March 1984 Volume 1, Number 2 $1.95

# Microkids™

THE MAGAZINE FOR KIDS WHO LOVE COMPUTERS

WPS 36633

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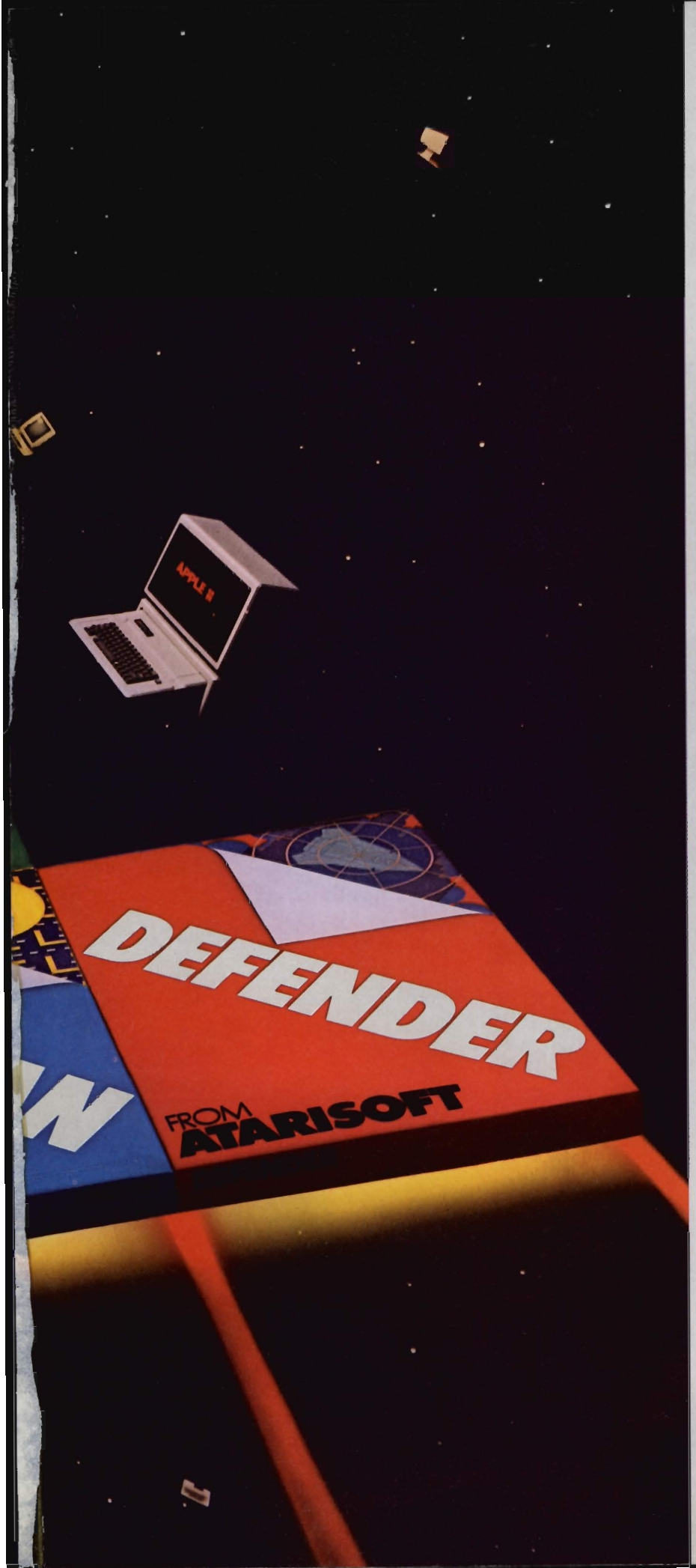


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ASM 30

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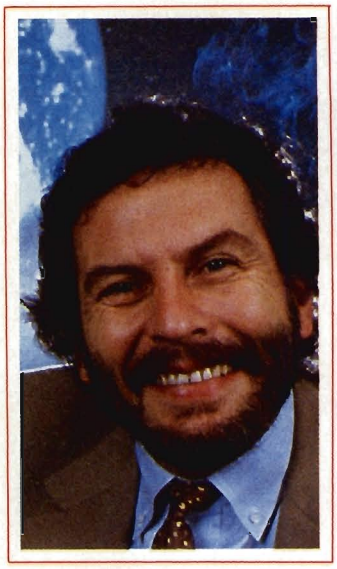

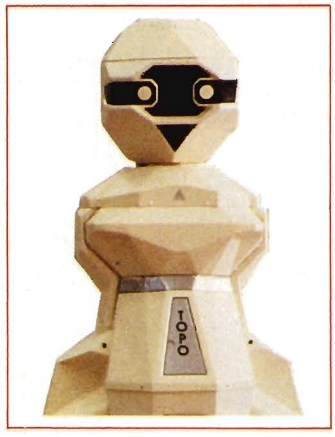


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THE MAGAZINE FOR KIDS WHO LOVE COMPUTERS

## Feature Articles



*Contents continued on Page 4*

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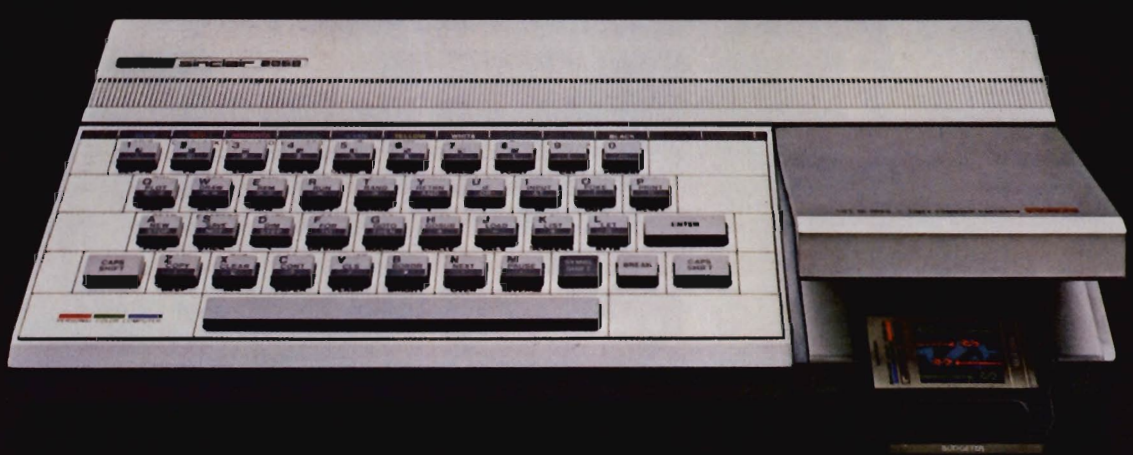

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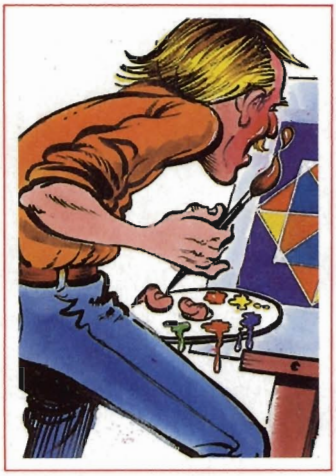


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# WRECK'EM RAM'EM RESCUE'EM

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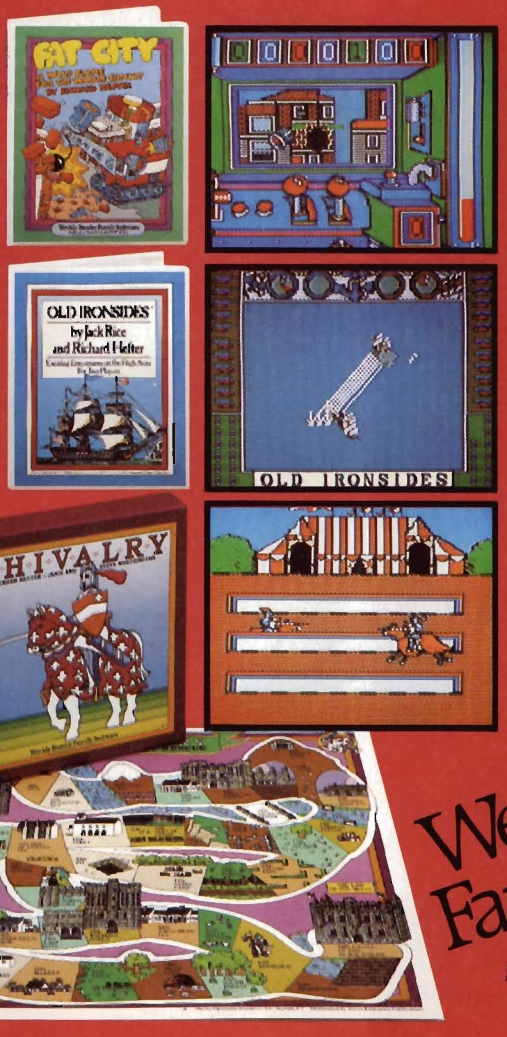


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Have you ever dreamed of having your own personal robot? I know I have. I mean, wouldn't it be great to have someone, or something, that you could count on to see you through any crisis, no matter what?

Your term paper is due tomorrow and you still have three other assignments to complete? No problem. Mr. Robot can do the job. You're having trouble with the school bully? Not to worry. Mr. Robot can zap him for you, if you want. Mom and Dad giving you a hard time? Whoops! Hold on there! That's going too far.

I suspect, though, that when you get right down to it there's hardly a teenager in the land who wouldn't exchange his next year's allowance for a reasonable facsimile of R2D2 or C3PO.

Of course, there's no chance of that happening . . . yet . . . or is there?

In this month's cover story, "Here Come the Robots!", author Tim Knight tells of the many robots already all about us, as well as the newer, smarter ones coming along every day. It's a fascinating article filled with promise of the future that we're sure you'll want to read.

Tim, by the way, is a 17-year-old California high school student who has also written a book on the coming age of personal robots. More important to us here at MICROKIDS, he's but one of a group of highly talented young computer enthusiasts whom we've recruited to help us make this a magazine that you can't put down.

Others whose names you'll find scattered through these pages from time to time include Michael Hyman, an 18-year-old freshman at Princeton University; David Lewis, an 18-year-old freshman at Union College in Schenectady, N.Y.; Dean Benz, a 17-year-old high school senior (and a classmate of Tim), of Moraga, Calif.; Morgan Schweers, a 14-year-old junior high school student, of Sea Cliff, N.Y.; and Rawson Stovall, an 11-year-old newspaper columnist from Abilene, Tex.

Our goal in this issue—as in every issue—is to give you something new to do, to solve, to marvel at just about every time you turn another page, and our young writers have helped us, we believe, to achieve that goal.

But to keep it up, we're going to need your help, too. Please write and tell us what you like or don't like about the magazine, or what you'd like to see that you don't see now. And if you have an article idea, a puzzle or a game that you think might be of interest to the rest of our readers, by all means send it in so we can consider it for publication.

As we said in our first issue, MICROKIDS is not just a magazine about computing. It's about you, for you, by you. So get in there and do your stuff! We're counting on you!

Robert Cubbedge

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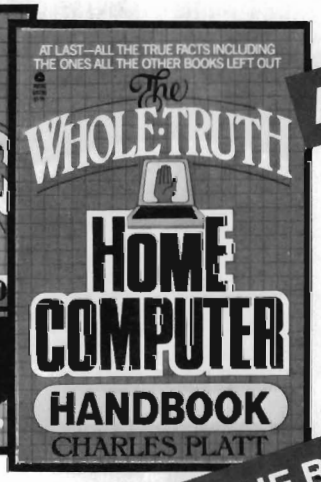


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Introducing the most elementary concepts of computer programming in this "hands-on" computer book. By Susan Drake Lipscomb and Margaret Ann Zuanich. $2.25


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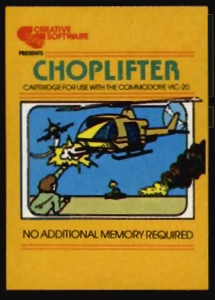
# Award-Winning Hits for your Commodore




***CHOPLIFTER****
***For the Commodore VIC-20.***

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***SERPENTINE****
***For the Commodore VIC-20.***

*Three huge and evil red snakes are slithering through the corridors of a burnt-out city, closing in on your good blue serpent from all sides. Move fast, watch your tail, and try to survive long enough to let your eggs hatch into reinforcements. Swallow the magical frogs or your enemy's eggs and you get the strength to go on! Complex strategy-action and increasing levels of difficulty.*


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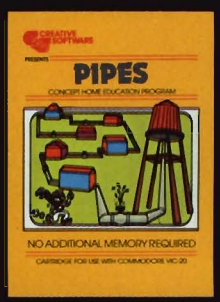


***PIPES**** 
***For the VIC-20 and Commodore 64.***

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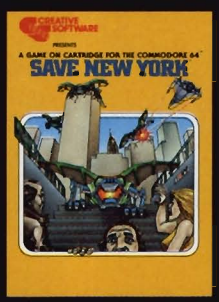


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**S O F T W A R E**


EDITED BY LAURA PALMER

# THE TWO OF US

When we first dreamed up the name "Bits and Bytes" for this column, we thought that surely we'd coined a new heading. Turns out, though, it's not so. At about the same time we were being so smart down here, a group of educators up in Canada were creating their own "Bits and Bytes," which has now evolved into a 12-part television series.

The new "Bits and Bytes," soon to be aired nationwide on the Public Broadcasting System, is part of a project called the Academy on Computers, which is aimed at encouraging the growth of computer literacy throughout the country. Viewers are invited to enroll in the Academy for a fee of $70, in return for which each registrant will receive materials including an overall course guide, a monthly newsletter, a machine-specific software disk and special access to a "Help!" Hotline staffed by local computer experts.

The first television-based course of its kind, the Academy on Computers fills an obvious void, says John Jay Iselin, president of New York's WNET, a PBS station. "There is a widespread need," he insists, "to dispel the mystique of computers. The Academy on Computers achieves this end by combining print and electronic media with emphasis on self-directed learning. Registrants become more than viewers—they become participants."

# MICRO-MEDICINE

Computers users are always asking themselves "what else" their computers can do. From Jamestown, N.Y., now comes another answer: They can help save lives in medical emergencies.

The proof is in a Tandy/Radio Shack TRS-80 Model 100 portable computer mounted on the dashboard of Jamestown's Chautauqua County Ambulance Service. Stored inside the TRS-80 are the names, addresses and listings of the complete health records of more than 1000 patients previously served in the area.

"When Dispatch asks you to respond," says Peter Bonadonna, director of the service, "they usually just give you an address. Based on that information, the computer (frequently) allows us to know who is there and what medical emergency to prepare for before we arrive at the scene.

"Having this information in advance allows us to concentrate on taking care of a person. The crew is finding it an invaluable aid, particularly with serious patients."

Neither Bonadonna nor his staff had any prior computer experience, but they learned to use the Model 100 in a matter of a few hours. Says Bonadonna proudly: "We're probably the only computerized ambulance service in the country."

# KRAFT KIDEO KAPER

The Kraft Food Co., long famous for household favorites such as Velveeta and Cracker Barrel cheeses, is now joining the computer generation. How? By means of a new computer contest open to anyone under 18.

Kraft's announced goal is to come up with an exciting and entertaining computer game that will also teach the very young about nutrition—very young meaning children aged 3 to 8. All you have to do is create it!

The best part, though, is you don't have to be some sort of computer genius to take part. Contestants are being asked to submit merely an *idea* for a game. Kraft itself will take the winning concept and turn it into an actual game program.

And speaking of winning, the prizes—if you do—are pretty neat. First prize is a four-day trip to Walt Disney World's Epcot Center for the winner and three other members of his or her family; second prize is a $1000 gift certificate for computer equipment of the winner's choice; and additional gift certificates of $50 each will go to 20 runners-up.

Contestants are required to print or type their ideas in 500 words or less. Entries will be judged equally, Kraft says, on originality, fun, educational value, nutritional content, non-violent activity and interactive game play between player and computer.

The game must focus primarily on the importance of eating a balanced diet, Kraft adds, but may include references to other healthy habits such as brushing your teeth, getting enough sleep and exercising properly. Entrants will also be asked to include sketches of their game schemes on sheets of paper no larger than 11 by 14 inches.

Like to give it a try? For full details, then, write: The Kraft Kideo Game Contest, P.O. Box 845, South Holland, Ill. 60473. The contest closes March 31 with winners to be announced May 1.

Good luck!

# ROLL OVER, BEETHOVEN

There's a new record just out in Chicago—a 45 rpm called "Classical Mosquito"—that'll probably never make the Top 40, but it's already made musical history. "Classical Mosquito" by Robb Murray, a Chicago composer, is the first commercial record ever made featuring music created entirely by computer.

Murray, who learned computing on a Tandy/Radio Shack TRS-80 Model III, has long been fascinated by the possibilities of computer-generated music. But it wasn't until he recently discovered a software package called "Orchestra 80" that he was able to unleash the real music-making potential of the machine.

The result—"Classical Mosquito"—sounds a lot like the kind of music that you might get from a Moog synthesizer. But what makes his achievement unique, says Murray, is his ability to create and direct four computer "voices" at once, each with the tonal quality of a full-sized reed organ. Moog music, he adds, is "just a bunch of single tracks overlaid."

What next for Murray and his computer? No one knows for sure, but Murray is convinced that his composition is merely the first note in what will soon be a growing cacophony of computer music.

"As flexible a medium as the computer is for music," he says, "it deserves a lot of experimentation to find the best and most imaginative use of its powers." Or as Paul Williams might put it, we've only just begun.

# SUPER BOWL OF COMPUTING

Everybody's heard of pro football's Super Bowl, but did you know there's also a super bowl of computing? Well, there is, and it's held every year in Providence, R.I., under the auspices of the American Computer Science League (ACSL), which is headquartered there.

Who's eligible to enter? Almost any junior or senior high school in the nation. Competing schools are required simply to put together problem-solving teams and the ACSL takes over from there, administering a series of elimination tests that eventually lead to the big showdown in Providence.

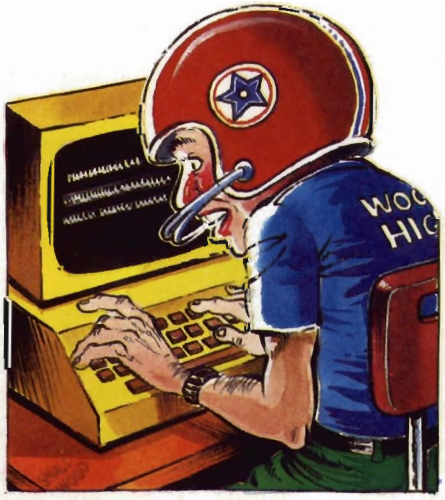
"We started five years ago with six competing schools," says ACSL director Marc H. Brown, "and now at least 600 are participating."

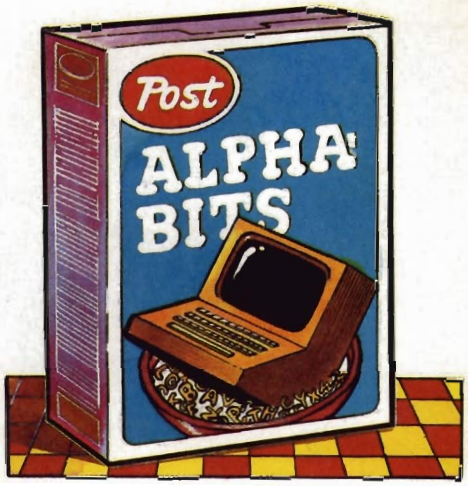
"It's made an exciting difference for our students," adds Andre Samson, whose W. T. Woodson High (of Fairfax, Va.) was one of the finalists last year. "Exposure to new areas of programming like assembly language, bit-string flicking and Pascal . . . has really expanded the team members' computing horizons."

In the final round, a head-to-head confrontation, competing students are required to write their own programs to solve problems posed by ACSL experts.

The winners last year each received Sinclair ZX81 computers as well as books on advanced mathematics and programming, subscriptions to a number of computer magazines and trophies galore.

For full details, write: American Computer Science League, P.O. Box 2417A, Providence, R.I. 02906.






# ALPHA-BITIZED ATARIS

What do Alpha-Bits and Ataris have in common? Not a lot, you might think. But if so, you'd be wrong—for Post Cereals, the maker of Alpha-Bits, and Atari Inc., the big computer maker, have now teamed up to make an offer that could pay big dividends for your school or local youth group.

The joint effort is called "Catch On to Computers." And the way it works is like this: Students, teachers and parents are asked to collect proof-of-purchase seals from Post Cereals, and when they get enough they can trade them in on Atari hardware and software.

How much is enough? Well, for 6250 Post proof-of-purchase seals you can get a new Atari 800XL. For 7675 more, you can also get an Atari 1050 disk drive, with software programs similarly available for anywhere from 225 to 1100 seals.

Contest officials stress that not only schools can take part, but so can camps, Boy Scout and Girl Scout troops, religious organizations, 4-H clubs—you name it.

If you'd like to get in on the action, write: Catch On to Computers, P.O. Box 3445, Kankakee, Ill. 60902.

A final thought: If Post Cereals is going to get into computers, should Alpha-Bits now be called Alpha-Bytes? ■

*Do you have a bit or byte of news that might be of interest to other Microkids readers? If so, send it, please, to Bits and Bytes, Microkids, 133 Fifth Avenue, New York, NY 10003. Newspaper clippings—dated, if possible—are fine.*

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BY MICHAEL HYMAN

**Q: I have an Apple II computer and an MX-80 printer with Graftrax$^{PLUS}$. I'd like to print out a high-resolution screen using a BASIC program, but sometimes I don't want to print the whole screen, only blocks.**

**A:** This routine should solve your problems:

```
10 LM = 0:RM = 39:BM = 191:TM = 0
   :BA = 8192
20 PRINT CHR$ (4) "PR#1"
30 PRINT CHR$ (9) "255H"
40 PRINT CHR$ (27) "A" CHR$ (7)
50 FOR X = RM TO LM STEP - 1
60 PRINT CHR$ (27) "K" CHR$ (0) CHR$
   (1);
70 PRINT CHR$ (0);
80 FOR Y = TM TO BM
90 Y1 = INT (Y/8):Y2 = Y - Y1 * 8
100 MA = Y2 * 1024 + Y1 * 128 - ((Y1
   > 7) + (Y1 > 15)) * 984 + BA + X
110 POKE 49296, PEEK (MA)
120 NEXT: FOR A = 0 to 256 - BM +
   TM: POKE 49296,0: NEXT : PRINT
   CHR$ (13) CHR$ (10);
130 NEXT
140 PRINT CHR$ (27) "@"
150 PRINT CHR$ (4) "PR#0"
```

Line 10 sets up the margins of the page to be plotted. Set TM to the top margin of the screen portion you want to plot (0 to 191) and BM to the bottom margin (TM to 191). For convenience, I divided the screen into 40 horizontal columns of 7 dots each. This corresponds to one-byte columns.

Set LM, the left margin, to the left-most column you want printed (0 to 39). Similarly, set RM to the right-most column you want printed (LM to 39). If you want to print the second hi-res page instead of the first, change BA to 16384. As listed here, the whole first page will be printed.

If your printer is not in slot 1, change line 20 accordingly. Line 30 is required to prevent printing problems. Line 40 limits line feed spacing to seven dots. Line 60 tells the printer it will receive 256 bytes of graphics data.

Lines 90 and 100 specify the bytes in the graphic page according to the rows and columns to be plotted. Line 110 places these values into the printer interface. Line 140 returns the printer to normal operation.

By the way, when you run this program, don't be alarmed if nothing seems to happen at first. The printer waits for a *full line* of graphics data before printing.

**Q: Can you please give me some advice about what to look for in a printer and the different types available?**

**A:** A printer is one of the most important peripherals you can buy for your computer. It's essential for word processing, extremely useful in programming, and an absolute must if you ever intend to send hard copy from here to there, wherever that is. There are two main types of printer — dot matrix and daisy wheel.

**Dot matrix:** The head on a dot matrix printer contains several hammers that strike an inked ribbon as it moves across the paper, thereby creating a pattern, or matrix, of dots.

Prices for dot matrix printers run from around $200 to $600 and up, and here, as in everything, you get what you pay for. At the low end, the characters produced are likely to be spaced unevenly and will probably lack true descenders. At the high end, though, the quality can be excellent, giving you crisp, clear characters that can be used even for business letters.

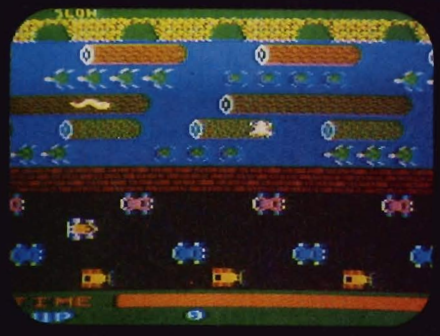
Dot matrix printers are, in my opinion, the best around for general use. They're fast enough for almost any chore, and the quality of their output, if not perfect, is more than adequate for most applications.

**Daisy wheel:** This type of printer gets its name from its head, which looks vaguely like a daisy and rotates to imprint different characters by impact as it moves across a sheet of paper, much like a typewriter.

A daisy wheel printer can cost anywhere from $400 to $3000 and up. It's great for producing high-quality documents such as business letters and special reports.

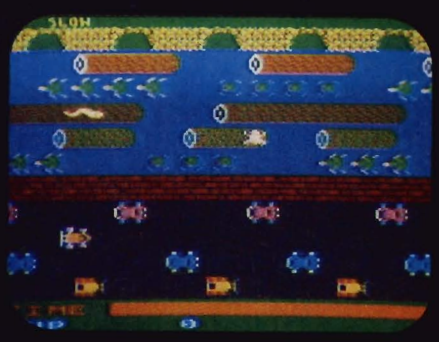
But a daisy wheel printer is often slow; it usually makes a lot of noise; and it tends to break down more often than the others—most often, it seems, when you're facing an imminent deadline. ■

*Do you have a question you'd like answered in this column? If so, send it, please, to: Input/Output, Microkids, 133 Fifth Avenue, New York, NY 10003.*



ATARI 5200

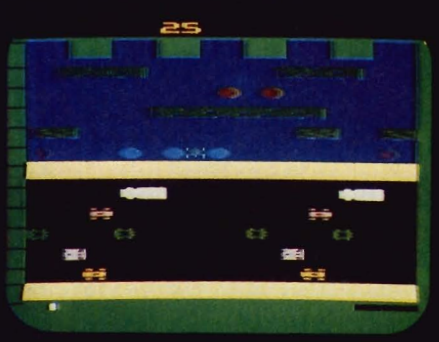
TI99/4A



ATARI 400/800/600XL

INTELLIVISION


COMMODORE VIC 20




ATARI 2600


COMMODORE 64

COLECOVISION

# 8 WAYS YOU CAN PLAY FROGGER*™ AT YOUR PAD.

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Catch Frogger along with POPEYE,® Q*bert,™ TUTANKHAM™ and SUPER COBRA™ where you buy your video and computer games. You'll find it absolutely ribbitting. PARKER BROTHERS

# MicroMoneyMakers

BY MARY SHAUGHNESSY AND KIM DRAMER-PANNELL

It's not often that teenagers get to tell their elders what to do—and get paid for it, too — but that's the enviable position in which four seniors from Hunter College High School in New York City recently found themselves. Even more remarkable, the elders they were advising were a group of editors at prestigious Time Inc.

The students—Peter Arden, Reza Keshavarz, Marc Schaedle and Leon Stankowski, computer buffs all — were hired as interns in Time's video group development unit. There they spent up to 50 hours a week hunched over desktop terminals, mainly analyzing and revising video games.

Along the way, they also won the admiration and respect of Time staffers. Says Time official Sean McCarthy: "Most people over 30 come to computers with a sense of awe. They're slightly intimidated. Not these kids. They'll take a new computer, play with it and reach an understanding of its subtleties quickly, naturally. We wanted to dip into that well of imagination and enthusiasm."

Peter Arden, 17, has been working with computers since he was 12, first with a Tandy/Radio Shack TRS-80 Model I and later with his own Atari. At Time, he worked mainly with two games — one that allows a user to compose his own limericks by the touch of a few keys, and another that allows a user to call up personal astrology readings.

"The edit people were excited by the prospect of working with kids," he notes, and the feeling, needless to say, was mutual.

Reza Keshavarz, 18, not only worked at Time but taught a computer course back in school and also put in long hours developing a new computer game on a free-lance basis.

Computers, he says, occupy "more than all" his time. The trick to working with computers, he adds, is simply "the ability to see how a large project can be broken down into hundreds of small tasks."

Leon Stankowski, 18, plays the keyboard, guitar and French horn when he can spare the time from computers, so his job at Time, naturally enough, was in the area of computer music. "I see computers," he says, "as a way of being able to pursue all my interests without sacrificing any one too much."

Marc Schaedle, 18, who describes himself as both a computer buff and a video freak, was concerned mostly with improving the visual and musical aspects of games.

Marc had previously interned in a recording studio but admitted that a lot of his expertise had come from playing coin-operated games in neighborhood video arcades. His love of video games, he says, is "just another outlet for me to do programming."

But the path Marc took is not one that he recommends to others. "You have to be realistic," he says, "in assessing your own abilities. The video parlor is not the real world." ■


Nancy Kessler

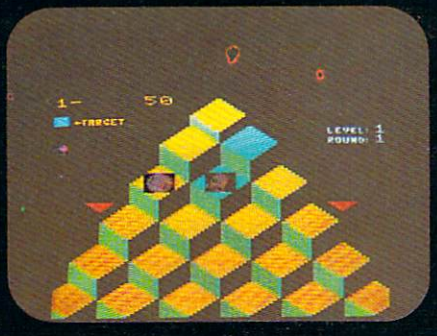
**Time Inc.'s "computer kids"—*(from left)* Marc Schaedle, Leon Stankowski, Peter Arden and Reza Keshavarz.**

ATARI 5200


TI99/4A

ATARI 400/800/600XL


INTELLIVISION

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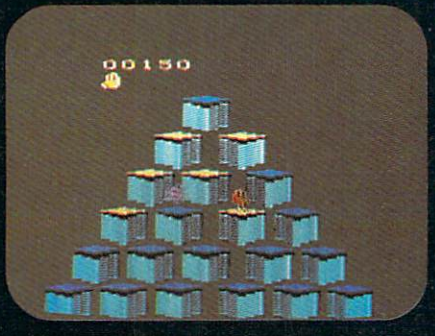


ATARI 2600


COMMODORE 64

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# HOW TO GET Q*BERT™ OUT OF YOUR SYSTEM.

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PARKER BROTHERS

# GI/GO

## GARBAGE IN... GARBAGE OUT...

BY GENE BROWN

Is a computer anything at all like a bulldozer? Normally, the answer to that would be no. And yet . . .

A bulldozer is a powerful and efficient machine, just like a computer. When handled carefully, it's capable of accomplishing a great deal of difficult and often disagreeable work in a very short time, just like a computer. And if mishandled — if, for instance, the operator is daydreaming when he should be paying careful attention—it can also do catastrophic things, just like a computer.

A case in point is the way a little mistake in a computer recently created a fiscal calamity in the town of Skowhegan, Maine. If the computer had been a bulldozer, it might have leveled half the town. Instead, it nearly threw it into bankruptcy. Here's how:

A big part of Skowhegan's town budget comes from taxes paid by the Scott Paper Co. on its plant there. Those taxes are based on the value of the Scott plant plus the value of the equipment used by the company at that location. For tax purposes, said value was increased in the past year to a grand total of $3,875,000.

However, in the process of transferring that value from a sheet of paper into the computer that was supposed to figure Scott's new tax bill, somebody accidentally added an extra 3 to the original number, raising the figure to $33,875,000. The result was a tax bill exactly $336,000 more than it should have been.

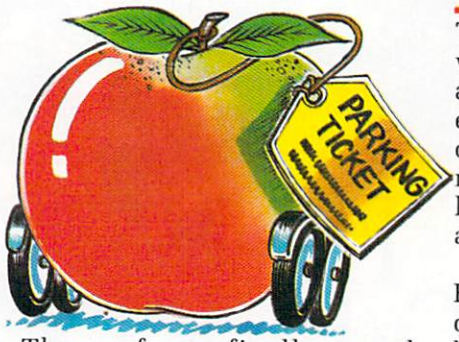
Unfortunately for Skowhegan officials, a town budget based on the faulty figure was then drawn up. In due time, though, the mistake was discovered, and the company's tax bill was reduced accordingly. The town was then faced with a tremendous budget gap.

Somehow, some way, they made it up, but check around today and you'll probably still find some pretty prominent red faces there.

### SORRY, WRONG NUMBER

Computers seldom make mistakes, it's true, but people do, and that fact had a group of Boston motorists up in arms last year.

The problem was they were receiving computerized parking ticket notices from the New York City Parking Violations Bureau when many of them, in fact, had never even seen the Big Apple.




The goof was finally traced, though, to nothing more complicated than the sloppy handwriting of the police who originally issued the tickets. Data entry clerks had simply typed in the numbers and letters they *thought* they had seen, and their computers did the rest.

### THE WRONG STUFF

Perhaps no programs on earth are more dependent on precisely entered numbers than those that guide our nation's spacecraft. Over the long distances of outer space, the slightest mistake can throw a spaceship way off course.

Still, mistakes happen — as, for example, in the Gemini flight of astronauts L. Gordon Cooper and Charles Conrad back in 1965. The person with primary responsibility for formulating their flight plan naively assumed that it takes the earth exactly 24 hours to complete a full turn on its axis.

Of course, that's not quite accurate; otherwise, we wouldn't need leap years. The astronauts' computerized guidance system thus set them down in the ocean exactly where it was programmed to set them down—which was exactly 103 miles from where they should have been.

### COMPUTERSPEAK

Translating the written or spoken word from one language into another is more an art than a science. Of course, computers may change all that someday. But up to now, computerized efforts at translation seem to have proven more amusing than helpful.

In one early attempt to translate English into Russian, it's said, a computer took "the spirit is willing but the flesh is weak" and turned it into "the vodka is good but the meat is rotten." In another attempt, we're told, "out of sight, out of mind" was transformed into "invisible, insane."

Hope springs eternal, though, as seen in this recent attempt to translate English into Spanish.

The original sentence: "I'll make a special price for you, and we'll send it prepaid." The Spanish translation via computer: "For you, will put a special price and will be send it frank."

Oh, well, back to the drawing board. ■

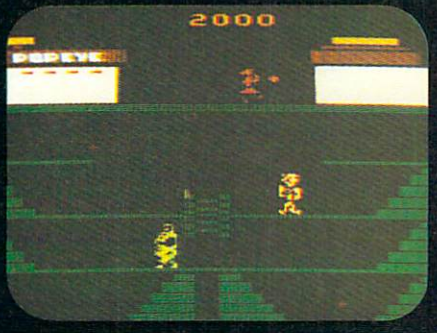

ATARI 5200


ATARI 400


ATARI 800


ATARI 600XL


TI99/4A

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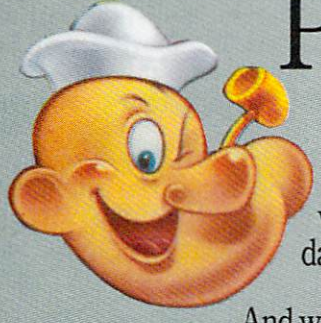

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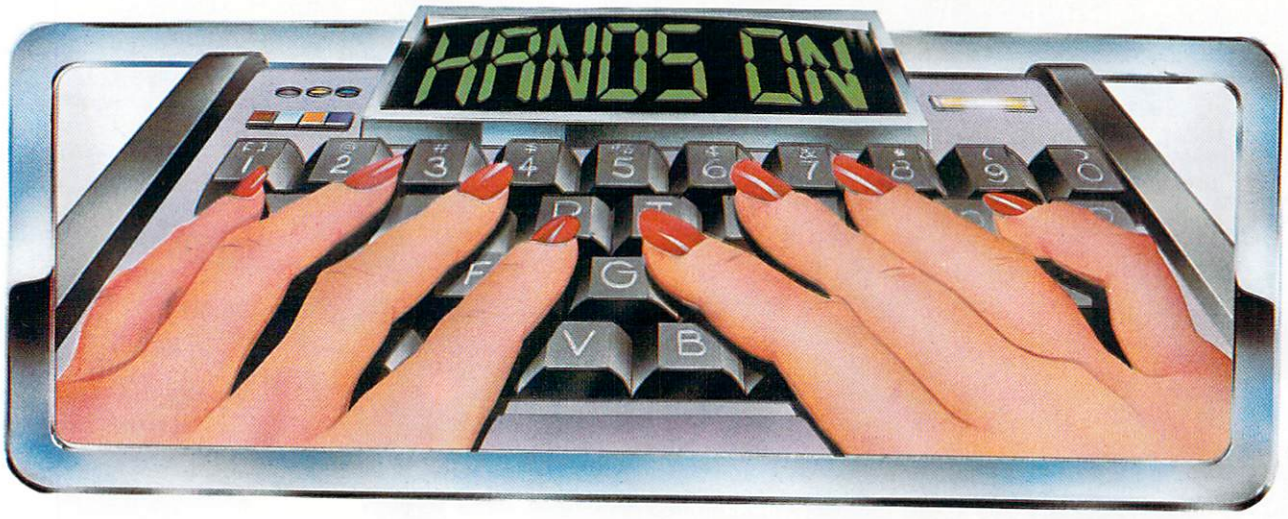


# FROM THE APPLE BARREL

The prompts you use in programs you write (such as Y/N for "Yes or No, choose one") can either be very unfriendly or quite professional in the way in which they tell one to proceed. In this article, we'll attempt to show you how to write an input subroutine that lays the groundwork for adding many professional features.

You can use this input routine in any application that requires a keyboard input to a program. The commands are specific to APPLESOFT BASIC, but may be modified to almost any other computer BASIC. Here's how it goes:

```
5 REM INPUT ROUTINE
10 INVERSE: PRINT X$;:
   NORMAL:PRINT ">";
20 X2$ = ""
30 POKE -16368,0
40 GET X1$
50 PRINT X1$;
60 REM RESERVED FOR FUTURE BELLS
   AND WHISTLES
100 IF X1$ = CHR$ (13) THEN 160
110 IF X1$ = CHR$ (8) THEN 180
120 REM RESERVED
130 X2$ = X2$ + X1$
140 X$ = X2$
150 GOTO 40
160 PRINT
170 RETURN
180 XX = LEN (X2$)
190 IF XX < 2 THEN X21 = ""
200 IF XX > = 2 THEN X2$ = LEFT$
    (X2$,XX-1)
210 X$ = X2$
220 GOTO 40
```

Here is what happens when the subroutine is called. First, in line 10, reverse video is invoked and the default or previous answer is displayed on the screen. Video is then restored to normal and the right bracket is printed after the default answer on the same line. Note the semicolon after the bracket. This means that the cursor will remain on the same line to the right of the bracket.

In line 20, the routine's working variable, X2$, is reset to " " (nothing).

The POKE statement in the next line clears the keyboard buffer to prevent you from entering any keypresses before it is time to process them (if, for example, you drum or tap on the keys while the computer is crunching data). The POKE statement clears the keyboard of any random pressings before it looks for the legitimate key you want to press.

In line 40, when you press a key, that character becomes X1$ and is printed automatically so you can see what it was you pressed. If that character is a carriage return (CHR$(13) in line 10), you are then diverted to the end of the input routine.

If the character is a backspace, however (CHR$(8)), then you are channeled to line 80 where a backspace routine is invoked. The backspace routine has to "erase" the unwanted characters from the string variable (X2$) you are creating.

If the character (X1$) survives all the bells and whistles (to be added later), then it is added to X2$ (line 130) and also added to X2$, which is the current default answer.

Here is how you would use the above routine as part of a program:

```
100 REM COLLECTION OF DEFAULT
    ANSWERS
110 PA$ = "Y"
.....
.....
500 PRINT "DO YOU WANT TO PLAY
    AGAIN? < ";:X$ = PA$:GOSUB
    10000
510 IF X$<>" " THEN PA$ = X$
520 IF PA$<> "Y" THEN IF
    PA$<>"N" THEN 500
```

In line 110, the original default answer for the question was chosen to be "Y" and assigned the variable PA$. When the question in line 500 is asked, the default answer is transferred to X$, which is the general variable for the input routine. Upon exiting the input subroutine, PA$ becomes the value of the general variable X$ as long as X$ is not equal to nothing.

Note, in line 520, the additional error trapping which declares that if the answer keyed in is not "Y" or "N" (the only two acceptable answers), then the question is repeated.

The advantage of a routine such as this over a conventional input statement is that the routine can monitor on a continual basis (since a program always needs to stop from time to time for inputs) the presence of special instructions.

Let's say you need help on a particular question. With this routine you can add a line that will look for a question mark as the first character and divert the program to a help screen.

Or maybe you'll want to quit the program at any given point and return to the beginning. You can add a line to this input routine to do that too. Next month, we'll show you how.

**—Marty Petersen**

# TUNING IN ON TI

The TI 99/4A is very versatile at

producing sounds. Before we show you how it does it, though, let's look at the two basic sounds that exist in the world: tones and noises.

A tone is a sound normally associated with music (even "new wave" music), but it can be described mathematically as a fraction of a whole number (i.e., 1/5, 3/4, 7/8, etc.). Noise—even a pleasant noise such as waves breaking on a beach—cannot be described in such simple mathematical terms.

What tones and noises do have in common, though, is that each can be made by specifying three factors: duration (how long the sound lasts); frequency (what the sound actually sounds like); and volume (how loud it is). Using these factors, the TI can be easily programmed to make almost any sound you want.

Duration is measured in milliseconds, or "ms" (a second is 1000 ms; 1/10 second is 100 ms). The TI can play any given sound for a duration of from 1 ms to 4250 ms.

Frequency for tones is measured in Hertz (Hz) and on the 99/4A ranges from 110 Hz (a very low bass) to 44,733 Hz (a pitch too high for you to hear, although your dog's ears will perk up). For noise, the frequency is given in arbitrary values ranging from -1 to -8. (It's tough to describe noise, so experiment with the numbers and see what happens.)

Volume is determined by the numbers ranging from 30 (quietest) to 0 (loudest).

Thus, to produce one sound, you might type in something like this:

```
CALL SOUND (500,440,2)
```

The 500 means 500 ms, or ½ second; the 440 is a frequency around the middle of the musical scale; and the 2 means that it is relatively loud.

By substituting, say, -5 for the second number in the sequence (440), you get a "white noise" (a not-unpleasant hum) that is relatively loud and lasts for half a second.

Notice that the first number in the parentheses is for duration; the second, for frequency; and the third, for volume. However, with the 99/4A you only need specify duration once (at the beginning), so you can actually play three tones and one noise simultaneously. Remember, though, for each tone or noise, you must specify a volume immediately.

Here then is a program for producing a C Major chord. You will observe that the whole sound lasts

for 2½ seconds and is made up of three tones and one noise (for resonance).

```
10 DUR=2500
20 VOL=2
30 C=262
40 E=330
50 G=392
60 CALL SOUND (DUR, C, VOL, E, VOL, G, VOL)
```

The machine now actually plays a C Major chord. Produce a few more chords like this and you can actually harmonize with yourself on the guitar or some other instrument.

**—David Weber**

# KEEPING UP WITH COMMODORE

The most efficient and most powerful way that you can store programs, data and other types of information is by means of your Commodore 64 disk drive. But there's an easy way and a hard way to do almost everything, and here's an easy way to use your disk drive more efficiently.

Before you can tell your drive to do anything, you have to use an OPEN command. Simply type in: OPEN 15,8,15. After you have OPENed the disk, you can then input the command needed to operate the disk drive.

If you're using a new disk the first thing you'll need to do is to format it so that the 64 can store information on it properly. To format a disk, use the command NEW or N for short. When you type in the NEW command, you also need to specify a couple of other things, so the format for your command looks like this:

```
PRINT # 15, "NEW0:DISKNAME, NUMBER"
```

The diskname can be anything you want, such as GAMEDISK or MYPROGRAMS, and the number, again, can be any number you want. If you are going to use three disks for games, you might want to number those disks 1, 2 and 3 to make them easily identifiable.

Here then is what you would type into the computer if you wanted to format a disk called GAMEDISK, and you wanted it to be identified as number two:

```
PRINT#15,"N0:GAMEDISK,2:
```


As you can see, the letter N may be used in place of NEW. Remember, though, you must use the OPEN command before you use any of these disk commands. If your computer says, "FILE OPEN ERROR", don't worry — it's just telling you that you don't have to OPEN that file right now, since the disk is already set to take your commands.

Another useful disk command is for saving programs. If you wanted to save a program written in BASIC, for example, you would use the SAVE command followed by the name of the program in quotes, followed by a comma and the number eight.

The comma and the eight are necessary to tell the computer to save the computer to disk rather than tape. If you don't type in ,8 the computer will automatically try to save the program to tape. If you forget, just press the RUN STOP key. Here then is what you would type into the computer if you wanted to save a program called ZAPPER:

```
SAVE"ZAPPER",8
```

If later on you wanted to load in the same program (in this case, the program ZAPPER), you would use the same format but substitute a load command as follows:

```
LOAD "ZAPPER",8
```

Finally, if you wanted to erase a program, you would need to use the SCRATCH command. This may be abbreviated as the letter S to save you the trouble of typing in the whole name. Here is the format for the scratch command:

```
PRINT#15, "SCRATCH0:name"
```

The zero after the SCRATCH tells the computer to use disk drive number zero, or your first disk drive. So if later you wanted to erase the same program, you would type in:

```
PRINT#15, "SCRATCH0:ZAPPER"
```

Or more simply:

```
PRINT# 15, "S0:ZAPPER"
```

Using a disk drive is not difficult. Using it efficiently can speed up the process of running programs that other people have made and, better still, make it easier to write your own.

**—Tim Knight**

# TIPS FOR TRS-80'S

If you're like most of us, you've probably found it very trying to have to retype long program lines simply to correct a single typographical error or to make only a minor change.

The TRS-80's built-in editor can eliminate much of this extra work. It allows you to insert, delete or change characters, to jump around within a line, and even to search for specific characters. These subcommands are logically named, and the editor is very easy to learn to use.

To get into the Edit mode, type EDIT and then the number of the line you want to alter. EDIT 10, for example, puts you into the Edit mode for line 10 (if line 10 does not exist, you get an error signal). The line number appears on the left-hand side of the screen, followed by a space and the blinking cursor.

You may have already come across this situation. When BASIC encounters a mistake in a line, it automatically puts you into the editing mode. Beginners' manuals usually tell you then to press Q. This allows you to exit the editing mode if you wish. It is the first of your possible choices.

The next simplest is A. This command cancels any changes made on the line and allows you to start over, so don't worry about botching it up beyond repair! Pressing L (don't follow it with ENTER) lists the current version of the line, so you're able to see exactly what you're doing. The subcommand X jumps you to the end of the line so you can tack on some more data if that's what you need.

Now to the good stuff! To move the cursor to the part of the line that you want to edit, use the spacebar, which scans over the characters.

You can do this in one of two ways: 1) Keep it pressed down until you come to the statement to be changed; or 2) estimate the number of characters between the cursor and the faulty statement, type in this number (the digits do not appear), and then press the spacebar. The cursor instantly jumps to the mistake.

Once you are there, you can do several things. H is the most drastic. It erases the rest of the line. You can then type in the correct or altered text. I allows you to start inserting characters (you may insert more than one at a time).

In the line 10 PRINT 'HELLO", you might want to change the single quote to a double quote (so that the word HELLO will be printed out). Simply position the cursor over the ' with the spacebar, press I, and type ". Now press SHIFT-UP ARROW to stop inserting.

You should now be right on top of the single quote and ready to use another extremely useful subcommand, the D for delete. Just press it to remove the character under the cursor. The character will be bracketed by exclamation marks.

There is also a more advanced version of the delete subcommand —you can type a number (again, the digits will not appear) and then D to delete that number of characters at one time. You could also make the quote change by using C (for change). Position the cursor over the single quote, press C, and then ". The C also allows you to change several characters at one time by typing a number before it.

When you are done with your changes, press ENTER to save them. You can then LIST the line to see the alterations.

There are also a number of more sophisticated subcommands. The K (for kill) subcommand, for example, works like a delete, but it deletes the line up to a certain character. Press K and then the character. Or you can type a number before the K, and the text will then be deleted up to the nth occurrence of that character.

The S subcommand uses the same syntax, but it does not delete any text; instead it finds the nth occurrence of the character and places the cursor over it. In the example noted previously, you could have positioned the cursor over the single quote by typing S'. Rather than retyping the entire line, it could have been altered with three or four keystrokes.

When used to best advantage, the TRS-80's built-in editor takes a lot of the drudgery out of programming. It makes it easy to find mistakes in a program and correct them — or to make changes quickly just to see what happens.

**—David Lewis**

# WE WANT TO KNOW ABOUT YOU!

**Dear Microkids, Buffs, Whizzes and Hackers:**

**We want to bring you more of the kinds of articles and features that *you* like—but to do that, we need your help. By completing the questionnaire below and sending it back to us, you can help us get to know you better. MICROKIDS is *your* magazine, so don't miss the opportunity to give us your valuable input and help us create a publication that's just right for you.**

1. How old are you? ___
2. Are you ___ male or ___ female?
3. Where do you live?

   _____
   City

   _____
   State ZIP
4. Do you use a computer in school? ___ Yes ___ No
5. If Yes, what kind(s) of computer(s) do you use?

   _____

   _____
6. If you use a computer in school, do you use the computer under supervision as part of your classwork? ___ Yes ___ No
   Do you use it on your own for your personal projects—just for fun? ___ Yes ___ No
7. During the past week, how many hours did you spend with a computer in school as part of your classwork? _____
   for your own projects? _____
8. Do you use pre-packaged software? ___ Yes ___ No
   Do you create your own programs? ___ Yes ___ No
9. Do you have a personal computer in your home?
   ___ Yes ___ No
10. Do you have a separate game system in your home?
    ___ Yes ___ No
    (If you answered "No" to questions 9 and 10, go directly to question 18.)
11. If you do have a personal computer, game system or combination system at home, please tell us what type you have.

    _____

    _____

    If you have a computer in your home, were you consulted on the brand before the purchase was made? ___ Yes ___ No
12. What peripheral equipment do you have for your computer?

    _____

    _____
13. Do you make use of any electronic information services such as CompU-Serve or The Source?
    ___ Yes ___ No
    If so, which one? _____
14. What other products do you buy for your computer on a regular basis?

    _____

    _____
15. How many hours did you spend with your home computer last week? For your own projects or fun? _____ For school projects? _____
16. Please rank from 1 to 6 the principal ways that you use your home computer.
    ___ Games
    ___ Schoolwork
    ___ Word processing
    ___ Computer graphics
    ___ Electronic information service
    ___ Other (please specify) ___

    _____
17. What MICROKIDS articles did you like best?

    _____

    _____

    _____
18. What MICROKIDS article did you like least?

    _____
19. What other computer publications do you read regularly? (List in order of preference.)

    _____

    _____

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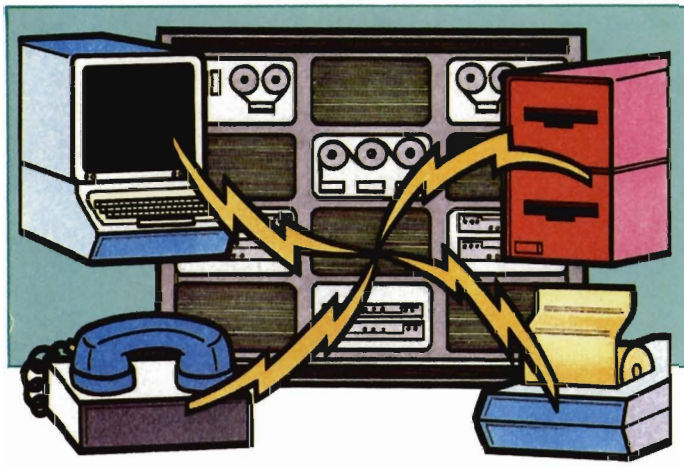
New York, NY 10003

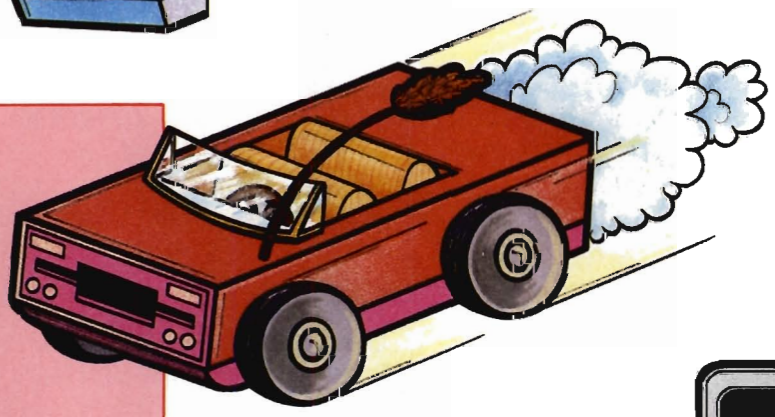
# The Microkids' Dictionary BUZZ



## CPU

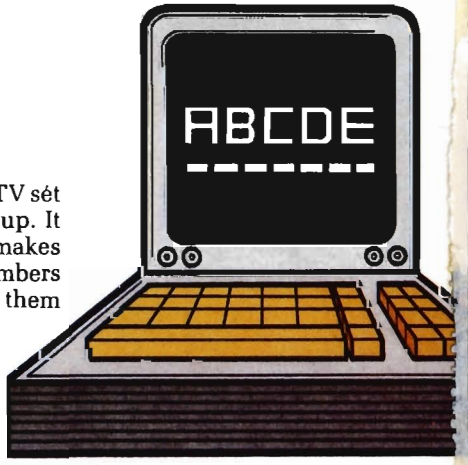
**(Central Processing Unit)**

The **CPU** is the central core of a personal computer. All computations, instructions and processes originate from it. It is very similar to the human brain in that it controls everything that happens throughout the computer's overall operations.



## DISK DRIVE

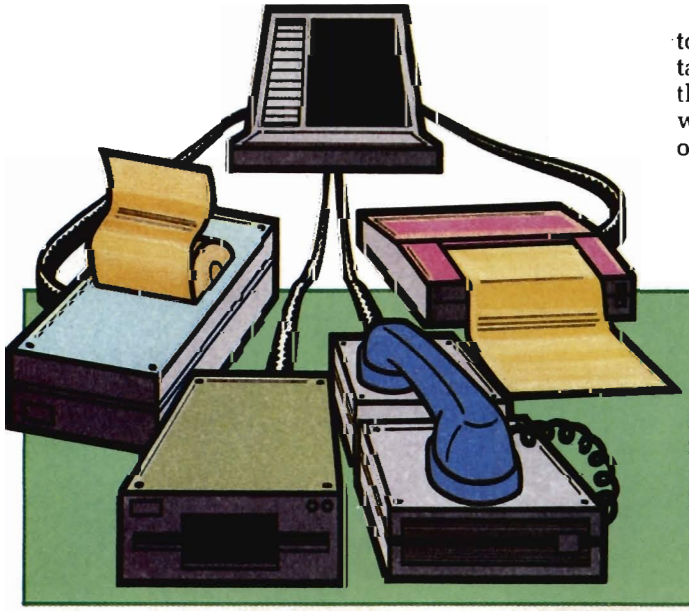
A **disk drive** is a device that serves essentially the same purpose as a tape recorder—it records and/or plays back the information on a floppy disk. In its "read" mode, for example, a head inside the drive picks up information from the disk, converts it into electrical impulses, and then sends them to the computer's **central processing unit** to be used as needed.




## CRT

**(Cathode Ray Tube)**

A **CRT** is nothing more than a TV set to which a computer is hooked up. It takes electrical impulses and makes them visible as letters and numbers we can understand, displaying them on a screen.

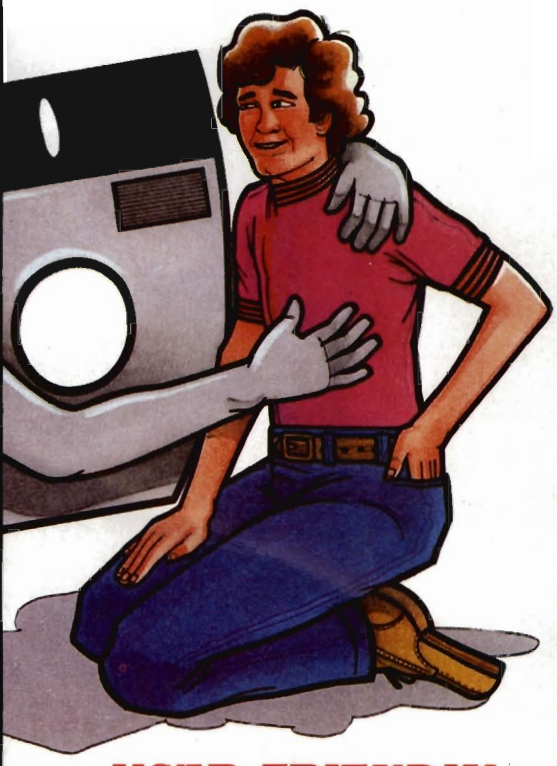


## PERIPHERAL

A **peripheral** device is one that is normally outside the computer, and must be connected to the computer by a **cable** and a special connection, or **interface.** Examples include a **printer, disk drive, hard disk, graphics tablet, plotter,** etc.

# WORDS

BY IRV BRECHNER

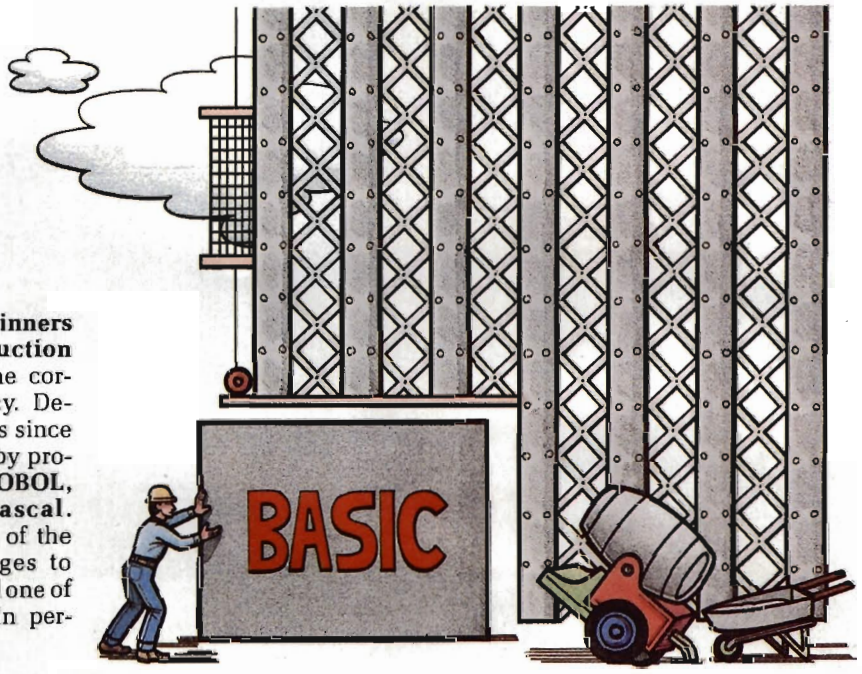


## USER-FRIENDLY

The trend in designing computer equipment today is to make it **user-friendly,** which simply means the user shouldn't need a programming degree to understand how to run it. In fact, with **menus** and **help** routines, the task of operating personal computers is growing easier each day.

## FLOPPY DISK

A **floppy disk** is a round, flexible disk enclosed in a square vinyl envelope that protects it from dust. It serves essentially the same purpose as the tape in a tape recording system. Data can be "written" or recorded on it, stored on it for as long as you like, and read or played back whenever you wish.




## BASIC

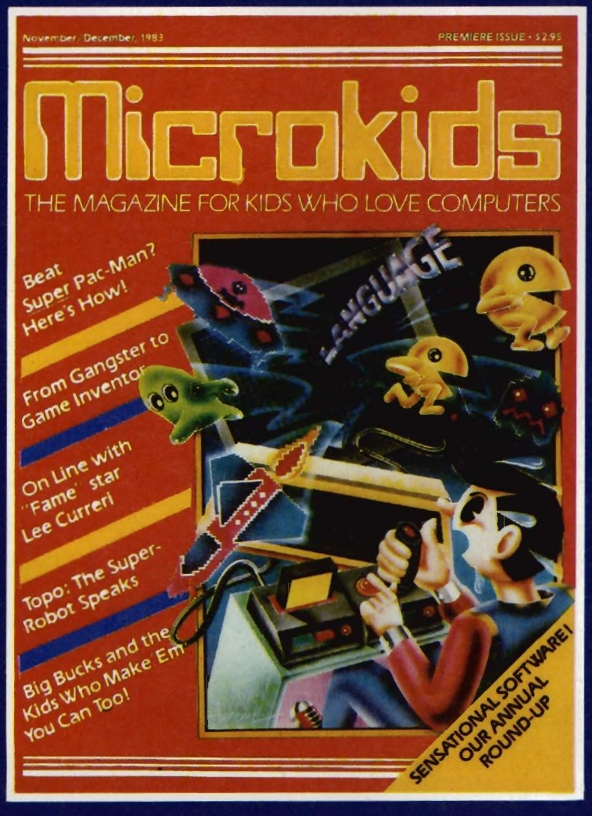
**BASIC** is an acronym for **Beginners All-purpose Symbolic Instruction Code,** considered by many the cornerstone of computer literacy. Developed in the mid-1960s, it has since been superceded in efficiency by programming languages such as **COBOL, FORTRAN, FORTH** and **Pascal. BASIC** remains, however, one of the easiest programming languages to learn, and because of that is still one of the most popular languages in personal computing.


COMPUTER Capers
IN A PENTHOUSE APARTMENT ON CENTER CITY'S POSH SOUTH SIDE...
STORY B. S. WATSON * ART ROBIN HART and HARRY CANDELARIO
MADAME XENA, NO. 6 HAS NOT REPORTED IN YET!
GIVE HIM TIME, NO. 3! THIS IS NO PURSE SNATCHING! WE'RE TALKING ABOUT A TRUCKLOAD OF PRICELESS PAINTINGS!
THERE ARE MANY DETAILS TO ARRANGE, THE FORGERIES ARE IN PLACE. NO. 6 IS STANDING BY!
ALL WILL GO AS PLANNED TONIGHT!
WHILE ACROSS TOWN...
IS THAT ALL STEVE'S GOING TO EAT?
I GUESS SO, MRS. WILKINS. ALL HE THINKS ABOUT IS BEING A DETECTIVE!
I'VE GOT AN IDEA -- WHY DON'T WE ALL GO TO THE ART MUSEUM TOMORROW?
ART MUSEUM?!
BUT WE WERE SUPPOSED TO GO TO THE DATA SECURITY SEMINAR!
AW, C'MON, WE COULD USE A LITTLE CULTURE.
OH, YEAH, SOME FUN.
GREAT! THEN IT'S SET. WE'LL HAVE LOADS OF LAUGHS.
THAT NIGHT, OUTSIDE CENTER CITY...
THIS IS GOING TO BE ONE EASY DELIVERY, PAL!
YUP! JUST DRIVE UP TO THE DELIVERY DOCK, AND THE MUSEUM GUARDS DO ALL THE REST.
MADAME XENA, THIS IS NO. 6. I'VE SPOTTED THE TRUCK. WILL PROCEED AS PLANNED.
NEXT ISSUE: A SWITCH IN TIME!

# AT LAST!

# Microkids™

## THE MAGAZINE FOR KIDS WHO LOVE COMPUTERS




At last—a computer magazine written especially for kids, by kids! **Microkids** is crunched full of computer games and special programs just for us. In the fantastic premier issue you'll find out how to build your own robot, how to beat Super Pac-Man, and how to make money with your home computer. Read the confessions of a teen-age computer whiz and learn how to make your own secret codes. Find out what's hot—and what's not—from other kids just like you. Be the first to get your hands on **Microkids** magazine. Subscribe today at the great introductory price of only $14.95 for one full year (six issues).

- **Homework Hotline**
- **Computers in Space**
- **Program Your Own Graphics**
- **Hands-On Info for Commodore, Apple, Atari, TRS, TI**

# BE FIRST!

**P.S.** to Parents: If you want to know what's really happening in the world of computers, get a copy for yourself.

**If the reply card has already been removed, send your check or money order for $14.95 to Microkids, 133 Fifth Avenue, New York, NY 10003**

*Do you know of a puzzle, a riddle or a word game that might be appropriate for this page? If so, and you'd care to share it with us, send it, please, to Pencil-Powered, Microkids, 133 Fifth Avenue, New York, NY 10003.*

# PENCIL Powered!

## 15 THE HARD WAY

**BY DAVID LEWIS**

Warren Peace was thumbing through one of his father's old math books when he encountered a rather intriguing diagram. It was a 3 x 3 box with a lone figure 8 in it (see below). "Place a different number in each of the remaining cells so that each line of 3 adds up to 15," the book said. Can you do it? Warren did.

| | | |
|---|---|---|
| | 8 | |
| | | |
| | | |

## PIECE O' CAKE

**BY DAVID LEWIS**

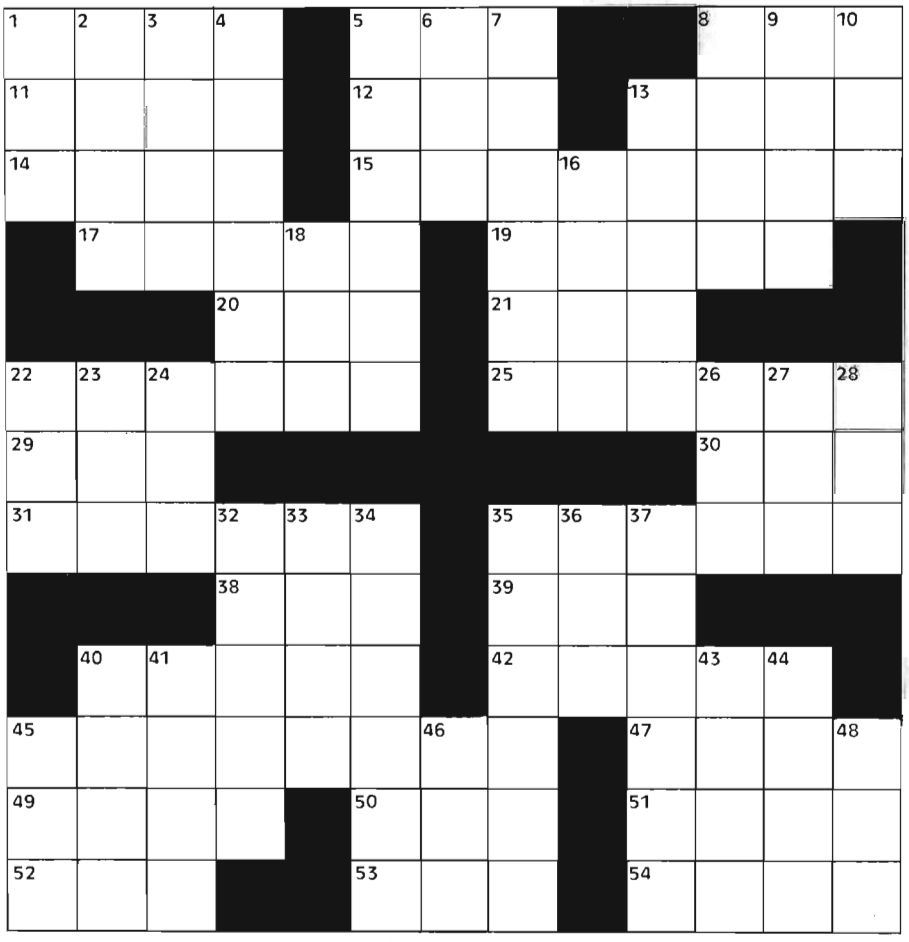
Two brothers decide to split up a cake 20 inches in circumference. John suggests that they cut it up in alternating slices that can be either 1 or 2 inches wide at the outer edge. Carl suggests that whoever gets the last piece of cake should wash their dirty dishes. John agrees, and Carl goes first. What size piece of cake should he cut to get out of washing the dishes?

## WORD TEST

**BY LOUIS SABIN**

**ACROSS**
1 Arc tangents: Abbr.
5 Health resort
8 Computer setting
11 Word with rain or lemon
12 199, Roman style
13 Butter substitute
14 Computer facts
15 Storage device
17 Personal computer
19 Concluded
20 Slippery fish
21 Sault --- Marie
22 Drum-shaped container
25 Classification program
29 --- tree (trapped)
30 Top game player
31 Arm or leg
35 First part of 24 Down
38 Chopper's tool
39 World's second largest bird
40 Sit down again
42 Newspaper of record
45 Service related
47 Memory unit
49 Great work of art
50 Young dog
51 God of love
52 Moon vehicle
53 Opp. of SWS
54 Congressmen: Abbr.

**DOWN**
1 Tote
2 Coal car
3 "----," said the cat.
4 Keyboard bar
5 Roll up
6 America's favorite dessert
7 Part of 24 Down
8 Ye ---- Book Shoppe
9 Put in
10 ---/NEXT loop
13 Restaurant request
16 Aware of
18 Arikara Indian
22 Panhandler
23 King Kong, for one
24 Volatile computer memory
26 Small child
27 College course: Abbr.
28 FYI only: Abbr.
32 Computer language
33 Theater sign
34 Copy a program
35 Copy a program, a different way
36 French friend
37 Itemize
40 Ready for eating
41 Delete: Abbr.
43 "Jane ----"
44 "Bus ----"
45 Actor Brooks
46 Start-up command
48 Curved letter





ANSWERS ON PAGE 96

# "...perhaps the most graphically magnificent computer game yet created!"

Bill Kunkel, Electronic Games Magazine

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*Electronic Games Magazine*

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*Software Showcase, Consumer Electronics Show*

**Computer Game of the Month**
*The Whiz Kid, Dealerscope Magazine*

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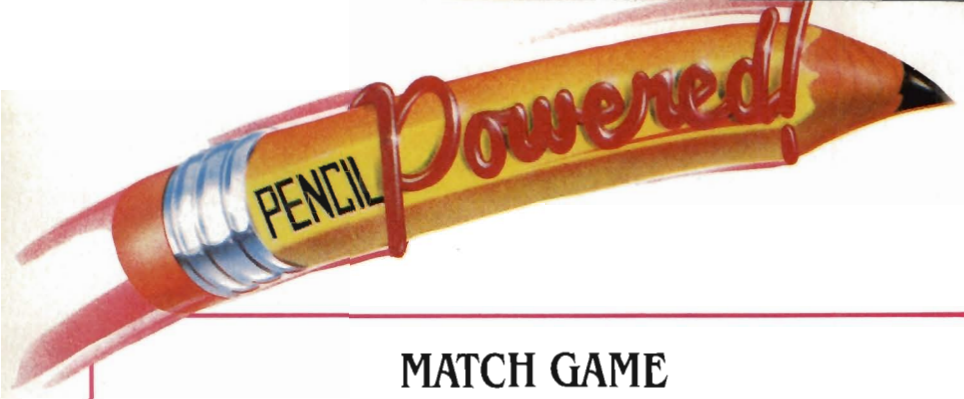



# MATCH GAME

BY JOHN K. YOUNG

**Enclosed in the box below are 28 words commonly used in computing. These terms may be printed forward or backward, as well as horizontally, vertically or diagonally. How many can you find?**

**Look carefully!**

**WORD LIST**

| | | | |
|---|---|---|---|
| Baud | Copy | Gate | Package |
| Byte | Cursor | Graphic | Peripheral |
| Buffer | Data | Input | Processor |
| Cassette | Disk | Matrix | Readout |
| Chips | Dump | Memory | Scan |
| Code | Embed | Micro | Storage |
| Component | Floppy | Mode | Terminal |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | A | R | G | U | E | T | R | E | T | A | G | S |
| P | I | R | O | S | R | U | C | N | T | E | T | C |
| S | E | D | I | F | Z | P | E | Z | I | O | N | H |
| E | D | R | S | L | A | N | I | M | R | E | T | I |
| P | O | P | I | O | O | I | E | A | B | O | S | P |
| R | C | I | H | P | A | R | G | T | Y | E | M | S |
| O | T | A | M | P | H | E | P | R | Y | U | D | D |
| C | R | O | S | Y | O | E | O | I | D | B | I | N |
| E | C | C | P | S | E | M | R | X | S | S | S | B |
| S | A | O | I | D | E | E | G | A | K | C | A | P |
| S | C | T | R | M | D | T | I | V | L | U | A | E |
| O | R | E | A | D | O | U | T | T | D | O | R | N |
| R | O | C | K | D | M | P | R | E | F | F | U | B |

# JIG SAW

BY SHELLEY LIPSON

This 15-line BASIC program was written for use on a Commodore 64, but somehow the lines got all switched around. Can you place them in their proper order? To help, here are some clues: 1) The program is supposed to print out randomly four diamond shapes. 2) The starting point is also chosen randomly. And 3) the x,y coordinates of the remaining points are computed within nested loops.

```
IF I=4 THEN A=(-1)
PRINT "(CLEAR HOME)"
IF I=7 THEN B=-1
NEXT K
Y=INT(1+(17)*RND(1))
POKE53280,8:POKE53281,5
FOR I=1TO12
IF I=10 THEN A=+1
LET A=1:B=1
NEXT I
X=INT(4+(32)*RND(1))
LET Y=Y+B
LET X=X+A
POKE1024 + x + 40*Y, 81
FOR K=1TO4
```

# BERTHA DAY

BY DAVID LEWIS

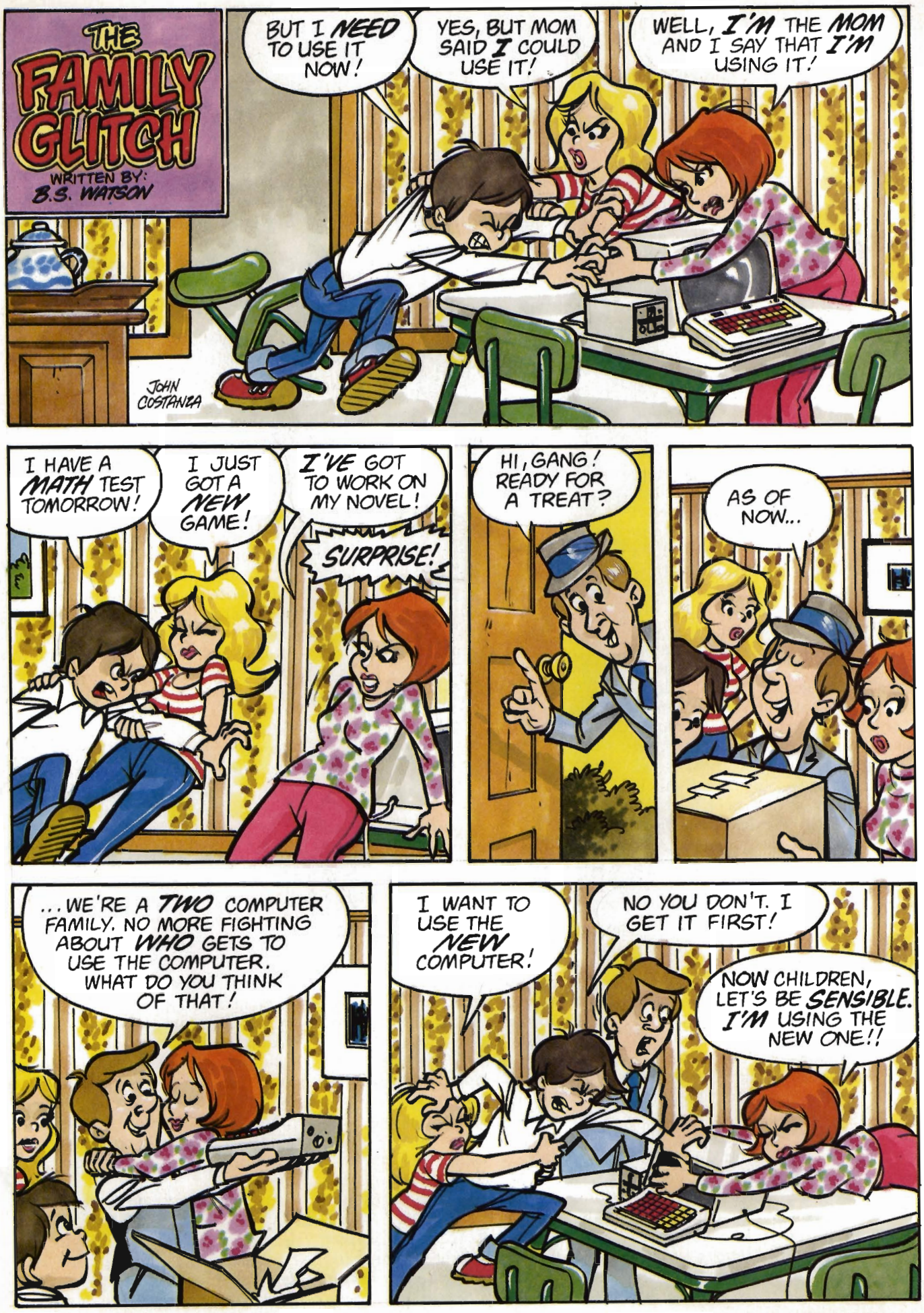
Computers are up-to-the-hour examples of state-of-the-art technology. But can they tell you something about yourself that happened years ago? Like your birthday?

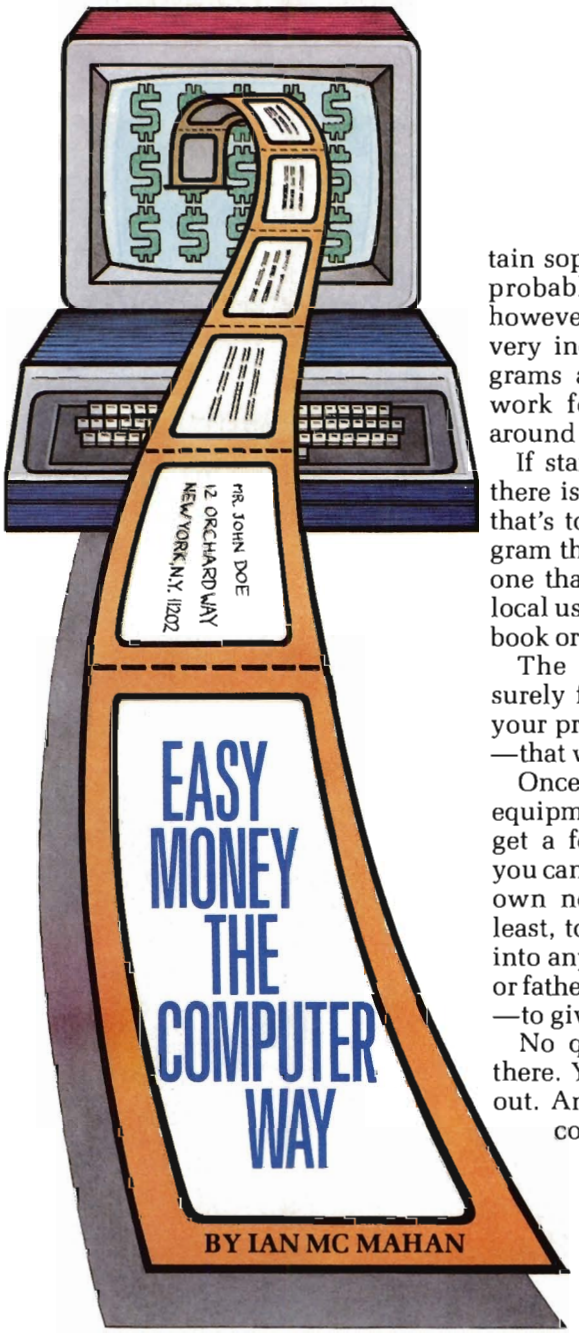
Type in the program below. Bertha Day asks for some pertinent facts, then miraculously tells you the day of the week on which you were born! To check this program, try today's date. Amazing, what!

```
5 CLS: PRINT @448, "Hi there! My
  name is Bertha Day, and I'm a
  birthday-teller from Texas."
10 PRINT:PRINT"If you are less than
  80 years old I will be able to tell
  you what day of the week you
  were born on."
20 PRINT:INPUT"Press ENTER to
  start the crystal ball run-
  ning";X$
30 CLS:INPUT"First, I need to know
  your name. What is it";N$
40 PRINT:INPUT"And what year
  were you born in";YE$:YE=
  VAL(YE$)
45 IF YE<1900 OR YE>1999 THEN
  PRINT"Wow! I can't do
  that!":GOTO40
47 VAR=5/4*VAL(RIGHT$(YE$,2))
50 PRINT:INPUT"What is your
  favorite color";C$
60 PRINT:INPUT"What is the number
  of the month you were born in?
  Count them so that January is 1,
  February is 2, March is 3, and
  so on ";MO$:=VAL(MO$)
65 IF MO<1 OR MO>12 THEN
  PRINT"I've never heard of that
  month.":GOTO60
70 PRINT:INPUT"Do you like
  hamburgers";C$
80 PRINT:INPUT"And what day of
  the month were you born
  on";DY$:DY=VAL(DY$)
85 IF DY<1 OR DY>31 THEN
  PRINT"Neat! Please try
  again.":GOTO80
87 VAR=VAR+DY
100 PRINT:PRINT"Thanks. Now I will
  be able to tell you the day of
  the week you were born on."
110 PRINT:INPUT"Press ENTER to put
  me into a short trance";X$
160 DATA 1,4,4,0,2,5,0,3,6,1,4,6
170 RESTORE:FOR G=1 TO MO: READ
  W:NEXT
180 VAR=VAR+W: Q=
  VAR -7*INT(VAR/7)
190 RESTORE:FORG=1TO12:
  READZ:NEXT
200 DATA Saturday, Sunday,
  Monday, Tuesday, Wednesday,
  Thursday, Friday
210 FOR G=0TOQ:READD$:NEXT
220 CLS:PRINT◆320,N$;", you were
  born on a "D$"!"
230 PRINT:PRINT:PRINT
```



ANSWERS ON PAGE 96


THE FAMILY GLITCH
WRITTEN BY: B.S. WATSON
BUT I NEED TO USE IT NOW!
YES, BUT MOM SAID I COULD USE IT!
WELL, I'M THE MOM AND I SAY THAT I'M USING IT!
JOHN COSTANZA
I HAVE A MATH TEST TOMORROW!
I JUST GOT A NEW GAME!
I'VE GOT TO WORK ON MY NOVEL!
SURPRISE!
HI, GANG! READY FOR A TREAT?
AS OF NOW...
...WE'RE A TWO COMPUTER FAMILY. NO MORE FIGHTING ABOUT WHO GETS TO USE THE COMPUTER. WHAT DO YOU THINK OF THAT!
I WANT TO USE THE NEW COMPUTER!
NO YOU DON'T. I GET IT FIRST!
NOW CHILDREN, LET'S BE SENSIBLE. I'M USING THE NEW ONE!!




# EASY MONEY THE COMPUTER WAY

BY IAN MC MAHAN

Over the next couple of weeks or so, take a close look at the mail you get every day. If yours is anything like ours, it will probably include a number of circulars and sales announcements, a few school and church bulletins, some flyers for meetings, concerts and the like, and perhaps dozens of letters of the kind routinely sent out in bulk mailings.

So what? Look a little closer and you'll see that most of these mailings were addressed by computer. The computer here has taken what was once a time-consuming, tremendously boring job and turned it into an easy one. Adding to or updating a mailing list is now simple; names can be sorted instantly in any number of ways; and address labels or envelopes can be printed out quickly, clearly and cheaply.

Again, so what? Aha, thought you'd never ask! So now look at all the mail you got that was *not* computer addressed. Each of the groups or organizations that sent out these pieces could have saved time, effort and money by using a computerized mailing list. And each of them is thus a potential customer for your own mailing list service, should you decide to go into the business.

How do you get started? Well, first of all, of course, you need a computer, preferably equipped with a disk drive, and you need a printer.

For best results, your computer should have a typewriter-style keyboard and the ability to generate both uppercase and lowercase characters. You might get by for a while with a membrane keyboard and only capital letters, but the more professional your work looks, the more customers you'll be likely to get.

As for a printer, a letter-quality device would be nice, but a good dot matrix printer will do just fine. A dot matrix printer may actually be preferable because it costs less, prints a lot faster and, most important of all, generally comes standard with a tractor- or pin-type paper feed (moving the paper you use by means of small holes along the right- and left-hand edges).

As you can imagine, this is vital when you're printing addresses on narrow labels strung out one after the other on long rolls of paper. Friction feed—the kind that typewriters use—can allow a sheet of labels to slip sideways, so for sure you don't want that. You could end up wasting labels, ink and your own time.

Sooner or later, you'll also need some software. No problem, though — there are now mailing-list programs available for practically every kind of computer. Most are fairly expensive, having been written originally for office use, and so contain sophisticated features that you probably don't need. There are, however, a number of very good, very inexpensive mailing list programs around, one of which may work for you if you'll just shop around till you find it.

If start-up money is really tight, there is yet another way to go, and that's to try and track down a program that's in the public domain—one that you can obtain through a local users' group or possibly from a book or a magazine.

The point is, you can almost surely find something out there in your price range—whatever that is—that will do the trick.

Once you've gotten the necessary equipment, it's time to go out and get a few customers. Chances are you can find one or two right in your own neighborhood — enough, at least, to get you started. If you run into any problems, ask your mother or father—or any other close relative—to give you a hand.

No question, the prospects are there. You just have to search them out. And, as noted earlier, the uncomputerized mailings you receive could very well be the best place to look.

O.K., let's say you've finally found your first customer. What next? First, you take whatever that group or organization has been using as a mailing list and type it into your computer, storing it on disk. (This might also be a good time to get that typing tutor program you've been meaning to buy. The faster and more accurately you can type, the quicker you'll finish the job.) To complete the task, you then simply print the addresses on standard self-sticking labels to be applied later to envelopes, flyers, packages or whatever.

Another important part of your service will be making sure that any list you do is always kept up to date. This means not only adding new names but also making sure that older names and addresses are still

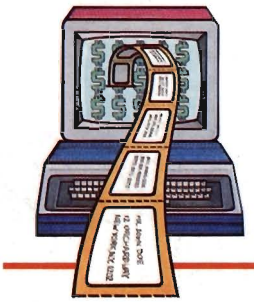
correct.

To help here, you might ask a customer to put "Address Correction Requested" on one mailing, and then to pass along to you any changes or deletions. This will obviously cost a lot less than sending out mail that never gets where it's supposed to.

We haven't mentioned price yet because that can vary a lot, depending on where you live and who you're working for. In the end, that's really up to the persons directly involved. It should be noted, though, that the biggest mistake many people make in starting up a new business is charging too little. If your fees are too high, your customers will let you know; if they're too low, however, not many people will tell you.

Whatever your rates, you will probably want to charge a set fee for each name and address entered or updated on the list, an additional fee for each label printed, and still further fees for extra services, such as doing special sorts.

One way to arrive at these fees is to find out how long each task takes you, working at a comfortable pace. If you are expected to pick up and



## EASY MONEY THE COMPUTER WAY

deliver the lists and labels, don't forget to include travel time. Now decide what you think is a fair hourly wage, then add to that the cost of materials (floppy disks, labels) and then double it to allow for a return on your investment. From these figures, you can calculate how much each task should cost.

Whether you charge a lot or a little, though, always remember that mailing lists are valuable. Often, the most important asset an organization has is its list of members, contributors or customers. If someone entrusts you with such an asset, you have a serious responsibility to care for it properly.

To do this, first of all ALWAYS BACK UP YOUR DISKS!!! Make at least *two* back-up copies, and give one to your customer. Keep the other in a safe place far away from your computer. A fire-resistant file box on a closet shelf isn't a bad idea.

For added safety, print out a hard copy of the list and keep it in still another location. And don't forget to make back-ups every time you add to or correct a list.

Second, promise your customers that you will keep their lists confidential, and *keep your promise.* Don't take chances; never put two customers' lists on the same disk. Each list should have a set of disks to itself, with clearly marked, color-coded labels on the disk covers. You may also want to type occasional messages into the list itself, reminding you whose it is.

Anyone with the equipment, the time and the ability to find customers can start a mailing list service. To succeed at it is another matter. That depends largely on whether you give your customers efficient and dependable service at a reasonable cost. If you do, they are likely to refer other customers to you.

With luck, you may then find yourself in the enviable position of having to decide whether you want to turn your spare-time occupation into a full-time business. ■

# Mind Benders

## SING-SONG

**BY CAPTAIN CRYPTO**

The following is a passage drawn from one of the world's most famous operettas—a British classic that was recently revived on Broadway.

**/OLOATC/**
**IDEATMNEIHATUAQMC/AS/**
**RLELTETWA/MY/RHETVI/WM/**
**I/HLTAOCBI/**
**TSANRODIATUAQU/QDEN/**
**AD/NEALTPSMRIESD/NEUH/**
**TIS/WMEIN//MOE/RTOOELH/**
**TA//LHATIIMWO/NGINBI/**
**MTEUEOTB/A ETSUUONBEAT/**
**OSPTYCHA/FE/HLTU/FFROE/**
**EEHRCA/UYQNSA/ME/HHTT/**
**ITW**

What's that? It's Greek to you? Why, of course — it's in code. If you want to figure it out, though, here's a program that may be of help.

```
100 ' CAPTAIN CRYPTO
110 '       CIPHER
120 '
130 DEFINT A-Z
140 '**********GET
    MESSAGE**********
150 LINE INPUT "ENTER TEXT: ";T$
160 A=LEN(T$)/2
170 IF 2*A>LEN(T$) THEN
    T$=T$+" "
180 INPUT "ENTER S TO SCRAMBLE
    OR U TO UNSCRAMBLE: ";M$
190 IF M$<>"S" AND M$<>"U"
    THEN 180
200 ' ELIMINATE SPACES
210 C$=""
220 FOR I=1 TO LEN(T$)
230 IF MID$(T$,I,1)=" " THEN
    C$=C$+"/" ELSE
    C$=C$+MID$ (T$,I,1)
240 NEXT I
250 T$=C$
260 '**********PROCESS
    MESSAGE**********
270 S$=""
280 IF M$="U" THEN 350
290 ' SCRAMBLE MESSAGE
300 A$=LEFT$(T$,A):B$=RIGHT$
    (T$,A)
310 FOR I=A TO 1 STEP -1
320 S$=S$+MID$ (B$,I,1)+MID$
    (A$,I,1)
330 NEXT I
340 GOTO 420
350 ' UNSCRAMBLE MESSAGE
360 A$=" ":B$=""
370 FOR I=2*A TO 2 STEP -2
380 A$=A$+MID$ (T$,I,1)
390 B$=B$+MID$(T$,I-1,1)
400 NEXT I
410 S$=A$+B$
420 '**********PRINT**********
430 PRINT
440 PRINT T$
450 PRINT S$
```

## 3 FOR THE ROAD

**BY DAVID LEWIS**

Problems involving the transfer of liquids are among mathematics' most enjoyable challenges—perhaps people like them because the solver can always try the experiments himself. Anyway, here are three to test your mettle.

**1. In a state of global emergency,** you are unexpectedly called upon to measure out precisely 4 quarts of liquid hydrogen from a huge tank. However, you have been provided with only a 5-quart measure and a 3-quart measure with which to save the masses. How do you avert the destruction of the world?

**2. As part of a psychiatric examination,** you are given a bucket containing 24 ounces of fluid and three bottles, holding 5, 11 and 13 ounces, respectively. The test is to separate the original 24 ounces into three drinkable, 8-ounce volumes. How do you prove that you are sane and thinking?

**3. This one is a little different.** You need to remove a delicate, glazed bowl from the kiln in precisely 9 minutes. Unfortunately, there are no clocks handy—but you do have two accurate hourglasses, one for 7 minutes and the other for 4 minutes. How do you measure exactly 9 minutes?

**ANSWERS ON PAGE 96**

*Do you know of a puzzle, or a riddle, or a word game that might be appropriate for this page? If so, and you'd care to share it with us, send it, please, to Mind-Benders, Microkids, 133 Fifth Avenue, New York, NY 10003.*

# NEW GAMES


## BATTLEZONE

Atari's latest offering for its 2600 and 5200 systems is **Battlezone**, set in the year 1999 with the world at peace—almost. The world truce is being challenged by a council of military commanders (no doubt very bored by now) who have unleashed battalions of automated weapons into the countryside.

Fortunately, you've discovered an old military tank inside a museum, and now you must seek out and destroy enemy tanks, supertanks, fighters and even flying saucers in order to save innocent lives.

The Battlezone playfield comes complete with a sighting mark and a radar screen for long-range scans so you can fend off your malicious enemies and save the world.

Price: For the 2600, $30; for the 5200, $41.

## LA GUILLOTINE AND LA CORRIDA DE TOROS

In **La Guillotine** (in French) and **La Corrida de Toros,** (in Spanish), two new games from Gessler Educational Software, you can either save an endangered aristocrat from the guillotine or help a bullfighter stop the charge of an enraged bull. You will also be learning some French or Spanish vocabulary at the same time.

Both programs are based on the popular Hangman word game, in which a player is given the number of letters in a word and then must try to guess that word by selecting the correct letters.

Settings for the games reflect each country's heritage. The color graphics in La Corrida de Toros depict a bull-fighting scene, with the matador and a bull preparing for a confrontation. Those in La Guillotine show a Parisian square crowded with peasants waiting for a beheading. And in both there is appropriate background music.

Players may choose lists of vocabulary words from five categories, including: 1) days, months, seasons and weather; 2) a restaurant; 3) a school; 4) around the house; and 5) professions. The player is allowed three incorrect letters, but on the fourth the guillotine blade falls or the bull charges the matador.

If the word is correctly spelled in the French version, the nobleman will look up at the blade and smile while the "Marseillaise" is played. In the Spanish version, the matador kills the bull to the sounds of a Spanish fanfare.

These games are available for the Apple II Plus and IIe, and for the TRS-80 I, III and 4.

Price: $28 each.

## PIE MAN

Penguin Software's **Pie Man** is a non-violent game where you start out as a baker's apprentice in the Automated Bakery Company. As each pie comes out of the oven onto a conveyor belt, it's your job to get some whipped cream and a cherry and put them both on, and then carry the pie to a pie bin.

Watch out, though, for flour sacks, grease spots and a slightly drunken wedding-cake baker. If you let seven pies fall to the floor, you're fired!

Pie Man is available for the Atari 400 or 800 on 32K disk and 16K cassette (a joystick is required). The game is also available for the Apple.

Price: $20.

## VIDEO PINBALL

Another new game for the Commodore 64 is **Night Mission Pinball** from SubLOGIC. Written by Bruce Artwick, author of Flight Simulator, this program recreates the look and feel of a real pinball machine. One to four players may compete at a time.

The game is based on a simulated World War II night bombing run. Realistic sound effects place you in the cockpit of a B-17 Flying Fortress soaring over enemy territory as you try to maneuver one or more of your balls down a bomb release line. Four


stand-up targets control a bonus multiplier. Your ball may also be caught by a "hole kicker," which activates a number of bonus features

# NEW GAMES

before ejecting the ball back into play. And you can keep up to four balls in play simultaneously.

Night Mission Pinball offers 10 different modes of play, from "Competition" to "Cosmic." There are also 40 user-adjustable program parameters that allow you to redesign any play mode to your own specifications. Joysticks are recommended, but keyboard control is also possible.

Price (on disk or cassette): $30.

## MOON MINE

In this new game cartridge from Texas Instruments for the TI99/4A, you're the captain of the USS Recovery, a spaceship trying to recapture treasures stolen from Earth.

As you travel through space, you're challenged by the mighty Zygonaut and his menacing creatures. There are varying levels of difficulty, and an angled background for a 3-D effect.

This one-person game can be played with the up/down, left/right arrows on the keyboard, or with a joystick. Use of the TI Speech Synthesizer makes the game more exciting. It's also available in Spanish.

Price: $40.

## REACTOID

This new game for the TRS-80 Color Computer from Radio Shack takes you to the world's first nuclear fusion reactor, where the automatic safety system has failed to operate.

Under normal conditions, a system-driven reflectoid directs high-energy particles toward "energy posts" at the reactor core—where their energy is translated into power. When the reflectoid is not working, though — as is the case here — the particles smash into adjoining particle-emission tubes, creating the danger of a meltdown.

Using a joystick to maneuver the reflectoid, your task is to guide the particles to the energy posts. You have to light up all the posts to get to the next round. If you fail, the word MELTDOWN (hovering ominously above the screen) lights up one letter at a time as the particle-emission

# Writing Your Own Game

Have you ever been frustrated playing the same old computer game? Has the magic gone out of it? Do you find yourself dreaming up games you could write—if *only* you knew how to write assembly language and the code for generating time sequences for ghoulie things to chase around the screen?

Perhaps some day . . .

Or perhaps you could get Lode Runner.

Lode Runner is on the front line of a revolution in computer game design. And that is, simply, that *you* design the game. (You can also just play it if you don't want to design it, but you'll eventually want to change it.)

Broderbund Software's Doug Smith has written a game that runs on any of the Apple II series computers. At first it looks a little like any number of cascade-type games, where you must avoid bumping into a series of objects moving in two-dimensional matrix—ladders or grids, steps or planes. What you see on the screen, in fact, is a series of ladders connecting one level with the next. Little figures descend through the maze and patrol the floors of this imaginary building, and you control a humanoid figure within. You can use either a joystick or a keyboard to control the android.

You need to accomplish several tasks, such as avoiding contact with those patrols and such as trapping them and seizing their gold. Since you don't know which ones have gold and which ones do not, you really have to use your head. And since you can't move to a more difficult mode in this game before stealing all the gold, things can become tricky, indeed. In fact, if you elect to play Lode Runner much before you start designing, you should be warned that there are an amazing 150 levels of difficulty to this breakthrough game.

One of the reasons it's a breakthrough is that there are actually no limits to the number of levels. For all you have to do is press the key that lets you enter the editing mode, and you instantly become your own game designer. Lode Runner has its own disk-formatting program, which you use to create a data disk to store your new game designs. Once you have entered the editing mode, you simply move the cursor to any position on the screen and place the characters you wish to use at that point.

For example, you can set up floors that your android can dig through. You can set up trap doors the player won't be able to see when he plays, or ladders he can climb. You can increase or decrease the number of patrols that are going to be moving about and the speed with which they move.

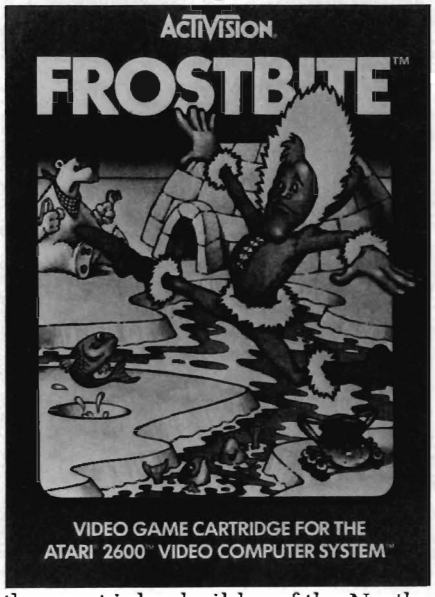
With this new type of program you can literally let your imagination run wild. All those annoying glitches you've fought against are now in your power to control and eliminate. If you don't like the game, guess whose fault it'll be? ■

tubes are hit. When seven tubes are hit, the screen disintegrates into a mock meltdown, ending the game.

Price: $20.

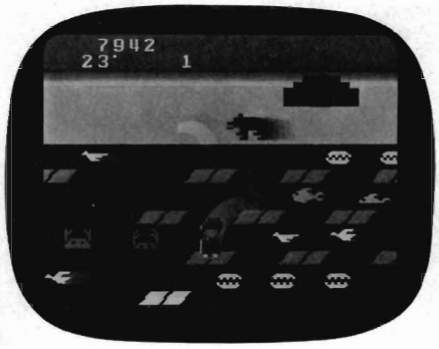
## FROSTBITE

This new game from Activision (for the Atari 2600 VCS) is a chilling adventure starring **Frostbite** Bailey,




the great igloo builder of the North.

You direct the arctic architect as he roams a frigid wasteland in




search of ice blocks. Grizzlies, Alaskan king crabs, low-flying snow geese and dreaded killer clams abound. But worst of all is the cold.

When the game begins the temperature is 45 degrees and falling. Frostbite must gather enough blocks to build an igloo before the temperature drops to zero. He does this by hopping from ice floe to ice floe. Each time he lands safely, the white ice turns blue and another block is added to his igloo on shore.

During the course of his exertions, Frostbite must also grab raw fish (for energy) as they swim by. Meanwhile, the crabs and clams try to push him into the water, and even the birds try to nudge him gently overboard. And always, on shore, there's a grizzly lurking nearby. When Frostbite completes an igloo, he must dodge the bear and duck quickly inside, or it's curtains.

Price: $32.

## SAVE NEW YORK!

The object of this new game from Creative Software for the Commodore 64 is to save the Big Apple from city-munching monsters who have dropped in from outer space.

The player flies around in a rocket ship, shooting down the creatures before they gobble up the New York City skyline—and must make sure he doesn't run out of rocket fuel or crash into a skyscraper.

But beware! The alien scavengers can also lay eggs that drop safely to the ground. These eggs hatch into baby mutants that crawl into the subways and then proceed to chomp away on buildings from the ground up. To destroy them, the player has to land his rocket and track them down on foot through the sewer system beneath the city.

**Save New York!** has increasing difficulty levels and a one- or two-player option.

Price: $40. ■

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Video game visionary Nolan Bushnell with one hand full of pizza and the other full of game tokens, the key ingredients in one of his latest ventures, the Chuck E. Cheese's Pizza Time Theatre chain.

Photography by Roger Ressmeyer

# HOW TO DO IT *YOUR* WAY

## By Nolan Bushnell

*The author – creator of the first commercially-successful video game, Pong, and founder of Atari Inc. – here debunks five myths that may be stifling your creative ingenuity.*

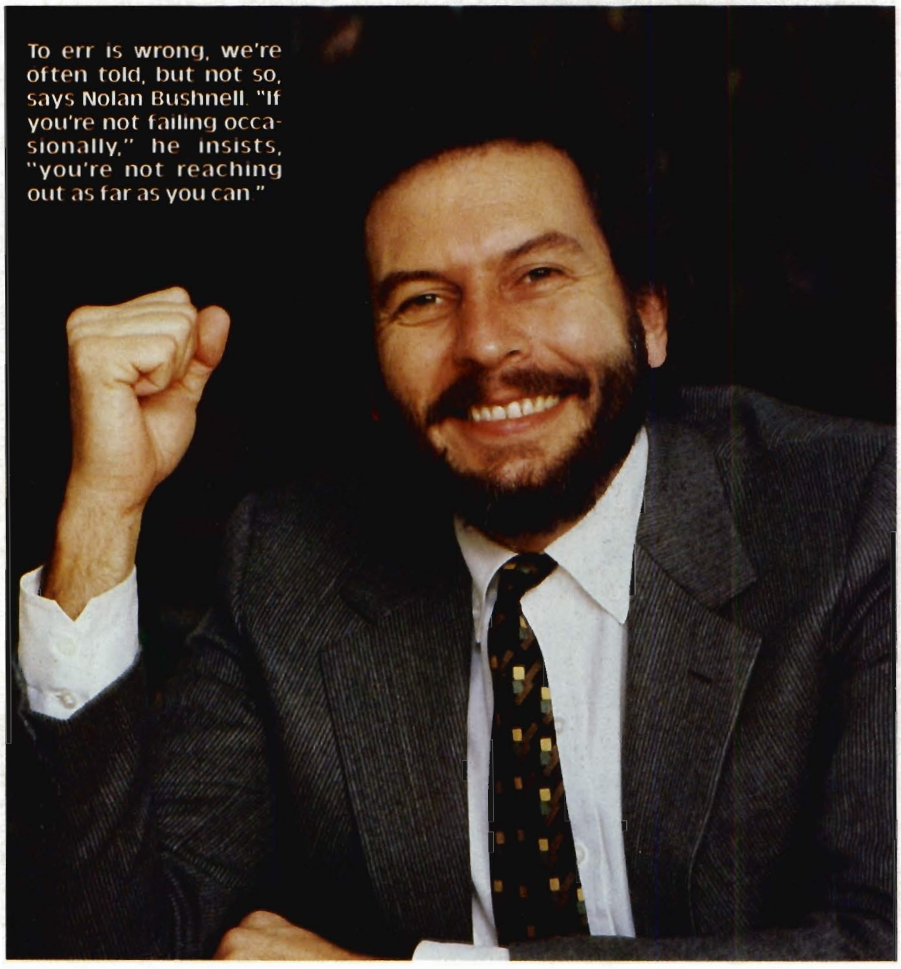
PERSONALLY, I believe that innovation is a lot of fun. This is what has motivated me to try the various things I've done.

You see, I love to build. When I was a kid, my favorite toy was my Erector Set. Since then I've gone on to engineering and then to business. I see each of these activities as a subset of the other. The creative aspects of how something is put together—whether it's a toy bridge, an array of integrated circuits, or a new company—really excite me.

With the toy bridge, you have to balance the pieces to create a sturdy structure. When you're building a new company, you have to create a product that people want, have hiring policies that attract good people, and provide an environment where they can be efficient and innovative.

I've also discovered through the years that innovative people share certain characteristics. For one thing, they feel a sense of urgency—a desire to make their ideas happen. And they want to do them now, not next week, not the day after tomorrow, but right now.

# HOW TO DO IT *YOUR* WAY



To err is wrong, we're often told, but not so, says Nolan Bushnell. "If you're not failing occasionally," he insists, "you're not reaching out as far as you can."

Most people allow their jobs to expand to the time that's allotted. I like to set difficult deadlines for myself. That's because I believe the ultimate inspiration is a deadline. I think one of the things that's made American business successful in meeting deadlines is the "trade show" phenomenon. The fact that twice a year, the creative talent in this country is working until midnight to get something ready for a trade show is very good for the economy. Without this kind of pressure, things would turn to mashed potatoes.

I've also found that innovative people have a passion for what they do. I don't know if this passion is innate or not, but it can be snuffed out in a person. Think about it: How much passion will Johnny exhibit if after every time he runs around the house and displays passion, he gets hit on the head and is told to "Sit down!" You're right, not much.

This is one of the things that make being a parent such a challenge. I see characteristics in my kids that in an adult would be fantastic, and yet occasionally they drive me nuts. Sometimes, I have to catch myself and stop and listen to them. If I just say no, they will probably lose the inventiveness and imagination they will need to be creative when they grow up.

More often than not, though, it's our own innate attitudes that prevent us from being creative. We're hung up on mental blocks that get in the way when we are trying to be innovative. I have tried to keep my thinking flexible and free from these fetters. Here are a few thoughts I have on how I keep some of these blocks from affecting my thinking.

**Mental Block No. 1: Follow the Rules.** For years, the standard in pinball-game design was the 26-inch-wide playing field. Whenever designers tried to improve the game, they spent their time thinking—about how to add more bumpers, more flippers and more targets. The problem was that they confined themselves to too narrow a field, and thus asked the wrong questions. I decided that I could make the game better by changing the width to 30 inches. At that point, I increased its possibilities and its playability. I learned then not to be afraid to break the rules if it would lead to new ideas.

**Mental Block No. 2: Don't Be Foolish.** I give myself the license to play the fool. I think that playing the fool allows people not to take themselves too seriously, and when that happens, they loosen up their thinking and come up with more ideas.

Ever the experimenter, Nolan Bushnell tinkers with the insides of a computer—an Atari, of course—in his futuristic inner sanctum at Catalyst Technologies, another of his many interests.

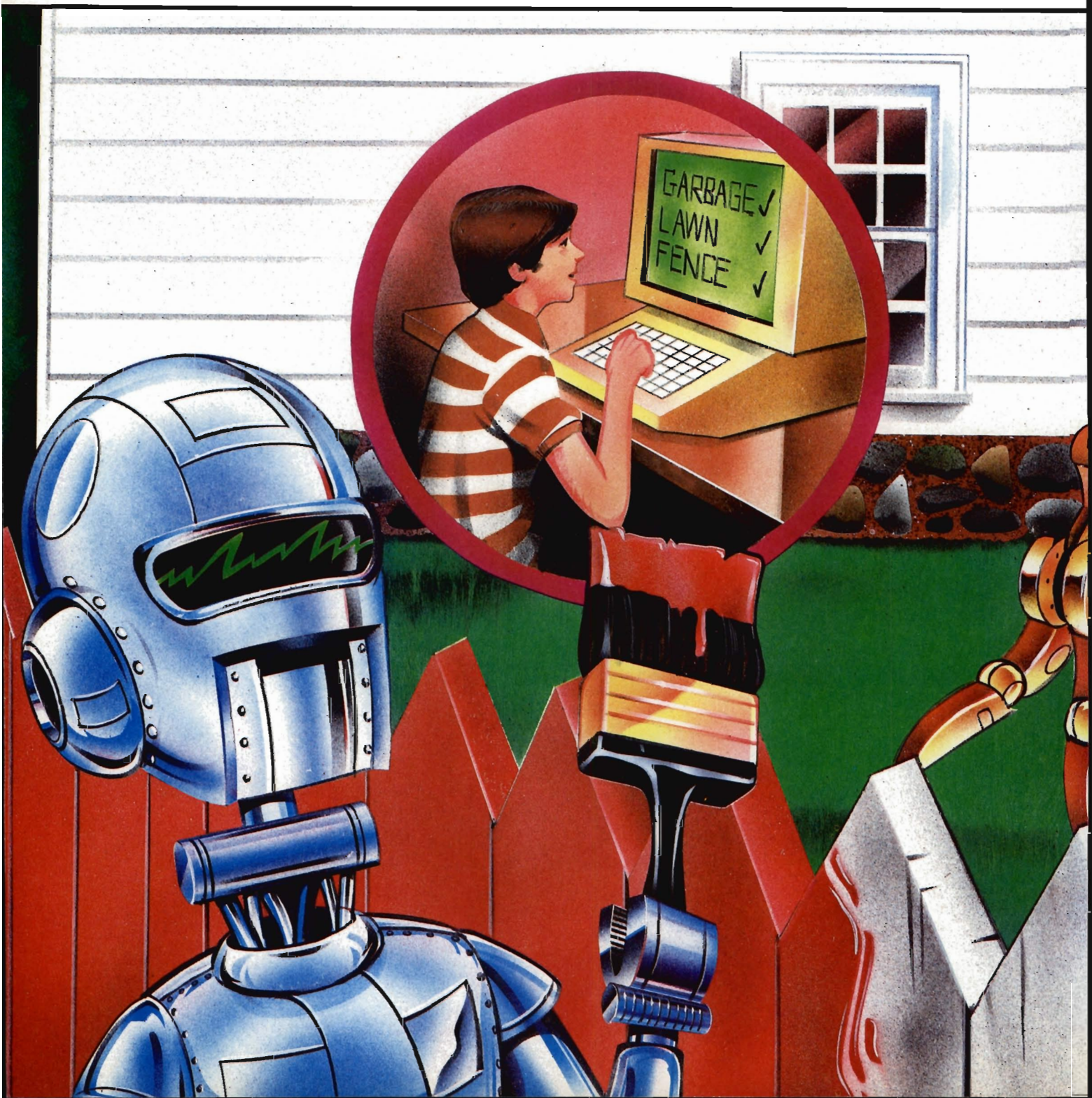
**Mental Block No. 3: Play Is Frivolous.** I've found that a significant proportion of my "big-money" ideas come to me when I'm on my boat offshore, when I'm out of the routine. That's because I'm away from the phone and my usual surroundings, and free to try different things. When I play, I think I allow a different part of my brain to be activated. For example, I invented the game Breakout when I was running my fingers through the sand on a beach. I find that my life switches between being a morning person and an evening person. When I'm an evening person, I'm very creative, and when I'm a morning person, I get a lot done. But I like to vary it so that I'm not locked into any routine.

**Mental Block No. 4: To Err Is Wrong.** It's the old story of the guy who does only five things and gets them all right versus the guy who does 100 things but gets only 60 right. If I can keep the mistakes from being dangerous, then I've done 60 right things and the other guy has done only five. If you're not failing occasionally, then you're not reaching out as far as you can.

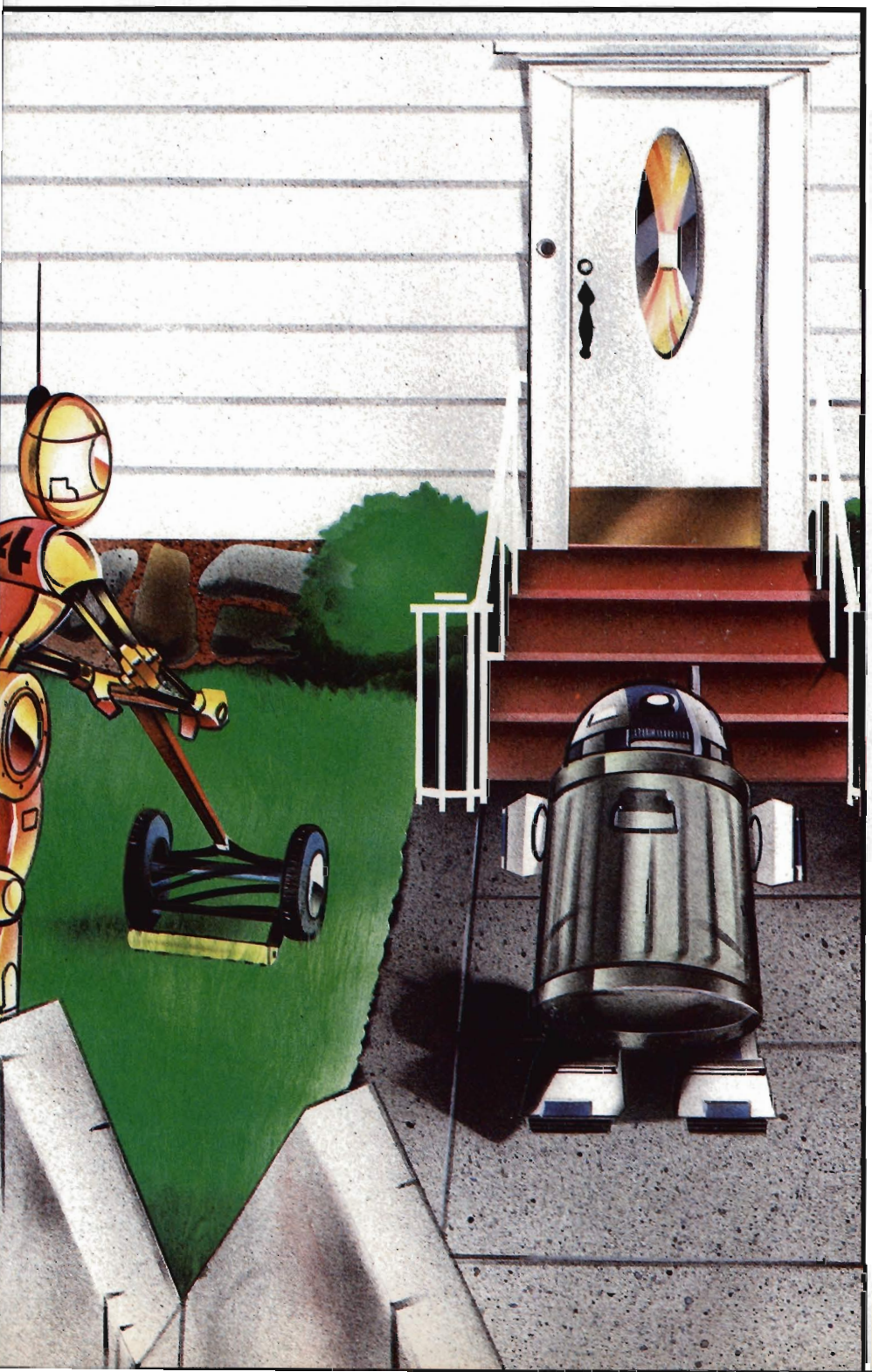
**Mental Block No. 5: I'm Not Creative.** When Nietzsche said, "People will lay their freedoms on the doorstep of the Church," he was talking about religion, but he could just as easily have been talking about having the courage to try new things. Most people abandon the responsibility to be innovative, to be creative. They say, "I can't do it." This is crazy. If you really think you can do it, then you'll go out and do it. I know that my self-esteem has been vital to making my ideas happen—I see myself as a doer. I'm sure that other people have had ideas that were similar to mine. The difference is that I have carried mine into action, and they have not. ■

Portions of this article originally appeared in a foreword to *A Whack on The Side of the Head* by Roger von Oech, published by Creative Think, Menlo Park, Calif. 94025.

# Here come



# THE ROBOTS!



BY TIM KNIGHT

Mention the word "robot" and the image that springs most often to mind is that of a walking, talking bucket of bolts like C3PO of "Star Wars" fame. Or his gutsy little buddy, R2D2. Or any of the dozen or so "droids" that keep popping up on reruns of "Star Trek."

Nothing wrong with that—except for one thing. For every robot you've ever seen in the movies or on television, there are thousands here on earth right now—and thousands more on the way. For better or worse, the robot of science fiction has become a fact of life in twentieth-century America.

Most of the robots around us you'll probably never run into on the street—or ever even see. They're hard at work on auto production lines, in steel plants, in shipbuilding yards—in hundreds of places where they've taken on boring, backbreaking and often downright dangerous jobs.

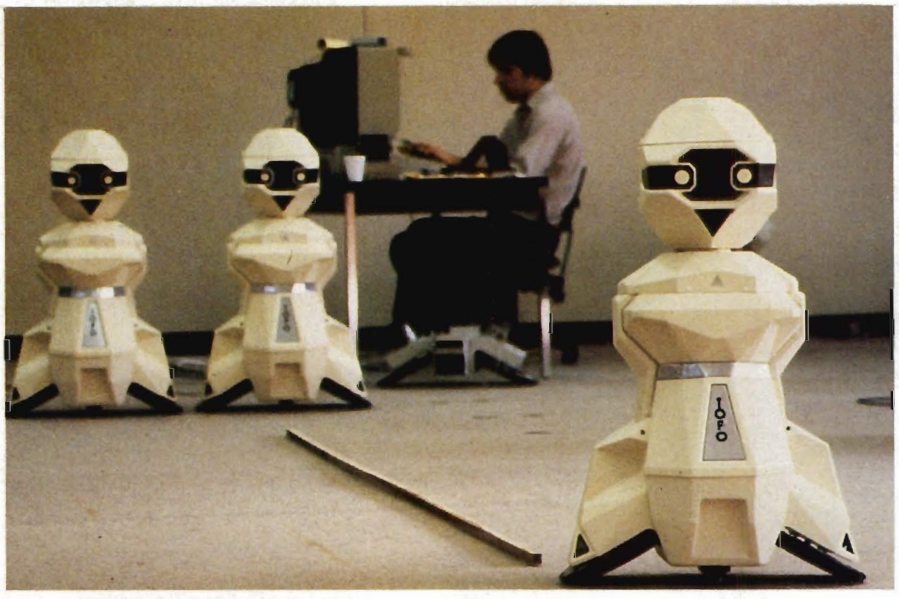
By next year, the experts say, sales of industrial robots such as these will total an estimated 10,000 in the U.S. alone and thousands more overseas. Why the rush to robots? Because, says one observer, "robots don't unionize, get pregnant, call in sick, quit or drop Twinkies in the machinery."

From a workingman's point of view, that's the dark side of robots—not that they could take over the earth but that they might cause widespread unemployment. But the same thing has been said of practically every technological innovation over the past 100 years.

In the long run, robots will make our lives easier, pleasanter and more



Above: R2D2 and C3PO of "Star Wars," perhaps the most famous and certainly the most popular robots in film history. Below: A trio of Androbots under the direction of a human programmer.





# ROBOTS!

rewarding. And nowhere is that more true than in the area of personal robots for the home—or, as I like to call them, probots.

I can hear it now, hundreds of you out there saying, "Robots for the home? Ridiculous!" But that's what they used to say about computers, and look at them now—they're everywhere. Personal robots are merely the next step in the evolutionary process.

Look at it this way. Computers are all brains and no brawn. They can't move; they can't lift; they can't carry. Robots are nothing more than computerized machines. They carry their brains with them. They can adapt and react to all sorts of changing conditions. And their potential is limited only by the ingenuity of man.

Having said all that, I'm now forced to admit that the age of the personal robot is now in its infancy. The personal robots we have now can't really do an awful lot just yet. But the things they can do hold the

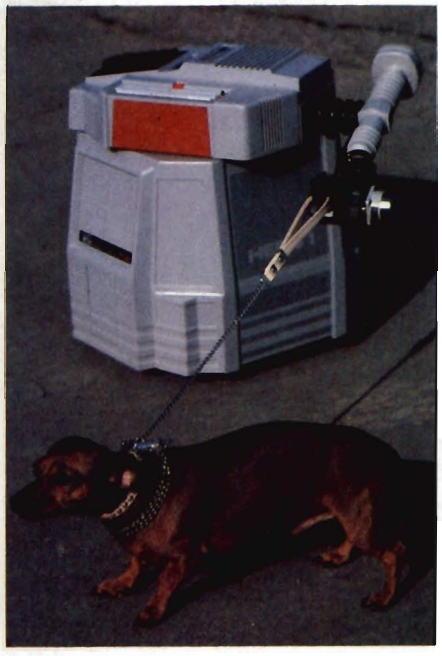
HERO-1 from the Heath Co. of Benton Harbor, Mich., a machine that has probably taught more people about robotics than any other device yet created by man.

promise of more yet to come, and that to me is very exciting. Of these robots, the two I'd like to discuss here are the HERO-1 and the Androbot.

The HERO-1 is a robot made by the Heath Co. of Benton Harbor, Mich.; you can buy it for $1500 in kit form or for $2500 fully assembled. The HERO (which is short for Heath Educational Robot) has probably taught more people about robots than any other device yet created by man.

Although a squatty-looking little thing, HERO has some remarkable capabilities. He can be programmed through a keypad perched atop his 20-inch body, or through a "teaching pendant" that works like an elaborate joystick. You can direct him to move around a room, turn on

**The HERO-1 as dog walker: A bit expensive for this — and perhaps somewhat dangerous — but "he could do it."**



FAVERTY/GAMMA-LIAISON

command, move his arms and even speak.

Even more amazing, perhaps, is the fact that this little robot can hear sounds, seek out sources of heat and light, and manipulate objects weighing up to a pound. HERO's arm can be extended and retracted; it can move up and down or right and left; and its "hand," or gripper, can open up to five inches wide or close completely. He can certainly get a good grip on things.

"Great," you say, "but what can he *really* do?"

Well, for one thing, he could walk your dog if you wanted him to. He could hold the leash with no trouble

# ROBOTS!


at all and guide the dog easily along a predetermined path. Of course, he'd be a rather expensive dog walker, and you probably wouldn't want him to roam around unattended. The fact remains, though—he could do it.

What's that? You don't have a dog—no one to guard the premises? HERO can do that, too. When equipped with heat and motion sensors, HERO can instantly find an intruder anywhere within a confined area such as a house or apartment. Outside, he could patrol a path and, if he saw any prowlers, challenge them with an electronic voice that could say, "Halt! Please identify yourself!"

At this point, HERO might wait for a reply that he could detect with his sound sensor, such as three hand claps if the challenged party were a member of the household. If not, he wouldn't know what to do, so after a few seconds HERO could begin running around, shouting: "ALERT! ALERT! An intruder has entered the grounds." That would wake up everyone within earshot and probably give the intruder a heart attack.

Serious emergencies aside, HERO could also be a fairly competent baby-sitter. Using his computerized voice, he could recite stories to the kids at pre-programmed intervals. If the kids were making too much noise, he could say, "Please quiet down—the noise is disturbing me." And when the time came for the children to go to bed, HERO could say, "It's time for us to go to bed," and escort the kids to their respective rooms.

HERO is no C3PO or R2D2, but he's pointing the way. For a "starter," he's given the personal robotics movement quite a send-off.

The Androbot, on the other hand, is actually a generic name for a whole family of robots under development by Androbot Inc., of Sunnyvale, Calif., a company founded by former Atari impresario Nolan Bushnell.

Unlike HERO, none of the Androbots have arms, and yet they all look somewhat humanoid, boasting torsos, eyes and "mouths." Androbot is, in fact, a name created from the words "android" (meaning humanlike) and "robot" (derived from the Czechoslovakian word for "forced labor").

There are four Androbots in all, and their names are Topo, F.R.E.D., Andromen and B.O.B. Let's take a look at them one at a time.

**Topo.** This machine is not completely independent, since it needs a computer (such as an Apple II) to serve as its "brain." But Topo can still do some interesting things. He can talk, he can memorize the layout



**A section of the "robot assembly line" at Androbot Inc.'s Sunnyvale, Calif., plant, where Topo, F.R.E.D., Andromen and B.O.B. are all constructed.**


© 1983 ANDROBOT INC.

Above: Androbot Inc.'s Topo doubles as a teacher in a mock classroom setting. Below: Heath's HERO helps with the dishes, but he won't do windows.

FAVERTY/GAMMA-LIAISON

of a house so he can travel around without bumping into things, and he can carry up to 20 pounds of payload.

Like all Androbots, Topo also has sensors to make sure he doesn't fall down stairs or off tabletops. Topo could be ordered to bring you a beverage if you wanted one; he could teach you things about robots and computers that you'd never learn in school; he could even go into certain rooms of your house at dinnertime to tell everyone to come to the table.

**F.R.E.D.** These letters stand for "Friendly Robotic Educational Device." Like Topo, this robot needs a computer to direct him. F.R.E.D.'s power, however, lies in his ability to move around and carry small payloads.

For what it's worth, F.R.E.D. can also "draw" patterns on a piece of paper, as directed by a computer. F.R.E.D. doesn't take up much room either; he's only a foot tall.

**Androman.** Another mini-robot, Androman is designed to be hooked up to the Atari 2600 Video Computer System as part of a game. Androman is placed on a "three-dimensional landscape" where he and you, the player, come under attack from enemy aliens.

This little robot will even talk to you while you play the game. You control the play on the screen, but Androman takes it all in and when you get in trouble, he might say, "Alert! Watch out for aliens!" This robot makes game play more interesting, no doubt about it.

**B.O.B.** This is the most sophisticated and the most powerful of all the Androbots. His name stands for "Brains on a Board," which means that B.O.B. is as intelligent as a computer and has a large amount of memory all his own. B.O.B. can move around, "see" objects, remember the layout of a building, and even alert you if someone tries to break into your home. Priced at $2500, B.O.B. is a fairly expensive machine, but he's well worth it.

The one big plus he has going for him is his expandability. For example, he could easily be expanded to become, in effect, a walking refrigerator filled with your favorite soft drinks. He's also expected to get an arm soon, which will greatly increase his versatility.

What good is a personal robot? Why would anyone want or need one, having gotten along perfectly well without them all these years?

But remember, that's what people were saying about computers a few years ago. Now they're wondering how they ever got along without them. And that may soon be the case with personal robots too.

If this were 1977 and you were asked what your personal computer could do, you probably wouldn't know what to say. There were virtually no software programs available then. But once people began to use their imaginations, they were able to create all sorts of programs. And today you can name thousands of things your computer can do.

In the same way, I believe, people will soon begin to find applications for robots. It seems almost certain that the first of these applications will involve routine household chores like mowing the lawn, taking out the garbage and so on.

But as more and more software is developed, that will change. And soon, uses for personal robots that we haven't even dreamed of yet will become almost commonplace. ■

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Tim Knight, 17, of Moraga, Calif., is the author of *The Age of the Personal Robot: Probots and People*, to be published this spring by McGraw-Hill Inc.

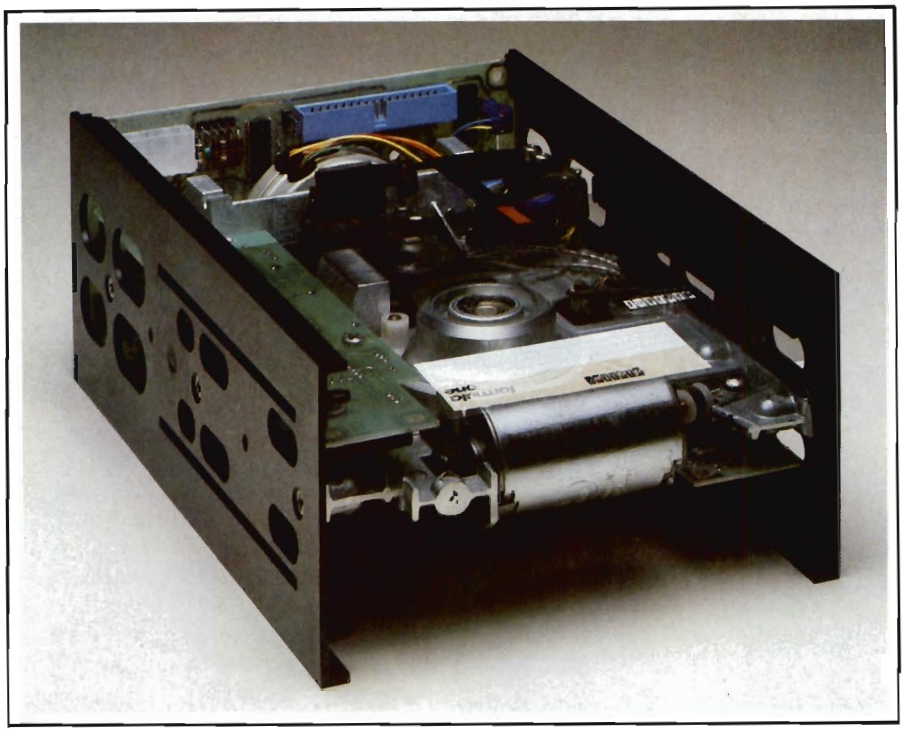


Photo courtesy of Digital Equipment Corp.

# INSIDE THE DISK DRIVE

**Input for advanced users. If you've been hacking away for some time now, this column is for you. In each issue we will present a close-up look at the inner workings of the computer or its peripherals.**

The disk drive to most of us is a blank space on the front of a computer with a slit in it and a door to open and close. Even if you've taken the top off your computer, you've probably only seen the electronic circuit board on top of the drive. You can't really see how it works inside.

But we're going to take a trip inside a disk drive and take it apart piece by piece. In order to do that, though, you have to understand what the surface of the disk itself is like.

Take a disk out of its envelope and look at it. It's a black plastic casing with a square notch cut into the right side. There are three holes—two round, one oblong. Inside is a brown disk, and you can see some of it through the holes.

At about the four o'clock position, beside the big hole in the middle, is a little hole. If you insert two fingers carefully in the big hole and rotate the disk gently (don't touch the brown surface), you will see that the brown disk, too, has a little hole in it. All of these elements of the disk—holes, notches, even its brownness, have a function and a reason for being.

The dark brown surface of the disk is made up of millions of microscopic magnets embedded in plastic. Like all magnets, they're made of a type of iron oxide. The disk is the color of rust because that, in effect, is what's on the surface—rust is a type of iron oxide.

When the disk is made, a liquid plastic with these microscopic magnetic particles in it is spread evenly on the plastic disk and put into a strong magnetic field. This lines up all the iron oxide particles the same way. As you know, all magnets have north and south poles. When the liquid plastic hardens, the magnets are lined up so that all the north poles face the same way. And because they are stuck in plastic, they can no longer move.

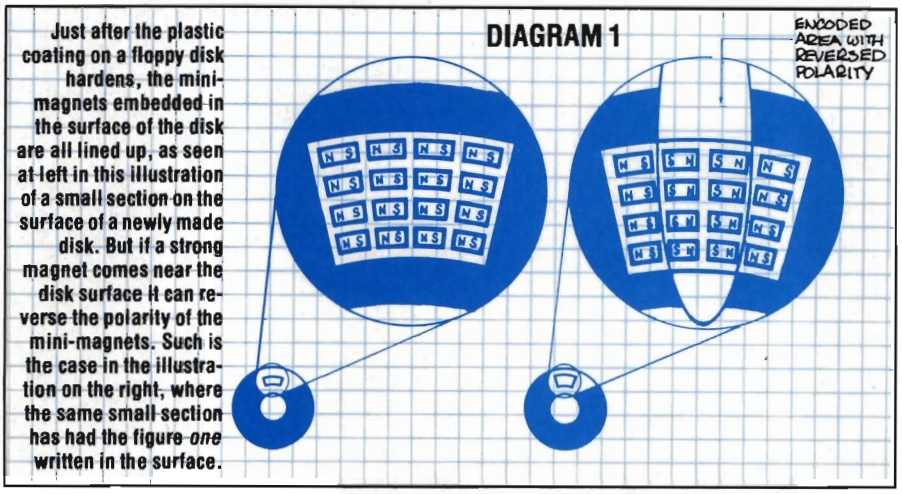
If a strong magnet is brought near the surface of the disk now, the magnets will want to turn toward or away from it. But since they cannot turn, they will reverse their polarity instead. North poles become south, south poles become north.

The computer, then, can encode information on the disk by making magnetic changes on sections of the disk. It does this with the disk drive head, which is, in fact, a strong electromagnet, usually encased in soft plastic to keep it from damaging the disk surface. The head makes contact with the brown surface through the oblong hole in the disk's black outer casing.

The head is like a tape recorder head, which can both record something on the tape and play it back. How does the disk drive head do both? An electromagnet such as a recording head produces a magnetic field that affects whatever is near it. But anything that is magnetized also produces such a field as well.

As you also probably know, an electromagnet can be turned on and off. When the electromagnet is turned on, a current is run through a coil or wire. (That's really all an electromagnet is—a coil of wire.) The current running through it produces a magnetic field, which, if it is brought near the surface of the disk, changes the polarity of a little section of the disk. That then becomes encoded information. Encoded information on a disk is nothing more than a series of such sections, which have either had their polarity reversed or not—yes/no, off/on, etc.

Just as the current running in the




Just after the plastic coating on a floppy disk hardens, the mini-magnets embedded in the surface of the disk are all lined up, as seen at left in this illustration of a small section on the surface of a newly made disk. But if a strong magnet comes near the disk surface it can reverse the polarity of the mini-magnets. Such is the case in the illustration on the right, where the same small section has had the figure *one* written in the surface.

coil wire produces a magnetic field, a magnetic field produces a current in the wire. If the magnet is turned off, and then brought near a section of disk where the polarity has been reversed, the current induced in the coil of wire can be read by the computer.

The computer uses these sections of the disk as a kind of code. A section in which the magnets have been reversed is read as a one. Otherwise it's a zero. Zeros and ones, as you probably know, make up the binary digits (bits) the computer can understand. So this system is perfect for talking to the computer.

But back to the head. What is it? And how does it get to the right place on the disk to read or write?

If you could look at the insides of a typical drive, you would see that it is like a cross between a turntable and a tape recorder. It has the tape recorder head but the turntable's ability to spin a disk. When you close the drive doors, the spindle is seated in the large hole in the disk. This spins the disk, like a turntable.

Although you can't tell by looking, information is stored in segments on the disk. The disk is divided into tracks and sectors. The little hole at the four o'clock position on the disk is there to let the drive know where the sectors start.

When you format or initialize a disk for your particular system, the drive encodes certain places on the disk to mark where the tracks are. From then on it goes to those spots, and uses the hole, to orient itself. Then it counts. If, for example, it writes something on track 7, sector 10, it must mechanically step inward on the disk until it reaches the seventh place where it encoded a track marker. Then it must count over ten sectors. Then and only then can it read what's there or write something new.

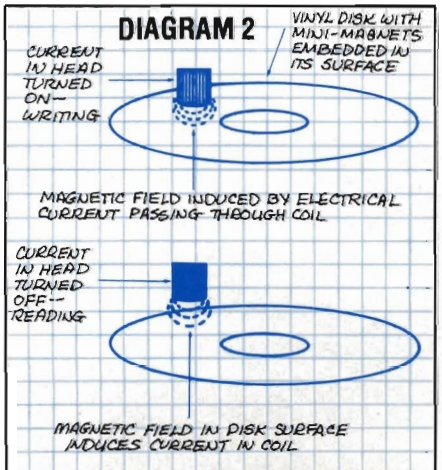
If you've ever had to type in a message to tell the computer you've changed disks, now perhaps you understand why. If you didn't, and if the head were to start writing where it thought it was on the old disk, you could really destroy a lot of information on the new disk you inserted. Fortunately, most systems protect you from this by issuing an error message first.

All this seems as if it would take a long time. But it's actually quite fast. The trick is that the disk spins about five times a second.

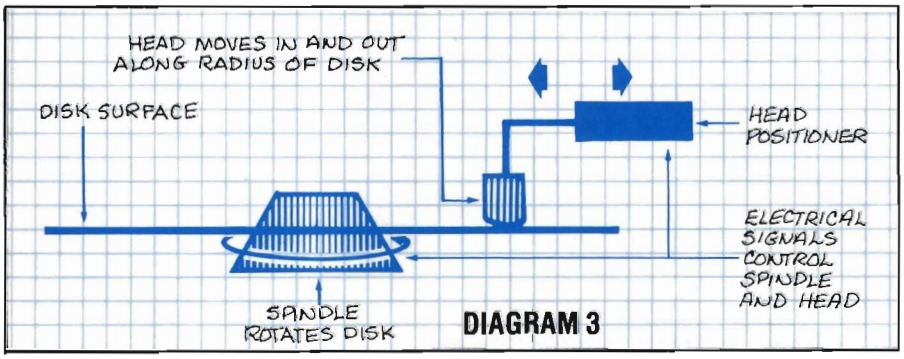
The disk drive controller card and special software, a program called a driver, help the drive head find its way around the disk format. The computer's operating system keeps track of where information was written so that you don't write over it. Together, these "intelligent" elements of the system direct the head. The controller card and driver actually run a little robot operation, causing the mechanical movement of the head to be precise.

The reason for using a disk instead of a tape, for example, is that in order to find something on a tape, the head has to search from one end to the other until it gets to the right spot. As you know from trying to find the right song on a tape, this can be time consuming and frustrating. Imagine how long it would take a computer.

On the disk, since it's circular, the head is never farther than one revolution from any sector on the disk. Move in toward the center or out toward the edge a little, and it's at the right track. The seek time is split-second.




The main parts of a floppy disk drive are the spindle—which rotates the disk; the head—which reads or writes information on the disk; and the head positioner—which moves the head in and out along a radius of the disk. Very accurate control of the positioner is necessary for good information transfer. Electrical signals between the disk drive and the disk interface card (usually installed inside the computer) control the motors which move the head and spindle. Other electrical signals carry the information being transferred between the disk and the computer.



# 4 WAYS TO BEAT THE SAT...

# MAYBE

BY TOM CULLEM

You say you're a computer whiz but somehow your smarts seem to desert you whenever you take a written exam? You say you're especially concerned about the upcoming Scholastic Aptitude Test?

Well, fret no more, friend. Your trusty computer can now help you prepare for the SAT. It's possible, in fact, that your computer can play a key role in determining where (and maybe even whether) you go to college.

How so? By enabling you to take advantage of any one of the dozen or so SAT tutorials for personal computers introduced in the past couple of years.

College officials vary, of course, in the weight they assign to SAT scores (and those of its Southern cousin, the American College Test). What they're looking for, after all, is a comprehensive track record that indicates whether a student can really succeed in college.

However, at highly desirable schools — where thousands may apply for only a limited number of openings — admissions officers are

# 4 WAYS TO BEAT THE SAT... MAYBE

often hard put to decide who the chosen few will be. Too often, it seems, an applicant's SAT score is the ultimate yardstick. Small wonder, then, that so many high school seniors find the SAT a trying experience.

Whether SAT tutorials can make it less so is a matter of some dispute. The companies who make them say there's no question they can help. But the group that administers the SAT, the Educational Testing Service, says no way. The long-standing ETS position is that students can't really improve their SAT scores very much by any sort of drill, be it tutoring, self-directed study or computer-aided instruction.

Of one thing you can be certain, though: It couldn't hurt. So here for your enlightenment and edification are reviews of four of the most popular SAT tutorials. They include, in order of price (lowest to highest):

SAT English I, from Microlearn, the computer education division of MicroLab Inc.; SAT Word Attack Skills, from EduWare; Computer SAT, from Harcourt Brace Jovanovich; and Krell's College Board SAT, from Krell Software.

## SAT ENGLISH I

Although list priced at only $30, lowest of the lot reviewed here, SAT English I is also one of the most ambitious SAT tutorials on the market. Originally written for the Apple II, it was recently revised for use on the Commodore 64, the Atari 800 and the IBM PC. Its makers say it's the best-selling SAT tutorial. If so, at least part of the reason is the fact that it covers all aspects of the English portion of the SAT.

SAT English I not only presents lessons in the four kinds of test questions that make up the verbal SAT — antonyms, analogies, sentence completion and reading comprehension — but it also has a section on grammar, which is technically not covered in the SAT.

The study plan for this software starts with the student taking a test in each of the five sections, then reviewing each section in an instructional mode and finally taking the test again to measure his progress. The same questions are used in both the test and instruction modes.

The analogies section of SAT English I illustrates the learning approach taken in this software. Analogies measure the user's grasp of word relationships, based on the supposition that "one word is to a second as a third is to a fourth."

In the instruction sequence, the


user goes through 25 such analogies, each with five possible answers. If he chooses a right answer, the program tells him so with a variety of messages that range from a simple "Yes" to "A genius, obviously a genius." It also explains the relationship between the word pairs (such as cause and effect) to reinforce the correct response.

This software also reinforces analogies lessons by wording the explanations of correct and incorrect answers in consistent fashion. Consider for example, the analogy "Stubble is to beard as . . ." The five possible answers are:

1) whiskers are to face.
2) nails are to fingers.
3) butterfly is to caterpillar.
4) tadpole is to frog.
5) toes are to foot.

The relationship here is "what something becomes." So the right answer is No. 4. If the student picks No. 1, the program points out that "whiskers grow on a face, not into it." For choices 2 and 5, the program similarly notes that "nails (or toes) grow on fingers (or a foot), and not into them." For choice 4, the program notes that caterpillars do indeed grow into butterflies, but not the other way around.

SAT English I is at its best when illustrating the various relationships usually covered in the analogies section, and its 25 sentence-completion questions are a decent short prep for this part of the SAT.

When it comes to antonyms, though, it's another story. Granted, the brochure that accompanies SAT English I says it's merely an introduction to the exam and not an exhaustive tutorial. Still, Microlearn sales materials promise to teach you "to recognize words that have similar or opposite meanings." With only 25 words covered, that claim seems somewhat overblown.

Even so, the computer seems to offer at least one advantage over studying out of a book — or even being tutored by a teacher in a classroom — in that the student can get instant feedback. Like the other programs reviewed here, SAT English I makes extensive use of this capability.

On the other hand, the computer pales in comparison with the printed page when it comes to displaying a large piece of text. The problem is that a typical "window" on a monitor shows a lot less text than a page in a book. (This is certainly the case on any Apple that hasn't been upgraded to 80-column width.)

It is infintely easier to skim a printed page of text, jumping backwards and ahead again, than to do so via computer. Comprehension can nosedive, especially when the jump from one item to another spans more than a single frame. This is espe-

cially disconcerting in an SAT setting, where a key test-taking strategy calls for skimming a passage, then reading through the questions to learn what to look for in the pasage, and then rereading the text to find the answers.

The reading comprehension segment of SAT English I demonstrates the computer's disadvantage here all too well. Text presentation is in strict sequential order. Until actually answering a question, the user cannot review the composition; nor can he move ahead to find out what other materials he should be digging out of the text.

Microlab officials seem to know how weak their reading comprehension drill is; they have included only one passage in this section, and only five questions. As an experiment, this part of SAT English I might be laudable; as a selling point for the program, it is laughable. The free handout from the ETS, which includes sample reading comprehension questions, is a better tutor on this subject.

## SAT WORD ATTACK SKILLS

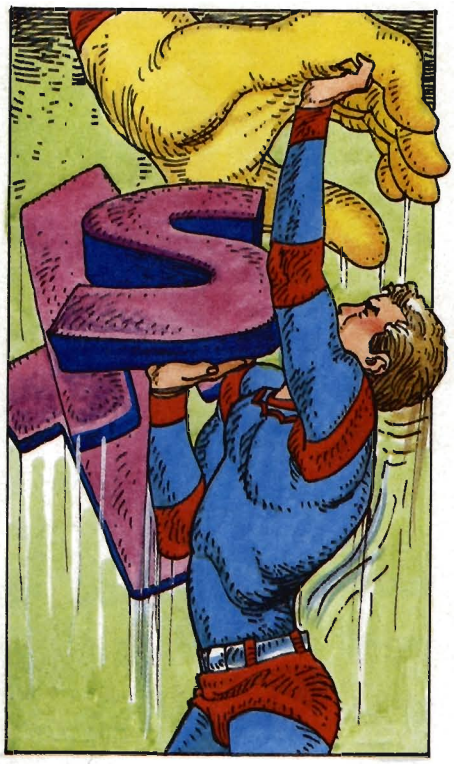
List priced at $49, SAT Word Attack Skills is a twin-disk program that runs on the Apple II or II Plus with DOS 3.3, on the Apple IIe with disk drive, and on the Franklin Ace with disk drive.

Out about a year now, SAT Word Attack Skills is the follow-up to a program called The Science of Learning PSAT Word Attack Skills, which deals with materials found on the Preliminary Scholastic Aptitude Test. It's the first of a series of programs designed to prepare students for the verbal portion of the SAT, which includes questions about vocabulary, word relationships and reading comprehension. As such, it deals only with vocabulary—in particular, taking aim at the antonyms portion of the SAT.

SAT Word Attack Skills is not just for test-takers, though; it teaches an approach to vocabulary that could prove useful to all kinds of people.

Program author Judith Priven takes the position that a knowledge of prefixes and word roots is the key to understanding what an unfamiliar word means. The EduWare game plan thus has the user studying prefixes first. Six drills each focus on a related set of prefixes such as "ab" or "ad." The program first shows a menu of the 10 words that will be covered in that particular lesson. Below this list is an explanation of what the designated prefix usually means, along with familiar "clue words."

In its instruction mode, the program goes through each word on the menu once, demanding that the student pick the appropriate synonym or antonym from a list of five choices. If the user responds correctly, the display says so and then offers the option of further practice on the word.



If this option is taken, the display first shows a sentence with the word in it, then gives the definition, shows yet another sentence, provides another list of five possible choices, and then repeats the definition of the word after the student answers again. All in all, a hefty amount of reinforcement.

At a wrong answer, the program does not tell the user why the choice is incorrect, but does provide a sentence in which the word in question is used correctly. The student then has a second chance to select the correct synonym. If he picks correctly this time, the program repeats the definition, shows a related form of the word (for example, "artificial" along with "artifice"), provides another set of possible answers, and repeats the definition once again.

If, back at the first set of five choices, the user guesses wrong twice in a row, Word Attack Skills displays the correct choice, then a sentence in which the word is used correctly, then the definition, and then related forms of the word. Next comes a second set of choices, and, regardless of a right or wrong answer, the definition. Then it is on to the next word.

After going through the six sets of prefix words in search of synonyms, the student is supposed to do the same for antonyms. To prevent confusion, the student is urged to do these on different days. Likewise, after learning about prefixes, the student tackles six families of word roots, looking first for synonyms, then for antonyms. (Prefixes are on one disk and roots on another.)

SAT Word Attack Skills keeps score during the instruction sequence, and shows the tally at the end of each exercise. Users are urged to attain a score of at least 80 percent before proceeding to the next lesson.

A review and a test mode check how well students have absorbed their lessons. The review sequence selects 15 previously-asked questions from the prefix instruction set, and 15 from the root family. Users must answer each question within about seven seconds from the time that the possible answers are listed. Right and wrong answers prompt responses similar to those in the instruction mode.

The test mode is similar to the review. The questions are identical, but the order of presentation is mixed up, and answers are not revealed until the end. Also, the test sequence is not timed.

Given its limited scope, SAT Word Attack Skills is worthwhile. It not

only provides instruction in some of the prefix and root families contained in words that appear often on the SAT, it also forces students to recognize those words in a slightly different form when encountering them in the review and test modes.

## COMPUTER SAT

For students who wish to hone their math skills as well as their verbal skills, it costs a little more to do both. The least costly entry in this dual category is Computer SAT, introduced last year by Harcourt Brace Jovanovich and now priced at $79. It is currently available only for the Apple family (minimum Apple II with 48K of memory and a disk drive using 3.3 DOS).

Computer SAT consists of two double-sided disks, a manual with both operating instructions and test-taking tips, and a 470-page text entitled *How to Prepare for the SAT.* It also boasts an on-line answer sheet, a timer and a scorer for four practice tests, and a diagnostic feature that ranks a user in 15 broad categories and, where necessary, assigns him a program of remedial study.

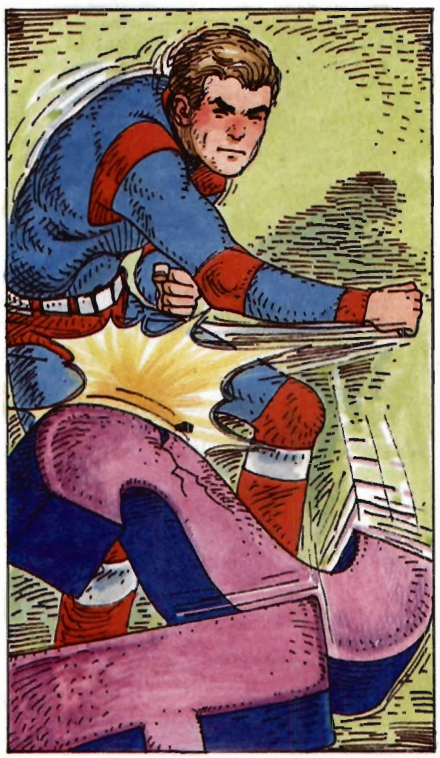
The best way to start out here is to read the first four pages of the text, which are an outline of the purpose and nature of the SAT. This section is especially helpful because it includes an explanation of SAT scoring procedures.

If you fail to answer a particular question, for example, there is no penalty. But answer wrong, and there is—usually either a third or a quarter of a point. This is meant to compensate for the correct guesses a student might make at random.

The next step is to go to the main menu and select a prompt for taking one of the four practice tests in the text. The user can put answers on the SAT-style answer sheet in the text (a machine-readable series of filled-in ovals corresponds to his choices). Or he can keyboard his responses directly into disk drive A. (Those who prefer paper and pencil can input their answers later, if they wish, to make use of the automatic scoring feature on the disk.)

The program quickly displays an answer sheet for each of six test sections, and keeps track of the time spent completing them. The cursor takes the space to the right of the first question as its starting point, but will move to other positions as ordered; this enables the test-taker to use the highly recommended strategy of answering the easiest questions first and then working on the hard ones.

To answer a question, the student types in the number of the question, and the letter of his multiple-choice response. A fail-safe feature prevents the inputting of impossible answers, such as the letter F in a question with only A through E as possible responses. Correcting an answer is accomplished by typing in the question number, which erases the old response, and then typing in the new choice.



Once through all or part of the practice test, the user can invoke the automatic scoring features of the software. Wrong answers are highlighted with inverse video, and the letter of the correct response is displayed immediately to the right. At his option, the student can examine the correct answers to one section at length before seeing the next one, or he can return to reexamine prior displays.

Computer SAT also satisfies the competitive desire to know how well one has done by not only tallying right, wrong and unattempted responses, but by translating the whole into a projected SAT score. It is wise, however, to remember that a practice test is not really the same as an SAT exam, and test results almost certainly will vary.

Practice test finished, the student can now use the program to construct an individual study plan. Or he can try another test and build his plan based on his average performance (which is what the program advises).

It's important to recognize, though, that this program does not customize study plans on the basis of practice test scores. Whether you do good or bad on geometry, for instance, the recommended book and disk drills are the same. Nor is the program sophisticated enough to notice that a student does well with angles and cubes, but just can't figure out what pi means to a circle. All the study plan tells is the general curriculum area a student should attack first, given limited time.

Limitations aside, Computer SAT contains drills notable for both their quality and quantity.

Computer SAT has 280 math and 260 verbal items on disk, but leaves reading comprehension exercises to the text. The 36 long passages and 24 short ones found there cover literary, scientific, political and historical subjects—the range of subjects usually covered in the SAT.

## KRELL'S COLLEGE BOARD SAT

For students willing to pay the price for SAT success, Krell's College Board SAT may be the best bet of all. Developed in 1981 by Krell Software of Stony Brook, N.Y., this six-disk program costs $299.95. But under a unique warranty program launched last summer, students can get a re-

fund if the software fails to boost their SAT score significantly.

Besides its unusual warranty, the Krell program is a trailblazer in terms of hardware compatibility. There are versions available for Apple, Atari, Commodore, Franklin, IBM, Radio Shack and Texas Instruments machines.

Now, as to that warranty: The first thing to realize is that it doesn't pertain unless the student takes the SAT twice—once before purchasing the program, and once after.

Assuming the student affirms in writing that he has used the Krell materials for at least six hours, the company guarantees a 70-point increase on the combined SAT.

The serious student could easily spend many more hours than just six drilling his way through the Krell package, for its 42 programs offer nothing if not bulk. There are eight sets of exercises on antonyms, three for analogies, two for sentence completion, and 15 for math, with each set offering 1000 possible exercises. Krell also lists 180 items relating to the Test of Standard Written English.

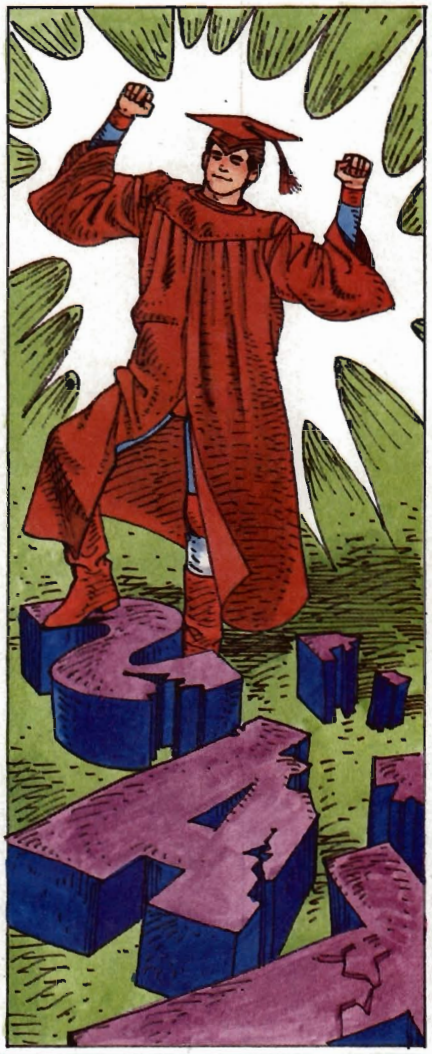
Quality, however, is another matter. On this count, Krell must be judged as uneven.

One problem is repetition. In one pass at antonyms, the reviewer responded with "10" when asked how many words he wanted to review out of the 1000 total. Three times in the 10 subsequent exercises, a question turned up based on the word "torpid." Since the reviewer made the right choice the first two times, this did not seem to be merely a case of reinforcement.

On another run of 20 antonyms, the team of "circumspect" and "heady" showed up twice. It all makes one wonder whether the 8000 words that are said to be on this disk are separate and distinct, or just repeats of a much smaller word set.

The Krell materials are better, or at least less repetitious, in the area of analogies and sentence completion. The latter drill does tend to use the same base sentences repeatedly, which might bore the user, but the words in the blanks do change, so the drill serves its purpose.

Reading comprehension is another area where there is surface diversity, but a lot of repetition. The 14 passages in this segment are contained in the user manual, but questions are on line. Each drill consists of 15 questions, covering from three to five passages. After completing a round the user can opt for another



go and continue the loop indefinitely.

The flaw in this system is that some passages wind up being repeated again and again as drill items, and others hardly at all.

The reading comprehension section also lacks the important testmanship option of allowing one to read all questions before reading the passage. And the passages are almost exclusively oriented to political philosophy, rather than the mix of subject areas covered in the SAT.

Krell's College Board SAT moves up the quality ladder when it comes to mathematics, however. The 15 programs housed on the two math disks are exhaustive, and make excellent use of the computer's edge over a textbook in changing the numbers and terms of the problems presented.

Would-be test-takers will particularly value the last five programs here, which contain questions said to be slightly harder than those found in the SAT itself. All math questions also have a helpful learning reinforcement procedure. When the student completes a question, the answer appears on the next screen, followed by a Yes/No option on whether to see another question of the same type. If this option is declined, a random question follows.

Krell also offers some intriguing options not found on other SAT programs. One is a worksheet generator that prints exercises from disk to a printer; it also prints an answer sheet.

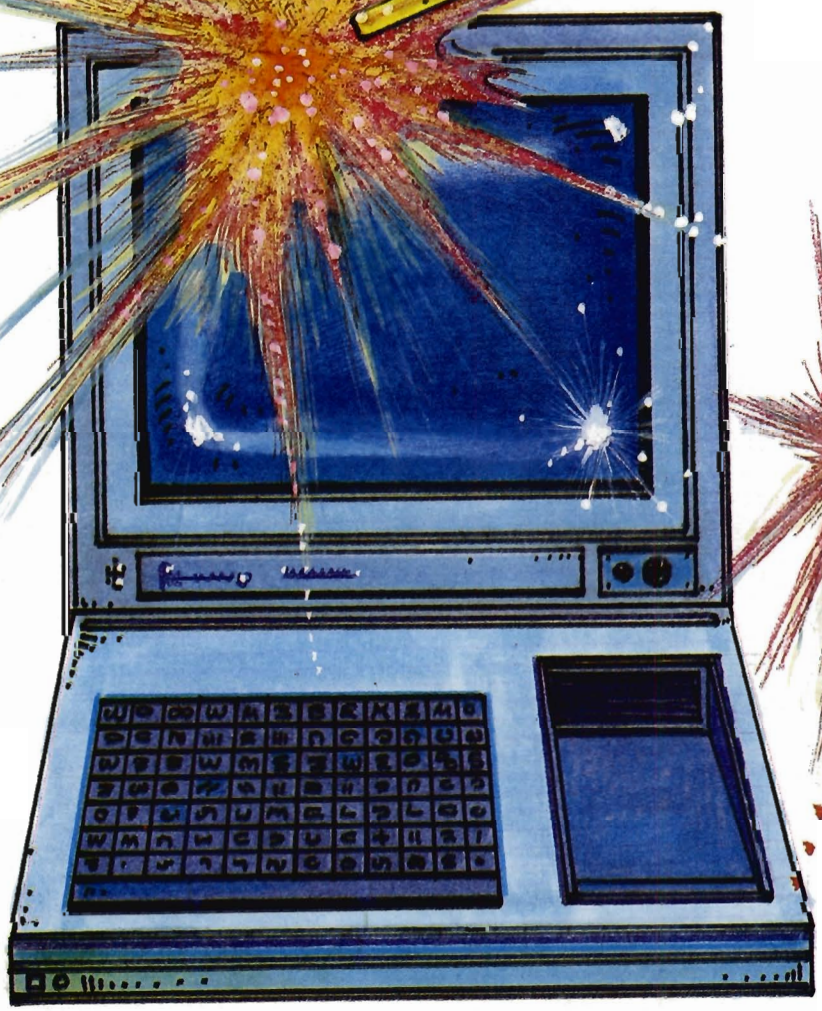
Other options (not included in the base price) include a diagnostic feature that classifies questions by skill type and keeps track of the user's absolute and percentage scores; a vocabulary builder package that stresses mastery of word prefixes, suffixes and roots and further contains an on-line dictionary; and a classroom record management system.

One last feature of the Krell package deserves mention: It's a running tally of drill performance. By taking one point off for wrong answers (vs. zero credit for a pass and positive points for a correct response), the program graphically reinforces the lesson that wild guesses are not advisable in the SAT. In fact, the Krell program goes a bit overboard; the SAT penalty for wrong answers is only a fraction of a point, but Krell subtracts a full one. ■

Portions of this article have been excerpted from *Computers & Programs, The Complete Buyer's Directory*, published by the Sargent Publishing Co.

# Presenting MORE... GRAPHICS MAGIC

**In the first issue of MICROKIDS (December 1983), we presented an article called "Graphics Magic" that was such a hit we've decided to make it a regular feature of the magazine. Here, then, is the second installment of "Graphics Magic," chock full of programs that you can run—even if you're a beginner—by typing them in just as you see them on the printed page. Have fun!**



## A Rose Is a Rose

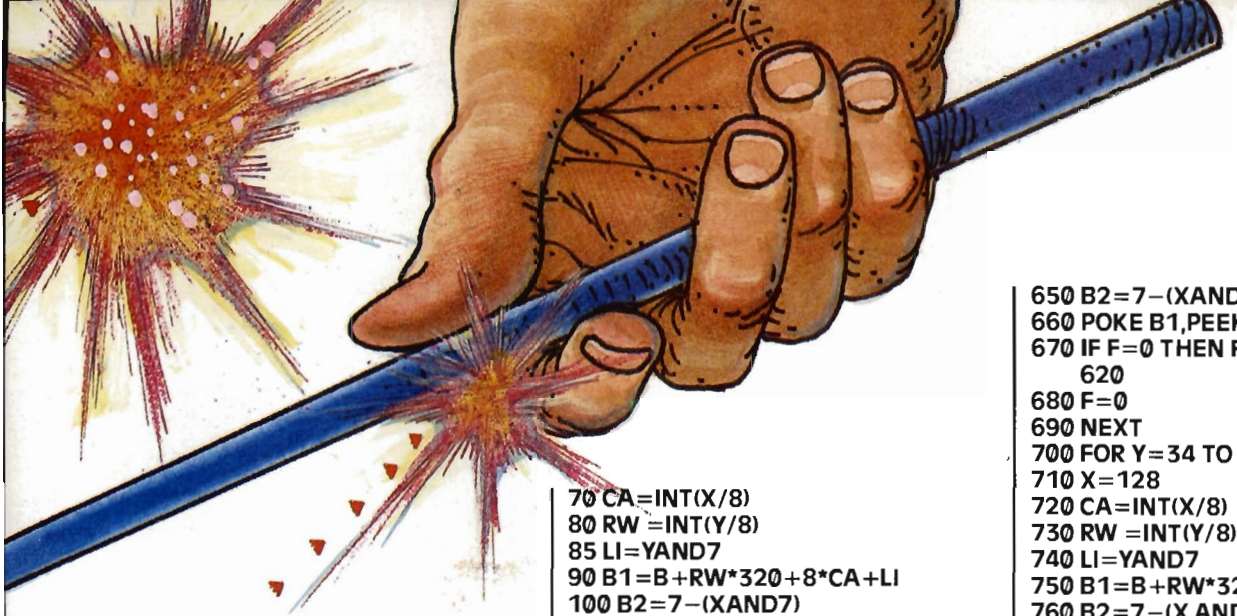
Gertrude Stein's place in literary history is indisputable, but her views on the rose might have changed somewhat had she ever seen the TRS-80 Model I, II or 4 in action. Behold!

```
10 CLS
20 FOR A=0 TO 31.4 STEP .02
30 R=6*COS(2*A/3)
40 SET(64+7*R*COS(A),
   24+3*R*SIN(A))
50 NEXT
60 INPUT X$ :RUN
```

As you'll see when you run it, this program creates a fascinating set of overlapping rings—very roselike. If you wish, though, you can vary the image dramatically by substituting one of the following for line 30:

```
R= 7*COS(4*SIN(2*A))
R= A*COS(A)*SIN(A))
R= 6*COS(2*SIN(A))
R= 2*(2-COS(2*A))
R= EXP(A/6)
R= 4*(1-COS(A))
```

**—David Lewis**



## Funky Stuff

Enough seriousness! Here's a funky new program for your TRS-80 Model I, III or 4 that is pure wildness. It's called Funky.

Type in the program and prepare yourself for a spectacular light show. Type RUN and at first nothing seems to happen. But then press some other keys. The screen goes crazy! Press several keys, all the digits or the letters in your name. The different, crazy patterns you will see are absolutely wild!

```
10 CLEAR 300 : A$=STRING$(255,32)
20 V=VARPTR(A$)
30 POKE V+1, 0: POKEV+2,56
40 PRINT @0,A$;: GOTO 40
```

—David Lewis

## Commodore Cube

Squares are generally boring, but cubes can be something else again. A good example is the Commodore Cube, a fascinating three-dimensional object designed for display on the Commodore 64. Run it up and enjoy, enjoy!

```
1 REM THREE DIMENSIONAL COLOR
  CUBE USING BIT GRAPHICS
2 PRINT CHR$(147)
5 B=8192:POKE
  532723,PEEK(53272)OR8
10 POKE 53265,PEEK(53265) OR 32
20 FOR I = B TO B+7999:POKE
   I,0:NEXT
30 FOR I = 1024 TO 2023:POKE
   I,1:NEXT
50 FOR X=110 TO 190
60 Y=100
70 CA=INT(X/8)
80 RW =INT(Y/8)
85 LI=YANDZ
90 B1=B+RW*320+8*CA+LI
100 B2=7-(XANDZ)
110 POKE B1,PEEK (B1)OR (2^B2)
120 IF F=0 THEN F=1:Y=50:GOTO 80
130 F=0
135 NEXT
140 FOR Y=51 TO 100
150 X=110
160 CA=INT(X/8)
170 RW =INT(Y/8)
180 LI=YANDZ
190 B1=B+RW*320+8*CA+LI
200 B2=7-(X AND 7)
210 POKE B1,PEEK (B1)OR (2^B2)
220 IF F=0 THEN F=1:X=190:GOTO
    160
230 F=0
240 NEXT
255 Y=50
260 FOR X=110 TO 126
270 Y=Y-1
280 CA=INT(X/8)
290 RW =INT(Y/8)
300 LI=YANDZ
310 B1=B+RW*320+8*CA+LI
320 B2=7-(XANDZ)
330 POKE B1,PEEK (B1)OR (2^B2)
340 X1=X+80
350 CA=INT(X1/8)
365 B1=B+RW*320+8*CA+LI
366 B2=7-(X1ANDZ)
370 POKE B1,PEEK (B1)OR (2^B2)
380 NEXT
400 Y=100
410 FOR X=110 TO 126
420 Y=Y-1
430 CA=INT(X/8)
440 RW =INT(Y/8)
450 LI=YANDZ
460 B1=B+RW*320+8*CA+LI
470 B2=7-(XANDZ)
480 POKE B1,PEEK (B1)OR (2^B2)
490 X1=X+80
500 CA=INT(X1/8)
510 B1=B+RW*320+8*CA+LI
520 B2=7-(X1ANDZ)
530 POKE B1,PEEK (B1)OR (2^B2)
540 NEXT
590 FOR X=128 TO 207
600 Y=33
610 CA=INT(X/8)
620 RW =INT(Y/8)
630 LI=YANDZ
640 B1=B+RW*320+8*CA+LI
650 B2=7-(XANDZ)
660 POKE B1,PEEK (B1)OR (2^B2)
670 IF F=0 THEN F=1:Y=83:GOTO
    620
680 F=0
690 NEXT
700 FOR Y=34 TO 83
710 X=128
720 CA=INT(X/8)
730 RW =INT(Y/8)
740 LI=YANDZ
750 B1=B+RW*320+8*CA+LI
760 B2=7-(X AND 7)
770 POKE B1,PEEK (B1)OR (2^B2)
780 IF F=0 THEN F=1:X=207:GOTO
    720
800 F=0
810 NEXT
830 GOTO 830
```

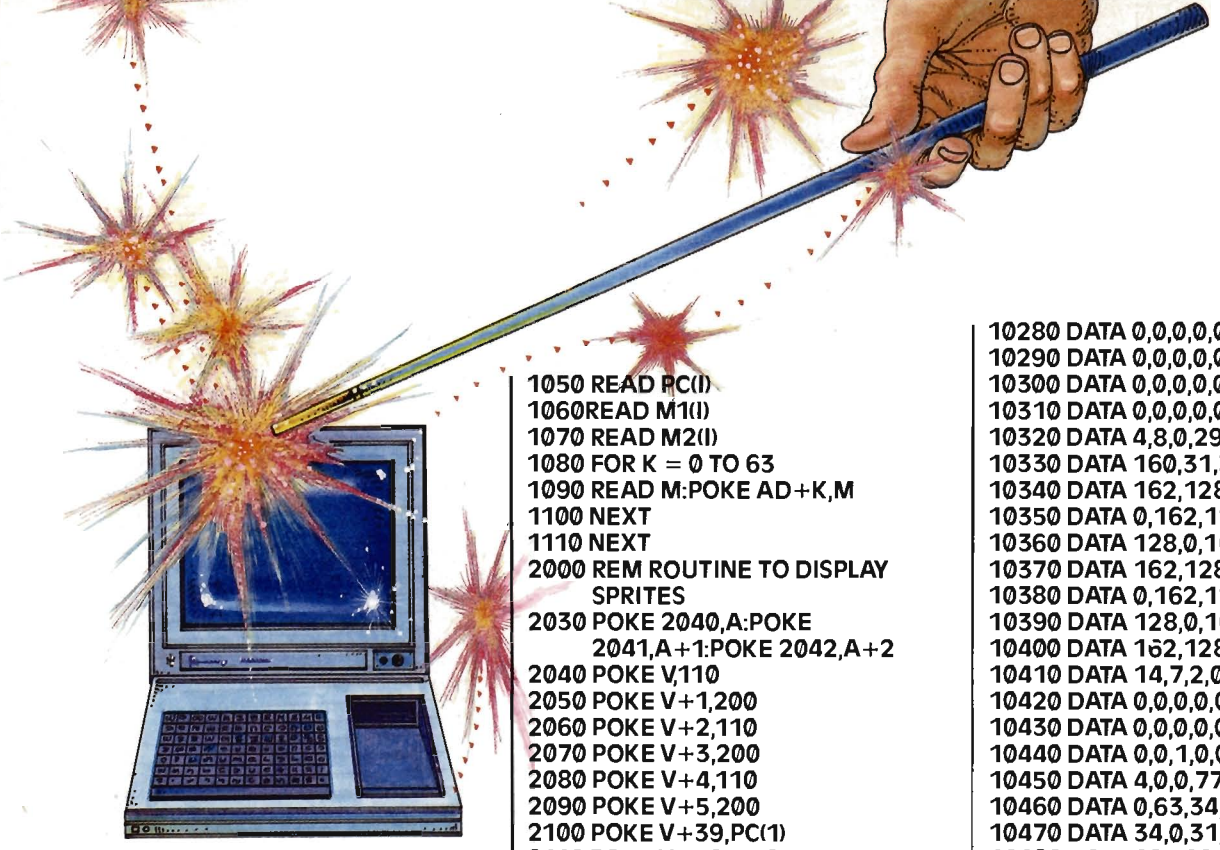
—Tim Knight

## Reset Invaders

When you press Reset, program execution normally halts and you're automatically returned to BASIC. If you want to, though, you can easily change the function of Reset. A simple way to do this is to have Reset reboot the disk.

Reset Invaders, for the Apple II Plus, mimics this action. At first the screen clears, then "APPLE II" appears at the top of the screen, and the disk drive turns on—just like a boot. But then the fun begins. The "APPLE II" moves noisily across the screen like a saucer in Space Invaders. A missile intercepts it, and from the ensuing explosion a real boot begins.

```
10 FOR X=768 TO 939
20 READ A
30 POKE X,A
40 NEXT
45 PRINT CHR$ (13) CHR$ (4) "BSA VE
   RESET INVADERS,A$300,L$AC"
49 END
50 DATA 169,14,141,242,3,169,3,141,
   243,3,32,111,251,96,32,88,252,
   141,233,192,32,116,3,162,8,169,
   255,32,168,252,202,208,248,32,
   116
60 DATA 3,32,132,3,169,64,32,168,
   252,238,148,3,206,149,3,208,237,
   174,159,3,189,166,3,133,6,189,
   160,3,133,7,160,0,169,170,145,6
70 DATA 162,48,160,16,32,136,3,169,
   21,32,168,252,32,116,3,32,132,3,
```



```
    169,21,32,168,252,169,160,145,6,
    238,148,3,206,159,3,16,202,162
80 DATA 136,160,56,32,136,3,76,0,
    198,174,148,3,160,8,185,150,3,
    157,0,4,202,136,16,246,96,162,86,
    160,85,173,48,192,202,138,32
90 DATA 168,252,136,208,245,96,23,
    10,160,193,208,208,204,197,160,
    221,219,5,5,7,5,7,5,7,39,39,79,79,
    119,119
```

—Michael Hyman

# Space Sprites

The "Star Wars" movies have grossed hundreds of millions of dollars. You may not make millions, but you too can create a space adventure via the following program, written for the Commodore 64. And away we go!

```
3 REM THE MULTICOLORED
  SPRITES
5 REM SHOWS CANNON
  CONTINUALLY SHOOTING
10 PRINT CHR$(147)
20 V=53248
30 POKE V+33,0
1000 REM SUBROUTINE TO STORE
     SPRITE DATA
1010 N=3
1020 A=13
1030 FOR I = 1 TO
     3:AD=A*64+(I-1)*64
1040 READ M:M(I)=MAND 1
1050 READ PC(I)
1060READ M1(I)
1070 READ M2(I)
1080 FOR K = 0 TO 63
1090 READ M:POKE AD+K,M
1100 NEXT
1110 NEXT
2000 REM ROUTINE TO DISPLAY
     SPRITES
2030 POKE 2040,A:POKE
     2041,A+1:POKE 2042,A+2
2040 POKE V,110
2050 POKE V+1,200
2060 POKE V+2,110
2070 POKE V+3,200
2080 POKE V+4,110
2090 POKE V+5,200
2100 POKE V+39,PC(1)
2110 POKE V+40,PC(2)
2120 POKE V+41,PC(3)
2130 POKE V+28,M(1)*2 ^
     0+M(2)*2 ^1+M(3)*2^2
2140 POKE V+37,M1(1)
2150 POKE V+38,M2(1)
2160 POKE V+23,7
2170 POKE V+29,7
2180 POKE V+21,1:GOSUB
     5000:POKE V+21,
     2:GOSUB 5000:POKE
     V+21,4:GOSUB 5000
2190 GOTO 2180
5000 FOR D=1 TO 100:NEXT:
     RETURN
10000 DATA 129,14,7,2,0
10010 DATA 0,0,0,0,0
10020 DATA 0,0,0,0,0
10030 DATA 0,0,0,0,0
10040 DATA 0,0,0,0,64
10050 DATA 8,0,80,35,160
10060 DATA 0,34,0,0,162
10070 DATA 128,0,162,128,0
10080 DATA 162,128,0,162,128
10090 DATA 0,162,128,0,162
10100DATA 128,0,162,128,0
10110 DATA 162,128,0,162,128
10120 DATA 0,162,128,0,162
10130 DATA 128,0,0,129,14
10140 DATA 7,2,0,0,0
10150 DATA 0,0,0,0,0
10160 DATA 0,0,0,0,0
10170 DATA 0,0,0,0,0
10180 DATA 0,0,0,8,0
10190 DATA 16,34,255,244,34
10200 DATA 0,0,162,128,0
10210 DATA 162,128,0,162,128
10220 DATA 0,162,128,0,162
10230 DATA 128,0,162,128,0
10240 DATA 162,128,0,162,128
10250 DATA 0,162,128,0,162
10260 DATA 128,0,162,128,0
10270 DATA 0,129,14,7,2
10280 DATA 0,0,0,0,0
10290 DATA 0,0,0,0,0
10300 DATA 0,0,0,0,0
10310 DATA 0,0,0,0,0
10320 DATA 4,8,0,29,34
10330 DATA 160,31,34,0,5
10340 DATA 162,128,0,162,128
10350 DATA 0,162,128,0,162
10360 DATA 128,0,162,128,0
10370 DATA 162,128,0,162,128
10380 DATA 0,162,128,0,162
10390 DATA 128,0,162,128,0
10400 DATA 162,128,0,0,129
10410 DATA 14,7,2,0,0
10420 DATA 0,0,0,0,0
10430 DATA 0,0,0,0,0
10440 DATA 0,0,1,0,0
10450 DATA 4,0,0,77,8
10460 DATA 0,63,34,160,51
10470 DATA 34,0,31,162,128
10480 DATA 68,162,128,4,162
10490 DATA 128,0,162,128,0
10500 DATA 162,128,0,162,128
10510 DATA 0,162,128,0,162
10520 DATA 128,0,162,128,0
10530 DATA 162,128,0,162,128
10540 DATA 0,0,129,14,7
10550 DATA 2,0,0,0,0
10560 DATA 0,0,0,0,0
10570 DATA 0,4,4,0,0
10580 DATA 3,0,1,12,0
10590 DATA 0,192,8,0,0
10600 DATA 34,160,0,34,0
10610 DATA 0,162,128,196,162
10620 DATA 132,4,162,128,0
10630 DATA 162,128,64,162,128
10640 DATA 0,162,128,0,162
10650 DATA 128,0,162,128,0
10660 DATA 162,128,0,162,128
10670 DATA 0,162,128,0,0
10680 DATA 129,14,7,2,0
10690 DATA 0,0,0,4,0
10700 DATA 0,0,0,0,1
10710 DATA 0,0,0,0,0
10720 DATA 0,1,0,0,0
10730 DATA 8,0,0,34,160
10740 DATA 0,34,0,65,162
10750 DATA 128,0,162,128,0
10760 DATA 162,128,1,162,128
10770 DATA 0,162,129,0,162
10780 DATA 128,1,162,128,0
10790 DATA 162,128,0,162,128
10800 DATA 16,162,128,0,162
10810 DATA 128,0,0
```

—Tim Knight

*Do you have a favorite graphics program of your own? If so, and you'd care to share it with the rest of us, send a copy, please, to: Graphics Magic, Microkids, 133 Fifth Avenue, New York, NY 10003.*

# HOW TO MAKE YOUR OWN SECRET CODES

BY WILLIAM O'CONNELL

**What do all these numbers mean?**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | 89 | 24 | 96 | 14 | 79 | 4 | 88 |
| 47 | 79 | 19 | 87 | 8 | 87 | 41 | 110 |
| 46 | 129 | 49 | 81 | 27 | 111 | 2 | 74 |
| 19 | 92 | 3 | 86 | 46 | 78 | 48 | 125 |
| 35 | 104 | 15 | 80 | 50 | 128 | 8 | 71 |

UNTIL YOU READ through this article or, even better, type in the appropriate programs listed here, you probably won't have any idea of what they stand for. It's a message, of course, but a message written in secret code.

Codes are neither new nor rare. The earliest known piece of coded writing was found on a clay tablet dating back to 1500 B.C. It was a formula, written by a Mesopotamian, telling how to make a pottery glaze—at the time, a high-technology trade secret. The message-maker attempted to protect his special knowledge by jumbling syllables in his words.

Other examples of coding have also been found dating back to the Spartan Wars. Still another code is called a Caesar Cipher after its inventor, Julius Caesar. It jumbles the alphabet so that each letter stands for another letter.

Coding has, in fact, become so common that nowadays we're literally surrounded by codes. Virtually all manufactured goods have codes stamped on them telling when, where and often how they were made. Almost anything you buy in a store today has a pattern of bars on it—a so-called Universal Product Code (UPC)—that can be read by computerized cash registers. Your telephone uses a code of audible pulses, or tones, that are transmitted to and instantly translated by computerized switching equipment.


Major companies, government agencies and the military also make extensive use of codes to handle sensitive and important information. And you, too, use a code—a ZIP Code—every time you address a card or letter; it helps the mailman deliver it quicker.

If you'd like to try something a little harder, though—and, coincidentally, crack the code at the top of this article—the program we're about to show you is just what you've been waiting for.

This program (shown here in two forms, one for the Atari and another for the TRS-80) allows the user to enter a message using up to 50 keystrokes, including letters, numbers, spaces and punctuation marks. If your message is longer than that, you can break it up into two or even three segments. The computer will then instantly translate each keystroke into a pair of numbers.

This kind of code is called a cipher, a type that's easy to break if you can obtain a large enough sample of it. This is because some letters are always used more than others. For example, the letter E is used more than any other. It represents more than 10 percent of any large sample of text written in ordinary English (or, as cryptographers call it, "plain text").

A code-breaking expert, or cryptanalyst, uses this fact to translate the cipher back into plain text. The

# SECRET CODES

cryptanalyst counts how many times each character appears, and the one that shows up most often he labels E. He also knows, based on frequency tables, that the next most common letter will be the letter T, followed by A, R and then I.

The computer, using the program shown here, though, will draw up as many as 50 pairs of numbers to stand for *each* letter in the code, so no combination will be repeated very often, if at all. The letter E may appear as an 8 with a 77 one time, and a 43 with a 112 the next time. This should be enough to confuse almost anyone but an expert.

The program also allows you to enter a coded message and get plain text in return. When you enter your paired numbers, the machine automatically decodes them and then displays the characters they were meant to represent. The program thus makes your computer both a cryptographer and a cryptanalyst.

How does it do all this? Easy.

Because of the very nature of the machine, every character you type into a computer is stored as a number. When you type in the letter A, for example, the machine stores it as a 65. Numbers are similarly stored as other numbers. A zero is stored as a 48. Even a blank space has to be assigned a number—32.

This is because computers are designed to use the ASCII code (pronounced ASK-ey), which stands for American Standard Code for Information Interchange. By mutual agreement between computer-makers, every letter, number and punctuation mark is thus stored as a number ranging from 0 to 255.

So much for principle; now for the program itself.

The first part, as you can see, is fairly straightforward, building to Line 205, which allows you to enter your plain text into the computer. Line 210 and then Line 220 examine the message *one character at a time*, and give each character the label B$. Line 222 then picks a random number from 1 to 50, and Line 224 prints it on the screen.

Line 230 uses the ASC command to change the first character you typed back into its ASCII number, then adds the number previously picked at random, and places the sum on the screen. Line 240 sends the computer back to work on the next character. Line 245 prints a pair of zeros that will later tell the translating computer that it's reached the end of the message.

In decoding the cipher, Lines 290 to 310 allow you to enter and temporarily store the numbers in question. Line 305 keeps scanning for the zeros that should end the message.

When these zeros are detected, the program skips to Lines 400 to 425, where the coding process is reversed. Line 410 takes the code number—B(X)—and subtracts the random number—A(X)—to get the ASCII number of the correct character. The command CHR$ then converts the ASCII code back to the original character.

Finally, Line 430 sends you back to Line 100, which starts the process all over again.

Sound complicated? Sure does! But try it on your computer and you'll be amazed at how well it works—almost like magic.

Happy coding! Or to put it another way:

| | | | | |
|---|---|---|---|---|
| 34 | 106 | 16 | 81 | 46 |
| 126 | 13 | 13 | 93 | 24 |
| 113 | 29 | 61 | 10 | 77 |
| 2 | 81 | 26 | 94 | 42 |
| 115 | 28 | 106 | 21 | 92 |
| 25 | 58 | 0 | 0 | |

## William O'Connell's Secret Coders

```
5 REM = TRS-80 MODEL III VERSION
10 DIM A(50),B(50)
100 PRINT "ENTER THE
    CORRECT NUMBER:"
110 PRINT "DO YOU WANT TO
    (1) CODE, OR (2) DECODE";
120 INPUT A
130 IF A<1 OR A>2 THEN GOTO 100
140 ON A GOTO 200,280
200 PRINT "ENTER MESSAGE
    (LESS THAN 50 SPACES LONG),
    NO COMMAS!"
205 INPUT A$
210 FOR X = 1 TO LEN(A$)
220 B$ = MID$(A$,X,1)
222 A = RND(50)
224 PRINT A;
230 PRINT ASC(B$) + A$;
240 NEXT
245 PRINT "0 0"
250 GOTO 100
280 PRINT "ENTER YOUR
    NUMBERS ONE-AT-A-TIME:"
290 FOR X = 1 TO 50
300 INPUT A(X),B(X)
305 IF A(X) = 0 THEN GOTO 400
310 NEXT
400 FOR X = 1 TO 50
410 PRINT CHR$ (B(X)-A(X));
420 NEXT
425 PRINT
430 GOTO 100
```

```
5 REM == ATARI 400/800 VERSION
10 DIM A$(50),B$(1),A(50),B(50)
100 PRINT "ENTER THE
    CORRECT NUMBER:"
110 PRINT "DO YOU
    WANT TO (1) CODE,"
120 PRINT "OR (2) DECODE";
125 INPUT A
130 IF A<1 OR A>2 THEN GOTO 100
140 ON A GOTO 200,280
200 PRINT "ENTER MESSAGE
    (LESS THAN 50 SPACES LONG),
    NO COMMAS!"
202 PRINT "LONG):"
205 INPUT A$
210 FOR X = 1 TO LEN(A$)
220 B$ = A$(X,X)
222 A = INT(50*RND(0)) + 1
224 PRINT A;" ";
230 PRINT ASC(B$) + A;" ";
240 NEXT X
245 PRINT "0 0"
250 GOTO 100
280 PRINT "ENTER NUMBERS
    ONE-AT-A-TIME:"
290 FOR X = 1 TO 50
300 INPUT Y
302 A(X) = Y
304 IF A(X) = 0 THEN GOTO 400
306 INPUT Y
308 B(X) = Y
310 NEXT X
400 FOR X = 1 TO 50
410 PRINT CHR$ (B(X)-A(X));
420 NEXT X
425 PRINT
430 GOTO 100
THE END.
```

# The VID KID NEWS & VIEWS



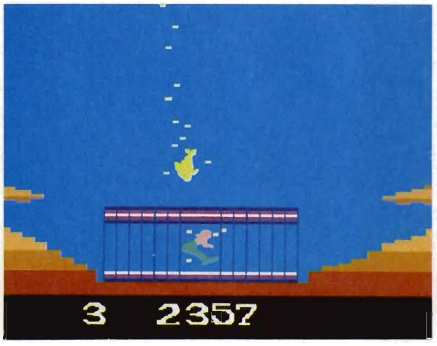
BY RAWSON STOVALL

## FATHOMING IMAGIC'S FATHOM

I've played lots of games, and I think I know by now what it takes to make a good adventure game. It has to have different scenes, enemies, traps and objectives, and have good game play. It also has to have graphics that stand above the crowd.

Imagic's **Fathom,** designed by Rob "Demon Attack" Fulop for play on the Atari 2600, has each of these qualities. In fact, Imagic has come up with a game here that seems to exceed the capabilities of the Atari 2600.

Fathom is based on the idea that evil Titans have kidnapped Neptina




Imagic's Fathom

(a mermaid), who is Neptune's daughter. They've stuck her inside a cage and have dropped it onto the floor of the deepest trench in the ocean. As if that weren't enough, they've also broken Neptune's magical trident (the only thing that can open up the cage) and have scattered its three pieces deep in the ocean and high in the atmosphere.

Proteus, a guy who can turn into a dolphin or a seagull and is a member of Neptune's court, decides to find the pieces of the trident to free Neptina and bring freedom to the world. But each time he saves her, the Titans capture her again, break the trident, add more sea, air and land (more screens), and again scatter the pieces of the trident. Proteus' job gets harder and harder.

Proteus further loses his chance to save Neptina (game over) when his energy/point level reaches zero. The level decreases if he touches octopuses, seaweed, black birds, gray clouds or fireballs from volcanoes. But it increases each time Proteus touches a seahorse or a pink cloud.

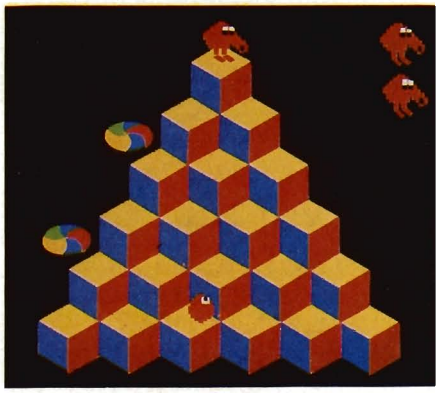
According to the instructions, when the player saves the mermaid seven times, he should watch for a surprise. As I said, I've saved her only five times. If you save her seven times, let me know what happens. Whatever the surprise, though, I predict Fathom will be a hit.

## PARKER BROTHERS' NEWEST: Q*BERT

ColecoVision is fast becoming the most popular video game system. I mean, after all, the system can play both ColecoVision games and Atari 2600 games (with the Expansion Module No. 1), and it can be turned into a computer with the new Adam expansion module.

Coleco is so popular, in fact, that Odyssey, Imagic, Starpath, Sidney Development and Parker Brothers are all now designing games for it. Parker Brothers' first release for the ColecoVision is the famous arcade game **Q*bert** by Gottlieb.

Q*bert (the player) is a lovable, orange, fuzzy ball with legs and a long snout. He hops around a floating pyramid of 28 cubes, gaining points by making them change colors. That's the object of the game—it's very simple. But what makes it fun is that Q*bert has to avoid all sorts of enemies: red bouncing rubber balls; a purple egg that hatches a purple snake named Coily; and a spidery-looking creature named Ugg.



Parker Brothers' Q*bert

# The VID KID NEWS & VIEWS

At both sides of the pyramid are swirling disks that act as elevators when Q*bert hops aboard. These elevators take Q*bert to the top of the pyramid, and they are very useful when Coily is after him. All Q*bert has to do is hop on one and Coily will follow him—except there will be no elevator. Coily will jump, fall and scream ("Ahhhhhhhh!") as he falls off the pyramid.

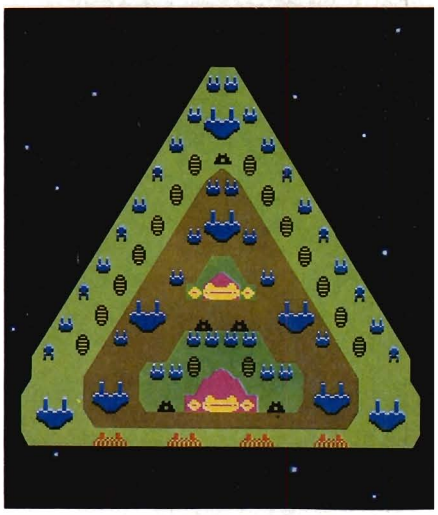
The only useful objects, besides the elevators, are the bouncing green balls. Hit one and everything except you freezes for a moment, giving you a few extra seconds to move on to some more cubes or plan your next move.

If one of the evil objects—bouncing red balls, Coily or the spidery-looking creature, Ugg—hits Q*bert, then he mumbles under his breath and a word balloon appears on the screen. It says somthing that looks like "#!?!", and Q*bert meets his fate. In other words, Q*bert says what you're thinking. There are nine different levels of play here, each consisting of four different rounds. Each round and each level is different. I don't know what some of the levels are like because I've only made it to Level Three.

But get this—my mom can make it to Level Five! The other day she played Q*bert on a coin-op for the first time. On the very first play she made it through Level Two.

## BATTLING THE DREADED DREADNAUGHT

According to the New American Webster Dictionary, the word "dreadnought" is another name for a



The dreaded Dreadnaught

powerful battleship. In Activision's latest game for the Intellivision, **The Dreadnaught Factor,** the word is spelled with an "a" instead of an "o," but it's still all about a powerful battleship. Read on!

In The Dreadnaught Factor, designed by Tom Loughry, the galactic radar of the water planet Terra has spotted a strange, very large configuration that is 100 parsecs away (about 3.26 light years), but is closing in at an ultrafast speed.

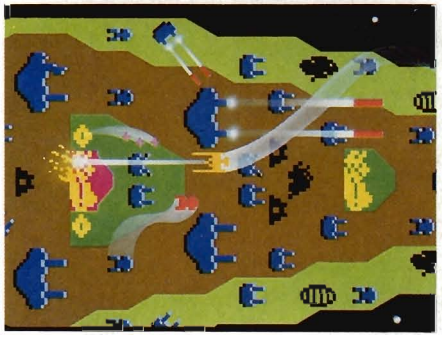
The player controls a lightweight Terran hyperfighter that takes off from its fleet in order to investigate this "unknown factor." After leaving Terra's stargate and flying for about 91 parsecs, the player learns that the "factor" is a gigantic, alien battleship (larger than the entire playing screen of the television set). And it's bent on destroying Terra, so there's no time to lose!

The player must destroy the dreadnaught by guiding his hyperfighter through a series of attack passes. On each pass, the player shoots lasers at large and small cannons, bridges and small launchers that fire back heat-seeking missiles. Also on each pass, the player drops deadly strontium bombs on black silos that house the dreadnaught's doomsday warheads.


A Terran hyperfighter to the attack.

The player also drops the bombs on the dreadnaught's engines and its black air vents. When the vents are all destroyed, a cell of high pressure will build up inside the dreadnaught, finally causing it to blow up.

Seven levels of difficulty—ranging from one dreadnaught on Level 1 to ten on Level 5 and 100 on Level 6—make The Dreadnaught Factor a challenging game. I haven't made it through Level 5 yet, and



Kaboom! A direct hit!

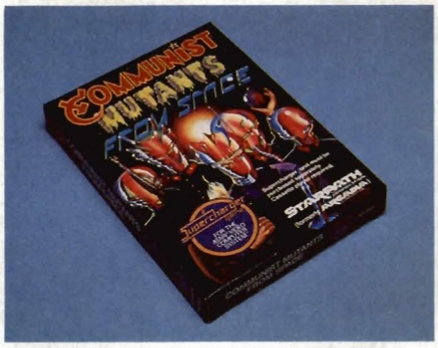
Tom Loughry hasn't passed Level 6 yet. Here's one game where the player has a chance to beat the designer at his own game.

## OF MUTANTS, STORMS AND MORPIDS

Space shoot-'em-ups are still among the most popular games, judging by the number of them on the market. With so many out there, though, shopping for one can be hard, so here are mini-reviews of four of the latest space shoot-'em-ups that I've really enjoyed playing on the Atari 2600.

### SOLAR STORM

It's still winter, but Imagic is forecasting a high today in the upper 9000s in **Solar Storm** for the Atari 2600. The players shoots cricket-




Starpath's Communist Mutants


Imagic's Solar Storm

sounding lasers at Deltoid Blasters, Sun Spots and fast-moving Sizzloids.

Watch out, though, because if too much of this "solar debris" reaches the planet, Imagic's weather forecast will come true.

### COMMUNIST MUTANTS FROM SPACE

In Starpath's **Communist Mutants from Space,** for play on the Atari 2600 with Starpath's Supercharger, the player has to vaporize mutant warriors before they take control of the earth and turn everyone into "Bloodthirsty Communist Mutants." The player moves his gun back and forth, shooting upward at the Mother Creature, at Mutant Eggs and at Diving Mutant Attackers.

Nine levels of difficulty, an option of shields, a time warp, penetrating fire, guided fire and a choice of one to four players make Communist Mutants from Space an outstanding, fast action shoot-'em-up.

### FLASH GORDON

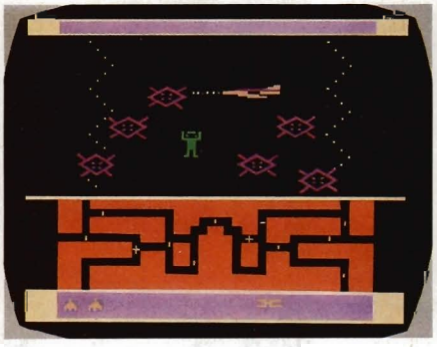
In **Flash Gordon** by Fox Video Games for the Atari 2600, the player is Flash Gordon, who has to rescue the spacemen trapped in mysterious Spider City. Debris, patrol ships, disrupters generators and Spider Warriors make saving them difficult.

Flash Gordon is a different space game because it is played like Defender in an invisible maze. You can "see" the maze only by looking at the Spider City map displayed at the bottom of the screen.

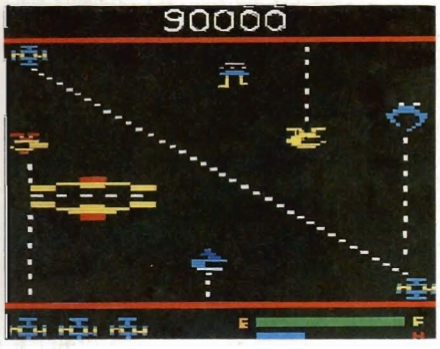
### CROSS FORCE

Year after year, in **Cross Force** by SpectraVideo, the evil Mirpods have been raiding the far corners of the galaxy, causing mass destruction. Even worse, no weapon around could destroy the Mirpods.

However, our scientists have now developed a new weapon called a Spectron. The Spectron uses high concentrations of energy beamed from one flying platform to the other, destroying any Mirpods caught in between. ■



Fox Video's Flash Gordon




SpectraVideo's Cross Force

## VIDEO GAME ALTERNATIVES

Buying video game cartridges can be expensive. Luckily, there are other choices for the person who would like to play more games but perhaps can't afford to buy as many as he'd like.

One choice for an Intellivision owner is **PlayCable,** an all-game pay-television channel. Subscribers receive a quarterly newsletter filled with all kinds of contests. We don't get PlayCable where I live so I haven't seen it in operation, but if you'd like to know more about it, you can write The PlayCable Co., 1775 Broadway, New York, N.Y. 10019.

If you're an Atari 2600 owner—or own any system that takes Atari 2600 cartridges, like ColecoVision's Expansion Module No. 1—another choice is **Gameline,** a division of Control Video Corp. To subscribe to Gameline, you need a device called a Master Module, which retails for about $60, a telephone and your parents' credit card.

The games you play will be charged to your parents' credit card at $1 for about 10 plays. That should be enough for an hour or more of play—or even all day—depending on how good you are.

Parents don't have to worry about the telephone being tied up because the process of hooking up with Gameline takes less than a minute, and the call is toll-free. Also, parents shouldn't be scared about high credit card bills because each person in the family can have his own weekly game limit—set in advance by the parents, of course.

What's really exciting about Gameline is being able to enter your best scores and knowing right away how you rank across the nation with other Gameline players.

You should be able to find Gameline in almost any retail store, but if you can't and would like more information, write Gameline Control Video Corp., 8620 Westwood Center Drive, Vienna, Va. 22180. ■

His flaming sword at the ready, Dirk the Daring bravely faces his arch enemy at the final showdown in Dragon's Lair, the sensational new video arcade game.

# Mastering Dragon's Lair

BY ABBOT NEIL SOLOMON

There's a revolution going on right now at your local video game arcade. The motivating force is a tough, exciting new game called Dragon's Lair that in a few short months has totally captivated the coin-op crowd.

The first interactive arcade game based on videodisc technology (see "Tune In Tomorrow . . . Today," MICROKIDS, December 1983), Dragon's Lair actually allows the player to direct the course of the action according to his own choosing—to a certain extent, at least. Better yet, its animated graphics absolutely explode across the screen as Dirk the Daring sets out to rescue his Princess Daphne from a castle guarded by an evil dragon.

One try at Dragon's Lair is enough to convince any video game player that the industry has entered a new age. The next question, naturally, is: How do you beat it? With great difficulty. But it can be done.

Let's take it from the top. You already know that Dirk's job is to slay the dragon and thereby save Princess Daphne. The trick, though, is to get Dirk through the harrowing adventures he has to face—perhaps as many as 40 in all—before he gets to the final confrontation with the dragon.

Dirk the Daring in one of the many chambers of horrors that have helped to make Dragon's Lair the hottest coin-operated game in years.

The tools the player is given to accomplish this include: 1) A joystick with which to move Dirk forward and backward, right and left; and 2) a sword button, located next to the joystick, that directs Dirk to whale away with his sword whenever necessary. That's it. But it's enough if you use it just right.

The first step in mastering Dragon's Lair is realizing that he who hesitates is lost. Why? Because, in

# Dragon's Lair

each adventure that Dirk faces, the game's videodisc technology sets up a brief "time window" during which you must decide what to do and do it fast—or Dirk is "dead."

How do you know when you've entered this time window? It's simple. Whenever you see Dirk *crouch*, or *turn around*, or *extend his sword arm*, it's time to act.

Take the first episode, for example. The menacing castle drifts onto the screen, and then you see Dirk running into an entranceway. He *crouches* . . . something is about to happen . . . but no problem. Just push the joystick and Dirk dashes forward, barely escaping the crushing weight of two heavy metal gates coming down on him. So much for the easy part.

Dirk now enters the castle. The screen darkens, and we can just about see him in a brick-lined corridor. Something's about to happen, but what? Then Dirk *turns* toward a hole in one of the walls. That's your cue; move him forward quickly and he dives through the hole just as the corridor's brick walls come tumbling down all around him.

In many episodes in Dragon's Lair, Dirk's escapes and triumphs are heralded by blaring trumpets (a nice touch), which also announce the start of a new adventure. We can't cover all these adventures, of course, but a lot of them in the later stages of the game are mirror images of earlier problems.

For that reason, we've chosen to discuss 15 of the game's most challenging episodes. Learn to beat them, and you'll soon have the dragon at your mercy.

Dirk vs. the Lizard King—and the sword proves mightier than the scepter.

Animation © Don Bluth

**Dirk takes flight before the onslaught of a fearsome mounted knight.**

## MECHANICAL HORSE

Having found his way into this seemingly endless castle, Dirk suddenly comes upon a metallic-looking mechanical horse, which he quickly mounts. The horse, with Dirk in the saddle, then takes off along a series of brick-lined paths where fire shoots out at Dirk from either side.

The action here is faster than in previous episodes, but mastering the mechanical ride is easy. As the flames explode to the right or left, just flick the joystick in the opposite direction. If you act quickly, Dirk will dodge the flames and continue to press forward without suffering a meltdown.

As this episode comes to an end, Dirk is heading pell-mell toward a corner of the castle formed by two brick walls. To save him from being smashed to pieces, push the joystick toward the open side of the screen. Dirk will then swiftly skirt the castle corner and head on into the next episode.

## FLAMING ROPES

This episode bears a striking resemblance to the game Jungle Hunt. Dirk finds himself on a ledge overlooking a huge room. The only way he can get across is by swinging on flame-tipped ropes hanging from the ceiling.

Again, look for Dirk's *outstretched arm*. That's the beginning of your "time window." Push the joystick toward the ropes, one after

another, and if you time it right Dirk will quickly swing across.

**FALLING WOODEN DISC**

Dirk is walking along through the castle when a large wooden disc in the floor beneath him suddenly falls into a cavern below. Dirk screams—but wait just a second, and you'll see that the disc pauses in its fall next to a pathway along one of the walls of the cavern.

The trick here is to wait for that split second before the disc begins to fall again. As Dirk *crouches*, push the joystick in the direction he's facing and he'll leap safely to a ledge adjoining the pathway. Of course, the ledge collapses under his feet, but don't worry. Fueled now with renewed confidence, Dirk automatically leaps forward over the crumbled pathway to continue his quest.

**RIVERS AND WHIRLPOOLS**

No self-respecting dragon would live anywhere without an indoor swimming pool, right? But this dragon has equipped his home with not only an indoor pool but rivers with rapids and whirlpools as well.

As Dirk rows his way down one of these rivers, he approaches two caverns. Look closely and you'll see that in one of the caverns there's a light. Move the joystick toward the light and Dirk sails smoothly into the right cavern; pick the wrong one, though, and he crashes into the river bank.

Keep following the lights along the way and Dirk will eventually reach another water obstacle appropriately called "Ye Rapids." Disaster awaits, but getting through the rapids is actually easy. Simply look for the lighter colored stream of water, direct the joystick toward it, and Dirk will automatically paddle his way to safety.

**SPINNING BALLS**

At one point in his quest, Dirk encounters a narrow, elevated path guarded by spinning balls. Walking into these balls means certain death. Not to worry!

Wait for Dirk to *crouch*. As he does, you'll notice that he also *extends his arm*. Push the joystick forward at that precise instant and, as impossible as it seems, Dirk will walk safely between the spinning balls.

Before you relax, though, wait . . . there's more. At the end of the elevated pathway, Dirk is confronted by a brown-robed villain. Dirk hesitates and giant thorns spring up all around him. Quick! Pull the joystick back. Dirk will leap backward, escaping the thorns.

The thorns will keep appearing, by the way, but keep pulling the joystick back and Dirk will escape through a rear doorway.

**THE LIZARD KING**

Occasionally, Dirk is chased through the castle by one of the villains of Dragon's Lair. In the Lizard King episode, the "baddie" is a long-tailed reptile wielding a heavy scepter.

Dirk prepares to do battle, but before he can strike his sword sticks to a floating metal pot that begins to soar through a cavern-like maze. Obviously, it's hard to slay the Lizard King without a sword, so Dirk begins to run after the floating pot.

The trick to this episode is to keep your eyes on the pot *and* on the Lizard King. Follow the pot, remembering that the first turn in the cavern is to the left, all others to the right. At the same time, watch the Lizard King's arm. Each time he raises his scepter to strike Dirk, it's time to move the joystick for a turn.

At the end of this sequence, Dirk finally catches up to the pot. Push the joystick forward and Dirk will take hold of his sword. When the Lizard King then closes in, push the sword button and Dirk will cut him in half.

**FIRE ROOM**

This episode looks easy enough at first glance. But as Dirk stands around, seemingly wondering what to do next, a fire breaks out and spreads quickly across the left side of the room. And then it breaks out behind him. There seems no escape.

As the flames grow, though, push the joystick to the left a number of times. Dirk will head toward an

# Dragon's Lair

overturned bench leaning against a wall. Automatically sensing an escape route, Dirk will push the bench aside and exit through a hole in that wall.

### THE TILE ROOM

The entire floor of this room is made up of purple and blue tiles. As our hero walks in, some of these tiles begin to fall out from under him. Pull back on the joystick. Dirk will leap backward but the tiles will continue to fall until finally he's left straddling a gaping hole in the floor.

Now it's time to push the joystick forward and then quickly to the left. If you act quickly, Dirk will narrowly avoid falling through the hole and will then escape through a nearby exit.

### THE SKULL ROOM

This episode is one of the more complicated in the lair. Dirk is walking along when suddenly Princess Daphne pops her head out of a doorway, pleading for help. Push the joystick forward, and it's Dirk to the rescue! But soon skulls come tumbling out from either side of the hall.

Push the joystick forward to get Dirk past the skulls. Now he's confronted by an evil-looking hand that comes out of one of the hall's doorways. Press the sword button and he will cut the hand in half.

When the hand is finally destroyed, a black ooze seeps out of the next set of doors. Push the joystick forward to get Dirk past the ooze, and then hit the sword button to clear his path to an unlocked door just beyond.

### ROLLING BALLS

At the end of a long stretch of pathway, Dirk sees six balls rolling across a trench. Behind him, a larger black ball begins to roll toward him. Pull the joystick toward you to prevent the black ball from reaching Dirk. Remember, though, there are six balls still ahead.

The trick here is to wait until each of the smaller balls passes in front of Dirk and then pull back on the joystick. Although it will look as if the black ball is going to catch up to Dirk, it won't if your timing is just right—Dirk will survive.

### THE TENTACLE ROOM

As Dirk dumbly stares around this room, a green tentacle descends from the upper left side of the room. Quickly push the sword button and Dirk will slice the tentacle in two. Now push the joystick forward and Dirk will approach a weapons rack.

Once Dirk reaches the rack, move the joystick to the right twice and he will begin to climb a nearby stairway. After a few seconds, the stairs become blocked. Move the joystick to the left and Dirk will leap onto a table. Then quickly push the joystick forward, sending Dirk through the exit door.

Dirk the Daring and his beloved Princess Daphne: Together at last . . . till the next game.

### CRYPT CREATURES

In this episode, Dirk is attacked by a series of brown monsters living near the castle's lava pits. As soon as the scene begins, hit the sword button. The sword will bounce off the closest monster, driving it back momentarily. Now quickly push the joystick forward *two* times. The next move is to the right.

As the creatures continue to chase Dirk, you have to keep moving him forward. Although the Crypt Creatures will get close, they'll never catch up to Dirk if you react this way.

### THE INDOOR POOL ROOM

As this episode begins, move the joystick to whatever side of the room Dirk's sword is on. Then move it forward two times. Now move Dirk away from the wall, and it's time for a quick dip in the pool. Push the joystick forward and in goes Dirk, whereupon he's confronted by a giant spider.

Pull the joystick back to move Dirk back to the side of the pool from which he entered. Now move him forward again and then quickly hit the sword button to kill the spider. After the spider is dead, move to the side to get by it and then forward again to leave the pool.

### THE SLIDE

Dirk is facing you, about to venture forth upon a sloped tile floor. Forget it. Push the joystick toward the stairway against the wall. Keep pushing it and at the same time hit the sword button.

Soon you'll see a hanging chain and near it a hole in the wall. If you touch the chain, it's certain death. So quickly push the joystick toward the left and Dirk will exit through the hole in the wall.

### THE SMITHIE

Dirk has somehow found himself in a green rectangular box. Welcome to the Smithie's Room.

From above, a floating sword rushes at Dirk. It's time to hit the sword button. Soon a magical mace comes sailing toward Dirk, and it's time to hit the sword button again. Next comes a flying anvil. Time to move the joystick in the opposite direction.

The display will now focus on Dirk, but the Smithie, who has been sleeping nearby, finally begins to awaken. Push the sword button again and Dirk is ready to continue his quest.

### DRAGON'S LAIR

Having mastered all of the above, you will eventually guide Dirk into the vaunted *Dragon's Lair* where the Princess Daphne awaits. This is a very complicated room. Remember to keep a close watch for Dirk's warning signs (crouching, turning, etc.) and react accordingly.

When you're finally face to face with the dragon, the main thing to remember is to keep Dirk away from it until he finds—would you believe it?—a magic sword. Then Dirk grabs the sword, slays the dragon, rescues Daphne and they live happily ever after—or at least till the next game. ■

# TYPE ATTACK:

## *More Than Just A Game*

BY DAWN GORDON

The trouble with educational games is—let's face it — they're mostly B–O–R–I–N–G! But Type Attack from Sirius Software is something else again. As a game, it's as fast moving and exciting as almost anything on the market. And as an educational tool, it's clearly in a class by itself. That's why last year it was awarded the highly prized Consumer Electronics Showcase Award.

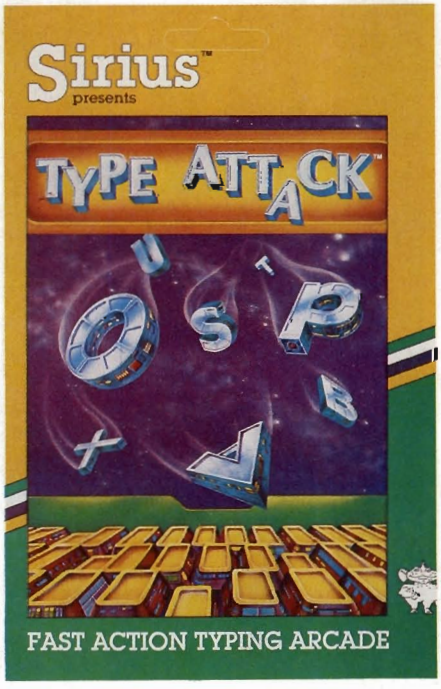
The basic purpose of this game is to teach you to touch type using all your fingers (as opposed to one- or two-finger typing). As anyone who's ever learned to touch type knows, that can take a long, long time—and even longer to become proficient at it. Type Attack is a quick and enjoyable shortcut.

Written for Apple, Atari and Commodore computers—and soon to be available for the IBM PC—Type Attack is available on disk or cartridge and is priced at $39.95. That's a little more than a game alone, but considerably less than most educational programs. And here you get the best of both worlds.

### BOOTING UP

To get started in Type Attack, the first thing you do, of course, is simply slip in your disk or pop in your cartridge. The object of the game, you're informed, is to fire your missiles so as to knock off flying letters and soaring words just as you would enemy spacecraft in an ordinary space shoot-'em-up.

To do this, you're told, you have to hit the letter on your keyboard that corresponds to the letter (or group of letters) that you're trying to bring down. Do it right, and a missile streaks upward, destroying the threatening letter. Sounds easy—but, in fact, it can be a lot more difficult than you might think.




Before you begin, the screen will also prompt you with speed and lesson selections. The speed at which the letters fly across the screen is rated from 1 to 99. Beginning typists should choose from 1 to 19; intermediates, 20 to 59; and skilled typists, 60 to 79. (At speeds of 80 and above, the attackers are joined by hostile robots and genetic mutants.)

Lesson selection is next, and here you can choose from 39 different screens. Each lesson will stress a particular combination of letters—or you can, if you wish, create your own lessons (more about that later).

### SCORING AND ENERGY

Each lesson consists of a Character Attack first (single letters flying across the screen) followed by a Word Attack (where the aliens are represented by whole words). The first lesson consists of the letters A, S and D with a chart in the instruction book showing you where to place your fingers.

The player begins each game with 100 units of energy. During the Character Attack, each typing error will cost you one unit of energy, and each wave that hits the bottom of the screen will gobble up an additional 35 energy units.

In the Word Attack, each letter you hit gives you an extra energy unit, but if you fail to destroy a word entirely an energy unit is lost. As you may have guessed, the game ends when you run out of energy units.

Scoring is accomplished a little differently. In the Character Attack, you earn five points for each letter you destroy, and you lose five points for each error you make. During Word Attack, you earn 20 points per letter in each word destroyed. And at the end of each successfully completed lesson, you earn bonus points computed by multiplying your average words per minute by the lesson speed you selected.

Useful screen information includes: the current score, high score, energy gauge, current lesson and a words per minute selection.

## CHARACTER ATTACK

Each Character Attack consists of three separate waves of attackers. Each wave is made up of eight columns of letters, appears at the top of the screen, and keeps coming at you until you destroy them all. However, only the bottom character in each column is vulnerable to your missiles, and with repeat characters (two Zs, for example), only the character farthest to the left will be destroyed.

Each time you hit a correct character on the keyboard, the corresponding letter is destroyed by your missile automatically; therefore, aiming is not necessary. It is recommended, however, that you destroy the columns starting with the one farthest left since that is the column that will get to you first should you fail to demolish an entire wave. If any character touches the bottom, as noted, you lose energy.

## WORD ATTACK

Once you've made it through the Character Attack, next comes the Word Attack. During this phase, groups of complete words fly across the screen, but only one word at a time is vulnerable to attack. This word can be identified by its blinking shield, and you must type out the entire word and then press the space bar to wipe it off the screen.

If you miss a letter or two, all is not lost. Words allowed to go off the left edge of the screen will reappear at the right side where you can get

# TYPE ATTACK

another shot at them. Typing errors can be corrected by using the backspace or control keys, which can move a word back one letter at a time.

After you have completed the Word Attack, you will automatically advance to the next lesson and a new set of characters.

## BONUS WORDS

If by some stroke of luck you've managed to earn Character Attack Trophies and you've blasted all of the words on their first pass, you're given a shot at Bonus Words Attack. There are no penalties during this phase of the game, only a chance to earn extra points.

## LESSON CREATOR

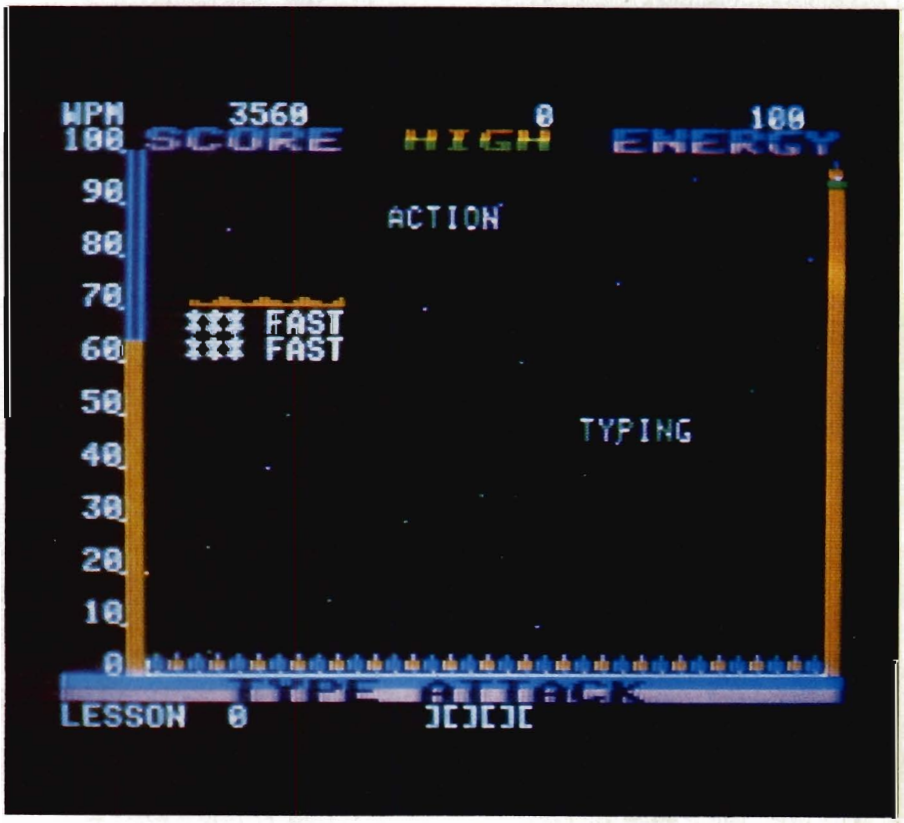
From the main menu, you can, if you wish, select Lesson Creator. By entering the lesson you wish to create (40-99), and then the letters you wish to practice, you can actually create your own personalized lesson and even save it to disk if you're so equipped. This is especially convenient since it allows you to become more adept at typing letters that have given you problems and thereby improve your score during the next game.

## SOME FINAL THOUGHTS

To improve your typing skills more rapidly, and also to make the game more challenging, it's a good idea to pick a speed that forces you to go ever faster than before. An increased pace will force you to type faster, and after a while you'll surely be able to achieve even faster typing speeds. All in all, it's worth it in the end because your typing will improve dramatically!

I know because it worked for me. I was a "hunt and peck" typist for years, but Type Attack has changed all that, and for the first time I'm now able to concentrate on my computer screen rather than my keyboard. My typing speed has improved, and I've had a blast at the same time.

If you're at all like me, this is one game you won't want to miss! ■



# EXPLORING


BY DAVID COLLOPY

As soon as I finish writing this, my daughter Dawn and I will compose a letter on our Apple personal computer to send to a friend of ours in California—and that friend will receive the letter only seconds after it's written.

How is that possible? The answer is electronic mail, for our California friend is but one of many fellow computerists we've met on a new communications network called Electronic Information Exchange System (EIES).

Developed by Murray Turroff of the New Jersey Institute of Technology, EIES (pronounced like "eyes") allows anyone with a personal computer to "talk to" anyone else with a personal computer, anywhere, anytime.

To take advantage of this system you need a modem, plus the software to run it. This will allow you to receive and transmit electronic data over regular telephone lines. Beyond that, all it takes is an access code and you're in business.

Of course, there's a small subscription charge. (Nothing's free these days.) But the benefits you can derive from a system such as this are many (see "Homework Hotline," MICROKIDS, December 1983). Perhaps the most satisfying, though, is the opportunity it gives you to meet and get to know computer enthusiasts all over the country.

Our California friend, for example, will be able to respond to our letter just as quickly as we send it. No waiting weeks for a reply. That's probably the greatest advantage of electronic mail over traditional types of communication.

To give you an example, Dawn and I happen to live in Cincinnati, and it normally takes a week to send a letter from here to California via regular mail. A telephone call is more immediate, but it costs more, too—especially if, once you get started, you like to talk and talk and talk. Electronic mail, on the other hand, is quick, convenient and relatively inexpensive.

When Dawn and I first subscribed to the EIES system, we entered information about ourselves in the EIES directory. This is kind of like an electronic telephone book where you and other users of the system can find out a little bit about each other and decide whether you'd like to get in touch.

Besides your name and address, you can put in things like special interests or hobbies, as well as the kind of work you do. This allows people with similar backgrounds —or even opposite interests—to compare notes with each other.

For instance, Dawn and I noted that we were professional writers interested in personal computers. As a result, we often communicate now with other writers and people who are simply interested in seeing what else they can do with their personal computers.

To find out where other subscribers live (or to find out what they do), all that's required is a quick look in the directory. So it didn't surprise us when one day we turned on our computer and found this message:

"I just wanted to say hello to some folks who live in Cincinnati. I lived there for 18 years and I'm feeling a bit homesick."

The message was signed with a nickname—LEFTY—a common practice on systems like EIES. But even nicknames are entered in the directory, so it was easy for us to find out that he was, in fact, Richard Butcher, a resident of LaJolla, California.

Lefty, it developed, was further a project manager for the Western Behavioral Science Institute. And he was using EIES as part of his research into the subject of how people can utilize computer communications.

Shortly after receiving Lefty's message, we responded with one of our own. We gave him a thumbnail sketch of current events here. We let him know that we were disappointed in the way the Cincinnati Reds were playing and told him about recent Cincinnati area happenings, such as "The Winterfest" at Kings Island. After that we began communicating with each other on a regular basis.

Since then, Lefty has become a rather close friend of ours. We genuinely look forward to turning on the computer each day, hoping that he has sent us a piece of electronic mail. Our friendship has grown to the point, in fact, where we try to keep him informed of just about everything we're doing, with messages such as:

*Dear Lefty,*

*We just wanted to drop you a note to let you know that we're writing an article for this great new magazine called MICROKIDS. Be sure to check it out. We know you're going to like it.*

*Sincerely,*
*David and Dawn* ■

# 6 QUICK

We've said it before and we'll say it again: You don't have to be a computer expert to make your computer sit up and do tricks. All it takes is a little patience and the ability to type in a program exactly as you see it on the printed page. By way of proof, we offer the following six programs guaranteed to convince your friends that you're a real computer whiz.

These programs have been written, it should be noted, expressly for Apple computers. But we've also included some directions showing you how to adapt them to other types of computers. Give them a whirl . . . and then just stand by for applause.


## 1 GUESSING GAME

This is a little game that illustrates the IF/THEN statement. You can choose to guess a number that the computer generates or choose to let the computer guess your number.

```
 5 N = 100
 9 REM CLEAR THE SCREEN
10 HOME
20 PRINT "GUESSING GAME"
30 PRINT
40 PRINT "DO YOU WANT TO"
50 PRINT
60 PRINT "1. GUESS THE
   COMPUTER'S NUMBER."
70 PRINT "2. LET THE
   COMPUTER GUESS YOUR
   NUMBER."
80 PRINT
90 INPUT "TYPE 1 OR 2 THEN
   PRESS RETURN"; A$
100 A = VAL (A$)
110 IF A < 1 OR A > 2 THEN 90
120 ON A GOTTO 200,400
199 REM PERSON MAKES
   GUESS
200 HOME
210 X = INT (RND (1) * N + 1)
220 PRINT "GUESS A NUMBER
   FROM 1 TO";N
230 PRINT
240 PRINT "THEN TYPE THE
   NUMBER AND PRESS
   RETURN"
250 PRINT
260 INPUT A$
270 G = VAL (A$)
280 IF G > X THEN PRINT "TOO
   BIG"
290 IF G < X THEN PRINT "TOO
   SMALL"
300 IF G = X THEN 320
310 GOTO 260
320 PRINT " YOU GOT IT!"
330 GOTO 600
399 REM COMPUTER MAKES
   GUESS
400 HOME
410 G = 50:MIN = 1:MAX = N
420 PRINT "THINK OF A
   NUMBER FROM 1 TO";N
430 PRINT
440 PRINT "AND I WILL GUESS
   IT."
450 PRINT
460 PRINT "IF MY GUESS IS TOO
   BIG TYPE'>'"
470 PRINT "IF MY GUESS IS TOO
   SMALL TYPE'<'"
480 PRINT "IF MY GUESS IS
   CORRECT TYPE' = '"
490 PRINT "THEN PRESS
   RETURN."
500 PRINT
510 PRINT "MY GUESS IS";G
520 INPUT A$
530 IF A$ = ">" THEN MAX = G
540 IF A$ = "<" THEN MIN = G
550 IF A$ = " = " THEN 590
570 G = INT ((MAX + MIN) / 2)
580 GOTO 500
590 PRINT "I GOT IT!"
600 INPUT "DO YOU WANT TO
   PLAY AGAIN?";A$
610 IF LEFT$ (A$,1) = "Y" THEN
   10
620 PRINT "BYE!"
630 END
```

**Adaptations:** HOME clears the screen here, but many other computers use CLS or PRINT "#", or simply CLEAR. RND ( ) works differently on some computers. TRS-80 users must precede RND with RANDOM, and IBM users must precede it with RANDOMIZE. On Atari computers, A$ must be DIMentioned to 1, DIM A$(1).

## 2 VERSE-ATILITY

Did you know that computers can generate poetry? This program does

# TRICKS THAT'LL DAZZLE YOUR FRIENDS

BY MICHAEL CALLERY

just that. The quality of this poetry is somewhat dubious, however. To improve it, if you wish, simply alter the DATA statements to include more interesting words.

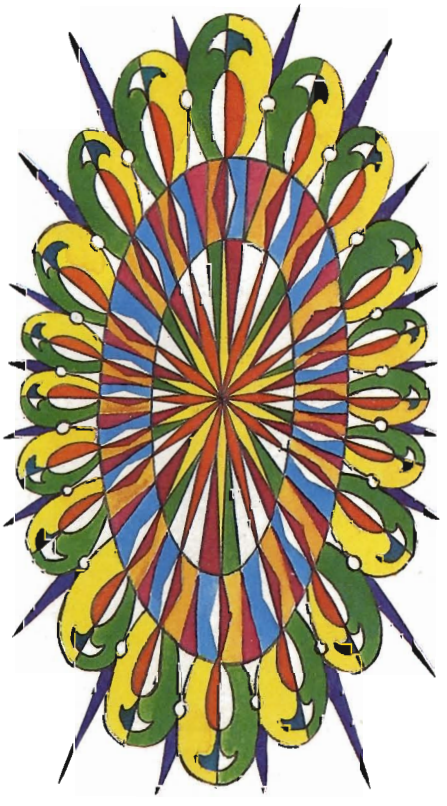

```
100 MN = 10
110 NV = 10
120 NP = 10
130 NA = 3
140 FOR I = 1 TO 3
150 N = 0
160 V = 0
170 P = 0
180 A = 0
190 NW = NA
200 GOSUB 400
210 A = 1
220 PRINT W$;" ";
230 NW = NN
240 GOSUB 400
250 N = 1
260 PRINT W4;" ";
270 NW = NV
280 GOSUB 400
290 V = 1
300 PRINT W$;" ";
310 NW = NP
320 GOSUB 400
330 P = 1
340 PRINT W$;"."
350 NEXT I
360 END
400 X = INT (RND (1) * NW + 1)
410 W = NN * N + NV*V + NP
    *P + NA*A
420 FOR J = 1 TO W + X
430 READ W$
440 NEXT J
450 RESTORE
460 RETURN
500 REM ARTICLES
510 DATA THE, A
520 DATA HEART, GULL,
    LOVE, FRIEND, DOG,
    OCEAN, TREE, WAVE,
    TOUCH, HAIR
530 REM VERBS
540 DATA LOVES, BUILT,
    ROARED, SANK, GREW,
    SAW, FLOUNDERED,
    RODE, WAS, SHOCK
550 REM PHRASES
560 DATA TO THE END, LIKE A
    DOVE, WITHOUT A CARE,
    BEYOND THE BLUE
    HORIZON, NEVERMORE,
    ON THE BEACH, WITH
    LOVE
570 DATA FOR A LARK, TO THE
    END, IN THE HEART
```

**Adaptations:** On Atari computers, string variables must be DIMentioned; DIM W$ (40) will do it. Your computer may also require a RANDOM or RANDOMIZE statement, as in "Guessing Game."

## 3 RANDOM GRAPHICS

"Random Graphics" is a program that does just that—it draws a series of random graphics in the upper right-hand corner of the graphics screen. These graphics are then reflected in the other quadrants of the screen in a pattern designed to amuse and bemuse.

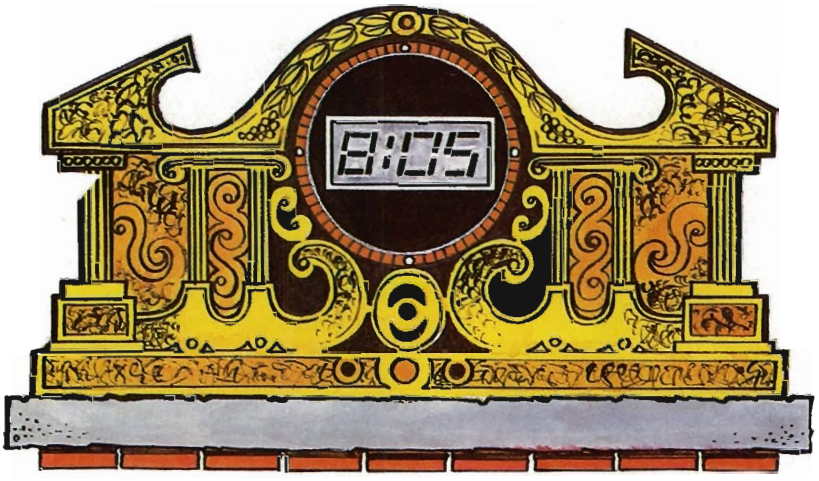
```
10 XMAX = 279:YMAX =
   191:NC = 7
20 HGR : POKE – 16302,0
30 HCOLOR = 3
```



# 6 QUICK TRICKS

```
40 HPLOT 0,0 TO 0, YMAX TO
   XMAX, YMAX TO XMAX,0
   TO 0,0
50 HPLOT XMAX / 2,0 TO
   XMAX / 2, YMAX
60 HPLOT 0, YMAX / 2 TO
   XMAX, YMAX / 2
70 C = INT ( RND (1) * NC + 1)
80 HCOLOR = C
90 X = INT ( RND (1) * XMAX /
   2):Y = INT ( RND (1) * YMAX
   / 2)
100 HPLOT X,Y TO XMAX / 2-
    X,YMAX / 2 - Y
110 HPLOT X MAX / 2 + X,Y TO
    XMAX - X,YMAX / 2 - Y
120 HPLOT X, YMAX - Y TO X
    MAX / 2 - X, YMAX / 2 + Y
130 HPLOT XMAX / 2 + X,YMAX
    - Y TO XMAX - X, YMAX / 2
    + Y
140 GOTO 70
```

**Adaptations:** The first thing you need to do here is to change the constants to reflect the size of your graphics screen and the number of colors available. Line 20 initializes the graphics screen and the POKE commands that the full screen be shown (without the usual 4 lines of text). On the IBM PC, SCREEN 2:KEY OFF and, on the Atari, GRAPHICS 8 will accomplish the same thing. On the IBM PC, color is indicated in the plotting statement, so lines 30 and 80 are unnecessary. On the Atari, they become COLOR n where n is the desired color number. Plotting commands also vary. On the IBM PC, we can use LINE (start)-(end), color where color start, end, and color to replace the appropriate statements from the Apple program. For example, line 40 becomes LINE (0,0)-(0,YMAX),3:LINE (0, YMAX)-(XMAX, YMAX),3:LINE (XMAX, Y-MAX)-(XMAX,0), 3:LINE (XMAX,0)-(0,0),3. (There are other ways to accomplish this same task, but for simplicity we'll keep it a direct translation.) On the Atari the HPLOT becomes PLOT and the TO becomes DRAWTO in all plotting commands. As before, your computer may also require RANDOM or RANDOMIZE in order to generate random numbers.



## 4 TICK-TOCK

If your computer has an accessible clock, like the IBM, there is little need for this program. However, Apples and many other personal computers don't have them, unless you buy one as a peripheral. Anyway, this program will give you essentially the same thing.

```
10 T = 650
20 HOME
30 PRINT "ENTER THE TIME
   AS HH MM SS"
40 INPUT TIME$
50 HOME
60 GOSUB 500
70 H$ = LEFT$ (TIME$,2):M$
   = MID$ (TIME$,4,2):S$ =
   RIGHT$ (TIME$,2)
80 GOSUB 1000
90 S$ = STR$ (VAL (S$) + 1)
100 IF VAL (S$) > 59 THEN S$ =
    "00":M$ = STR$ (VAL (M$)
    + 1)
110 IF VAL (M$) > 59 THEN M$
    = "00":H$ = STR$ (VAL
    (H$) + 1)
120 IF LEN (S$) < 2 THEN S$ =
    "0" + S$
130 IF LEN (M$) < 2 THEN M$
    = "0" + M$
140 IF LEN (H$) < 2 THEN H$ =
    "0" + H$
150 FOR D = 1 TO T: NEXT D
160 GOTO 80
500 INVERSE:HTAB 14: VTAB
    8: PRINT SPC( 12)
510 HTAB 14: VTAB 12: PRINT
    SPC ( 12)
520 HTAB 14: VTAB 9: PRINT "
    ":: HTAB 25: PRINT "":
530 HTAB 14: VTAB 10: PRINT "
    ":: HTAB 25: PRINT "";
540 HTAB 14: VTAB 11: PRINT "
    ":: HTAB 25: PRINT "";
550 NORMAL
560 RETURN
1000 VTAB 10: HTAB 16: PRINT
     H$;"";M$;"";S$
1010 RETURN
```

**Adaptations:** The HOME statement must be replaced on computers other than Apples. Use CLS for TRS-80s and IBM PCs; use GRAPHICS 0 on Ataris. The INVERSE and NORMAL commands control the production of inverse or normal video on the Apple. On many other computers, these directions can be typed in directly on the keyboard. On computers with graphics characters, it would be nice to substitute a box in graphics characters. HTAB and VTAB control print positioning on the Apple screen. On the TRS-80, you will need to substi-

tute PRINT @; on IBMs and Ataris, you will need to use the LOCATE command.

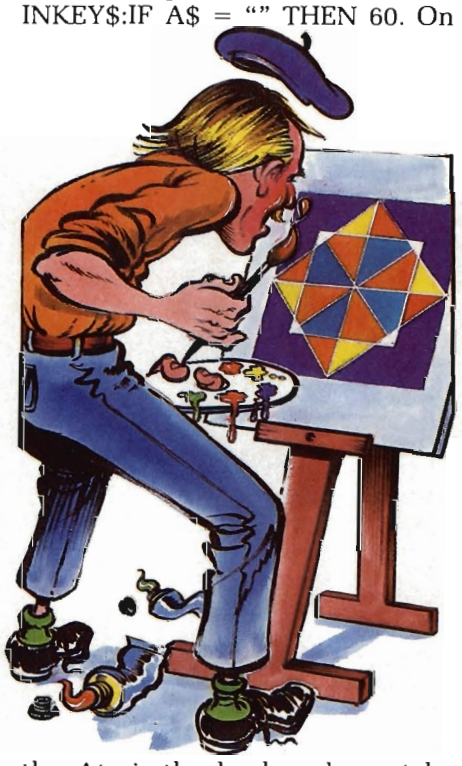
# 5 ETCH-A-SKETCH

Sooner or later, everyone with a computer capable of graphics will want a program that allows him to sketch things directly on the screen. There are many excellent commercial products that allow you to do this, but writing your own will let you customize it for the type of drawing you want to do. This program is a start.

```
5 LOMEN: 17000
10 HGR
20 MX = 279:MY = 191:C1$ = "0":C2$
   = "7"
30 X = MX/2:Y = MY/2:PC = 3
40 HCOLOR = 3: HPLOT X,Y
50 GOSUB 270
60 GET A$: IF A$ = ""THEN 60
70 IF A$ = "G" THEN GOTO 200
80 IF A$ = "R" THEN X = X +
   1: IF X = > MX THEN X = 0
90 IF A$ = "L" THEN X = X -
   1: IFX < = 0 THEN X = MX
100 IF A$ = "U" THEN Y = Y -
    1: IF Y < = 0 THEN Y = MY
110 IF A$ = "D" THEN Y = Y +
    1: IF Y = > MY THEN Y = 0
120 IF A$ = >C1$ AND A$ = < C2$
    THEN PC = VAL (A$)
130 IF A$ = CHR$ (27) THEN 180
140 HCOLOR = PC: HPLOT X,Y
150 IF G = 1 THEN RETURN
160 C$ = C$ + A$
170 GOTO 60
180 TEXT
190 END
200 G = 1
210 FOR I = 1 TO LEN (C$)
220 A$ = MID$ (C$,I,1)
230 GOSUB 80
240 NEXT I
250 G = 0
260 GOTO 60
270 HOME : VTAB 22: HTAB 2
280 PRINT "U - UP D - DOWN R -
    RIGHT L - LEFT"
290 PRINT "1 . . . 7 COLOR G - GO ESC
    QUIT"
300 VTAB 21: HTAB 1
310 PRINT "COMMAND- > ";
320 RETURN
```

**Adaptations:** Line 5 is unnecessary on computers other than the Apple. The HGR command must be replaced by the command that initializes the graphics screen on your computer—SCREEN 1 on the IBM and GRAPHICS 7 on the Atari. The maximum X and Y coordinates and minimum and maximum color numbers must also be changed. Line 40 puts the initial dot on the screen, in the center. The HCOLOR and PLOT commands also must be changed. On the IBM PC, these become PSET(X,Y),PC—and on the Atari, COLOR PC:PLT X,Y. (These same changes must also be made to line 140.)

The HOME, VTAB, and HTAB commands in line 270 and line 300 must be changed to the correct positioning commands on your computer. The GET statement is another Applesoft specific command. On the IBM, replace it with the A$ = INKEY$:IF A$ = "" THEN 60. On



the Atari, the keyboard must be OPENed before the GET. OPEN #4,4,0,"K:" early in the program (perhaps as line 6) will allow line 60 to become GET #4,A:A$ = CHR$(A).

On the Atari computer, the strings will need to be DIMentioned. DIM A$(1), C$(255, C1$(1), C2$(1) replacing line 5 will do it. The MID$ statement in line 220 must also be replaced by A$ = C$(I). Since Atari BASIC does not allow the +, string concatenation operator, we'll need a counter: K. This counter can be initialized in line 7 K = 1. Then replace line 160 with C$(D) = A$:K + 1. This will 'bump' the counter each time a new command is added to C$.

Although most TRS-80 computers do not have high-resolution graphics, this program can still be used by using the SET command and deleting the color references.

# 6 MESSAGE CENTER

The first requisite of this program is a disk drive. After that, it gets a little complicated. So instead of including a list of adaptations you can make for various computers, we hereby present three variations on the "Message Center" program, written for the Apple, the Atari and the IBM PC.

## APPLE

```
1 REM ***** MESSAGE
  CENTER--APPLE VERSION
10 HOME
15 M = 0
20 PRINT "*** MESSAGE CENTER ***"
30 PRINT : PRINT "SELECT:"
40 PRINT : PRINT "1. GET MESSAGES"
50 PRINT : PRINT "2. LEAVE MESSAGE"
55 PRINT : PRINT "3. EXIT PROGRAM"
60 PRINT : INPUT "YOUR CHOICE?";A$
70 IF A$ < > "1" AND A$ < > "2" AND
   A$ < > "3" THEN 60
80 HOME
90 ON VAL (A$) GOTO 200,500,900
100 GOTO 10
110 F$ = A$ + ".MSG": RETURN
120 POKE - 16368,0: VTAB 24: HTAB
    1: PRINT "PRESS SPACE BAR TO
    CONTINUE";
125 X = PEEK (- 16384): IF X < > 128
    + 32 THEN 125
130 HOME : PRINT : RETURN
200 PRINT "*** GET MESSAGE ***"
210 PRINT : PRINT "ENTER YOUR
    NAME";
220 INPUT A$
230 GOSUB 110
240 ONERR TOTO 400
250 PRINT CHR$ (4)"VERIFY"F$
255 ONERR GOTO 310
260 PRINT CHR$ (4)"OPEN"F$
270 PRINT CHR$ (4)"READ"F$
280 INPUT A$
290 PRINT A$
295 IF A$ = "*** END MSG" THEN M =
    M + 1: GOSUB 120
300 GOTO 270
310 PRINT CHR$ (4)"CLOSE"F$
320 PRINT M;" MESSAGES"
330 GOSUB 120
340 GOTO 10
```

# 6 QUICK TRICKS

```
400 PRINT "SORRY NO MESSAGES"
410 GOSUB 120
420 GOTO 10
500 PRINT "*** SEND MESSAGE ***"
510 PRINT : PRINT "WHO GETS THIS
    MESSAGE";
520 INPUT A$
530 GOSUB 110
540 ONERR GOTO 700
550 PRINT CHR$ (4)"VERIFY"F$$
560 ONERR GOTO 610
562 PRINT : PRINT "WHO ARE
    YOU";:INPUT A$
564 PRINT CHR$ 94)"APPEND"F$
565 PRINT CHR$ (4)"WRITE"F$
566 PRINT "***FROM";A$
570 PRINT CHR$ (4)"APPEND"F$
575 INPUT"";A$
580 IF A$ = "END MSG" THEN 610
585 PRINT CHR$ (4)"WRITE"F$
590 PRINT A$
600 GOTO 570
610 PRINT CHR$ (4)"APPEND"F$
620 PRINT CHR$ (4)"WRITE"F$
630 PRINT "*** END MSG"
640 PRINT CHR$ (4)"CLOSE"F$
650 GOTO 100
700 PRINT : PRINT CHR$ (4)"OPEN"F$
710 PRINT CHR$ (4)"WRITE"F$
720 PRINT A$"'S MESSAGES"
730 PRINT CHR$ (4)"CLOSE"F$
740 GOTO 560
900 END
```

### ATARI

```
1 REM ****MESSAGE CENTER-ATARI
  VERSION
5 DIM A$*40),F$(15)
6 FOR I=1 TO 12:F$(I)=" ":NEXT I
10 PRINT CHR$(125)
15 M=0
20 PRINT "*** MESSAGE CENTER ***"
30 PRINT :PRINT "Select:"
40 PRINT :PRINT "1. GET MESSAGE"
50 PRINT :PRINT "2. LEAVE MESSAGE"
55 PRINT 'PRINT "3. QUIT"
60 PRINT :PRINT "Your choice ":INPUT
   A$
70 IF A$<>"1" AND A$<>"2" AND
   A$<>"3" THEN 60
80 PRINT CHR$ (125)
90 ON VAL (A$) GOTO 200,500,900
110 IF LEN(A$)>8 THEN A$=A$(1,8)
115 F$(1,2)="D:"
116 F$(3,2+LEN(A$))=A$(1,LEN(A$))
117 F$(LEN(A$)+3,
    LEN(A$)+7)=".MSG"
118 RETURN
120 POSITION 1,23:? "Press the
    SPACE BAR to continue";
122 OPEN #4,4,0,"K:"
124 GET #4,X:IF X<>32 THEN 124
126 CLOSE #4
128 PRINT CHR$(125):RETURN
200 PRINT "*** GET MESSAGE ***"
210 PRINT:PRINT "Enter
    your name ";:INPUT A$
220 GOSUB 110
240 TRAP 400
250 OPEN #5,4,0,F$
255 TRAP 310
260 INPUT #5;A$
270 PRINT A$
280 IF A$="*** END MSG" THEN
    M=M+1:GOSUB 120
300 GOTO 260
310 CLOSE #5
320 PRINT M;" Messages"
330 GOSUB 120
340 GOTO 10
400 CLOSE #5
405 PRINT "Sorry, no messages"
```

```
410 GOSUB 120
420 GOTO 10
500 PRINT "*** SEND MESSAGE ***"
510 PRINT :PRINT "Who gets this
    message";
520 INPUT A$
530 GOSUB 110
540 TRAP 700
550 OPEN #5,4,0,F$
555 CLOSE #5
560 TRAP 610
562 PRINT :PRINT "Who are you
    ";:INPUT A$
564 OPEN #5,9,0,F$
566 PRINT #5;"*** FROM ";A$
570 INPUT A$
580 IF A$= "END MSG" THEN 610
590 PRINT #5;A$
600 GOTO 570
610 PRINT #5;"*** END MSG"
640 CLOSE #5
650 GOTO 10
700 CLOSE #5
705 OPEN #5,8,0,F$
710 PRINT #5;F$(3,10);"'s Messages"
730 CLOSE #5
740 GOTO 560
900 END
```

### IBM PC

```
1 REM ***** MESSAGE CENTER-IBM PC
  VERSION
10 CLS:KEY OFF
15 M=0
20 PRINT "*** MESSAGE CENTER ***"
30 PRINT:PRINT"Select:"
40 PRINT:PRINT"1. Get Messages"
50 PRINT:PRINT"2. Leave Messages"
55 PRINT:PRINT"3. Quit"
60 PRINT:INPUT "Your choice";A$
70 IF A$<>"1" AND A$<>"2" AND
   A$<>"3" THEN 60
80 CLS
90 ON VAL(A$) GOTO 200,500,900
100 GOTO 10
110 F$=LEFT$(A$,8)+".MSG":
    RETURN
120 LOCATE 25,1:PRINT"PRESS the
    SPACE BAR to continue";
122 X$=INKEY$:IF X$=" " THEN 122
125 IF X$<>CHR$932) THEN 122
130 CLS:RETURN
200 PRINT "*** GET MESSAGE ***"
210 PRINT:PRINT"Enter your name";
220 INPUT A$
230 GOSUB 110
240 ON ERROR GOTO 400
250 OPEN F$ FOR INPUT AS #1
260 ON ERROR GOTO 310
280 INPUT #1,A$
290 PRINT A$
295 IF A$= "*** END MSG" THEN
    M=M+1:GOSUB 120
300 GOTO 280
310 CLOSE #1
320 PRINT M;" Messages"
330 GOSUB 120
340 RESUME 10
400 PRINT "Sorry, no messages"
410 GOSUB 120
420 RESUME 10
500 PRINT"*** SEND MESSAGE ***"
510 PRINT:PRINT"Who gets this
    message";
520 INPUT A$
530 GOSUB 110
540 ON ERROR GOTO 700
550 OPEN F$ FOR APPEND AS #1
560 ON ERROR GOTO 610
562 PRINT:PRINT "Who are
    you";:INPUT A$
566 PRINT #1, "*** from ";A$
570 INPUT A$
580 IF A$="end msg" THEN 610
590 PRINT #1,A$
600 GOTO 570
610 PRINT #1, "*** END MSG"
620 CLOSE #1
630 RESUME 10
700 CLOSE #1
710 OPEN F$ FOR OUTPUT AS #1
720 PRINT #1,A$"'s messages"
730 CLOSE #1
740 RESUME
900 END
```

■

# THE SOUND & THE FURY

BY DAVID LEWIS

Sound is often as important as graphics in creating the fun and excitement of a computer game. If you happen to own a TRS-80 Model I, III or 4, you've probably missed all that sound. These machines just don't have speakers. But there is a way to enable them to produce sound as a part of the programs you create. Read on, and we'll tell you how.

To begin with, you'll need a cassette player and a cassette jack. Since many of you already use cassette tape for storage, this should present no problem. Just make sure you remove any tape still in the player. Next, take the large gray plug on the player end of the jack and plug it into the player port labeled AUX (or DC IN). Put the player on PLAY, and you're on your way.

Now try this short program:

```
10 OUT 255,1
20 OUT 255,2
30 GOTO 10
```

Run it, and presto! Your computer has finally found its voice.

To control the length of this tone, you can add the following:

```
5 INPUT "DURATION:";D
25 FOR G = 1 TO D: NEXT
```

The sound you get is still pretty low; that's about the best you can do in BASIC. But switch to machine language, and it's watch out Atari and Apple!

Before we go on, a quick explanation may be in order. The TRS-80, you see, does not actually speak BASIC. When you type in something in BASIC, it is automatically converted into a series of numbers that are then fed into the machine's Z80 microchip. These numbers are the machine's language, or machine language for short.

Unfortunately, the conversion from BASIC to machine language is not especially efficient; it takes time. But we can get faster action by writing our programs in machine language right from the start.

For example, the following routine takes the numbers in a machine language subroutine and stores them in a string until you're ready to unleash them. M$ (instead of A$) may look funny to you at first, but have faith. Once the routine is loaded into the string, you must input two values — one for the frequency and one for the duration. The tone is then produced. Give it a try.

```
10 CLS: GO SUB 15000
20 INPUT "TYPE A FREQ AND A DURA";
   F, D: IFF<0ORD<0ORF>699
   EL .>127 THE N20
30 J=USR (F+256*D) :GOTO 20
15000 M$=STRING$ (21, " "):
      V=VARPTR (M$)
15010 LS=PEEK (V+1): MS=PEEK
      (V+2)
15020 L=LS+256*MS:IFL>32767
      THEENL=L-65536
15030 DATA205,127,10,69,62,1,211,
      255,16,254,69,62,2,211,255,16,
      254,37,32,239,201
15040 FORJ=LTOL+20:READX:POKEJ,
      X:NEXT
15050 IFPEEK (16396)=201
      THENPOKE
      16526, LS:POKE16527,
      MSELSEDEF USR=L
15060 RETURN
```

Now let's take a closer look at what's happening. Line 15000 sets M$ to be a dummy string with a length of 21. The statement V=VARPTR (M$) sets V to point to the first byte of an index for M$. The first byte tells how long M$ is. The second and third tell the true address of M$. These bytes are stored in the variables LS and MS.

The address of the string is then calculated in line 15020. If your machine has more than 32K, the adjustment is made in the value of L. Now it points to the first byte (read "character" for "byte") in M$. Line 15040 makes the changes. It reads a byte in from the data and then replaces it in the string.

Finally, the address for the user call is set. The computer needs to know exactly where the machine language subroutine is. If the value at 16396 equals 201, then your machine does not use disks, and so the USR is set one way; on a disk machine, it is set another way. The pointer is now towards the first byte of M$, our routine.

If all this sounds a bit complicated, no need to worry. You can use this routine without understanding exactly how it works. Just type in J=USR (X) where X is the frequency, plus 256 times the duration. This can add a lot of power to your programs. Experiment with this routine and you'll further find that 0,0 is the deepest sound and 1,1 the highest. The reason for this is that 0,0 here is really equivalent to 128,256.

Now that you've got all that down pat, here's another demonstration of the sound and the fury you can generate on the TRS-80.

Did you ever hear of an audible keyboard? Well, delete lines 20 and 30 from the program above and add these lines:

```
5   CLEAR 300: DIMA (26):FORG=
    1TO26: READA(G): NEXT
20  A$=INKEY$: IFA$=" " THEN 20
25  IFA$=CHR$ (13) THEN 50
30  GO SUB 75: C$=C$+A$: GOTO 20
50  FORG=1 TOLEN (C$): A$=MID$
    (C$, G,1): GOSUB 75: FORF=1 TO
    20: NEXT: NEXT: C$=" ":GOTO 20
75  A=bb ,' r 68 -64: IFA<10RA>26
    THEN RETURN ELSEJ=USR (A (A)):
    RETURN
100 DATA 1942,21810,11058,9622,
    7624,13462,17302,21142,14792
110 DATA 24982,26112,32512,32562,
    27186,29128,32712,456,11208
120 DATA 5782,14792,21960,16434,
    4040,5682,18376,306
```

The first thing to notice is the INKEY$ command. It will react only when you press a key. The keys you press are also stored in C$, so when you later press ENTER, you can hear your sounds played back. It can even be a melody, if you wish, because the values of the keys have been arranged somewhat harmonically. They are in the data lines 100 to 120.

The top line of alphabetic keys has the highest frequency and the bottom line has the lowest. The duration of the note increases as you move from left to right. The values are stored in the array A (1 to 26).

In a way, you've now turned your TRS-80 into a piano. Is that power? Is that magic? Wait until our next issue and maybe we'll show you how to turn it into a refrigerator.

# Secrets of the Computer Artist

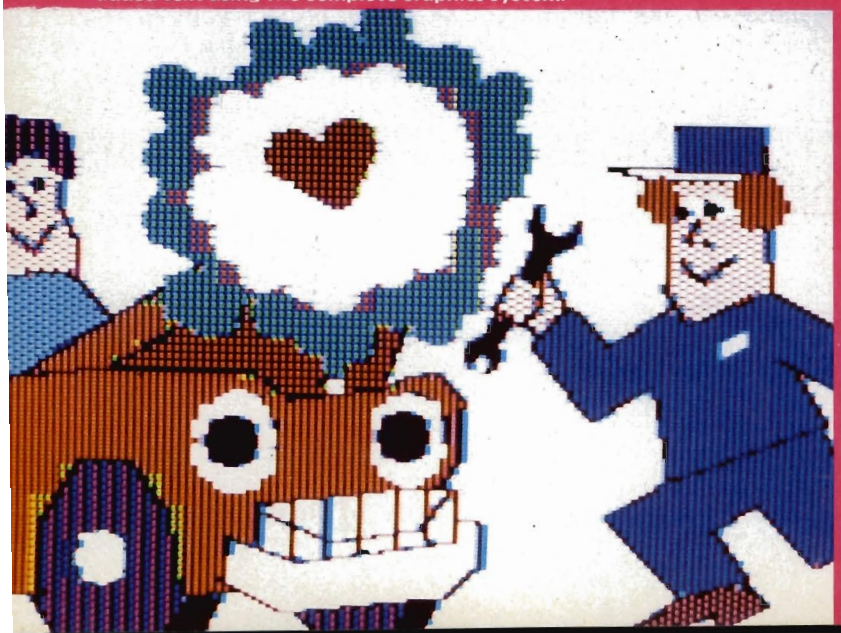
BY AME FLYNN

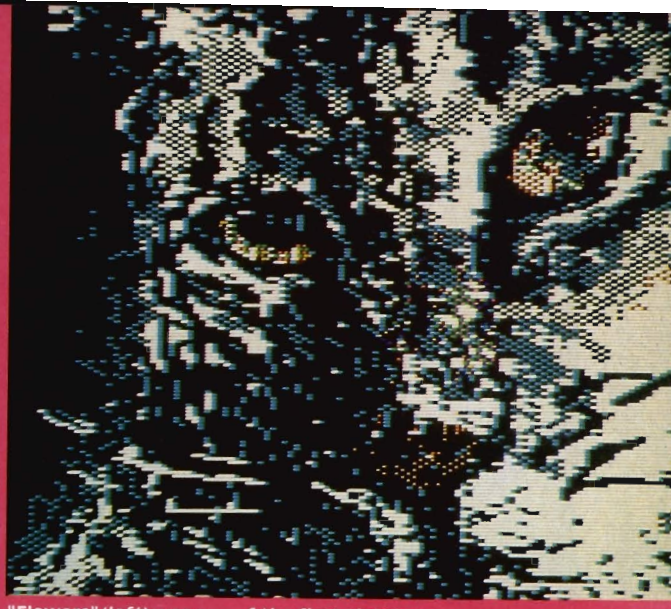
The first computer graphics you ever saw were probably those used in a video game such as Pong. Computers have come a long way since then, and so have computer artists, as you can see from the computer art shown here.

The "canvas" for each of these "paintings" was an Apple II Plus. In each case, the artist first "sketched" his or her creation by means of a graphics tablet, and then modified and/or colored it through the use of graphics software.

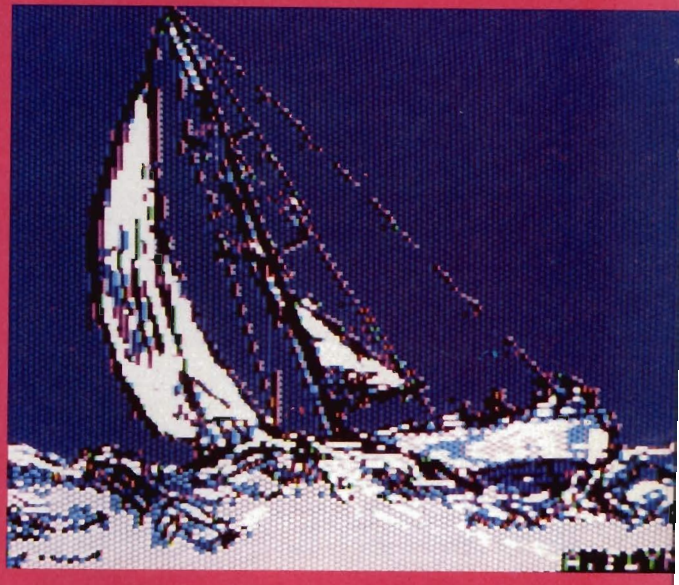
The resolution on most computers is still somewhat limited, and it's impossible as yet to blend colors and shapes for maximum effect. Indeed, the artists who produced these pictures were trained first as painters and only later transferred their talents to the computer. But the day may come when virtually all artists will come to depend, in one way or another, on the computer.


The picture below was created by New York artist Steve Sullivan using a program called The Graphics Magician. Maria Manhattan created the picture at right using the same program, then added text using The Complete Graphics System.

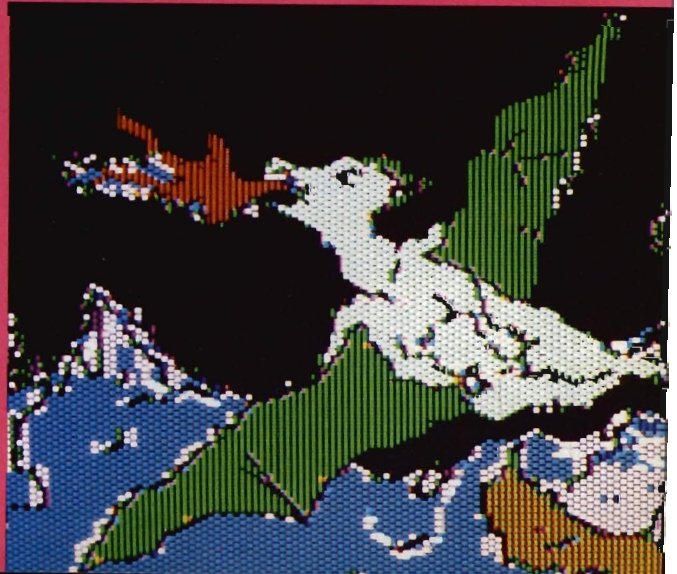


"Flowers" (left) was one of the first pictures created by author Ame Flynn using an Apple Graphics Tablet. Lorene Lavora's portrait of one of her cats (above) was created using the same program.

Ame Flynn's "Sailboat" (above) was created through the use of an Apple Graphics Tablet in combination with Micro-Painter. Her "Dragons" (below) was drawn with an Apple Graphics Tablet and then colored in using Datasoft's Micro-Painter.



Photography by George A. Robinson

Summertime, and the livin' is easy—even at a computer camp, where there's always time for a dip in the lake.

At a computer camp in upstate New York, first a stint at the computer and then it's time for a little baseball—an ideal midsummer mix.

# HOW TO CHOOSE A COMPUTER CAMP

BY MIKE BENTON

**Like computers themselves, computer camps are sprouting up at an incredible rate across the nation. As recently as three years ago, there were only two fully accredited computer camps in the whole country; now there are hundreds, and soon perhaps there'll be thousands.**

**Some are excellent, some not so excellent. The following article is thus an attempt to guide you through the computer camp maze, and so to help you choose the computer camp that's just right for a fun-filled summer.**

The first question you have to ask yourself about computer camps is really the biggest question of all: "Do I really want to go?"

If the answer is, "Well, er . . . ah . . . not really," you'd be better off telling your parents that as quickly as possible, and forgetting the whole thing. If your answer, though, is "maybe" or an emphatic "yes," then read on; if nothing else, we can help you sort out the possibilities.

A good place to begin winnowing down your choices is in the camp listings at the end of this article. These are only a few, though, of the many good computer camps now in

# COMPUTER CAMP

operation. To find more, look at the camp listings in your local or areawide newspaper, check out as many computing periodicals as you can, and ask around among your friends to see if maybe they have any good ideas.

The point is there are plenty of well-run computer camps out there. Your job then is simply to select the one that best seems to suit your interests, computing and otherwise.

O.K., so let's say you've narrowed the field down to maybe half a dozen possibilities. The next step is to write away to each of them in order to find out, as nearly as possible, exactly what they offer and what they don't.

There are at least five specific areas of interest that you ought to ask about. They include:

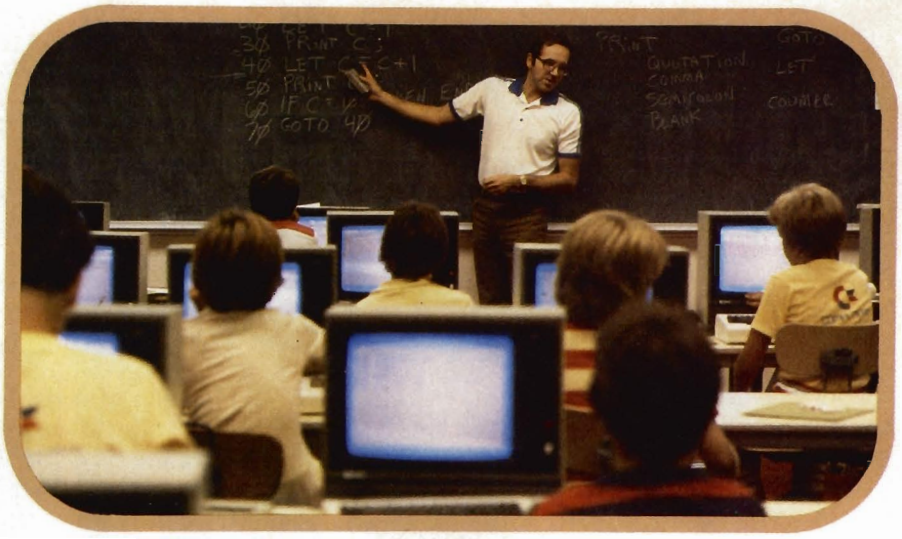
**1. Range of interest.** Most computing camps can accommodate beginning computer users, but not all camps can accommodate the experienced or advanced computer student. If you already have some computer skills, be careful that you don't choose a camp geared to beginners only.

**2. Computer time.** For an in-depth and significant computer experience, most camp directors agree, you'll need at least three to four hours of daily computer instruction. Of course, if you're only interested in getting acquainted with the computer and not mastering it, then a camp that provides one to two hours of computer activities

per day could be just fine.

**3. Quality of instruction.** Courses at computer camps may be taught by a very wide range of instructors. At one camp we visited, the computing staff consisted of a highly qualified college professor and a 17-year-old assistant. But when the kids there had a question, they always went to the teenager because he had a better understanding of their problems.

**4. Computer facilities.** Make sure that the camp you're considering has sufficient computing equipment to accommodate all the students it expects to enroll. In the rush to cash in on the computer revolu-



At left and above: Typical classroom settings at typical computer camps. "A good rule of thumb," the experts say, "is to make sure there will never be more than two students per computer."


At a computer camp—as at any other camp—life can be fun, life can be beautiful, as shown in the photos above and below.

# COMPUTER CAMP

tion, some camps are accepting more students than they can possibly handle. A good rule of thumb is to make sure there will never be more than two students per computer. You should also check to see whether the camp has any "extras" such as color monitors, robotics equipment or music and voice synthesizers. These can be important if you want to learn more than just how to program.

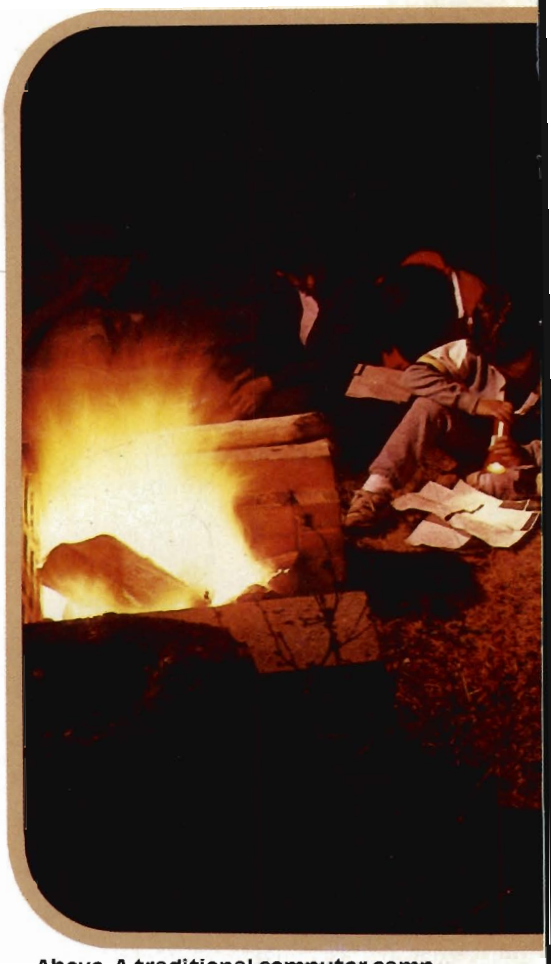
**5. Accreditation and past history.** Some computer camps listed here and elsewhere are accredited by the American Camping Association; some are licensed by the states in which they're located. But some of the newer computer camps still have no accreditation whatever. The field is so new that so far there is still no agency that governs, oversees or regulates all the summer computer camps now in existence. That means you may have to check for yourself to find out how long a camp has been in operation and a little about the background of the people who run it. Many reputable camps will be happy to provide you with names and addresses of previous campers. Check them out; it could save you a lot of grief later on.

In addition to the five points listed above, another key factor to consider, if you haven't already, is how much all this is going to cost.

Most camps will tell you right out, of course, how much they charge. Surprisingly, though, these costs can vary enormously—from as little as $30 a week for a day camp offering two to three hours of daily instruction, up to $550 for a week-long computer course in the most luxurious of accommodations.

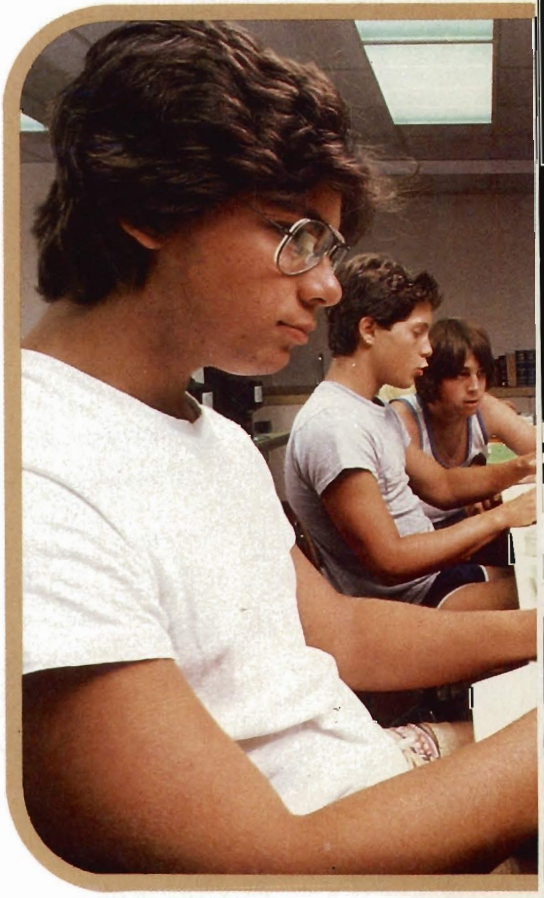
If the camp you'd most like to attend costs too much, you may have to settle for something a little less grand—and then again, maybe not. In many cases, you can apply for and often get financial aid from the camp itself.

In any event, money alone should



Above: A traditional computer camp bonfire. Some things never change.

Below: A field trip to a computerized research lab where every precaution must be taken to guard against contamination, even by tiny dust particles.



not prevent you from enjoying a full computing/camping experience. In the last two years, many camps operated by non-profit organizations have begun to offer computer courses and other computer-related training at minimal cost. If you look hard, you can still find one-week residential camps that offer programs in computer instruction for less than $200, total.

If that's still too much, many of these same camps have scholarship programs or work-study programs that can help reduce your cost by one-half or more if you qualify.

Your choice then ranges from a full-time computer camp with a lot of recreational opportunities at the high end to a no-frills, cut-rate camp that meets a few hours a day at the low end. Somewhere in there, you ought to be able to find a suitable camp that you can easily afford.

A word of caution, though: Check in advance for hidden expenses. For example, some camps charge extra for activities such as horseback riding or for instructional material used in computer training. Costs such as these can mount up very quickly and come as a real shocker to parents if they're a complete surprise.

What should you expect to learn at a computer camp?

It depends a lot, naturally, on how much effort you're willing to put forth. For starters, though, most camps offer training in programming, word processing, game design, financial planning, and software and hardware selection.

You may already know exactly what computer skills you want to learn at a camp or workshop, especially if you have some computer experience. But if you're a beginner and don't know what skills you should acquire, don't worry. All camps that accept beginners will teach you basic skills as you need them.

Although the computer skills you learn at these camps and workshops will be valuable, the real benefit will come from just learning how to use a computer and becoming familiar with what it can do. Once you learn the computer basics you can quickly develop any other skills you may need.

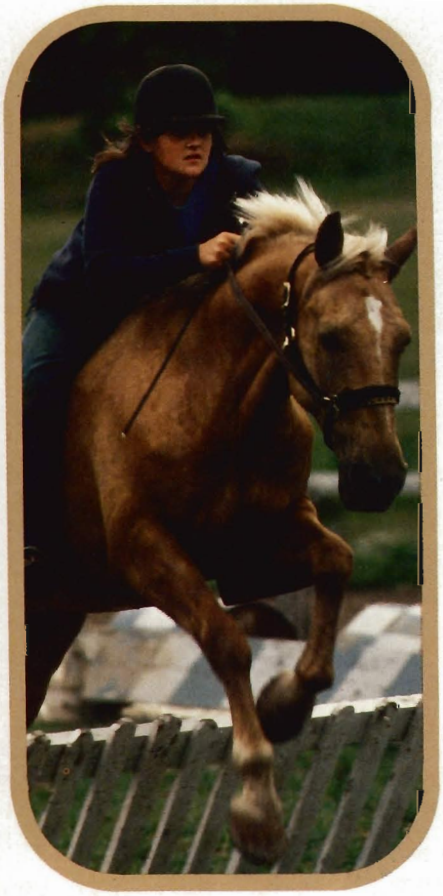
Most camps are flexible and will try to fit a learning program to your needs and desires instead of forcing you into one class or the other. Since much computer learning is self paced anyway, you can often use the computer as your teacher and learn at your own rate.

One specific skill that most people want to learn is how to program a computer in one of the many computer languages floating around. The most popular of these languages is BASIC, which is taught at almost every camp and is easy enough to serve as a good first programming language.

If you're an advanced computer user or perhaps college bound, you may want to learn a more sophisticated programming language such as Pascal. This is fast becoming the standard programming language in the nation's colleges and indeed is the language most commonly used in advanced placement tests for incoming freshmen.

Whatever camp you choose, whatever you study, the computer you're given to use will probably be either an Apple, an Atari, a TRS-80, a Commodore (VIC 20 or 64), an IBM PC, a Texas Instruments 99/4A or a combination thereof. The reason for this is that camps generally try to use the various kinds of computers

**Below: Computing's fun, but so are games—especially those you've created yourself. Below, right: Clearing a hurdle of another sort.**



# COMPUTER CAMP

Time for a letter from camp: "Having a wonderful time, wish you were here."

you're most likely to have used previously in your home, your school or over at a neighbor's house.

How important is the type of computer you use at camp? It depends. Once you learn to use one personal computer, you can very easily learn to use another one. It's a lot like learning to drive a car in that respect.

You may also discover that in the long run it's a decided advantage to have had some experience on a variety of different computers. This is especially true if you don't yet own a computer and are still shopping around trying to decide what to buy.

For what it's worth, though, studies have shown that the computer you learn on is the one you will probably end up buying. Familiarity in this respect apparently breeds not contempt but devotion.

Have we skipped anything? Yes, lots. There's simply not enough room here to cover the subject fully. But there's one thing we should

## COMPUTER CAMP LISTINGS

**Computer camps have mushroomed to the point where now, no matter where you live, there's a computer camp nearby. We can't list them all, of course; it would take too much space. The following, though, are listings of some of the best known and most respected computer camp chains in the U.S.**

### Atari Computer Camps

These are probably the most-publicized computer camps in the nation, and will be offered this year at 10 different locations from coast to coast.

Camp sessions run two weeks, four weeks or seven weeks—take your pick—from late June through late August. You can also combine sessions or add additional weeks if you wish to extend your stay.

A two-week session at an Atari Computer Camp costs $990; a four-week session, $1750; and a seven-week session, $2490. Extra weeks, if any, are priced at $450 each.

At an Atari Computer Camp, you'll spend at least two and a half hours a day in a computer lab. If you want it, you can also get an extra hour and a half of free computer time.

Beginners are taught how to use existing software as well as how to program in LOGO. Intermediate students are taught to create their own graphics programs in BASIC or LOGO. For advanced students, there are special independent projects as well as instruction in how to program in Pascal, PILOT, FORTH, Lisp and/or Atari's own 6502 assembly language.

Atari Computer Camps are now located in Danville and Los Olivos, Calif.; Glencoe, Md.; and Greenfield, Mass. New camps will be added this year at sites to be chosen in Colorado, Florida, Illinois, Pennsylvania, Texas and Washington.

For more information, contact: Atari Computer Camps, 40 East 34th Street, New York, N.Y. 10016, (800) 847-4180.

### CompuCamp Computer Camps

CompuCamp operates five different camps, most of them located in the Western U.S. You can attend a CompuCamp Computer Camp from June through August for one or two weeks, or add on extra weeks if you care to stay longer.

A one-week session costs about $425; a two-week session, about $850. Extra weeks are priced at $390 each.

At CompuCamp, you can spend up to 10 hours a day at the computer console if you're so inclined (although it's not recommended). For beginners, there's an introduction to computers plus courses in programming in BASIC and Pascal. More advanced classes at CompuCamp cover subjects such as computer music, graphics, word processing, voice synthesis, networking and turtle robotics.

The various CompuCamps generally provide access to three or four different types of computers, and some locations even offer a special robotics lab.

CompuCamp Computer Camps are located in Beaver Falls, Pa.; Denton, Tex,; Duluth, Minn.; Greeley, Colo.; Kenosha, Wis.; Newberg, Oreg.; Orange and Rohnert Park, Calif.; and St. Paul, Minn.

For more information, contact: CompuCamp Computer Camps, 5810 West 78th Street, Minneapolis, Minn. 55435, (612) 835-0064.

### Computer Camps International

Computer Camps International has five locations across the nation. A normal session at Computer Camps International lasts two weeks and costs about $835. If you want, though, you can attend additional sessions up to a period of eight full weeks.

The activities at Computer Camps International change from day to day, but generally include computer programming instruction, special workshop projects and computer games, as well as an occasional guest speaker.

Here you'll be taught at least two of the more popular programming languages (available choices include BASIC, LOGO, APL, PILOT, Pascal and assembly). Students are also encouraged to try their hands in areas such as synthesized music, graphics, voice synthesis and computer electronics.

Computer Camps International are located in East Haddam, Conn.; Oxford, Ga.; Denton and San Antonio, Tex.; and Whitewater, Wis.

For more information, contact: Computer Camps International, 281 Hartford Turnpike, Suite 506, Vernon, Conn. 06066, (203) 871-9227.

### Computer Summers

Computer Summers operates five computer camps in as many states. Computer Summers camps meet during the day only, from 9 a.m. to 4 p.m., Monday through Friday.

Each camp session lasts two weeks and costs about $300. If you wish, though, you can attend up to three additional sessions for a total of eight weeks.

At Computer Summers camps, you receive at least two hours of com-

**Girls and boys together, sharing the joys of computing along with all that other stuff that goes into a great camping experience.**

stress before we close, and that's the fact that there should be more to a camping experience—any camping experience—than just computers.

Like what? Like fun, recreation, games, playing and entertainment. In choosing a computer camp, that should be at least as important as its computer training. ■

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*Mike Benton is the author of* The Complete Guide to Computer Camps and Workshops, *published by Bobbs-Merrill Publishing Co.*

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puter instruction each day plus whatever you may want in the way of additional free time in the computer lab.

The emphasis at Computer Summers is on teaching you how to program in BASIC and LOGO, but advanced students are encouraged to work on special projects, and classes are offered in areas such as word processing, computer game design and graphics.

Computer Summers camps are located in Bel Air, Calif.; Houston, Tex.; Madison, N.J.; Purchase, N.Y.; and Tampa, Fla.

For more information, contact: Computer Summers, P.O. Box 436, South Salem, N.Y. 10590, (813) 961-3201.

**Computer Tutors**

Computer Tutors operates four computer camps, each of them open to campers for one or more two-week sessions running from June through August.

You can go to a Computer Tutors camp during the day only, if you live nearby, or you can stay both day and night. For campers who stay overnight, each two-week session costs about $855. If you go to camp only during the day, the cost is $550 for each two-week period.

At Computer Tutors, you receive up to 30 hours of computer instruction per week. That's five or six hours a day in a computer lab or classroom, if you want it and feel you can take it.

Campers are taught programming skills in BASIC, LOGO and Pascal. Additional instruction in computer art and animation, word processing and computer music is also available.

Computer Tutors camps are located in Hanover, N.H.; Palo Alto and Portola Valley, Calif.; and Williamstown, Mass.

For more information, contact: Computer Tutors, 980 Magnolia, Larkspur, CA 94939, (415) 461-7533.

**National Computer Camps**

One of the pioneers in computer camping in this country, National Computer Camps now operates five facilities nationwide.

Normal sessions at these camps each last one week, but you can combine or repeat sessions for up to five weeks. The cost is about $390 for each week.

At a National Computer Camp, you can use the computer as much as you want for as long as you want. This can include up to five hours of computer instruction each day, plus free time in the computer lab at any time during regular camp hours.

Instruction is offered in beginning, intermediate and advanced BASIC. Pascal for Beginners is also taught. Activities in addition to classroom instruction include regularly scheduled guest speakers and computer game tournaments.

National Computer Camps are located in Atlanta, Ga.; Cleveland, Ohio; McMinnville, Oreg.; Simsbury, Conn.; and St. Louis, Mo.

For more information, contact: National Computer Camps, P.O. Box 585, Orange, Conn. 06447, (203) 795-9667.

**Original Computer Camps**

Originally established on the West Coast, Original Computer Camps now operates camps in seven different locations, including Hawaii and Great Britain.

You can attend an Original Computer Camp for two or four weeks from June through August. A two-week session usually costs about $895; a four-week session, about $1790 (although costs may be and usually are somewhat higher at those camps outside the continental U.S.).

At an Original Computer Camp, you can spend four to six hours a day at the computer, if you wish. You can learn to program in LOGO, BASIC, FORTH, Pascal or assembly language, or devote your time to courses in subjects such as graphics, computer electronics, artificial intelligence and robotics.

For advanced students, there's also a special course in Adventure/Arcade Game Writing.

Original Computer Camp facilities are located in Grants Grove and Santa Barbara, Calif.; Lake Tahoe, Nev.; Lake Winnipesaukee, N.H.; Steamboat Springs, Colo.; Waimea, Hawaii; and in England and Scotland (special tour).

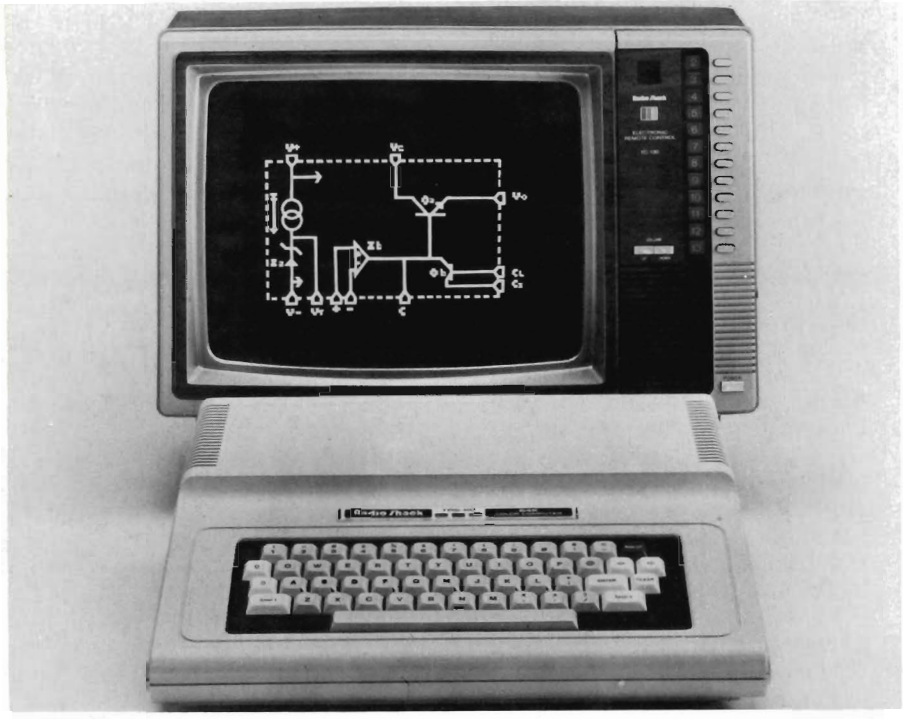
For more information, contact: The Original Computer Camp, 1235 Coast Village Rd., Santa Barbara, Calif. 93108, (809) 969-7871.

**A Final Note**

The camping costs cited above are, of course, subject to change at a moment's notice. Any camp listed, though, will be glad to supply you with up-to-date prices, along with complete details about all of its operations. All you have to do is ask, and please do!

It should further be noted that each of these computer camps—and virtually any camp worth attending—offers a wide variety of recreational programs in addition to its computer instruction. After all, man does not live by computer alone—yet.

# The Hardware Store



## POWERPAD: TOUCH-SENSITIVE INPUT DEVICE

Chalk Board Inc., a computer peripherals and software company, has announced the introduction of **PowerPad**, a new touch-sensitive input device.

The PowerPad is a foot-square tablet, housed in a 20-inch by 17-inch hard plastic case, that effectively replaces a computer's keyboard. Its multiple-point electronic contacts respond to direct hand contact with its surface. A series of mylar keyboard overlays, when used with accompanying cartridge or disk software, provide a range of applications that allow it to be used as an artist's canvas, a piano keyboard, a game board, a LOGO package or a programming kit for creating new software.

The PowerPad is compatible with most home computers from Apple, Atari, Commodore and IBM. The PowerPad alone is priced at $100 with associated software packages ranging in price from $25 to $50.

## RADIO SHACK'S LATEST

The **TRS-80 64K Extended Basic Color Computer** is the heart of a new disk-based color graphics system recently introduced by Tandy/Radio Shack. The Extended BASIC language of this machine can be used to access 32K RAM. Its full 64K RAM can be utilized by adding a new Color 2 Disk Kit and an OS-9 operating system priced at about $450 (that's over and above the computer's initial price of $400).

The computer utilizes easy-to-use, one-line commands to simplify the creation of detailed color graphics with 256 x 192 resolution (49,152 pixels). Other features of interest to the serious programmer include multi-character variable names, string arrays of up to 255 characters, full-featured editing, tracing, floating point 9-digit accuracy, trig functions, user-definable keys, error messages, and PEEK, POKE and USR commands.

A printer, a plotter, a digitizer, a graphics tablet, a telephone interface and up to four disk drives can all be added easily.

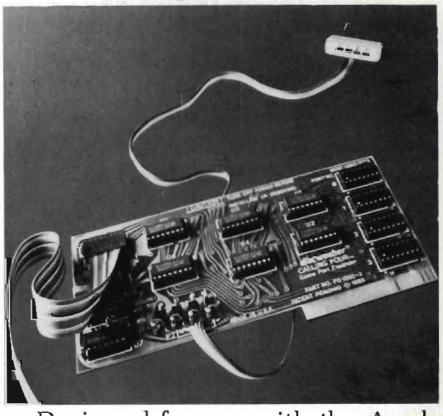
Another offering from Radio Shack is its new **TP-10 Thermal Printer,** specifically designed for use with the TRS-80 Micro Color Computer MC-10, but also compatible with the TRS-80 Color Computer.

The TP-10 prints 32 characters per line at 30 characters per second on 4⅛-inch-wide thermal paper. Its print set includes 95 ASCII and 16 block graphics characters, as well as an elongation mode for expanded print and a repeat function for easier graphics programming.

Price: $100.

## GAME PORT EXPANDER

What do a trackball, a joystick, a paddle and a mouse all have in common? They can all be plugged into Discwasher's latest computer accessory, the **CALLING FOUR Game Port Expander.**



Designed for use with the Apple II, II Plus or IIe, the CALLING FOUR eliminates the necessity of removing a computer's cover every time you want to switch controllers. The selection of each controller is accomplished through a simple keyboard entry or a software code.

The unit further features an LED display that indicates which of the four ports is in use, as well as a demonstration disk offering two programs that illustrate the CALLING FOUR's capabilities.

According to Discwasher, the product's value is fully realized when the user frequently utilizes a whole range of controllers.

Price: $70. ■


# RADIO SHACK OFFERS 3 NEW PROGRAMS

**Magic Carpet** is a new interactive fiction adventure written for TRS-80 Models III and 4.

Designed for young users, it attempts to duplicate the excitement of a magic carpet ride to some exotic country. From time to time, the user is asked to choose a course of action: "Enter the tower or the marketplace?" "Go into the alley or the street?" Each choice of action affects the outcome of the tale.

When the story ends, the cassette can be rewound and the story read again, choosing other alternatives.

Magic Carpet requires 16K of RAM, and is priced at $10.

**Color Disk Graphics,** designed for the TRS-80 Color Computer, costs $50, requires 16K of RAM and allows you to plot color charts and graphs.

Plotting formats include vertical or horizontal bar charts, pie charts and line charts. Graph lines can be keyed to a legend at the bottom of the screen, and all graphics from this program can be saved to disk.

Display can be achieved through a CRT, a standard TV receiver, or a printer with graphics capabilities. If any of your display equipment has only black and white capability, the program will still work—although not, of course, in color.

Besides requiring a 16K or 32K TRS-80 Color Computer, Color Disk Graphics requires a disk drive and a Radio Shack Disk Controller Pak. A ROM Version of the program can be loaded, however, with a cassette recorder.

**Micro Color Compac** is a machine-language program on cassette tape. It allows the TRS-80 Micro Color Computer Model MC-10 to communicate by telephone with information services such as CompuServe and The Source. It thus provides a user with a relatively inexpensive way to access news, weather, sports and electronic mail.

To use this program, you need an MC-10, a television (or CRT), a cassette recorder and a modem. The user can choose any one of a number of communications protocols, as long as it matches that of the information service he's hooking into. Protocol options include a baud rate that may be set at 110, 300, or 1200; half or full duplex; auto line feed on or off; and text display of uppercase and lowercase, or uppercase only.

Price: $30.

# LUCKY 7 FOR THE VIC-20

The **VIC PAK #1** is a series of seven simple programs in cassette format for the Commodore VIC-20. Written in BASIC, these programs include:

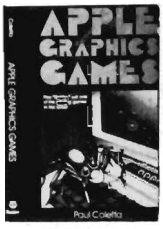
- *Elements,* a short quiz on the chemical symbols that stand for key chemical elements.
- *Mortgage,* a program that helps your parents (or you, if you're interested) find out how their payments on a mortgage loan are split between interest and principal.
- *Statistics,* a brief introduction to statistical analysis that enables you to use the VIC-20 as a sophisticated calculator.
- *Calendar,* a program that displays any calendar month from 1 A.D. to 9999 A.D.
- *Marblestat,* a program that illustrates the computer's ability to chart real-life events through a programming flowchart.
- *Expectancy,* a program that lets you calculate your life expectancy as an insurance company might do it.
- *U-Draw,* a drawing program for the VIC-20 that allows you to draw simple blocked graphics on a TV screen in eight different colors.

VIC PAK #1 is priced at $20. ■

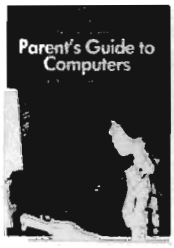
# Microkids™ Bookstore

*A computer is not too smart all by itself. Only you can educate it and you're going to need some books and software to do the job right. Order what you need from MICROKIDS' list of recommended titles and get your computer into training!*











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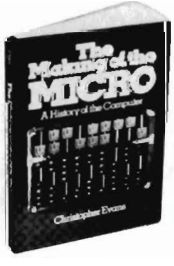


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Hardware requirements: Apple: Apple IIE or 48K Apple II Plus or 48K Apple II with Applesort in ROM or RAM, and a 16 sector controller. **Order #81153U**
Retail Price: $59.95, Microkids Price: **$53.95.**
Atari: Atari 400/800/1200XL version requires 48K (Basic cartridge for use of tutorial). Order **#83323U**
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**THE BEGINNER'S GUIDE TO COMPUTERS**
ROBIN BRADBEER, PETER DE BONO AND PETER LAURIE
Addison-Wesley Publishing Co.
Reading, Mass.
208 pp., $10.35

This is a great book to give to your friends. If I had a few dozen copies, I'd give one to Celia, who sneers at computers because "they are just machines;" one to Ted, who claims to be incapable of operating a hand calculator; one to Debbie, who "doesn't have time to learn about computers," and so on. Even my computer-savvy friends could learn a lot from this little book and enjoy reading it just as I did.

*The Beginner's Guide to Computers* was originally published by the British Broadcasting Corporation as an adjunct to an educational TV series called "The Computer Programme." Incidentally, that TV show can be seen on several PBS stations —check your local listings because it's well worth watching (and recording if you have a VCR).

The book was first called, not surprisingly, *The Computer Book*, a rather better title than the one adopted by the U.S. publishers. And that's what the book is — it's about computers. But, like so many BBC publications, the book has a strong human dimension, stressing that computers are essentially stupid and can do only as they are told by human beings. That's a point too many people forget.

In contrast to many of the computer books recently rushed to the marketplace, this book is well thought out, nicely illustrated, carefully designed and — to my amazement—well written, too. Although a few Britishisms still remain, the book has been edited for a U.S. audience — another nice touch. Good work, BBC and Addison-Wesley!

Although a chapter on "Understanding Programming" delves quite deeply into the logic of writing programs in BASIC, this is not a book that will teach you how to program a computer. Rather, it will give you plenty of ideas about what a computer can do and what you can do with a microcomputer. The book also raises some interesting questions about what we might want computers to do for us in the future.

For example, the book closes by asking whether someday, through universal use of the computer, we might create a society where work is no longer seen as a necessary part of life. Or will we create a divided society where some have work and some do not? Trust the Brits to close on a sobering note. However, it's not too soon for us to start thinking about such problems. So make a start by giving a copy of this book to a friend who isn't yet into computers. He soon will be.

*— Jeffrey Bairstow*

**THE FAST TRACK TO THE TOP JOBS IN COMPUTER CAREERS**
PETER MULLER
The Putnam Publishing Group
New York, N.Y.
122 pp., $4.95

You hear a lot these days about the computer world's insatiable appetite for qualified people, but have you tried to get an entry-level programming job recently? Companies want people with a couple of years' experience. But how to get it? That's the catch. You also hear a lot about guys who strike it rich in the computer business. And, of course, jobs there are. But top jobs? Hardly. The fact is they're just as scarce in computing as they are in other businesses.

Author Peter Muller here glosses rather quickly over the problems of starting a career in computing. However, the people he quotes in his book clearly understand the difficulties of getting a toehold. According to one college recruiter, the student that companies value most is the "water walker"–the outstanding individual who will make an exceptional contribution to his employer. But what do you do if you're not capable of walking on water?

Well, as *The Fast Track to the Top Jobs in Computer Careers* notes, the Bureau of Labor Statistics of the Department of Labor predicts that computer-related jobs will increase from 1,445,000 in 1980 to 2,140,000 in 1990, an increase of 48 percent. Some people further say that those in computer-related jobs will be the largest employed group by the turn of the century. What the statistics don't say, though, is that many of these jobs will be routine and not particularly well paid. More computer operators and data entry personnel are needed than high-flying programmers and systems analysts.

Fast tracks there may be in the computer business, says Muller, but to get on one you'd better have very useful characteristics—better than average creativity and a real capacity for long hours and hard work. Muller cites as evidence the testimony of Alan Sung, a programmer with Digital Equipment Corp., who says, "There's a lot of pressure so we've all been working some pretty weird hours . . ."

That kind of pressure often produces yet another hacker who lives only to peck at his computer terminal. Muller notes, however, that the

best jobs in the future will go to those who are knowledgeable not only in computer science but in another field as well. Dr. Domenico Ferrari of the University of California at Berkeley tells his students: "Don't spend all your time on computer terminals in basements. Get out and learn about other subjects. The computer profession needs people who are open to the rest of the world."

*—Jeffrey Bairstow*

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**BASIC FUN: COMPUTER GAMES, PUZZLES, AND PROGRAMS CHILDREN CAN WRITE**
SUSAN DRAKE LIPSCOMB AND MARGARET ANN ZUANICH
Avon Books, New York
176 pp., paperback, $2.25

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There comes a time in the life of every computer owner when temptation can no longer be resisted: The desire to create your own programs becomes so strong that it demands action. But we soon discover that computers don't understand ordinary English. To get them to follow a new set of instructions—a program—that we want to write, we have to issue those instructions in a "computer language."

That sounds like work, so we promise ourselves that we'll get around to it eventually, hoping that in the meantime something will come along to make things a little easier. That "something" has.

Most personal home and school computers use a language called BASIC. Except for a few special, and admittedly strange, words and phrases, BASIC is very much like ordinary English. With that comforting news, and a copy of *BASIC Fun*, you can learn to write your own programs in a way that is not only painless and easy but is also fun, as this book suggests.

This is not a lesson or instruction book. After a short introduction, the authors have you enter a program they have written. All you have to do is copy the program out of the book, and Eureka! It appears on your screen. I must admit that the first program is not particularly exciting; it's a rather silly little poem. But that's unimportant. What is important is that you know now how to write a program for a poem—any poem—that you want to save and bring up on your screen later.

Of course, it's reasonable to expect that you'll want to do that with somewhat more important things than little verses. In easy stages, *BASIC Fun* takes you through increasingly more complicated programs, so that by the time you reach the end of the book, you're inventing your own games, working out math problems, allowing the computer to make decisions (such as which of three available jobs to choose), and even creating some simple graphics, including a rocket ship that blasts off.

"Program Notes" follow many of the listings with information that you'll need to write your own versions of that particular program. "Computer Notes" show you how to adjust for the slight variations in BASIC that occur from computer to computer. There's also an appendix that does essentially the same thing. (Because of those variations, not every program will run on every computer, but the number of those that won't is minimal, and you won't miss much.)

If *BASIC Fun* were a movie, I'd rate it G; parental guidance is defintely not needed. This is a book you can pick up whenever you feel like it, spend 10 minutes or an hour with it, as you choose, and know that when you put it down, you'll be that much more of a programmer.

*—Marvin Grosswirth*

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**APPLE II DISKGUIDE**
ZELDA GIFFORD
Osborne/McGraw-Hill
Berkeley, Calif.
36 pp., $7.95

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This little book is one of a series of floppy disk-sized guides to both hardware and software. In a spiral bound format that opens easily to sit alongside your computer, this book contains all the commands and functions you need to know and are likely to forget. It's ideal for someone, like me, who hates to read manuals. With one of these *DiskGuides*, you can sit down and get started without plowing your way through a boring manual.

My only criticism is that these guides are a mite expensive, ranging in price from $6.95 to $8.95 each. That's a lot of bread for a skinny book. Something like $3.95 would sell a lot more *DiskGuides*, I suspect.

The other titles in this miniseries are *IBM PC DiskGuide, Atari 400/800 DiskGuide, CP/M DiskGuide* and *VisiCalc DiskGuide*. Others are planned, so be patient if the one you'd like isn't here yet. Osborne/McGraw-Hill is a prolific publisher of computer books, so you can probably expect others sometime soon—perhaps on Commodore and Texas Instrument computers. Clearly, they've come up with a winner in these little books.

*— Jeffrey Bairstow*

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**BASICALLY SPEAKING**
FRANCES LIEBERMAN COHEN
Reston Publishing Co.
Reston, VA.
129 pp., $12.95

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Oh dear, yet another book on how to program in BASIC. This one is written by an elementary school teacher and reads like it. *BASICally Speaking* isn't a bad effort, but why cover the same ground that David Lien did so much better in his book for Radio Shack, *Getting Started With TRS-80 BASIC*, or his more general version, *Getting Started With BASIC*, published by CompuSoft Publishing Co.? Lien's books are amusing and easy to work through. Mrs. Cohen's book is about as amusing as a math assignment on a warm summer evening.

Once the novelty of using a computer wears off, programming in BASIC becomes as boring as the repetition of multiplication tables. I doubt that many people will get to the end of this book without a teacher prodding them. However, as a school textbook, integrated into a programming course, this book could be at least adequate. A good teacher might even be able to overcome the book's deficiencies by devising more open-ended uses of the computer.

There's one more thing I should mention, and that's the fact that this book suffers from near-terminal cuteness. Even the book's dedication is a three-line computer program. Too bad, because the program is an endless loop, one of the no-no's of proper program construction. Sorry, Mrs. Cohen, you flunked that one.

*—Jeffrey Bairstow*

# Answers

## Mind Benders

### SING-SONG

I'M VERY WELL ACQUAINTED TOO WITH MATTERS MATHEMATICAL / I UNDERSTAND EQUATIONS BOTH THE SIMPLE AND QUADRATICAL/ABOUT BINOMIAL THEOREM I'M TEEMING WITH A LOT O' NEWS/ WITH MANY CHEERFUL FACTS ABOUT THE SQUARE OF THE HYPOTENUSE.

**—"The Pirates of Penzance" by Gilbert & Sullivan**

### THREE FOR THE ROAD

1. You quickly fill the 3-quart measure with hydrogen from the tank and pour it into the 5-quart. Now you refill the 3-quart and pour from it into the 5-quart until the 5-quart is full. Now you dump the contents of the 5-quart back into the tank, pour the 1 remaining quart in the 3-quart measure into the 5-quart, and refill the 3-quart. At last, by merely pouring the contents of the 3-quart into the 5-quart, you have saved the world.

2. First, fill the 11- and 5-ounce bottles, leaving 8 ounces in the bucket, and pour all the contents of the 5-ounce into the 13-ounce. Now pour from the 11-ounce into the 13-ounce until the 13-ounce is full and the 11-ounce has 3 ounces. Now refill the 5-ounce from the 13-ounce and pour the contents into the 11-ounce. Voila! You can reason!

3. Start both hourglasses. When the 4-minute timer runs out, flip it over; when the 7-minute runs out, flip it over. When the 4-minute runs out again, flip them both over. When the 7-minute runs out a second time, 9 minutes will have elapsed.

### JIG SAW

```
5 PRINT"O"
6 POKE53280,8:POKE53281,5
7 FOR K= 1TO4
10 X=INT(4+(32)*RND(1))
20 Y=INT(1+(17)*RND(1))
30 A=1:B=1
40 FOR I=1TO12
50 LETX=X+A
60 IF I=4 THEN A=(-1)
70 IF I=10 THEN A=+1
80 LET Y=Y+B
90 IF I=7 THEN B=-1
100 POKE 1024 + X+ 40*Y, 81
110 NEXT I
120 NEXTK
```

## Pencil Powered!

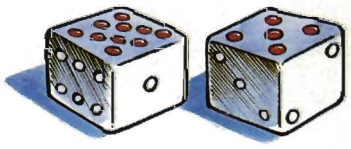
### PIECE O'CAKE

Carl should begin by cutting off a 1-inch piece of cake. His next cut should bring the total cut to 4 inches, then 7, 10, 13, 16 and 19 inches. John must then wash the dishes, but by then he'll have eaten nearly two-thirds of the cake (13 inches), so maybe it was worth it.

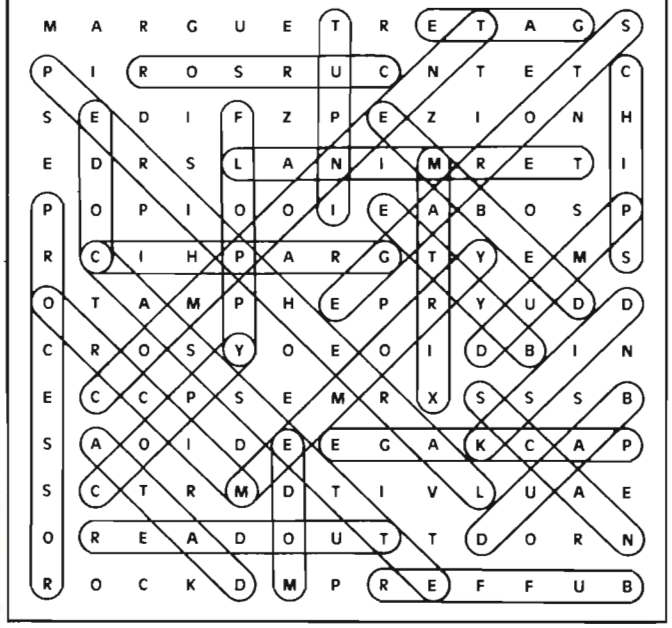
### 15 THE HARD WAY

Warren's answer:

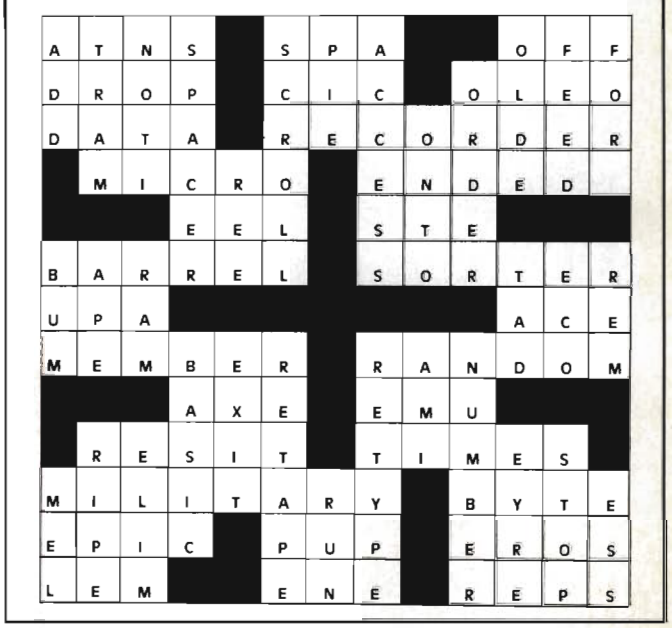
| | | |
|---|---|---|
| 4½ | 8 | 2½ |
| 3 | 5 | 7 |
| 7½ | 2 | 5½ |



### MATCH GAME



### WORD TEST



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