FORP=1TO20:NEXT:POKES,0:RE
TURN
1000 REM VIC PLAYS
1005 I=INT(RND(1)*12)+1:ON(R%(I)=0)+2GOT
O1005,132
1040 J=INT(RND(1)*12)+1:IFJ=ITHEN1040
1050 IFR%(J)=0THEN1040
1060 PRINTD$SP$D$"VIC PICKS"I"AND"J"
{LEFT}."
1065 FORP=1TO2E3:NEXT:GOTO137

```

Program 2: 64 Word Match

```

100 POKE53281,1:PRINT"[CLR]"SPC(250)"
{BLK}{2 SPACES}WORD MATCH "
110 FORP=1TO2E3:NEXT:PRINTSPC(90)"[BLU]
{2 SPACES}TOUCH A KEY..."
120 GETA$:IFA$=""THEN120
130 DIMN$(2):PRINT"[BLU]{CLR}NAMES, PLEA
SE!"
140 PRINT"[HOME]{15 DOWN}TO PLAY AGAINST

```



```

    THE COMPUTER,"
145 PRINT"ENTER '64' AS PLAYER TWO"
150 PRINT"{HOME}{DOWN}":FORN=1TO2:PRINT"
    {DOWN}PLAYER"N;:INPUTN$(N):NEXT:PRIN
    T"{CLR}"
160 O=54272
161 S=54272:FORE=STOS+28:POKEE,0:NEXT
162 POKE54296, 15 :POKE54277, 66 :POKE54
    278, 210
163 POKE 54276, 17 :POKE 54272, 63
164 J=20:FORT=1TO 200:POKE54273,J:J=RND(
    0)*150+1:NEXT:POKE54276,16
165 FORT=1TO200:NEXT
170 DIMW$(12),R$(28),W1$(6),C$(2),SQ$(12
    ),BK$(2)
180 DATACAR,CAT,BOY,HAT,HIT,TOP,ATE,EAT,
    PIT,PAT,GOT,HIM,HER,WHY,HOW,TIN,ILL,
    WHO,RUN,YOU
190 DATAACE,BED,INK,AIM,ART,TOT,TIE,END
200 FORN=1TO28
210 Z=INT(RND(1)*28)+1:IFR$(Z)<>0THEN210
220 R$(Z)=N:NEXT
230 FORN=1TO6:FORQ=1TOR$(N):READW$:NEXT:
    W1$(N)=W$:RESTORE:NEXT:FORQ=1TO28:RE
    ADW$:NEXT
240 C$(1)=2:C$(2)=5:BK$(1)=172:BK$(2)=23
    6
250 FORN=1TO12:R$(N)=0:NEXT
260 FORN=1TO11STEP2
270 Z=INT(RND(1)*12)+1:Y=INT(RND(1)*12)+
    1
280 IFR$(Z)<>0ORR$(Y)<>0ORZ=YTHEN270
290 R$(Z)=N:R$(Y)=N+1
300 NEXT
310 FORN=1TO12:R$(N)=INT((R$(N)-1)/2)+1:
    W$(N)=W1$(R$(N)):NEXT
320 FORN=1TO4
330 PRINT"[BLK] {RVS}{31 SPACES}"
340 FORZ=1TO3
350 PRINT"[RVS] {OFF}{9 SPACES}{RVS}
    {OFF}{9 SPACES}{RVS} {OFF}{9 SPACES}
    {RVS} {OFF}"
360 NEXTZ,N
370 PRINT"[RVS]{31 SPACES}"
380 PRINT"[HOME]{2 DOWN}{PUR}"
390 FORN=1TO9STEP3
400 PRINTTAB(5)NSPC(7)N+1SPC(7)N+2
410 PRINT"{2 DOWN}":NEXT
420 PRINT"{6 RIGHT}10{8 RIGHT}11
    {8 RIGHT}12"
430 D$="{HOME}{18 DOWN}"
440 SP$="{39 SPACES}"
450 PRINTD$SP$SP$
460 FORN=1TO12:READSQ$(N):NEXT
470 DATA 1108, 1118, 1128, 1268, 1278, 1
    288, 1428, 1438, 1448, 1588, 1598,
    1608
480 REM GAME
490 X=1
500 PRINTD$"{RED}WHICH BLOCKS, "N$(X)"?"
510 POKEBK,BK$(X)
520 IFN$(X)="64"THENGOSUB1070
530 PRINTD$"{DOWN}"SP$D$"{DOWN}{PUR}
    {RVS}BLOCK A?{BLK}{OFF}";
540 GETA$:IFA$=CHR$(13)THENJ=VAL(AN$):AN
    $="":GOSUB1060:ON(I>12)+2GOTO530,570
550 IFA$<"0"ORA$>"9"THEN540
560 PRINTA$;:AN$=AN$+A$:GOTO540
570 ON(R$(I)=0)+2GOTO530,650
580 PRINTD$"{2 DOWN}"SP$D$"{2 DOWN}{BLU}
    {RVS}BLOCK B?{BLK}{OFF}";:
590 GETA$:IFA$=CHR$(13)THENJ=VAL(AN$):AN
    $="":GOSUB1060:ON(J>12)+2GOTO580,620
600 IFA$<"0"ORA$>"9"THEN590
610 PRINTA$;:AN$=AN$+A$:GOTO590
620 ON(R$(J)=0)+2GOTO580,630
630 IFI=JTHEN580
640 PRINTD$SP$SP$SP$SP$;:GOTO680
650 FORN=1TO3
660 POKESQ$(I)+N+40+O,6:POKESQ$(I)+N+40,
    ASC(MID$(W$(I),N,1))-64:NEXT
670 ON(N$(X)="64")+2GOTO1090,580
680 FORN=1TO3
690 POKESQ$(J)+N+40+O,6:POKESQ$(J)+N+40,
    ASC(MID$(W$(J),N,1))-64
700 NEXT
710 IFR$(I)=R$(J)THEN810
720 PRINTD$SP$D$TAB(12)"{RED}{RVS}NO MAT
    CH-{OFF}"
730 REM NO MATCH
731 S=54272:FORE=STOS+28:POKEE,0:NEXT
732 POKE54296, 15 :POKE54277, 51 :POKE54
    278, 164
733 POKE54275, 8 :POKE54274, 100
734 POKE 54273, 2 :POKE54272, 135 :POKE5
    4276, 65
735 FORT=1TO 200 :NEXT:POKE54276, 64
740 FORP=1TO2E3:NEXT:PRINTD$SP$
750 I$=STR$(I):I$=RIGHT$(I$,LEN(I$)-1):J
    $=STR$(J):J$=RIGHT$(J$,LEN(J$)-1)
760 POKESQ$(I)+41,32:POKESQ$(J)+41,32:PO
    KESQ$(I)+43,32:POKESQ$(J)+43,32
770 FORN=1TOLEN(I$):POKESQ$(I)+41+N,ASC(
    MID$(I$,N,1)):POKESQ$(I)+41+N+O,4:NE
    XT
780 FORN=1TOLEN(J$):POKESQ$(J)+41+N,ASC(
    MID$(J$,N,1)):POKESQ$(J)+41+N+O,4:NE
    XT
790 IFX=1THENX=2:GOTO500
800 X=1:GOTO500
810 REM RIGHTANS
820 PRINTD$SP$SP$D$"{12 SPACES}{BLK}
    {PUR}{RVS}MATCH!!!!{OFF}"
830 REM MATCH!!
831 S=54272:FORE=STOS+28:POKEE,0:NEXT
832 POKE54296, 10 :POKE54277, 35 :POKE54
    278,163
833 POKE 54273, 33 :POKE54272, 135 :POKE
    54276,17
834 FORT=1TO 100 :NEXT
835 POKE 54273, 42 :POKE54272, 62
    {2 SPACES}:POKE54276,17
836 FORT=1TO 100 :NEXT
837 POKE 54273,50{2 SPACES}:POKE54272, 6
    0{2 SPACES}:POKE54276,17
838 FORT=1TO 600 :NEXT:POKE54276, 16
840 IFX=1THENS1=S1+1
850 IFX=2THENS2=S2+1
860 FORP=1TO2E3:NEXT
870 Q=SQ$(I):R=SQ$(J)
880 FORN=1TO3
890 FORW=Q-2TOQ+6:POKEW+O,C$(X):POKEW,16
    0:NEXT:Q=Q+40:NEXT
900 FORN=1TO3
910 FORW=R-2TOR+6:POKEW+O,C$(X):POKEW,16
    0:NEXT:R=R+40:NEXT
920 PRINTD$SP$
930 CR=CR+1:IFCR=6THEN960

```



```

940 R$(I)=0:R$(J)=0
950 GOTO500
960 FORN=1TO5:FORZ=250TO150STEP-2:POKES,
Z:NEXTZ,N:POKES,0
970 PRINTD$"THE GAME IS OVER-
980 FORP=1TO2E3:NEXT
990 IFS1>S2THENPRINTD$SP$D$N$(1)" WINS!!
1"
1000 IFS2>S1THENPRINTD$SP$D$N$(2)" WINS!
11"
1010 IFS2=S1THENPRINTD$SP$D$"IT'S A TIE!
11"
1020 FORP=1TO2E3:NEXT:PRINTD$"{DOWN}WANT
ANOTHER?(Y/N)"
1030 GETA$:IFA$="N"THENPRINT"{CLR}{BLU}"
:POKEBK,27:END
1040 IFA$="Y"THENRUN130
1050 GOTO1030
1060 REM SOUND FOR BEGINNING
1061 S=54272:FORE=STOS+28:POKEE,0:NEXT
1062 POKE54296,15:POKE54277,51:POKE5
4278,246
1063 POKE54276,17{2 SPACES}:POKE54273,
1{2 SPACES}:POKE54272,135
1064 FORT=1TO200STEP16{2 SPACES}:POKE54
273,T/2+50:NEXT:POKE54276,16:FORT=1
TO500:NEXT
1065 RETURN
1070 REM C-64 PLAYS
1080 I=INT(RND(1)*12)+1:ON(R$(I)=0)+2GOT
O1080,650
1090 J=INT(RND(1)*12)+1:IFJ=1THEN1090
1100 IFR$(J)=0THEN1090
1110 PRINTD$SP$D$"64 PICKS"I"AND"J"
{LEFT}."
1120 FORP=1TO2E3:NEXT:GOTO680

```

Understanding Sound

BEFORE TYPING...

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Program 1: Demonstration Of The ADSR Envelope

```

5 PRINT"{CLR}":POKE53281,12:POKE646,0
10 PRINTTAB(8)CHR$(18)CHR$(169)CHR$(223)"
{OFF}"
20 PRINTTAB(7)CHR$(18)CHR$(169)"
{2 SPACES}CHR$(223)
30 PRINTTAB(6)CHR$(18)CHR$(169)"
{4 SPACES}CHR$(223)
40 PRINTTAB(5)CHR$(18)CHR$(169)"
{6 SPACES}CHR$(223)
50 PRINTTAB(4)CHR$(18)CHR$(169)"
{19 SPACES}CHR$(223)
60 PRINTTAB(3)CHR$(18)CHR$(169)"
{21 SPACES}CHR$(223)
70 PRINTTAB(2)CHR$(18)CHR$(169)"
{23 SPACES}CHR$(223)
80 PRINTTAB(1)CHR$(18)CHR$(169)"
{25 SPACES}CHR$(223)

```

```

90 PRINT
100 PRINT"{4 SPACES}A{5 SPACES}D
{3 SPACES}SUSTAIN{4 SPACES}R
110 PRINT"{4 SPACES}T{5 SPACES}E
{14 SPACES}E
120 PRINT"{4 SPACES}T{5 SPACES}C
{14 SPACES}L
130 PRINT"{4 SPACES}A{5 SPACES}A
{14 SPACES}E
140 PRINT"{4 SPACES}C{5 SPACES}Y
{14 SPACES}A
150 PRINT"{4 SPACES}K{20 SPACES}S
160 PRINT"{25 SPACES}E
170 CL=55296:S=54272:W=S+4:AD=S+5:SR=S+6
:V=S+24
175 POKEV,15:POKEAD,202:POKESR,58:POKES,
135:POKES+1,33:POKEW,33
180 FORR=CLTOCL+5:FORU=RTOCL+1024STEP40:
185 POKEU,1:NEXT:NEXT
190 FORR=CL+6TOCL+12:FORU=RTOCL+1024STEP
40
195 POKEU,1:NEXT:NEXT
197 FORR=CL+13TOCL+23:FORU=RTOCL+1024STE
P40
198 POKEU,1:NEXT:NEXT
200 POKEW,16:FORR=CL+24TOCL+28:FORU=RTOC
L+1024STEP40
290 POKEU,1:NEXT:NEXT
300 FORT=STOS+28:POKET,0:NEXT

```

Program 2: Demonstration Of Waveforms, Pitches, And The Envelope Generator

```

5 POKE53281,1:POKE646,0
10 S=54272:FORE=STOS+28:POKEE,0:NEXT
15 PRINT"{CLR}{UP}":GOSUB200
20 INPUT"ATTACK RATE 0-15";AT:INPUT"DECF
Y RATE 0-15";DE:AD=16*AT+DE:POKE54277
,AD
25 INPUT"SUSTAIN{SHIFT-SPACE}VOLUME 1-15
";SU:INPUT"RELEASE RATE 0-15";RL:J=16
*SU+RL
30 POKE54278,J:INPUT"OVERALL VOLUME 1-15
";V:POKE54296,V
32 INPUT"WAVEFORM 17,33,OR 129 ";W:POKE5
4276,W
33 INPUT"SUSTAIN LENGTH (* .1 SECOND)";L
E:LE=LE*100
34 INPUT"RELEASE LENGTH (* .1 SECOND)";D
L:DL=DL*100
35 INPUT"HIGH BYTE";H:INPUT"LOW BYTE";L:
POKE54273,H:POKE54272,L
40 FORT=1TOLE:NEXTT
42 POKE54276,(W-1)
43 FORT=1TODL:NEXT
50 S=54272:FORE=STOS+28:POKEE,0:NEXT
60 PRINT"{HOME}{13 DOWN}{RVS}AGAIN?{OFF}
Y OR N"
70 GETA$:IFA$="Y"THENPRINT"{HOME}
{13 DOWN}{16 SPACES}":GOTO20
75 IFA$<>"N"THEN70
80 REM PRINT PROGRAM
85 INPUT"{CLR}STARTING LINE";SL:INPUT"IN
CREMENT";IN
86 PRINT"{CLR}"
88 PRINT"{3 DOWN}NEW{3 DOWN}"
89 PRINTSL;"S=54272:FORE=STOS+28:POKEE,0
:NEXT":SL=SL+IN
90 PRINTSL;"POKE54296,";V;"POKE54277,";

```



```

AD;":POKE54278,";J:SL=SL+IN
120 PRINTSL;"POKE 54276,";W;":POKE 54273
,";H;":POKE54272,";L:SL=SL+IN
140 PRINTSL;"FORT=1TO";LE;":NEXT";":POKE
54276,";(W-1);"{LEFT}:FORT=1TO";DL;":
:NEXT"
150 SL=SL+IN:PRINTSL;"FORE=STOS+28:POKEE
,0:NEXT
155 PRINT"HOME";":FORR=631TO644:POKER,1
3:NEXT
160 POKE198,13
165 END
200 PRINT" SAMPLE DATA FOR PITCH VALUES"
205 PRINT" PITCH HIGH BYTE LOW BYTE
{2 SPACES}{RVS}WAVEFORMS
210 PRINT"{3 SPACES}C{7 SPACES}33
{6 SPACES}135{5 SPACES}TRIANGLE=17
220 PRINT"{3 SPACES}C#{6 SPACES}35
{6 SPACES}134{5 SPACES}SAWTOOTH=33
230 PRINT"{3 SPACES}D{7 SPACES}37
{6 SPACES}162{5 SPACES}NOISE=129
240 PRINT"{3 SPACES}D#{6 SPACES}39
{6 SPACES}223
250 PRINT"{3 SPACES}E{7 SPACES}42
{6 SPACES}62
260 PRINT"{3 SPACES}F{7 SPACES}44
{6 SPACES}193
270 PRINT"{3 SPACES}F#{6 SPACES}47
{6 SPACES}107
280 PRINT"{3 SPACES}G{7 SPACES}50
{6 SPACES}60
290 PRINT"{3 SPACES}G#{6 SPACES}53
{6 SPACES}57
300 PRINT"{3 SPACES}A{7 SPACES}56
{6 SPACES}99
310 PRINT"{3 SPACES}A#{6 SPACES}59
{6 SPACES}190
320 PRINT"{3 SPACES}B{7 SPACES}63
{6 SPACES}75
335 PRINT
340 RETURN

```

Speeding Up The VIC

Program 1: BASIC Loader

```

59998 FORA=828TO848:READB:POKEA,B:NEXT:E
ND
59999 DATA120,169,73,141,20,3,169,3,141,
21,3,88,96,169,0,141,140,2,76,191,
234

```

Program 2: Location Modifier

```

59997 FORA=828TO853:READB:POKEA,B:NEXT:E
ND
59998 DATA120,169,73,141,20,3,169,3,141,
21,3,88,96,169,1,141,139,2,169,0,1
41,140,2,76
59999 DATA191,234

```

Program 3: Ball Character Movement

```

59997 FORA=828TO853:READB:POKEA,B:NEXT:E
ND
59998 DATA120,169,73,141,20,3,169,3,141,
21,3,88,96,169,1,141,139,2,169,0,1
41,140,2,76
59999 DATA191,234

```

```

60000 A=7680:B=38400:C=8185:E=A:F=38905:
G=B:H=81:I=32:POKE650,128:SYS828:P
RINT"{CLR}":D=1
60010 GETA$:IFA$="R"THEND=1:GOTO60060
60020 IFA$="W"THEND=-1:GOTO60060
60030 IFA$="*"THEND=22:GOTO60060
60040 IFA$="P"THEND=-22:GOTO60060
60050 IFD=0THEN60010
60060 POKEA,I:A=A+D:B=B+D:POKEA,H:POKEB,
6:D=0
60070 IFA<ETHENA=C:B=F:GOTO60060
60080 IFA>CTHENA=E:B=G:GOTO60060
60090 GOTO60010

```

Power BASIC

Program 1: VIC Paddle Reader

```

10 FORA=828TO859:READB:POKEA,B:NEXT
828 DATA 169,0,170,168,24,109,8,144
836 DATA 144,1,200,202,208,247,132,251
844 DATA 138,168,24,109,9,144,144,1
852 DATA 200,202,208,247,132,252,96,0

```

Program 2: 64 Paddle Reader

```

10 FORA=679TO710:READB:POKEA,B:NEXT
679 DATA 169,0,170,168,24,109,25
686 DATA 212,144,1,200,202,208,247
693 DATA 132,251,138,168,24,109,26
700 DATA 212,144,1,200,202,208,247
707 DATA 132,252,96,256

```

The Beginner's Corner

Math Competency: Saving Money

```

10 REM MATH COMPETENCY :rem 102
20 REM SAVING MONEY :rem 150
30 PRINT"{CLR}{BLU}" :rem 230
40 FOR C=1 TO 6 :rem 213
50 READ N$(C) :rem 135
60 NEXT C :rem 232
70 FOR C=1 TO 3 :rem 213
80 READ A$(C),B(C),M(C),F(C) :rem 146
90 NEXT C :rem 235
100 DATA SALLY,HEIDI,NANCY,BRENT,DAVID,CH
UCK :rem 57
110 DATA BIKE,80,5,7,STEREO,90,5,14,COMPU
TER,100,10,10 :rem 22
120 PRINT"{CLR}{BLU}" :rem 22
130 R6=INT(6*RND(0)+1) :rem 182
140 PRINT N$(R6);" WANTS TO BUY A" :rem 77
150 R3=INT(3*RND(0)+1) :rem 178
160 PRINT A$(R3);"." :rem 12
170 T=B(3)+M(R3)*INT(F(R3)*RND(0)+1) :rem 170
180 GOSUB 480 :rem 181
190 PRINT"IT WILL COST ";C$;"." :rem 200
200 P$="HE" :rem 20
210 IF R6>=4 THEN 230 :rem 29
220 P$="SHE" :rem 105
230 W=10*INT(4*RND(0)+1) :rem 15
240 PRINT"IF ";P$;" SAVES FOR" :rem 141
245 PRINTW;"WEEKS," :rem 169
250 PRINT"HOW MUCH WILL ";N$(R6)" :rem 99

```



```

260 PRINT"NEED TO SAVE EACH"
265 PRINT"WEEK?"
270 PRINT"{BLK}"
280 S=(T/W)/100
290 INPUT ANS
300 IF ABS(ANS-S)<.01 THEN 380
310 PRINT"{RED}TOTAL COST ";C$
320 PRINT"DIVIDED BY";W;"WKS ="
330 GOSUB 470
340 PRINTC$
350 PRINT"{GRN}"
360 INPUT "PRESS <RETURN>";E$
370 GOTO 120
380 PRINT
390 PRINT"{RED}CORRECT!"
400 PRINT
410 PRINT"{BLK}ANOTHER PROBLEM?"
420 PRINT"(Y/N)"
430 GET E$
440 IF E$="Y" THEN 120

:rem 104 450 IF{2 SPACES}E$="N" THEN 520 :rem 38
:rem 217 460 GOTO 430 :rem 106
:rem 250 470 T=S+.005 :rem 109
:rem 21 480 T=INT(100*T) :rem 120
:rem 13 490 T$=STR$(T) :rem 20
:rem 64 500 C$="$"+LEFT$(T$,LEN(T$)-2)+"."+RIGHT$(T$,2) :rem 168
:rem 224 :rem 118
:rem 61 510 RETURN :rem 26
:rem 177 520 PRINT"{CLR}{BLU}" :rem 111
:rem 139 530 END
:rem 135
:rem 248
:rem 102
:rem 40
:rem 188
:rem 33
:rem 87
:rem 142
:rem 224
:rem 44

```

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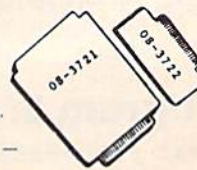
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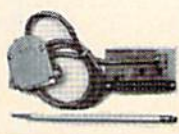
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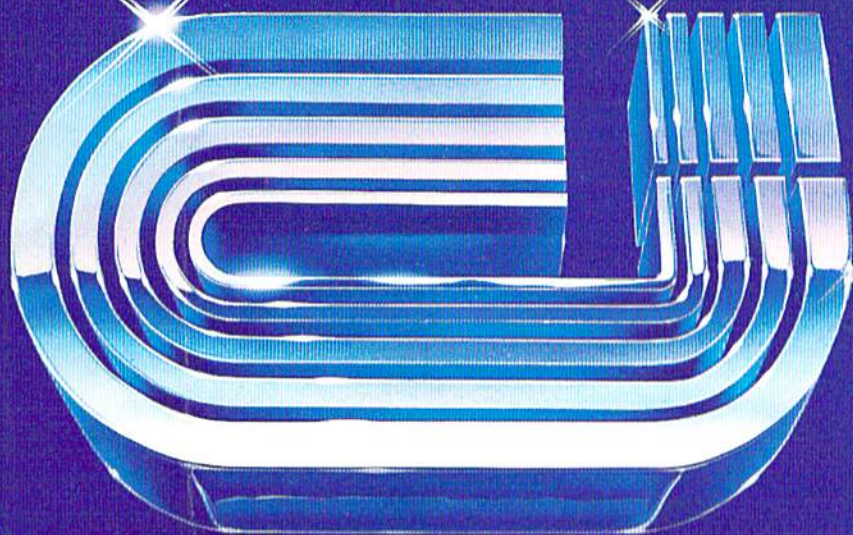
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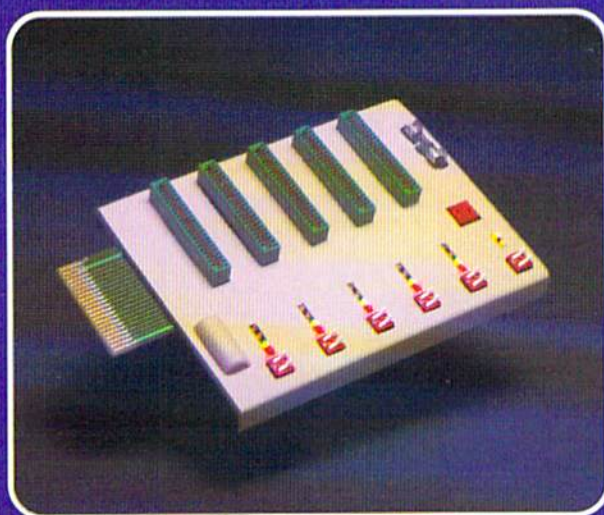
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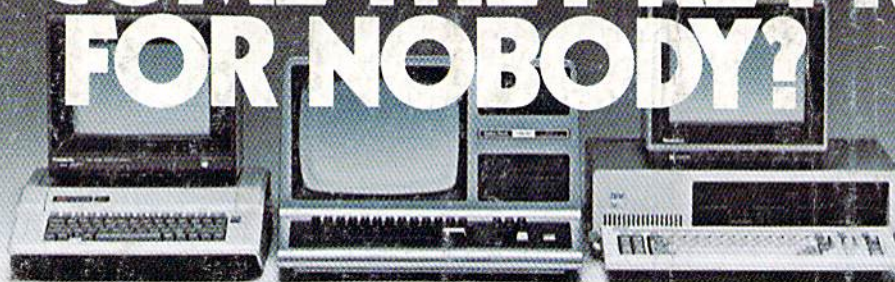
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