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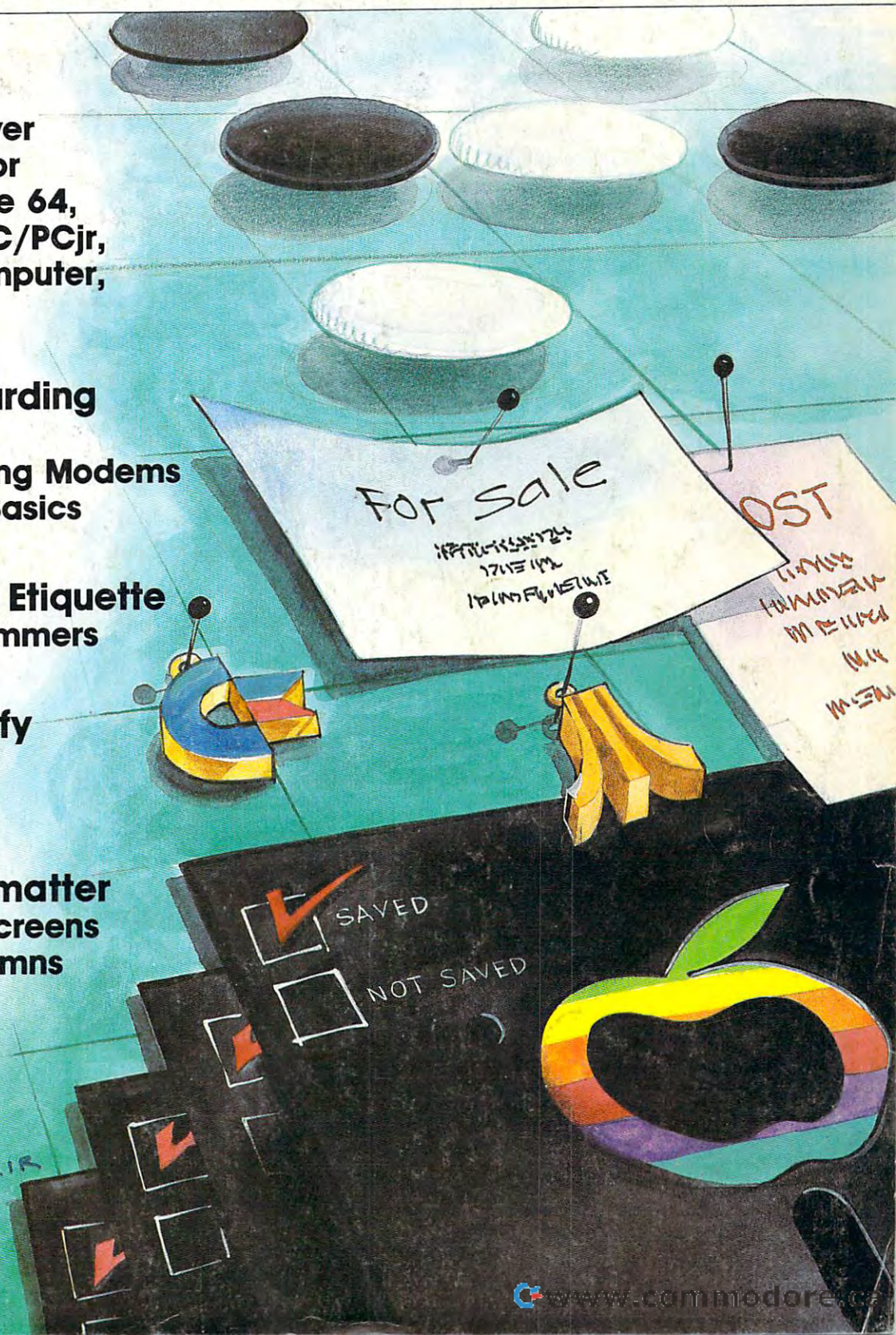

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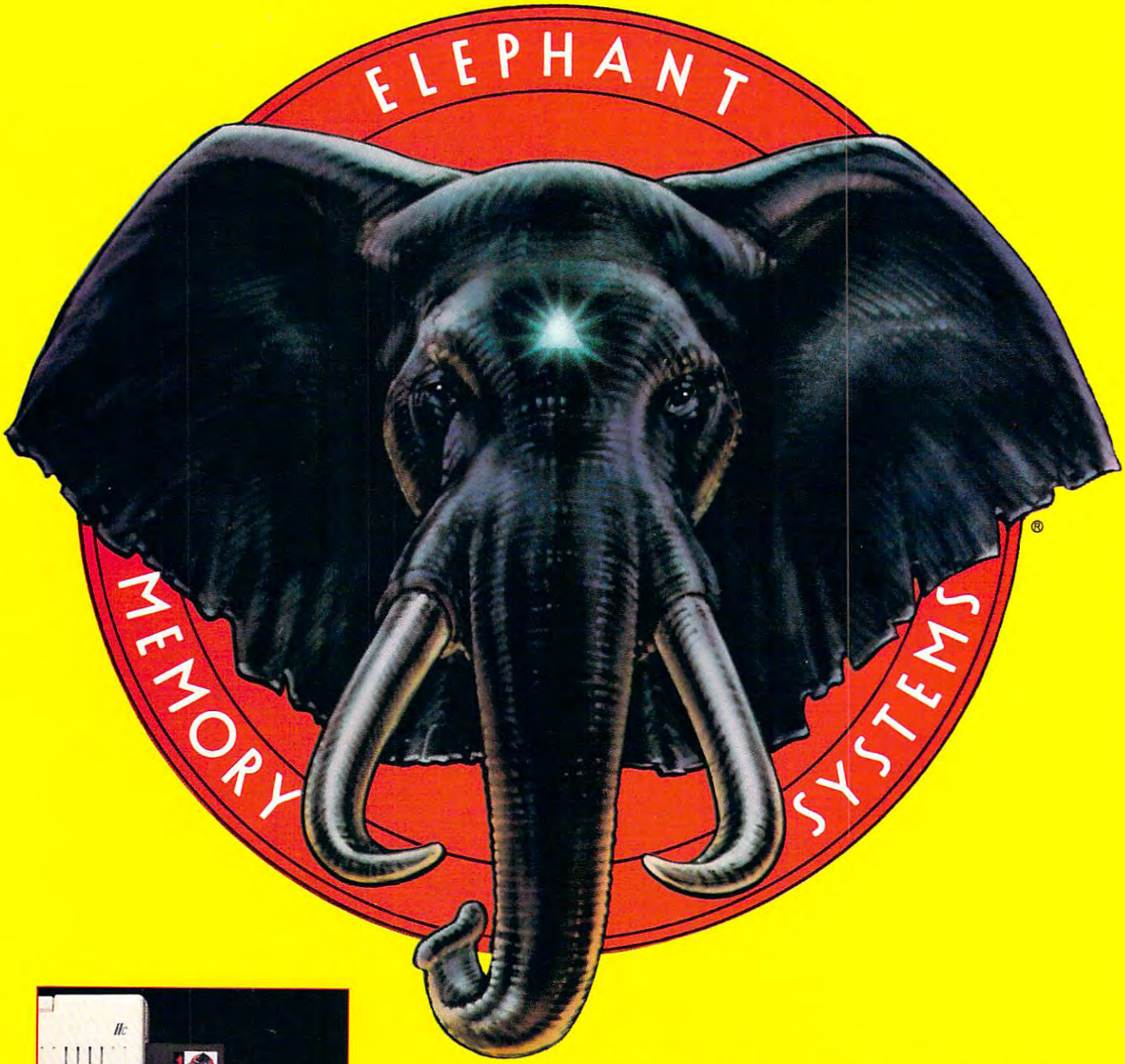

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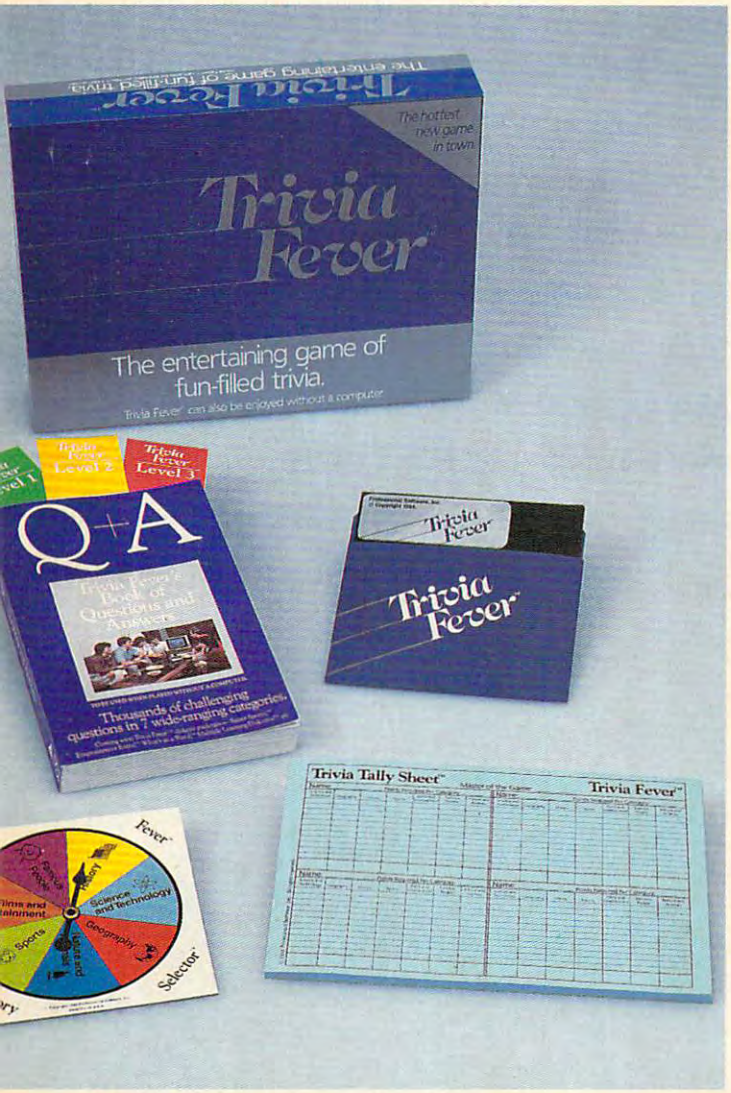

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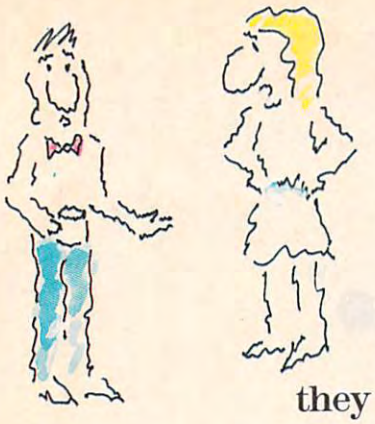

The Nice Family: Bill, Janet, Tom and Marybeth.

Once upon a time (it was 1984, in fact) and not so far away (right in your neighborhood), there lived a Nice Family: Bill and Janet Nice, and their children, Tom and Marybeth. The Nices owned a home computer, and they liked what they could do with it. But something was wrong. Every time they went to the store to buy a new game, no one was ever happy. ● "Oh no," said Janet Nice. "This won't do at all! These games are not for us!"

"You're right," said Bill. "They're just not nice." You see, all the games were about war and killing and hurting for no good reason. Things that the Nices didn't want the Nice children doing or even thinking about doing. So Mr. and Mrs. Nice decided to buy educational programs. But that made Tom and Marybeth unhappy, because they thought educational programs were—you know—B-o-r-i-n-g. What were these Nice people to do? ● Then, one day, they found some new games called *Adventures in Narnia*, part of the new LifeWare™ line from Word Publishing. The first two games were *Narnia* and *DawnTreader*, and they were based on the classic fantasies by C.S. Lewis. ● The Nice kids were happy because these games were loaded with action, adventure, excitement

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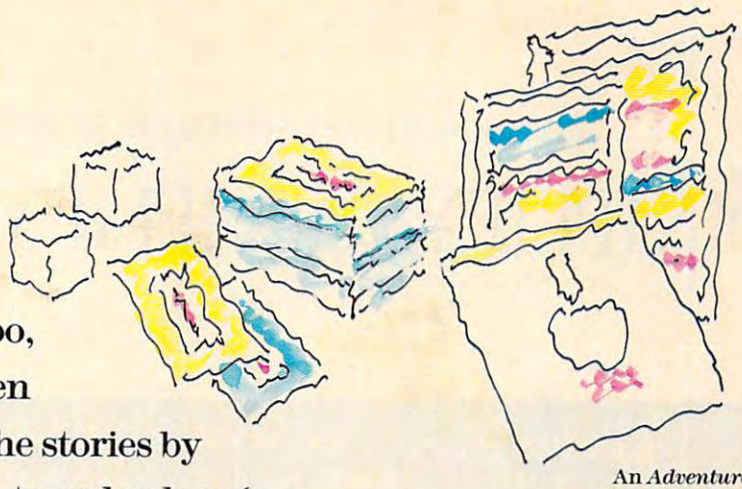
and challenge. Why, they even included things usually found in board games! So everyone in the family could get in on the fun! ● Mr. and Mrs. Nice were happy with *Adventures in Narnia* games, too, because they made their children *think*. And, of course, because the stories by C.S. Lewis present sound concepts and values (no other computer games do). "It's as if these games had our name on them!" said Janet Nice. ● Which brings us to the end of the story. It might be too much to say this family lived happily ever after. But they did live more happily with their computer—and with each other. ● And what could be nicer than that?



An *Adventures in Narnia* game includes diskette, a guide to Narnia, a free C. S. Lewis paperback book and playing pieces usually found in board games.

The End.

But not really. Your family's ***Adventures in Narnia*** are waiting for you at your local computer store or Waldenbooks store. Ask for *Narnia* and *DawnTreader*—the first two games in the ***Adventures in Narnia*** interface series—they're compatible with Apple II series® and Commodore 64™ home computers.

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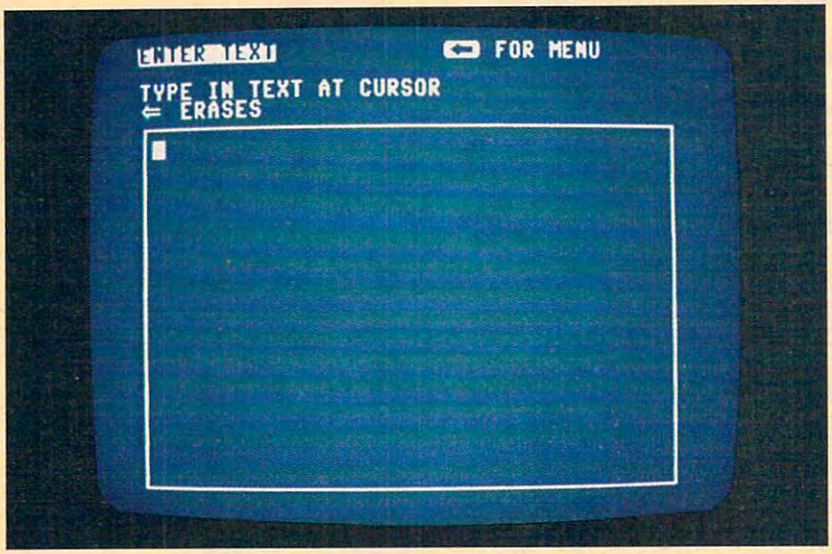

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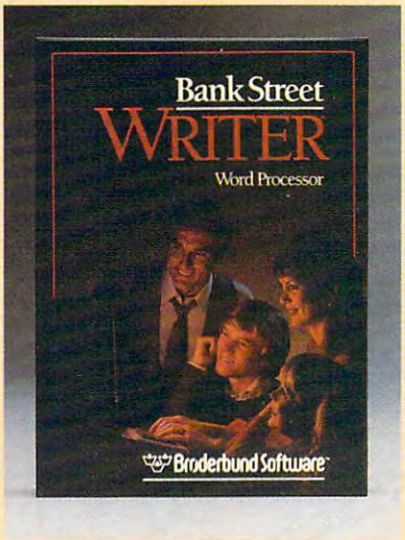

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NOTE: See page 184 before typing in programs.

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EDITOR'S NOTES

Senior Editor Richard Mansfield writes about the end of the analog age in this month's Guest Editorial.

Robert Lock
Editor In Chief,
COMPUTE! Publications

We are moving into a digitized world of bar codes, synthetic music, computerized TV, and thousands of other kinds of computerization. This is a major technological and cultural shift, and it's already having an impact on the way we entertain ourselves, communicate, perhaps even on the ways we think.

To better understand what digitization means, let's reflect for a minute on the difference between *analog* and *digital* systems. A rotary-dial phone is analog: To dial a seven, you stick your finger in the seventh hole and drag the wheel around until you hit a bar. Then you release the wheel and there are seven clicks which the telephone company switching network can hear and register as the number seven. In other words, you've sent some information by counting off the number in a physical way. This isn't all that removed from communication via smoke signal or drum.

A digital (Touch-Tone) phone doesn't attempt to imitate the number seven. You just push a button labeled seven and a particular musical tone beeps. It doesn't beep seven times. By previous agreement, that tone represents the number seven.

A fundamental difference between analog and digital is that analog *imitates* the thing it's trying to communicate—it's a physical charade. If you could make yourself very small and walk along a groove in a record album, you'd see canyon walls of vinyl rising and bulging on either side. There would be various bumps in the walls which imitate the sounds of the music. In fact, if you saw big bulges at regular intervals, it's likely you'd be seeing the sound of a drum.

Historically, man has usually assumed that nature itself is based on analogies. For example, some Greek thinkers believed that a chair was composed of millions of little chairs, too small for us to see. There's something reassuring about analogies: They seem to suggest a chain of being, a continuity. But modern physics has revealed a stark, discontinuous, virtually random world of quanta. Tables, they tell us, are made up of accidental packets of reality, thrusting and bumping beneath the quiet surface we observe.

And now music is being quantized. Digital discs measure music by taking samples of it 44,000 times each second. Each of these samples is simply a number, like 1388, which represents what a microphone heard during a particular 1/44,000 second. These numbers are then stored on a small disc which can be read by a laser. On the laser disc, a song is a string of numbers: 1388 42778 42778 42758 and so on. It takes about eight million of these numbers to store a typical three-minute-long song. But a laser can read them and a computer can process them so fast that you think you're hearing real sounds.

They're working on digital TV, too. The picture will come in from the antenna, but it won't be immediately put on the screen. Instead, it will be held inside the TV for a brief instant, translated into numbers, analyzed, and then sent up so you can see it. During this analysis, any blurring, ghosting, or other degradation of the image will be fixed. What you will see will be a tighter, sharper image. You'll also be able to freeze a picture and print it out. A digitized picture, like digitized music, is just a huge collection of numbers. And numbers have several advantages: They are easy to store and transmit, they can be efficiently manipulated, and they cannot be easily degraded.

If a tiny piece of dirt gets on a record, it will add its own sounds to those canyons of vinyl, hissing or popping sounds, depending on the size of the dirt. And with all the miles of phone lines and all the millions of switches, sooner or later there is bound to be an extra click or two when you're trying to dial a seven.

Analog records can be scratched; clicking rotary dials can be misunderstood by a switchboard; ordinary TV signals can suffer during a thunderstorm—the problems with analog are legion. But bad weather, dust, or scratches cannot hurt a number. 1388 is always 1388.

So everywhere you see the effects of digitization. You used to turn up the volume on a radio by turning a knob. Now you're likely to find a button or a pressure pad where the knob used to be. When you press it, nothing behind the button revolves, nothing analog happens. Numbers are simply increasing or decreasing in a microprocessor chip. Many electronic appliances now have no analog knobs at all.

Speed, efficiency, malleability, and integrity are the advantages of digitization. The analog world is in its twilight. It's too early to tell if there are any hidden, unpleasant side effects of digitization, any thrusting or bumping beneath the surface. Yet we increasingly depend on a reality composed of numbers so quick and so immense that we cannot watch them or feel them or even, in many ways, understand them. In a sense, we're turning things over to the computers. They have no trouble at all with numbers.

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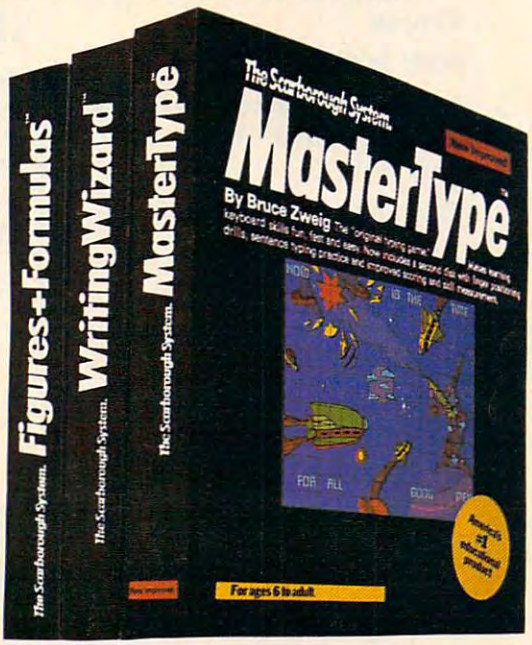

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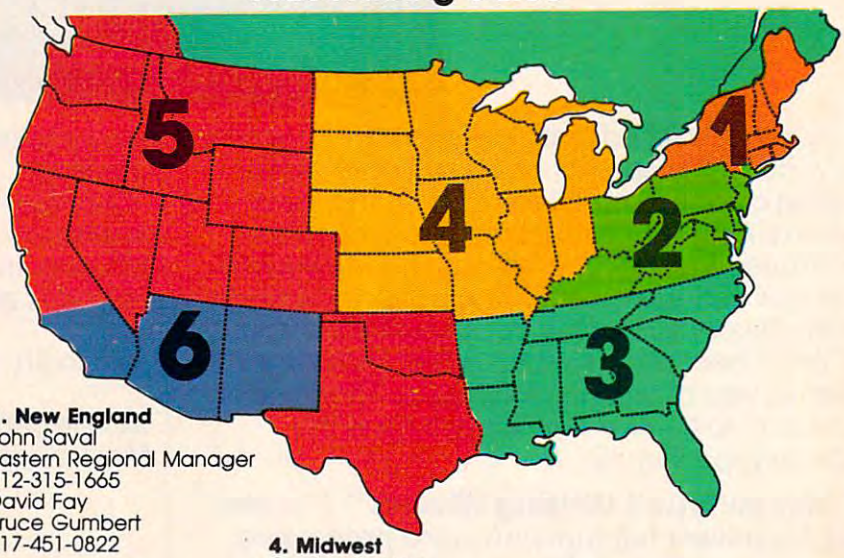

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READERS' FEEDBACK

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TI Reverse Flash

I own a TI-99/4A with Extended BASIC, but have programmed on a number of computers. Several of these computers, such as the Apple and Atari, have reverse video characters. Since the TI lacks reverse characters, I wrote the following short routine to simulate them:

```
100 REM INVERSE CHAR
110 CALL SCREEN(2)
120 FOR I=65 TO 90 :: CALL CHARPA
    T(I,A$):: CALL CHAR(I+32,A$):
    : NEXT I
130 CALL CLEAR
140 FOR I=9 TO 12 :: CALL COLOR(I
    ,2,16):: NEXT I :: FOR I=5 TO
     8 :: CALL COLOR(I,16,2):: NE
    XT I
150 A$="INVERSE"
160 B$="inverse"
170 DISPLAY AT(11,11):A$ :: FOR I
    =1 TO 50 :: NEXT I :: DISPLAY
     AT(11,11):B$ :: FOR I=1 TO 5
    0 :: NEXT I :: GOTO 170
180 END
```

This routine replaces the lowercase letters (produced with the ALPHA LOCK key up) with inverse capitals. First, in line 120, the CHARTPAT and CHAR subprograms replace the lowercase letters (characters 97–122) with capitals. Next, in line 140, color codes are assigned to the redefined characters to create inverse characters.

For added effect, a flashing routine similar to that produced with the Apple's FLASH command has been added in line 170.

J. P. Lester

Thank you for contributing this handy routine.

Commodore 1541 Head Alignment

I own a Commodore 64 and a 1541 disk drive. I am having problems loading programs that were saved about two months ago. Programs that were recently saved don't present a problem. When I attempt to load the older programs, the red read/write light flashes the entire time the program is loading. Some programs won't load, period. I've tried to clean my drive, but the problem persists. Can you please tell me what is causing this? I remember reading an article that said when programs are saved in different temperatures, problems may arise. If this is true, can this be the nature of my problem?

Gerry Robinson

Although temperature extremes can damage stored disks, it is probably not the source of your problem. As long as disks are used and stored within the recommended range of 50 to 125 degrees Fahrenheit, you shouldn't have any trouble.

The alignment of the read/write head in your disk drive may be skewed. The stepper motor sometimes slips out of alignment on some models of the 1541. This motor is responsible for precisely positioning the read/write head when the disk is reading or writing data. You should consider taking your drive to a Commodore Service Center to have it checked out.

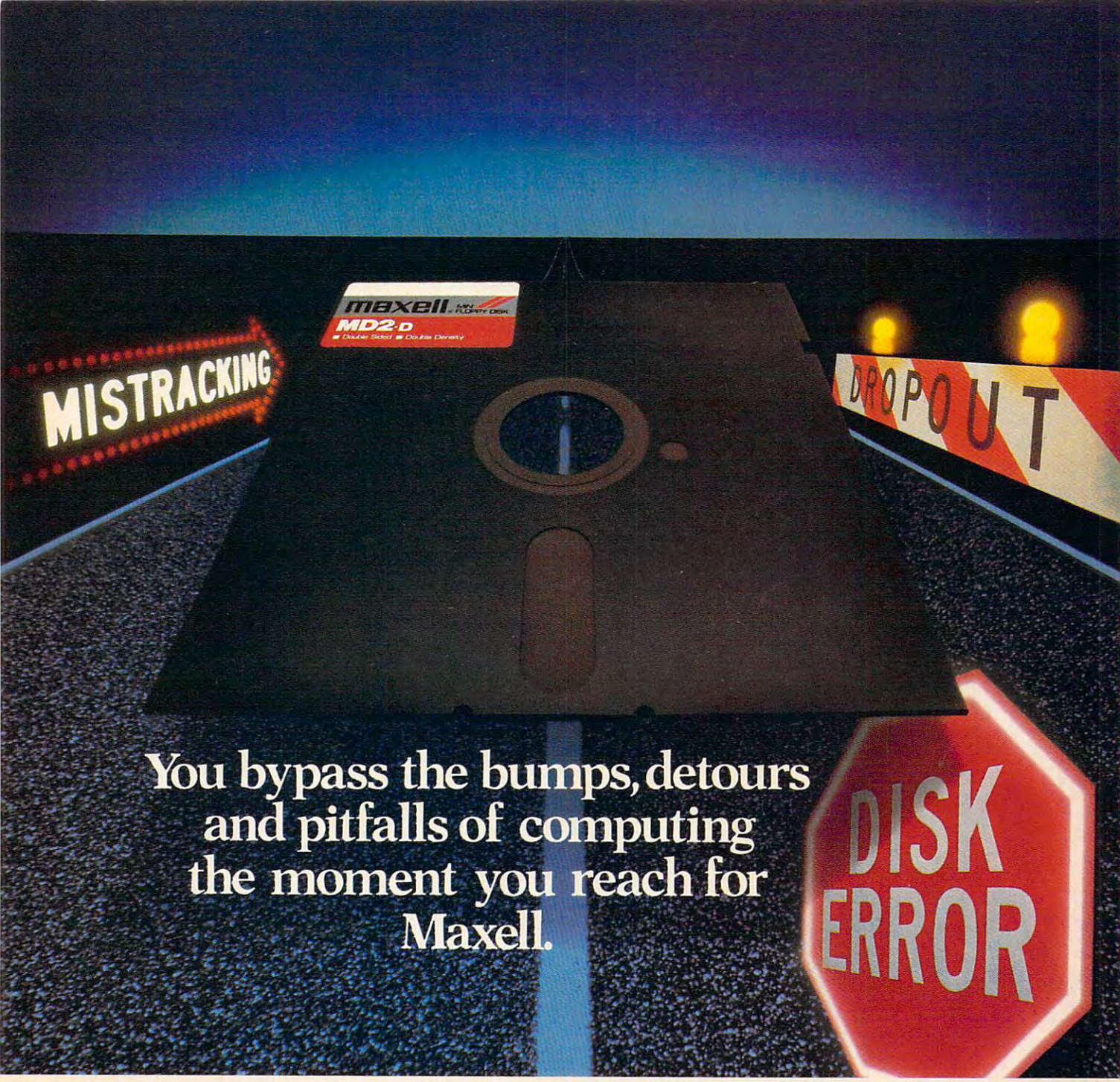
If the red busy light on the front of the drive blinks while you're loading programs, this can indicate the drive is having trouble reading the data on the disk. This is not to be confused with the steadily blinking light encountered with a DOS (Disk Operating System) error. Ideally, the busy light should constantly glow red while reading data on the disk.

Computers And Laser Discs

I was wondering if Atari was planning to produce a laser disc machine for use with its computers. I had read they had planned to do so, but then decided to drop the idea. Is this true?

John Engman

Originally designed to store high-quality video images, the laser disc's power is only now being tapped. Unlike a videocassette recorder, which works like a computer tape drive, a laser disc player has fast random access to any frame, analogous to a computer disk drive. Theoretically, any computer can be interfaced with the relatively simple controls required to drive a laser disc. Digital Research, Inc.,



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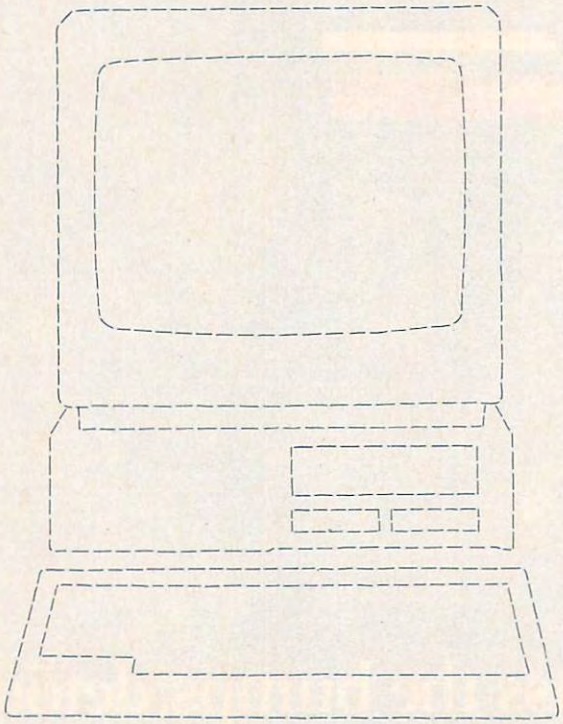

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Runs over 1,000 programs written for the IBM PC
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Display
40- and 80-column
Resolution:
4-color: 640h x 200v
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Expandability
Open architecture
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PC*jr*'s new typewriter-style keyboard adds a nice touch to business, home or educational computing.

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sells the VidLink, a $49 hardware/software package that lets you interface a Commodore 64 to a laser disc player. Versions will soon be available for the IBM PC and Apple II.

Also, while not essential, it's useful if the interface can mix computer and laser disc images so you can superimpose sprites and text with the laser disc image. With a laser disc, surprising realism can be attained in computer backgrounds, but laser discs do not seem to be capable of entirely replacing the bitmapped raster graphics currently used by computers. A laser disc is limited to the available images, whereas computer graphics can be dynamically synthesized.

Since the laser disc can be accessed at random, video can be shown in nonsequential order, branching to different frames under computer control. The laser disc has already proved to be a valuable educational aid, especially when teamed with a computer.

The new Atari 7800 Pro-System videogame machine has a jack on the side for mixing video from a laser disc. A computer keyboard that accepts standard Atari peripherals also was planned for the 7800 Pro-System. Several Japanese companies have shown machines (including a low-cost MSX computer) with laser disc control and video image mixing.

Laser discs have enormous storage capacity. A laser disc can store much more information than a comparably sized conventional magnetic disk, making it an attractive mass-storage alternative. Up to this point, laser discs have been read-only, since storing the information involves burning pits into the disk surface. New technologies such as optical-assisted magnetic recording permit both read and write access. Panasonic sells a read/write optical disk recorder using 8-inch disks. According to the press release, "Each disk can hold the equivalent of 10,000 letter-size documents." The list price is $35,000.

Commodore Plus/64?

After reading about the new Commodore Plus/4, I loved the idea of their BASIC having 60K of user memory, even though I don't care for the reduced graphics and sound capabilities. Is it physically and electronically possible to install the Plus/4's BASIC ROM chip into the 64?

Ken Climer

Although the ROM chips used in the Plus/4 can plug into your 64 physically, as well as respond properly electrically, the software contained in the chips is incompatible with the hardware of the 64. Even though both machines use software-compatible microprocessors, the 64 does not map its memory, graphics, sound, or input/output in the same manner as the Plus/4. An experienced programmer might be able to translate the BASIC, but it would be quite a task. The 64 Super Expander *cartridge offers the same graphics commands found on the Plus/4, although there are no disk commands.*

IBM Feedback

Here are some comments offered by a reader of COMPUTE!'s PC & PCjr *magazine (now incorporated into* COMPUTE!*) on two "Feedback" answers published in the September 1984 issue.*

With respect to the letter from John Bugianesi pertaining to a graphics dump to the Gemini 10X printer: Your suggestion to LPRINT CHR$(27)"A"CHR$(6) does set the proper linefeed for a graphics dump, but the GRAPHICS utility resets the linefeed to an incorrect value for the Gemini.

Also, it *is* possible to enter graphics characters from the PCjr keyboard. First, press the Fn key, then press N. This puts the keyboard into numeric mode. The cursor keys, when pressed, type out numbers. Now, hold down the ALT key and type in the ASCII value of the desired graphics character. When you let go of ALT, the character appears. To get out of numeric mode, press Fn-N again.

N. Thomas Lischer

Thanks for clarifying the problem with dumping graphics to the Gemini 10X printer.

Your second suggestion, however, still doesn't solve the problem of entering all the graphics characters from the PCjr keyboard. Even though ALT can be used to enter any ASCII value, there are still many graphics characters that can be displayed on the screen, but not typed from the keyboard. For example, when you press CTRL-A, a happy face character appears. CTRL-A returns CHR$(1), the value of the happy face. The solid face, CHR$(2), theoretically could be entered with CTRL-B, but this value causes BASIC to move the cursor, not print the character. Some graphics characters cannot be reached even with CHR$, let alone from the keyboard. The only way to access some characters in BASIC is to POKE them directly into screen memory.

Expanding VIC Custom Characters

When the 16K memory expander is plugged into a VIC-20, the BASIC, color, and screen memory locations are moved around. I have used a technique published in your magazine to move these locations in the expanded VIC to the unexpanded VIC's locations. However, doing this sometimes causes the BASIC program to overwrite my programmable characters.

I have tried to protect my character set by moving down the top of user BASIC, but this

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limits the memory so much that I may as well write my programs without my expander. Can you tell me how to locate my programmable characters higher in the user BASIC area without changing the screen, color, and BASIC locations?

Michael Worobec

The major problem encountered when using custom characters on a VIC-20 with 8K or more memory expansion is where to place them.

In the unexpanded VIC, a small amount of memory is usually reserved at the top of user BASIC for the characters. However, this cannot be done in the expanded VIC because the VIC chip (which controls character information) cannot see the expansion memory. In this case, the easiest solution is to move the start of BASIC up a few pages and place the custom characters below BASIC.

For example, if you're using an 8K expander, you can move the start of BASIC to 5632, and place the custom characters at locations 5120–5631. This reserves 512 bytes of memory, enough for up to 64 custom characters.

Here's an example. Clear the computer by turning it off, then on again. Then enter the following statements:

```
POKE 44,22:POKE 5632,0:NEW
```

To make your custom character set visible to the VIC chip, POKE 36869,205. To switch back to the standard set, POKE 36869,192.

Protecting Disks

I am planning to put some floppy disks into a safety deposit box and there is the possibility of some magnetized objects being in the box, too. Is there anything that I could store these disks in that would protect them from magnetism?

Bubba Woods

A magnetic field can penetrate wood, glass, plastic, aluminum, and most other nonferrous materials. However, magnetism cannot penetrate steel, iron, nickel, or cobalt (metals which are attracted to a magnet). Since nickel and cobalt boxes aren't widely available, simply find a small steel box in which to store your disks. However, if the magnetic field is strong, the box itself can become magnetized over time. Also remember that the strength of a magnetic field decreases rapidly with distance from the magnetic object. A steel box located a safe distance from the field would be your best bet.

Atari Telecommunications

I own an Atari 400 with 48K of memory, an 810 disk drive, and 1027 printer. I would like to expand my system with a modem, but I know nothing about them. What would be the best modem to buy? Who can I talk to? Am I limited to conversing with Atari computers or can I converse with other computers? What is a direct-connect modem?

Paul S. Reyes

There are a huge number of third-party (non-Atari) modems available. The acoustic modem has two rubber cups into which you insert the telephone handset, whereas a direct-connect modem attaches directly to the telephone lines. All modems communicate by translating the ones and zeros of data into two tones, which are reconverted into data by the modem on the other end. The disadvantage of an acoustic modem is that outside noise can interfere with the modem tones. Also, some handsets just can't fit into the acoustic cups. The direct-connect modem sends its pulses directly over the phone line, and can automatically dial or answer the phone (although not all direct-connect modems have these features). Early phones without modular jacks must be adapted for use with direct-connect modems.

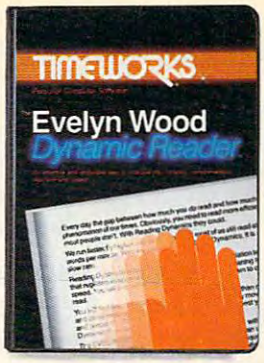
Almost all third-party modems plug into an RS-232C serial port. This is an extra option on many computers, including the Atari. The Atari 850 Interface Module has four RS-232C ports, but is hard to find these days. Some companies sell modems that plug into the joystick ports, and Atari sells a direct-connect modem that needs no additional interface. The Atari modem comes with its own software, but is not compatible with other modem software. You need this software to turn your computer into a dumb terminal, permitting you to see what's coming in over the modem, and letting you type to send out information over the modem. Advanced modem programs let you record everything coming in (downloading), or transmit a block of information to the other computer (uploading).

There's a huge world waiting for you on the other end of the modem. You are not limited to communicating with other Ataris. Large data base services like The Source, Dow Jones, and CompuServe offer news, stock quotations, electronic mail, games, even computer programming in FORTRAN, COBOL, and more. Prices for these services start at $5 per hour of connect time.

Also, there are thousands of public-access bulletin boards. These boards are set up by individuals who dedicate their computer and modem to a kind of mass communication. Bulletin boards let callers read and leave messages, even send and receive public-domain programs. Special-interest bulletin boards range from ham radio boards to religious and adult-only programming.

Atari Keyboard Scanning

I own an Atari 800. When I OPEN #1,4,0,"K:", GET #1,N, press the letter A, and PRINT N, I get the number 65. But when I PRINT PEEK(764)



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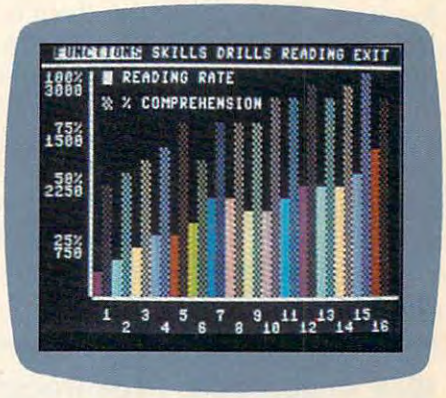

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and press A, I get a different number. Are there any PEEKs that will get me 65? Or is there another way to OPEN and GET so it doesn't pause?

Brian Worley

Location 764 holds the value of the last key pressed. This value is not in Atari ASCII (ATASCII), but represents the row and column of the key pressed. When no key has been pressed, PEEK(764) returns a 255. If you don't want to wait for a keypress, yet get the ATASCII value once the key is pressed, use something like this:

```
100 OPEN #1,4,0,"K:"
110 IF PEEK(764)=255 THEN 130
120 GET #1,N:PRINT N,CHR$(N):EN
    D
130 PRINT "Still waiting...":GO
    TO 110
```

Commodore 64 Lost Leader

I have a program on tape for the Commodore 64, but the beginning was accidentally erased, wiping out the header. Because the 64 saves its programs twice, I was wondering if there is a way to load the second, undamaged copy.

Joe Monnin

It's true that Commodore computers automatically save programs twice on tape. However, if the tape header has been destroyed, there is very little hope for recovering the lost program. The header contains important information on the type of file and where the data it contains is to be stored. Without this, the LOAD routine won't know how to handle the program.

If the header was intact, but one of the copies of the program was damaged, it's likely that you could still recover the program (see "VIC/64 Tape Aids" in the November 1983 issue of COMPUTE!).

IBM Automatic Proofreader Enhancement

Some readers have been having problems with SAVE and LOAD on the IBM Automatic Proofreader. A space must be used between the command and the filename. Leaving it off causes a syntax error:

SAVE "filename" *[correct]*
SAVE"filename" *[incorrect]*

Reader Mike Duch offers the following modification that lets you leave out the space between the command and the filename:

```
270 DELIMITER=INST(TEXT$," "):COMMA
    ND$=TEXT$:ARG$="":IFDELIMITER T
    HEN COMMAND$=LEFT$(TEXT$,DELIMI
    TER-1):ARG$=MID$(TXT$,DELIMITER
    +1):GOTO280
275 DELIMITER=INSTR(TEXT$,CHR$(34))
    :COMMAND$=TEXT$:ARG$="":IF DELI
    MITER THEN COMMAND$=LEFT$(TEXT$
    ,DELIMITER-1):ARG$=MID$(TEXT$,D
    ELIMITER)
620 IF INSTR(ARG$,".")=0 THEN ARG$=
    ARG$+".asc"
```

VIC Metamorphosis

Help! My VIC is changing. I recently noticed that my character set has been relocated. In the past, when I powered up my VIC, the location for the character set (36869) used to be 240. Now it is 192. Can you tell me why?

Scott D. Killen

Odds are that when you get the value of 192 at powerup, you have 8K or more of expansion memory plugged in. The normal powerup value for the unexpanded VIC is 240. Memory location 36869 does more than just indicate the location of the character set. It also points to the start of screen memory.

When you use 8K or more of expansion memory with the VIC, a few things change. Screen memory moves to 4096–4607, color memory to 37888–38399, and the start of user BASIC moves to 4608. In other words, the value of 36869 is not changing because the character set is moving, but because screen memory is relocating.

Moving The 64 Kernal

I was given two Commodore 64 games on a disk for Christmas, but could not get either of them to work. The disk drive returned the error message "Invalid command." My dad and I think that there is an error in our Kernal, because we've used the same disk drive with other 64s and both games have loaded and run fine. We saved the Kernal ROM from another 64 to disk, then loaded the Kernal into the RAM beneath the ROM. We then executed POKE 0,PEEK(0) AND 253 to disable the ROM, thus replacing the Kernal with the RAM-loaded one, but this did not work. Is this the right command to turn the Kernal off?

John Brooks

The Kernal is another name for the 64's operating system. Although it is responsible for communicating with the disk drive, it seems unlikely that this would cause the disk error, especially if you are having no other problems. A hardware malfunction in your 64 could just as easily be the culprit. Nonetheless, the command you should use is POKE 1,PEEK(1) AND 253. This will effectively remove the ROMs from $A000–$BFFF and $E000–$EFFF, revealing the underlying RAM. If you save both these ranges on another machine using a machine language monitor, you can load the two files into your 64. If you only want to load the Kernal from

["Hi, we're from Europe. Where's the gold?"]

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Seven Cities does all this with the real world or, better still (since the "new" world really isn't anymore), it will construct any number of completely detailed hemispheres for you to try your hand with.

Designed by Ozark Softscape (the people who made M.U.L.E., *Infoworld's* "Strategy Game of 1983"), *Seven Cities* is about as near a recreation of history as has ever been accomplished, with or without a computer.

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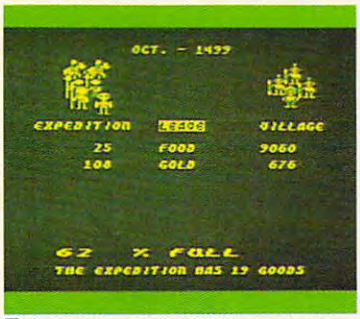
This is Europe, in scrolling 3-D graphics. You outfit, visit the Crown, launch your ships, and if you're cut out for this, you return later to tell all sorts of wild stories about what it's like over there.

There are over 2800 screens to explore in the new world. As you scroll through them, seasons change.

Animated natives surround you. They have no reason to trust you. The drum beat quickens.



Trading with the Aztecs is tricky. You could wind up with enough gold to build an empire. Or as soup.

Home again you view your maps, pat yourself on the back, and consider your place in history.

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MACHINE REQUIREMENTS: *Seven Cities of Gold* is available for the Apple II, II+, IIe & IIc, Commodore 64 and Atari home computers.

the other machine, but don't want to change BASIC, you must copy the contents of the BASIC ROM to the underlying RAM with this statement:

```
FOR I=40960 TO 49151:POKE I,PEEK(I):NEXT
```

After the Kernal and BASIC have been copied or loaded into RAM, use the aforementioned POKE, or simply POKE 1,53.

A BASIC Sort

My daughter has written an inventory program to list our music cassettes. It uses DATA statements to list type of music, name of cassette, and performer. We have for several months attempted to write a routine whereby we can list all the performers in alphabetical order, but without success. Is there any way we can do this and not have the program running forever?

Don Cordry

There are a number of good, fast sorts, but the bubble sort is one of the shortest and easiest to understand and modify. It works by comparing every item to the one beneath it. If the two items are out of order, they are switched. The sort continues until no more exchanges are necessary.

The name comes from the way lower-ranked data tends to "bubble" upwards. The small subroutine below can be used to sort string arrays. It's easy to modify for whatever purpose you need. The variable N should be set to the number of performers, and all the performers should be read into the array prior to the sort. This program will work as is with most versions of BASIC, but would need to be modified to run on an Atari.

```
5000 EX=0
5010 FORI=1TON-1
5020 IFA$(I)>A$(I+1)THENT$=A$(I):A$(I)=A$
     (I+1):A$(I+1)=T$:EX=1
5030 NEXT I
5040 IFEX<>0THEN5000
5050 RETURN
```

Commodore Compatibility

I have a Commodore 4032 computer with a Commodore 2031 disk drive. I am thinking about buying a Commodore 64, but only if the 2031 drive can be used with it. Is there any way this can be done?

Robert D. Byers

The 4032 computer and 2031 disk drive communicate over the IEEE-488 parallel bus. Bytes are sent eight bits at a time. The Commodore 64 and its 1541 disk drive use a serial bus that is similar to the IEEE-488, but it sends bytes one bit at a time. You cannot directly attach your IEEE-488 disk drive to the 64, but several manufacturers sell IEEE interfaces for the Commodore 64, some as low as $100. With an IEEE interface plugged into the cartridge port, your 2031 will transfer data faster than a 1541. There are also IEEE interfaces that attach through the serial port.

In addition, your drive is read and write compatible with the 1541, so you should be able to load most commercial software. Unfortunately, few of these interfaces are perfect. Some software just won't work with them, due to changes in the memory map caused by the addition of the interface.

VIC Paddle PEEKs

I own a Commodore VIC-20 and a set of paddle controllers, but cannot find the commands used to incorporate the paddles into my programming.

Brad Mills

Although there are no built-in commands in VIC BASIC for reading the paddles, there are two memory locations you can read. Location 36872 returns a value from 0 to 255 (corresponding to a counter-clockwise rotation) for paddle 1. Paddle 2 is read by location 36873 in the same manner. In BASIC, use PEEK(36872) or PEEK(36873) to read the paddle position. The paddle buttons are read by checking the locations normally used to read the joystick. Paddle 1's fire button corresponds to a joystick position of west (left). Paddle 2's fire button is synonymous with a right deflection of the joystick. Also, be aware that Atari paddle controllers used on the VIC do not return the full 0–255 range provided by Commodore paddle controllers. Additional information can be found in the VIC-20 Programmer's Reference Guide, *or* COMPUTE!'s Mapping the VIC.

Commodore Colons

I have seen Commodore 64 programs that have a line number followed by a colon. What purpose does the colon serve?

Mike Wells

Most Microsoft BASICs allow you to put a colon as the first character in a line, and this has no effect on the running of the program (except to slow execution a bit). The superfluous colon is often used to merely insert a visual gap in the program listing, since you can't store a blank program line. Since many BASICs delete any leading spaces after a line number, the colon is also used to indent lines for increased readability, since spaces after a colon are preserved.

Atari Versus Commodore Disk Drives

I read in a lot of articles that the Atari disk drive is an intelligent drive like the Commodore 1541. But isn't it true that you have to load the disk operating system (DOS) into the Atari before it

[OH NO, NOT AGAIN.]

SON of ARCHON.

Jon Freeman, Paul Reiche III and Anne Westfall created Archon, the 1983 "Game of the Year" according to Softline and Creative Computing. Recent evidence, however, indicates they were not satisfied with this.

If you took all the hours spent by all the people who've played Archon and put them together, there's a good chance it'd amount to more human effort than it took to put a man on the moon.

The Archon Dragon.

What does this mean? Is it a good thing? And why, in light of this, did the people pictured here decide to issue a scorching sequel named *Archon II: ADEPT?*

For starters, we don't really know what it means. Except that a lot of people who had a pretty good time with *Archon* are about to get more of what they like. And people who've yet to experience the best-selling, award-winning, knuckle-whitening original have *two* good things coming their way.

The Archon Basilisk.

Point two: If there's a moral issue here, we see it this way: A wise man once said, "I ain't never had too much fun." We agree. And we think that once you get your hands on *Archon II: ADEPT*, you'll see his point.

Now for the third question. Why a sequel? Well, there are sequels and there are sequels. The good ones happen because people just haven't had enough of a good thing. Obviously we're here to tell you that *Archon II: ADEPT* falls into the right category.

The ADEPT Chimera.

Where Archon took inspiration from chess, fantasy role-playing characters and arcade combat, *ADEPT* comes more from a world of its own making. Like *Archon*, it pits the forces of good against those of evil. But in place of the chessboard motif there is a map of elements—Earth, Air, Fire and Water. The role of magic is greater. The strategies are deeper. Things move faster. And the hidden algorithms that control the computer's play are considerably smarter.

The ADEPT Thunderbird.

Having already spent the better part of a month playing *ADEPT* (in order to write this ad, of course), we're quite confident it will seduce you too.

And if, by some strange chance, there is a parallel universe in which computer simulations come to life, we are confident that a large part of its population has Jon Freeman, Paul Reiche III and Anne Westfall to thank for their brief and miserable existence.

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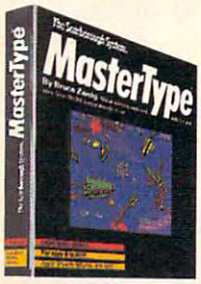

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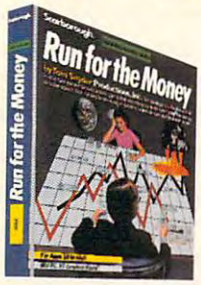

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can use the disk drive, whereas the 1541 has DOS built in? Do you really think this qualifies the Atari as an intelligent drive?

Jerry Cole

Good question. An intelligent peripheral is merely one with its own microprocessor, making it a kind of computer in its own right. Intelligent modems can dial phone numbers automatically. Most printers are intelligent peripherals. Years ago, a printer couldn't even print characters on its own. The computer had to turn the daisywheel, strike the character, advance the carriage, and perform linefeeds by commanding the slave circuitry in the printer. Other "dumb" peripherals include the cassette drive, simple modems, and most joystick-type controllers. The television screen could be considered a dumb peripheral. Some computers use one smart drive with a controller, then add unintelligent slave drives which depend on the smart drive.

There's no question that the 1541 is more intelligent than the Atari drive. The 1541 does all disk operations on its own. The VIC or 64 merely has to give some commands. The original Commodore PET was not able to access the disk on its own, so a RAM-loaded DOS was impossible, forcing Commodore to put the DOS in its 4040 disk drive along with the extra RAM and ROM required to support the DOS in the drive. It was necessary to carry over this technique to the 1541 in order to preserve compatibility with PET/CBM 4040 disks.

The Atari 810 (or the new 1050) drive can only read sectors, write sectors, and format disks on its own. Nonetheless, there are real advantages to controlling the drive from the computer. If there is ever a bug in DOS, it's much easier to re-issue a new version of DOS than to have to replace ROM chips in the drive itself. It's also easier to customize and modify DOS when it's in RAM. When the computer controls primitive disk access, far more flexibility and even greater speed is possible. For example, on the 1541, disk errors must be requested from the drive, so it's easy to miss the blinking light, then later find your program wasn't saved. On the Atari, disk errors are tied right into BASIC.

On the other hand, no computer memory is used up when a 1541 is added to a VIC or 64, which is a vital consideration for a 5K VIC. The only real disadvantage of a RAM-loaded DOS is that some memory is made unavailable for other programming.

Electronic Spreadsheets

What is a spreadsheet? What is it used for?

Andrew Hansen

A spreadsheet is a computerized version of a ruled notepad like the ones often used by accountants. The electronic worksheet consists of a number of rows and columns. A cell, which can hold a number, a label, or a formula, is one of the spaces created by the intersection of row and column lines.

For example, a column could be labeled Expenses. *Under* Expenses *you would list a column of numbers. The last cell could then hold a formula to add up everything in the column, so this sum always appears in the last cell. The power of spreadsheet software derives from the fact that you could change any number in the column, and the sum would then be updated instantly. And spreadsheets offer a wide range of mathematical and logical operations.*

In effect, a spreadsheet is an intuitive and effective programming language for making calculations and setting up large, interactive models. The fact that you can change any value, then see the results instantly, gives you the ability to efficiently play "what if" on a massive scale, as you model complex situations.

Apple ML Disk Access

I own an Apple IIe computer and do a lot of my programming in machine language. One of the things I'm currently working on is a program that accesses the disk drive from ML using the RWTS and File Manager routines in DOS. The way to access these routines is to JMP to location $3D9 for RWTS or to $3D6 for File Manager. At each of these locations is another JMP that goes somewhere in DOS. In Apple's new Disk Operating System, ProDOS, there is nothing at these addresses to JMP to RWTS or File Manager. Could you tell me how to access RWTS and File Manager from ProDOS?

Daniel Wilson

Apple's ProDOS operating system might resemble DOS 3.3 when used from BASIC; but, as you have discovered, it is quite different when used from machine language. The RWTS ("Read or Write a Track and Sector") and File Manager subroutines are parts of DOS 3.3, not the Apple IIe, and aren't included in ProDOS. Instead, all operating system services are requested by calling the ProDOS MLI (Machine Language Interface). There are 24 functions that can be requested through the MLI, including many of the functions performed by the DOS File Manager.

Unlike DOS 3.3, which works only with Disk II drives, ProDOS is designed to work with many different disk drives, each with its own method of storing data. ProDOS organizes data into "blocks" of 512 bytes, which may or may not correspond to the size of the sector used by the storage device. The MLI contains functions to read and write individual blocks from disk, which are barely equivalent to RWTS's functions, but these are intended only for diagnostic and repair purposes. For ordinary use, direct disk access is not recommended because file

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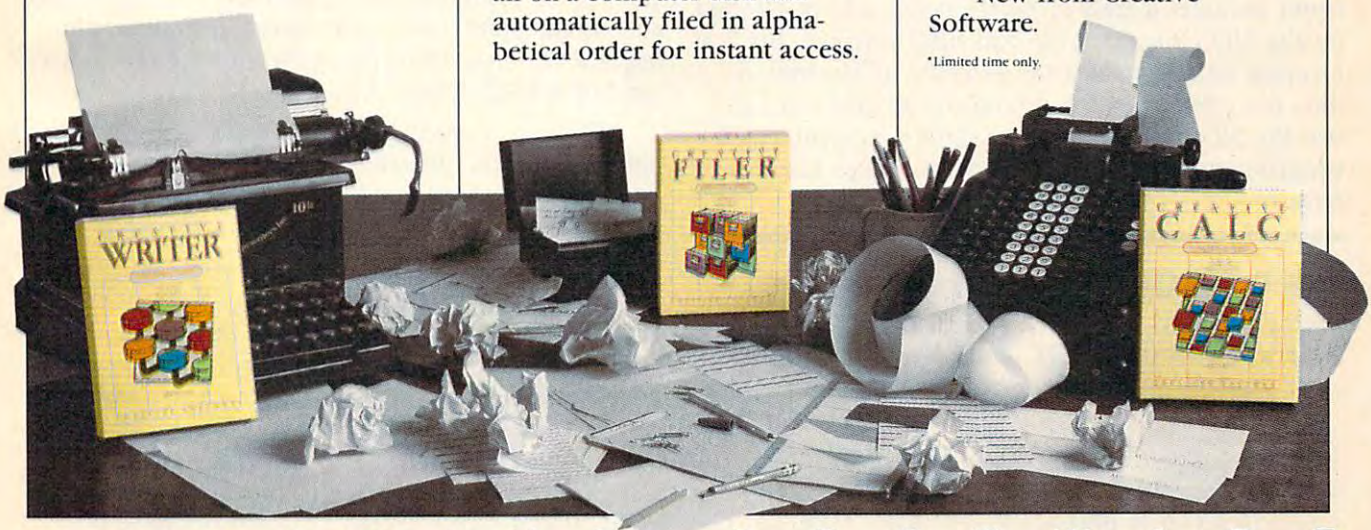

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operations are provided which could do the same job.

The MLI is called by a JSR $BF00 instruction, followed by three bytes of data. The first byte is the number of the MLI function being requested, and the second and third bytes contain the address of the parameter list for the request. These three bytes must be placed in your program immediately after the JSR $BF00 instruction. The MLI function dispatcher increases the return address on the stack by three to skip over these bytes.

Although the MLI performs many of the same functions as the DOS File Manager, there is no compatibility between the two. ProDOS has a completely different set of function codes, error codes, and parameter list formats. Information about these codes, the structure of ProDOS, and lots more, is available in the Apple ProDOS Technical Reference Manual. *This publication is available from most Apple dealers and is intended for advanced programmers who want to use ProDOS from machine language.*

Commodore 64 Audio Input

I own a Commodore 64 and have had no problems with it at all. Documentation of all its features is another story. I know that the 64 has an audio input located on the audio/video port on the back of the unit. However, I have not been able to find any literature on how to access this feature. Could you please tell me how to use it? What memory locations are affected?

Kevin Caylor

The audio input pin is used to mix in an external sound source. You can test this by feeding the sound output of another 64 into the audio input. When mixing in another audio source, be sure it's at the same low level as SID chip output. (Feeding in an amplified signal could destroy your SID chip.) Intended for chaining SID chips together, the audio input becomes a kind of fourth voice, and is affected by the SID chip's volume and filter settings. Bit 3 of location 54295 enables the filtering of external audio. You cannot process sound per se, but you can use the SID chip's filter as a simple, programmable equalizer which will emphasize or reduce various frequencies.

IBM PC/PCjr BASIC Compatibility

I would like to know if a program written for the PCjr in Cartridge BASIC would work on the PC with a color/graphics adapter and BASICA.

Richard Bookal

PCjr Cartridge BASIC is a superset *of BASICA, which means that it contains all the commands found in BASICA plus some new ones. Likewise, the PCjr has all the graphics and sound features found in an IBM PC equipped with the color/graphics adapter, plus some enhancements. Therefore, programs written for a PCjr with Cartridge BASIC will run on a PC with a color/graphics adapter and BASICA only if the extra commands and features are not used.*

An example of a new Cartridge BASIC command is PCOPY. Briefly, this command copies an image from one screen page to another. But only the PCjr with Cartridge BASIC has this capability. If you attempt to run the program on a PC, BASICA won't know how to interpret PCOPY and an error will result.

An example of an enhanced feature on the PCjr is SCREEN 5, a graphics mode with 320 × 200-pixel resolution and 16 simultaneous colors. A program written for the PCjr using SCREEN 5 won't run on a PC equipped with the color/graphics adapter, because the PC's 320 × 200 graphics mode (SCREEN 1) is capable of displaying only four simultaneous colors.

If you want to write programs on a PCjr with Cartridge BASIC that will be compatible with a PC and BASICA, you'll have to avoid using all of these new commands and features. For your guidance, IBM's Cartridge BASIC manual generally states when a command is available only in Cartridge BASIC. It would also help to acquire a BASICA manual and familiarize yourself with a PC outfitted with the IBM color/graphics adapter.

Instant TI RUNs

Quite awhile ago I read about a command for the TI-99/4A which causes a program to RUN instantly after you hit ENTER. I looked through many books and articles and did not find this information. Can you help?

Dorr Wilson

It sounds like you are describing the pre-scan commands available with Extended BASIC. *These commands (!@P− and !@P+) are documented on pages 7 through 10 in the Addendum of the* TI Extended BASIC Manual.

When you enter RUN on the TI, there is a brief pause before the program executes. During this pause (most evident with long programs), the computer "pre-scans" the program and sets aside memory for variables, arrays, and data.

Only certain instructions in a TI BASIC program require pre-scanning. These include the first DATA statement, the first use of each variable and/or array, the first reference to each CALL statement of any subprogram, all DEF statements (for user-defined functions), and all SUB and SUBEND statements (and any variables introduced in the user-defined subprogram). So, rather than pre-scanning an entire program, you can pre-scan only part of it by appropriately positioning the pre-scan

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commands (!@P+ to turn pre-scan on and !@P− to turn it off). in many cases, this greatly reduces the initial pause.

Although you can scatter the pre-scan commands throughout your program where necessary, there is a more efficient way to use this option. Simply collect all the statements you want pre-scanned on one line without regard to syntax and place a GOTO at the beginning of the line. This prevents the other statements on the line from executing during the program run. Here's an example of this technique:

```
100 DATA 5
110 GOTO 120 :: I :: X :: Y :: Z
    :: CALL CLEAR :: CALL SCREEN
    :: CALL CHAR :: CALL HCHAR ::
     CALL VCHAR :: !@P-
120 CALL CLEAR :: CALL SCREEN(14)
130 CALL CHAR(97,"FFFF0000FFFF000
    0")
140 READ X :: FOR I=1 TO X :: CAL
    L HCHAR(X+1,10,97,X):: CALL V
    CHAR(15,X+1,97,X):: NEXT I
150 READ Y,Z
160 DATA 10,20
170 DISPLAY AT(20,5):Y,Z
180 FOR I=1 TO 1000 :: NEXT I
```

For other examples using these commands, consult the Extended BASIC Manual Addendum.

Upgrade A VIC To A 64?

I have expanded my VIC-20 to 32K. I want to know if I can run 64 software on it, because the expansion cartridge says, "Expands VIC to C-64 power."

Thomas A. Roznovsky

The VIC and 64 are inherently incompatible machines. The only similarity in power between a 32K VIC and a 64K Commodore 64 is that both machines would have roughly the same amount of BASIC programming space. If memory alone distinguished these machines, the expansion cartridge would suffice. But even though the VIC and 64 use almost identical microprocessors, the video, sound, and input/output hardware are completely different. The difference in screen width (22 versus 40 columns) is not a trivial consideration either. The VIC and 64 will never be able to run all of each other's software. Some BASIC programs that avoid hardware-specific features like sound and graphics will, however, run interchangeably on the VIC and 64.

Atari Numeric I/O

In the course of my Atari programming, I have found the need to store numbers on disk with BASIC. The Atari PUT/GET commands only store numbers from 0 to 255. I'd like to know if there's any way to store larger numbers.

A. J. Allie

All input/output works a character (or byte) at a time. When you PUT a number to disk, you are sending a character in the range 0–255. GET retrieves a character as a number from 0 to 255. PUT and GET are indeed compact ways to store and retrieve numbers in this range, since only one byte is needed for what is printed on the screen as up to three digits. One way to store quantities outside the one-byte range is to break up a number into pieces. A number from 0 to 65535 can be broken into two bytes with a statement like this:

```
HIGHBYTE=INT(NUMBER/256):LOWBYTE=
NUMBER-HIGHBYTE*256:PUT#1,LOWBYTE
:PUT#1,HIGHBYTE
```

The variable NUMBER (in the range 0–65535) is broken into the two variables HIGHBYTE and LOWBYTE. You can then PUT these numbers to disk as characters. When you want to GET back the numbers, use a statement like this:

```
GET#1,LOWBYTE:GET#1,HIGHBYTE:NUMB
ER=LOWBYTE+256*HIGHBYTE
```

There is a much easier way to store and recall numbers. This method does not limit the range of the number. You can store any number the Atari can hold in a variable. Although less memory-efficient, you merely PRINT# (print-file) the number to a file, then use INPUT# (input-file) to read the number back.

PRINT# and INPUT# work exactly like their normal BASIC counterparts, but instead of reading from the keyboard and writing to the screen, input/output is redirected to tape, disk, modem, etc. You must always INPUT# the numbers in the same order they were written to disk. Additionally, when writing the numbers, each number must end with a carriage return, just as you must use the RETURN key to terminate keyboard INPUT.

You can also PRINT# strings to disk and read them back into a string variable. INPUT# can read the data written from one variable into another variable name. VAL and STR$ can be used to convert strings to numbers and vice versa. Try this small program to get an idea of how PRINT# and INPUT# work.

```
FG 100 DIM A$(1),F$(20):GRAPHICS 0
IM 110 PRINT "(C)reate file, or (R)e
       ad file";:INPUT A$
MC 120 PRINT "Enter filename (includ
       e D: for disk":? "or use C: f
       or cassette)";:INPUT F$
CM 130 IF A$="R" THEN OPEN #1,4,0,F$
       :FOR I=1 TO 10:INPUT #1;A:PRI
       NT I,A:NEXT I:CLOSE #1:END
KF 140 PRINT "Enter 10 numbers.":OPE
       N #1,8,0,F$:FOR I=1 TO 10:PRI
       NT I;:INPUT A:PRINT #1;A:NEXT
        I:CLOSE #1:END
```

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"When the going gets tough, the tough go shopping" is a tongue-in-cheek, modern American proverb which reveals a lot about our urge to browse, bargain, and buy. Of course, shopping, in one form or another, is one of the oldest and most popular customs in almost every society.

But shopping habits changed little until late in the nineteenth century, when a few astute retailers discovered that many people preferred to do at least some of their shopping the easy way—without trudging from store to store, without the disappointment of learning that their sought-after product was out of stock, and without fighting crowds of competing shoppers. At the same time, millions of people in rural America who lived far away from big cities simply were unable to shop for the things they wanted to buy. So retailers like Sears, Roebuck & Co. created a multibillion-dollar business by popularizing catalog shopping—comparing and ordering products by mail and by telephone.

Electronic shopping malls and on-line storefronts have emerged from science fiction into reality. You can already shop for, compare, order, and purchase literally thousands of products using your home computer. Within the next several years computer-based shopping services will offer far more—and increasingly sophisticated—buying options.

We're now on the verge of another shopping revolution, this time made possible by the rise of another new communications system: personal computing and telecommunications. Using your computer as a remote terminal, you can gain access to a growing number of computer-based shopping and banking services. Some examples are CompuServe, Inc.'s Electronic Mall, Compu-U-Card of America, Inc.'s Comp-U-Store, Chemical Bank's Pronto Home Information and Banking System, and Keycom Electronic Publishing's Keyfax Interactive Information Service in Chicago.

There are also experimental *videotex* systems for home use which feature dedicated video terminals capable of receiving and displaying signals with superior graphics and other advantages. Knight-Ridder's Viewtron system in Miami, with its AT&T Sceptre terminal, is perhaps the furthest along in this area. But major companies, including CBS; Sears, Roebuck; IBM, and many others are researching the possibilities of on-line shopping services.

Although in today's urbanized America practically everyone lives near a big city, shopping center, or suburban mall, the very popularity of modern marketplaces keeps alive some of the big advantages of catalog shopping: the absence of crowds and traffic, and the convenience of buying from your own living room. Coupled with credit cards, the climate for shop-at-home services might be even better than it was in the nineteenth century. Besides that, on-line stores can potentially offer greater discounts if volume is high enough, because their overhead can be lower. And all shoppers have one thing in common—everyone likes a good buy.

"I believe it's going to be a steady, geometric growth as the services become available and as the industry discovers which services people want," says Merrill Millman, president of American Home Networks. Based in Illinois, American Home Networks is scheduled in December to go on-line with its American People/Link telecommunications system throughout the continental United States. The system will be accessible by virtually all home computers and will initially feature electronic mail service, a party-line communications service, an electronic bulletin board, and games.

"I think there will be success in areas connected with user interaction, electronic mail, information retrieval, games. And merchandise ordering—I think that's great," says Millman. "Right now on CompuServe, for instance, you can order from Sears, Roebuck & Co., and I think that's fantastic."

In fact, CompuServe, with a subscription base of more than

Understanding Modems

Sharon Darling, Research Assistant

While your computer is capable of doing thousands of jobs, from functional to recreational, there is one peripheral you can buy that will open up a whole new world of computing—a modem. With a modem, you can communicate over ordinary telephone lines with other computers also equipped with modems.

Basically, a modem performs two jobs. At one end, the modem transforms the digital information from the computer into analog sounds that can be transmitted over the phone line. This is called *modulation*. The tones sound like high-pitched whistles, each blip and beep representing an individual bit of data. At the receiving end, the second modem translates the analog tones back into the original digital information *(demodulation)*. Hence the term *modem (mo*dulator-*demo*dulator). Coupled with terminal software that tells your computer how to communicate with another computer, a modem puts you in business to telecommunicate. (For a few more fundamentals, see "Bulletin Board Basics" elsewhere in this issue.)

While the basic job of modems is to serve as signal converters and translators, they are becoming more and more sophisticated. The new breed of modems can automatically dial phone numbers, answer phone calls, sign on to commercial information services, retrieve data, and perform other tasks under program control with no human intervention.

That's not to say that people aren't buying less expensive modems—they are, and in great numbers, says Jerry Hussong, director of consumer sales for Anchor Automation, Inc., a modem manufacturer. "People are buying [inexpensive modems] and they're having a great time with them. Then they come back a couple of months later and say, 'Hey, this is nice, but I'm lazy—I want something that will automatically answer the phone.' "

Besides making modems more sophisticated, modem designers and programmers are also trying to make the devices easier to use. They're trying to overcome the intimidation some people feel when they sit down to a desk filled with new technology—especially computers and modems. But that fear should fade as more people become involved with personal computers, manufacturers feel.

"People are not so much intimidated by telecomputing as they are by the whole idea of computing itself," says

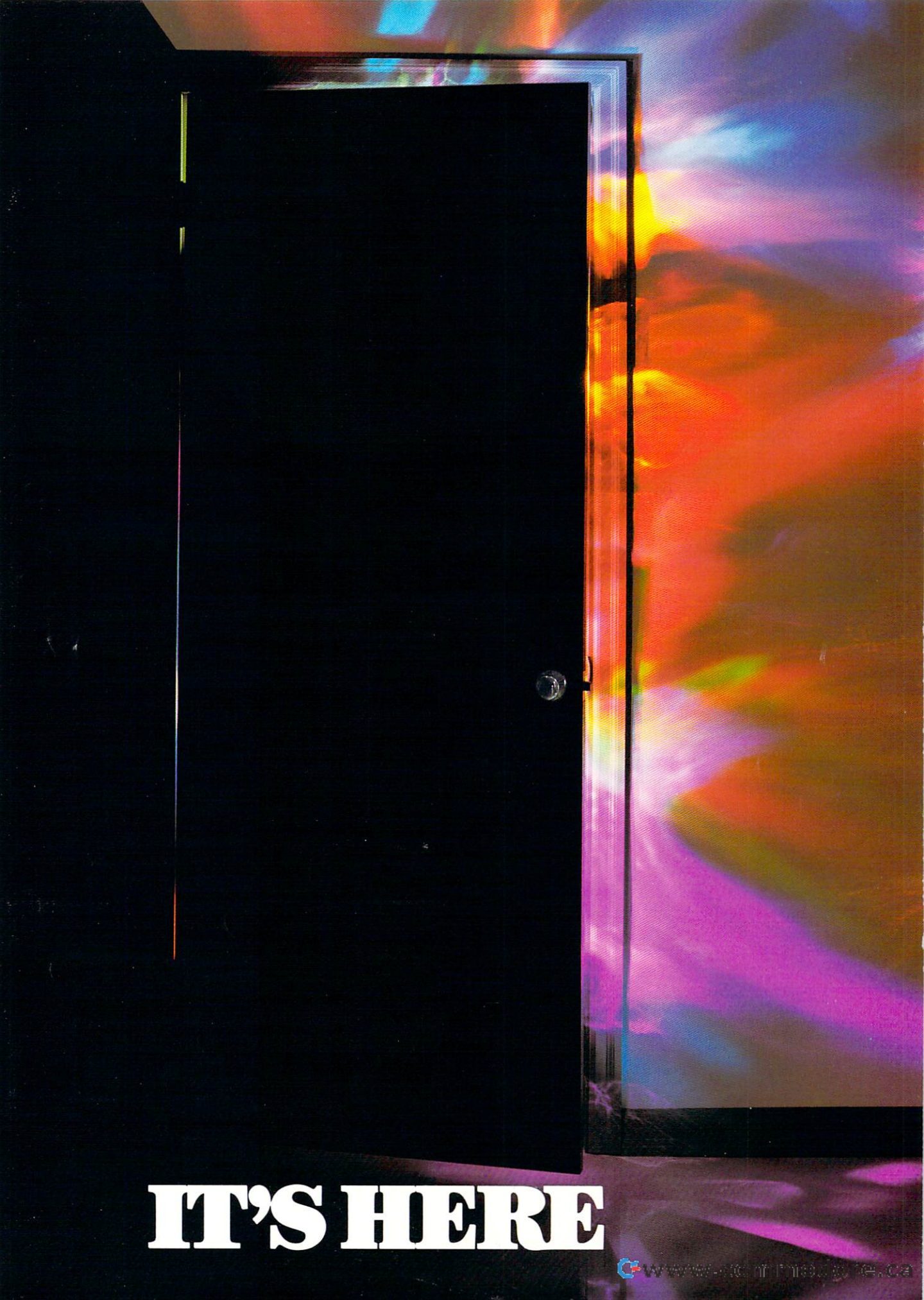
130,000 computer users, offers access to more than 80 merchants through its Electronic Mall service. Firms like WaldenBooks, American Express, Commodore, McGraw-Hill, Microsoft, and American Airlines are part of the system.

The Electronic Mall is open 24 hours a day, seven days a week. The on-line catalog contains not only descriptions of each product, but also a "mailbox" which allows you to query merchants for more details. Shipping information and order forms are also part of the Mall system.

Sometimes, though, as this infant industry continues to mature, the terminology can become more confusing than the actual services themselves. For instance, terms such as *teletext*, *videotext*, *videotex*, and *viewdata* are being used in a multitude of ways, some inappropriately, to describe how your computer can communicate with other computers.

Teletext generally refers to the transmission of information to your computer screen or TV set via a standard broadcast signal, giving you access to that information without letting you fully *interact* with what you see. For example, some data base services might let you receive encyclopedia information. You can control what you see and the speed at which you view it, but you can't ask questions and get responses. What you see is what you get—basically a one-way link.

Videotex—sometimes referred to as *videotext* or *viewdata*—is interactive. What you see is just a starting point for what you can get by using your computer to talk to the remote computer, usually a mainframe system. Thousands of people can communicate with the mainframe at the same time. Examples of these interactive, or two-way, videotex systems


IT'S HERE

COL

INTRODUCING OKIMATE 10... THE FIRST

The printer in a class by itself.

It's here! The new OKIMATE 10 Personal Color Printer. The first color printer that lets you show off and tell all. The printer that lets you print all the information you can create with your Atari® or Commodore® computer. But with the remarkable ability to create original drawings and graphics as well, in over 26 beautiful colors.

A class act! The OKIMATE 10 gives you crisp, clean term papers, school reports and homework. Word processing capability means everything you do can be printed letter quality in minutes, instead of typed in hours. OKIMATE 10 color gives you the opportunity to print graphs, charts and pictures from popular graphics and drawing programs. OKIMATE 10's brilliant color means you'll shine, every time.

OKIMATE 10 feels right at home. Anywhere.

A special PLUG 'N PRINT™ package lets you plug your new OKIMATE 10 into your Atari or Commodore computer. And print. It's that easy. In minutes you'll be printing everything from soufflé recipes to needlepoint patterns. Party invitations to kitchen inventory. Love letters to gardening directions. At 240 remarkable words per minute. And not just in black and white, but in over 26 brilliant colors!

Financial statements will keep you tickled pink for very little green.

If you use your personal computer to keep track of mortgage payments, tuition payments, balance your checkbook or jump ahead of the Dow Jones', there's good news for you. You'll find that the new OKIMATE 10 gets down to business quickly. And easily.

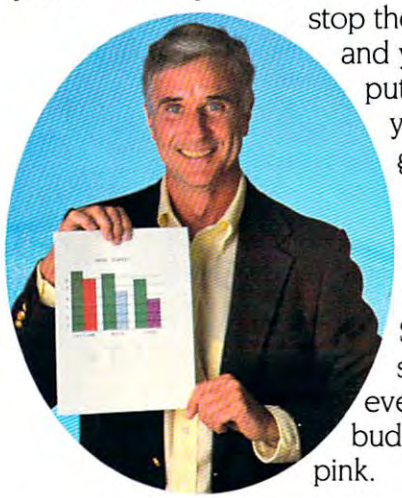
A "Learn-to-Print" diskette and tape shows you how to set up your new personal color printer and start printing. A complete OKIMATE 10 Handbook will show you how you can take your imagination to places it's never been before.

*Atari is a registered trademark of Atari Inc. *Commodore is a registered trademark of Commodore Business Machines, Inc.

.OR

PERSONAL COLOR PRINTER UNDER $250.

And while your imagination is soaring, you'll be glad to know that your new printer can keep right up with it! The new OKIMATE 10 is built with the same tradition of quality and manufacturing excellence that has made Okidata the most respected name in computer printers. Okidata craftsmen specially designed and engineered the new OKIMATE 10 to be incredibly small and lightweight. And they made it quiet as a whisper. But their imagination didn't stop there. To help you and your personal computer keep within your personal budget, they made the OKIMATE 10 available at retailers everywhere for less than $250. Something that should make every personal budget tickled pink.



Color your world.

If you've been playing games on your personal computer, now you can get serious and still have fun. The new OKIMATE 10 is completely compatible with a variety of software packages that will run on your Atari and Commodore with a simple disk drive. Just load and you're off and running. Plotting charts. Designing special graphs. Creating original illustrations and pictures. Drawing special graphics. And printing them all beautifully for everyone. On most kinds of paper. In over 26 beautiful colors!

QUESTIONS & ANSWERS

Q: Why do I need a printer?

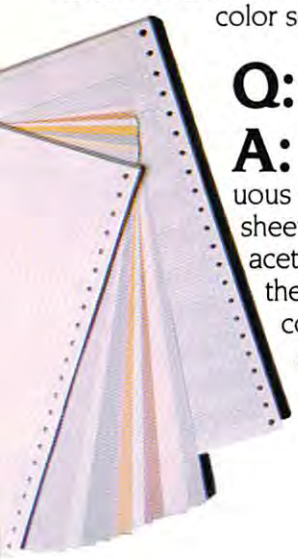
A: You might as well ask, "Why do I need crayons?" When it comes to communicating, "putting it on paper" is still the best way to get your message across. You can have lots of computer equipment, but without the OKIMATE 10, it doesn't mean very much. Unless you get your letter, report, term paper or party invitation off the screen and down on paper, nobody's going to see it.

Q: What makes the OKIMATE 10 better than any other printer?

A: Because the OKIMATE 10 is unlike any other printer. First, it prints in COLOR. Up to 26 beautiful colors. Second, it prints up to 240 words a minute, so quietly you can talk in a whisper right next to it and still hear every word! And third, it prints letter quality, every time.

Q: What about graphics and pictures?

A: The OKIMATE 10 does it all. Graphs, charts, symbols, pictures, illustrations, and special drawings! With a compatible drawing package, anything you create on your screen can be printed in full color; a disk drive is required for color screen printing.



Q: What kind of paper can I use?

A: Just about any kind of smooth paper you want. From continuous feed computer paper to single sheets. From mailing labels to plastic acetate for overhead transparencies, the OKIMATE 10 prints crisp, clean, colorful images you'll be proud to send to friends, teachers, business associates, or frame and hang right in your own living room!

Q: Is the OKIMATE 10 easy to use?

A: As easy as "PLUG 'N PRINT!" No other printer is easier to use than the OKIMATE 10. Connecting the printer to your Commodore or Atari computer is, literally, a snap. The exclusive PLUG 'N PRINT package snaps into the printer. One cable connects it directly to your computer or disk/tape drive. Turn it on and you're in business. Once your OKIMATE 10 is up and running, the "Learn-to-Print" software program (included) teaches you printer basics—the "Color Screen Print" disk (also included) automatically prints everything on the screen in a single stroke. As a matter of fact, most of your printing can be done with just one command.

Q: What's the printer like in operation?

A: In one word: easy! Incredibly easy! The ribbon comes in a "Clean Hands" cartridge. So it's as easy to change as the tape in your audio cassette player.

Q: What about reliability?

A: Okidata has built the reputation of its complete line of printers on quality, dependability and rugged construction. The OKIMATE 10 is no exception. Don't let its light weight and compact size fool you. This printer is not a toy. It's a workhorse.

OKIDATA
an OKI AMERICA company

Available at retailers everywhere.

include home banking, services which let you buy stocks and bonds and make other financial transactions, on-line computer games, and electronic shopping.

Telecommunications experts are convinced that teletext will be a widespread, though limited, mass-market technology since it can be made inexpensive. There is disagreement, however, about how widespread the penetration of videotex will be. Will it become a mass-market service?

"That depends on how you define *mass*," says Gary H. Arlen, head of Arlen Communications, Inc., a Washington, D.C., research firm specializing in electronic communications. The publisher of *Videotex/Teletext News*, Arlen predicts that videotex will come into its own in the late 1980s.

"It's going to be widespread and cut across a number of lines," he says.

But that doesn't mean, he cautions, that the great majority of American people who now have televisions will have access to videotex in the same way. There are limiting factors—chiefly cost and functionality—which to some extent will control the spread of videotex systems.

"The biggest problem in that whole general industry is that they've been mostly selling the glitter of this new technology—which really isn't a new technology—without bothering to explain to people in any real way why they would want to subscribe," says Steven Weissman, a videotex expert and the director of information services analysis for the market research firm of International Resource Development, Inc.

"The whole utility of it has been largely ignored until recently," says Weissman. "They love what the concept embodies—as do I. But as a consumer, Nick Wreden of Hayes Microcomputer Products, Inc., a pioneer in sophisticated modems for personal computers. "They're not just scared of a modem, they're scared of everything connected with a computer."

"Modems, computers—no matter how sophisticated we all claim to be—are scary," adds A. W. Johnson, a vice president at Code-A-Phone Corporation. "They take us out and test our ability to learn, our ability to understand new things, and to remember and use the new tools. Risky business, because we might expose our ignorance."

Code-A-Phone makes a new telephone with a built-in modem. It's designed for business use and should help people get used to new technology, says Johnson, because "it's a nice, plain-looking, ordinary telephone that everybody feels comfortable with."

Sounds Or Silence

There are several things to consider before buying a modem. First you'll have to decide which type to get. Modems can be either *acoustic-coupled* or *direct-connect*. Acoustic modems were developed first and used to be cheaper and more popular, but lately direct-connect models have drastically dropped in price and are pushing many acoustic modems off the market.

Acoustic modems have a pair of soft rubber cups into which the telephone handset fits snugly. One cup contains a speaker, which generates the tones to be transmitted over the phone line, and the other cup contains a microphone, which in turn receives the tones sent by the other modem. If you listen closely to an acoustic modem, you can hear the high-pitched whistling of the tones being transmitted.

Acoustic modems have two main drawbacks: Many newer phones have nonstandard handsets which won't fit into the rubber cups; and since acoustic modems depend on a tight seal between the handset and the cups, a poor fit means the telecommunications link can be garbled by outside room noises.

Direct-connect modems bypass the handset and the cups. They connect directly into any modular phone jack and work in total silence. Some direct-connect modems look

Acoustic-coupled modems like this Atari model grip the telephone handset with tightly fitting rubber cups to keep outside noises from interfering with communications.

just because I love it isn't enough to make me go and spend money on it. And a lot of consumers feel the same way."

The AT&T Sceptre terminal required by the Viewtron service costs subscribers $600 each. Though quite sophisticated, the terminal can be used only with the Viewtron system itself. The Sceptre is essentially a videotex graphics decoder which lets the transmitter send high-resolution graphic images rather than the all-text or blocky computer graphics available on conventional computer-based shopping services.

While services such as CompuServe tap into a base of subscribers who already own computers, the hardware requirements for Viewtron and a few other videotex systems mean hefty expenditures of money to get started. The tradeoff, of course, is that with Viewtron an advertiser can present you with high-quality images not yet possible through a system like the Electronic Mall, which depends primarily on text to sell its products.

"The Sceptre terminal being sold in Miami now will never see the light of day outside of Florida," says Gary Arlen. "AT&T admits that. The Model One, as they call it, is very limited—expensive, dumb, it doesn't do very much. At the same time, a lot of software for Commodore computers—as low as sixty bucks for a Commodore and typically two hundred to two hundred and fifty bucks for an IBM PC—does the same kind of thing. The only problem is that the software doesn't fully implement the NATLTS protocol—the presentation-level protocol that the system operators are using.

"The problem with that," explains Arlen, "is that the software may only have a color palette of eight or sixteen colors, depending on the board that you have to put in your PC. If someone wants to advertise something and they want to display their logo, which is in Kodak Yellow, and the software or the board can't display that particular shade of yellow, the advertiser loses interest in offering his material on that system. So, obviously, the Sceptre terminal is dedicated to overcoming that problem."

What results is a classic Catch-22 situation: Advertisers won't advertise unless they can display their products in a sophisticated fashion; system operators can't produce that signal yet without charging subscribers for expensive terminals; and consumers aren't willing to pay that much.

What will solve this problem in the next few years and allow a greater proportion of the population to take part in advanced on-line shopping is the develop-

ment of cheaper, more flexible hardware and software.

"The most exciting things are those things coming from the electronic imaging world," says Arlen. "There are a lot of folks at IBM, Wang, and DEC [Digital Equipment Corporation], almost everywhere, working on new imaging systems to present photographic quality images rather than the computer graphic images.

"You start doing this with the AT&T concept—that is, with a box, hopefully cheaper, that can be used in connection with a standard TV set. Or more likely—and this is really the key—the digital TV sets that will be coming into the market next year," Arlen adds. "By the time the price comes down a little, and people start buying them—that's three or four years away—the equipment will then be out there to display the kinds of things that electronic marketers want to display."

Despite the so-called high-resolution graphics available on today's personal computers, notes Arlen, when you try to display a picture of the latest Paris fashion, it still looks too much like a dress made out of a child's Lego blocks. Even the Sears, Roebuck catalogs of 80 years ago could plug their products with better pictures.

In the long run, then, today's text-based shopping services will give way to newer technologies.

"I'm impressed with what CompuServe and CompuCard have done, but that isn't for everybody," says Arlen. "It's worse than looking things up in a catalog. It's not as easy as flipping through pages and comparing prices.

"If you know you want to buy a digital watch, say, Seiko model LX2271, or whatever, and you know the model number, you're presented with an array of model numbers. But if you have to start reading and comparing which has the larger readout, which has the light on it, which has a videogame on it, you lose the value [of the system]."

In spite of the limiting factors which Arlen, Weissman, and others mention, they nonetheless have great expectations for the future of videotex. As with most types of computer technology, rapid advances seem to go hand-in-hand with dwindling prices.

And response to the new on-line systems has so far been quite good, says Robert McBride, a senior vice president with Chemical Bank's Pronto Home Information and Banking System, based in New York.

"We just hit the 10,000-subscriber mark toward the end of July, and the rate of new signup has continued at a very good pace," he says. "We are actively pursuing now the

like cartridges and plug into an expansion port on the computer, while others are stand-alone units that hook up between the computer and your phone. There are also internal modems which fit into the expansion slots inside some computers, and modems built into telephones, such as Code-A-Phone's Tel-A-Modem 212A.

Fast Talking

Another factor to consider when buying a modem is the speed at which it communicates. Naturally, faster modems are more desirable, but they also cost more. Modem speeds are expressed in *bits per second* (bps) or *baud rates* (the latter term is technically incorrect but commonly used). Modems for personal computers generally work at either 300 bps (roughly 30 characters per second) or 1200 bps (120 characters per second). Although some very expensive modems can transmit up to 9600 bps, ordinary phone lines have trouble with anything coming over the wires faster than 2400 bps.

Faster modems save money as well as time, because they cut long-distance phone bills and reduce the access time on commercial information services, which charge by the hour. At 1200 bps, words stream by faster than most people can read, so the better terminal programs let you capture everything and save it on your disk drive or printer for later perusal.

High-speed telecommunications in the future will depend on what phone companies can do to fix their lines, some of which have been in use since the 1920s, says Wreden. "As soon as they're upgraded to fiber optics or whatever, then you can speed up your transmission because you cut down line noise and that sort of thing."

For today, 1200 bps seems to be the new standard in offices. When large files are being *uploaded* (sent) or *downloaded* (received), the extra cost of a faster modem can be recovered after just a few long-distance phone calls. But there's still a large market for the slower modems, explains Hussong, especially among home users. "There are too many local bulletin boards, and far too much out there

Direct-connect modems, such as this Volksmodem, plug right into the modular phone jack and are generally more reliable than acoustic modems.

small-business customer and applying the same home banking applications to business accounts. And the reception there has been quite strong."

Although Pronto does not yet offer home shopping services, Chemical Bank is aware of the potential.

"What we envision is that the number of services that can be provided over a network such as Pronto is really mind-boggling and limitless. At this point in time, the on-line securities and investment service seems to be something that is directly applicable to the financial role we play. But certainly telemarketing, shopping, purchasing airline or theater tickets, dictionary services, encyclopedia services—there's just a whole gamut of possibilities."

Pronto users can bank at home, pay bills, transfer funds, determine balances, see electronic statements, track budgets, and balance checkbooks.

Chemical Bank also has licensing agreements with eight other banks, ranging from San Francisco's Crocker National Bank to Bankers Trust of South Carolina.

In the Chicago area, the popularity of the Keyfax Interactive Information Service is being closely watched by videotex observers because of the system's relatively low cost (a $10 to $15 monthly base rate with a one-time $40 software package), and because it is accessible by home computers. In addition to its data base services, financial options, home banking, and educational packages, home shopping will be offered as well.

One indication of things to come is the introduction of a new videotex decoder by Telelogic, Inc., of Cambridge, Massachusetts, shown first at the Videotex 84 trade show last spring. The unit, called Tex, is being sold for

The next investment in your PC should be a small one.

Free software catalog direct from IBM.

The people who brought you your personal computer now bring you a catalog of programs to make it even more useful. It's *The Directory of Personally Developed Software* and it's direct from IBM.

You'll find new programs for business, personal productivity, education, entertainment, and graphics. There are scientific and engineering programs. Even programs for programmers. All the software was written by IBM people or members of their families. People who go about their programming with a special kind of enthusiasm.

Half the programs are under $20. Some are as little as $14.95. But even the $150 programs are exceptional values. And although the catalog itself carries a $4 cover price, it's yours free if you order before December 31, 1984. Just fill out the coupon below or call:

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In Alaska or Hawaii, 1-203-237-4504.

One of the best investments you make in your PC may be the smallest.

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OUR ARCADE GAMES WE BROUGHT

Bally Midway's Spy Hunter puts you in the driver's seat of the hottest machine on four wheels. You're after enemy spies. The situation is life and death. You'll need every weapon you've got – machine guns, and guided missiles, oil slicks and smoke screens. But the enemy is everywhere. On the road, in the water, even in the air. So you'll have to be more than fast to stay alive in Spy Hunter. You'll need brains and guts, too.

Do you have what it takes?

Bally Midway's Tapper would like to welcome you to the fastest game in the universe.

You're serving up drinks in some of the craziest places you've ever seen. And the service better be good, or else. You'll work your way through the wild Western Saloon to the Sports Bar. From there to the slam dancing Punk Bar and on into the Space Bar full of customers who are, literally, out of this world.!

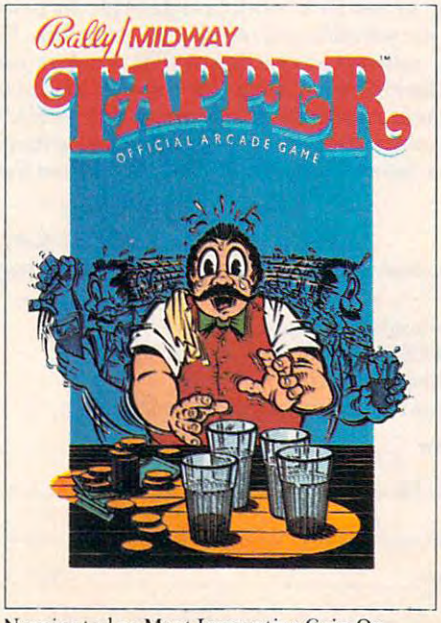
Are you fast enough to play Tapper? If you have to ask, you probably already know the answer.

Bally Midway's Up 'N Down by Sega. In this game, a crash is no accident.

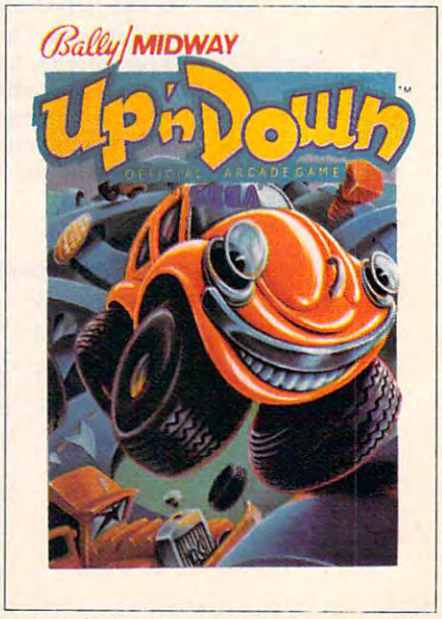
In fact, it's the whole object of the game. You'll race your baja bug over some of the worst roads south of any border. Leap dead ends, gaping canyons and oncoming traffic in a single bound. And if anyone gets in your way, crush 'em.

Crashing, bashing Up 'N Down. It's one smash hit that really is a smash.

The #1 Arcade Game of 1984.



Nominated as Most Innovative Coin-Op Game of 1984 by *Electronic Games* magazine.



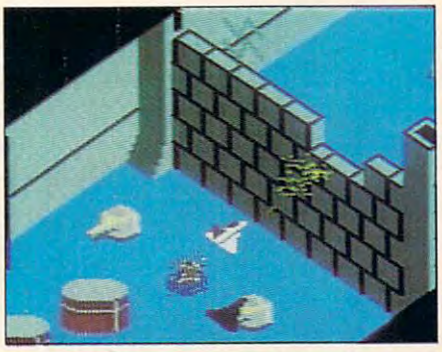
#1 Arcade Hit, *Play Meter* Conversions Poll, 8/1/84.

WERE SUCH BIG HITS, THEM HOME.

Sega's Congo Bongo rocked the home game world when it shot up to Number 3 on the Billboard chart this summer.

And now it's available for even more home systems. So check the chart and get ready for jungle action. You'll pursue the mighty ape Congo up Monkey Mountain and across the Mighty River. Do battle with dangerous jungle creatures. Ride hippos, dodge charging rhinos and try to avoid becoming a snack for a man-eating fish.

Congo Bongo. It's fast and it's fun. But be careful. It's a jungle in there.



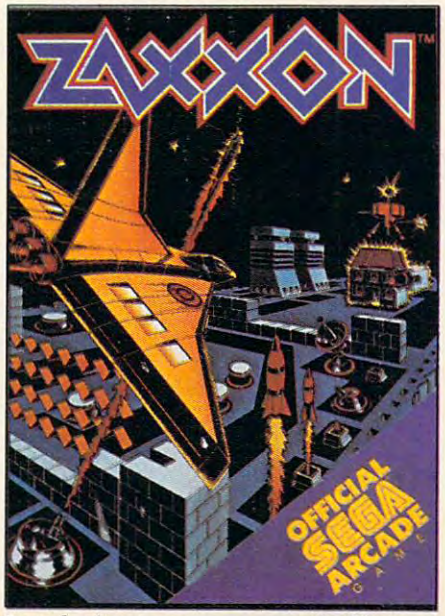
Sega's Zaxxon. If you haven't played Zaxxon, you must have been living on another planet for the past few years.

And now the ultimate space combat game is available for even more home systems. You'll pilot a space fighter through force fields and enemy fire on your way to do battle with the mighty Zaxxon robot. Countless others have gone before you in this Hall of Fame game. But this time your life is in your own hands.

Zaxxon killed them in the arcades. But compared to what it will do to you at home, that was child's play.

	SPY HUNTER	TAPPER	UP 'N DOWN	CONGO BONGO	ZAXXON
Atari 2600 cartridge	✓ NEW	✓ NEW	✓ NEW	✓	✓
Atari 5200 cartridge				✓	✓ NEW
Atari Computers* cartridge	✓ NEW	✓ NEW	✓ NEW	✓	✓ NEW
Atari Computers† diskette	✓ NEW	✓ NEW	✓ NEW		✓
ColecoVision & ADAM cartridge	✓ NEW	✓ NEW	✓ NEW	✓ NEW	✓
Commodore 64 cartridge	✓ NEW	✓ NEW	✓ NEW	✓	✓ NEW
Commodore 64 diskette	✓ NEW	✓ NEW	✓ NEW	✓ NEW	✓
Apple II, IIe, IIc diskette	✓ NEW	✓ NEW	✓ NEW	✓ NEW	✓
IBM PC diskette	✓ NEW	✓ ** NEW	✓ NEW	✓ ** NEW	✓ ** NEW

Arcade and Home Smash. Hit #3 on *Billboard* magazine's Top Video Games survey.



One of only ten games ever to make *Electronic Games'* Hall of Fame.

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✓ Published by Coleco Industries, Inc. under license from Sega Enterprises, Inc.
✓ Published by Synapse Software Corporation under license from Sega Enterprises, Inc.

*Atari 400, 800, 600XL, 800XL and 1200XL. (Congo Bongo cartridge: 400, 800 and 800XL.)

†Atari 800, 600XL, 800XL and 1200XL.

**Also available for IBM PCjr.

All new games are scheduled to be in your stores for Christmas. Check your local dealer.

‡Number of game levels varies on cartridges for Atari and Commodore systems. Atari, 2600, 5200, 400, 800, 600XL, 800XL, and 1200XL are trademarks of Atari Corporation. Commodore 64 is a trademark of Commodore Electronics, Inc. ColecoVision and ADAM are trademarks of Coleco Industries, Inc. Apple, II, IIe, and IIc are trademarks of Apple Computer, Inc. IBM, PC and PCjr are trademarks of International Business Machines Corp. UP 'N DOWN is a trademark of Sega Enterprises, Ltd., manufactured under license from Sega Enterprises, Ltd., Japan. Videogame copyright © 1983 Sega Enterprises, Ltd. BALLY MIDWAY is a trademark of Bally Midway Mfg. Co. Package and program copyright © 1984 Sega Enterprises, Inc. TAPPER and SPY HUNTER are trademarks of Bally Midway Mfg. Co. Videogame copyright © 1983 Bally Midway Mfg. Co. All rights reserved. ZAXXON is a trademark of Sega Enterprises, Inc. Copyright © 1984, Sega Enterprises, Inc. CONGO BONGO is a trademark of Sega Enterprises, Inc. Copyright © 1983, Sega Enterprises, Inc.

available at 300....If you're only getting on there to talk to some friends, or to read a bulletin board, there's no need to spend the money for a 1200—it's actually more intelligent and economical to be at 300 baud."

Other features that add to the versatility—and price—of a modem are auto-answering (the modem can take phone calls from other computers by itself); auto-dialing (the modem can place calls by itself); auto-redialing (the modem automatically redials a call if the line is busy); and self-testing (the modem makes sure everything is hooked up and working properly).

Another consideration is the type of phone system you have. While some modems work with either Touch-Tone or rotary (pulse) phones, others work only with one or the other. Adapters are available to let certain modems work with certain types of systems.

Like other computer peripherals, modems are not generic items. Some modems plug into RS-232 serial interfaces and will work with a number of different systems, while others are designed only for specific computers. Check advertisements and brochures carefully for this information.

Terminal software usually must be purchased separately, acquired through a user group, or typed in from a book or magazine.

Lower Prices Coming

Modem prices currently range from about $49 to $1000 or more. Last year the least expensive models cost about $80. A few years earlier they were hardly available for less than $200. Competition will continue to drive prices down, Hussong says, and by the end of this year 1200 bps modems should cost around $300–$500. In 1985, he estimates, 1200 bps modems will cost $250–$400 and 2400 bps modems should cost under $1000. A major force behind the lower prices is a new modem-on-a-chip designed by Texas Instruments. More computers are starting to come with built-in modems as a standard feature, too.

Code-A-Phone's Tel-A-Modem 212A is a telephone with a built-in modem and two phone lines for simultaneous voice and data transmissions.

$100 to providers of information services, such as banks, who can then offer the units to their own customers.

Using a Touch-Tone phone, you dial the service you wish to contact and place the phone handset on the Tex decoder. Menus displaying available services appear on your television screen, from which you make selections by using the telephone keypad. The one-piece unit includes a decoder that translates the information transmitted from the host computer plus a modulator which connects to a TV's antenna terminals. The computer service sends the text and graphics over the phone lines to be received and decoded by Tex.

The decoder uses the Prestel graphics protocol, which was developed for Great Britain's commercial videotex services.

The system is as easy to use as a bank's automatic teller machine, says Telelogic President William J. Harris. "This combination of low price and ease of use will help bring videotex technology to a large number of people."

Tex units are being tested already by the National Bank of Detroit for its Video Information Provider (VIP), a telebanking pilot project.

While videotex may still be in its infancy, don't expect it to stay that way for long. The text-based shopping services you can access now will soon be joined by low-cost national videotex systems in just a few years. And telecommunications specialists agree that the market for those services will be the same people who today have been among the first to use personal computers, VCRs, and similar technological advances.

"No one's doing a satisfactory job yet," says Arlen. "But everyone is trying very, very hard." ©

Meet your kid's new teachers.

At first glance, they look like funny creatures right out of a computer game shoot 'em up. But underneath the funny surface, they represent one of the most serious approaches to home education you've ever heard of.

INTRODUCING SPROUT™ SOFTWARE. GAMES THAT TEACH.

These amazing teachers are called Tink and Tonk. They come from Sprout. Software for kids 4 to 8.

The beauty of Sprout is how we balance entertainment with a healthy dose of education.

While kids are having fun at home, they're reinforcing what they've learned at school. Things like the alphabet, spelling, vocabulary, counting, adding, and pattern recognition.

You'll also like how Sprout prevents boredom. Our games grow up, instead of wear out. As kids get older, the game gets harder—with many variations and many decisions to make.

Sprout didn't learn how to do all this overnight. You see, we've got a hundred years of experience to lean on. (Our parent company is SFN, the country's #1 textbook publisher for elementary and high schools.)

We've also got the experience of Mercer Mayer, who has written or illustrated 80 children's books. He dazzles kids with ideas and pictures that keep them coming back for more.

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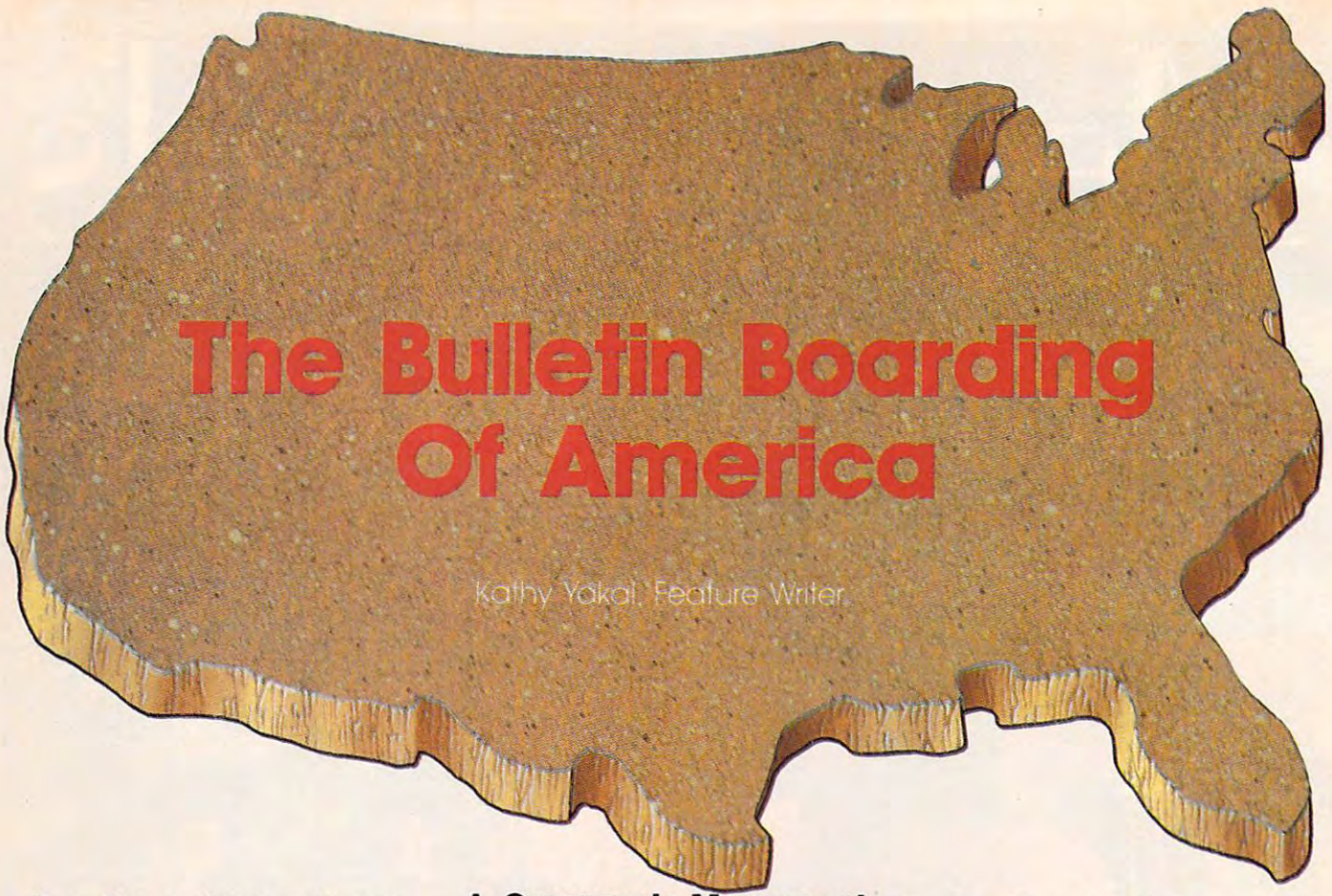

The Bulletin Boarding Of America

Kathy Yakal, Feature Writer

According to dozens of recent magazine and newspaper articles, some psychologists are worried that personal computer hobbyists are spending so much time with their computers that they're becoming isolated from other people and the outside world.

But ironically, communication with people in the outside world is the focus of a fast-growing application for personal computers today: telecomputing. Electronic Bulletin Board Systems (BBS's) are providing a forum for new friendships and the exchange of information between computer owners. And it's a forum not bounded by neighborhoods or physical distances. BBS's offer free public-domain software, technical assistance, and contact with people across the street or across the country.

With the addition of a modem and a simple terminal program, a personal computer can help foster, rather than hinder, communication.

A Grassroots Movement

If you've ever logged on to a major information service such as CompuServe, you were probably overwhelmed by the wealth of menus and features available. A BBS is not nearly that sophisticated, but consider this: Most are operated by average people out of their homes, on equipment they purchased themselves or with a local user group.

The earliest BBS's came online in the late 1970s. Many served as information boards for fledgling user groups. Club officers would post important messages and meeting notices, and store public-domain software for members to download. Some computer stores also set up BBS's to allow customers easy and up-to-date access to prices and inventory information. And a few people—people who were willing to devote their computer system and a lot of time—started boards simply because they enjoyed making it easier for computer owners to get in touch with each other.

Hundreds of boards have come and gone since those early days, but hundreds more remain.

* * *

John Semenek, a Chicago, Illinois computer programmer/analyst, bought an Atari 800 a couple of years ago. Intrigued by its sound and graphics capabilities, he joined a local user group and started looking for Atari bulletin boards in the Chicago area.

He found only one. Now there are at least 20 in that metropolitan area alone, and Semenek's is one of them.

"I started it as a service to our user group, though it's not limited to those people," he says. "It really extends the usage of a home computer." Semenek estimates that if someone normally spends five hours a week with their home computer, buying a modem boosts that figure by about 300 percent.

* * *

If you made a printout of all of the BBS phone numbers

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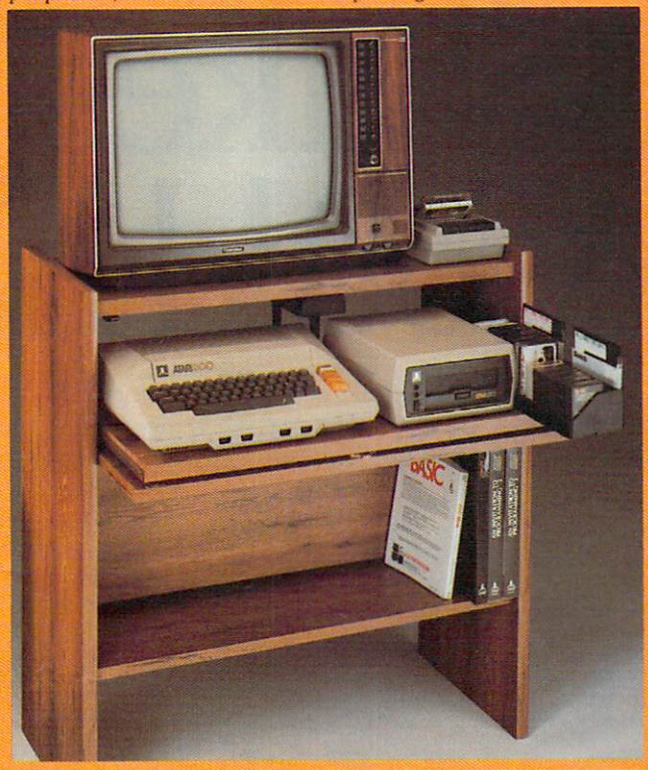
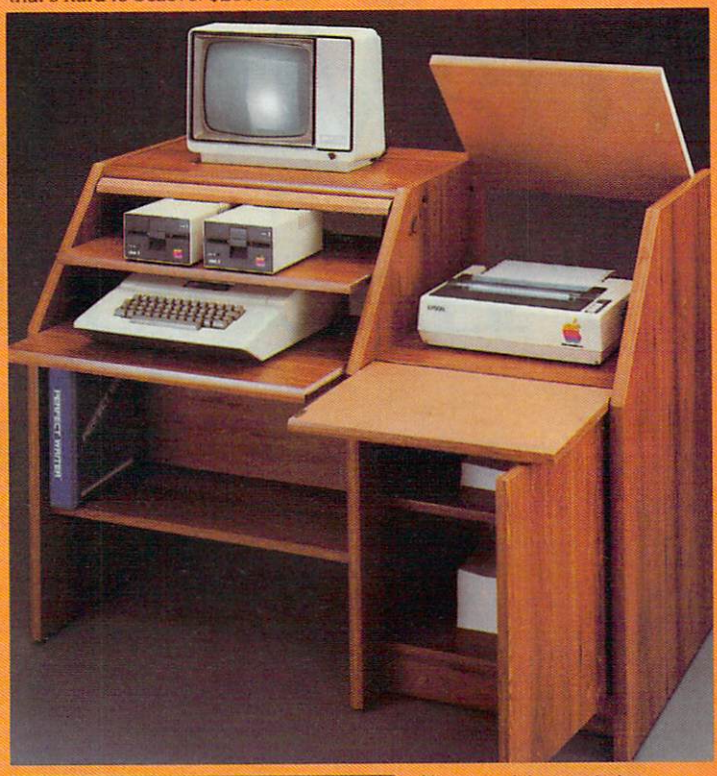


For those with a large computer family the CS-2748 gives you all the room you need for your computer, monitor, printer, peripherals, software, etc. at a price that's hard to believe: **$299.95.**



The CS-1632 computer storage cabinets compact yet functional design fits almost anywhere while housing your computer monitor, joysticks, software, books and peripherals all for only $89.95.
The slide out shelf puts the computer at the right height and position for easy comfortable operation.
The fold up locking door keeps unwanted fingers off the key board when not in use.
To store joysticks just turn them upside down and slide them into the inverted storage rack.
Twist tabs on the back of center panel allow for neat concealed grouping of wires, while power packs rest hidden behind center panel on shelf.
The slide out software tray has room for 14 cartridges or cassettes and up to 30 diskettes. Most brands of software will fit between the adjustable partitions with a convenient hook for the spare key at rear.
Stand fits Atari 400 & 800, Commodore 64 & VIC 20, Ti 99/4A and TRS-80.
Cabinet dimensions overall 36" high x 33-7/8" wide x 16" deep.

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Immediate shipment if in stock. If not, allow 3-4 weeks for delivery. If personal check is sent allow additional 2 weeks. CS-1632 ships UPS freight collect from Oregon. CS-2748 ships by truck freight collect from Oregon. Prices subject to change. Shipment subject to availability.

Both the CS-1632 and CS-2748 ship unassembled in two cartons. Assembly requires only a screwdriver, hammer, and a few minutes of your time.
Choice in simulated woodgrain of warm golden oak or rich natural walnut finish.

The two slide-out shelves put the keyboard at the proper operating height while allowing easy access to the disk drives.
The bronze tempered glass door protecting the keyboard and disk drives simply lifts up and slides back out of the way during use.
Twist tabs on the back of the center panel allow for neat concealed grouping of wires while a convenient storage shelf for books or other items lies below.
The printer sits behind a fold down door that provides a work surface for papers or books while using the keyboard. The lift up top allows easy access to the top and rear of the printer. A slot in the printer shelf allows for center as well as rear feed printers.
Behind the lower door are a top shelf for paper, feeding the printer, and a bottom shelf to receive printer copy as well as additional storage.
Stand fits same computers as the CS-1632 as well as the Apple I and II, IBM-PC, Franklin and many others.
The cabinet dimensions overall: 39-1/2" high x 49" wide x 27" deep.
Keyboard shelf 20" deep x 26" wide. Disk drive shelf 15-34" deep x 26" wide. Top shelf for monitor 17" deep x 27" wide. Printer shelf 22" deep x 19" wide.

Computer prog
da Vinci, Shakesp
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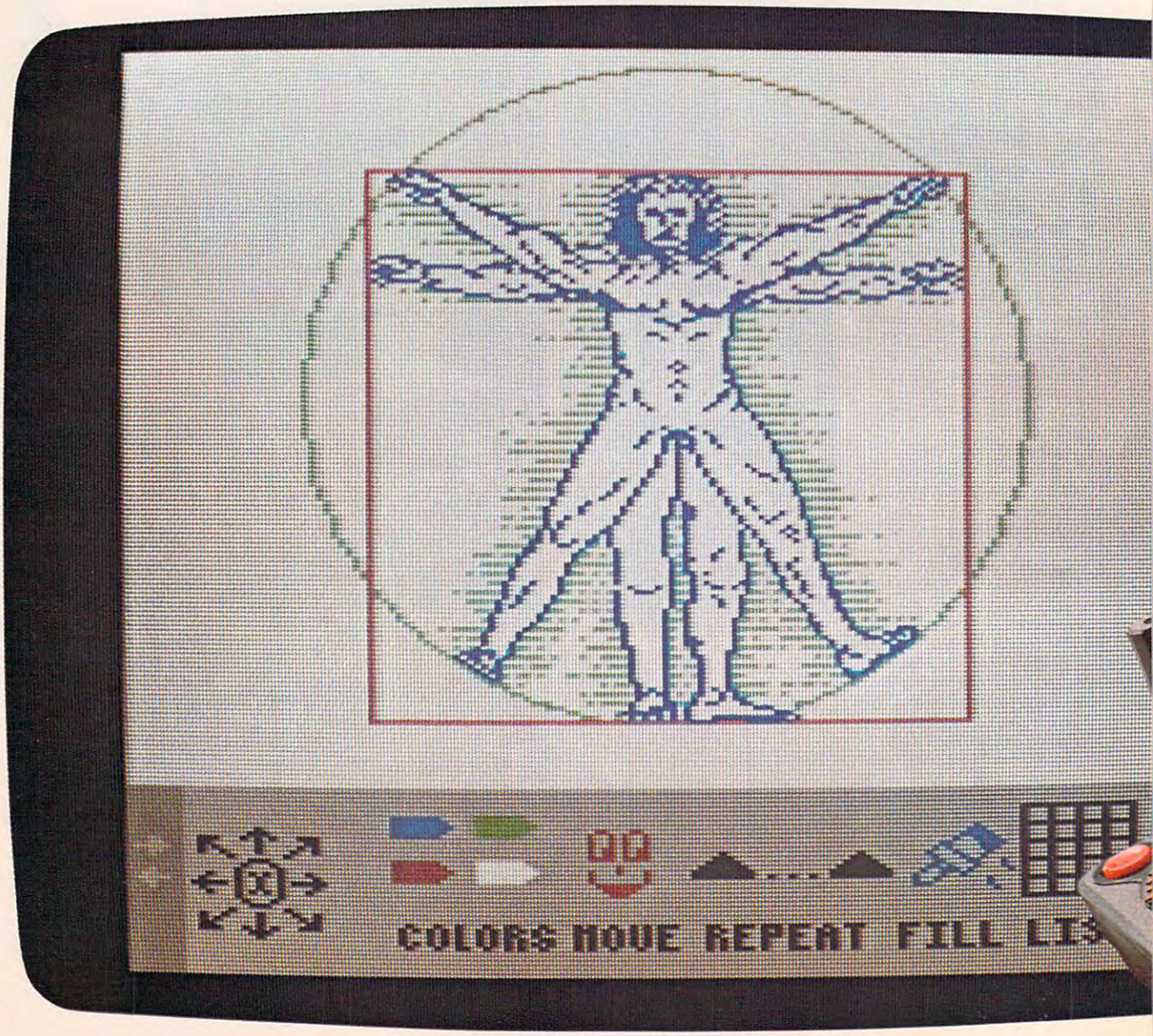

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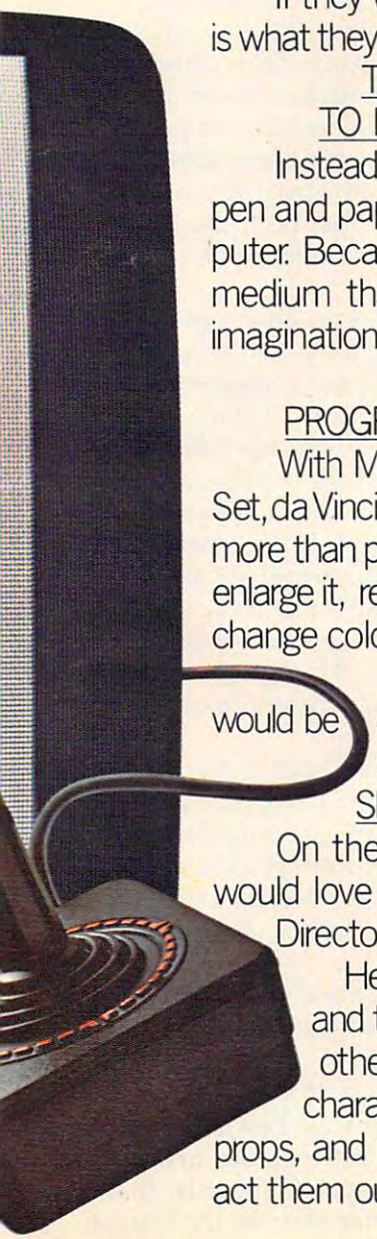

If they were starting out today, this is what they could start with. Pixelwerks.

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With Mr. Pixel's Programming Paint Set, da Vinci (or any 8-year old) could do more than paint a picture. He could also enlarge it, repeat it, move it around, and change colors. Instantly.

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On the other hand, Shakespeare would love to play around with Show Director.

He'd use it to create plots and think up one scene after another, and he'd get a big cast of characters, lots of backgrounds, props, and musical sound effects to act them out.

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Not only could he write his own story, but he could also illustrate the scenes and characters he sees in his mind.

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In short, we supply the tools. Kids supply the imagination.

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Pixelwerks is published by Mindscape, Inc., 3444 Dundee Road, Northbrook, IL 60062. For more information, call 1-800-221-9884. In [illegible] 1-800-942-7315.

Bulletin Board Basics

Gregg Peele,
Assistant Programming Supervisor

When you press a key to send a character from your computer to another system, you set in motion a series of events.

First, your *terminal software*—the program that tells your computer how to communicate with another computer—sends the character to a device called a UART, which stands for Universal Asynchronous Receiver Transmitter. (The VIC-20 and Commodore 64 computers do not have a UART. Instead, they use special built-in software to emulate a UART.) The UART breaks the eight-bit byte that makes up the character into a serial stream of eight sequential bits, then adds special bits to the character. *Start* and *stop bits* are added to signal the beginning and end of the byte (character) being sent, and the *parity bit* is altered to allow any transmission errors to be detected. There are a couple of different systems for this error-checking, or *parity-checking*. Like most other factors in telecommunications, the most important thing is not which type of parity you use (you don't have to use parity at all), but that both the sending and receiving systems agree to use the same type of parity.

All the bits are then sent to the modem, which converts them from their digital form into analog tones which a telephone can transmit. A tone of a certain pitch represents a binary 0, and another tone represents a binary 1. Following the Bell 103 standard for modem *protocol*—the specific rules of the road for communications—both of these pitches are within a specific range determined by whether your modem is set to originate or answer a transmission. If you are linking to a bulletin board system (BBS), you should set your modem to originate. Bulletin board systems normally set their modems in answer mode. Modems use one set of frequencies to listen and another set to talk. That's how a computer can use a single telephone line to both send and receive.

The receiving computer's modem translates the analog tones back into digital data, which the BBS program uses to control some function or print a character on the system operator's (sysop's) screen. If the two computer systems are in *full duplex mode*, then the characters are echoed back to the sender from the receiver. These echoed characters are then printed on the sender's screen.

In *half-duplex*, the characters sent are automatically printed on the sender's screen before being transmitted, but

listed on the People's Message Service of Santee, California (619-561-7277), the list would stretch out to about the length of a good Carl Lewis long jump.

The list includes many machine-specific boards; that is, boards that cater to the special

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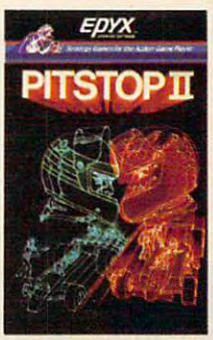
When we introduced Pitstop, we created action in the pits. Now, with PITSTOP II, EPYX introduces true competitive auto racing, both on the track and in the pits. Auto racing is not a one man sport. With PITSTOP II, you can now experience the thrill of speed and competition as you battle your opponent in a race against the clock. Now, more than ever, the strategy of when you make a pit stop and your pit crew's speed and performance, combined with your skill on the track, will determine the winner.

A split screen shows you your position and that of your opponent, a digital clock displays time and a lap counter gives you your race position as you race against each other in pursuit of the checkered flag. You can also play against the computer and take a practice lap or race against the computer controlled pace car as you prepare for real head-to-head competition. Step up to PITSTOP II because auto racing is not a solo sport.

One or two players: joystick controlled.



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Strategy Games for the Action-Game Player

communication is only one-way; characters are not echoed. Full duplex is considered best since, with half-duplex, there is no direct way to tell whether the other system is receiving you. Full duplex lets you know immediately if your connection is working correctly.

Just as communication between humans requires a common language, the language of computers must be agreed upon by both parties. ASCII (American Standard Code for Information Interchange) is a standard code representing each letter, number, and punctuation mark, plus a few common control keys. The Commodore 64, VIC, and Plus/4 computers use a modified version of ASCII. To access an ASCII BBS system with these computers, you must have a terminal program which translates the normal Commodore codes to ASCII.

Even with such a program, certain incompatibilities may exist between systems which use ASCII. For instance, BBS systems may offer an option for an extra linefeed with each return character. If your terminal program includes a linefeed (moves the cursor down a line) when you hit RETURN, you won't need the extra linefeed. Other characters may also cause problems. The delete character, for instance, which is usually CHR$(127), may be CHR$(20) or even another character on some systems. Hopefully, your terminal program will allow you to alter the characters sent and received so you can match the computer you're communicating with. If you have questions about the codes used with a particular system, leave a note for the sysop. Most sysops are technically proficient and are glad to help you make your system work with their BBS.

Transferring programs and other files over the phone lines (uploading/downloading) is one of the most useful functions of BBS communications. This can be a complex procedure, often requiring a special terminal program designed specifically for a certain type of BBS. These programs are designed to compensate for noise in phone lines which may garble characters.

Often, to insure accuracy, a *checksum* is added to each block of transmitted data. The checksum indicates whether a bit has been scrambled during transmission. If an error occurs, the data is sent again. This process is repeated until the entire file is successfully transferred.

The two communicating computers handle all of this automatically. Such communication between two computers without human intervention is called *handshaking*. In this case, handshaking lets each computer know if the blocks of data were properly sent and received.

Since there are several different file transfer schemes, be sure that your particular program is compatible with the BBS you're calling. Again, the sysop can help you decide on the appropriate program to use with the BBS.

interests of people with Apples or Commodores or Ataris or TIs or IBMs or Radio Shack computers. No matter what kind of computer you have, you can access any of these boards, but you won't be able to download any of the public domain

SUMMER GAMES.™
NOW IT'S YOUR CHANCE TO GO FOR THE GOLD.

The 84 Olympics are over, but for you, the competition has just begun. How well can you score in track, swimming, diving, shooting, gymnastics and more? So realistic, there's even an opening ceremony and awards presentation after each event.

Unlike other "Olympics-Like" games, Summer Games has incredible realism, superb state-of-the-art graphics and sound effects (including national anthems from 18 countries), and it is a true action-strategy game. In each event you must plan and execute your game strategy in order to maximize your score. It is not just a matter of how fast you can move the joystick.

So change into your running shoes, grab your joystick and GO FOR THE GOLD!

One or more players; joystick controlled.

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software.

There are boards containing nothing but movie reviews, religious boards, "Dial-Your-Match" boards (computer dating services), boards for people who work with CP/M, adventure game boards, boards for lawyers, boards for aviators—boards tailored to just about any special interest.

Most BBS's, however different their reason for existence, follow a similar format. Once you've logged on to a few, you'll begin to recognize the general process of interacting with them, even though commands may differ.

Probably the first thing most people do when they call is check the message files. Nearly all BBS's let users read and write messages to individuals or the general public. In fact, some exist solely for that reason.

Many of the messages are technical queries or requests for information on hardware and software. Some messages advertise items for sale, or items sought. Some are just running conversations between different users. And quite often, one caller will start a debate on some topic that is picked up by others and carried on for weeks.

The second most popular BBS feature, say many sysops (*sys*tem *op*erators), is the ability to upload and download public-domain software. This is especially true on boards run by user groups; instead of standing in a long line at a user group meeting to copy a disk, club members can call the BBS and download that month's offerings.

Other features commonly found on bulletin boards include ads from local computer stores; bulletin sections where callers can post meeting notices or industry news, or call attention to books or magazine articles; "chat mode," or on-line conversation with the sysop if he or she is available; a classified ad section, which allows callers to advertise items for sale or trade; and lists of other BBS's.

* * *

Stan and Susie Subeck recently added an unusual feature to their Chicago-area Atari BBS: an on-line games section. Atari owners can choose from a few adventure games—even a trivia quiz—and play while connected to the board.

"At first, everyone said that would be impossible on an Atari," says Susie. "Actually, it's very simple. It just takes a lot of disk space."

Like many sysops, the Subecks started their bulletin board to provide support to other Atari owners. And, says Susie, as an educational tool for her 12- and 13-year-old children. "The kids have learned a lot about computers by helping with the maintenance on the board."

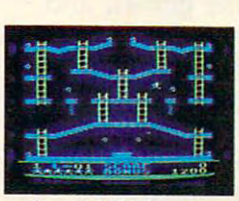
It was their 13-year-old daughter's habit of talking in "Valspeak" (Valley Girl jargon) that sparked an idea for the board's theme. Called "Valley Girl BBS," the Subecks' board has command menus written in Valspeak, as well as a glossary to understanding the Southern California lingo. Callers to this BBS don't delete messages: They "bag" them. And you don't exit the board: you "de-val." Crude callers are "grody" or "nerds."

* * *

Try to be patient. BBS's are single-user networks (only one person may be on-line at a time), unlike commercial information services, which are multi-user networks capable of simultaneously handling thousands of callers. When calling a BBS, chances are you'll get lots of busy signals before you get through. A modem with auto-dial and auto-redial can ease the frustration.

Another problem you may encounter is finding numbers of bulletin boards that suit your interests. A good place to start

JUMPMAN'S A GREAT GAME. BUT YOU'VE GOT TO WATCH YOUR STEP.



Meet the Alienators. A fiendish bunch who've planted bombs throughout your Jupiter Command Headquarters.

Your job? Use your lightning speed to scale ladders, scurry across girders, climb ropes and race through 30 levels to defuse the bombs before they go off.

That's the kind of hot, non-stop action we've packed into the award-winning,* best-selling Jumpman,™ and into Jumpman Jr.,™ our new cartridge version with 12 all-new, different and exciting screens.

Both games force you to make tough choices. Should you avoid that Alienator, climb to the top and try to work your way down, or try to hurdle him and defuse the bombs closest to you before they go off?

If you move fast you'll earn extra lives. But if you're not careful, it's a long way down.

So jump to it. And find out why Jumpman and Jumpman Jr. are on a level all their own.

One to four players; 8 speeds; joystick control. Jumpman has 30 screens. Jumpman Jr. has 12 screens.

*1983 C.E.S. award winner.

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STRATEGY GAMES FOR THE ACTION-GAME PLAYER.

looking is the People's Message Service mentioned above. The list is several thousand bytes long, so make sure you've got enough file space if you plan to download it. If you want, you can enter your area code and get a list of only those boards in your own region (to avoid a hefty long-distance bill).

Noisy phone lines and faulty hardware or software can give you a screenful of garbage, even on the most reliable boards. If this happens, disconnect and try again, checking to make sure your modem is connected properly. If it persists, wait a couple of days and call back: The sysop may have corrected the problem.

A few words about etiquette: Most BBS's run 24 hours a day, seven days a week, but some don't. Please observe the limited calling hours of those exceptions, and remember to check what time zone you're calling. A phone call from Sacramento to Boston at 9:00 local time may awaken an East Coast sysop out of a midnight slumber. Limited BBS hours usually mean the phone line is also used for business or personal purposes.

Most BBS's don't tolerate obscenity and the uploading of copyrighted software, and sysops are quick to ban such callers from their systems. Many BBS's are switching to closed systems (requiring a password and sometimes a membership fee) for that reason.

* * *

When he wasn't acting in San Francisco Bay area theatrical productions, Kent Fillmore was working as a maintenance man at a local hotel in the late 1970s. The hotel manager was using an Apple for record-keeping, and suggested that Kent play around with it a bit.

"I went through the manual in a month," recalls Fillmore. "Then I said to myself, 'I'm going to get one of these, and I'm going to change my job.' "

Fillmore now does research and development for Pacific Alchemical, a company specializing in educational software and programming utilities. His interest in bulletin boards led him to pitch a proposal for a nationwide network of BBS's to a software retail firm.

The plan is to have one franchise in every area code of the country, a BBS that will offer information on software available through retail company software brokers. It's primarily a commercial venture, but there's a bonus for user groups. Fillmore's system is set up so there can be several boards within one BBS, and he's offering those boards to local user groups to use for their own purposes.

The first BBS in the system, Draco-Net, has been running out of Fillmore's home on an Apple II for about three months now, and he's enjoying the interaction with fellow users. "I honestly don't know what the fascination is with bulletin boards," he says. "It's a whole new way of dealing with people. You can literally create your own personality if you want."

* * *

Sysops spend an average of more than $3000 to put a BBS on-line and an additional $50 per month to keep it running, according to a recent survey conducted by Ric Manning, editor of *Plumb*, a monthly telecommunications newsletter.

Besides this drain on the sysop's wallet, a lot of time is involved. Manning reports that general maintenance, data entry, and other chores can take up to 50 hours a month.

The biggest problem sysops encounter is heavy usage at peak times, which they defined as 6:00 p.m. to 11:00 p.m.

Tim Renshaw, sysop of the AVC Commodore BBS in Indianapolis, Indiana, tells of another problem. "The twits," he says, "the callers who have very little sense of good taste and like to leave obscene messages. That's really tapered off, though. It used to be a daily event."

Hundreds of boards have fallen by the wayside because the scales tipped too far for the sysops: The bad outweighed the good.

But Renshaw and other sysops anticipate even better things over the next year. Things like more graphics, increased storage space (enabling more users, on-line games, and room for more messages and programs), and BBS software that supports a wider variety of communication standards.

Sysops continue to support each other and improve their systems as manufacturers work on the cheaper, faster, easier-to-use modems anticipated in the future. The bulletin boarding of America is well on its way. ©

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Strategy Games for the Action-Game Player

*9 TO 5 is a trademark of Twentieth Century Fox Film Corp.

Reflection

Sean Puckett

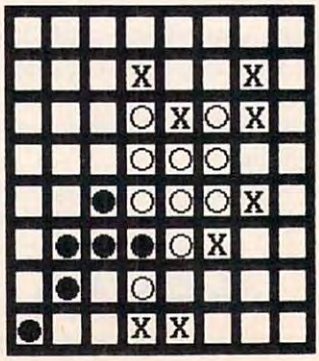
"Reflection" is a fast-paced computer version of reversi. You can play it as a strategy game with two people or challenge the brain of the computer. It was originally written for the Atari (24K), and we've added versions for the Commodore 64, unexpanded VIC-20, TI-99/4A (16K and regular BASIC), Apple, IBM PC (with 64K, BASICA, and the color/graphics adapter), PCjr (with Cartridge BASIC), and TRS-80 Color Computer (with Extended Color BASIC). A joystick is required for the Atari, 64, VIC, and Color Computer.

Through the ages, people have devised many pastimes to exercise their minds. The most well-known match of wits is chess, with backgammon and checkers running close behind. Another board game, reversi, is not as popular, but combines the logic of these games with the action and excitement of a good football game.

The trouble is, some players can become so excited that they tend to get carried away and attempt a forward pass with the board, or they fumble and scatter the chips everywhere (a method most often employed by sore losers). A computer version of reversi is ideal. The computer can act as a referee, permitting only legal moves, or it can be a ruthless opponent.

"Reflection" gives you the option of playing either way—against another person or against the computer. The rules are quite simple. Players take turns placing chips on the board, one piece per turn. To capture your opponent's pieces, you sandwich a row of them between one of your existing pieces and the one you're laying down. You can capture one or several pieces this way. The row can be vertical, horizontal, or diagonal. Once a piece is captured, it turns into your color and effectively becomes one of your pieces.

In this example, the black player can capture pieces by placing one of his chips on any spot marked here with an X:



The best move is either the one that captures the most pieces, or the one which leaves your own pieces less vulnerable—depending on the stage of the game. Sometimes you can place a single piece to capture more than one row of chips. Each player must capture at least one enemy piece per turn, or the turn is forfeited. When all of one player's pieces have been captured, or when neither player can make a legal move, the chips are tallied and the victory is awarded.

Because capturing an enemy piece converts it to your color, the game can reverse directions very quickly. A winning player can suddenly find himself far behind, with most of his chips flipped to the opponent's color.

Playing Reflection

The Atari version of Reflection uses one or two joysticks. You can play against another player or against the computer, and you can select whether black or white moves first. Move the large cursor with the joystick, then press the button to place your piece. You can put down only one piece per move, and only on empty squares. If you place your chip so it doesn't capture any enemy pieces, the program removes the piece and you forfeit your turn. You must purposely forfeit in this way if you can't make a legal move. If neither player can make a move, press E on the keyboard to end the game.

All other versions except the VIC version play much like the Atari version, but have extra options. When playing against the computer, there are two levels of computer intelligence. Level two plays better, but naturally it takes longer for the computer to make up its mind.

These versions also let you set up the board prior to play. On all computers except the Color Computer, press W to set down a white chip, B for a black chip, and space to skip a square. You continue left to right, top to bottom, until you reach the lower-right corner. On the Color Computer, use a joystick plugged into port 2 to move to any square, where you type W for a white chip, B for a blue chip, or space bar to leave an empty square.

The 64 version of Reflection requires a joystick plugged into port 2. The VIC-20 uses a single joystick for both players. Both the Apple and IBM versions use a diamond-shaped arrangement of keys to move the cursor: I for Up, M for Down, J for Left, and K for Right. The TI-99/4A version uses the arrow keys E, S, D,

and X. When you've moved the cursor to the desired position, press the space bar to place your piece. As with the Atari version, you forfeit your turn and lose the piece if you place it so that no enemy pieces are captured. Press Q to end the game on the TI-99/4A, and E for all other versions.

Before loading the Apple version, first enter this direct statement:

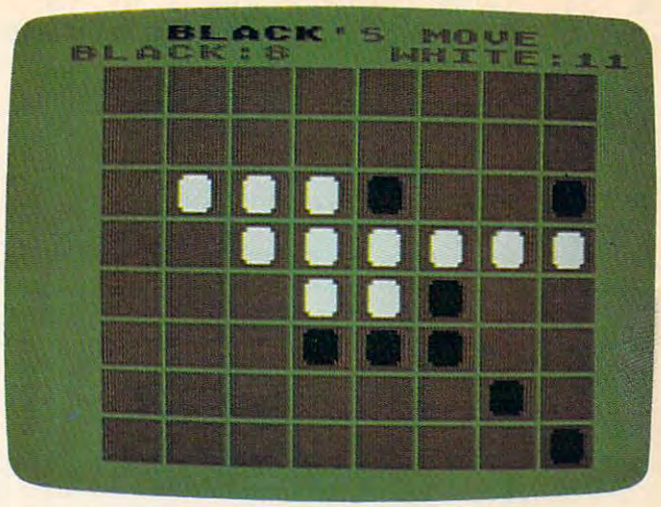
```
POKE 104,64: POKE 16384,0: NEW
```

Similarly, enter PCLEAR 1 before loading the Color Computer version.

Program 1: Reflection For Atari

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
ML 1000 N1=1:N2=2:N0=0:N3=3:N4=4:N
        5=5:N6=6:N7=7:N8=8:N9=9:O2
        =N2
BB 1009 GRAPHICS 23:POKE 708,20:PO
        KE 709,0:POKE 710,15:POKE
        712,198:POKE 711,30:GOSUB
        1950:GOSUB 1720:UI=N1
LE 1010 DL=PEEK(560)+256*PEEK(561)
        :POKE DL+N3,70:POKE DL+N6,
        N6:DIM M$(40):DL=DL+UI:H=I
        NT(DL/256):L=DL-H*256
GI 1011 M$="{5 SPACES}reflection
        {5 SPACES}":GOSUB 1940
EF 1020 M$="{4 SPACES}press start
        ":POKE 560,L:POKE 561,H
CI 1030 COLOR UI:FOR A=N1 TO 88:PL
        OT 16,A:DRAWTO 142,A:NEXT
        A
EL 1040 DIM X(N8),Y(N8):Z=UI:COLOR
         0:FOR A=N1 TO 88 STEP 11:
        Y(Z)=A+N2:Z=Z+UI:PLOT N0,A
        :DRAWTO 142,A:DRAWTO 146,A
        +4:NEXT A
KC 1050 Z=UI:FOR A=16 TO 142 STEP
        16:X(Z)=A+N4:Z=Z+UI:PLOT A
        ,UI:DRAWTO A,88:DRAWTO A+4
        ,92:NEXT A
JI 1051 COLOR N0:PLOT 143,N1:DRAWT
        O 143,89:DRAWTO 0,89
LN 1060 DIM BO(N9,N9)
BI 1070 FOR A=N0 TO N9:FOR B=N0 TO
         N9:BO(A,B)=N0:NEXT B:NEXT
         A
KC 1080 RESTORE 1080:FOR A=N1 TO N
        4:READ B,C,D:BO(B,C)=D:NEX
        T A:GOSUB 1810:DATA 4,4,2,
        5,5,2,4,5,3,5,4,3
OD 1090 GOSUB 1940:E=PEEK(711)
BG 1110 IF PEEK(53279)=N6 THEN FOR
         A=53248 TO 53251:POKE A,N
        0:NEXT A:GOTO 1130
MA 1120 GOTO 1110
AJ 1130 M$="{4 SPACES}<0>NE PLAYER
        {8 SPACES}<t>wo player":GO
        SUB 1940
JE 1132 OPEN #UI,12,0,"K:":GET #UI
        ,K:IF K=79 THEN PL1=1:GOSU
        B 2100
AC 1140 M$="{3 SPACES}<W>HITE FIRS
        T{7 SPACES}<b>lack first":
        GOSUB 1940
CP 1150 GET #UI,K:IF K=87 THEN TUR
        N=UI:GOTO 1180
LN 1160 IF K=66 THEN TURN=N2:GOTO
        1180
KF 1170 SOUND N0,255,10,15:POKE 53
        768,UI:FOR D=UI TO 500:NEX
        T D:SOUND N0,N0,N0,N0:GOTO
         1150
CO 1180 MOVE=N4:M$="  use joystick
         to{7 SPACES}move cursor"
        :GOSUB 1940:FOR D=N1 TO 10
        00:NEXT D:NW=N2:NB=N2
AG 1190 M$="  press trigger to
        {6 SPACES}enter move":GOSU
        B 1940:FOR D=UI TO 500:NEX
        T D:DIM F$(10):F$="WHITEbl
        ack"
NE 1200 M$(1)=" ":M$(40)=" ":M$(2)
        =M$:XP=4:YP=4:M$="
        {4 SPACES}":M$(5)=F$(TURN*
        5-4,TURN*5):M$(10)="'S MOV
        E":M$(22)="BLACK:"
HB 1210 M$(28)=STR$(NB):M$(32)="WH
        ITE:":M$(38)=STR$(NW):GOSU
        B 1940:DATA 243,1,121,4
ON 1215 IF TURN=2 AND PL1 THEN GOS
        UB 2200:GOSUB 1355:GOTO 13
        47
PO 1220 RESTORE 1210:IF TURN=N2 TH
        EN RESTORE 1220:DATA 121,1
        ,243,4
DG 1230 TG=N2:GOSUB 1700:CO=N8:GOS
        UB 1690:F=N1:K=N1
GH 1240 POKE 77,N0:Q=STICK(N0):IF
        (Q=10 OR Q=14 OR Q=N6) AND
         (YP>N1) THEN YP=YP-N1
AL 1245 IF PEEK(764)=42 THEN 1600
MP 1250 IF (Q=10 OR Q=11 OR Q=N9)
        AND (XP>N1) THEN XP=XP-N1
BF 1260 IF (Q=N6 OR Q=N7 OR Q=N5)
        AND (XP<N8) THEN XP=XP+N1
PL 1270 IF (Q=N9 OR Q=13 OR Q=N5)
        AND (YP<N8) THEN YP=YP+N1
```



"Reflection," Atari version.

```
PL 1280 IF Q<15 THEN FOR A=N0 TO 1
        2 STEP N3:SOUND 0,0,0,A:NE
        XT A:SOUND 0,0,0,0
ED 1290 IF Q=15 THEN 1310
BE 1300 GOSUB 1690
EH 1310 POKE 53248,48+X(XP):Y1=Y(Y
        P)+P0+20:Y4=YP
AJ 1320 PM$(Y1,Y1+N7)=CUR$(F*N8-N7
        ,F*N8):POKE 704,CO:F=F+K:I
        F F=N4 OR F=N1 THEN K=-K
CE 1330 CO=CO+16:IF CO=264 THEN CO
        =8
KF 1340 IF STRIG(N0) THEN 1240
BE 1343 GOSUB 1350
PL 1344 IF WW=1 THEN WW=0:GOTO 124
        0
KA 1347 IF NB=N0 OR NW=N0 THEN 160
        0
FM 1348 IF NB+NW=64 THEN 1600
DG 1349 TURN=3-TURN:GOTO 1200
GM 1350 IF BO(XP,YP)>0 THEN RESTOR
        E 1350:TG=3:GOSUB 1700:WW=
        1:RETURN :DATA 162,.5,144,
        .5,243,3
JD 1355 IF DE=1 THEN DE=0:RETURN
AN 1360 BO(XP,YP)=(N3-TURN)+1:B=XP
        :A=YP:MOVE=MOVE+1
KB 1365 GOSUB 1820:GOSUB 1420:GOSU
        B 1450:GOSUB 1520
MA 1380 IF TURN=N1 THEN NW=NW+N1
JI 1390 IF TURN=N2 THEN NB=NB+N1
DD 1400 IF TAKE<>1 THEN RETURN
FM 1401 B=XP:A=Y4:M$="  no piece t
        aken.{3 SPACES}FORFEITURE
         OF MOVE":GOSUB 1940:BO(B,
        A)=0:C=1:CX=X(B):CY=Y(A)
FL 1402 GOSUB 1790:O2=N2:TG=N3:RES
        TORE 1402:GOSUB 1700:DATA
        243,1,243,1,243,4
NE 1403 FOR D=N1 TO 500:NEXT D:IF
        TURN=N1 THEN NW=NW-N1
CH 1404 MOVE=MOVE-N1:IF TURN=N2 TH
        EN NB=NB-N1
KK 1405 RETURN
HK 1420 FOR A=N1 TO N8:I(A)=N1:NEX
        T A:TAKE=N1
DA 1430 FOR A=N1 TO N8:IF BO(XP+RX
        (A),Y4+RY(A))=N0 THEN I(A)
        =N0
HI 1435 ZZ=I(A)+ZZ
GD 1440 NEXT A:RETURN
JA 1450 FOR A=1 TO 8:IF I(A)=N0 TH
        EN 1510
BM 1460 FOR B=1 TO 8:X2=XP+RX(A)*B
        :Y2=Y4+RY(A)*B
HO 1470 IF X2<N1 OR X2>N8 OR Y2<N1
         OR Y2>N8 THEN B=10:I(A)=N
        0:GOTO 1500
JC 1480 J=BO(X2,Y2):IF J=E THEN I(
        A)=B:ZZ=ZZ+B-1:B=10:GOTO 1
        500
EB 1490 IF J=N0 THEN I(A)=N0:B=10
EH 1500 NEXT B
GB 1510 NEXT A:RETURN
FL 1520 FOR U=N1 TO N8:IF I(U)<N2
        THEN 1590
JN 1530 FOR V=N1 TO I(U)-N1:B=XP+R
        X(U)*V:A=Y4+RY(U)*V
DI 1540 IF BO(B,A)=N5-E THEN BO(B,
        A)=N5-BO(B,A):GOSUB 1820:T
        AKE=N0:GOTO 1560
EI 1550 NEXT V:NEXT U:RETURN
AB 1560 IF E=N3 THEN NW=NW+N1:NB=N
        B-N1
AB 1570 IF E=N2 THEN NB=NB+N1:NW=N
        W-N1
GD 1580 NEXT V
HN 1590 NEXT U:RETURN
KK 1600 WH=88:BL=88:FOR A=N1 TO N8
        :FOR B=N1 TO N8:C=N1:R=BO(
        B,A)
MD 1610 IF R=N3 THEN BL=BL-N1:COLO
        R N3:PLOT N0,BL:DRAWTO N4,
        BL+N1:DRAWTO N9,BL
BB 1620 IF R=N2 THEN WH=WH-N1:COLO
        R 2:PLOT 150,WH:DRAWTO 154
        ,WH+N1:DRAWTO 159,WH
AF 1630 NEXT B:NEXT A
AP 1640 IF WH=BL THEN M$="
        {6 SPACES}tiE GaMe":GOSUB
        1940:GOTO 1675
EP 1650 Z=710:M$="{5 SPACES}WHITE
        WINS!":IF BL>WH THEN Z=709
        :M$="{5 SPACES}black WINS!
        "
BL 1660 GOSUB 1940
IN 1670 FOR A=200 TO N0 STEP -4:FO
        R B=A TO A+50 STEP 12.5:PO
        KE Z,B:SOUND N0,B,10,15:NE
        XT B:NEXT A:SOUND N0,N0,N0
        ,N0
BK 1671 DATA 243,2,243,2,217,1,193
        ,1,217,1,243,1,162,2,162,2
        ,162,1,144,1,193,1,182,1,2
        17,2,217,2,217,1,182,1,193
        ,1
AK 1672 DATA 217,1,243,8
JH 1673 O2=N1:RESTORE 1671:TG=19:G
        OSUB 1700:FOR D=N1 TO 500:
        NEXT D:GOTO 1677
JA 1675 DATA 243,1,162,1,193,1,162
        ,1,243,1,162,1,193,1,162,1
        ,243,1,162,1,182,1,193,1,2
        43,8
FA 1676 O2=N1:TG=13:RESTORE 1675:G
        OSUB 1700:FOR D=N1 TO 500:
        NEXT D
CG 1677 D=N1^N1^N1^N1^N1^N1
NL 1678 GOSUB 1690:M$="{4 SPACES}P
        ress start{10 SPACES}or br
        eak":GOSUB 1940
GH 1679 POKE 53248,0:IF PEEK(53279
        )<>6 THEN 1679
ME 1680 RUN
BD 1690 PM$(N1)="{,}":PM$(2048)="
        {,}":PM$(2)=PM$:RETURN
GB 1700 FOR A=N1 TO TG:READ B,C:C=
        C*O2:G=14:FOR Q=N1 TO C:FO
        R D=N1 TO 4:SOUND 0,B,10,G
        :G=G-(G>0)
OK 1710 NEXT D:NEXT Q:NEXT A:RETUR
        N
```

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C-11/84

```
JC 1720 DATA -1,-1,0,-1,1,-1,-1,0,
        1,0,-1,1,0,1,1,1
BO 1730 RESTORE 1720:DIM RX(8),RY(
        8),I(8):FOR A=N1 TO 8:READ
         B,C:RX(A)=B:RY(A)=C:NEXT
        A:RETURN
EB 1760 DATA 204,1,217,1,230,4,114
        ,4
IM 1770 TG=21:GOSUB 1700
LA 1780 RETURN
FL 1790 COLOR C:FOR DR=N1 TO N6:PL
        OT CX,CY+DR:DRAWTO CX+N7,C
        Y+DR:NEXT DR:PLOT CX+N1,CY
        :DRAWTO CX+N6,CY
KM 1800 PLOT CX+N1,CY+N7:DRAWTO CX
        +N6,CY+N7:RETURN
DD 1810 FOR A=N1 TO N8:FOR B=N1 TO
         N8:GOSUB 1820:NEXT B:NEXT
         A:RETURN
JO 1820 E=BO(B,A):LOCATE X(B)+N4,Y
        (A)+N4,F
MF 1830 IF F=N1 AND E>N1 THEN GOSU
        B 1900:RETURN
PK 1840 IF F=E OR (F=N1 AND E=N0)
        THEN RETURN
OB 1850 GOSUB 1690:POKE 53249,X(B)
        +48:YP=Y(A)+20+P1:POKE 705
        ,15*(F=N3):R=N4
IG 1860 PM$(YP,YP+N7)=CHIP$(R*N8-N
        7,R*N8):C=N1:CX=X(B):CY=Y(
        A):GOSUB 1790
BG 1870 FOR R=N4 TO N1 STEP -N1:PM
        $(YP,YP+N7)=CHIP$(R*N8-N7,
        R*N8):SOUND N0,R*10,10,D:N
        EXT R
BL 1880 GOSUB 1900
LC 1890 RETURN
JB 1900 GOSUB 1690:POKE 53249,X(B)
        +48:YP=Y(A)+20+P1:POKE 705
        ,15*(E=N3)
GK 1910 FOR R=N1 TO N4:PM$(YP,YP+N
        7)=CHIP$(R*N8-N7,R*N8):SOU
        ND N0,R*10,12,N5:NEXT R
NB 1920 SOUND N0,N0,N0,N0
PO 1930 C=E:CX=X(B):CY=Y(A):GOSUB
        1790:POKE 53249,0:RETURN
OB 1940 POKE 87,N1:POSITION N0,N0:
        ? #6;"{40 SPACES}";:POSITIO
        N N0,N0:? #N6;M$;:POKE 87,
        N7
KP 1941 RETURN
KG 1950 DIM PM$(2048):PM=INT(ADR(P
        M$)/1024)*1024:IF PM<ADR(P
        M$) THEN PM=PM+1024:ST=PM-
        ADR(PM$):POKE 54279,PM/256
AF 1960 POKE 559,46:POKE 53277,N3:
        POKE 623,N1
HF 1970 P0=ST+512:P1=P0+128:P2=P1+
        128:P3=P2+128:DIM CUR$(100
        ),CHIP$(100):PM$(N1)="{,}"
        :PM$(2048)="{,}":PM$(2)=PM
        $
FH 1980 CUR$="{BACK S}{6 E}
        {BACK S}{,}{BACK S}BBBB
        {BACK S}{3 ,}<$$<{5 ,}{2 X}
        {3 ,}"
NK 1990 CHIP$="{3 ,}{2 X}{5 ,}{X}<
        <{X}{3 ,}<{4 BACK S}<{,}
        {BACK S}{6 INSERT}{BACK S}
        "
KC 2000 RETURN
FH 2100 RESTORE 2150:DIM E1(8,8),P
        T(8,8):FOR L=1 TO 8:FOR T=
        1 TO 8
CM 2110 READ A:PT(T,L)=A:NEXT T:NE
        XT L
KF 2120 RETURN
DM 2150 DATA 16,-6,6,2,2,6,-6,16,-
        6,-12,-2,-2,-2,-2,-12,-6
FJ 2160 DATA 6,-2,6,2,2,6,-2,6,2,-
        2,2,1,1,2,-2,2
FK 2170 DATA 2,-2,2,1,1,2,-2,2,6,-
        2,6,2,2,6,-2,6
DP 2180 DATA -6,-12,-2,-2,-2,-2,-1
        2,-6,16,-6,6,2,2,6,-6,16
KL 2200 E=2:HI=-32000:FOR Y4=1 TO
        8:FOR XP=1 TO 8
AB 2210 IF BO(XP,Y4)>0 THEN 2290
EO 2220 ZZ=0:GOSUB 1420:IF ZZ=0 TH
        EN 2290
FC 2230 ZZ=0:GOSUB 1450:IF ZZ=0 TH
        EN 2290
AM 2240 TT=NW+NB:QW=(TT/8)*(ZZ-1)+
        PT(XP,Y4)*((65-TT)/8)
MK 2250 IF QW>HI THEN HI=QW:H1=XP:
        H2=Y4:GOTO 2290
FI 2265 IF HI=0 THEN 2290
AK 2270 IF QW/HI>0.8 AND QW/HI<1.2
         THEN TR=INT(RND(1)*2)+1
HH 2280 IF TR=1 THEN TR=0:HI=QW:H1
        =XP:H2=Y4
BF 2290 ZZ=0:NEXT XP:NEXT Y4
JP 2300 IF HI=-32000 THEN TAKE=1:D
        E=1:M$="NO POSSIBLE MOVES.
        ":GOSUB 1940:FOR I=1 TO 10
        00:NEXT I
DB 2310 IF (H1=1 OR H1=8) AND (H2=
        1 OR H2=8) THEN GOSUB 2350
FH 2320 XP=H1:YP=H2:Y4=H2:RETURN
PF 2350 IF H1=1 AND H2=1 THEN 2450
PJ 2360 IF H1=1 AND H2=8 THEN 2500
PP 2370 IF H1=8 AND H2=1 THEN 2550
ML 2380 FOR I=3 TO 8:PT(I,7)=I-3:N
        EXT I
MM 2390 FOR I=3 TO 8:PT(7,I)=I-3:N
        EXT I
KG 2400 RETURN
MD 2450 FOR I=1 TO 6:PT(2,I)=6-I:N
        EXT I
ME 2460 FOR I=1 TO 6:PT(I,2)=6-I:N
        EXT I
KN 2470 RETURN
ME 2500 FOR I=1 TO 6:PT(I,7)=6-I:N
        EXT I
MG 2510 FOR I=3 TO 8:PT(7,I)=I-3:N
        EXT I
KJ 2520 RETURN
MF 2550 FOR I=3 TO 8:PT(I,2)=I-3:N
        EXT I
MK 2560 FOR I=1 TO 6:PT(7,I)=6-I:N
        EXT I
KO 2570 RETURN
```

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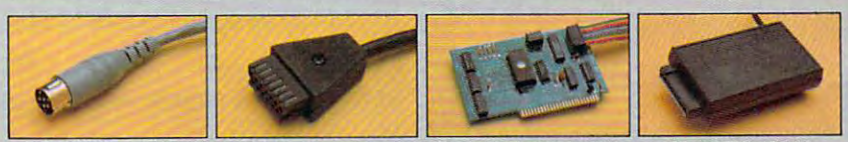

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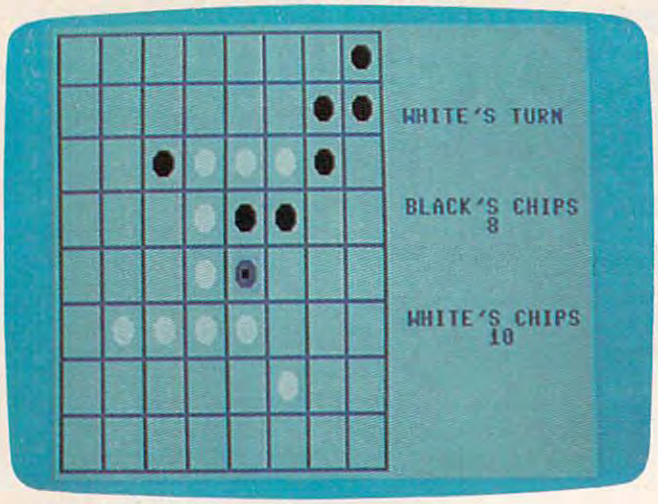

"Reflection," 64 version.

Program 2: Reflection For Commodore 64

Version By Chris Poer, Editorial Programmer
Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
10 POKE56,56:CLR:TU=1:POKE53281,15:CO=542
   72:SC=13:CHIP$="%&{DOWN}{2 LEFT}#$":PL
   =1                                  :rem 158
20 DIM BO(80),TA(71),PT(71),A(71),PO(80)
                                       :rem 51
30 GOSUB 2500                          :rem 170
40 GOSUB 760                           :rem 129
50 GOSUB 1060                          :rem 172
60 GOSUB 960                           :rem 133
70 IF DE=1 THEN GOSUB 1210:GOTO150
                                       :rem 105
80 FORY=2TO5:FORX=2TO5                 :rem 175
90 READA:PO(Y*9+X)=A:NEXT:NEXT         :rem 159
100 BO(30)=2:BO(31)=1:BO(39)=1:BO(40)=2:B
    C=2:WC=2                           :rem 137
110 POKE646,1:POKE214,9:PRINT:PRINTTAB(10
    );CHIP$                            :rem 189
120 POKE214,9:PRINT:POKE646,0:PRINTTAB(13
    );CHIP$                            :rem 192
130 POKE646,0:POKE214,12:PRINT:PRINTTAB(1
    0);CHIP$                           :rem 232
140 POKE214,12:PRINT:POKE646,1:PRINTTAB(1
    3);CHIP$                           :rem 237
150 FL=1:X=4:Y=4:WC$=STR$(WC)+" ":BC$=STR
    $(BC)+" "                          :rem 203
160 IF TU=1 THEN M$="{BLU}BLACK'S TURN":G
    OTO180                             :rem 169
170 M$="{BLU}WHITE'S TURN"             :rem 237
180 POKE 214,4:PRINT:PRINTTAB(26);M$:POKE
    214,10:PRINT:PRINTTAB(31);BC$      :rem 20
190 IF PL=1THENAL=BC+1:GOTO210         :rem 19
200 AL=WC+1                            :rem 82
210 POKE214,16:PRINT:PRINTTAB(31);WC$
                                       :rem 255
220 POKE214,9:PRINT:PRINTTAB(26)"BLACK'S
    {SPACE}CHIPS"                      :rem 111
230 POKE214,15:PRINT:PRINTTAB(26)"WHITE'S
     CHIPS"                            :rem 193
240 IF CM=1 AND TU=PL THEN GOSUB 1930:GOT
    O450                               :rem 0
250 POKE53269,1                        :rem 44
260 JV=PEEK(56320):FR=JVAND16:JV=15-(JVAN
    D15):S=0                           :rem 162
270 IF JV=1 AND Y>0 THEN Y=Y-1:GOTO320
                                       :rem 84
280 IF JV=2 AND Y<7 THEN Y=Y+1:GOTO320
                                       :rem 89
290 IF JV=4 AND X>0 THEN X=X-1:GOTO320
                                       :rem 86
300 IF JV=8 AND X<7 THEN X=X+1:GOTO320
                                       :rem 85
310 GOTO330                            :rem 99
320 POKECO+4,17:POKECO+1,25:FORI=1TO20:NE
    XTI:POKECO+4,16{6 SPACES}          :rem 191
330 GET A$:IF A$<>"E"THEN 380          :rem 214
340 POKE214,20:PRINT:PRINTTAB(26)"ARE YOU
     SURE";SPC(27);"YOU WANT TO END"
                                       :rem 108
350 GET A$:IF A$="Y" THEN 1740         :rem 224
360 IF A$<>"N"THEN 350                 :rem 96
370 POKE214,20:PRINT:PRINTTAB(26)"
    {12 SPACES}";SPC(27);"{15 SPACES}"
                                       :rem 170
380 POKE 53248,32+X*24:POKE53249,58+Y*24
                                       :rem 145
390 SC=SC+1:IFSC=16THENSC=13           :rem 202
400 POKE 2040,SC                       :rem 75
410 IF FR=16 THEN 260                  :rem 39
420 XY=Y*9+X:IF BO(XY)>0 THEN 260      :rem 84
430 POKECO+4,33:POKECO+1,10:FORJ=1TO50:NE
    XTJ                                :rem 209
440 POKECO+4,32:FOR J=15TO0STEP-1:POKECO+
    1,T:NEXT                           :rem 20
450 IF FL=0 THEN 530                   :rem 238
460 POKE 53269,0:POKE214,Y*3:PRINT:rem 215
470 POKE 646,TU-1:PRINTTAB(X*3+1);CHIP$
                                       :rem 32
480 POKECO+4,33:POKECO+1,10:FORJ=1TO50:NE
    XTJ                                :rem 214
490 POKECO+4,32:FOR J=15TO0STEP-1:POKECO+
    1,T:NEXT                           :rem 25
500 IF PO(XY)=0 THEN 530               :rem 249
510 GOSUB 1500                         :rem 220
520 IF CHIPS>0 THEN GOSUB 1610:BO(XY)=TU:
    GOTO650                            :rem 67
530 POKE214,20:PRINT:PRINTTAB(26)"{BLU}IL
    LEGAL MOVE";SPC(29);"END OF TURN"
                                       :rem 175
540 POKECO+4,33:POKECO+1,5:FORJ=1TO300:NE
    XTJ:POKECO+4,32:POKECO+1,0         :rem 115
550 FORJ=1TO150:NEXTJ                  :rem 53
560 IF FL=0 THEN 630                   :rem 241
570 POKECO+4,33:POKECO+1,10:FORJ=1TO150:N
    EXTJ                               :rem 7
580 POKECO+4,32:FOR J=15TO0STEP-1:POKECO+
    1,T:NEXT                           :rem 25
590 POKE646,15:POKE214,Y*3:PRINT       :rem 168
600 PRINTTAB(3*X+1);CHIP$              :rem 223
610 POKECO+4,33:POKECO+1,10:FORJ=1TO50:NE
    XTJ                                :rem 209
620 POKECO+4,32:FOR J=15TO0STEP-1:POKECO+
    1,T:NEXT                           :rem 20
630 POKE214,20:PRINT:PRINTTAB(26)"
    {12 SPACES}";SPC(29);"{11 SPACES}"
                                       :rem 171
640 GOTO 700                           :rem 106
650 IF TU=1THENBC=BC+CHIPS+1:WC=WC-CHIPS:
    GOTO670                            :rem 20
660 WC=WC+CHIPS+1:BC=BC-CHIPS          :rem 48
670 FORQ=1TO8                          :rem 30
680 IF XY+OF(Q)>-1THEN PO(XY+OF(Q))=1
                                       :rem 124
690 NEXTQ                              :rem 47
700 TU=3-TU                            :rem 134
710 IF WC=0 OR BC=0 OR WC+BC=64 THEN 1740
                                       :rem 78
```

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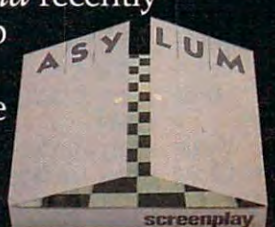

screenplay™

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```
720 GOSUB 750                          :rem 181
730 IF XY=0 OR XY=7 OR XY=63 OR XY=70 THE
    N GOSUB 2350                       :rem 116
740 GOTO 150                           :rem 106
750 FORI=0TO71:TA(I)=0:NEXT:RETURN
                                       :rem 173
760 PRINT"{CLR}{BLK}":PRINTTAB(14)"REFLEC
    TION"                              :rem 20
770 PRINTTAB(10)"{2 DOWN}(W)HITE MOVES FI
    RST"                               :rem 254
780 PRINTTAB(10)"(B)LACK MOVES FIRST"
                                       :rem 185
790 GET A$:IF A$="W"THENTU=2:GOTO810
                                       :rem 62
800 IF A$<>"B"THEN790                  :rem 91
810 PRINTTAB(13)"{2 DOWN}(N)ORMAL BOARD"
                                       :rem 154
820 PRINTTAB(8)"(D)ESIGN YOUR OWN BOARD"
                                       :rem 129
830 GET A$:IF A$="D"THENDE=1:GOTO850
                                        :rem 9
840 IF A$<>"N"THEN830                  :rem 102
850 PRINTTAB(14)"{2 DOWN}(O)NE PLAYER"
                                       :rem 29
860 PRINTTAB(13)"(T)WO PLAYERS"        :rem 102
870 GET A$:IF A$="T"THEN950            :rem 180
880 IF A$<>"O"THEN870                  :rem 111
890 CM=1:PRINTTAB(11)"{2 DOWN}WHAT LEVEL?
     (1-2)"                            :rem 34
900 GET A$:LE=VAL(A$):IFLE<1ORLE>2THEN900
                                       :rem 176
910 PRINTTAB(9)"{2 DOWN}COMPUTER PLAYS (B
    )LACK"                             :rem 148
920 PRINTTAB(9)"COMPUTER PLAYS (W)HITE"
                                       :rem 151
930 GETA$:IFA$="W" THEN PL=2:GOTO950
                                       :rem 50
940 IFA$<>"B" THEN 930                 :rem 92
950 RETURN                             :rem 126
960 A$="{A}**{R}**{R}**{R}**{R}**{R}**{R}
    **{R}**{S}"                        :rem 193
970 B$="-{2 SPACES}-{2 SPACES}-{2 SPACES}
    -{2 SPACES}-{2 SPACES}-{2 SPACES}-
    {2 SPACES}-{2 SPACES}-"            :rem 76
980 C$="{Q}**+**+**+**+**+**+**+**{W}"
                                       :rem 228
990 D$="{Z}CC{E}CC{E}CC{E}CC{E}CC{E}CC{E}
    CC{E}CC{X}"                        :rem 252
1000 PRINT"{CLR}{BLU}":PRINT A$        :rem 112
1010 FORI=1TO7                         :rem 58
1020 PRINTB$:PRINTB$:PRINTC$           :rem 17
1030 NEXTI:PRINTB$:PRINTB$:PRINTD$;
                                       :rem 16
1040 RETURN                            :rem 165
1050 GOTO 1050                         :rem 197
1060 PRINTTAB(11)"{2 DOWN}LOADING IN SPRI
     TES"                               :rem 3
1070 FORI=832TO1024                    :rem 60
1080 READ A:POKEI,A                    :rem 69
1090 NEXTI                             :rem 82
1100 POKE 2040,15:POKE53287,4          :rem 27
1110 IF PEEK(14616)=63 THEN 1150       :rem 102
1120 POKE56334,PEEK(56334)AND254       :rem 13
1130 POKE1,PEEK(1)AND251               :rem 99
1140 FORI=0TO1023:POKEI+14336,PEEK(I+5324
     8):NEXT                           :rem 63
1150 POKE1,PEEK(1)OR4                  :rem 207
1160 POKE56334,PEEK(56334)OR1          :rem 117
1170 FORI=14336+280TO14336+311         :rem 96
1180 READA:POKEI,A:NEXT                :rem 191
1190 POKE53272,(PEEK(53272)AND240)+14
                                       :rem 236
1200 RETURN                            :rem 163
1210 POKE53248,32:POKE53249,58:POKE53269,
     1                                 :rem 98
1220 PRINT"{HOME}{6 DOWN}{BLU}";TAB(26)"T
     YPE (B) FOR":PRINTTAB(27)"BLACK CHIP
     {2 DOWN}"                         :rem 56
1230 PRINTTAB(26)"TYPE (W) FOR":PRINTTAB(
     27)"WHITE CHIP{2 DOWN}"           :rem 91
1240 PRINTTAB(25)"TYPE SPACE FOR":PRINTTA
     B(29)"NO CHIP"                    :rem 27
1250 FORY=0TO7:FORX=0TO7               :rem 15
1260 POKE53248,32+X*24:POKE53249,58+Y*24
                                       :rem 191
1270 GET A$:XY=X+Y*9                   :rem 118
1280 IF A$="W"THENWC=WC+1:BO(XY)=2:GOTO13
     50                                :rem 11
1290 IF A$="B"THENBC=BC+1:BO(XY)=1:GOTO13
     50                                :rem 204
1300 IFA$=" "THEN POKECO+4,17:POKECO+1,25
     :FORI=1TO20:NEXTI:POKECO+4,16:GOTO14
     50                                :rem 207
1310 U=U+1:IFU=6THENU=1                :rem 139
1320 IFU=1THEN SC=SC+1:IFSC=16THENSC=13
                                       :rem 117
1330 POKE 2040,SC                      :rem 126
1340 GOTO 1270                         :rem 203
1350 POKE646,BO(XY)-1                  :rem 181
1360 POKECO+4,33:POKECO+1,10:FORJ=1TO50:N
     EXTJ                               :rem 4
1370 POKECO+4,32:FOR J=15TO0STEP-1:POKECO
     +1,T:NEXT                         :rem 71
1380 POKE214,Y*3:PRINT                 :rem 59
1390 PRINTTAB(X*3+1);CHIP$             :rem 22
1400 POKECO+4,33:POKECO+1,10:FORJ=1TO50:N
     EXTJ                              :rem 255
1410 FORE=1TO8                         :rem 59
1420 POKECO+4,32:FOR J=15TO0STEP-1:POKECO
     +1,T:NEXT                         :rem 67
1430 IF XY+OF(E)>-1THEN PO(XY+OF(E))=1
                                       :rem 142
1440 NEXTE                             :rem 77
1450 NEXTX:NEXTY                       :rem 51
1460 PRINT"{HOME}{6 DOWN}{BLU}";TAB(26)"
     {12 SPACES}":PRINTTAB(27)"
     {10 SPACES}{2 DOWN}"              :rem 1
1470 PRINTTAB(26)"{12 SPACES}":PRINTTAB(2
     7)"{10 SPACES}{2 DOWN}"           :rem 235
1480 PRINTTAB(25)"{14 SPACES}":PRINTTAB(2
     9)"{7 SPACES}"                    :rem 203
1490 RETURN                            :rem 174
1500 CHIPS=0:FORI=1TO8:L=1:V=0:XX=0
                                       :rem 165
1510 V=V+OF(I):IF XY+V>70 OR XY+V<0 THEN
     {SPACE}1550                       :rem 227
1520 IF BO(XY+V)=5 THEN 1550           :rem 215
1530 IF BO(XY+V)=3-TUTHENXX=1:L=L+1:GOTO1
     510                               :rem 164
1540 IF XX=1 AND BO(XY+V)=TUTHENGOSUB1570
                                       :rem 192
1550 NEXT                              :rem 10
1560 RETURN                            :rem 172
1570 W=1:V=0                           :rem 143
1580 V=V+OF(I):TA(XY+V)=TU             :rem 73
1590 W=W+1:IF W <= L-1 THEN 1580       :rem 86
1600 CHIPS=CHIPS+W-1:RETURN            :rem 236
1610 FORI=0TO71                        :rem 112
1620 IF TA(I)=0 OR TA(I)=5 THEN 1720
                                       :rem 47
1630 POKE646,TU-1:L=INT(I/9)           :rem 124
```

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```
1640 POKE214,L*3:PRINT                    :rem 45
1650 POKECO+4,33:POKECO+1,10:FORJ=1TO15:N
     EXTJ                                 :rem 7
1660 POKECO+4,32:FOR J=15TO0STEP-1:POKECO
     +1,T:NEXTJ                           :rem 147
1670 PRINTTAB((I-9*L)*3+1);CHIP$          :rem 53
1680 POKECO+4,33:POKECO+1,10:FORJ=1TO15:N
     EXTJ                                 :rem 10
1690 POKECO+4,32:FOR J=15TO0STEP-1:POKECO
     +1,T:NEXTJ                           :rem 150
1700 BO(I)=TU                             :rem 217
1710 POKECO+4,32:FOR J=15TO0STEP-1:POKECO
     +1,T:NEXTJ                           :rem 143
1720 NEXTI                                :rem 82
1730 RETURN                               :rem 171
1740 PRINT"{HOME}":FORI=3TO24:PRINTSPC(25
     )"{15 SPACES}";:NEXTI                :rem 57
1750 IF BC>WC THEN M$="BLACK":HI=BC:LO=WC
     :GOTO1780                            :rem 179
1760 IF BC<WC THENM$="WHITE":HI=WC:LO=BC:
     GOTO1780                             :rem 214
1770 T1=1:HI=BC:LO=WC                     :rem 251
1780 Z=INT(HI/6):FORY=0TOZ:FORX=26TO31
                                          :rem 162
1790 IF X+Y*6-26=HI THEN X=31:GOTO1840
                                          :rem 103
1800 POKECO+4,33:POKECO+1,X+Y*4:FORJ=1TO5
     0:NEXTJ                              :rem 220
1810 POKECO+4,32:FOR J=15TO0STEP-1:POKECO
     +1,T:NEXT                            :rem 70
1820 IF X+6*Y-26<BC THEN POKE1384+X+Y*40,
     81:POKE55656+X+Y*40,0                :rem 169
1830 IF X+6*Y-26<WC THEN POKE1384+X+7+Y*4
     0,81:POKE55656+X+Y*40+7,1            :rem 132
1840 NEXT:NEXT                            :rem 133
1860 PRINT"{HOME}{3 DOWN}":IF T1=1 THENPR
     INTTAB(28)"TIE GAME":GOTO1880
                                          :rem 116
1870 PRINTTAB(27);M$;" WINS"              :rem 90
1880 PRINTTAB(27)HI;" TO ";LO             :rem 120
1890 PRINT"{5 DOWN}":PRINTTAB(25)"PLAY AG
     AIN Y/N"                             :rem 254
1900 GETA$:IF A$="N" THENPOKE197,0:SYS197
                                          :rem 65
1910 IF A$<>"Y" THEN 1900                 :rem 207
1920 GOTO10                               :rem 102
1930 HY=-32000:POKE53269,0                :rem 155
1940 HI=-32000:FORXY=0TO71                :rem 8
1950 IF BO(XY)>0 OR PO(XY)=0 THEN NEXT:GO
     TO2040                               :rem 181
1960 GOSUB 1500:IFCHIPS=0THENNEXT:GOTO204
     0                                    :rem 106
1970 TT=WC+BC:QW=TT/8*CHIPS+PT(XY)*(65-TT
     )/8                                  :rem 194
1980 IFLE=2ANDCHIPS=A1THENQW=10000:rem 95
1990 IF LE=2 AND REC=0 THEN GOSUB 2110:NE
     XT:GOTO2040                          :rem 161
2000 IF QW>HI THEN HI=QW:H1=XY:NEXT:GOTO2
     040                                  :rem 192
2010 IF HI=0THENNEXTXY:GOTO2040           :rem 168
2020 IF QW/HI>.85 AND QW/HI<1.15THEN ZZ=I
     NT(RND(1)*2):IFZZ=1THENHI=QW:H1=XY
                                          :rem 31
2030 NEXT                                 :rem 4
2040 IF LE=2 AND REC=1 THEN RETURN
                                          :rem 127
2050 IF (HI=-32000 AND LE=1) OR (HY=-3200
     0 AND LE=2) THEN FL=0:CHIPS=0
                                          :rem 122
2060 XY=H1                                :rem 47
2070 IF LE=2 THEN XY=H2                   :rem 239
2080 GOSUB 750                            :rem 230
2090 Y=INT(XY/9):X=XY-Y*9                 :rem 31
2100 RETURN                               :rem 163
2110 A1=AL:FORE=0TO71                     :rem 222
2120 A(E)=BO(E)                           :rem 0
2130 IF TA(E)>0 THEN BO(E)=TA(E):A1=A1+1
                                          :rem 99
2140 NEXTE                                :rem 75
2150 FORQ=1TO8                            :rem 73
2160 IF XY+OF(Q)>-1THEN PO(XY+OF(Q))=PO(X
     Y+OF(Q))+1                           :rem 213
2170 NEXTQ                                :rem 90
2180 BO(XY)=TU                            :rem 68
2190 NW=QW:REC=1:Y1=XY                    :rem 138
2200 TU=3-TU:GOSUB1940:REC=0              :rem 188
2210 QY=NW-HI:TU=3-TU                     :rem 56
2220 IF QY>HY THEN HY=QY:H2=Y1            :rem 16
2230 IF HY=0 THEN 2250                    :rem 92
2240 IF QY/HY>.85 AND QY/HY<1.15 THEN ZZ=
     INT(RND(1)*2):IFZZ=1THEN HY=QY:H2=Y1
                                          :rem 51
2250 XY=Y1                                :rem 65
2260 FORE=0TO70                           :rem 109
2270 BO(E)=A(E):NEXT                      :rem 127
2280 GOSUB750                             :rem 232
2290 FORQ=1TO8                            :rem 78
2300 IF Y1+OF(Q)<0 THEN 2330              :rem 163
2310 IF PO(Y1+OF(Q))=2 THEN PO(Y1+OF(Q))=
     1:GOTO2330                           :rem 84
2320 PO(Y1+OF(Q))=0                       :rem 16
2330 NEXTQ                                :rem 88
2340 RETURN                               :rem 169
2350 IF XY=7 THEN 2410                    :rem 116
2360 IF XY=63 THEN 2440                   :rem 170
2370 IF XY=70 THEN 2470                   :rem 172
2380 FORI=9TO13:PT(I)=15-I:NEXT           :rem 132
2390 FORI=1TO37STEP9:PT(I)=6-INT(I/9):NEX
     T                                    :rem 108
2400 RETURN                               :rem 166
2410 FORI=6TO42STEP9:PT(I)=6-INT(I/9):NEX
     T                                    :rem 102
2420 FORI=16TO12STEP-1:PT(I)=I-10:NEXT
                                          :rem 65
2430 RETURN                               :rem 169
2440 FORI=54TO58:PT(I)=60-I:NEXT          :rem 186
2450 FORI=64TO28STEP-9:PT(I)=INT(I/9)-1:N
     EXT                                  :rem 202
2460 RETURN                               :rem 172
2470 FORI=61TO58STEP-1:PT(I)=I-55:NEXT
                                          :rem 89
2480 FORI=69TO33STEP-9:PT(I)=INT(I/9)-1:N
     EXT                                  :rem 206
2490 RETURN                               :rem 175
2500 FORI=1TO8                            :rem 64
2510 READ A                               :rem 37
2520 OF(I)=A:NEXT                         :rem 239
2530 FORX=0TO71                           :rem 129
2540 READA:PT(X)=A                        :rem 45
2550 NEXTX                                :rem 99
2560 FORI=8TO71STEP9:BO(I)=5:NEXT         :rem 66
2570 FORI=COTOCO+24:POKEI,0:NEXT          :rem 26
2580 POKECO+5,130:POKECO+6,66:POKECO+24,1
     5                                    :rem 194
2590 RETURN                               :rem 176
2600 DATA -10,-9,-8,-1,1,8,9,10           :rem 208
2610 DATA 16,-8,5,2,2,5,-8,16,0,-8,-12,-2
     ,-2,-2,-2,-12,-8,0                   :rem 251
2620 DATA 5,-2,8,2,2,8,-2,5,0,2,-2,2,1,1,
     2,-2,2,0                             :rem 20
2630 DATA 2,-2,2,1,1,2,-2,2,0,5,-2,8,2,2,
     8,-2,5,0                             :rem 21
```

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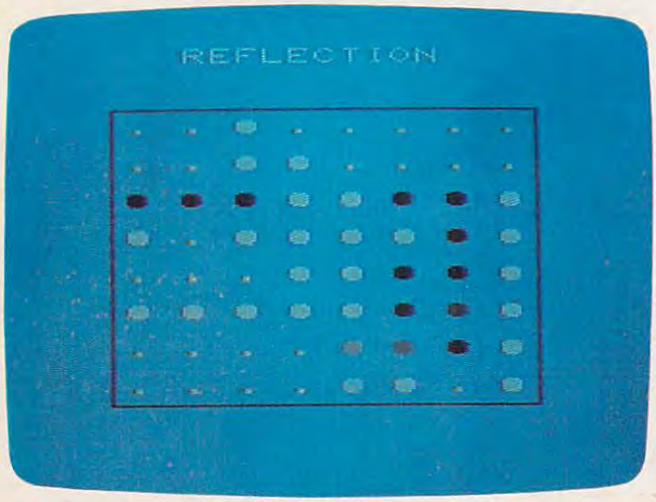
```
2640 DATA -8,-12,-2,-2,-2,-2,-12,-8,0,16,
     -8,5,2,2,5,-8,16,0              :rem 254
2650 DATA0,0,0,0,0,0,0,0             :rem 155
2660 DATA0,0,0,0,15,240,0,15         :rem 110
2670 DATA240,0,12,48,0,12,48,0       :rem 225
2680 DATA12,48,0,12,48,0,15,240       :rem 24
2690 DATA0,15,240,0,0,0,0,0           :rem 59
2700 DATA0,0,0,0,0,0,0,0             :rem 151
2710 DATA0,0,0,0,0,0,0,0             :rem 152
2720 DATA0,0,0,0,0,0,0,235             :rem 3
2730 DATA0,0,0,0,0,0,63,252           :rem 60
2740 DATA0,63,252,0,48,12,0,48       :rem 232
2750 DATA12,0,48,12,0,48,12,0        :rem 173
2760 DATA48,12,0,48,12,0,48,12       :rem 234
2770 DATA0,48,12,0,63,252,0,63       :rem 232
2780 DATA252,0,0,0,0,0,0,0             :rem 8
2790 DATA0,0,0,0,0,0,0,0             :rem 160
2800 DATA0,0,0,0,0,0,0,235             :rem 2
2810 DATA255,255,0,255,255,0,192,3
                                     :rem 184
2820 DATA0,192,3,0,192,3,0,192       :rem 228
2830 DATA3,0,192,3,0,192,3,0         :rem 124
2840 DATA192,3,0,192,3,0,192,3       :rem 233
2850 DATA0,192,3,0,192,3,0,192       :rem 231
2860 DATA3,0,255,255,0,255,255,0      :rem 81
2870 DATA0,0,0,0,0,0,0,0             :rem 159
2880 DATA0,0,0,0,0,0,0,8             :rem 168
2890 DATA63,63,63,63,31,15,7,0,0      :rem 82
2900 DATA252,252,252,248,240,224,0,0
                                      :rem 16
2910 DATA0,0,7,15,31,63,63,63        :rem 182
2920 DATA0,0,224,240,248,252,252,252
                                     :rem 18
2930 DATA 1,1,1,1,1,0,0,1,1,0,0,1,1,1,1,1
                                     :rem 136
```

Program 3: Reflection For VIC-20

Version by John Krause, Assistant Technical Editor

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
10 GOSUB540                          :rem 122
20 IFJ=20RF=64THEN470                  :rem 2
30 IFC1=1THENC1=2:C2=1:GOTO50        :rem 219
40 C1=1:C2=2                         :rem 100
50 IFC1=1ANDB$="C"THEN270            :rem 155
60 IFC1=2ANDW$="C"THEN270            :rem 178
70 GETA$:IFA$="P"THENJ=J+1:GOTO20:rem 220
80 POKE37154,127:A=PEEK(37152)AND128:B=(A
   =0)                               :rem 183
90 POKE37154,255:A=PEEK(37151)       :rem 147
100 R=R+((AAND8)=0)-((AAND4)=0)      :rem 124
110 C=C+((AAND16)=0)-B               :rem 121
120 IFR<0THENR=0                     :rem 206
130 IFR>7THENR=7                     :rem 223
140 IFC<0THENC=0                     :rem 178
150 IFC>7THENC=7                     :rem 195
160 B=8079-44*R+C+C                  :rem 219
170 D=PEEK(B):D1=PEEK(B+30720)       :rem 156
180 POKEB+30720,C1-1:POKEB,D+128      :rem 16
190 FORE=0TO99:NEXT                  :rem 193
200 POKEB+30720,D1:POKEB,D           :rem 230
210 FORE=0TO99:NEXT                  :rem 186
220 IF(AAND32)=0THENP=9*(7-R)+C:GOTO240
                                     :rem 247
230 GOTO70                            :rem 53
240 IFB(P)THEN50                     :rem 156
250 GOSUB400:IFNTHENA=P:GOSUB370:POKEL-30
    720,46:POKEL,7:B(P)=0:GOTO50       :rem 1
260 J=0:F=F+1:GOTO20                 :rem 131
270 M=-99:FORE=0TO70:IFB(E)THEN350   :rem 7
280 N=0:FORX=0TO7:A=E:B=0            :rem 251
290 A=A+D(X):IFA<0ORA>70THEN320       :rem 51
300 IFB(A)=C2THENB=B+1:GOTO290         :rem 2
310 IFB(A)=C1THENN=N+B               :rem 29
320 NEXT:IFN=0THEN350                :rem 31
330 N=N+RND(1)*.9:IFF<55THENN=G(E)+G(E)-N
                                     :rem 96
340 IFM<NTHENM=N:P=E                 :rem 16
350 NEXT:IFM=-99THENJ=J+1:GOTO20     :rem 250
360 J=0:F=F+1:GOSUB400:GOTO20        :rem 210
370 POKE36874,230:FORH=0TO99:NEXT:POKE368
    74,0                             :rem 203
380 L=38491+26*INT(A/9)+A+A:POKEL,C1-1
                                     :rem 90
390 B(A)=C1:RETURN                   :rem 59
400 A=P:GOSUB370:POKEL-30720,81      :rem 41
410 N=1:FORX=0TO7:A=P:B=0             :rem 2
420 A=A+D(X):IFA<0ORA>70THEN460       :rem 51
430 IFB(A)=C2THENB=B+1:GOTO420         :rem 1
440 IFB(A)<>C1ORB=0THEN460             :rem 2
450 N=0:A=P:FORE=1TOB:A=A+D(X):GOSUB370:N
    EXT                              :rem 243
460 NEXT:RETURN                      :rem 243
470 FORE=0TO70:IFB(E)=1THENS1=S1+1:rem 29
480 IFB(E)=2THENS2=S2+1               :rem 68
490 NEXT:PRINT"{HOME}{DOWN}{WHT}":IFS1>S2
    THENPRINT" BLACK WINS"S1"TO"S2:GOTO52
    0                                :rem 184
500 IFS1<S2THENPRINT" WHITE WINS"S2"TO"S1
    :GOTO520                         :rem 37
510 PRINT"{4 SPACES}IT'S A DRAW!     :rem 236
520 GETA$:IFA$=""THEN520              :rem 81
530 RUN                              :rem 141
540 FORA=0TO7:READD(A):NEXT          :rem 173
550 DIMB(70),G(70):A=RND(-TI):F=4:POKE368
    78,15                            :rem 76
560 FORA=0TO34:READB:G(A)=B:G(70-A)=B:NEX
    T                                 :rem 3
570 FORA=8TO62STEP9:B(A)=3:NEXT      :rem 176
580 B(30)=2:B(31)=1:B(39)=1:B(40)=2
                                     :rem 232
590 C1=2:C2=1                        :rem 158
600 POKE36879,110:C$="{BLK}BLACK":GOSUB77
    0:B$=A$                          :rem 61
610 C$="{WHT}WHITE":GOSUB770:W$=A$
                                     :rem 180
620 IFZ=0THEN690                     :rem 188
630 PRINT"{CLR}{DOWN}MOVE CURSOR WITH
    {6 SPACES}JOYSTICK."             :rem 125
```



"Reflection," VIC-20 version.

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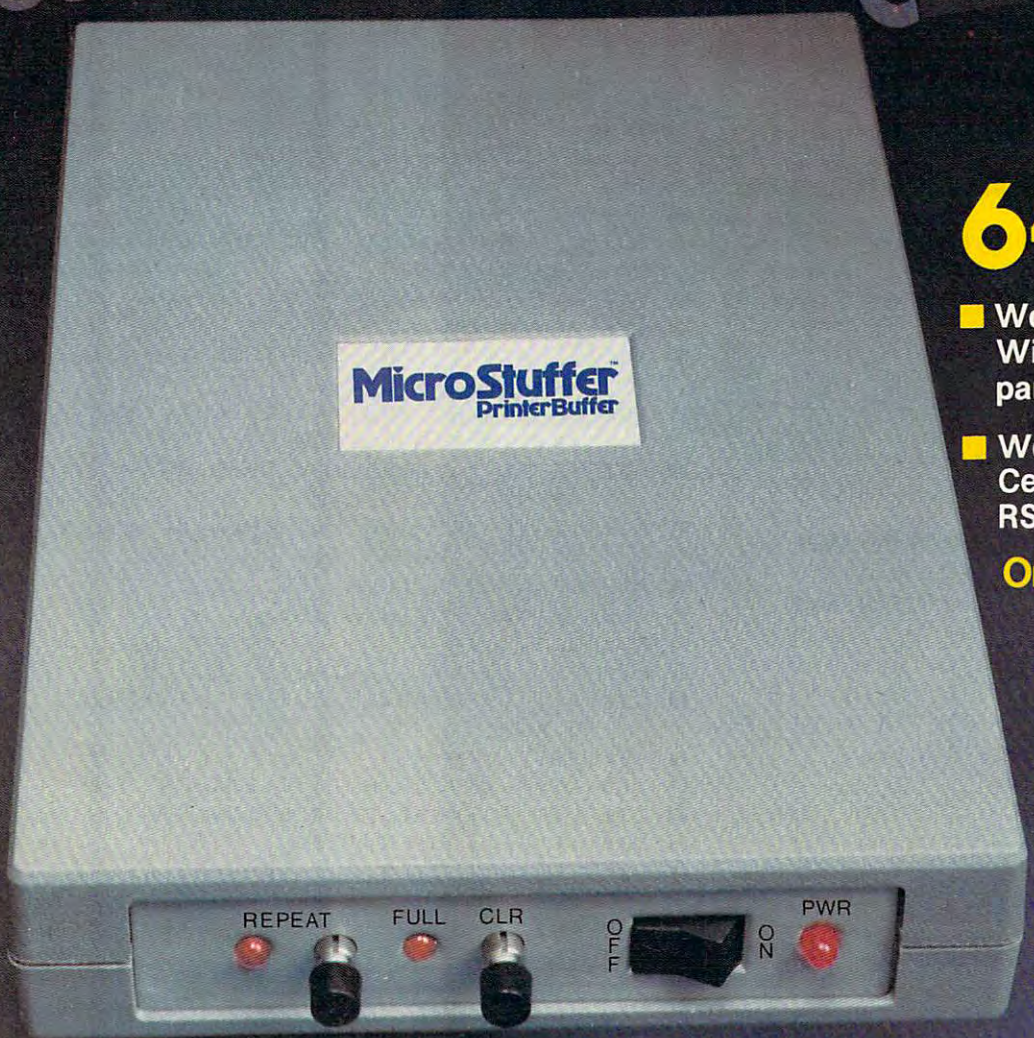

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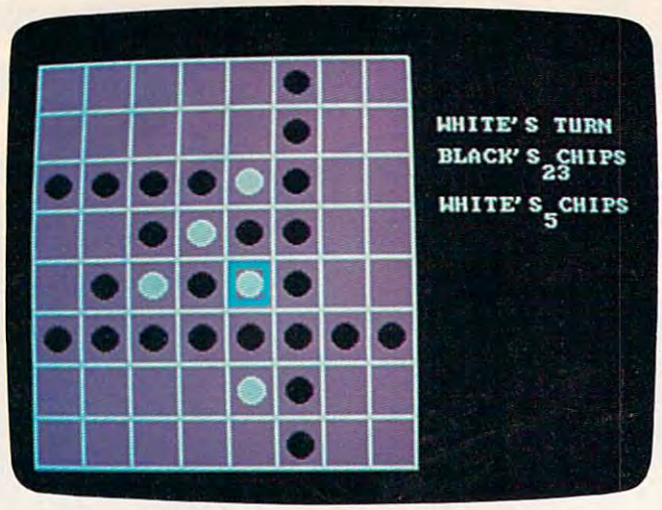
```
640 PRINT"{DOWN}PRESS FIRE BUTTON TO
    {2 SPACES}MAKE YOUR MOVE."     :rem 0
650 PRINT"{DOWN}PRESS P TO PASS."
                                   :rem 226
660 IFZ=2THENPRINT"{DOWN}CURSOR COLOR IND
    ICATESWHOSE TURN."             :rem 115
670 PRINT"{DOWN}PRESS SPACEBAR ..."
                                   :rem 87
680 GETA$:IFA$<>" "THEN680         :rem 156
690 PRINTCHR$(142)"{CLR}{WHT}{5 SPACES}RE
    FLECTION"                      :rem 220
700 PRINT"{2 DOWN}{2 RIGHT}{BLK}{A}******
    *********{S}                  :rem 208
710 FORA=1TO8:PRINT"{BLK}{2 SPACES}-{YEL}
    . . . . . .{BLK}-"             :rem 252
720 PRINT"{2 RIGHT}-"TAB(18)"-":NEXT
                                   :rem 172
730 PRINT"{UP}{2 RIGHT}{Z}**************
    {X}                            :rem 190
740 PRINT"{HOME}{10 DOWN}"TAB(9)"{WHT}Q
    {BLK}Q                         :rem 227
750 PRINTTAB(9)"{DOWN}{BLK}Q {WHT}Q
                                   :rem 244
760 RETURN                         :rem 125
770 PRINTCHR$(14)"{CLR}{WHT}WHO WILL PLAY
     THE"                          :rem 123
780 PRINT"{DOWN}{RVS}"C$"{OFF}{WHT} PIECE
    S?                             :rem 171
790 PRINT"{2 DOWN}{2 RIGHT}{RVS}C{OFF}OMP
    UTER                           :rem 62
800 PRINT"{DOWN}{2 RIGHT}{RVS}H{OFF}UMAN
                                   :rem 47
810 GETA$:IFA$=""THEN810           :rem 85
820 IFA$="H"THENZ=Z+1              :rem 211
830 RETURN                         :rem 123
840 DATA-9,-8,1,10,9,8,-1,-10      :rem 164
850 DATA16,-4,4,2,2,4,-4,16,0,-4,-12,-2,-
    2,-2,-2,-12,-4,0               :rem 189
860 DATA4,-2,4,2,2,4,-2,4,0,2,-2,2,0,0,2,
    -2,2                           :rem 128
```

Program 4: Reflection For IBM PC/PCjr

Version By Chris Poer, Editorial Programmer

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
MJ  5 DEF SEG=0:POKE 1047,64:KEY OFF:WI
      DTH 40:DEFINT A-Z:TU=1:PL=1
NI 10 DIM BO(80),TA(71),PT(71),A(80),P
      O(81),BC(56),WC(56),CU(68)
BI 20 GOSUB 9000
MJ 30 GOSUB 1000
NO 40 GOSUB 3000
MF 50 GOSUB 2000
BC 60 IF DE=1 THEN GOSUB 4000:GOTO 100
LE 70 FOR Y= 2 TO 5:FOR X = 2 TO 5
IL 75 READ A:PO(Y*9+X) = A:NEXT X:NEXT
       Y
NC 80 BO (30)= 2:BO(31)=1:BO(39)=1:BO(
      40)=2:NB=2:NW=2
JN 85 PUT (81,81),WC,XOR:PUT (106,81),
      BC,XOR
OC 90 PUT (81,106),BC,XOR:PUT (106,106
      ),WC,XOR
PF 100 FL=1:X=4:Y=4:NW$=STR$(NW)+"  ":
       NB$=STR$(NB)+"  "
IN 105 IF TU =2 THEN M$="WHITE'S TURN"
       :GOTO 120
EE 110 M$="BLACK'S TURN"
```



"Reflection," IBM PC/PCjr version.

```
MA 120 LOCATE 5,28:PRINT M$
GH 130 LOCATE 7,28:PRINT"BLACK'S CHIPS
       ":LOCATE 8,34:PRINT NB$
GB 140 LOCATE 10,28:PRINT"WHITE'S CHIP
       S":LOCATE 11,34:PRINT NW$
HJ 145 IF PL=1 THEN AL=NB+1:GOTO 150
MO 147 AL=NW+1
NI 150 IF CM=1 AND TU=PL THEN GOSUB 80
       00:GOTO 300
GC 160 PUT (3+X*25,3+Y*25),CU,XOR
GC 170 A$=INKEY$
JN 180 IF A$="I" AND Y>0 THEN Y=Y-1:XX
       =0:YY=1:GOTO 240
LI 190 IF A$="M" AND Y<7 THEN Y=Y+1:XX
       =0:YY=-1:GOTO 240
DD 200 IF A$="J" AND X>0 THEN X=X-1:YY
       =0:XX=1:GOTO 240
DK 210 IF A$="K" AND X<7 THEN X=X+1:YY
       =0:XX=-1:GOTO 240
CN 220 IF A$=" " THEN 270
NN 225 IF A$="E" THEN 800
FA 230 GOTO 170
GP 240 PUT (3+X*25,3+Y*25),CU,XOR
AD 250 PUT (3+(X+XX)*25,3+(YY+Y)*25),C
       U,XOR
FG 260 GOTO 170
II 270 XY=X+Y*9:IF BO(XY)>0 THEN 170
GH 280 PUT (3+X*25,3+Y*25),CU,XOR
OG 300 IF FL=0 THEN 350
FP 305 IF TU=1 THEN PUT (6+X*25,6+Y*25
       ),BC,XOR:GOTO 320
NL 310 PUT (6+X*25,6+Y*25),WC,XOR
MO 320 IF PO(XY)=0 THEN 350
OM 330 GOSUB 5000
MO 340 IF CHIPS>0 THEN GOSUB 6000:BO(X
       Y)=TU:GOTO 420
KH 350 LOCATE 18,27:PRINT"ILLEGAL MOVE
       ":LOCATE 19,27:PRINT"END OF TUR
       N"
QN 360 BEEP:FOR I= 1 TO 2000:NEXT I
MK 370 IF FL=0 THEN 410
FP 380 IF TU=1 THEN PUT (6+X*25,6+Y*25
       ),BC,XOR:GOTO 410
OL 390 PUT (6+X*25,6+Y*25),WC,XOR
KH 410 LOCATE 18,27:PRINT"
```

```
        ":LOCATE 19,27:PRINT"
         ":GOTO 470
MK 420  IF TU=1 THEN NB=NB+CHIPS+1:NW=N
        W-CHIPS:GOTO 440
NM 430  NW=NW+CHIPS+1:NB=NB-CHIPS
KK 440  FOR Q= 1 TO 8
FN 450  IF XY+OF(Q)>-1 THEN PO(XY+OF(Q)
        )=1
CG 460  NEXT Q
DN 470  TU=(TU-2)*-1+1
JD 480  GOSUB 900
GP 490  IF NB=0 OR NW=0 OR NW+NB=64 THE
        N 7000
MG 500  IF XY=0 OR XY=7 OR XY=63 OR XY=
        70 THEN GOSUB 8800
AC 510  GOTO 100
PB 800  LOCATE 18,28:PRINT"DO YOU WANT"
        :LOCATE 19,27:PRINT"TO QUIT (Y/
        N)"
GN 810  A$=INKEY$
OH 820  IF A$="Y" THEN FL=0:GOTO 840
IB 830  IF A$<>"N" THEN 810
LL 840  LOCATE 18,28:PRINT"
        ":LOCATE 19,27:PRINT"
            "
NO 850  IF FL=0 THEN 7000
GM 860  GOTO 170
OL 900  FOR I= 0 TO 70:TA(I)=0:NEXT I:R
        ETURN
PA 1000 CLS:LOCATE 2,14:PRINT"REFLECTI
        ON"
OH 1010 PRINT:PRINT"  USE THE (I-J-K-M
        ) KEYS TO MOVE THE        CURSO
        R  TYPE (E) TO END THE GAME"
CD 1020 LOCATE 7,10:PRINT"(W)HITE MOVE
        S FIRST"
IJ 1030 LOCATE 8,10:PRINT"(B)LACK MOVE
        S FIRST"
ID 1040 A$=INKEY$:IF A$="W" THEN TU=2:
        GOTO 1060
EC 1050 IF A$<>"B" THEN 1040
BA 1060 LOCATE 10,13:PRINT"(N)ORMAL BO
        ARD"
PG 1070 LOCATE 11,8:PRINT"(D)ESIGN YOU
        R OWN BOARD"
DK 1080 A$=INKEY$:Z=INT(RND(1)):IF A$=
        "D" THEN DE=1:GOTO 1100
FG 1090 IF A$<>"N" THEN 1080
KM 1100 LOCATE 13,13:PRINT"(1-2)PLAYER
        S"
DO 1120 A$=INKEY$:Z=INT(RND(1)):IF A$=
        "2" THEN RETURN
DH 1130 IF A$<>"1" THEN 1120
FK 1140 CM=1:LOCATE 16,11:PRINT"WHAT L
        EVEL? (1-2)"
IB 1150 A$=INKEY$:Z=INT(RND(1))
KF 1160 LE = VAL(A$):IF LE <1 OR LE>2
        THEN 1150
CI 1170 LOCATE 18,9:PRINT"COMPUTER PLA
        YS (B)LACK"
OP 1180 LOCATE 19,9:PRINT"COMPUTER PLA
        YS (W)HITE"
EP 1190 A$=INKEY$:IF A$="W" THEN PL=2:
        RETURN
MG 1200 IF A$<>"B" THEN 1190
IC 1210 RETURN
NI 2000 CLS:COLOR 0,1:LINE (0,0)-(199,
        199),2,BF
MO 2010 FOR X = 0 TO 200 STEP 25
EC 2020 LINE (X,1)-(X,200):LINE (X+1,1
        )-(X+1,200)
NA 2030 LINE (0,X)-(200,X):LINE (0,X+1
        )-(200,X+1)
AB 2040 NEXT X
OE 2050 LINE (0,198)-(200,198):LINE (0
        ,199)-(200,199)
JO 2060 RETURN
KM 3000 SCREEN 1:CLS:COLOR 0,1
LB 3005 CLS:LINE (105,105)-(120,120),0
        ,BF
GJ 3010 LINE (105,105)-(121,121),3,B
HA 3020 LINE (104,104)-(122,122),3,B
IH 3030 LINE (103,103)-(123,123),3,B
EC 3040 GET (103,103)-(123,123),CU
NA 3050 CLS
EB 3060 CIRCLE (113,113),7,1
MD 3070 PAINT (113,113),1,1
EM 3080 GET (106,106)-(120,120),WC
MI 3090 CLS:LINE (105,105)-(120,120),0
        ,BF
FK 3100 CIRCLE (113,113),7,2
OB 3110 PAINT (113,113),2,2
LG 3120 GET (106,106)-(120,120),BC
IB 3200 RETURN
BH 4000 LOCATE 4,27:PRINT"TYPE (B) FOR
        ":LOCATE 5,28:PRINT"BLACK CHIP
        S"
IP 4010 LOCATE 8,27:PRINT"TYPE (W) FOR
        ":LOCATE 9,28:PRINT"WHITE CHIP
        S"
HO 4020 LOCATE 12,27:PRINT"TYPE SPACE
        FOR":LOCATE 13,30:PRINT"NO CHI
        P"
GL 4030 FOR Y=0 TO 7:FOR X= 0 TO 7
PH 4050 PUT (X*25+3,Y*25+3),CU,XOR:C=C
        +1
MC 4060 A$=INKEY$:XY=Y*9+X
BJ 4070 IF A$="W" THEN NW=NW+1:BO(XY)=
        2:PUT(6+X*25,6+Y*25),WC,XOR:GO
        TO 4110
FP 4080 IF A$="B" THEN NB=NB+1:BO(XY)=
        1:PUT(6+X*25,6+Y*25),BC,XOR:GO
        TO 4110
EO 4090 IF A$=" " THEN 4130
NN 4100 GOTO 4050
BJ 4110 FOR E = 1 TO 8
DD 4120 IF XY+OF(E) > -1 THEN PO(XY+OF
        (E))=1
EC 4125 NEXT E
MC 4130 IF C/2<>INT(C/2) THEN PUT (X*2
        5+3,Y*25+3),CU,XOR
FP 4140 C=0
EG 4150 NEXT X:NEXT Y
EL 4160 LOCATE 4,27:PRINT"
        ":LOCATE 5,28:PRINT"
         "
CG 4170 LOCATE 8,27:PRINT"
        ":LOCATE 9,28:PRINT"
         "
EB 4180 LOCATE 12,27:PRINT"
           ":LOCATE 13,30:PRINT"
         "
```

```
IC 4200 RETURN
AF 5000 CHIPS=0:FOR I=1 TO 8:L=1:V=0:X
        X=0
JN 5010 V=V+OF(I):IF XY+V>70 OR XY+V<0
         THEN 5040
FN 5015 IF BO(XY+V)=5 THEN 5040
JN 5020 IF BO(XY+V)=3-TU THEN XX=1:L=L
        +1:GOTO 5010
QJ 5030 IF XX=1 AND BO(XY+V)=TU THEN G
        OSUB 5100
GP 5040 NEXT I
JO 5050 RETURN
BJ 5100 W=1:V=0
MC 5110 V=V+OF(I):TA(XY+V)=TU
CH 5120 W=W+1:IF W <=L-1 THEN 5110
KJ 5130 CHIPS=CHIPS+W-1:RETURN
KA 6000 FOR I=0 TO 7:FOR L= 0 TO 7
OC 6010 IF TA(I*9+L)=0 THEN 6050
KO 6020 IF TU=1 THEN PUT (6+L*25,6+I*2
        5),WC,XOR:PUT (6+L*25,6+I*25),
        BC,XOR:GOTO 6040
ML 6030 PUT (6+L*25,6+I*25),BC,XOR:PUT
         (6+L*25,6+I*25),WC,XOR
MF 6040 BC(I*9+L)=TU
KC 6050 NEXT L:NEXT I
JC 6060 RETURN
HF 7000 IF NW>NB THEN A$="WHITE WINS":
        H1=NW:H2=NB:GOTO 7030
LO 7010 IF NB>NW THEN A$="BLACK WINS":
        H1=NB:H2=NW:GOTO 7030
FH 7020 A$=" TIE GAME":H1=NW:H2=NB
FF 7030 LOCATE 18,29:PRINT A$
IJ 7040 LOCATE 19,29:PRINT H1;" TO ";H
        2
CF 7050 LOCATE 21,28:PRINT"PLAY AGAIN
        ?"
JC 7060 A$=INKEY$
KL 7070 IF A$="Y" THEN RUN
MG 7080 IF A$="N" THEN CLS:END
BH 7090 GOTO 7060
KI 8000 HY=-32000
HF 8010 XY=0:HI=-32000:FOR XY=0 TO 70
DC 8020 IF BO(XY)>0 OR PO(XY)=0 THEN G
        OTO 8200
LH 8050 GOSUB 5000:IF CHIPS=0 THEN 820
        0
AE 8060 TT=NB+NW:QW=(TT/8)*CHIPS+PT(XY
        )*(65-TT)/8
LI 8065 IF LE=2 AND CHIPS=A1 THEN QW=1
        0000
AA 8070 IF LE=2 AND REC=0 THEN GOSUB 8
        400:GOTO 8200
EK 8080 IF QW>HI THEN HI=QW:H1=XY:GOTO
         8200
NC 8090 IF HI=0 THEN 8200
CH 8100 IF QW/HI>.85 AND QW/HI<1.15 TH
        EN ZZ=INT(RND(1)*2):IF ZZ=1 TH
        EN HI=QW:H1=XY
PH 8200 NEXT
KI 8210 IF LE=2 AND REC=1 THEN RETURN
KL 8220 IF (HI=-32000 AND LE=1) OR (HY
        =-32000 AND LE=2) THEN FL=0:CH
        IPS=0
HO 8230 XY=H1
OG 8240 IF LE=2 THEN XY=H2
LD 8250 GOSUB 900
KP 8260 Y=INT(XY/9):X=XY-Y*9
KL 8270 RETURN
DM 8400 A1=AL:FOR E=0 TO 71
PL 8410 A(E)=BO(E)
EC 8420 IF TA(E)>0 THEN BO(E)=TA(E):A1
        =A1+1
EL 8430 NEXT E
LM 8440 BO(XY)=TU
MD 8441 FOR Q=1 TO 8
CA 8442 IF XY+OF(Q)>-1 THEN PO(XY+OF(Q
        ))=PO(XY+OF(Q))+1
NO 8443 NEXT Q
AC 8450 NE=QW:REC=1:Y1=XY
MP 8460 TU=3-TU:GOSUB 8010:REC=0
EB 8470 QY=NE-HI:TU=3-TU
GD 8480 IF QY>HY THEN HY=QY:H2=Y1:GOTO
         8550
CP 8490 IF HY=0 THEN 8550
CH 8500 IF QY/HY>.85 AND QY/HY<1.15 TH
        EN ZZ=INT(RND(1)*2):IF ZZ=1 TH
        EN HY=QY:H2=Y1
BD 8550 XY=Y1
JC 8560 FOR E=0 TO 70
NB 8570 BO(E)=A(E):NEXT E
NN 8580 FOR Q=1 TO 8
JA 8590 IF Y1+OF(Q)<0 THEN 8620
OC 8600 IF PO(Y1+OF(Q))=2 THEN PO(Y1+O
        F(Q))=1:GOTO 8620
DL 8610 PO(Y1+OF(Q))=1
MA 8620 NEXT Q
LF 8630 GOSUB 900
KK 8640 RETURN
EB 8800 IF XY=7 THEN 8860
FG 8810 IF XY=63 THEN 8890
MJ 8820 IF XY=70 THEN 8920
PF 8830 FOR I=9 TO 13:PT(I)=15-I:NEXT
        I
GF 8840 FOR I=1 TO 37 STEP 9:PT(I)=6-I
        NT(I/9):NEXT I
KB 8850 RETURN
GO 8860 FOR I=6 TO 42 STEP 9:PT(I)=6-I
        NT(I/9):NEXT I
ML 8870 FOR I=16 TO 12 STEP -1:PT(I)=I
        -10:NEXT I
LK 8880 RETURN
KA 8890 FOR I =54 TO 58:PT(I)=60-I:NEX
        T I
EC 8900 FOR I=64 TO 28 STEP -9:PT(I)=I
        NT(I/9)-1:NEXT I
JH 8910 RETURN
KC 8920 FOR I=61 TO 57 STEP -1:PT(I)=I
        -55:NEXT I
HE 8930 FOR I=69 TO 33 STEP -9:PT(I)=I
        NT(I/9)-1:NEXT
KA 8940 RETURN
GM 9000 FOR I=1 TO 8
NC 9010 READ A
MO 9020 OF(I)=A:NEXT
HL 9040 FOR X =0 TO 71
HL 9050 READ A:PT(X) = A
BO 9060 NEXT X
IL 9070 FOR I= 8 TO 71 STEP 9:BO(I) =
        5:NEXT I
MC 9099 RETURN
OA 9100 DATA -10,-9,-8,-1,1,8,9,10
```

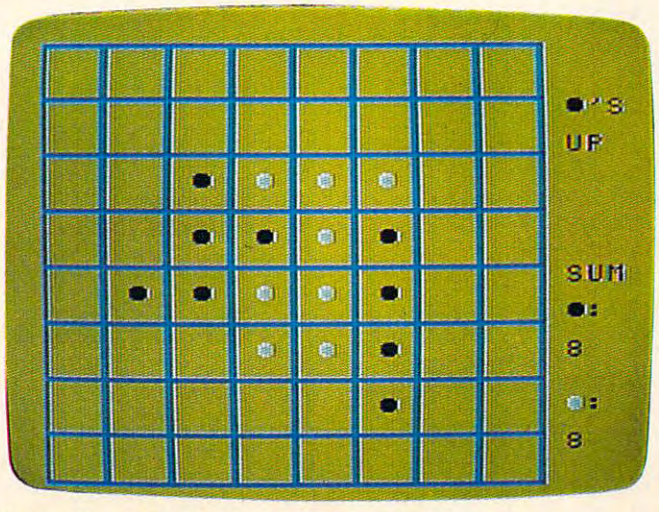
```
QP 9110 DATA 16,-6,6,2,2,6,-6,16,0,-6,
        -12,-2,-2,-2,-2,-12,-6,0
LJ 9120 DATA 6,-2,6,2,2,6,-2,6,0,2,-2,
        2,1,1,2,-2,2,0
BE 9130 DATA 2,-2,2,1,1,2,-2,2,0,6,-2,
        6,2,2,6,-2,6,0
PE 9140 DATA -6,-12,-2,-2,-2,-2,-12,-6
        ,0,16,-6,6,2,2,6,-6,16,0
DF 11000 DATA 1,1,1,1,1,0,0,1,1,0,0,1,
         1,1,1,1
```

Program 5: Reflection For TI-99/4A

Version by Pat Parrish, Programming Supervisor

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
10 DIM BO(80),TA(71),PT(71),A(71),P
   O(80)
20 GOTO 70
30 FOR I=1 TO LEN(A$)
40 CALL HCHAR(R,C+I,ASC(SEG$(A$,I,1
   )))
50 NEXT I
60 RETURN
70 TU=1
80 RANDOMIZE
90 GOSUB 3850
100 GOSUB 1310
110 IF DE=0 THEN 130
120 GOSUB 4090
130 GOSUB 1540
140 IF DE=0 THEN 170
150 GOSUB 1650
160 GOTO 330
170 RESTORE 4080
180 FOR Y=2 TO 5
190 FOR X=2 TO 5
200 READ PO(Y*9+X)
210 NEXT X
220 NEXT Y
230 BO(30)=2
240 BO(31)=1
250 BO(39)=1
260 BO(40)=2
270 BC=2
280 WC=2
290 CALL HCHAR(11,13,128)
300 CALL HCHAR(11,16,120)
310 CALL HCHAR(14,13,120)
320 CALL HCHAR(14,16,128)
330 FL=1
340 X=4
350 Y=4
360 KH=128
370 IF TU<>1 THEN 390
380 KH=120
390 CALL HCHAR(4,28,KH)
400 A$=STR$(BC)&" "
410 R=17
420 C=27
430 GOSUB 30
440 R=22
450 A$=STR$(WC)&" "
460 GOSUB 30
470 IF (CM<>1)+(TU<>1)THEN 500
480 GOSUB 2730
490 GOTO 900
500 KH=1
510 CALL GCHAR(3*Y+2,3*X+4,GG)
520 KH=1-KH
530 CALL HCHAR(3*Y+2,3*X+4,120+8*KH
    )
540 CALL KEY(0,K,S)
550 IF S=0 THEN 520
560 IF (K<>ASC("E"))+(Y<1)THEN 600
570 CALL HCHAR(3*Y+2,3*X+4,GG)
580 Y=Y-1
590 GOTO 510
600 IF (K<>ASC("S"))+(X<1)THEN 640
610 CALL HCHAR(3*Y+2,3*X+4,GG)
620 X=X-1
630 GOTO 510
640 IF (K<>ASC("D"))+(X>6)THEN 680
650 CALL HCHAR(3*Y+2,3*X+4,GG)
660 X=X+1
670 GOTO 510
680 IF (K<>ASC("X"))+(Y>6)THEN 720
690 CALL HCHAR(3*Y+2,3*X+4,GG)
700 Y=Y+1
710 GOTO 510
720 IF K<>ASC("Q")THEN 870
730 A$="SURE YOU WANT TO END (Y/N)?
    "
740 R=24
750 C=2
760 GOSUB 30
770 CALL KEY(0,K,S)
780 IF S=0 THEN 770
790 IF K<>89 THEN 820
800 EE=1
810 GOTO 830
820 IF K<>78 THEN 770
830 A$=C$&"{3 SPACES}"
840 C=2
850 GOSUB 30
860 IF EE=1 THEN 2370
870 IF K<>ASC(" ")THEN 520
880 XY=Y*9+X
890 IF BO(XY)>0 THEN 520
900 IF FL=0 THEN 990
910 CALL HCHAR(Y*3+2,X*3+4,120+(TU-
    1)*8)
920 IF PO(XY)=0 THEN 990
930 CALL SOUND(100,440,2)
940 GOSUB 2060
950 IF CHIPS<1 THEN 990
960 GOSUB 2300
970 BO(XY)=TU
980 GOTO 1110
990 R=24
```

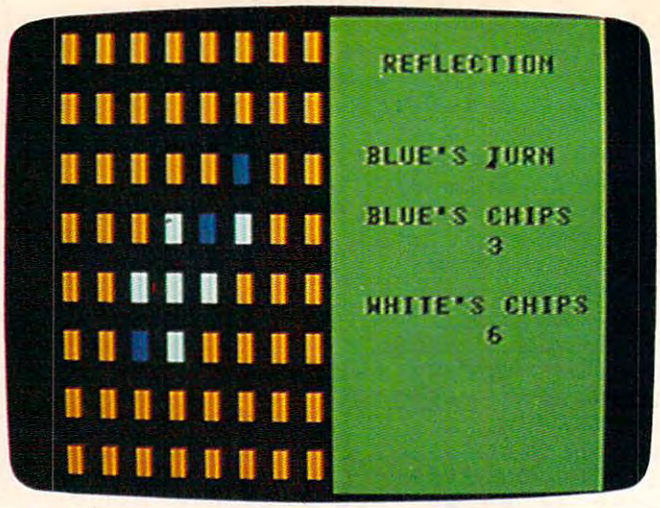


"Reflection," TI-99/4A version.

```
1000 CALL SOUND(100,110,2)
1010 C=2
1020 A$="ILLEGAL MOVE - LOSE TURN"
1030 GOSUB 30
1040 FOR I=1 TO 500
1050 NEXT I
1060 A$=C$
1070 GOSUB 30
1080 IF FL=0 THEN 1100
1090 CALL HCHAR(3*Y+2,3*X+4,32)
1100 GOTO 1210
1110 IF TU<>1 THEN 1150
1120 BC=BC+CHIPS+1
1130 WC=WC-CHIPS
1140 GOTO 1170
1150 WC=WC+CHIPS+1
1160 BC=BC-CHIPS
1170 FOR Q=1 TO 8
1180 IF XY+OF(Q)<0 THEN 1200
1190 PO(XY+OF(Q))=1
1200 NEXT Q
1210 TU=3-TU
1220 IF (WC=0)+(BC=0)+(WC+BC=64)THE
     N 2370
1230 GOSUB 1270
1240 IF (XY<>0)*(XY<>7)*(XY<>63)*(X
     Y<>70)THEN 1260
1250 GOSUB 3540
1260 GOTO 330
1270 FOR I=0 TO 71
1280 TA(I)=0
1290 NEXT I
1300 RETURN
1310 CALL CLEAR
1320 CALL SCREEN(11)
1330 PRINT TAB(10);"REFLECTION": :
     :
1340 PRINT TAB(11);"1ST MOVE"
1350 INPUT "{5 SPACES}(B)LACK/(W)HI
     TE: ":A$
1360 PRINT : :
1370 IF (A$<>"B")*(A$<>"W")THEN 134
     0
1380 IF A$="B" THEN 1400
1390 TU=2
1400 PRINT TAB(10);"GAME BOARD"
1410 INPUT "  (N)ORMAL/(D)ESIGN ONE
     : ":A$
1420 PRINT : :
1430 IF (A$<>"D")*(A$<>"N")THEN 140
     0
1440 IF A$="N" THEN 1460
1450 DE=1
1460 INPUT "{3 SPACES}# OF PLAYERS
     [1/2] ?: ":CM
1470 IF (CM<>1)*(CM<>2)THEN 1460
1480 PRINT : :
1490 CM=(CM=2)*2+CM
1500 IF CM=0 THEN 1530
1510 INPUT "{4 SPACES}SKILL LEVEL [
     1/2] ?: ":LE
1520 IF (LE<>1)*(LE<>2)THEN 1510
1530 RETURN
1540 A$="pqrqqrqqrqqrqqrqqrqqrqqr"
1550 B$="s t  t  t  t  t  t  t  t"
1560 C$="uvwvvwvvwvvwvvwvvwvvwvvw"
1570 CALL SCREEN(2)
1580 CALL COLOR(11,1,1)
1590 CALL COLOR(13,1,1)
1600 PRINT A$,B$,B$,A$&"  'S",B$,B$
     &" UP",A$,B$,B$,A$,B$,B$,A$&"
     SUM",B$,B$&" x:",A$,B$,B$,A$,B
     $&" "&CHR$(128)&":",B$,A$,B$,C
     $;
1610 CALL SCREEN(11)
1620 CALL COLOR(11,5,1)
1630 CALL COLOR(13,16,1)
1640 RETURN
1650 KH=0
1660 FOR Y=0 TO 7
1670 FOR X=0 TO 7
1680 KH=1-KH
1690 CALL HCHAR(3*Y+2,3*X+4,120+8*K
     H)
1700 CALL KEY(0,K,S)
1710 IF S=0 THEN 1680
1720 XY=X+Y*9
1730 IF K<>87 THEN 1770
1740 WC=WC+1
1750 BO(XY)=2
1760 GOTO 1850
1770 IF K<>66 THEN 1810
1780 BC=BC+1
1790 BO(XY)=1
1800 GOTO 1850
1810 IF K<>32 THEN 1680
1820 CALL HCHAR(3*Y+2,3*X+4,32)
1830 BO(XY)=0
1840 GOTO 1900
1850 CALL HCHAR(3*Y+2,3*X+4,120+8*(
     BO(XY)-1))
1860 FOR E=1 TO 8
1870 IF XY+OF(E)<=-1 THEN 1890
1880 PO(XY+OF(E))=1
1890 NEXT E
1900 NEXT X
1910 NEXT Y
1920 A$="OK?"
1930 R=22
1940 C=27
1950 GOSUB 30
1960 CALL KEY(0,K,S)
1970 IF S=0 THEN 1960
1980 IF (K<>78)*(K<>89)THEN 1960
1990 IF K<>89 THEN 2020
2000 CALL HCHAR(22,27,32,4)
2010 RETURN
2020 WC=0
2030 BC=0
2040 GOSUB 1540
2050 GOTO 1650
2060 CHIPS=0
2070 FOR I=1 TO 8
2080 L=1
2090 V=0
2100 XX=0
2110 V=V+OF(I)
2120 IF (XY+V>70)+(XY+V<0)THEN 2200
2130 IF BO(XY+V)=5 THEN 2200
2140 IF BO(XY+V)<>3-TU THEN 2180
2150 XX=1
2160 L=L+1
2170 GOTO 2110
2180 IF (XX<>1)+(BO(XY+V)<>TU)THEN
     2200
2190 GOSUB 2220
2200 NEXT I
2210 RETURN
2220 W=1
2230 V=0
2240 V=V+OF(I)
2250 TA(XY+V)=TU
```

```
2260 W=W+1
2270 IF W<L THEN 2240
2280 CHIPS=CHIPS+W-1
2290 RETURN
2300 FOR I=0 TO 71
2310 IF TA(I)=0 THEN 2350
2320 L=INT(I/9)
2330 CALL HCHAR(L*3+2,(I-9*L)*3+4,1
     20+(TU-1)*8)
2340 BO(I)=TU
2350 NEXT I
2360 RETURN
2370 REM WINNER
2380 IF BC<=WC THEN 2430
2390 A$="BLACK"
2400 HI=BC
2410 LO=WC
2420 GOTO 2490
2430 IF BC=WC THEN 2480
2440 A$="WHITE"
2450 HI=WC
2460 LO=BC
2470 GOTO 2490
2480 A$="TIE GAME."
2490 R=24
2500 C=3
2510 IF SEG$(A$,1,1)="T" THEN 2540
2520 CALL VCHAR(3,27,32,96)
2530 A$=A$&" WINS "&STR$(HI)&" TO "
     &STR$(LO)&" !"
2540 GOSUB 30
2550 BC=0
2560 WC=0
2570 DE=0
2580 TU=1
2590 FOR I=0 TO 71
2600 PO(I)=0
2610 BO(I)=0
2620 TA(I)=0
2630 NEXT I
2640 FOR I=1 TO 750
2650 NEXT I
2660 A$="  PLAY AGAIN (Y/N)?  "
2670 GOSUB 30
2680 CALL KEY(0,K,S)
2690 IF S=0 THEN 2680
2700 IF (K<>78)*(K<>89)THEN 2680
2710 IF K=89 THEN 100
2720 STOP
2730 HY=-32000
2740 HI=-32000
2750 XY=0
2760 IF (BO(XY)>0)+(PO(XY)=0)THEN 2
     960
2770 GOSUB 2060
2780 IF CHIPS=0 THEN 2960
2790 QW=(TT/8)*CHIPS+PT(XY)*(65-(TT
     /8))
2800 IF (LE<>2)+(CHIPS<>A1)THEN 282
     0
2810 QW=10000
2820 IF (LE<>2)+(RE<>0)THEN 2850
2830 GOSUB 3100
2840 GOTO 2960
2850 IF (QW<=HI)THEN 2890
2860 HI=QW
2870 H1=XY
2880 GOTO 2960
2890 IF HI=0 THEN 2960
2900 IF (QW/HI<.86)+(QW/HI>1.14)THE
     N 2960
2910 RANDOMIZE
2920 ZZ=INT(RND*2)+1
2930 IF ZZ<>1 THEN 2960
2940 HI=QW
2950 H1=XY
2960 XY=XY+1
2970 IF XY<71 THEN 2760
2980 IF (LE<>2)+(RE<>1)THEN 3000
2990 RETURN
3000 IF ((HI<>-32000)+(LE<>1))*((HY
     <>-32000)+(LE<>2))THEN 3030
3010 FL=0
3020 CHIPS=0
3030 XY=H1
3040 IF LE<>2 THEN 3060
3050 XY=H2
3060 GOSUB 1270
3070 Y=INT(XY/9)
3080 X=XY-Y*9
3090 RETURN
3100 A1=BC+1
3110 FOR E=0 TO 70
3120 A(E)=BO(E)
3130 IF TA(E)<1 THEN 3160
3140 BO(E)=TA(E)
3150 A1=A1+1
3160 NEXT E
3170 BO(XY)=1
3180 FOR Q=1 TO 8
3190 IF XY+OF(Q)<0 THEN 3210
3200 PO(XY+OF(Q))=PO(XY+OF(Q))+1
3210 NEXT Q
3220 NW=QW
3230 RE=1
3240 Y1=XY
3250 TU=2
3260 GOSUB 2740
3270 RE=0
3280 QY=NW-HI
3290 TU=1
3300 IF QY<=HY THEN 3340
3310 HY=QY
3320 H2=Y1
3330 GOTO 3410
3340 IF HY=0 THEN 3410
3350 IF (QY/HY<.86)+(QW/HY>1.14)THE
     N 3410
3360 RANDOMIZE
3370 ZZ=INT(RND*2)+1
3380 IF ZZ<>1 THEN 3410
3390 HY=QY
3400 H2=Y1
3410 XY=Y1
3420 FOR E=0 TO 70
3430 BO(E)=A(E)
3440 NEXT E
3450 GOSUB 1270
3460 FOR Q=1 TO 8
3470 IF Y1+OF(Q)<0 THEN 3520
3480 IF PO(Y1+OF(Q))<>2 THEN 3510
3490 PO(Y1+OF(Q))=1
3500 GOTO 3520
3510 PO(Y1+OF(Q))=0
3520 NEXT Q
3530 RETURN
3540 IF XY=7 THEN 3640
3550 IF XY=63 THEN 3710
3560 IF XY=70 THEN 3780
3570 FOR I=9 TO 13
3580 PT(I)=15-I
3590 NEXT I
```

```
3600 FOR I=1 TO 37 STEP 9
3610 PT(I)=6-INT(I/9)
3620 NEXT I
3630 RETURN
3640 FOR I=6 TO 42 STEP 9
3650 PT(I)=6-INT(I/9)
3660 NEXT I
3670 FOR I=16 TO 12 STEP -1
3680 PT(I)=I-10
3690 NEXT I
3700 RETURN
3710 FOR I=54 TO 58
3720 PT(I)=60-I
3730 NEXT I
3740 FOR I=64 TO 28 STEP -9
3750 PT(I)=INT(I/9)-1
3760 NEXT I
3770 RETURN
3780 FOR I=61 TO 57 STEP -1
3790 PT(I)=I-55
3800 NEXT I
3810 FOR I=69 TO 33 STEP -9
3820 PT(I)=INT(I/9)-1
3830 NEXT I
3840 RETURN
3850 FOR I=1 TO 8
3860 READ OF(I)
3870 NEXT I
3880 FOR X=0 TO 71
3890 READ PT(X)
3900 NEXT X
3910 FOR I=8 TO 71 STEP 9
3920 BO(I)=5
3930 NEXT I
3940 FOR I=0 TO 7
3950 READ A$
3960 CALL CHAR(I+112,A$)
3970 NEXT I
3980 CALL CHAR(120,"003C7E7E7E7E3C0
     0")
3990 CALL CHAR(128,"003C7E7E7E7E3C0
     0")
4000 RETURN
4010 DATA -10,-9,-8,-1,1,8,9,10
4020 DATA 16,-6,6,2,2,6,-6,16,0,-6,
     -12,-2,-2,-2,-2,-12,-6,0
4030 DATA 6,-2,6,2,2,6,-2,6,0,2,-2,
     2,1,1,2,-2,2,0
4040 DATA 2,-2,2,1,1,2,-2,2,0,6,-2,
     6,2,2,6,-2,6,0
4050 DATA -6,-12,-2,-2,-2,-2,-12,-6
     ,0,16,-6,6,2,2,6,-6,16,0
4060 DATA FFFFC0C0C0C0C0C0,FFFF0000
     00000000,FFFF030303030303,C0C0
     C0C0C0C0C0C0
4070 DATA 0303030303030303,C0C0C0C0
     C0C0FFFF,0000000000000FFFF,0303
     03030303FFFF
4080 DATA 1,1,1,1,1,0,0,1,1,0,0,1,1
     ,1,1,1
4090 CALL CLEAR
4100 CALL SCREEN(13)
4110 PRINT TAB(3);"TYPE (B) FOR BLA
     CK CHIP": : : :
4120 PRINT TAB(3);"TYPE (W) FOR WHI
     TE CHIP": : : :
4130 PRINT TAB(3);"TYPE SPACE FOR N
     O CHIP": : : : : : :
4140 FOR T=1 TO 750
4150 NEXT T
4160 RETURN
```



"Reflection," TRS-80 Color Computer version.

Program 6: Reflection For TRS-80 Color Computer

Version By Chris Poer, Editorial Programmer

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
10 CLEAR:DIM BO(80),TA(71),PT(71),A
   (71),PO(80)
20 BT$=CHR$(161)+CHR$(162):BB$=CHR$
   (164)+CHR$(168):WT$=CHR$(193)+CH
   R$(194):WB$=CHR$(196)+CHR$(200)
30 CT$=CHR$(177)+CHR$(178):CB$=CHR$
   (180)+CHR$(184):ET$=CHR$(241)+CH
   R$(242):EB$=CHR$(244)+CHR$(248)
40 CLS:TU=1:PL=1
50 GOSUB 670
60 GOSUB 590
70 GOSUB 900
80 IF DE=1 THEN GOSUB 1040:GOTO 140
90 FOR Y=2TO5:FORX=2TO5
100 READA:PO(Y*9+X)=A:NEXTX:NEXTY
110 BO(30)=2:BO(31)=1:BO(39)=1:BO(4
   0)=2:BC=2:WC=2
120 PRINT@198,WT$;:PRINT@200,BT$;:P
   RINT@230,WB$;:PRINT@232,BB$;
130 PRINT@262,BT$;:PRINT@264,WT$;:P
   RINT@294,BB$;:PRINT@296,WB$;
140 FL=0:WC$=STR$(WC)+"  ":BC$=STR$
   (BC)
150 IF TU=1 THEN A$="BLUE'S TURN":G
   OTO180
160 A$="WHITE'S TURN"
170 PRINT@51,"REFLECTION"
180 PRINT@146,A$:PRINT@210,"BLUE'S
   CHIPS":PRINT@248,BC$
190 PRINT@306,"WHITE'S CHIPS":PRINT
   @344,WC$
200 IF PL=1 THEN AL=BC+1:GOTO220
210 AL=WC+1
220 IF TU=PL AND CM=1 THEN GOSUB 16
   20:GOTO340
230 A=JOYSTK(0):X=INT(JOYSTK(2)/8):
   Y=INT(JOYSTK(3)/8)
240 SP=Y*64+X*2:XY=X+Y*9
250 PRINT@SP,CT$;:PRINT@SP+32,CB$;
260 FORI=1TO50:NEXTI
270 IF (PEEK(65280)=253 OR PEEK(652
   80)=125) AND BO(X+Y*9)=0 THEN 3
   50
```

```
280 A$=INKEY$:IFA$="E" THEN 540
290 IFBO(XY)=0THENPRINT@SP,ET$;:PRI
    NT@SP+32,EB$;
300 FORI=1TO50:NEXTI
310 IF BO(XY)=1 THEN PRINT@SP,BT$;:
    PRINT@SP+32,BB$;:GOTO330

320 IF BO(XY)=2 THEN PRINT@SP,WT$;:
    PRINT@SP+32,WB$;
330 GOTO 230
340 IF FL=1 THEN 390
350 IF TU=1 THENPRINT@SP,BT$;:PRINT
    @SP+32,BB$;:GOTO370
360 PRINT@SP,WT$;:PRINT@SP+32,WB$;
370 IF PO(XY)=0 THEN 390
380 GOSUB 1330:IFCHIPS>0THENGOSUB14
    40:BO(XY)=TU:GOTO440
390 PRINT@402,"ILLEGAL MOVE"
400 SOUND 15,15
410 PRINT@402,"{11 SPACES}"
420 IF FL=1 THEN 490
430 PRINT@SP,ET$;:PRINT@SP+32,EB$;:
    GOTO490
440 IF TU=1 THEN BC=BC+CHIPS+1:WC=W
    C-CHIPS:GOTO460
450 WC=WC+CHIPS+1:BC=BC-CHIPS
460 FORQ=1TO8:IFXY+OF(Q)>-1 THENPO(
    XY+OF(Q))=1
470 NEXTQ
480 IF XY=0ORXY=7ORXY=63ORXY=70THEN
    GOSUB2040
490 TU=3-TU
500 IF WC=0 OR BC=0 OR BC+WC=64 THE
    N 1500
510 GOSUB 530
520 GOTO140
530 FORI=0TO70:TA(I)=0:NEXT:RETURN
540 PRINT@400,"WANT TO QUIT Y/N";
550 A$=INKEY$:IF A$="Y" THEN 1500
560 IF A$<>"N" THEN 550
570 PRINT@400,"{16 SPACES}";
580 GOTO 290
590 CLS:FORY=0TO7:FORX=0TO7
600 XY=X*2+Y*64:PRINT@XY,ET$;:PRINT
    @XY+32,EB$;
610 NEXTX:NEXTY
620 RETURN
630 SET(I,J,6)
640 NEXTJ:NEXTI
650 REM FORI=1TO56:SET(I,31,3):NEXT
    I
660 RETURN
670 PRINTTAB(11)"REFLECTION"
680 PRINT:PRINT"  USE JOYSTICK2 TO
    MOVE THE{5 SPACES}CURSOR, PRESS
     THE JOYSTICK{6 SPACES}BUTTON T
    O  MAKE YOUR MOVE."
690 PRINT"TYPE (E) TO END THE GAME
    "
700 PRINT:PRINT"(W)HITE MOVES FIRST
    "
710 PRINT"(B)LUE MOVES FIRST"
720 A$=INKEY$:IF A$="W"THENTU=2:GOT
    O 740
730 IF A$<>"B"THEN720
740 PRINT:PRINT"(N)ORMAL BOARD"
750 PRINT"(D)ESIGN YOUR OWN BOARD"
760 A$=INKEY$:IF A$="D" THEN DE=1:G
    OTO 780
770 IF A$<>"N" THEN 760
780 PRINT:PRINT"(1-2) PLAYERS"
790 A$=INKEY$
800 IF A$="2" THEN RETURN
810 IF A$<>"1" THEN 790
820 CLS
830 CM=1:PRINT:PRINT:PRINT"WHAT LEV
    EL (1-2)"
840 A$=INKEY$:LE=VAL(A$):IF LE>2 OR
     LE<1 THEN 840
850 PRINT:PRINT"COMPUTER PLAYS (W)H
    ITE"
860 PRINT"COMPUTER PLAYS (B)LUE
870 A$=INKEY$:IF A$="W" THEN PL=2:G
    OTO 890
880 IF A$<>"B" THEN 870
890 RETURN
900 FORI=1TO8
910 READ A
920 OF(I)=A:NEXT I
930 FORX=0TO71
940 READ A:PT(X)=A
950 NEXT X
960 FOR I=8TO71STEP9:BO(I)=5:NEXTI
970 RETURN
980 DATA -10,-9,-8,-1,1,8,9,10
990 DATA 16,-6,6,2,2,6,-6,16,0,-6,-
    12,-2,-2,-2,-2,-12,-6,0
1000 DATA 6,-2,6,2,2,6,-2,6,0,2,-2,
    2,1,1,2,-2,2,0
1010 DATA 2,-2,2,1,1,2,-2,2,0,6,-2,
    6,2,2,6,-2,6,0
1020 DATA -6,-12,-2,-2,-2,-2,-12,-6
    ,0,16,-6,6,2,2,6,-6,16,0
1030 DATA 1,1,1,1,1,0,0,1,1,0,0,1,1
    ,1,1,1
1040 PRINT@81,"MOVE THE CURSOR";:PR
    INT@113,"WITH JOYSTICK2"
1050 PRINT@178,"TYPE (B) FOR":PRINT
    @211,"BLUE CHIP"
1060 PRINT@274,"TYPE (W) FOR":PRINT
    @307,"WHITE CHIP"
1070 PRINT@370,"HIT SPACE IF":PRINT
    @403,"A MISTAKE"
1080 PRINT@464,"TYPE (E) TO QUIT";
1090 A=JOYSTK(0):X=INT(JOYSTK(2)/8)
    :Y=INT(JOYSTK(3)/8):SP=X*2+Y*6
    4:XY=X+Y*9
1100 PRINT@SP,CT$;:PRINT@SP+32,CB$;
1110 FORI=1TO60:NEXTI
1120 PRINT@SP,ET$;:PRINT@SP+32,EB$;
1130 A$=INKEY$
1140 FORI=1TO50:NEXTI
1150 IF BO(XY)=1 THEN PRINT@SP,BT$;
    :PRINT@SP+32,BB$;:GOTO1170
1160 IF BO(XY)=2 THEN PRINT@SP,WT$;
    :PRINT@SP+32,WB$;
1170 IF A$="E" THEN 1230
1180 IF A$<>"E" AND A$<>" " AND A$<
    >"W" AND A$<>"B" THEN 1090
1190 IF A$="W"THEN BO(XY)=2:PRINT@S
    P,WT$;:PRINT@SP+32,WB$;:GOTO12
    20
1200 IF A$="B" THENBO(XY)=1:PRINT@S
    P,BT$;:PRINT@SP+32,BB$;:GOTO12
    20
1210 BO(XY)=0:PRINT@SP,ET$;:PRINT@S
    P+32,EB$;
1220 GOTO 1090
1230 FORI=0TO71:IFBO(I)=0 OR BO(I)=
    5 THEN 1290
```

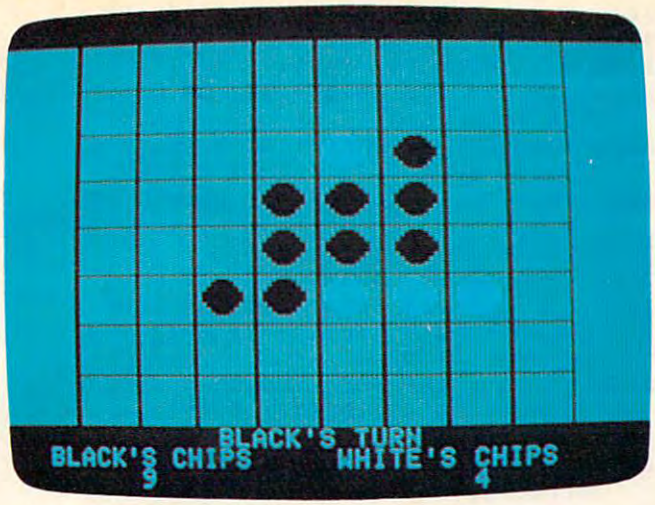
```
1240 FORE=1TO8
1250 IF I+OF(E)>-1 THEN PO(I+OF(E))
     =1
1260 NEXT E
1270 IF BO(I)=1 THEN BC=BC+1:GOTO12
     90
1280 WC=WC+1
1290 NEXT I
1300 FORI=64TO448STEP32:PRINT@I+16,
     "{16 SPACES}";
1310 NEXT I
1320 RETURN
1330 CHIPS=0:FORI=1TO8:L=1:V=0
1340 V=V+OF(I):IFXY+V>70 OR XY+V<0
     THEN 1380
1350 IF BO(XY+V)=5 THEN 1380
1360 IF BO(XY+V)=3-TU THENXX=1:L=L+
     1:GOTO1340
1370 IF XX=1 AND BO(XY+V)=TU THENGO
     SUB1400
1380 XX=0:NEXT
1390 RETURN
1400 W=1:V=0
1410 V=V+OF(I):TA(XY+V)=TU
1420 W=W+1:IF W<L THEN 1410
1430 CHIPS=CHIPS+W-1:RETURN
1440 FORJ=0TO7:FORI=0TO7
1450 IF TA(I+J*9)=0 THEN 1490
1460 SP=I*2+J*64:IF TU=2 THEN PRINT
     @SP,WT$;:PRINT@SP+32,WB$;:GOTO
     1480
1470 PRINT@SP,BT$;:PRINT@SP+32,BB$;
1480 BO(I+J*9)=TU
1490 NEXT:NEXT:RETURN
1500 FORI=128TO384STEP32
1510 PRINT@I+16,"{16 SPACES}";
1520 NEXT I
1530 IF WC>BC THEN A$="WHITE WINS":
     H1=WC:H2=BC:GOTO 1560
1540 IF BC>WC THEN A$="BLUE WINS":H
     1=BC:H2=WC:GOTO 1560
1550 A$=" TIE GAME":H1=BC:H2=WC
1560 PRINT@147,A$
1570 PRINT@212,H1;"TO";H2
1580 PRINT@304,"PLAY AGAIN (Y/N)";
1590 A$=INKEY$:IF A$="Y" THEN 10
1600 IF A$<>"N" THEN 1590
1610 CLS:END
1620 HY=-32000
1630 HI=-32000:FORXY=0TO70
1640 IF BO(XY)>0 OR PO(XY)=0 THEN N
     EXT:GOTO1730
1650 GOSUB 1330:IF CHIPS=0 THEN 172
     0
1660 TT=WC+BC:QW=(TT/8)*CHIPS+PT(XY
     )*(65-TT)/8
1670 IF LE=2 AND CHIPS=A1 THEN QW=1
     0000
1680 IF LE=2 AND REC=0 THEN GOSUB 1
     800:GOTO 1720
1690 IF QW>HI THEN HI=QW:H1=XY:GOTO
     1720
1700 IF HI=0 THEN 1720
1710 IF QW/HI >.85 AND QW/HI<1.15 T
     HEN ZZ=INT(RND(0)*2):IF ZZ=1TH
     ENHI=QW:H1=XY
1720 NEXT
1730 IF LE=2 AND REC=1 THEN RETURN
1740 IF (HI=-32000 AND LE=1) OR (HY
     =-32000 AND LE=2) THEN FL=1
1750 XY=H1
1760 IF LE=2 THEN XY=H2
1770 GOSUB 530
1780 Y=INT(XY/9):X=XY-Y*9:SP=X*2+Y*
     64
1790 RETURN
1800 A1=AL:FOR E=0TO70
1810 A(E)=BO(E)
1820 IF TA(E)>0 THEN BO(E)=TA(E):A1
     =A1+1
1830 NEXT E
1840 BO(XY)=TU
1850 FORQ=1TO8
1860 IF XY+OF(Q)>-1THENPO(XY+OF(Q))
     =PO(XY+OF(Q))+1
1870 NEXT Q
1880 NW=QW:REC=1:Y1=XY
1890 TU=3-TU:GOSUB 1630:REC=0
1900 QY=NW-HI:TU=3-TU
1910 IF QY>HY THEN HY=QY:H2=Y1:GOTO
     1940
1920 IF HY=0 THEN 1940
1930 IF QY/HY>.85 AND QY/HY<1.15 TH
     EN ZZ=INT(RND(0)*2):IFZZ=1THEN
     HY=QY:H2=Y1
1940 XY=Y1
1950 FORE=0TO70
1960 BO(E)=A(E):NEXT
1970 GOSUB 530
1980 FORQ=1TO8
1990 IF Y1+OF(Q) <0 THEN 2020
2000 IF PO(Y1+OF(Q))=2 THEN PO(Y1+O
     F(Q))=1:GOTO 2020
2010 PO(Y1+OF(Q))=0
2020 NEXT Q
2030 RETURN
2040 IF XY=7THEN2100
2050 IF XY=63THEN2130
2060 IF XY=70THEN2160
2070 FORI=9TO13:PT(I)=15-I:NEXT
2080 FORI=1TO37STEP9:PT(I)=6-INT(I/
     9):NEXT
2090 RETURN
2100 FORI=6TO42STEP9:PT(I)=6-INT(I/
     9):NEXT
2110 FORI=16TO12STEP-1:PT(I)=I-10:N
     EXT
2120 RETURN
2130 FORI=54TO58:PT(I)=60-I:NEXT
2140 FORI=64TO28STEP-9:PT(I)=INT(I/
     9)-1:NEXT
2150 RETURN
2160 FORI=61TO57STEP-1:PT(I)=I-55:N
     EXT
2170 FORI=69TO33STEP-9:PT(I)=INT(I/
     9)-1:NEXT
2180 RETURN
```

Program 7: Reflection For Apple

Version By Chris Poer, Editorial Programmer

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
5  CLEAR : DIM BO(80),TA(71),A(71),P
     O(80),PT(71)
10 TU = 1: ROT= 0: POKE 232,28: POKE
     233,3: TEXT : HOME :FL = 1:PL =
     1
12  RESTORE
15  GOSUB 9000
```



"Reflection," Apple version

```
20  GOSUB 1000
30  GOSUB 2000
40  GOSUB 10000
50  IF DE = 1 THEN  GOSUB 3000: GOTO
    100
60  HCOLOR= 4: SCALE= 1: DRAW 2 AT 1
    54,82: DRAW 2 AT 128,62
70  HCOLOR= 7: DRAW 2 AT 127,82: DRAW
    2 AT 153,62
80 BC = 2:WC = 2: FOR Y = 2 TO 5: FOR
    X = 2 TO 5
90  READ A:PO(Y * 9 + X) = A: NEXT :
    NEXT
100 FL = 1: IF TU = 1 THEN M$ = "BLA
    CK'S TURN": GOTO 120
110 M$ = "WHITE'S TURN"
120  VTAB 21: PRINT  TAB( 15)M$: VTAB
    (23): PRINT  TAB( 10);BC; TAB(
    30);WC;"        "
125  VTAB (22): PRINT "   BLACK'S CH
    IPS     WHITE'S CHIPS"
127  IF PL = 1 THEN AL = BC + 1: GOTO
    130
128 AL = WC + 1
130  IF COM = 1 AND TU = PL THEN  GOSUB
    6000: GOTO 250
135 X = 4:Y = 4:Z = 1: POKE  - 16368
    ,0
140 Q =  PEEK ( - 16384):X1 = X:Y1 =
    Y: POKE  - 16368,0
150  IF Q = 201 AND Y > 0 THEN Y = Y
     - 1
160  IF Q = 205 AND Y < 7 THEN Y = Y
     + 1
170  IF Q = 203 AND X < 7 THEN X = X
     + 1
180  IF Q = 202 AND X > 0 THEN X = X
     - 1
183  IF Q <  > 197 THEN 188
184  VTAB (23): PRINT "    ARE YOU S
    URE YOU WANT TO QUIT? ";: GET A
    $: IF A$ = "Y" THEN 7000
185  SCALE= Z: HCOLOR= 6: DRAW 1 AT
    X1 * 26 + 39,Y1 * 20 + 2
186  HOME : GOTO 100
188  IF BO(X1 + 9 * Y1) = 2 THEN OF =
    1: GOTO 190
189 OF = 0
190  SCALE= Z: HCOLOR= 6: DRAW 1 AT
    X1 * 26 + 39,Y1 * 20 + 2
200  IF BO(X1 + 9 * Y1) <  > 0 THEN
     SCALE= 1: HCOLOR= 4 + (BO(X1 +
    9 * Y1) - 2) * 3: DRAW 2 AT X1 *
    26 + 49 + OF + (X1 > 4) * 2,Y1 *
    20 + 2
210 Z = Z + 3: IF Z > 16 THEN Z = 1
215  IF X <  > X1 OR Y <  > Y1 THEN
     POKE 768,1: POKE 769,160: CALL
    770
220  SCALE= Z: HCOLOR= 5: DRAW 1 AT
    X * 26 + 39,Y * 20 + 2
230  IF Q <  > 160 THEN 140
233  IF BO(X + 9 * Y) > 0 THEN 140
235  IF TU = 1 THEN OF = 1: GOTO 240
237 OF = 0
240  SCALE= Z: HCOLOR= 6: DRAW 1 AT
    X * 26 + 39,Y * 20 + 2
250  SCALE= 1: HCOLOR= 4 + (TU - 1) *
    3
253  IF FL = 0 THEN 280
255  POKE 768,2: POKE 769,110: CALL
    770
260  DRAW 2 AT X * 26 + 49 + OF + (X
     > 4) * 2,Y * 20 + 2
265  POKE 768,3: POKE 769,125: CALL
    770
267 XY = Y * 9 + X: IF PO(XY) = 0 THEN
    290
270  GOSUB 4000
280  IF CHIPS > 0 THEN  GOSUB 5000:B
    O(XY) = TU + 1: GOTO 320
290  VTAB (23): PRINT "    FALSE MOV
    E, FORFEITURE OF TURN."
295  POKE 768,50: POKE 769,10: CALL
    770
296  FOR I = 1 TO 500: NEXT I
297  IF FL = 0 THEN 340
299  POKE 768,3: POKE 769,125: CALL
    770
300  HCOLOR= 6: DRAW 2 AT X * 26 + 4
    9 + OF + (X > 4) * 2,Y * 20 + 2
310  POKE 768,2: POKE 769,110: CALL
    770: GOTO 340
320  IF TU = 1 THEN BC = BC + CHIPS +
    1:WC = WC - CHIPS: GOTO 333
330 BC = BC - CHIPS:WC = WC + CHIPS +
    1
333  FOR Q = 1 TO 8
337  IF XY + OF(Q) >  - 1 THEN PO(XY
     + OF(Q)) = 1
338  NEXT Q
340 TU = (TU - 2) *  - 1 + 1
350  IF WC = 0 OR BC = 0 THEN 7000
360  IF WC + BC = 64 THEN 7000
370  GOSUB 500
380  IF XY = 0 OR XY = 7 OR XY = 63 OR
    XY = 70 THEN  GOSUB 6800
400  GOTO 100
500  FOR I = 0 TO 71:TA(I) = 0: NEXT
    : RETURN
1000  HOME : VTAB (2): HTAB (14): INVERSE
    : PRINT "REFLECTION": NORMAL
1001  VTAB (4): PRINT  TAB( 9)"(I-J-
    K-M) MOVES CURSOR."
1002  PRINT  TAB( 8)"PRESS SPACE TO
    MAKE MOVE."
1003  PRINT : PRINT  TAB( 11)"TYPE (
    E) TO QUIT."
```

```
1010  VTAB (10): PRINT  TAB( 11)"(W)
      HITE MOVE FIRST"
1020  PRINT  TAB( 11)"(B)LACK MOVE F
      IRST"
1030  POKE  - 16368,0
1040  IF  PEEK ( - 16384) < 128 THEN
      1030
1050  GET A$: IF A$ = "W" THEN TU =
      2: GOTO 1070
1060  IF A$ <  > "B" THEN 1030
1070  VTAB (13): PRINT  TAB( 10)"(N)
      ORMAL GAME BOARD"
1080  PRINT  TAB( 9)"(D)IFFERENT GAM
      E BOARD"
1090  POKE  - 16368,0
1100  IF  PEEK ( - 16384) < 128 THEN
      1090
1110  GET A$: IF A$ = "D" THEN DE =
      1: GOTO 1140
1120  IF A$ <  > "N" THEN 1090
1130 BO(30) = 2:BO(40) = 2:BO(31) =
      3:BO(39) = 3
1140  VTAB (16): PRINT  TAB( 14)"(O)
      NE PLAYER"
1150  PRINT  TAB( 14)"(T)WO PLAYERS"

1160  POKE  - 16368,0
1170  IF  PEEK ( - 16384) < 128 THEN
      1170
1180  GET A$: IF A$ = "T" THEN  RETURN
1190  IF A$ <  > "O" THEN 1160
1200 COM = 1: VTAB (19): PRINT  TAB(
      13)"WHAT LEVEL (1-2)"
1210  POKE  - 16368,0
1220  IF  PEEK ( - 16384) < 128 THEN
      1210
1230  GET A$:LE =  VAL (A$): IF LE <
      1 OR LE > 3 THEN 1230
1240  VTAB (21): PRINT  TAB( 9)"COMP
      UTER PLAYS (B)LACK"
1250  PRINT  TAB( 9)"COMPUTER PLAYS
      (W)HITE"
1260  POKE  - 16368,0
1270  IF  PEEK ( - 16384) < 128 THEN
      1260
1280  GET A$: IF A$ = "W" THEN PL =
      2: GOTO 1300
1290  IF A$ <  > "B" THEN 1280
1300  HOME : RETURN
2000  HGR
2010  FOR I = 0 TO 159
2020  HCOLOR= 6: HPLOT 36,I TO 244,I
2023  HCOLOR= 2: HPLOT 0,I TO 33,I
2026  HCOLOR= 5: HPLOT 245,I TO 279,
      I
2030  NEXT I
2040  HCOLOR= 4
2050  FOR I = 1 TO 8
2060  HPLOT I * 26 + 36,0 TO I * 26 +
      36,159
2070  HPLOT 36,I * 20 TO 244,I * 20
2080  NEXT I
2130  RETURN
3000  VTAB (22): PRINT "TYPE (W) FOR
      PLACING A WHITE CHIP HERE."
3003  PRINT "TYPE (B) FOR PLACING A
      BLACK CHIP HERE."
3005  PRINT " HIT THE SPACEBAR TO MO
      VE THE CURSOR."
3009  FOR I = 0 TO 7: FOR T = 0 TO 7
3010 X = T * 26 + 38:Y = I * 20 + 2
3020  POKE  - 16368,0
3030 Q =  PEEK ( - 16384)
3040  IF Q = 160 OR Q = 194 OR Q = 2
      15 THEN 3080
3050  HCOLOR= 6: DRAW 1 AT X,Y:Z = Z
      + 2: IF Z > 16 THEN Z = 1
3060  SCALE= Z: HCOLOR= 5: DRAW 1 AT
      X,Y
3070  GOTO 3030
3080  HCOLOR= 6: DRAW 1 AT X,Y
3090  IF Q = 215 THEN  HCOLOR= 7:OF =
      0:WC = WC + 1:BO(T + 9 * I) = 3
      : GOTO 3110
3100  IF Q = 194 THEN  HCOLOR= 4:OF =
      1:BC = BC + 1:BO(T + 9 * I) = 2
      : GOTO 3110
3105  POKE 768,1: POKE 769,160: CALL
      770: GOTO 3120
3110  SCALE= 1: DRAW 2 AT X + 11 + O
      F + (T > 4) * 2,Y
3115  POKE 768,3: POKE 769,125: CALL
      770
3116  IF Q = 160 THEN 3120
3117  FOR E = 1 TO 8
3118  IF T + 9 * I + OF(E) > 0 THEN
      PO(T + 9 * I + OF(E)) = 1
3119  NEXT
3120  NEXT T: NEXT I
3130  HOME : RETURN
4000 CHIPS = 0: FOR I = 1 TO 8:L = 1
      :V = 0
4005 V = V + OF(I): IF XY + V > 70 OR
      XY + V < 0 THEN 4040
4006  IF BO(XY + V) = 5 THEN 4040
4010  IF BO(XY + V) = 4 - TU THEN XX
      = 1:L = L + 1: GOTO 4005
4020  IF XX = 1 AND BO(XY + V) = TU +
      1 THEN  GOSUB 4100
4040 XX = 0: NEXT I
4060  RETURN
4100 W = 1:V = 0
4110 V = V + OF(I):TA(XY + V) = TU +
      1
4120 W = W + 1: IF W < L THEN 4110
4130 CHIPS = CHIPS + W - 1: RETURN
5000  FOR I = 0 TO 7: FOR T = 0 TO 7
5010  IF TA(T + I * 9) = 0 THEN 5080
5020  HCOLOR= 6: DRAW 2 AT T * 26 +
      49 + (T > 4) * 2,I * 20 + 2
5025  POKE 768,2: POKE 769,110: CALL
      770
5030  HCOLOR= 4 + (TU - 1) * 3: DRAW
      2 AT T * 26 + 49 + OF + (T > 4)
       * 2,I * 20 + 2
5040 BO(T + I * 9) = TU + 1
5055  POKE 768,3: POKE 769,125: CALL
      770
5060  FOR Q = 1 TO 8
5070  IF XY + OF(Q) > 0 THEN PO(XY +
      OF(Q)) = 1
5075  NEXT Q
5080  NEXT T: NEXT I
5090  RETURN
6000 HY =  - 32000:OF = (PL - 2) *  -
      1
6010 HI =  - 32000: FOR XY = 0 TO 70
      : IF PO(XY) = 0 OR BO(XY) > 0 THEN
       NEXT XY: GOTO 6203
6030  GOSUB 4000
```

```
6040  IF CHIPS = 0 THEN  NEXT XY: GOTO
     6203
6060 TT = WC + BC:QW = (TT / 8) * CH
     IPS + PT(XY) * (65 - TT) / 8
6065  IF LE = 2 AND CHIPS = A1 THEN
     QW = 10000
6070  IF LE = 2 AND REC = 0 THEN  GOSUB
     6400: NEXT XY: GOTO 6203
6080  IF QW > HI THEN HI = QW:H1 = X
     Y: NEXT : GOTO 6203
6100  IF HI = 0 THEN  NEXT XY: GOTO
     6203
6110  IF QW / HI > .85 AND QW / HI <
     1.15 THEN ZZ =  INT ( RND (1) *
     2): IF ZZ = 1 THEN HI = QW:H1 =
     XY
6200  NEXT
6203  IF LE = 2 AND REC = 1 THEN  RETURN
6205  IF (HI =  - 32000 AND LE = 1) OR
     (HY =  - 32000 AND LE = 2) THEN
     FL = 0:CHIPS = 0
6210 XY = H1
6220  IF LE = 2 THEN XY = H2
6230  GOSUB 500
6250 Y =  INT (XY / 9):X = XY - Y *
     9
6260  RETURN
6400 A1 = AL: FOR E = 0 TO 70
6410 A(E) = BO(E)
6420  IF TA(E) > 0 THEN BO(E) = TA(E
     ):A1 = A1 + 1
6430  NEXT E
6440 BO(XY) = TU + 1
6441  FOR Q = 1 TO 8
6442  IF XY + OF(Q) >  - 1 THEN PO(X
     Y + OF(Q)) = PO(XY + OF(Q)) + 1
6446  NEXT Q
6450 NW = QW:REC = 1:Y1 = XY
6460 TU = 3 - TU: GOSUB 6010:REC = 0
     :TU = 3 - TU:QW = NW - HI
6470  IF QW > HY THEN HY = QW:H2 = Y
     1: GOTO 6550
6490  IF HY = 0 THEN 6550
6500  IF QW / HY > .85 AND QW / HY <
     1.15 THEN ZZ =  INT ( RND (1) *
     2): IF ZZ = 1 THEN HY = QW:H2 =
     Y1
6550 XY = Y1
6560  FOR E = 0 TO 70
6570 BO(E) = A(E)
6580  NEXT
6590  GOSUB 500
6600  FOR Q = 1 TO 8
6610  IF Y1 + OF(Q) < 0 THEN 6630
6615  IF PO(Y1 + OF(Q)) = 2 THEN PO(
     Y1 + OF(Q)) = 1: GOTO 6630
6620 PO(Y1 + OF(Q)) = 0
6630  NEXT Q
6640  RETURN
6800  IF XY = 7 THEN 6860
6810  IF XY = 63 THEN 6890
6820  IF XY = 70 THEN 6920
6830  FOR I = 9 TO 13:PT(I) = 15 - I
     : NEXT
6840  FOR I = 1 TO 37 STEP 9:PT(I) =
     6 -  INT (I / 9): NEXT
6850  RETURN
6860  FOR I = 6 TO 42 STEP 9:PT(I) =
     6 -  INT (I / 9): NEXT
6870  FOR I = 16 TO 12 STEP  - 1:PT(
     I) = I - 19
6880  RETURN
6890  FOR I = 54 TO 59:PT(I) = I - 4
     8: NEXT
6900  FOR I = 64 TO 28 STEP  - 9:PT(
     I) =  INT (I / 9) - 1: NEXT
6910  RETURN
6920  FOR I = 62 TO 58 STEP  - 1:PT(
     I) = I - 57: NEXT
6930  FOR I = 69 TO 33 STEP  - 9:PT(
     I) =  INT (I / 9) - 1: NEXT
6940  RETURN
7000  SCALE= 1:WI = 3: IF WC > BC THEN
     GC = WC:BL = 4:M$ = "WHITE":WH =
     1: GOTO 7020
7010  IF BC > WC THEN GC = BC:WI = 2
     :WH = 3:M$ = "BLACK":BL = 6: GOTO
     7020
7015 TI = 1:GC = WC:WH = 1:BL = 6:WI
      = 0
7020  FOR I = 1 TO GC
7030  IF WC >  = I THEN  HCOLOR= 3: DRAW
     2 AT 15,140 - I * 2
7040  IF BC >  = I THEN  HCOLOR= 4: DRAW
     2 AT 266,140 - I * 2
7045  POKE 768,2: POKE 769,80 + I *
     2: CALL 770
7050  NEXT I
7060  HCOLOR= CO: FOR I = 1 TO GC
7070  IF WC >  = I THEN  HCOLOR= WH:
      DRAW 2 AT 15,140 - I * 2
7075  IF BC >  = I THEN  HCOLOR= BL:
      DRAW 2 AT 266,140 - I * 2
7080  POKE 768,2: POKE 769,80 + I *
     2: CALL 770
7090  NEXT I
7100  HOME : VTAB (21): IF TI THEN  PRINT
      TAB( 10)"THE GAME IS A TIE": GOTO
     7120
7110  PRINT  TAB( 12)M$" IS THE WINN
     ER"
7120  PRINT "  WOULD YOU LIKE TO PLA
     Y AGAIN? (Y/N)";
7130  POKE  - 16368,0
7140  IF  PEEK ( - 16384) < 128 THEN
     7130
7150  GET A$: IF A$ = "N" THEN  TEXT
     : HOME : END
7160  IF A$ <  > "Y" THEN 7150
7170  GOTO 5
7200  END
9000  FOR I = 1 TO 8
9010  READ A
9020 OF(I) = A
9030  NEXT I
9040  FOR X = 0 TO 71
9050  READ A:PT(X) = A
9060  NEXT
9070  FOR I = 770 TO 795: READ M: POKE
     I,M: NEXT I
9080  FOR I = 8 TO 71 STEP 9:BO(I) =
     5: NEXT
9099  RETURN
9100  DATA  -10,-9,-8,-1,1,8,9,10
9120  DATA  16,-8,5,2,2,5,-8,16,0,-8
     ,-12,-2,-2,-2,-2,-12,-8,0
9130  DATA  5,-2,8,2,2,8,-2,5,0,2,-2
     ,2,1,1,2,-2,2,0
9140  DATA  2,-2,2,1,1,2,-2,2,0,5,-2
     ,8,2,2,8,-2,5,0
```

```
9150  DATA  -8,-12,-2,-2,-2,-2,-12,-
      8,0,16,-8,5,2,2,5,-8,16,0
9160  DATA    172,01,03,174,01,03,16
      9,04,32,168,252,173,48,192,232,
      208,253,136,208,239,206,0,03,20
      8,231,96
10000 X = 795: IF  PEEK (796) = 2 THEN
      RETURN
10010  READ A: IF A =  - 1 THEN  RETURN
10020 X = X + 1: POKE X,A
10030  GOTO 10010
10040  DATA  2,0,6,0,9,0
10050  DATA  46,60,0
10055  DATA  7,63,63,19,45,45,45,45
10060  DATA  45,19,63,63,63,63,63,17
      ,27,45,45,45,45,45,45,45,19
10070  DATA  63,63,63,63,63,63,63
10080  DATA  19,45,45,45,45,45,45,45
      ,45,45,19,63,63,63
10090  DATA  63,63,63,63,63,63,21,45
      ,45,45,45,45,45,45,45
10100  DATA   45,19,63,63,63,63,63,6
      3,63,63
10110  DATA  63,17,13,45,45,45,45,45
      ,45,45,45
10120  DATA  19,31,63,63,63,63,63,63
      ,63
10130  DATA  10,45,45,45,45,45,45,45
      ,19
10140  DATA  31,63,63,63,63,63,10,45
      ,45,45,45,45,19
10150  DATA  31,63,63,63
10999  DATA  0,-1
11000  DATA  1,1,1,1,1,0,0,1,1,0,0,1
      ,1,1,1,1
```

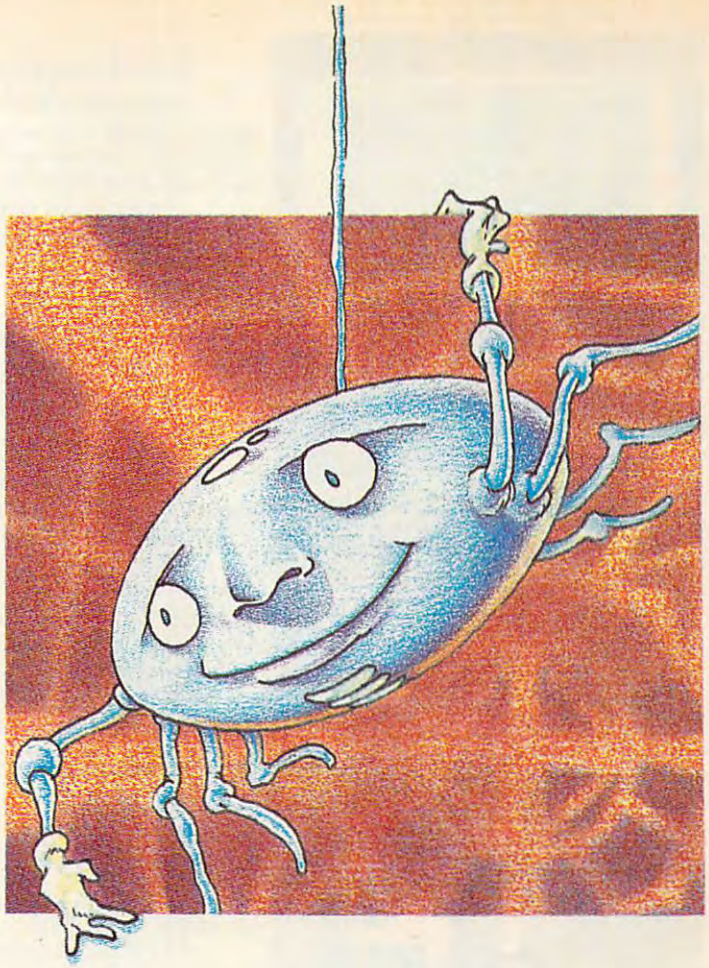


Illustration by Lee Noel

Spiders

Joe Rocke

A furiously fast and frenzied game, "Spiders" will keep your fire-button finger in top physical condition. It takes sharp reflexes and lots of stamina to resist the waves of alien spiders bent on attacking your solar system. Originally written for the unexpanded VIC-20, Spiders has been adapted for the Commodore 64 with joystick; Apple; IBM PC with 128K, color/graphics adapter, game port adapter, joystick, and Advanced BASIC (BASICA); and PCjr with 128K, joystick, and Cartridge BASIC.

The Arachnid Empire is invading, and it's up to you to stop them. These venomous spiders have left their home web-world to seek fresh prey, and are attracted to the blue sphere of Earth.

As you sip coffee in your comfy chair, you're suddenly interrupted by screaming klaxons and flashing lights which alert you that a large Arachnid armada is speeding toward Earth. It's too late to send up manned fighters, so you activate the planetary defense system—radio-controlled robot fighters. No longer comfortable, you poise before your video screen, thumb on the launcher button, awaiting the onslaught.

Your video screen shows the spider formation. Three rows of fighting spiders jockey for position, hoping to receive the signal that will dispatch them toward glorious conquest. The whole armada sways back and forth hypnotically. Individual fighters get the signal and careen away, dropping missiles. You must position your robot fighter beneath each spider, then squeeze off a shot. Down they come, firing missiles as they whirl toward seeming victory. If you miss, the spider will rejoin its comrades. Their orders are to eliminate the planetary defense system (you), then attack *en masse*.

Two Arachnidan generals radio orders from their safe positions at the top of the formations. A lieutenant waits beneath each general. The generals and lieutenants won't attack until you've eliminated all the fighters, but then will fight with surprising speed and fury. Until you've destroyed the fighters, these officers are impervious to your attack.

You get 10 points for shooting a fighter in formation, and 100 points for an attacking spider. You have three robot ships available, one at a time. You lose a ship when a spider hits it with a missile or crashes into it. When (not *if*) you lose a ship, the invaders victoriously swarm to the ground.

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Before all of Humankind is crushed beneath the Bungeling Empire's iron heel, one faint hope remains: you in your helicraft.

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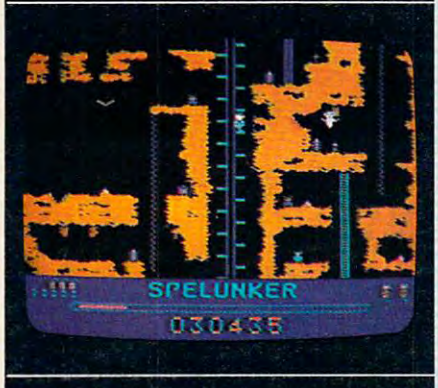
Ever dream that you were locked in a haunted castle, wandering blindly through darkened corridors, never knowing what ghastly demons await you? Then you'll feel right at home in *The Castles of Doctor Creep.*

It's a maddening maze of 13 separate castles, more than 200 rooms in all. Sinister surprises await you behind every door: mummies and monsters, forcefields and death rays, trap doors and dead—*very* dead—ends. Remember where you've been and watch where you're going...there's got to be a way out *somewhere*!

Better hurry, or you'll wind up playing a rather unpleasant role in one of Doctor Creep's experiments.



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Let's face it: you're in deep, deep trouble.

WHISTLER'S BROTHER™

You're the star of a full-fledged arcade adventure—and the big question is whether it'll turn out to be a comedy or a tragedy. That's because your co-star and beloved brother, Archaeologist Fenton Q. Fogbank, is rather absent-minded and extremely accident-prone.

As you search for priceless treasures in steaming tropical jungles, ancient cliff villages, musty old tombs and glittering crystal caverns, you control both your character and your brother. The only way to keep him on track and out of trouble is to whistle and pray that he follows you to safety.

Poison arrows, runaway boulders, fearsome frogs and mysterious mummies are only a few of the hazards that'll make you wish you weren't your brother's keeper.

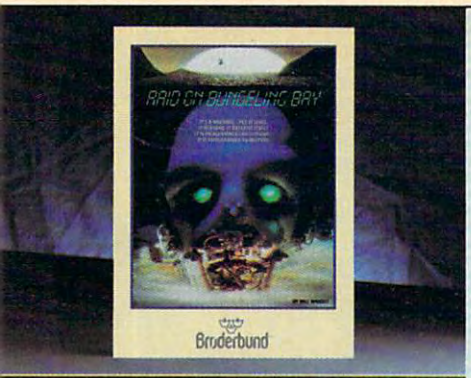
STEALTH™

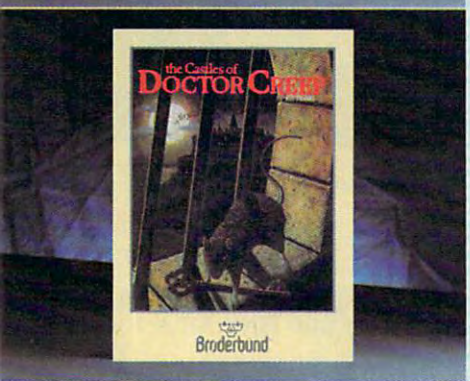
You're all alone on a strange and forbidding planet. On the distant horizon, looming thousands of meters above the blasted landscape, lies your destination: The Dark Tower, home of the mysterious Council of Nine, cruel overlords of a conquered world.

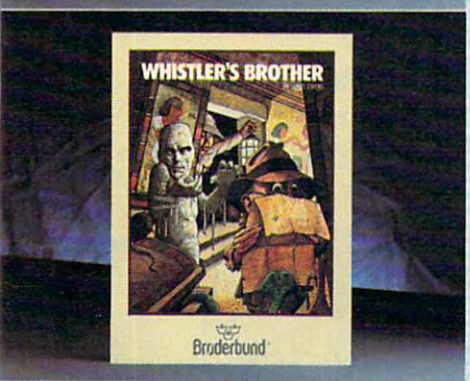
You must maneuver your Stealth Starfighter through an unending assault by the Council's automated arsenal—jets and heat-seeking missiles, photon tanks and anti-aircraft batteries, vaporizing volcanoes and deadly energy fields. Outgunned and outmanned, you must press ever onward, with only your stealth to rely on.

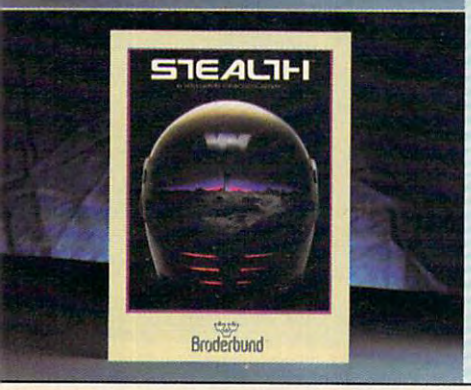
You must reach the Tower. You must destroy it. There's no turning back.

All titles available on Commodore 64. Championship Lode Runner *also available on Apple II+, IIe, IIc.* Whistler's Brother, Spelunker *and* Stealth *also available for Atari Home Computers. Commodore 64 is a trademark of Commodore Electronics, Ltd. Apple is a trademark of Apple Computer, Inc. Atari is a trademark of Atari Corporation.*









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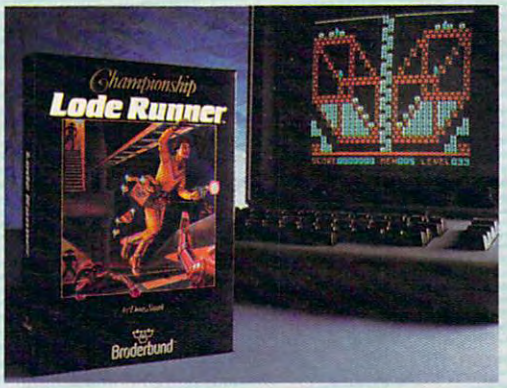

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And if you haven't yet paid your dues on the original *Lode Runner,* don't even think of attempting this championship round.

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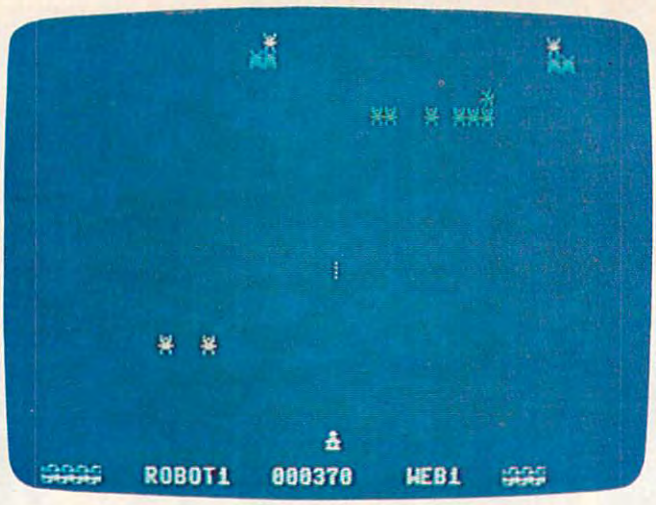
"Spiders," VIC-20 version.



"Spiders," Commodore 64 version.

The bonus round begins once you've eliminated all the fighters. Two at a time, the lieutenants and then the generals launch their attack. The bonus round scores ten times as much as normal play. Shooting an officer in formation gets you 100 points, and hitting an officer in flight is worth 1000 points. The bonus round ends when your ship is hit or when you've finished off the officers. You don't lose your ship if hit during the bonus round. After the round, a new (more difficult) formation appears.

VIC-20 Spiders

The VIC, 64, and Apple versions of "Spiders" each consist of two programs, one written in BASIC, the other in machine language.

Program 1 is the BASIC portion of Spiders for the unexpanded VIC-20. Program 2 must be typed in with "Tiny MLX," the machine language editor for the unexpanded VIC found elsewhere in this issue. Before typing in Program 2, make these modifications to the Tiny MLX program:

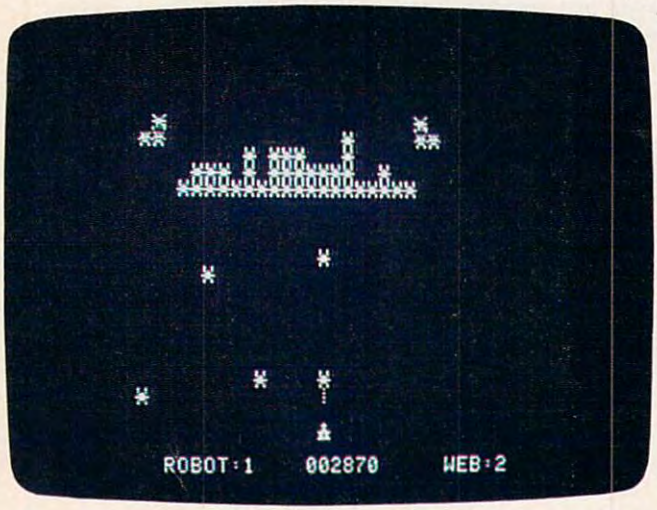
```
100 POKE55,0:POKE56,25:CLR          :rem 8
210 S=6405:E=7676                   :rem 136
```

After you have typed in and saved both programs, follow these steps to load and run Spiders on the unexpanded VIC:

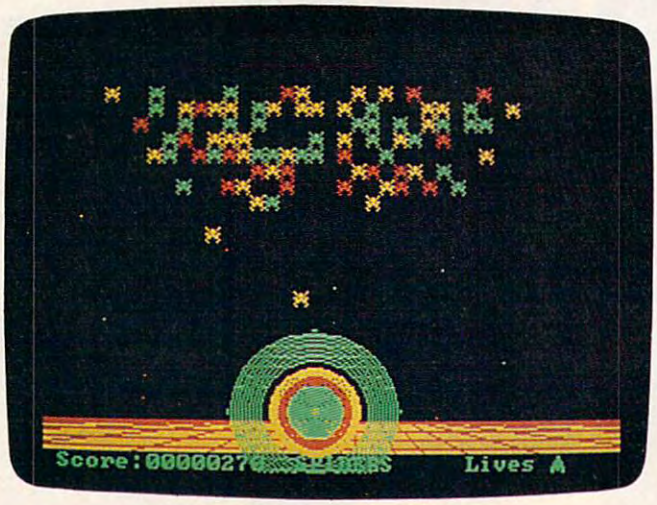
1. Load the BASIC program (LOAD *"filename"*,8 for disk or LOAD *"filename"* for tape).
2. Load the machine language program (LOAD *"filename"*,8,1 for disk or LOAD *"filename"*,1,1 for tape).
3. Plug in a joystick and enter RUN.

Commodore 64 Spiders

The 64 version is entered much like the VIC version. Enter the BASIC portion (Program 3) and



"Spiders," Apple version.



"Spiders," IBM PC/PCjr version.

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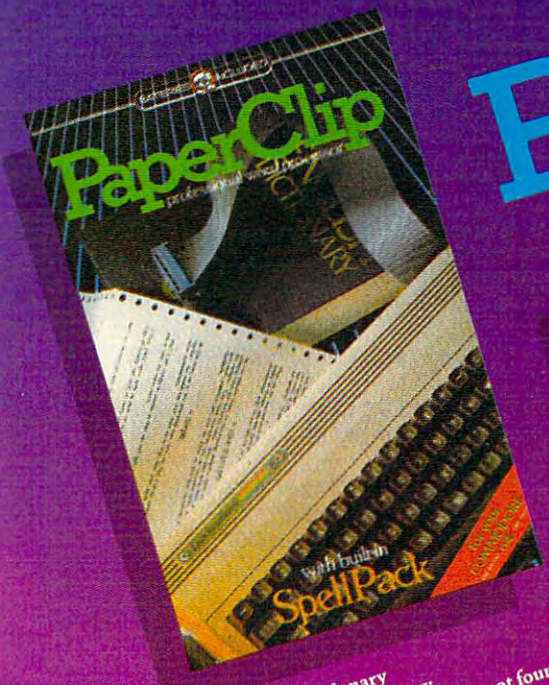

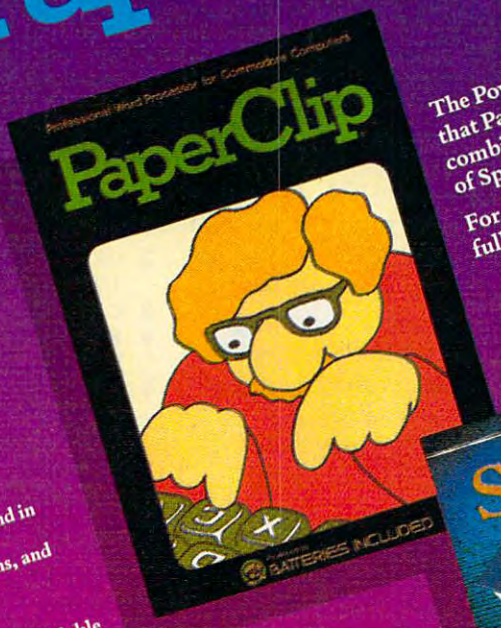

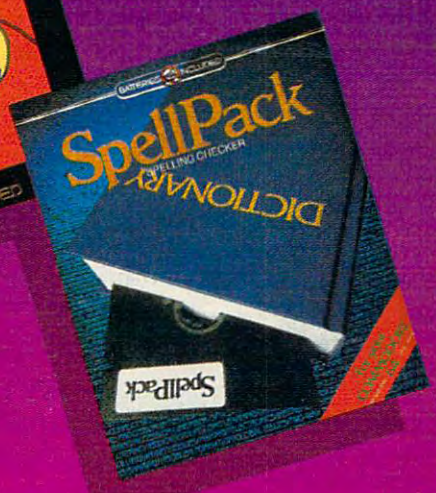

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save it to tape or disk. Then use the 64 MLX machine language editor to enter Program 4. Use a starting address of 7911 and an ending address of 9182. To load and run Spiders on the 64, follow these steps:

1. Load the machine language program (LOAD *"filename"*,8,1 for disk or LOAD *"filename"*,1,1 for tape).

2. Enter NEW.

3. Load the BASIC program (LOAD *"filename"*,8 for disk or LOAD *"filename"* for tape).

4. Plug a joystick into port 2, enter RUN.

Apple Spiders

The Apple version works on the Apple II Plus, Apple IIe, or Apple IIc with DOS 3.3. The keyboard is used instead of the joystick. Press the space bar to fire shots and the left- and right-arrow keys to position your ship.

Type in the BASIC portion (Program 5) and save it to disk. Enter the machine language portion (Program 6) with the Apple's machine language monitor. Follow these steps:

1. From BASIC, enter CALL −151. You'll see the asterisk (*) prompt of the monitor instead of the bracket (]) used by Applesoft.

2. To enter each line, type in the address of the line (the four-digit number), then a colon (:). Use this colon in place of the hyphens shown in the listing. Next, enter the eight two-digit numbers, separating each with a space. Press RETURN at the end of the line, then enter the address of the next line, and so on.

3. After you've entered the listing, press CTRL-C, then RETURN to exit to BASIC.

4. To save the machine language to disk, enter this command, using the exact filename given here:

```
BSAVE "SPIDER 2",A$9000,L$4C6
```

5. To play Spiders, simply run the BASIC program. It will automatically BLOAD the machine language portion as long as the disk with "SPIDER 2" is in the drive.

PC/PCjr Spiders

Due to programming considerations, the IBM PC/PCjr version of Spiders plays differently than the VIC, 64, and Apple versions.

Despite gallant efforts, the VIC, 64, and Apple players have let some of the invading spiders escape. Now the spiders are heading for the final battle, which takes place on your IBM. As mankind's last hope, you must thwart the ruthless aims of the Arachnid Empire. The evil Empire sends wave after wave of Spider ships with only one purpose in mind—get past your defenses and conquer. As the lone defender, you must not let these ships escape. Line up your craft beneath the oncoming horde and press the fire button on your joystick to send a pulse of energy flashing skyward. The alien ships will not fire, nor will they attempt to dodge your shots. They depend on their strength in numbers to defeat you. The dreaded arachnids do not fear death and will happily fall upon you, detonating both of you in a flash.

You get more points for shooting the aliens when they're closer to your ship. Therefore, shooting a spider can be worth anything from 10 points to 200 points. After all the spiders have either fallen or been destroyed, you get a 10,000-point bonus, but watch out—you lose 1000 points for every spider you let escape. If your score falls to zero, you lose one of your three ships, as if you had been hit by a falling spider.

Program 1: VIC-20 Spiders (BASIC Portion)

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering these listings.

```
1 POKE45,88:POKE46,24:POKE55,5:POKE56,25:
  CLR:SYS7651                          :rem 140
2 DEF FNR(X)=INT(6*RND(1)+2):R$="{RVS}
  {22 SPACES}":H$="000000"             :rem 182
3 GOSUB12                              :rem 22
4 RESTORE:FORI=0TO6:READA:POKEI+6412,A:NE
  XT:GOSUB23:GOSUB36:GOSUB27           :rem 148
5 SYS6431:IFPEEK(6423)=0THENGOSUB28
                                       :rem 150
6 IFPEEK(6422)THEN8                    :rem 112
7 GOTO5                                :rem 165
8 POKE6422,0:L=L+1                     :rem 252
9 FORI=0TO6:POKEI+6412,1:NEXT:GOSUB52:FOR
  I=1TO50:SYS6437:NEXT                 :rem 182
10 GOSUB51:IFL=4THENGOSUB54:GOTO3:rem 139
11 W=W-1:GOTO4                         :rem 82
12 POKE36869,242:PRINT"{CLR}{3 DOWN}{BLK}
   {7 SPACES}{RVS}SPIDERS{2 DOWN}"
                                       :rem 149
13 PRINT"{DOWN}{3 SPACES}{RVS}POINTS:
   {DOWN}":PRINT"{3 SPACES}FORMATION = 10
   {DOWN}":PRINT"{3 SPACES}ATTACKER
   {2 SPACES}= 100{DOWN}"              :rem 162
14 PRINT"{3 SPACES}PUSH {RED}FIRE BUTTON"
   :PRINT"{4 SPACES}{BLK}{DOWN}{2 SPACES}
   TO START"                           :rem 241
15 IFH$<>"000000"THENPRINT"{DOWN}
   {3 SPACES}HIGH:{2 SPACES}"H$;       :rem 209
16 D=250:B=102:S=36879:T=7680:C=38400:A=0
   :S$="000000"                        :rem 57
17 POKES,D:F=FNR(0):POKET+A,B:POKET+22*22
   +A,B:POKET+22*A,B:POKET+21+22*A,B
                                       :rem 161
18 POKEC+A,F:POKEC+22*22+A,F:POKEC+22*A,F
   :POKEC+21+22*A,F                    :rem 30
19 IF(PEEK(37137)AND32)=0THEN22        :rem 253
20 A=A+1:IFA<22THEN17                  :rem 190
21 A=0:D=D+1+5*(D=255):B=B+3+6*(B=105):GO
   TO17                                :rem 137
22 W=1:L=1:RETURN                      :rem 55
```

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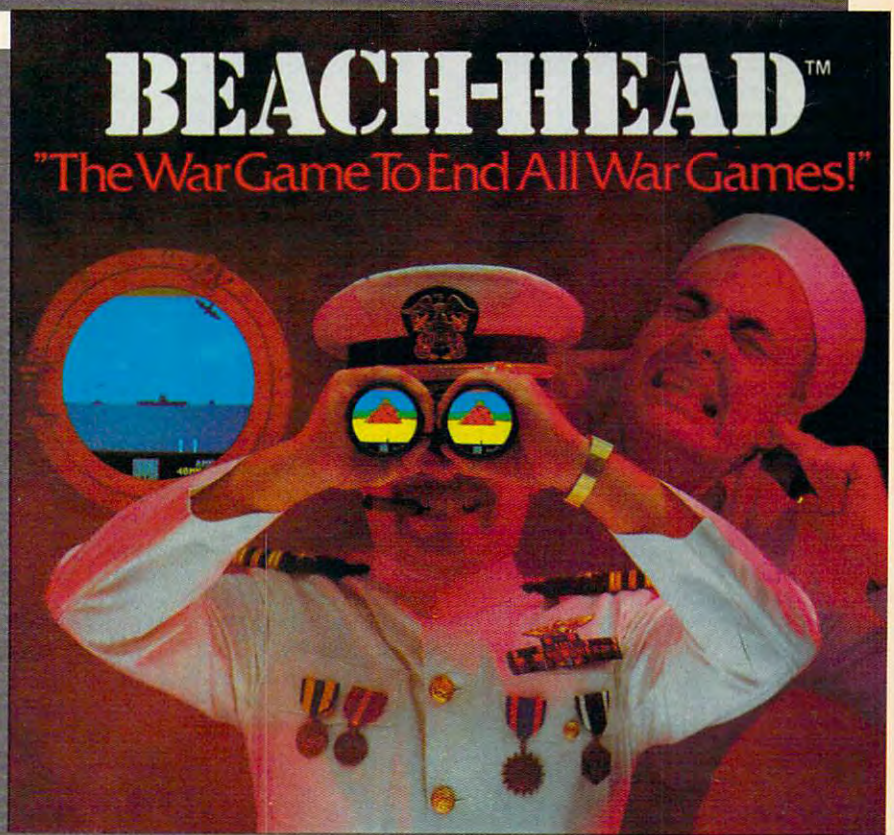

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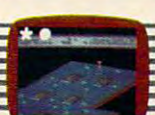
The Scrolls of Abadon


Spell Now

```
23 PØKE36879,110:POKE36878,15:PRINT"{CLR}
   ":FORI=1TO2:PRINT"{YEL}"R$;:NEXT:PRINT
   "{CYN}"R$;                          :rem 231
24 PRINT"{PUR}"R$;:FORI=1TO2:PRINT"{GRN}"
   R$;:NEXT:FORI=1TO14:PRINT"{YEL}"R$;:NE
   XT                                  :rem 55
25 PRINT"{WHT}"R$:PRINT" {RVS}ROBOT
   {2 SPACES}"S$"{3 SPACES}WEB ";:POKE818
   5,32                                :rem 250
26 R=PEEK(6424):POKE8120+R,Ø:POKE8121+R,1
   :RETURN                             :rem 115
27 FORJ=1TO4:FORI=ØTO50:POKE36874,205+I:N
   EXT:NEXT:POKE6421,Ø:RETURN           :rem 8
28 GOSUB51:GOSUB52:BS=VAL(S$)          :rem 40
29 FORI=1TO300:NEXT:SYS6453:IFPEEK(6423)=
   ØTHEN33                             :rem 211
30 SYS6527:IFPEEK(6422)THENPOKE6422,Ø:FOR
   I=1TO300:NEXT:GOTO33                :rem 43
31 IFPEEK(6423)THEN30                  :rem 202
32 GOTO29                               :rem 9
33 GOSUB52:GOSUB51:BS=(VAL(S$)-BS)*9:S$=S
   TR$(BS+VAL(S$))                     :rem 97
34 S$=LEFT$("ØØØØØØ",7-LEN(S$))+RIGHT$(S$
   ,LEN(S$)-1)                         :rem 28
35 FORI=1TO6:POKEI+8171,ASC(MID$(S$,I,1))
   +128:NEXT:GOSUB26                   :rem 218
36 GOSUB52:PRINT"{HOME}{DOWN}{YEL}"R$"
   {CYN}"R$                            :rem 236
37 ONWGOSUB39,42,45:IFW>3THENGOSUB48
                                       :rem 29
38 POKE36869,255:POKE8184,W+176:POKE8170,
   L+176:W=W+1:RETURN                  :rem 17
39 PRINT"{HOME}{DOWN}{3 RIGHT}{YEL}G
   {10 RIGHT}G{9 RIGHT}{CYN}HH{10 RIGHT}H
   H"                                  :rem 236
40 PRINT"{UP}{6 RIGHT}{PUR}DDDDDD{GRN}
   {14 RIGHT}DDDDDDDDDD{10 RIGHT}DDDDDDDD
   DDDDDD"                             :rem 222
41 RETURN                               :rem 69
42 PRINT"{HOME}{DOWN}{3 RIGHT}{YEL}G
   {11 RIGHT}G{8 RIGHT}{CYN}HHH{9 RIGHT}H
   HH"                                 :rem 89
43 PRINT"{UP}{4 RIGHT}{PUR}DDD{5 RIGHT}DD
   D{GRN}{10 RIGHT}DDDDD{3 RIGHT}DDDDD
   {8 RIGHT}DDDDDDD{RIGHT}DDDDDDD"
                                       :rem 254
44 RETURN                               :rem 72
45 PRINT"{HOME}{DOWN}{3 RIGHT}{YEL}G
   {12 RIGHT}G{7 RIGHT}{CYN}HHH{10 RIGHT}
   HHH"                                :rem 121
46 PRINT"{UP}{5 RIGHT}{PUR}DDDDDDDDDD
   {GRN}{11 RIGHT}DDDDDDDDDDD{9 RIGHT}DD
   DDDDDDDDDD"                         :rem 235
47 RETURN                               :rem 75
48 PRINT"{HOME}{DOWN}{3 RIGHT}{YEL}GG
   {10 RIGHT}GG{7 RIGHT}{CYN}HHHH
   {2 RIGHT}DDDD{2 RIGHT}HHHH"      :rem 194
49 PRINT"{UP}{6 RIGHT}{PUR}DDDDDDDD{GRN}
   {12 RIGHT}DDDDDDDDDDD{9 RIGHT}DDDDDDD
   DDDDDDD"                            :rem 160
50 RETURN                               :rem 69
51 S$="":FORI=ØTO5:S$=S$+CHR$(PEEK(8172+I
   )-128):NEXT:RETURN                   :rem 6
52 IFPEEK(255)THENPOKEPEEK(254)+256*PEEK(
   255),160:POKE255,Ø                  :rem 159
53 RETURN                               :rem 72
54 GOSUB52:IFVAL(S$)>VAL(H$)THENH$=S$
                                       :rem 241
55 PRINT"{HOME}{RVS}{3 SPACES}PLAY AGAIN?
    Y<N":FORI=ØTO2:POKE6419+I,Ø:NEXT
                                       :rem 74
56 IFPEEK(6419)THENPOKE7696,188:POKE6419,
   Ø                                   :rem 228
57 IFPEEK(6420)THENPOKE7696,190:POKE6420,
   Ø                                   :rem 206
58 IFPEEK(6421)=ØTHEN56                 :rem 70
59 IFPEEK(7696)=190THENSYS65234         :rem 88
60 RETURN                               :rem 70
61 DATA1,1,16,4,30,20,60               :rem 177
```

Program 2: VIC-20 Spiders (ML Portion, Enter With Tiny MLX)

```
6405 :000,000,000,000,000,000,005
6411 :000,000,000,000,000,000,011
6417 :000,000,000,000,000,000,017
6423 :000,000,000,021,022,023,089
6429 :000,000,032,230,028,032,095
6435 :093,026,032,148,025,032,135
6441 :166,027,032,072,028,032,142
6447 :214,026,032,103,027,096,033
6453 :162,255,232,224,022,176,100
6459 :031,189,044,030,201,008,050
6465 :208,244,169,005,157,044,124
6471 :030,162,022,202,048,014,037
6477 :189,044,030,201,008,208,245
6483 :246,169,003,157,044,030,220
6489 :208,036,162,255,232,224,182
6495 :022,176,029,189,022,030,051
6501 :201,007,208,244,169,005,167
6507 :157,022,030,162,022,202,190
6513 :048,012,189,022,030,201,103
6519 :007,208,246,169,003,157,141
6525 :022,030,032,072,028,169,222
6531 :160,141,010,030,032,214,206
6537 :026,032,103,027,032,230,075
6543 :028,032,093,026,096,173,079
6549 :009,025,240,001,096,173,181
6555 :016,025,141,009,025,173,032
6561 :025,025,208,034,173,044,158
6567 :030,201,160,208,059,160,217
6573 :000,132,252,200,132,250,115
6579 :160,030,132,251,132,253,113
6585 :032,241,025,230,252,230,171
6591 :250,165,252,201,132,208,119
6597 :243,096,173,065,030,201,237
6603 :160,208,025,160,131,132,251
6609 :252,136,132,250,160,030,145
6615 :132,253,132,251,032,241,232
6621 :025,198,252,198,250,165,029
6627 :252,208,245,096,169,001,174
6633 :056,237,025,025,141,025,230
6639 :025,096,160,000,177,250,179
6645 :170,201,002,240,088,201,123
6651 :006,240,084,201,009,176,199
6657 :080,177,252,201,161,144,248
6663 :001,096,201,002,208,016,019
6669 :132,255,138,201,006,176,153
6675 :057,169,255,141,013,144,030
6681 :169,006,208,048,138,201,027
6687 :004,208,043,166,250,224,158
6693 :110,176,037,174,025,025,072
6699 :208,004,160,023,208,002,136
6705 :160,022,072,177,252,201,165
6711 :160,240,003,104,208,016,018
6717 :173,025,025,208,004,160,144
6723 :023,208,002,160,022,104,074
6729 :145,252,169,160,160,000,191
6735 :145,252,096,177,252,201,178
6741 :003,144,004,201,009,144,078
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6747 :239,096,173,006,025,240,102
6753 :001,096,173,013,025,141,034
6759 :006,025,165,255,208,001,251
6765 :096,032,050,027,160,000,218
6771 :177,254,201,002,208,004,193
6777 :169,160,145,254,056,165,046
6783 :254,233,022,133,254,165,164
6789 :255,233,000,133,255,201,186
6795 :031,240,000,177,254,201,018
6801 :006,144,009,201,160,208,105
6807 :054,169,002,145,254,096,103
6813 :201,004,208,016,165,255,238
6819 :201,031,240,010,165,254,040
6825 :201,132,176,004,162,005,081
6831 :208,002,162,004,254,235,016
6837 :031,189,235,031,201,186,030
6843 :208,008,169,176,157,235,116
6849 :031,202,016,238,169,006,087
6855 :145,254,169,255,141,013,152
6861 :144,169,000,133,255,141,023
6867 :021,025,096,173,008,025,047
6873 :240,001,096,173,015,025,255
6879 :141,008,025,032,050,027,250
6885 :165,255,240,006,169,160,200
6891 :160,000,145,254,169,205,144
6897 :133,250,169,031,133,251,184
6903 :160,000,177,250,201,002,013
6909 :208,038,160,022,177,250,084
6915 :201,160,208,006,169,002,237
6921 :145,250,208,018,201,002,065
6927 :176,014,174,024,025,169,085
6933 :006,157,184,031,157,185,229
6939 :031,238,022,025,160,000,247
6945 :169,160,145,250,198,250,181
6951 :208,208,165,255,240,004,095
6957 :169,002,145,254,096,169,112
6963 :000,141,023,025,168,169,065
6969 :205,133,250,169,031,133,210
6975 :251,177,250,201,006,208,132
6981 :006,169,160,145,250,208,239
6987 :009,176,007,201,003,144,103
6993 :003,238,023,025,165,250,017
6999 :208,009,198,251,165,251,145
7005 :201,029,208,001,096,198,058
7011 :250,076,064,027,173,010,187
7017 :025,240,001,096,173,017,145
7023 :025,141,010,025,169,031,000
7029 :133,251,160,000,032,148,073
7035 :224,165,141,133,250,177,189
7041 :250,201,003,144,026,201,186
7047 :006,176,022,152,024,105,108
7053 :022,168,177,250,201,160,095
7059 :240,001,096,169,002,145,032
7065 :250,169,255,141,012,144,100
7071 :096,200,192,022,208,219,072
7077 :096,173,011,025,240,001,199
7083 :096,173,018,025,141,011,123
7089 :025,032,148,224,165,141,144
7095 :056,233,003,176,252,105,240
7101 :003,170,169,030,133,251,177
7107 :169,042,133,250,024,165,210
7113 :250,105,022,133,250,165,102
7119 :251,105,000,133,251,202,125
7125 :016,240,173,025,025,208,132
7131 :017,160,021,177,250,201,021
7137 :004,240,004,136,016,247,104
7143 :096,169,005,145,250,096,224
7149 :169,000,177,250,201,004,014
7155 :240,006,200,192,022,208,087
7161 :245,096,169,003,145,250,133
7167 :096,003,007,003,007,031,146
7173 :012,012,031,000,128,000,188
7179 :128,224,128,192,224,000,139
7185 :008,000,008,000,008,000,041
7191 :008,004,104,025,031,108,047
7197 :146,018,032,066,090,102,227
7203 :060,255,060,066,066,004,034
7209 :072,073,054,120,152,024,024
7215 :032,042,149,042,149,110,059
7221 :153,082,042,130,146,108,202
7227 :056,254,056,068,068,130,179
7233 :068,056,254,124,214,170,183
7239 :130,173,007,025,240,001,135
7245 :096,173,014,025,141,007,021
7251 :025,169,031,133,251,169,093
7257 :205,133,250,160,000,177,246
7263 :250,201,006,176,074,201,235
7269 :003,144,070,072,032,148,058
7275 :224,104,168,185,023,025,068
7281 :168,177,250,201,032,208,125
7287 :013,169,160,160,000,145,254
7293 :250,169,004,141,010,030,217
7299 :208,041,201,160,240,020,233
7305 :201,002,176,033,174,024,235
7311 :025,169,006,157,184,031,203
7317 :157,185,031,238,022,025,039
7323 :208,017,165,142,056,233,208
7329 :003,176,252,105,006,145,080
7335 :250,169,160,160,000,145,027
7341 :250,165,250,208,002,198,222
7347 :251,198,250,201,132,208,139
7353 :162,165,251,201,030,208,178
7359 :156,160,000,177,250,201,111
7365 :003,240,004,201,005,208,090
7371 :021,170,168,185,023,025,027
7377 :168,177,250,201,160,208,093
7383 :009,138,145,250,169,160,062
7389 :160,000,145,250,198,250,200
7395 :208,219,096,173,005,025,185
7401 :240,001,096,173,012,025,012
7407 :141,005,025,165,255,208,014
7413 :026,173,021,025,240,021,239
7419 :169,016,205,007,028,169,077
7425 :184,109,024,025,133,254,218
7431 :169,031,133,255,169,255,251
7437 :141,011,144,173,019,025,014
7443 :240,008,169,000,141,019,084
7449 :025,032,044,029,173,020,092
7455 :025,208,001,096,169,000,018
7461 :141,020,025,032,084,029,112
7467 :096,173,015,028,208,023,074
7473 :173,024,025,208,001,096,064
7479 :174,024,025,169,160,157,252
7485 :184,031,157,185,031,206,087
7491 :024,025,032,126,029,162,209
7497 :008,030,007,028,062,255,207
7503 :027,202,208,247,096,173,008
7509 :007,028,208,025,173,024,038
7515 :025,201,020,208,001,096,130
7521 :174,024,025,169,160,157,038
7527 :184,031,157,185,031,238,161
7533 :024,025,032,126,029,162,251
7539 :008,094,255,027,126,007,120
7545 :028,202,208,247,096,162,040
7551 :008,189,255,027,072,189,099
7557 :007,028,157,255,027,104,199
7563 :157,007,028,202,208,239,212
7569 :174,024,025,169,000,157,182
7575 :184,031,169,001,157,185,110
7581 :031,096,162,007,189,004,134
7587 :025,240,003,222,004,025,170
7593 :202,208,245,169,127,141,237
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7599 :034,145,173,032,145,041,233
7605 :128,208,003,238,020,025,035
7611 :169,255,141,034,145,169,076
7617 :016,044,017,145,208,003,114
7623 :238,019,025,010,044,017,040
7629 :145,208,003,238,021,025,077
7635 :162,003,189,010,144,240,191
7641 :003,222,010,144,202,016,046
7647 :245,108,029,025,120,173,155
7653 :020,003,141,029,025,173,108
7659 :021,003,141,030,025,169,112
7665 :159,141,020,003,169,029,250
7671 :141,021,003,088,096,013,097
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Program 3: 64 Spiders (BASIC Portion)

Version By Tim Victor, Editorial Programmer
Refer to "COMPUTE!'s Guide To Typing In Programs" before entering these listings.

```
100 POKE55,200:POKE56,30:CLR:H$="000000":
    SYS8299                          :rem 194
110 FORI=9472TOI+7:POKEI,0:NEXT      :rem 170
120 FORI=36874TOI+3:POKEI,0:NEXT     :rem 221
130 DEF FNR(X)=INT(15*RND(1)):R$="{RVS}
    {40 SPACES}"                     :rem 164
140 FORI=0TO6:READDF(I):NEXT         :rem 254
150 POKE255,0:POKE8280,0:W=1:L=1:S$="0000
    00"                              :rem 153
160 RESTORE:FORI=2TO6:POKEI+8271,DF(I):NE
    XT:GOSUB310:GOSUB500             :rem 130
170 SYS8290:IFPEEK(8282)=0THENGOSUB390
                                     :rem 53
180 IFPEEK(8281)THEN200              :rem 50
190 GOTO170                          :rem 107
200 POKE8281,0:L=L+1:GOSUB770        :rem 179
210 FORI=2TO6:POKEI+8271,1:NEXT:GOSUB780
                                     :rem 233
220 FORI=1TO50:POKE36875,255:SYS8293:NEXT
    :IFL<>4THENW=W-1:GOTO160         :rem 69
230 GOSUB780:IFVAL(S$)>VAL(H$)THENH$=S$
                                     :rem 85
240 PRINT"{HOME}{RVS}{WHT} HIGH SCORE:"H$
    "{RIGHT}- PLAY AGAIN? Y<-N"      :rem 70
250 FORI=8278TO8280:POKEI,0:NEXT     :rem 217
260 IFPEEK(8278)THENPOKE8278,0:POKE1058,1
    88:POKE1059,173                  :rem 12
270 IFPEEK(8279)THENPOKE8279,0:POKE1058,1
    73:POKE1059,190                  :rem 8
280 IFPEEK(8280)=0THEN260            :rem 165
290 IFPEEK(1058)=188THENPOKE8280,0:GOTO14
    0                                :rem 224
300 SYS65126                         :rem 150
310 POKE53280,6:POKE53281,6:PRINT"{CLR}":
    FORI=1TO2:PRINT"{YEL}"R$;:NEXT:PRINT"
    {CYN}"R$;                        :rem 110
320 PRINT"{3}"R$;:FORI=1TO2:PRINT"{GRN}"R
    $;:NEXT:FORI=1TO16:PRINT"{YEL}"R$;:NE
    XT                               :rem 98
330 PRINT"{WHT}"R$:PRINT"{4 SPACES}{RVS}
    {3 SPACES}ROBOT{4 SPACES}"S$"
    {4 SPACES}WEB{SHIFT-SPACE}{3 SPACES}
    {OFF}{3 SPACES}";:POKE2023,32    :rem 76
340 R=PEEK(8283):POKE1904+R,0:GOSUB780
                                     :rem 218
350 RETURN                           :rem 120
360 BA=984+VR*40:FORI=BATOBA+19:IFPEEK(I)
    =160THENNEXT:RETURN              :rem 40
370 P1=I:FORI=BA+39TOBA+20STEP-1:IFPEEK(I
    )=160THENNEXT:RETURN             :rem 147
380 P2=I:RETURN                      :rem 189
390 GOSUB770:BS=VAL(S$)              :rem 113
400 FORI=2TO6:POKEI+8271,DF(I)/2:DF(I)=DF
    (I)*.9:IFDF(I)<1THENDF(I)=1      :rem 215
410 NEXT                             :rem 212
420 VR=3:GOSUB360:IFI=BA+20THENVR=2:GOSUB
    360:IFI=BA+20THEN480             :rem 35
430 FORI=VRTO6:POKEP1,160:POKEP2,160:P1=P
    1+40:P2=P2+40:POKEP1,4:POKEP2,4
                                     :rem 135
440 FORJ=1TO20:NEXT:NEXT:POKE8282,2
                                     :rem 201
450 SYS8296:IFPEEK(8282)=0THEN420:rem 213
460 IFPEEK(8281)THENPOKE8281,0:FORI=1TO30
    0:NEXT:GOTO480                   :rem 149
470 POKE1044,160:GOTO450             :rem 98
480 GOSUB780:GOSUB770:BS=(VAL(S$)-BS)*9:S
    $=STR$(BS+VAL(S$))               :rem 7
490 S$=LEFT$("000000",7-LEN(S$))+RIGHT$(S
    $,LEN(S$)-1):GOSUB310            :rem 160
500 PRINT"{HOME}{DOWN}{YEL}"R$"{CYN}"R$
                                     :rem 247
510 ONWGOSUB530,590,650:IFW>3THENGOSUB710
                                     :rem 11
520 POKE53272,24:POKE2013,W+176:POKE1996,
    L+176:W=W+1:RETURN               :rem 244
530 PRINT"{HOME}{DOWN}{7 RIGHT}{YEL}G
    {20 RIGHT}G"                     :rem 200
540 PRINT"{CYN}{6 RIGHT}HH{20 RIGHT}HH"
                                     :rem 27
550 PRINT"{UP}{14 RIGHT}{3}D{7 RIGHT}D"
                                     :rem 123
560 PRINT"{12 RIGHT}{GRN}DDDDD{3 RIGHT}DD
    DDD"                             :rem 229
570 PRINT"{UP}{10 RIGHT}DDDDDDDDDDDDDDDDD
    "                                :rem 164
580 RETURN                           :rem 125
590 PRINT"{HOME}{DOWN}{7 RIGHT}{YEL}G
    {20 RIGHT}G"                     :rem 206
600 PRINT"{CYN}{6 RIGHT}HH{20 RIGHT}HH"
                                     :rem 24
610 PRINT"{UP}{14 RIGHT}{3}DDDDDDDDD"
                                     :rem 137
620 PRINT"{12 RIGHT}{GRN}DDDDDDDDDDDDD"
                                     :rem 87
630 PRINT"{UP}{10 RIGHT}DDDDDDDDDDDDDDDDD
    "                                :rem 161
640 RETURN                           :rem 122
650 PRINT"{HOME}{DOWN}{6 RIGHT}{YEL}G
    {22 RIGHT}G"                     :rem 232
660 PRINT"{CYN}{5 RIGHT}HHH{20 RIGHT}HHH"
                                     :rem 145
670 PRINT"{UP}{12 RIGHT}{3}DDDDDDDDDDD"
                                     :rem 221
680 PRINT"{10 RIGHT}{GRN}DDDDDDDDDDDDDDD"
                                     :rem 171
690 PRINT"{UP}{8 RIGHT}DDDDDDDDDDDDDDDDD
    D"                               :rem 245
700 RETURN                           :rem 119
710 PRINT"{HOME}{DOWN}{5 RIGHT}{YEL}GG
    {22 RIGHT}GG"                    :rem 86
720 PRINT"{CYN}{4 RIGHT}HHHH{20 RIGHT}HHH
    H"                               :rem 1
730 PRINT"{UP}{11 RIGHT}{3}DDDDDDDDDDDDD
    "                                :rem 137
740 PRINT"{9 RIGHT}{GRN}DDDDDDDDDDDDDDDD
    D"                               :rem 87
750 PRINT"{UP}{7 RIGHT}DDDDDDDDDDDDDDDDD
    DDDD"                            :rem 161
760 RETURN                           :rem 125
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```
770 S$="":FORI=0TO5:S$=S$+CHR$(PEEK(2000+
    I)-128):NEXT:RETURN              :rem 46
780 POKE255,0:POKE8280,0:RETURN      :rem 119
790 DATA8,0,16,4,30,20,60            :rem 240
```

Program 4: 64 Spiders (ML Portion, Enter With 64 MLX)

```
7911 :120,173,020,003,141,096,016
7917 :032,173,021,003,141,097,192
7923 :032,169,082,141,020,003,178
7929 :169,035,141,021,003,165,015
7935 :001,041,251,133,001,162,076
7941 :000,189,000,208,157,000,047
7947 :036,189,000,209,157,000,090
7953 :037,232,208,241,165,001,133
7959 :009,004,133,001,088,162,164
7965 :024,169,000,157,000,212,079
7971 :202,016,250,169,014,141,059
7977 :005,212,141,012,212,141,252
7983 :019,212,165,015,141,024,111
7989 :212,096,173,076,032,240,114
7995 :001,096,173,083,032,141,073
8001 :076,032,173,092,032,208,166
8007 :034,173,080,004,201,160,211
8013 :208,059,160,000,132,252,120
8019 :200,132,250,160,004,132,193
8025 :251,132,253,032,148,031,168
8031 :230,252,230,250,165,252,194
8037 :201,240,208,243,096,173,238
8043 :119,004,201,160,208,025,056
8049 :160,239,132,252,136,132,140
8055 :250,160,004,132,253,132,026
8061 :251,032,148,031,198,252,013
8067 :198,250,165,252,208,245,169
8073 :096,169,001,056,237,092,020
8079 :032,141,092,032,096,160,184
8085 :000,177,250,170,201,002,181
8091 :240,088,201,006,240,084,246
8097 :201,009,176,080,177,252,032
8103 :201,161,144,001,096,201,203
8109 :002,208,016,132,255,138,156
8115 :201,006,176,057,169,255,019
8121 :141,013,144,169,006,208,098
8127 :048,138,201,004,208,043,065
8133 :166,250,224,200,176,037,226
8139 :174,092,032,208,004,160,105
8145 :041,208,002,160,040,072,220
8151 :177,252,201,160,240,003,224
8157 :104,208,016,173,092,032,078
8163 :208,004,160,041,208,002,082
8169 :160,040,104,145,252,169,079
8175 :160,160,000,145,252,096,028
8181 :177,252,201,003,144,004,002
8187 :201,009,144,239,096,024,196
8193 :060,024,060,255,102,102,092
8199 :255,000,000,000,000,000,006
8205 :000,000,000,000,008,000,021
8211 :008,000,008,000,008,004,047
8217 :104,025,031,108,146,018,201
8223 :032,066,090,102,060,255,124
8229 :060,066,066,004,072,073,122
8235 :054,120,152,024,032,042,211
8241 :149,042,149,110,153,082,222
8247 :042,130,146,108,056,254,023
8253 :056,068,068,130,068,056,251
8259 :254,124,214,170,130,000,191
8265 :000,000,000,000,000,000,073
8271 :000,000,000,000,000,000,079
8277 :000,000,000,000,000,000,085
8283 :000,000,039,040,041,000,211
8289 :000,076,110,032,076,113,248
8295 :032,076,132,032,076,231,170
8301 :030,032,220,034,032,148,093
8307 :032,032,055,031,032,064,105
8313 :034,032,235,033,032,164,139
8319 :033,032,010,033,096,032,107
8325 :220,034,032,148,032,032,119
8331 :064,034,032,010,033,032,088
8337 :164,033,096,173,073,032,204
8343 :240,001,096,173,080,032,005
8349 :141,073,032,165,255,208,007
8355 :001,096,160,000,177,254,083
8361 :201,002,208,004,169,160,145
8367 :145,254,056,165,254,233,002
8373 :040,133,254,165,255,233,237
8379 :000,133,255,201,004,144,156
8385 :064,177,254,201,006,144,015
8391 :009,201,160,208,054,169,232
8397 :002,145,254,096,201,004,139
8403 :208,016,165,255,201,004,036
8409 :208,010,165,254,201,240,015
8415 :176,004,162,005,208,002,012
8421 :162,004,254,207,007,189,028
8427 :207,007,201,186,208,008,028
8433 :169,176,157,207,007,202,135
8439 :016,238,169,006,145,254,051
8445 :169,255,141,013,144,169,120
8451 :000,133,255,141,088,032,140
8457 :096,173,075,032,240,001,114
8463 :096,173,082,032,141,075,102
8469 :032,032,112,033,165,255,138
8475 :240,006,169,160,160,000,250
8481 :145,254,169,151,133,250,111
8487 :169,007,133,251,160,000,247
8493 :177,250,201,002,208,035,150
8499 :160,040,177,250,201,160,015
8505 :208,006,169,002,145,250,069
8511 :208,015,201,002,176,011,164
8517 :174,091,032,169,006,157,186
8523 :112,007,238,089,032,160,201
8529 :000,169,160,145,250,165,202
8535 :250,208,008,198,251,169,147
8541 :004,197,251,240,005,198,220
8547 :250,076,045,033,165,255,155
8553 :240,004,169,002,145,254,151
8559 :096,169,000,141,090,032,127
8565 :168,169,151,133,250,169,133
8571 :007,133,251,177,250,201,118
8577 :160,240,019,201,006,208,195
8583 :006,169,160,145,250,208,049
8589 :009,176,007,201,003,144,169
8595 :003,238,090,032,198,250,190
8601 :208,227,198,251,165,251,173
8607 :201,003,208,219,096,173,035
8613 :077,032,240,001,096,173,016
8619 :084,032,141,077,032,032,057
8625 :151,224,169,003,037,140,133
8631 :208,001,096,024,105,004,109
8637 :133,251,165,141,133,250,238
8643 :160,000,177,250,201,003,218
8649 :144,026,201,006,176,022,008
8655 :152,024,105,040,168,177,105
8661 :250,201,160,240,001,096,137
8667 :169,002,145,250,169,255,185
8673 :141,012,144,096,200,192,242
8679 :040,208,219,096,173,078,021
8685 :032,240,001,096,173,085,096
8691 :032,141,078,032,032,151,197
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8697 :224,169,003,037,141,170,225
8703 :169,004,133,251,169,080,037
8709 :133,250,024,165,250,105,164
8715 :040,133,250,165,251,105,187
8721 :000,133,251,202,016,240,091
8727 :173,092,032,208,017,160,193
8733 :039,177,250,201,004,240,172
8739 :004,136,016,247,096,169,191
8745 :005,145,250,096,169,000,194
8751 :177,250,201,004,240,006,157
8757 :200,192,040,208,245,096,010
8763 :169,003,145,250,096,173,127
8769 :074,032,240,001,096,173,169
8775 :081,032,141,074,032,169,088
8781 :007,133,251,169,151,133,153
8787 :250,160,000,177,250,201,097
8793 :006,176,072,201,003,144,179
8799 :068,072,032,151,224,104,234
8805 :168,185,090,032,168,177,153
8811 :250,201,032,208,013,169,212
8817 :160,160,000,145,250,169,229
8823 :004,141,020,004,208,039,023
8829 :201,160,240,017,201,002,178
8835 :176,031,174,091,032,169,036
8841 :006,157,112,007,238,089,234
8847 :032,208,018,169,003,037,098
8853 :142,208,002,169,002,105,009
8859 :001,145,250,169,160,160,016
8865 :000,145,250,165,250,208,155
8871 :002,198,251,198,250,201,243
8877 :239,208,164,165,251,201,121
8883 :004,208,158,160,000,177,118
8889 :250,201,003,240,004,201,060
8895 :005,208,021,170,168,185,180
8901 :090,032,168,177,250,201,091
8907 :160,208,009,138,145,250,089
8913 :169,160,160,000,145,250,069
8919 :198,250,208,219,096,173,079
8925 :072,032,240,001,096,173,067
8931 :079,032,141,072,032,165,236
8937 :255,208,026,173,088,032,247
8943 :240,021,169,016,205,007,129
8949 :032,169,072,109,091,032,238
8955 :133,254,169,007,133,255,178
8961 :169,255,141,011,144,173,126
8967 :086,032,240,008,169,000,030
8973 :141,086,032,032,034,035,117
8979 :173,087,032,208,001,096,104
8985 :169,000,141,087,032,032,230
8991 :057,035,096,173,091,032,003
8997 :208,001,096,174,091,032,127
9003 :169,160,157,112,007,169,049
9009 :000,157,111,007,206,091,109
9015 :032,096,173,091,032,201,168
9021 :039,208,001,096,174,091,158
9027 :032,169,160,157,112,007,192
9033 :169,000,157,113,007,238,245
9039 :091,032,096,162,007,189,144
9045 :071,032,240,003,222,071,212
9051 :032,202,208,245,169,004,183
9057 :044,000,220,208,003,238,042
9063 :086,032,010,044,000,220,239
9069 :208,003,238,087,032,010,175
9075 :044,000,220,208,003,238,060
9081 :088,032,173,011,144,240,041
9087 :024,201,255,208,014,169,230
9093 :032,141,011,144,160,128,237
9099 :140,004,212,200,140,004,071
9105 :212,141,001,212,206,011,160
9111 :144,173,012,144,240,023,119
9117 :197,255,208,013,169,032,007
9123 :141,012,144,168,140,011,011
9129 :212,200,140,011,212,141,061
9135 :008,212,206,012,144,173,162
9141 :013,144,240,030,201,255,040
9147 :208,014,169,013,141,013,233
9153 :144,160,128,140,018,212,227
9159 :200,140,018,212,169,013,183
9165 :056,237,013,144,141,015,043
9171 :212,206,013,144,108,096,222
9177 :032,013,013,013,013,013,058
```

Program 5: Apple Spiders (BASIC Portion)

Version By Tim Victor, Editorial Programmer
Refer to "COMPUTE!'s Guide To Typing In Programs" before entering these listings.

```
100  HIMEM: 128 * 256
110  LOMEM: 80 * 256
120  CLEAR
130  PRINT  CHR$ (4);"BLOAD SPIDER 2"
140  FOR I = 36096 TO 36096 + 7: POKE I
     ,0: NEXT
150  POKE 6,0: POKE 7,141
160  CALL 36884: POKE 54,0: POKE 55,3: CALL
     1002
170 HS$ = "000000"
180 W = 1:L = 1:SC$ = "000000":D = 30
200  GOSUB 1000
210  HTAB 1: VTAB 22: PRINT "       ROBO
     T:"L"     "SC$"      WEB:"W
300  FOR I = 1 TO D
310  IF I = 12 THEN  CALL 36881
320  CALL 36872
330  IF I <  > 1 THEN 370
340  IF  PEEK (1280) <  > 160 THEN  POKE
     36868,1
350  IF  PEEK (1319) <  > 160 THEN  POKE
     36868,0
360  CALL 36875
370  IF I <  > 8 *  INT (I / 8) THEN 41
     0
380  CALL 36878
390  IF  PEEK (36865) THEN 500
400  IF  PEEK (36866) = 0 THEN 2000
410  NEXT : GOTO 300
500  GOSUB 1800:L = L + 1:RP =  PEEK (3
     6867): POKE 36865,0
510  FOR I = 1 TO 20: POKE 36870,1: POKE
     36869,255: VTAB 20: HTAB RP + 1: PRINT
     "F";: CALL 36881: CALL 36878: NEXT

520  IF L < 4 THEN 200
530  GOSUB 1800: IF  VAL (SC$) >  VAL (
     HS$) THEN HS$ = SC$
540  VTAB 23: HTAB 11: PRINT "HIGH SCOR
     E:"HS$
550  HTAB 10: PRINT "PLAY AGAIN? Y <- N
     ";
555  POKE 49168,0
560 A =  PEEK (49152): IF A < 128 THEN
     560
570  POKE 49168,0: IF A = 149 THEN A$ =
     "N": HTAB 24: PRINT "->";
580  IF A = 136 THEN A$ = "Y": HTAB 24:
      PRINT "<-";
590  IF A <  > 160 THEN  GOTO 560
600  IF A$ = "N" THEN  END
610  GOTO 180
1000  HOME : HGR : VTAB 20: HTAB  PEEK
```

```
     (36867) + 1: PRINT "@";: POKE 255,
     255: POKE 49168,0
1005  ON W GOTO 1010,1080,1143,1200: GOTO
     1200
1010  VTAB 2: HTAB 9: PRINT "G";: HTAB
     30: PRINT "G";
1020  VTAB 3: HTAB 9: PRINT "H";: HTAB
     30: PRINT "H";
1030  VTAB 4: HTAB 16: PRINT "DDDDDDDD"
     ;
1040  VTAB 5: HTAB 14: PRINT "DDDDDDDDD
     DDD";
1050  VTAB 6: HTAB 12: PRINT "DDDDDDDDD
     DDDDDDD";
1070  RETURN
1080  VTAB 2: HTAB 9: PRINT "G";: HTAB
     30: PRINT "G";
1090  VTAB 3: HTAB 8: PRINT "HH";: HTAB
     30: PRINT "HH";
1100  VTAB 4: HTAB 14: PRINT "DDDDDDDDD
     DDD";
1110  VTAB 5: HTAB 12: PRINT "DDDDDDDDD
     DDDDDDD";
1120  VTAB 6: HTAB 10: PRINT "DDDDDDDDD
     DDDDDDDDDDD";
1140  RETURN
1143  VTAB 2: HTAB 8: PRINT "G";: HTAB
     31: PRINT "G";
1146  VTAB 3: HTAB 7: PRINT "HHH";: HTAB
     30: PRINT "HHH";
1150  VTAB 4: HTAB 13: PRINT "DDDDDDDDD
     DDDDD";
1160  VTAB 5: HTAB 11: PRINT "DDDDDDDDD
     DDDDDDDDD";
1170  VTAB 6: HTAB 9: PRINT "DDDDDDDDDD
     DDDDDDDDDDDD";
1190  RETURN
1200  VTAB 2: HTAB 6: PRINT "GG";: HTAB
     32: PRINT "GG";
1210  VTAB 3: HTAB 5: PRINT "HHHH";: HTAB
     31: PRINT "HHHH";
1220  VTAB 4: HTAB 12: PRINT "DDDDDDDDD
     DDDDDDD";
1230  VTAB 5: HTAB 10: PRINT "DDDDDDDDD
     DDDDDDDDDDD";
1240  VTAB 6: HTAB 8: PRINT "DDDDDDDDDD
     DDDDDDDDDDDDDD";
1250  RETURN
1800 SC$ = "": FOR S = 1761 TO 1766:SC$
      = SC$ +  CHR$ ( PEEK (S) - 128): NEXT
     : RETURN
2000  GOSUB 1800
2010 VR = 3: GOSUB 2040: IF I = BA + 20
      THEN VR = 2: GOSUB 2040: IF I = B
     A + 20 THEN 2120
2020  FOR I = VR TO 6: VTAB I: HTAB P1:
     PRINT " ";: HTAB P2: PRINT " ";
2030  VTAB I + 1: HTAB P1: PRINT "D";: HTAB
     P2: PRINT "D";: NEXT : GOTO 2070
2040  VTAB VR:BA =  PEEK (40) + 256 *  PEEK
     (41): FOR I = BA TO BA + 19: IF  PEEK
     (I) = 160 THEN  NEXT : RETURN
2050 P1 = I - BA + 1: FOR I = BA + 39 TO
     BA + 20 STEP  - 1: IF  PEEK (I) =
     160 THEN  NEXT : RETURN
2060 P2 = I - BA + 1: RETURN
2070  FOR I = 1 TO D / 2: CALL 36872: IF
     I < > 4 THEN 2100
2080  CALL 36878: VTAB 2: HTAB 21: PRINT
     " ";: IF  PEEK (36866) = 0 THEN 20
     10
2090  IF  PEEK (36865) THEN  POKE 36865
     ,0: GOTO 2120
2100  IF I = 6 THEN  CALL 36881
2110  NEXT : GOTO 2070
2120 S1$ = SC$: GOSUB 1800:SC$ =  STR$
     ( VAL (SC$) + 9 * ( VAL (SC$) -  VAL
     (S1$)))
2130 SC$ =  LEFT$ ("00000",6 -  LEN (SC
     $)) + SC$:W = W + 1:D =  INT (.85 *
     D): IF D < 12 THEN D = 12
2140  GOTO 200
```

Program 6: Apple Spiders (ML Portion, Enter With Apple Monitor)

```
9000- 00 00 00 00 00 00 00 00
9008- 4C 17 90 4C 83 90 4C 81
9010- 91 4C 78 93 4C E4 93 20
9018- 0E 91 A9 13 20 5B FB AD
9020- 00 C0 10 0F 2C 10 C0 C9
9028- 95 F0 09 C9 88 F0 1C C9
9030- A0 F0 32 60 AD 03 90 C9
9038- 27 F0 F8 85 24 A9 A0 20
9040- 00 03 A9 C0 20 00 03 EE
9048- 03 90 60 AC 03 90 C0 00
9050- F0 E1 CE 03 90 AD 03 90
9058- 85 24 A9 C0 20 00 03 A9
9060- A0 20 00 03 60 A5 FF 30
9068- 01 60 A9 13 85 FF 20 5B
9070- FB AC 03 90 84 FE A9 40
9078- 8D 05 90 A9 FC 8D 06 90
9080- 60 00 00 A5 FF C9 06 B0
9088- 0C 20 5B FB A4 FE 84 24
9090- A9 A0 20 00 03 A9 00 20
9098- 5B FB A0 27 B1 28 C9 A0
90A0- D0 05 88 10 F7 30 43 8C
90A8- 81 90 8C 82 90 99 00 02
90B0- 88 30 08 B1 28 C9 A0 F0
90B8- F4 D0 EF AC 82 90 84 24
90C0- AD 04 90 F0 07 A9 A0 20
90C8- 00 03 E6 24 C6 24 B9 00
90D0- 02 20 00 03 CC 81 90 F0
90D8- 03 C8 D0 F2 AC 04 90 D0
90E0- 05 A9 A0 20 00 03 A5 24
90E8- F0 02 E6 25 A5 25 C9 06
90F0- D0 A5 A5 FF C9 06 B0 15
90F8- 20 5B FB A4 FE B1 28 C9
9100- A0 F0 03 4C 3C 91 A9 C2
9108- 84 24 20 00 03 60 A5 FF
9110- 10 01 60 20 5B FB A4 FE
9118- B1 28 C9 C2 D0 07 A9 A0
9120- 84 24 20 00 03 C6 FF 10
9128- 01 60 A5 FF 20 5B FB B1
9130- 28 C9 A0 D0 07 A9 C2 84
9138- 24 4C 00 03 C9 C6 90 05
9140- A9 FF 85 FF 60 C9 C2 F0
9148- 22 C9 C4 D0 0A A5 FF C9
9150- 06 B0 04 A2 05 D0 02 A2
9158- 04 FE E0 06 BD E0 06 C9
9160- BA D0 08 A9 B0 9D E0 06
9168- CA 10 EE A9 C6 84 24 20
9170- 00 03 A9 FF 85 FF A9 40
9178- 8D 05 90 A9 FF 8D 06 90
9180- 60 A9 00 8D 02 90 AC 03
9188- 90 8C 82 90 8C 81 90 A9
9190- 13 20 5B FB A0 00 A2 00
9198- B1 28 C9 A0 F0 1D CC 82
91A0- 90 B0 03 8C 82 90 CC 81
91A8- 90 90 03 8C 81 90 C9 C2
```

```
91B0- 90 09 F0 05 A9 C4 8D 14
91B8- 04 A9 A0 9D 00 02 E8 C8
91C0- C0 28 D0 D4 A0 00 A2 00
91C8- C6 25 A5 25 20 5B FB B1
91D0- 28 C9 A0 D0 03 4C 9F 92
91D8- C9 C3 B0 4C A5 25 C5 FF
91E0- D0 08 98 C5 FE D0 03 4C
91E8- 9F 92 BD 00 02 C9 A0 F0
91F0- 1B C9 C2 90 03 4C 9F 92
91F8- A9 A0 91 28 A9 C6 AE 03
9200- 90 9D 00 02 EE 01 90 90
9208- 03 4C 9F 92 84 24 20 00
9210- 03 A9 C2 9D 00 02 CC 82
9218- 90 B0 03 8C 82 90 CC 81
9220- 90 90 7C 8C 81 90 B0 77
9228- C9 C6 D0 0A A9 A0 84 24
9230- 20 00 03 4C 9F 92 B0 67
9238- EE 02 90 A5 4E 0A 0A 38
9240- 65 4E 85 4E 30 48 B1 28
9248- C9 C4 F0 12 90 09 E8 E0
9250- 28 D0 0B A2 00 F0 07 CA
9258- E0 FF D0 02 A2 27 BD 00
9260- 02 C9 A0 F0 0B C9 C2 B0
9268- 36 EE 01 90 A9 C6 D0 02
9270- B1 28 9D 00 02 A9 A0 84
9278- 24 20 00 03 EC 82 90 B0
9280- 03 8E 82 90 EC 81 90 90
9288- 16 8E 81 90 B0 11 A5 4E
9290- 29 03 C9 03 18 F0 04 29
9298- 01 69 04 69 C0 91 28 C8
92A0- 98 AA C0 28 F0 03 4C CF
92A8- 91 AC 82 90 88 CC 81 90
92B0- F0 22 AC 82 90 84 24 E6
92B8- 25 A5 25 20 5B FB B9 00
92C0- 02 20 00 03 CC 81 90 F0
92C8- 03 C8 D0 F2 C0 27 D0 02
92D0- C6 25 C6 25 A5 25 C9 06
92D8- F0 28 A0 00 8C 81 90 C8
92E0- 8C 82 90 20 5B FB A0 27
92E8- B1 28 99 00 02 C9 A0 F0
92F0- 0B CC 81 90 90 03 8C 81
92F8- 90 CC 82 90 88 10 E9 4C
9300- C4 91 A9 14 20 5B FB A0
9308- 00 84 24 A9 A0 91 28 C8
9310- C0 28 90 F9 A9 05 A0 00
9318- 20 5B FB B1 28 C9 C4 D0
9320- 05 EE 02 90 D0 46 C9 A0
9328- D0 37 C6 25 10 04 E6 25
9330- F0 3A A5 25 20 5B FB B1
9338- 28 C9 C4 D0 1A A9 A0 84
9340- 24 20 00 03 E6 25 A5 25
9348- 20 5B FB A9 C4 84 24 20
9350- 00 03 EE 02 90 D0 15 E6
9358- 25 A5 25 20 5B FB 4C 6C
9360- 93 C9 C6 D0 07 A9 A0 84
9368- 24 20 00 03 C8 C0 28 D0
9370- AA C6 25 A5 25 10 9F 60
9378- A9 05 20 5B FB A5 4E 0A
9380- 0A 38 65 4E 85 4E 38 E9
9388- 28 B0 FC 69 28 A8 B1 28
9390- C9 C4 D0 13 A9 A0 84 24
9398- 20 00 03 A9 06 20 5B FB
93A0- A9 C4 84 24 20 00 03 A9
93A8- 11 20 5B FB AC 03 90 B1
93B0- 28 C9 C3 90 04 C9 C6 90
93B8- 09 C6 25 A5 25 C9 05 D0
93C0- E8 60 E6 25 A5 25 20 5B
93C8- FB AC 03 90 B1 28 C9 A0
93D0- D0 11 A9 C2 84 24 20 00
93D8- 03 A9 40 8D 05 90 A9 FF
93E0- 8D 06 90 60 A9 4C 85 B1
93E8- A9 F3 85 B2 A9 93 85 B3
93F0- 4C 0E 94 2C 06 90 F0 0D
93F8- 2C 30 C0 CE 05 90 D0 05
9400- A9 00 8D 06 90 E6 B8 D0
9408- 02 E6 B9 4C B7 00 A0 00
9410- B9 29 94 99 00 03 C8 C0
9418- 55 D0 F5 A0 00 B9 7E 94
9420- 99 00 8E C8 C0 48 D0 F5
9428- 60 85 45 86 46 84 47 A6
9430- 07 0A 0A B0 04 10 3E 30
9438- 04 10 01 E8 E8 0A 86 1B
9440- 18 65 06 85 1A 90 02 E6
9448- 1B A5 28 85 08 A5 29 29
9450- 03 05 E6 85 09 A2 08 A0
9458- 00 B1 1A 24 32 30 02 49
9460- 7F A4 24 91 08 E6 1A D0
9468- 02 E6 1B A5 09 18 69 04
9470- 85 09 CA D0 E2 A5 45 A6
9478- 46 A4 47 4C F0 FD 08 1C
9480- 08 1C 7F 36 36 7F 00 00
9488- 00 00 00 00 00 00 08 00
9490- 08 00 08 00 08 00 10 56
9498- 58 38 36 49 48 04 22 22
94A0- 2A 1C 7F 1C 22 22 08 49
94A8- 2A 1C 3C 54 52 10 22 54
94B0- 2D 36 5D 14 4A 24 41 22
94B8- 1C 7F 1C 64 55 41 00 2A
94C0- 14 3E 55 1C 22 22
```

Program 7: IBM Spiders

Version By Charles Brannon, Program Editor
Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
EP 110 CLEAR ,32768!:DEFINT A-Z:KEY OF
       F:STRIG ON:SCREEN 1:COLOR 0,2:G
       OSUB 600:GOSUB 660
EC 120 LR=3:A=RND(-TIMER)
AA 130 FOR I=1 TO 9:READ FM$(I):NEXT
GO 140 CLS:FOR I=1 TO 50:PSET (320*RND
       ,80+110*RND),3*RND+1:NEXT:AL=0:
       WAVEOVER=0:HITS=0:WV=0
JP 150 FOR I=1 TO 9:PRINT TAB(5);:AX$(
       I)="":FOR J=1 TO LEN(FM$(I)):A=
       ASC(MID$(FM$(I),J,1)):IF A<>32
       THEN AL=AL+1:AX$(I)=AX$(I)+CHR$
       (POS(0)):POKE &H4E,A-48:PRINT C
       HR$(128); ELSE PRINT CHR$(32);
NK 160 NEXT:PRINT:NEXT
IE 170 POKE &H4E,1:LOCATE 25,1.PRINT"
       Score:";STRING$(9-LEN(STR$(SCR!
       )),48);MID$(STR$(SCR!),2);TAB(1
       8);"SPIDERS";TAB(30);"Lives ";S
       TRING$(LR,129);
CI 180 LINE (0,176)-(319,190),3,BF
BE 190 S!=1:FOR X=0 TO 104 STEP 8:LINE
        (160-X,176)-(160-X-S!,190),2:L
       INE (160+X,176)-(160+X+S!,190),
       2:S!=S!*2:NEXT
IN 200 FOR Y=176 TO 190 STEP 4:LINE (0
       ,Y)-(319,Y),2:NEXT
FL 210 PLAY "t255o2f14gg18bccfe
L' 220 IF WAVEOVER THEN WV=WV+1:IF WV=
       15 THEN 410 ELSE 230
NK 230 IF SCREEN(22,BX)<>128 THEN 270
EJ 240 Z=1:FOR C=0 TO 15:COLOR 15-C,Z:
       Z=3-Z:FOR W=1 TO 5:NEXT:NEXT
```