CURSOR!
Inside-the-Computer
ENTER Adventure (P.42)

CHILDREN'S TELEVISION WORKSHOP • MARCH 1985 • $1.75

ENTER®

THE WORLD OF COMPUTERS AND NEW TECHNOLOGY

COMPUTERS IN SPACE
What Happens When the Shuttle's Computers Break Down?

PRINTERS
A Buyers' Guide

PROGRAMMING
All Home Computers

COMPUTER CAMPS

Astronauts Rescue A Stranded Satellite

Why every kid should ha

Today, there are more Apples in schools than any other computer.

Unfortunately, there are still more kids in schools than Apples.

So innocent youngsters (like your own) may have to fend off packs of bully nerds to get some time on a computer.

Which is why it makes good sense to buy them an Apple® IIc Personal Computer of their very own.

The IIc is just like the leading computer in education, the Apple IIe. Only smaller. About the size of a three-ring notebook, to be exact.

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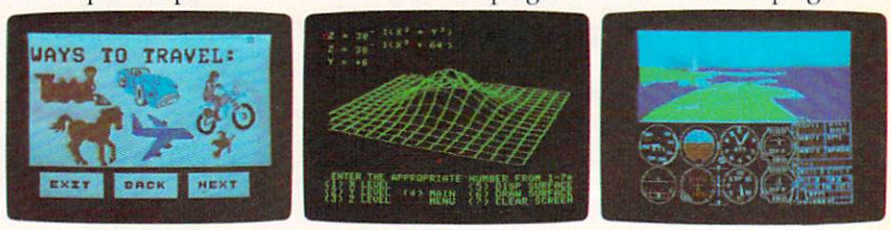

With a IIc, your kid can do something constructive after school. Like learn to write stories. Or learn to fly. Or even learn something slightly more advanced. Like multivariable calculus.

Not to mention fun programs for the whole family. Like "Genetic Mapping" and "Enzyme Kinetics."

ve an Apple after school.

And the Apple IIc comes complete with most everything you need to start computing in one box.

Including a free 4-diskette course to teach you how—when your kids get tired of your questions.

As well as a long list of built-in features that would add about $800 to the cost of a smaller-minded computer.

128K of internal memory—twice the power of the average office computer.

A built-in half-high 140K disk drive that could drive up the price of a less-senior machine considerably.

And built-in electronics for adding accessories like a printer, a modem, an AppleMouse or an extra disk drive when the time comes.

In its optional carrying case, the IIc can even run away from home.

So while your children's shoe sizes and appetites continue to grow at an alarming rate, there's one thing you know can keep up with them. Their Apple IIc.

To learn more about it, visit any authorized Apple dealer. Or talk to your own computer experts.

As soon as they get home from school.

INSIDE STORY

RRRRRRRRRRRRIIIIIIIIIIPPPPPPPPPPPP.

The sound you just heard was 10,000 pages being ripped out of ENTER. Over the last year and a half, that's how many pages our readers have put in envelopes and mailed to Box 777, Ridgefield, New Jersey.

We call these pages our "Input Poll." By filling them out, you've helped us make ENTER a better magazine. You've also told us who *you* are...and the results are pretty interesting. This month, we thought we'd tell you a little bit about yourselves, the 200,000 readers of ENTER.

You probably own at least one computer—and if you don't, you're going to buy one soon. When the input poll began in October, 1983, 56 percent(%) of you had a computer at home. By the October, 1984 poll, 82% owned computers. Most of you own Commodores (about 20%), Apples (20%) and Texas Instrument computers (15%). There's also a lot of owners of TRS-80 (10%), Atari (6%), IBM (5%), Timex (3%) and Coleco Adam (2%) computers. Because you're such a varied bunch, we've got to provide programming for a lot of different machines. That keeps our Technical Editor very busy.

You use your computer mostly to create graphics (over 60%), write programs (60%), do homework (35%), and word process (30%). Most of all, you play games on your computer (82%).

We certainly know—from your letters and electronic mail, as well as the polls—that you want more buyers' guides and reviews in ENTER. We've added a lot of features that do just that. We've also learned some surprising things about you:

More than 85% write programs in BASIC:

Less than 10% use Logo for programming:

69% have tried to write an original game program;

48% buy at least one software package a month.

This month, our poll asks a few special questions about bulletin boards. There's been a lot of bad publicity about kids and BBS's. We'd like to know what *your* experience has been. We promise to get back to you with the information—so go ahead and fill out Input Poll #8. You'll find it on page 39.

Okay now. All together:

RRRRRRRRRRRRRRRRRIIIIIIIIIIIIIIIPPPPPPPPPPPPPPPP.

Ira Wolfman

Ira Wolfman
Editor

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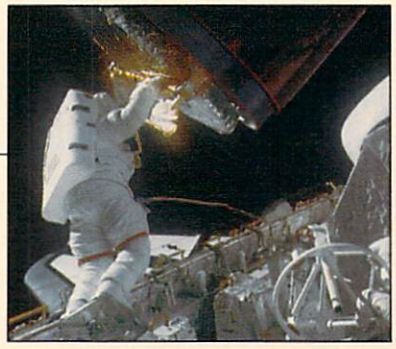
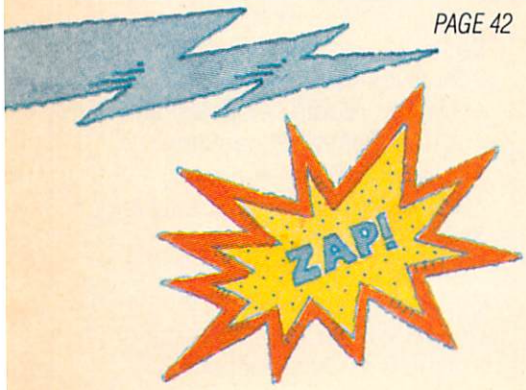
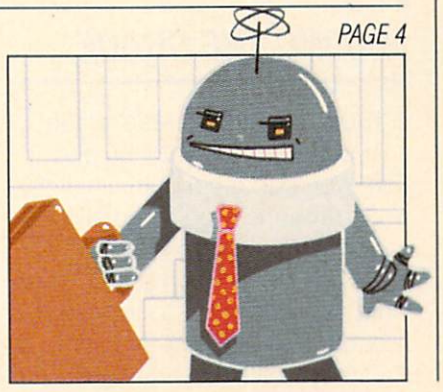
FEATURES







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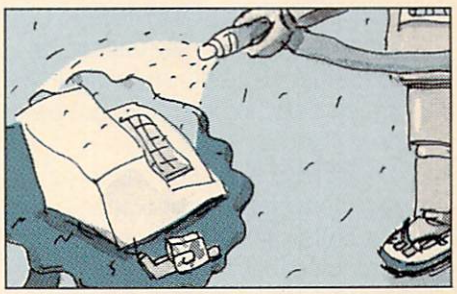
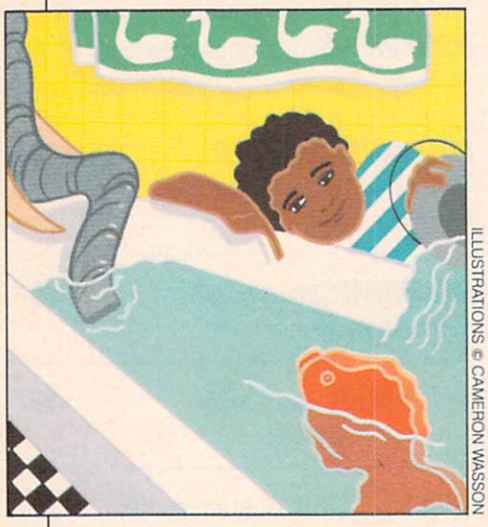


Cover: Photo courtesy of NASA

BITS

ENGLISH LESSON



ILLUSTRATIONS © CAMERON WASSON

Cricket isn't the only popular game in England. We discovered this while looking through the British computer game magazine, *TV Gamer.* Here are some real—and very unique—British games:

- *Bed Bugs*—In this game, you're in bed battling bugs with a sponge, a telephone and a sandwich. The magazine reviewer didn't do too well: "My fastidious concern for breadcrumbs and jam on bed clothes might account for my low score."
- *Metagalactic Llamas* turns you into a laser-shooting llama that battles interstellar spiders. The game, says the reviewer, "is bound to appeal to some hardened shoot-'em-up fanatics."
- *Bath Time*—This game puts you in charge of the water level in a bath tub. If it gets too low, the fish flounder. If it gets too high, the swans fly away. Your enemies: a water-bearing little boy and a thirsty elephant. "All in all," says the reviewer, "a good graphics game, very easy to play, with good, catchy tunes throughout."

Unfortunately—or maybe fortunately?—not one of these games is scheduled for release in the U.S.

We wondered what it would be like to be a laser-shooting llama.

VIDEO VARSITY

Who said video games aren't team sports? Howard Pearlmutter has created a 32-player version of the Atari-Lucasfilm game, *BallBlazer.*

Pearlmutter, head of The Knoware Institute of Technology in Santa Cruz, California, had a "soldering party" at a recent computer convention. He hooked up 32 joysticks to a single game machine so that everyone could play at once. High-tech handball became a team endeavor.

Pearlmutter's effort landed him in the record books. The previous record for joysticks hooked up to one computer was only 14. Heck, you can't even play baseball with 14 people.

MAKING THE GRADE

You studied hard, read all the assignments, did your homework and even participated in class. So what happens? You failed all your classes. What do you do?

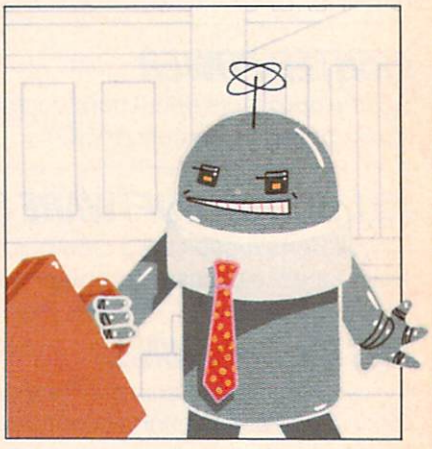
Blame it on the computer. That's what more than 6,000 students in Albuquerque, New Mexico did. And they weren't just trying to avoid the wrath of their parents. It really *was* the computer's fault.

The wrong list of students was programmed into the computer when the machine was printing out failing grades, according to Joseph Perno of the Albuquerque schools. What did the computer do? Blamed the programmer.

CAPITOL IDEA

A robot in Congress? Well, they may never get elected, but they are in Washington, D.C.

RoPet-HR and *Maxx Steele* are two mechanical marvels who've been seen around the nation's



capitol. RoPet-HR showed up before the House of Representatives' Committee on Aging to show how robots can assist senior citizens. RoPet-HR can detect intruders and set off alarms.

Meanwhile, a two-foot-tall *Maxx Steele* robot drew attention to "National High Tech Week" by delivering a resolution to the White House. Will we soon be reading "All the President's Robots"?

WATER WATCHER

Your hands are soapy and slippery. You won't be able to turn the faucet to rinse them off. But, as your hands move towards the sink, the water comes on automatically.

Hey, is this one of those TV practical joke shows?

You look around for a hidden camera. But instead you find an electronic eye. Yes, you've entered the age of high-tech hand washing. This automatic faucet, called the Optima, is made by the Sloan Valve Co. of Franklin Park, Illinois. The electronic eye puts out an invisible beam of light that detects approaching hands. When the hands are in range, the water goes on.

It's not as good as getting on TV, but it does rinse the soap off your hands.

PROOF POSITIVE

No one had to conduct a scientific study to tell you that learning to use computers can be difficult. But they did the study, anyway.

Researchers at Carnegie-Mellon University in Pittsburgh interviewed 250 beginning computer users to find out just how tough it was to use the school's computers. According to researcher Lee Sproull, the study found that:

- 78 percent of the students discovered that learning to use the computer took longer than they thought it would;
- 76 percent felt "overwhelmed" by the amount of work they had to do for computer class;
- Many discovered that the computer had become the center of their schedule. "I have to arrange everything else around computer time," said one student.

And to think, you probably knew all this even before the study was done.

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USER VIEWS

NEW COMPUTER GAMES

BY PHIL WISWELL AND BERNIE DEKOVEN

FAHRENHEIT 451

(Trillium/Spinnaker, Apple II series, $39.95; Commodore 64, $32.95)

This interactive fiction software is not as good as the book of the same name. And it's not as good as the movie of the same name. But it *is* filled with the wonderful prose of sci-fi author Ray Bradbury, who wrote the book. And it *is* a story that kept drawing us back for more.

Fahrenheit 451 is a graphic adventure game that displays each scene with a small picture and text. Player command is a problem, since you are limited to two-word commands like WALK NORTH or READ SIGN. But you still can elicit a wealth of responses. Bradbury did a stellar job of saying a lot with a little.

Fahrenheit 451 offers much to explore. There are dimly lit alleys, but few dead ends. And even though this adventure game world is very dangerous, your character will not be killed for every mistake you make.

Each step you take in *Fahrenheit 451* helps fill in part of the story. And the plot is compelling. You are in the future, on New York City's Fifth Avenue, hunted by mechanical hounds and members of the 451 Corps. Your only hope is to contact members of the underground movement. Where will you find them? That's the adventure.

WRAP-UP

BERNIE: Graphics and sound weren't great, but this is a superb game.

PHIL: I turned off the pictures after the first time. They just make gameplay slower.

ROBOT ODYSSEY I

(The Learning Company, Apple II, $49.95)

It is difficult to define *Robot Odyssey I*. The best we can do is this: a graphic-educational-adventure-game-robot-construction kit. This software is deep and fun. In many ways, it is an extension of The Learning Company's *Rocky's Boots*. In that game, the user designs, builds, and tests circuits.

In this program, you get much deeper into circuitry design. You actually use your design skills to program different robots to solve an adventure game. The object of the adventure is to maneuver through the five levels of Robotropolis and return to the real world. Each level of the robot-populated city requires more sophisticated circuit design. It's fun to watch your robots doing what you programmed them to do.

WRAP-UP

PHIL: I think it's great that you have to design your own inventions to get anywhere in this game. As your skill at circuit design increases so does your progress.

BERNIE: I call this game "Rocky's Gloves" because you can do so much more with it than with *Rocky's Boots*.

GHOSTBUSTERS

(Activision, Commodore 64, Apple II series, Atari, $34.95)

The theme music, which plays through *Ghostbusters'* introductory screen, is worth half the price of admission. Unfortunately, the game isn't deep enough to be worth the other half.

Ghostbusters divides into three segments. You begin by selecting equipment and a car. With your vehicle equipped, you find yourself on a map of the city prowling for ghosts. Your object? To protect the Temple of Zuul from ghosts.

On the map, you will see ghosts approaching the Temple. You can temporarily halt their progress by passing over them. Then the screen switches to a close-up of your car on a three-lane street. Here you pass frozen ghosts. If you have a ghost vacuum, you'll capture them.

At the ghost-infested building you place the ghost trap, position two ghostbusters, switch on the negative ionizers, and set the trap. Make a mistake and your ghostbuster gets "slimed." It's almost worth getting slimed to hear the game's great voice synthesis cry, "He slimed me!"

WRAP-UP

BERNIE: I liked selecting the funny gadgetry, and the ghostbusting. But this feels like parts of different games rather than one whole game.

PHIL: The driving part bothered me. There wasn't enough strategy required.

SPY VS. SPY

(First Star Software, Atari/Commodore combined disk, $29.95; Apple II series, $34.95)

This one- or two-player game is not easy to learn. But it's really worth the extra effort.

The game is played in two dozen rooms of an embassy. Memorizing the floorplan won't help, since the rooms change from game to game. The object is to find a briefcase, fill it with the objects of spydom—passport, money, secret plans—and make a getaway. To do this, you must not only outrun the other spy, but also outfox him. These spies, from *Mad* Magazine, will do anything to stop each other.

The outstanding feature of *Spy vs. Spy* is the split screen that lets you view your moves *and* your opponent's moves. You have to move fast, and also keep an eye on what the other spy is doing.

WRAP-UP

PHIL: The gameplay is wonderful, and the game is funny.

BERNIE: I found you can master the difficult joystick control by playing the part of both spies.

BREAKDANCE

(Epyx; Commodore 64, around $35.)

We can't find much to like about this software. The music, which is the heart of the game, isn't very good. Graphics are okay.

Using a joystick, you put your breakdancer through five different kinds of moves. In the first game, you repeat an ever-lengthening series of moves made by a computer breaker. In the second game, a crowd of breakers try to push you into the river. Your task is to "eliminate" each one by imitating his moves. In the third game, you play against the computer's best breaker. And in the fourth game, you combine all three of the first games in the series.

We *did* like the fifth game, which is really an activity. You choreograph your own dance and play it back. Perhaps the whole game should have been like this.

WRAP-UP

PHIL: If this were the last game for the C-64, I don't know if I'd play.

BERNIE: The music gets annoying and the games get boring.

CUTTHROATS

(Infocom, Apple II series, Macintosh, Atari, Commodore 64, TI 99/4A, IBM and compatibles)

This new Infocom all-text adventure is a real winner. As always, the Infocom sentence parser (the program that interprets your commands) is superb, allowing complex commands. The game really shivered our timbers.

Cutthroats takes place in a small seaport town on Hardscrabble Island. It's a town filled with—you guessed it—cutthroats. You've got a map of the four shipwrecks around the island. Still, you need help. The only characters who seem able to help you are the island's thugs.

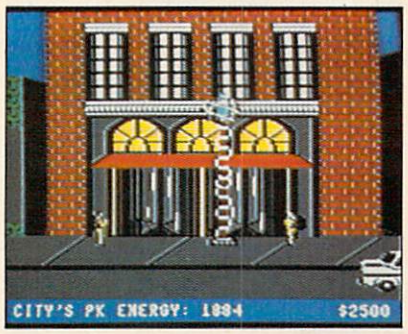
WRAP-UP

BERNIE: It's a very good text adventure. But I'm not sure I like Infocom spending so much time and money on the extra props—the map, the tide table.

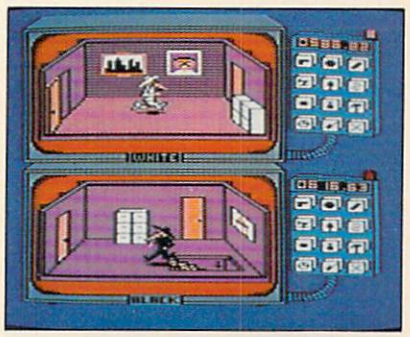
PHIL: I disagree. These props are half the fun of an Infocom game.

(Continued on page 41)

ROBOT ODYSSEY I



GHOSTBUSTERS

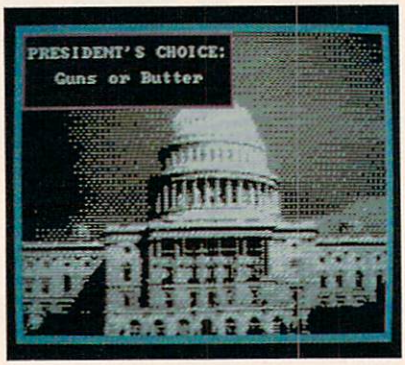


SPY VS. SPY

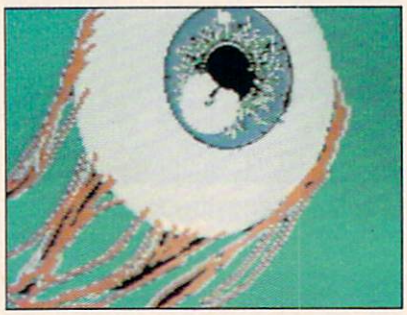
BREAKDANCE

SOFTWARE SCANNER

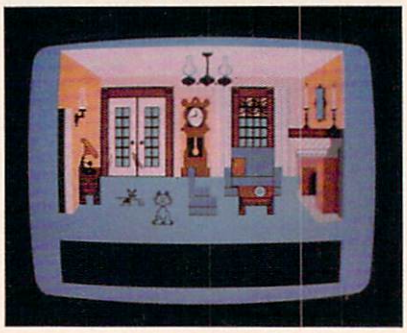
EDUCATIONAL SOFTWARE REVIEWS



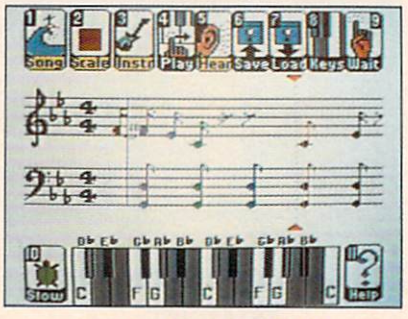
PRESIDENT'S CHOICE



FLYING COLORS



DREAM HOUSE



COLORTONE KEYBOARD

BY HILDE WEISERT

PRESIDENT'S CHOICE

(Spinnaker; Apple II series, IBM PC and PCjr, Commodore 64; disk, $39.95)

It's not easy being President—at least not when you're playing *President's Choice*, a simulation game for one player. As you enter the Oval office, "Hail to the Chief" plays and you are suddenly faced with decisions, decisions, decisions...presidential problems that *you* have to solve!

You'll like *President's Choice* best if the political bug has already bitten you. As you decide whether to get price supports for butter or more guns for the Army, you get a good idea of how many factors a president must weigh before reaching a policy decision.

Even if you aren't yet a political pundit, you still can learn a lot. You can even get help by calling on the software's built-in presidential advisors. Call political advisors by pressing the "?" key. Get information from your Council of Economic Advisors by pressing the "$" key. These advisors will supply charts and graphs about inflation, unemployment, and your popularity in the polls. They'll help you submit budgets, make important choices—and even help you run for re-election.

Whether or not you're interested in politics, this software will make you want to know more about how the presidency works. Unfortunately, only three references are listed with the software.

Still, *President's Choice* does let you act as if you are living in the White House. It even offers advantages a real president doesn't have.

For instance, if you get tired of being president, you can save your place on a formatted disk. And if you're weary of making the same old decisions, you can boot up a second "Scenarios" disk filled with all new issues.

FLYING COLORS

(Computer Colorworks; Apple II series, Commodore 64; disk, $39.95
Apple version with printer program, $69.95)

Flying Colors has features you don't usually get all in one graphics program. First, it works with joystick, paddles, trackball *or* touchpad. Second, it lets you create and save your own "slide tray" of pictures. You can, for instance, fade from one shot into the next. (This program is as smoothly flexible as the slide projector part of separate packages like Koala's *Graphics Exhibitor.*) Third, the $69.95 version of this program lets you print "slide trays" of your pictures.

In addition, *Flying Colors* has easy-to-follow menus and a solid manual that helps you get the most out of this software.

It is a program with a lot of options, but one big drawback. *Flying Colors* is only fair as a basic painting program. It lacks options like move, copy and mirror and allows only modest detail

work. That flaw takes away from otherwise admirable software.

DREAMHOUSE

(CBS; Apple series, Commodore 64; disk, $39.95)

An electronic dollhouse? Didn't you give that kind of thing up *years* ago?

I wondered why anyone over the age of six would want to play *Dreamhouse*. So I asked some friends to try out this software. Rachel (age 12), Joseph (13) and Bonnie (30+) all played happily for hours.

Dreamhouse is a joystick-controlled design program where you change, decorate and color any of four houses. You begin by checking out floorplans and choosing a house.

Rachel liked the colonial farmhouse. Joseph chose the penthouse. Bonnie liked the hideaway cottage. Rachel and Joseph were soon using the picture-menus to skip from screen to screen. (Bonnie needed the manual, which *should* have had a table of contents.)

My program testers picked up birdcages and couches and trees from the "storage screens" and dropped them in clever places. They painted rooms in all of the 16 colors you can choose on the Commodore. When the houses were done, my friends did one of two things. Either they saved the house on a disk, or they hit the "animate" command, which made dogs wag their tails and washing machines spin noisily.

Dreamhouse has flaws. Color fills sometimes have have odd edges. Some screen items are too small to see. But *Dreamhouse* also has lots of surprises and dozens of rooms to explore. It's a high-tech way to play house.

MISSION: ALGEBRA

(DesignWare: Apple II series, IBM PC, PCjr and compatibles, Atari, Commodore 64; disk, $44.95)

There are two things *Mission: Algebra* isn't. It isn't a way to learn all of algebra. And, despite its title and the spaceship picture on the package, it's not an adventure game.

But if you want to practice solving linear equations and plotting x,y, pairs on a graph, I think you'll like this game.

You're the pilot of a rescue craft searching for a lost sister ship. Clues have been left behind—a trail of linear equations like $Y + 7 = -1X + 10$. (A trail of bread-crumbs would have been easier to follow, but you wouldn't learn as much.)

You start your "mission" in a "workspace" screen, where you solve the equations. Then you go to a "graph" screen, where you plot x,y values. Solve the equations, plot the points and you rescue the other ship.

Unlike some tutorial programs, *Mission: Algebra* lets you solve problems in as many steps as it takes. A fanfare sounds when you solve a problem correctly. A buzz signals mistakes, and is followed by a message that tells what you did wrong.

Still having trouble? Just press the "H" key to call your on-line algebra tutor. This screen will remind you about basic rules and give you hints about the solution. If you're still confused, hit "C" for the solution.

Like other DesignWare programs, this one has a good demonstration screen and user's manual. The screen prompts are also well thought out and helpful. If algebra is a 12-chapter book, *Mission: Algebra* is only Chapter 2. But Chapter 2 is important, and this program hits the mark.

COLORTONE KEYBOARD

(Waveform; Commodore 64; disk and keyboard, $79.95)

This keyboard and software package can make *anybody* sound good. It lets you play nine different instrument-sounds and record with 13 different song accompaniments. Best of all, it blocks out sour notes.

First, plug the two-octave piano-like keyboard peripheral into your joystick port. Then load the program disk. The screen display is great! At the top of the screen, pictures explain the *Keyboard's* menu keys. Mid-screen, colorful notes from your melody march across treble and bass clefs. At the bottom of the screen, the keyboard is shown with letter names. As you play, a red dot highlights the key you've hit.

There are some shortcomings: storage space is limited if you want to save your tunes and the keyboard is a flat "membrane" that's not as much fun to play as real piano keys.

Still, this package is like a new-wave version of an old-time player piano. It encourages you to make music and have fun—and that can be great way to learn about music.

HILDE WEISERT is an educational consultant and freelance writer.

NEWS BEAT

EDITED BY RICHARD CHEVAT

KIDS HIT AT 'BITS' SHOW

Bits & Bytes: Products got a workout at the first kids' computer show.

Put thousands of kids, dozens of computer companies, and an assortment of robots, computers and software in a huge room and what do you get?

"Bits and Bytes: The First National Computer Show for Kids," that's what.

This three-day conference, attended by nearly 15,000 people, took place at the Disneyland Hotel in Anaheim, California, last December. The show featured workshops led by teenagers, and hands-on demonstrations of hardware, software and robots.

Speakers included teenage programming whizzes Will (*Music Construction Set*) Harvey and Cory Kosack, and TV actor and former star of *Whiz Kids*, Jeffrey Jacquet. The "Kid Keynote" speech ("Is There Life After Joysticks?") was given by 12-year-old "Vid Kid" Rawson Stovall, author of a syndicated newspaper column about video games. Rawson's conclusion: there is, indeed, life after joysticks.

More than 30 computer companies—including Apple, IBM, Spinnaker, Mindscape, Radio Shack, CBS Software, Weekly Reader Software and Commodore—had exhibits at the show. IBM's booth featured a stylish "old-time" factory, with company representatives dressed in factory worker aprons and 1930-style caps. The booth's special guest star was actor Billy Scudder, who plays the Charlie Chaplin character in IBM ads. Scudder didn't speak, but tweaked a squeaker and signed autographs throughout the show.

At other booths, new products were unveiled. Mindscape showed off *Indiana Jones and the Temple of Doom*, its new graphic adventure game. Sierra and Walt Disney Computer Software displayed three new software programs. Most notable was *Mickey's Space Adventure*, a graphic adventure game written by Sierra's Roberta Williams (author of *Kings' Quest*) and starring none other than Disney's #1 Mouse—the Mick himself.

Show organizers Cliff Mitchell and Douglas Mitchell judged their kid-oriented computer show a success. "We had good attendance by educators, parents and kids," said Doug Mitchell. "The companies that attended seemed very pleased. They came to the show because Bits and Bytes offered them a chance to see their products tested under battlefield conditions. Kids here gave them a good workout." Mitchell announced that a similar show is being planned for 1985 in Dallas, Texas. There should be one significant change, he suggests. "We expect the companies to make their displays more 'kid-compatible.'"

DIAL A GAME?: That's exactly what you can do with the new Masterline subscription service from the Control Video Corporation. Each month, this software-by-phone service will offer it subscribers 20 programs from leading software publishers. Some of the first month's selections included *Hard Hat Mack* by Electronic Arts, *Silicon Warrior* by Epyx and

MasterType by Scarborough.

For $20 a month, you can dial Masterline and download a program into your Commodore 64 or Apple II. Then you just hang up and play away. But you *can't* save the program on a disk or tape. As soon as you turn off the computer, the game is gone.

Right now, Masterline is only available for Apple and Commodore owners in Houston, Atlanta, Los Angeles, and Washington, D.C. If it's a hit, other cities and computers will be added. For more info, contact Control Video Corporation, 8620 Westwood Center Drive, Vienna, VA 22180.

OLYMPIC REVIVAL: You can't keep a good game down. *HESGames* (for the Commodore-64) from HESWare was Olympic-inspired software that hit the best-seller chart almost immediately. (And got a very good review in the July/August 1984 issue of ENTER.) But then HESWare ran into some problems and stores stopped ordering the game.

Enter Michael Crick of 3-2-1 Software, Inc. Crick, who created the game for HESWare, didn't want to see his game disappear. So he bought back the rights to the game and has started selling it independently. That's not all. He's selling an enhanced version of *HESGames* (now retitled *S-Games*) for $14.95—$20 less than the original price. *S-Games* Olympics includes even more features than the *HESGames* version, including a starter's voice ("On your mark, get set, go!") on running events, and a secret surprise on the long jump.

We can't keep secrets, so here it is: If you press the F5 key on your C-64 just before starting the long jump, you change the event from Earth gravity to lunar gravity. That means you'll soar past your opponents. Unless, of course, they read ENTER and know the secret, too.

Commodore 128: An upgraded C-64.

FLASH...FLASH...FLASH... COMMODORE INTRODUCES THE C-128: What's twice as powerful as the Commodore 64? The new Commodore 128, unveiled at the Consumer Electronics Show in Las Vegas. The 128 is exactly what it sounds like—an upgraded version of the C-64. It comes with 128K RAM and is expandable to 512K.

The C-128 is fully compatible with the 64, so there is already lots of software available for it. With its increased memory, the C-128 will be able to handle many new programs that wouldn't fit on the older model. (It is *not* compatible, however, with the other new Commodore machines, the C-16 and the Plus/4.)

Commodore hadn't set a price on the 128 when we went to press. They did say it would be available with a disk drive and a dot-matrix printer for under $1,000. That might make it very competitive with two other 128K computers: Apple's IIc and IBM's PCjr.

IDEAS UNLIMITED: If you've ever had to write a school report about the "History of The World"—or some other enormous topic—you'll want to know about idea processing software. This software helps you create detailed outlines that can turn mountains of jumbled notes into a pyramid of clear ideas.

To begin, you enter topic headings into your computer. For instance, you may be writing a paper that has sections on cavemen, plant life, dishware and musical instruments. By creating these headings, you create a file for each topic. As you gather information on cavemen, plant life, dishware and musical instruments, you enter this information under the correct heading.

When you're ready to organize your report, you don't have to move each scrap of information piece by piece. You simply shift headings. All the notes in that file move along with it. Idea processing software also lets you quickly shift screens, moving from general topic headings to specific information contained in each file.

"With idea [processing] software, it's easier to organize what you want to write," says Dan Lhamon, 14, an ENTER youth advisor. Dan says he's used this software to create outlines and papers for some of his classes at school.

Right now this new kind of software is available for the IBM PC and includes such products as *ThinkTank* from Living Videotext, Inc. of Mountain View, California, *THOR* (short for *Th*ought *O*rganizer) from Fastware of East Orange, N.J. and KAMAS (for *K*nowledge *A*nd *M*ind *A*mplification *S*ystem) from Compusophic of Aloha, Oregon.

If the idea catches on, you're likely to see more idea processing software for a wider variety of computers.

SHOW BEAT

EDITED BY PATRICIA BERRY

COMPUTERS IN THE 'CAULDRON'

COURTESY OF WALT DISNEY PRODUCTIONS

Disney artists drew on computer power to help with the "Black Cauldron."

Dragons, sorcerers and the Horned King have something special planned for you this summer.

Don't worry. These stars of *The Black Cauldron,* a new animated movie of medieval mayhem, aren't about to turn you into a newt. But they *will* show you what happens when animation artists team up with the latest computer technology.

Walt Disney's studio has been making animated films for more than 50 years. In the past few years, Disney has toyed with computers in movies like *The Black Hole* and *Tron.* But *Cauldron* marks the first time the studio has combined animation with state-of-the-art technology.

The Black Cauldron is the story of the evil Horned King. The King wants to possess the destructive powers of a huge, dark, mysterious kettle—the Cauldron itself. Only a young pigkeeper named Taran and the princess Eilonwy stand between the Horned King and his prize.

This animated fantasy took Disney five years to make. All of the characters and most other moving objects were done by hand by Disney's staff of artists. But computers helped with the animation of solid objects, and with the filming process itself.

On many scenes, a computerized device, appropriately called the Animators' Helper System, assisted the artistic staff. The Animators' Helper improved and speeded up the work, according to *Cauldron*'s producer, Joe Hale. "In one scene, we have a boat that Taran and Eilonwy escape in," says Hale. "First, the boat's just sitting in the water. But when the kids get in, it tips with their weight, and balances again.

"It takes a very long time to make that kind of movement look real by hand-drawing each frame," Hale explains. "If it's not done precisely, you get a kind of rubbery look instead of a fluid movement." But with the computer, animators simply had to input the dimensions of the boat, its various angles, and the directions in which it was to move. The computer then printed outlines for each position of the boat.

The computer can do some fancy work that hand-drawn animation can't. But Disney's animators didn't *want* to use the full power of the computer. For example, in the boat scene, the computer drawings could show three dimensions of the boat, including the inside ribs that you wouldn't normally see. But that would have looked very different than the rest of the animation. "So we traced only the part you'd see from the front," explains Hale, "for the painters to fill in later."

In the filming process, computers helped Disney artists create depth of field. This is very difficult to achieve in the two-dimensional world of animation. By using a multiplane camera with precisely timed computer-controlled exposures, the filmmakers were able to get an image that seemed deeper and more lifelike.

Yet while computers have proved very helpful, there are certain aspects of animated filmmaking that are off-limits to these machines. For instance,

says Hale, "we don't use the computer to add color [to the animation]. We do all that by hand. We even grind our own pigments."

Computers also do *not* play a part in creating the studio's memorable animated characters. Disney animators pride themselves on creating life-like characters—like the Horned King and Taran—out of pen, paper and paint.

"While [the computer] is great for animating solid, geometric objects that have [little or no] human characteristics, I doubt if the computer will ever be used for animating personality," says Hale. "The computer can save thousands of hours for us, but it's just a tool," he concludes. "The real work is done by the artists. A computer will *never* replace them."

DETENTION DETERRENT: A computer plays matchmaker in a CBS Schoolbreak Special, *The Day the Senior Class Got Married*. The show, scheduled to air March 5, tells the story of a senior high economics class. As a final project before graduation, the seniors have to simulate the dollars and cents of married life...in pairs. Of course, the students can't pick their own mates. They have to hand in questionnaires so the computer, programmed by their teacher (Paul Dooley, the actor who played the father in *Breaking Away*), can pair them off in "compatible" couples. That's where the fun...and frustration... begins.

It sure gives new meaning to the word homeroom.

IF THE SHOE FITS...: If Shoe has fits, it's probably because of his computer. Shoe is a comic strip character, and his computer is a centerpiece in a bird-brained newsroom.

COURTESY OF CBS

"Senior Class": Computer couples.

Cartoonist Jeff MacNelly has been poking fun at micros for most of the seven years his newspaper comic strip—appearing in more than 800 papers worldwide—has been published. *Shoe* tells of the misadventures of a newspaper—the *Treetops Tattler-Tribune*—and the real birds who run it. One of those birds is Shoe or Shoemaker, the paper's editor-in-chief. Another star is the uppity computer that mistakes downtime for on-line on a daily basis.

Shoe's high-tech hijinks are inspired by MacNelly's observation of the computers that surround him at work and home. Many of the glitches he captures on the comics pages actually happened to his Chicago journalist friends who work with computers.

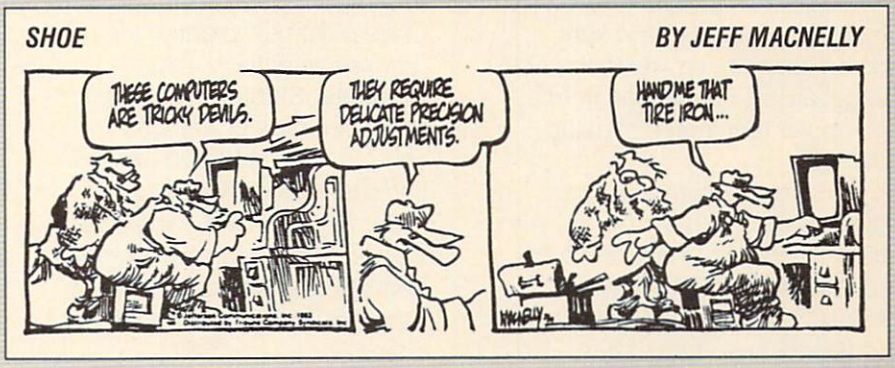
"I understand the frustration my colleagues have with computers. But I think it's hilarious," says MacNelly. "I love watching them, 'cause I'm not involved."

MacNelly also gets some of the computer comedy in *Shoe* from events around his house. There's a good chance the young cartoon character, Skyler, is modelled after MacNelly's own 10- and 12-year-old sons, Danny and Jake. Like Skyler, MacNelly's sons love video games. MacNelly also likes video games. He says he prefers "the old, simple ones where I can shoot the bugs and flies and spaceships, stuff like *Galaxian. Pac-Man*," he says, "makes me nervous."

Despite his joking, MacNelly claims that he "appreciates computers....[But] what I enjoy is the fact that these wonderful machines have silly humans running them."

Jeff MacNelly can afford to make light of computers. Graphics software may be getting better all the time, but he's convinced that "It's much easier to sit down and draw the comic strip by hand. And more fun."

Ah, but think of the comic strip he would draw after the computer "ate" his day's work. Guess that's "Shoe" business.



PACESETTERS

EDITED BY JESSICA WOLFE

FLYING WITH THE APPLE CORE:

HOW NINE KIDS WON A COMPUTER CONTEST

© MARTIN BENJAMIN

Airport Info Team: This club from Niskayuna, New York, combined programming and research skills to bring databases to new heights.

You've just arrived at a busy airport in a strange city. You have a million things to do: Rent a car, find your hotel, confirm your return flight and claim your luggage. You're lost. What do you do?

Thanks to a program developed by a Schenectady, New York, computer club, you might be able to get all this information from a computer terminal right at the airport.

The airport information program, called "Albany County Airport: Gateway to the World," was developed by the Niskayuna Apple Core, a club of nine 12- to 14-year-olds. It is an easy-to-use database program (complete with some animated graphics) that travellers will find helpful.

The nine club members—Jason Anthony, Craig Becker, Mark Kilty, Michael Lee, Jeff Serowick, John Shinners, Steve Spraragen, Dominic Versaci and Chris Williams—created the program as an entry in Apple Computer Clubs' 1984 competition. Their project was good enough to win $10,000 worth of computers from Apple.

But the members of the club also ended up learning a great deal about building a database program and working together as a team.

How to Organize a Database

The club's program provides useful information about airline schedules, seating plans, hotels, car rentals and baggage areas.

Creating this database took weeks of research and frequent visits to the airport. But the information had to be organized into a logical whole before the first line of programming could be written.

"We knew we wanted five main sections on the program before we even started making trips to the airport," recalls club member Steve Spraragen, 14. One section was "Travel Time," which calculates the cost and time it takes to get to and from the airport, then suggests direct routes.

A second section was "Arriving Traveler's Aid," which includes maps of the airport and the surrounding area. It pinpoints important places—departure gates, car rental booths, hotels, taxi stands, ticket counters, etc. Other sections include airline schedules and seating charts for various kinds of aircraft. There's even a section that explains airplane circling patterns.

The club members spent the better part of five weeks at the airport digging up all the necessary information. Craig, John, Michael, Jeff and Steven, who were assigned to do research, quickly became familiar faces around the airport as they collected "volumes" of notes, spoke to airport employees, and interviewed people at airlines.

A screen from the database.

"We made so many trips to the airport," says club advisor Angela Anthony, "that we found out things that the airport's manager didn't even know."

Ironically, one of their biggest problems was getting a floorplan of the airport. The information was available, but it was stored in—of all places!—a computer. Getting printouts, it turned out, was a problem that took a while to resolve.

Finally, all the pieces fell into place. Armed with enough information to fill both sides of two floppy disks, the Apple Core members began to create their database program.

Doing the Programming

Programming in Applesoft BASIC, Jason, Chris and Craig wrote the database one section at a time. Dominick came in after school every day for three weeks before the contest deadline to give last-minute help. Mike Lee worked on the "Circling Patterns" section of the program. To help with some more difficult aspects of the program, additional software had to be bought. To draw airport maps, the group had to purchase a graphics tablet.

The club members knew they'd have to make the program simple, since it would be used by people who may never have used a computer before. To accomplish this, they gave each of the five database sections its own menu and instructions. A user can access the database by just typing in answers to preprogrammed questions.

The finished product was a real team effort. Everyone was responsible for an equal amount of work and each club member had contributed something—whether it was running around the airport and digging up information, writing introductions or designing graphics.

You might imagine that winning $10,000 in computer equipment was the best part of this effort. That was great, admits Steven Spraragen. But, all nine members of the group agree, working together was a great experience.

Are you a pacesetter? Have you used your computer to do something inventive? Write a short note to: Pacesetters, ENTER, 1 Lincoln Plaza, New York, NY 10023. If we write your story, you'll get a T-shirt.

PROGRAMMING CONTEST TIPS

What does it take to win a computer programming contest? Here are some tips from kids who know— members of the Niskayuna Apple Core Club.

PLAN OUT YOUR PROJECT CAREFULLY. "Before doing anything, make sure you know ahead of time what you want to do," advises Jason Anthony. "Make sure everything is well-researched. And," he adds, "be persistent."

Also, try to keep track of your sources of information in case you have to go back and check something.

TRY TO DO SOMETHING DIFFERENT. Every contest has its own criteria, but almost all judges are looking for the same things in a winning entry: creativity, originality and educational value. If you do the 273rd version of a database for keeping track of hobbies, you're not going to stand out. Try to come up with something new and a little different.

BE READY TO WORK. "Never underestimate the amount of work you'll need to do," cautions Steve Spraragen. This is especially important when the project involves putting together a data base or anything requiring a lot of information.

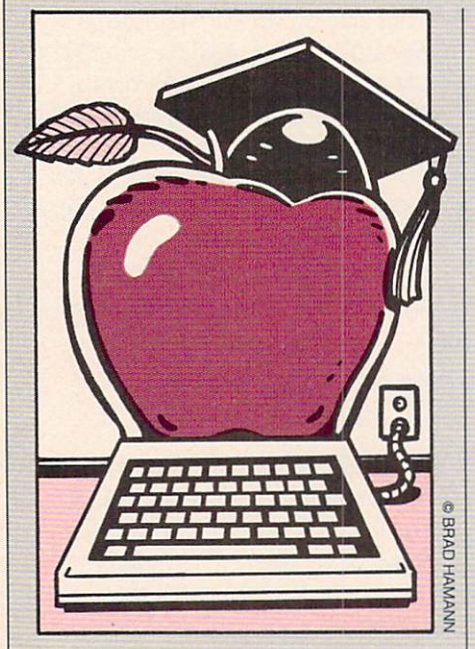
MAKE SURE YOUR ENTRY IS NEAT AND COMPLETE. It's important to include an explanation of how the program works, and how to use it. Don't assume the judges are going to understand everything.

IF MORE THAN ONE PERSON WORKS ON THE PROJECT, USE EVERYONE'S SKILLS. Everyone can contribute something. One or two people may be better programmers, but others may be better at researching, or documentation, or graphics.

One last, but very important, thing to keep in mind: have fun. The Niskayuna Apple Core members did.

CONNECTIONS

EDITED BY JESSICA WOLFE



Educated Apples

Apple owners in search of low-cost educational software should investigate the Audio Active series. *Ceres: A Space Odyssey* is one of 20 programs selling for $9.95. This high-flying text adventure teaches interesting lessons in astronomy and space science, then tests your knowledge.

Other programs in the series cover computer literacy, math, literature and reading for most ages and grade levels. To request a list of the Audio Active programs available, write to: ESP, Inc. 1201 E. Johnson, Jonesboro, AR 72401.

Newsletter Exchange

Atari computer clubs and users groups are invited to join a newsletter exchange program by the Atari Computer Club of the Palm Beaches. If your club publishes a newsletter, the ACCOPB will send you theirs, called the *Pokey Press*, free. For more information, write to the Atari Computer Club of the Palm Beaches, % Jim Woodward, 15993 S.W. Eighth Ave., Delray Beach, FL 33444.

Freeloading for Fun

Sometimes it pays to be a freeloader. *The Freeloader's Software Library* (American Software Publishing) offers more than 10,000 public domain programs. The software is available in both disk and cassette formats to anyone with Apple, Commodore 64, VIC-20, TI 99/4A, IBM-PC or Atari computers.

Much of the library is composed of multi-program disks and cassettes, with at least four programs on each. In addition to word processing, telecommunications and educational programs, American Software's catalog lists a wide variety of games, graphics and music software. The best news of all, though, is the price—cassettes cost only $5 each; disks are $7.50.

For a copy of their free, 165-page catalog, write to: Freeloader Catalog, American Software Publishing Company, P.O. Box 57221, Washington, D.C. 20037.

To be listed in this column, write to: "Connections," ENTER, 1 Lincoln Plaza, New York, NY 10023.

STAR TECH

COMPUTERS ABOARD THE SPACE SHUTTLE

BY JOANNE HARRISON

NASA

Countdown 10-9-8-7...

The space shuttle *Discovery* stands on the launch pad at Cape Canaveral, Florida. Inside the cockpit, astronaut Anna Fisher and four other crew members await liftoff. During the mission, Anna is responsible for operating the shuttle's mechanical arm to pluck two damaged satellites from orbit.

...6-5-4...

Meanwhile, on the ground, Phyllis Tanksley, Senior Sofware System Engineer, and other mission control specialists are ready to monitor every aspect of the flight—from liftoff to landing.

Phyllis, at Mission Control in Houston, is the computer expert. Anna, aboard the space shuttle, is a computer user like you or me. Through this and every space shuttle mission, astronauts and mission control workers depend upon a sophisticated network of computers to make each flight a success.

...3-2-1...Blastoff!

SKY-HIGH DIPS MALF

"Beware the dreaded DiPS Malf," says Anna, whose flight last November was a rousing success. Anna smiles when she gives this mysterious warning. But she knows that a DiPS Malf—space slang for a computer (*D*ata *P*rocessing *S*ystem) *malf*unction—can be a serious matter.

The world has already discovered how serious a DiPS Malf can be:

- On June 25, 1984, a faulty electronic component in a shuttle computer postponed the first *Discovery* launch. The next day, a computer did its job and detected a damaged fuel valve just seconds before lift-off.

© JAMES ARONOVSKY

Software specialist Phyllis Tanksley monitors every shuttle flight—from lift-off to landing.

• In December 1983, the shuttle *Columbia* had a flawless flight—until it was time to land. Then a DiPS Malf in two computers left the shuttle without navigation systems. Back-up computers saved the day. But that incident scared a lot of people, including astronaut John Young. He later admitted: "When the first computer went, my knees shook. When the second one went, I turned to jelly."

Neither of these DiPS Malfs placed the astronauts in serious danger. But they did help demonstrate how important computers are to the space shuttle program. From astronaut training to the launch and landing of each flight, computers are crucial.

NASA's use of computers may seem out of this world. But in space, as on Earth, there are computer users and computer experts. Surprisingly, most of the users are in the shuttle—and most of the experts are back here on Earth.

"There are only two computer 'wizards' that I can think of (among the astronauts)," says Anna Fisher. "That's Norm Thagard and Dave Hilmers....The rest of us have learned to be computer *users*. We don't need to understand *why* the software does what it does, we just need to know how to make it respond to Malfs."

The astronauts must learn how to use the spacecraft's computers. Like students in computer class, they read manuals and practice with the shuttle computers so that they know what to do if something goes wrong.

"We have this giant Malf book, " says Anna Fisher. "It's about three inches thick and it gives all the instructions for 'safe-ing' the systems."

"Safe-ing the system" means correcting the malfunction. This can be anything from shutting off a switch to transferring a failing on-board computer's memory to a computer on the ground. Mostly it's making sure whatever is "going Malf" aboard the shuttle doesn't make other things go wrong.

"We have these things called cue cards. They're cards printed with the actions to take *immediately* in case of a Malf on ascent," says Anna. During lift-off, she explains, "there's absolutely no time to go looking through anything. So, before a flight, the crew looks around the shuttle cockpit to see where we can put these cue cards up so the crucial instructions will be right

ILLUSTRATION © MIN-JAE HONG

COMPUTERS HELP PUT THE SHUTTLE ALOFT. BUT THEY'VE ALSO GROUNDED SOME FLIGHTS.

where we need them—when we need them.

"Ascents and Entries (A/E) are the most critical times in any flight," Anna says. "During A/E's, we have four computers running exactly the same software, 'talking' to each other.

"Then there's the BFS (Backup Flight System), the fifth on-board computer. It's always programmed by a different company." This is done, explains Anna, so that "if there's a problem with the primary software (in the four identical computers), then (the fifth computer) can get you up and bring you down safely....You can fly an entry on that one computer. You sure wouldn't want to, but you could if you had to."

To prepare for any possible problems, Anna and the other astronauts are trained in space flight simulators. Computer-controlled devices like the Digital Image-Generation system and the Poly-Voice Sound Synthesizer are used to accurately recreate the sights and sounds of an actual shuttle flight.

"The (shuttle computer) system isn't actually that difficult to learn to use," says Anna. "Most of (the on-screen displays) just say things like 'Item I, Execute...'" But, she adds, the astronauts must still train to become top-notch computer users.

Phyllis Tanksley and other computer experts at the space agency's SPF (Software Production Facility) also train hard for each mission.

"A large part of my job is to play 'what-if?'" explains Phyllis, who began working for NASA when she was 18 years old. She is fluent in Fortran, BASIC, PASCAL and Assembly computer languages. "What we do is play all of this out on our PC's and then plan backups for everything that might happen."

Thanks in part to this constant testing, NASA has never had any major in-flight *software* problems. "Oh, we've had some little nits, but never anything serious," according to Anna. "That's because we find the big ones early on over at SAIL."

SAIL, the *S*huttle *A*vionics *I*ntegration *L*aboratory, is where potential shuttle computer software problems are simulated. The SAILers' job is to check out all the software written for NASA to make sure it's as perfect as possible.

"Let me give you an example," says Phyllis. "On the first flight of the *Columbia* in 1981, they had a problem with the computers....We

NASA

Anna Fisher and other crew members during the November shuttle flight.

couldn't get them to agree.

"We'd say: 'Computer #1 says that 1+1=2, is that right Computer #2? What do *you* think Computer #3?' If we can't get complete agreement, then we have a problem and we have to track down the cause," Phyllis explains. "With the Columbia, we had people flying in from all over to work with the simulators. Eventually they were able to figure out that the computers were 'missing' one another's messages because timing (between computers) was off."

It was a programming problem, Phyllis points out. Once located, it was relatively simple to correct. "Fixing something is often easier than you might think," says Phyllis. "Although there are thousands of different computer systems on the shuttle, they're broken down into families of systems....For example, when the APU (Auxiliary Power Unit) kept failing on one of the flights, an APU system manager climbed into a little room with a computer and simulated what was going on in flight."

NASA

Anna's training: Floating in space to working on computers.

THE FUTURE IN SPACE

Over the years, the workings of SAIL have become increasingly sophisticated. These days the lab is looking more than ever like the flight deck of the starship *Enterprise*.

"We've begun to do basic software work for the space station," says NASA spokesperson Billie Deason. "We've just installed a mock-up of the station command center. Now one wall at SAIL has five computer display screens of different sizes, all with color displays. We plan to control the space station from a single module. Everything the astronauts will need to know will be in color graphics displays."

Future space flights, like the current generation of shuttle missions, will depend on this technology—operated by computer-using astronauts like Anna Fisher and perfected by computer experts like Phyllis Tanksley. It is a team effort.

"You have a real interest in making things perfect," explains Anna, "because your friends are going to be flying that shuttle, depending on it to work."

JOANNE HARRISON is a freelance writer in Houston, Texas.

ASTRONAUTS LEARN HOW TO USE SHUTTLE COMPUTERS—AND PREPARE FOR DiPS MALFS.

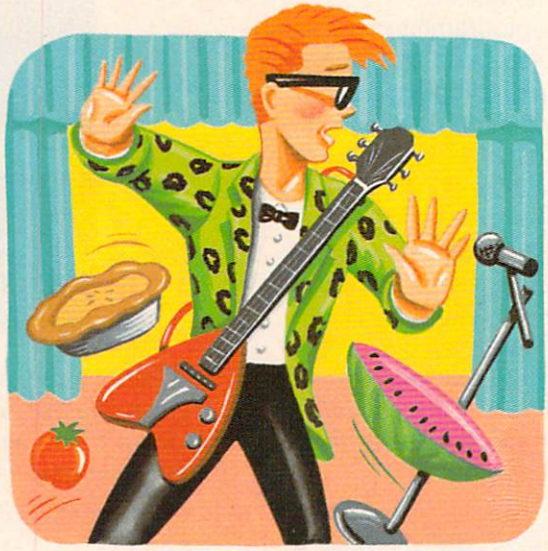
The Return of GONZO

ENTER READERS STRIKE BACK

Last year, we asked you to send us your ideas for the silliest, most ridiculous video and computer games you could imagine. You came through with flying colors—as well as cross-eyed pigeons, flying dishes and Hair Monsters. In the crazy game category, our contest was a roaring success. We'd be amazed to see any of these Gonzo games at the local arcade, but we think they're great just the same.

Everyone whose idea is printed here will receive an ENTER T-shirt.

Our thanks go to all of you who gave us your versions of "Games Gone Gonzo."



ROCKWARS

By Crystal King, 13

You are a young rock musician trying to make a living in a world where other famous performers and groups are determined to make you fail. In the first scene you use the joystick to reach the top floors of Caesar's Palace, where you are planning to give a concert. You must avoid crowds, reporters, and worst of all, other rock stars.

Your only weapon is a bass guitar which, when played improperly, will emit a deafening noise that will temporarily paralyze your enemies.

In the second scene, you must wander through New York City in search of the ultimate song. Again, you may use the bass to survive. In the last scene, you must play the ultimate song and win the hearts of millions.

As you dance around the stage, your enemies start a massive food fight to prevent you from completing your song. You must dodge flying pies, tomatoes, candy bars, and other foods. The ultimate prize is to receive Grammy Awards for Best New Artist, Song of the Year and Vocal Performance.

GAMES GONE
GONZO

ATTACK OF THE SPINACH THINGS

By Jennifer Buehler, 11

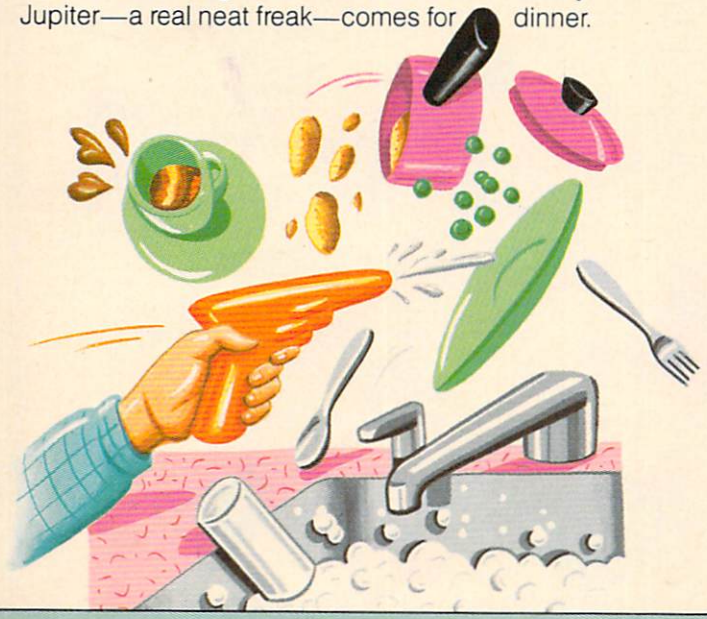
Your mother gives you pork chops and spinach for dinner. You finish off the chops in a minute, but don't touch the spinach. Your mother gives you a choice: go to bed or eat the spinach. You go to bed. That night, you have a terrible nightmare that you are in a video game called *Attack of the Spinach Things*. Little spinach sprouts are chasing you throughout a castle. To win, you must find the kitchen, grab a giant salt shaker and salt the spinach things away. You lose when they trap you and force you to eat five pounds of spinach.

INVASION OF THE DIRTY DISHES

By Raymond Waldron, 10

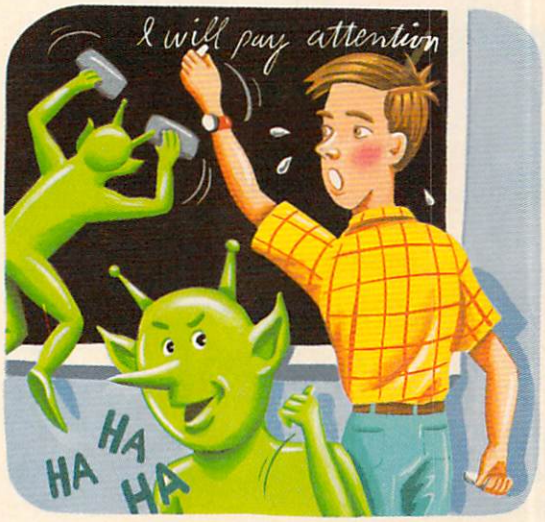
PART ONE: Your mom has left for work and tells you to wash dishes that are covered with food and don't want to get clean. With your soap liquid and rag, you have to get them clean before Mom gets home.

PART TWO: You and Dad have to clean flying dishes—you with your soap gun and Dad with a water fighter. You must get the dishes clean before Mayor Jupiter—a real neat freak—comes for dinner.



SPACE ERASERS

By Greg Howley, 10



You have been caught doodling in class and have to stay after school and write "I will pay attention in class" 50 times on the blackboard. Suddenly, Martian invaders break in and start erasing all your precious handwriting. You must finish before time runs out—or else they lock up the school and erase you.

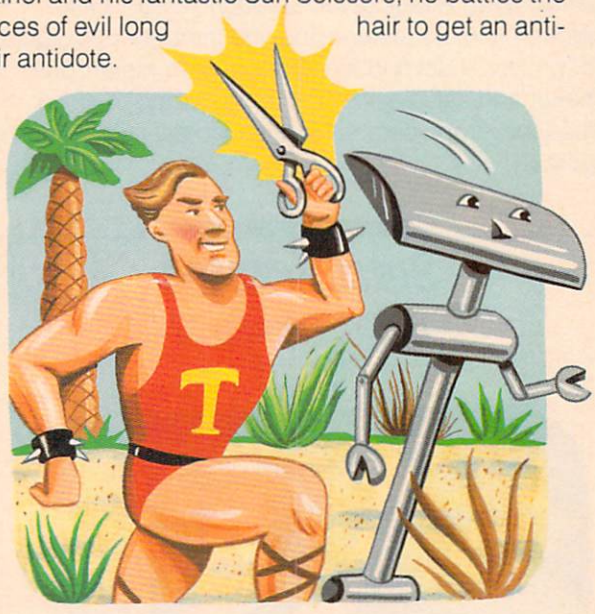
(Continued on next page)

GAMES GONE GONZO

THUNDARR THE BARBER

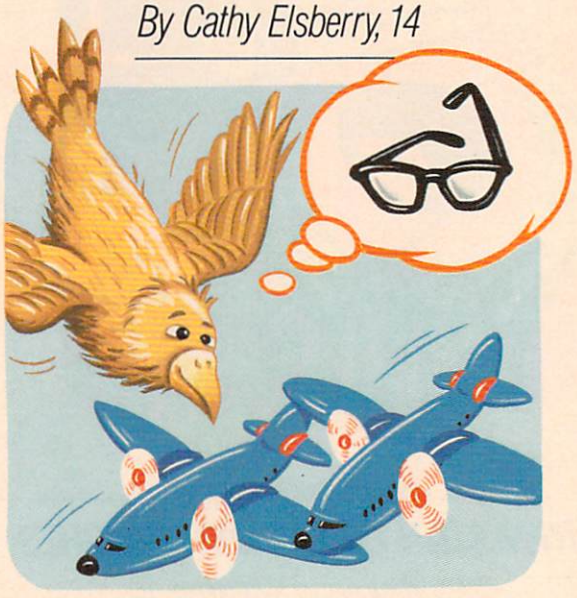
By Robby Smith, 9

It is 1994. A runaway Hair-Growth potion comes from outer space and unleashes cosmic destruction. Two thousand years pass. The Earth is reborn as a world of super long hairs. One man fights for haircuts—Thundarr the Barber! With Ookla the Razor, Princess Hairiel and his fantastic Sun Scissors, he battles the forces of evil long hair to get an anti-hair antidote.



HOMER

By Cathy Elsberry, 14



Your name is Homer, and you are a cross-eyed pigeon. To win, you must find your way through airplane-crowded skies to see an optometrist about getting some glasses. But watch out! Because of your crossed eyes, you see double—and if you accidentally hit a plane, your goose is cooked!
Second level: you lose your new glasses and must go back to the first level.

SCHOOL DAZE

By Julie McLaughlin, 13

You wake up with three minutes to get to school. You must get dressed, eat breakfast, brush your teeth and get to school.

If you make it to school in time, you have to pass quizzes in every class while dodging spitballs. You must avoid a bully in the halls and try not to get called on in your Social Studies class. If you get this far, you try to make it through Phys. Ed.

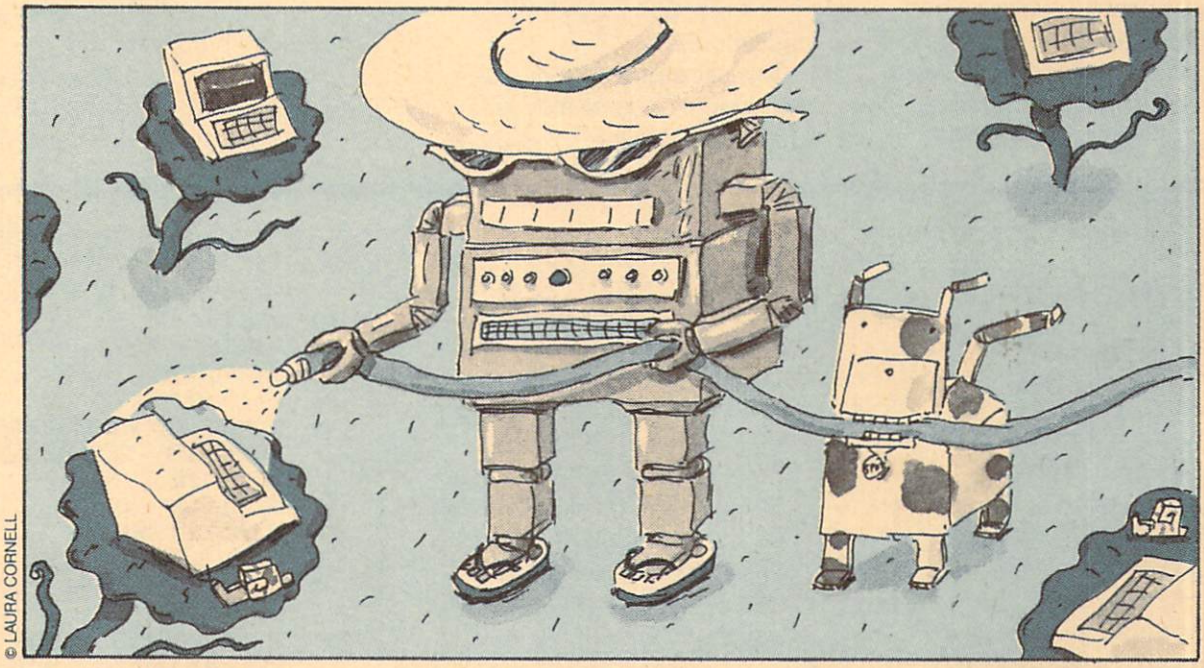
Finally you must go to basketball practice where you do hazardous drills (like layups) and avoid a flying basketball. Complete this and start all over again.

enter

C·E·N·T·E·R

THE COMPUTER-USER'S HANDS-ON HANDBOOK

MARCH, 1985



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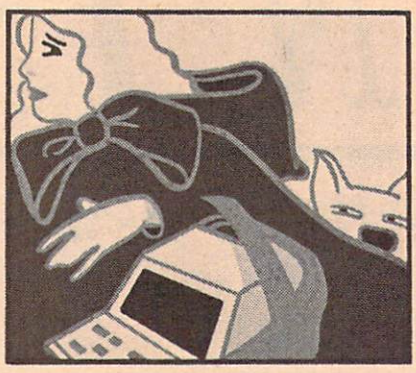
· FEATURING ·

BASIC TRAINING

PROGRAMS FOR YOUR COMPUTER

Apple, Adam, Atari, Commodore 64, IBM, TI 99/4A, Timex-Sinclair, TRS-80, VIC-20

Once upon a time, Little Red Serial Port went for a walk in the forest where it found seven portables named Sleepy, Grumpy, Gosub, Goto, Logo, Pascal and Joystick. "My, what a large disk drive you have, Grandmama," said Little Red Serial Port. "The better to catch your syntax errors, my dear," said the Wolf. Then, just as the clock struck midnight, Cinderella had to log off her bulletin board. And the Baby programmer said, "Somebody's been playing with my videogame, and they beat my high score!"



This excerpt is from one of our favorite bedtime stories—Goldilocks and the Three Bytes.

Remember those other great fairy tales, like the Princess and the Peripheral? Well don't worry, BASIC training this month is no fairy tale. It's a selection of great programs and advice.

In addition to programs for 10 different home computers, we have our Glossary with a new definition each month, a monthly programming Challenge, and our BASIC Plus column with tips on writing programs.

So, Fi Fie Fo Fum, type in those programs and get ready to RUN.

—Richard Chevat, Technical Editor

MOUSE MAZE: COMMODORE 64, ATARI

You've heard of the mouse—the newest rage in computer hardware. Well, now you can have a mouse of your own. It's a computerized mouse that can learn a maze right before your eyes.

Mouse Maze was written by Doug Krehbiel, age 17, who is ENTER's Technical Assistant. Each time you run the program, a new maze appears. Then you place some "cheese" in the maze by hitting the space bar. A second tap on the space bar sets your "mouse" in motion.

You can watch the mouse memorize the maze by drawing a "map" on the right hand side of your screen. Once the mouse has learned the maze, it will run back and forth from the entrance to the cheese without taking any wrong turns.

Note: in the programs below, words in *italics* mean press those keys. For example *SHIFT 9* means hold the SHIFT key and press 9. *19 SPACES* means press the space bar 19 times.

COMMODORE 64:

```
10   S1=1065:HL=32:M1=81
20   WL=160:CH=102:O=102
30   DIM P(3)
40   P(0)=1:P(1)=-40:
     P(2)=-1:P(3)=40
50   PRINT CHR$(147)
60   FOR G=1024 TO 1042
70   POKE G,160:NEXT G
80   FOR I=1 TO 22
90   PRINT "SHIFT 9 19 SPACES
     SHIFT 0 1 SPACE "
100  NEXT I
110  POKE S1,4:P=S1
120  D=INT(RND(1)*4):X=D
130  T=P+2*P(D)
140  IF PEEK(T)=WL THEN POKE
     T,D:POKE P+P(D),HL:P=T:
     GOTO 120
150  D=(D+1)*-(D<3)
160  IF D<>X THEN 130
170  D=PEEK(P):POKE P,HL
180  IF D<4 THEN P=P-2*P(D):
     GOTO 120
190  PRINT "SHIFT UP-CRSR
     HIT ANY KEY TO PLACE
     CHEESE IN MAZE"
200  GET C$: IF C$=" " THEN 200
210  X=INT(RND(1)*17+3)
220  Y=INT(RND(1)*19+3)*40
230  IF PEEK(982+X+Y)=32
     THEN POKE (982+X+Y),
     CH:GOTO 250
240  GOTO 210
250  POKE S1,M1:P=S1:D=2
260  T=P+P(D)
270  FOR U=1 TO 20: NEXT U
```

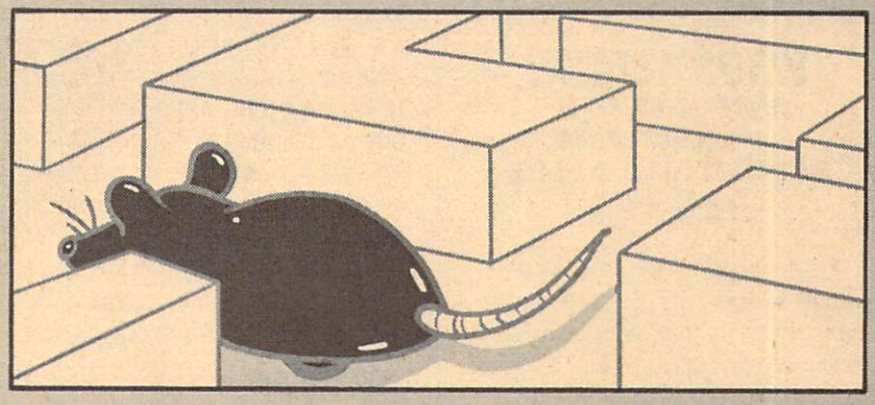
(Program continues on next page)

(Program continued from previous page)

```
280  IF PEEK(T)<>HL THEN
     GOTO 330
290  IF PEEK(T+20)=WL THEN
     FOR U=1 TO 100:NEXT
     U:POKE P+20,24
300  POKE T,M1:POKE P,HL
310  P=T:POKE P+20,WL
320  D=(D+2) +4*(D>1)
330  D=(D-1)-4*(D=0)
340  IF PEEK(T)=CH THEN GOTO
     360
350  GOTO 260
360  PRINT "SHIFT UP-CRSR
     HIT ANY KEY TO SEE
     MOUSE RUN MAZE    "
370  GET C$:IF C$-" " THEN 370
380  S1=P+20:P=S1
390  PRINT "SHIFT UP-CRSR
     HIT Q TO RUN
     ANOTHER MAZE      "
400  T=P+P(D)
410  IF PEEK(T)=WL THEN POKE
     T-20,M1:POKE P-20,
     HL:P=T:D=(D+2)+4*(D>1)
420  GET V$:IF V$="Q" THEN
     RUN
430  D=(D-1)-4*(D=0)
440  GET A$:IF A$=" " THEN
     END
450  GOTO 400
```

ATARI:

```
5    POKE 82,0
10   SC=PEEK(88)+256*PEEK(89):
     HL=0: M1=84
20   S1=SC+41:WL=128:
     CH=208: O=208
30   COM P(3)
40   P(0)=1:P(1)=-40:P(2)=-1:
     P(3)=40
50   PRINT CHR$(125)
```



```
60   FOR G=SC+41 TO SC+59
70   POKE G,160:NEXT G
75   FOR G=SC TO SC+18:POKE
     G,205:NEXT G
80   FOR I=1 TO 22
90   PRINT "ATARI KEY 19
     SPACES ATARI KEY 1 SPACE"
100  NEXT I
110  POKE S1,4:P=S1
120  D=INT(RND(0)*4):X=D
130  T=P+2*(P(D))
140  IF PEEK(T)=WL THEN POKE
     T,D:POKE P+P(D),HL:P=T:
     GOTO 120
150  D=(D+1)*(D<3)
160  IF D<>X THEN 130
170  D=PEEK(P):POKE P,HL
180  IF D<4 THEN P=P-2*P(D):
     GOTO 120
190  PRINT "HIT ANY KEY TO
     PLACE CHEESE IN MAZE";
200  OPEN #1,4,4,"K:":GET #1,Q
210  X=INT(RND(0)*17+3)
220  Y=INT(RND(0)*19+3)*40
230  IF PEEK((SC-42)+X+Y)=0
     THEN POKE ((SC-42)
     +X+Y), CH:GOTO 250
240  GOTO 210
250  POKE S1,M1:P=S1:D=3
260  T=P+P(D)
270  FOR U=1 TO 20: NEXT U
280  IF PEEK(T)<>HL THEN
     GOTO 330
290  IF PEEK(T+20)=WL THEN
     FOR U=1 TO 100:NEXT U:
     POKE P+20,56
300  POKE T,M1:POKE P,HL
310  P=T:POKE P+20,WL
320  D=(D+2)+4*-(D>1)
330  D=(D-1)-4*-(D=0)
340  IF PEEK(T)=CH THEN GOTO
     360
350  GOTO 260
360  PRINT "HIT ANY KEY TO
     SEE MOUSE RUN MAZE    ";
370  GET #1,Q
380  S1=P+20:P=S1
390  PRINT "HIT START TO RUN
     ANOTHER MAZE          ";
400  T=P+P(D)
410  IF PEEK(T)=WL THEN POKE
     T-20,M1:POKE P-20, HL:
     P=T:D=(D+2)+4*-(D>1)
420  IF PEEK(53279)=6 THEN
     RUN
430  D=(D-1)-4*-(D=0)
440  GOTO 400
```

—Douglas Krehbiel

KALEIDOSCOPE: APPLE, ADAM

This program was written by Enter Youth Advisor Philip Millwood, age 15, of Anchorage, Kentucky. It's a short but fun graphics program that creates a video kaleidoscope on your Apple or Adam computer screen.

```
10   GR : READ C
20   FOR J = 0 TO 19
30   FOR I = 0 TO 39
40   L = L + 0.015
50   IF L > 1 THEN READ C:L = 0:
     IF C = - 1 THEN RESTORE
     : READ C
60   COLOR= C
70   PLOT J,I
80   PLOT 39 - J,39 - I
90   PLOT I,J
100  PLOT 39 - I,39 - J
110  PLOT J / 2,I
120  PLOT 39 - J / 2,39 - I
130  PLOT I / 2,J
140  PLOT 39 - I / 2,39 - J
150  NEXT : NEXT
160  DATA 8,9,1,0,13,-1
170  GOTO 20
```

—Philip Millwood

(BASIC Training continues on next page)

(BASIC Training cont. from previous page)

VIRUS ATTACK:

APPLE, ADAM, ATARI, COMMODORE 64, IBM, MICROSOFT BASIC, TI 99 4/A, TRS-80, VIC-20

Here's a game to play while you're cooped up at home with a case of the flu. It may not work as well as a shot of penicillin, but it certainly is more fun.

In this game, you are a white blood cell. Your job is to fight off an invasion of viruses. Each turn, between one and three viruses—all of the same type—get into your blood stream. You must produce the correct antibody to kill them. The problem is that there are 16 different viruses to choose from, and you can only produce four antibodies per turn.

In real life, antibodies and viruses are complex molecules. In "Virus Attack," however, they are only four letters long, and can only be made up of the letters A and B. (To see a list of all the viruses, look at the DATA statements in lines 60 through 90.)

Sound easy? Maybe, but make sure you kill all the antibodies by your sixth turn, or they will mutate to another type.

Here's how the program works. It picks a virus randomly in lines 110 through 140. You select antibodies in lines 170 through 210. Lines 220 checks for a match. The amount of viruses (AMT) is increased in line 250.

Below is the program for Apple and Adam computers. Adaptations for other computers follow.

APPLE, ADAM:

```
10   REM VIRUS ATTACK
20   HOME
30   TURN = 0:HIT = 0
40   AMT = 3:FL = 0
50   GOTO 110
60   DATA "AAAA", "AAAB",
     "AABA", "AABB"
70   DATA "ABAA", "ABAB",
     "ABBA", "ABBB"
80   DATA "BAAA", "BAAB",
     "BABA", "BABB"
90   DATA "BBAA", "BBAB",
     "BBBA", "BBBB"
100  IF TURN < > 6 THEN GOTO
     150
105  REM PICK NEW VIRUS
110  RESTORE
120  FOR X = 1 TO INT ( RND (1) *
     16) + 1
130  READ PICK$ : NEXT X
140  VIRUS$ = PICK$
150  GOSUB 380
155  REM USER GUESS
160  VTAB (17): HTAB (1)
170  PRINT "PLEASE MAKE YOUR
     4 ANTIBODY SELECTIONS :"
180  PRINT
190  HIT = 0
200  FOR SEL = 1 TO 4
210  INPUT AB$
215  REM CHECK FOR MATCH
220  IF AB$ = VIRUS$ AND AMT
     < > 0 THEN AMT = AMT
     — 1:HIT = HIT + 1
230  NEXT SEL
240  IF AMT = 0 THEN GOTO 320
250  AMT = AMT + INT ( RND (1)
     * 3) + 1
260  TURN = TURN + 1
270  IF TURN > 12 THEN GOTO 290
280  GOTO 100
290  HOME
300  PRINT "YOU ARE VERY ILL
     AND NOW HOSPITALIZED"
310  GOTO 340
320  HOME
330  PRINT "YOU HAVE BEATEN
     THE VIRUS!!!"
340  PRINT "PLAY AGAIN? Y/N"
350  INPUT H$
360  IF H$ = "Y" THEN GOTO 10
370  END
380  REM DISPLAY STATUS
390  HOME
400  PRINT "       STATUS
     REPORT       "
410  PRINT
420  IF FL = 0 THEN GOTO 450
430  PRINT HIT; "OF YOUR
     ANTIBODIES WERE
     EFFECTIVE"
440  PRINT
450  PRINT "THERE ARE NOW";
     AMT; "VIRUSES ALIVE"
460  PRINT
470  PRINT "CURRENT
```

(Program continues on next page)

(Program continued from previous page)

```
480  FL = 1
490  INVERSE
500  IF AMT > 21 THEN GOTO
     580
510  ON (AMT / 3) GOTO
     520,530,540,550,560,570,580
520  PRINT "GOOD": GOTO 590
530  PRINT "MODERATE": GOTO
     590
540  PRINT "FAIR": GOTO 590
550  PRINT "FADING": GOTO 590
560  PRINT "POOR": GOTO 590
570  PRINT "UGH !": GOTO 590
580  PRINT "GASP !"
590  IF TURN < > 6 THEN GOTO
     610
600  PRINT : PRINT "CAUTION
     THE VIRUS HAS
     MUTATED!!"
610  NORMAL
620  RETURN
```

IBM PC AND PCjr: Change lines 20, 290, 320, and 390 to: CLS
Delete lines 160, 490, and 610

COMMODORE 64 AND VIC-20:
Change lines 20, 290, 320 and 390 to: PRINT CHR$(147)
Replace these lines:

```
160  PRINT:PRINT:PRINT
490  PRINT CHR$(18);
610  PRINT CHR$(146)
```

TRS-80 MODELS I, III, 4 AND COLOR COMPUTER: Change lines 20, 290, 320 and 390 to: CLS
Delete lines 160, 180, 410, 440, 460, 490, and 610.
Replace these lines:

```
120  FOR X = 1 TO RND(0) *16
250  AMT = AMT + INT(RND(0) *
     3) + 1
```

MICROSOFT BASIC (FOR KAYPRO AND OTHER COMPUTERS): Change lines 20, 290, 320, and 390 to: PRINT CHR$(147)
Delete lines 160, 490 and 610
Add or replace these lines:

```
5    RANDOMIZE
120  FOR X = 1 TO INT(RND *
     16) + 1
290  AMT = AMT + INT
     (RND*3) + 1
```

ATARI: Change lines 20, 290, 320 and 390 to: PRINT CHR$(125)
You must remove all the quotation marks from lines 60, 70, 80 and 90.
Delete lines 490 and 610.
Add this line:

```
5    DIM PICK$(4), VIRUS$(4),
     AB$(4), H$(4)
```

TI 99/4A: Change lines 20, 290, 320, and 390 to: CALL CLEAR
If you do not have Extended BASIC, you must break up all multiple lines.
Delete lines 160, 240, 490 and 610.
Add or replace these lines:

```
5    RANDOMIZE
100  IF TURN <> 6 THEN 150
120  FOR X = 1 TO INT((16*RND)
     + 1)
220  IF AB$ <> VIRUS$ THEN 230
222  AMT = AMT - 1
223  HIT = HIT + 1
224  IF AMT > = 0 THEN 230
225  AMT = 0
235  IF AMT = 0 THEN 320
250  AMT = AMT + INT ((3*RND)
     + 1)
270  IF TURN > 12 THEN 290
360  IF H$ = "Y" THEN 10
420  IF FL = 0 THEN 480
500  IF AMT > 21 THEN 580
590  IF TURN <> 6 THEN 610
```

—Richard Chevat, Daniel E. Cohn

(BASIC Training continues on next page)

CORRECTIONS

In our November issue, line 1150 of Downhill Racer should read:

```
1150 DATA 9,9,9,9,15,9,9,9,9
```

Line 190 of the program for the Postal Pete puzzle should read:

```
190  IF L>0 THEN L = L +
     B(5): B(5) = 0:GOTO 50
```

BASIC GLOSSARY: ON __ GOTO

ON __ GOTO allows a program to choose one of several lines to which it can go. An example would be:

```
80 ON A GOTO 120, 400, 100
```

To execute this statement, the computer first finds the value of variable A. The program will then GOTO the line number whose position in the list equals variable A. In this example, if A equals two, the program will GOTO line 400.

If A equals zero, or it equals a number larger than the list of line numbers, the program will ignore the ON __ GOTO, and move on to the next statement.

Instead of a simple variable, you could insert an arithmetic expression between ON and GOTO. For example, line 510 of "Virus Attack":

```
510  ON (AMT/3) GOTO 520,
     530, 540,550, 560, 570, 580
```

In this case, the computer first figures the value of AMT divided by three. If AMT divided by three equals five (if AMT is 15) then the program will go to the fifth line number, or 560. (Fractions are ignored.)

There is also an ON __ GOSUB command. It works the same way, but returns to the next line in the program after executing the correct subroutine.

One ON__GOTO can replace several IF statements. Make sure to plan for a variable that might be zero or larger than the line list.

(BASIC Training cont. from previous page)

CHALLENGE #12: HOBBY HELPER

If you're reading this, the chances are you're interested in computers. (Unless you're sitting in a dentist's waiting room and couldn't find anything else to do.) But just because you're interested in computers doesn't mean you don't have other interests and hobbies. This month's Challenge is to write a program that will help you with one of your other pastimes.

For example, Will Harvey, the programmer of *Music Construction Set*, once wrote a program that helped his brother organize his baseball card collection. You could do the same thing for anything from postage stamps to old hit singles. Or how about a graphics program that helps you with model airplane building? You could even write a program that keeps track of and monitors your tropical fish tank.

Whatever you come up with, send your program to CHALLENGE #12, ENTER Magazine, CTW, 1 Lincoln Plaza, N.Y., N.Y. 10023.

We will then pick the best programs and print them in BASIC Training. The winners will receive $25 and an ENTER T-shirt.

All entries must be your original work. Remember to enclose a note telling us your name, age, T-shirt size, the computer the program was written for, and a brief description of what the program does.

Entries must be postmarked no later than March 10, 1985. We read every program that is sent in, but because we get hundreds every month, we cannot reply to each of you.

And remember, if you've written any other programs you think belong in ENTER, send them to BASIC Training at the address above. We pay between $25 and $50 for programs we publish.

COMING NEXT MONTH: Programming Challenge #13 will be a contest for all you game designers. It will have different rules than our regular challenge, and a special prize for the winner. Tune in next month for details!

WINNER OF CHALLENGE #9: HI-RES DESIGNER

IBM PCjr OR PC WITH COLOR GRAPHICS CARD

Challenge #9 asked you to create a program that would turn your computer into an artist's tool. This winning program is by Brent Friar of Anaheim, California. Brent's program stood out because of the special features he included.

With this program running, you can use the U,D,L, and R keys to move a line up, down, left or right. (To draw a diagonal line, alternate up or down with right or left.)

The program uses some of the IBM graphics commands like PAINT and CIRCLE to make your drawing easier. For example, just press K to draw a circle. The computer will ask you for the radius, and a circle will appear using your cursor as the center. If you want to color in an area, position your cursor inside the shape to be filled and press F.

Pressing M allows you to move without drawing (or to erase). The B key turns your "pen" on again. P changes the color you are drawing in and C clears the screen.

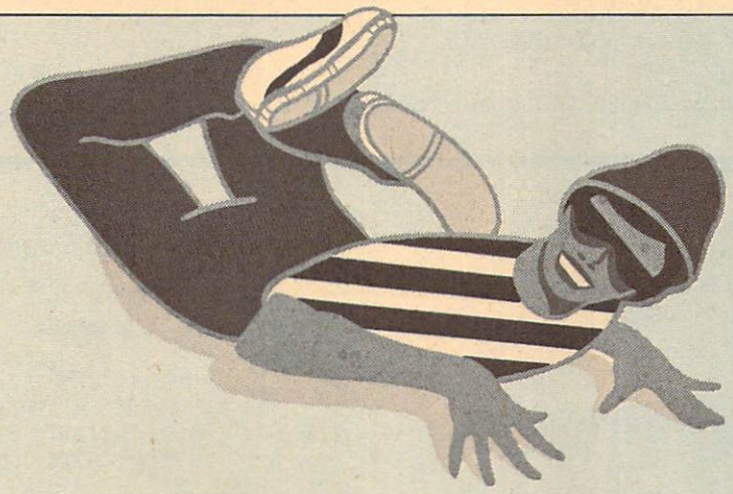
```
10  REM HI RES
20  Z=3
30  KEY OFF
40  SCREEN 1:CLS
50  X=160:Y=100
60  CLS
70  PSET(X,Y),Z
80  A$=INKEY$:IF
    A$=""THEN 80
90  IF A$=CHR$(85) THEN
    GOTO 240
100 IF A$=CHR$(76) THEN
    GOTO 250
110 IF A$=CHR$(82) THEN
    GOTO 260
120 IF A$=CHR$(68) THEN
    GOTO 270
130 IF A$=CHR$(67) THEN
    CLS:X=160:Y=100:GOTO 70
140 IF A$=CHR$(77) THEN
    GOSUB 290
150 IF A$=CHR$(80) THEN
    GOSUB 470
160 IF A$=CHR$(75) THEN
    GOSUB 510
170 IF A$=CHR$(70) THEN
    GOSUB 570
180 GOTO 70
190 X=X+DX:IF X>319 THEN
    X=0
200 IF X<0 THEN X=319
210 Y=Y+DY:IF Y>199 THEN
    Y=0
220 IF Y<0 THEN Y=199
230 GOTO 70
240 DX=0:DY=-1:GOTO 190
250 DX=-1:DY=0:GOTO 190
260 DX=1:DY=0:GOTO 190
270 DX=0:DY=1:GOTO 190
280 END
290 PSET(X,Y)
300 C$=INKEY$:IF C$=""
```

(Program continues on next page)

(BASIC Training cont. from previous page)

```
     THEN 300
310  IF C$=CHR$(85) THEN
     GOTO 430
320  IF C$=CHR$(76) THEN
     GOTO 440
330  IF C$=CHR$(82) THEN
     GOTO 450
340  IF C$=CHR$(68) THEN
     GOTO 460
350  IF C$=CHR$(66) THEN
     RETURN
360  GOTO 300
370  PRESET(X,Y)
380  X=X+DX:IF X>319 THEN
     X=0
390  IF X<0 THEN X=319
400  Y=Y+DY:IF Y>199 THEN
     Y=0
410  IF Y<0 THEN Y=199
420  GOTO 290
430  DX=0:DY=-1:GOTO 370
440  DX=-1:DY=0:GOTO 370
450  DX=1:DY=0:GOTO 370
460  DX=0:DY=1:GOTO 370
470  LOCATE 22, 1:INPUT
     "WHICH COLOR 1,2,3";Z
480  IF Z>3 OR Z<1 THEN 470
490  LOCATE 22,1:PRINT "
                        "
500  RETURN
510  LOCATE 23,1:INPUT "WHAT
     IS THE RADIUS";R
520  LOCATE 23,1:PRINT "
                        "
530  PI=3.141593
540  CIRCLE (X,Y),R,Z,PI,2*PI
550  CIRCLE (X,Y),R,Z,2*PI,PI
560  RETURN
570  LOCATE 22,1:INPUT
     "WHICH COLOR DO YOU
     WANT TO PAINT IN 1,2,3";Q
580  LOCATE 22,1:PRINT "
                        "
590  PAINT (X+1,Y),Q,Z
600  RETURN
```

—*Brent Friar*



BREAK DANCING: TI 99 4/A

Now your computer can join the latest craze to sweep the nation! That's right, your TI 99 4/A can breakdance (sort of). Just run this program by Travis Works, age 12, of Ringgold, Georgia, and you will see five small breakdancers on your screen. Press any one of the number keys and the break-dancers will do a different step. Hold a key down and four of them will keep dancing while the leader holds his pose. You can also let the computer do the directing.

Of course, this program would be even better if it had its own music. Try adding sound without slowing down the dancers.

```
5    REM BREAKDANCERS
10   RANDOMIZE
20   GOSUB 250
30   PRINT "BREAKDANCING!"
40   PRINT "HUMAN OR
     COMPUTR CONTROL?"
50   INPUT CON$
55   CALL CLEAR
60   IF CON$ = "HUMAN" THEN
     120
70   BD = INT (RND*5) + 153
80   CALL KEY (0,W,E)
90   IF E = 1 THEN 120
100  GOSUB 180
110  GOTO 70
120  CALL KEY (0,B,D,N)
130  IF N = 0 THEN 120
140  IF BD = 32 THEN 70
150  BD = BD + 102
160  GOSUB 180
170  GOTO 120
180  CALL VCHAR (12,10,
     BD-(INT(RND*2))+1)
190  CALL VCHAR (12,12,
     BD + (INT(RND*2))+1)
200  CALL VCHAR (12,16,BD)
210  CALL VCHAR (12,20,
     BD + (INT(RND*2)) + 1)
220  CALL VCHAR (12,22,
     BD + (INT(RND*2)) + 1)
230  RETURN
240  GOTO 120
250  REM CHARACTERS
260  CALL CHAR (151,
     "0000000004B84438")
270  CALL CHAR (152,
     "0000824438383854")
280  CALL CHAR (153,
     "0010FE38384482")
290  CALL CHAR (154,
     "8090FC3A39484808")
300  CALL CHAR (155,
     "0000000000847936")
310  CALL CHAR (156,
     "00107CBA7C281808")
320  CALL CHAR (157,
     "1424247838")
330  CALL CHAR (158,
     "41493E1C12214")
340  CALL CHAR (159,
     "40281E1D141414")
350  RETURN
```

—*Travis Works*

(BASIC Training continues on next page)

(BASIC Training cont. from previous page)

MELT AWAY: TRS-80 MODELS I, III AND 4

This program for TRS-80 models I, III and 4 lets you make nothing out of something. It "melts" away characters on your video screen until the screen is blank. As the letters and graphics vanish, they twist and twirl in patterns. All you have to do is type it in and run it.

```
10   DEFINT A-Z : DEFSNG S
20   F$=" ":G$=" "
30   DIM A(13)
40   S = 0
50   FOR J = 0 TO 13
60   READ A(J)
70   S= S + A(J)
80   NEXT
90   IF S <>11005 THEN PRINT"I
     THINK YOU MADE A
     MISTAKE IN TYPING THE
     DATA.":END
100  D = 100
110  V = VARPTR(A(0))
120  MS=V/256:LS= Y-256*MS
130  IF PEEK(16396)=201 THEN
     POKE 16526,LS: POKE
     16527,MS ELSE DEFUSR = V
140  FOR S = 1 TO D: NEXT
150  J=USR(0)
160  REM LOOP
170  IF J =1 THEN 140
180  F$ = CHR$(153) +
     CHR+$(179) + CHR$(166)
190  G$ = CHR$(158) +
     CHR+$(191) + CHR$(173)
200  FOR S = 0 TO 30
210  PRINT @ RND(1020), F$;
220  PRINT @ RND(1020), G$;
230  NEXT
240  FOR S = 1 TO D : NEXT
250  J = USR (0) : IF J = 1 THEN
     240
1000 DATA 33,316,1024,22,
     -386,10272,
     5635,13569
1010 DATA 2851,-20104,
     -3552,27232,
     -25917,10
```

—David Lewis

STAR DESTROYER: T/S 1000, 1500, 2068

In this game for Timex-Sinclair computers, you must defend your planet from an invasion of deadly neutron stars. You move your ship to the right with the 8 key and left with the 5 key. To fire your photon torpedo, press the 0 key. But there is one catch. If you fire and don't hit a star, your torpedo will bounce off an invisible force field—and destroy you!

You have one other problem. Your photon cannon is malfunctioning. Instead of shooting just one torpedo at a time, it will fire anywhere from one to seven. And your ship can't move while the torpedo is moving, so if it bounces back, you can't get out of the way.

Here's a strategy hint: start firing at rows with more than seven stars in them. Then work your way down to rows with six, five, etc. This will decrease your chance of firing an "extra" torpedo.

This game was sent in by James Torre, 15, of Springfield, Massachusetts. James tells us that his high score is 12,936.

```
5    REM STAR DESTROYER
10   FAST
20   CLS
30   LETS S=0
40   FOR X=0 TO 19
50   PRINT "■■■■■■■■■■
     ■■■■■■■■■■■■■■
     ■■■■■■■■■■■"
60   NEXT X
70   FOR X=1 TO 224
80   PRINT AT 19*RND, 31*RND;
     "■"
90   NEXT X
100  SLOW
105  REM CURSOR
110  LET R=20
120  LET C=16
130  PAUSE 0
140  GOTO 160
150  PRINT AT T,D;"  "; AT
     R,C;"="
160  LET D=C
170  LET T=R
180  LET C=C+(1 AND C<>31
     AND INKEY$="8")-(1 AND
     C<>0 AND INKEY $="5")
190  IF INKEY$<>"0" THEN
     GOTO 150
200  FOR X=1 TO INT (7*RND+1)
210  LET B=R
220  LET B=B-1
230  PRINT AT B,C; "■"; AT
     B-1,C;
240  LET P=PEEK (PEEK
     16398+256* PEEK 16399)
250  IF P=151 THEN GOTO 290
260  IF P=20 THEN GOTO 350
270  PRINT "■"
280  GOTO 220
290  FAST
300  LET S=S+1
310  PRINT "■"
320  SLOW
330  NEXT X
340  GOTO 150
350  LET S=S*2*(PEEK
     16437-128)
360  PRINT AT 3,5;"GAME
     OVER...SCORE:";S
370  PRINT AT 6,9;"
          "; AT 6,9; "PRESS
     ANY KEY"
380  IF INKEY$="" THEN GOTO
     370
390  CLS
400  PRINT AT 9,0; "WOULD YOU
     LIKE TO PLAY AGAIN?"
410  IF INKEY$="" THEN GOTO
     410
420  IF INKEY$="Y" THEN RUN
```

—James Torre

BASIC PLUS:

Top-Down Programming

BY MARK SUTTON-SMITH

One of the greatest things about home computers is that you can make them do what *you* want. (Up to a point, anyway. They still won't take out the garbage.) By writing a program, you can "customize" your computer—turn it into a calculator, a game player or a filing system.

There are, however, a thousand different ways to write any program. And different approaches can yield very different results. If you don't know what you're doing, a program that goes bloop and makes the screen flash can take 85 lines. But with a few simple guidelines, those same 85 lines will produce a marching spaceman singing "Beat It."

How do you decide on the best way to write a program? This month, I'm going to introduce you to an idea called *top-down* programming. It's easy, and will greatly improve your programming prowess.

All *top-down* means is that you start at the top with a general outline of the program, then work your way down filling in the details. Before you type a single line, divide your program up into its main parts. You'll need at least three sections in any program:

1) The beginning. Here you set up your screen, give instructions, and set up any variables you'll need. This part is also called the *initialization*.

2) The mainline. Most of the action takes place here. The mainline is where your program does the job for which you designed it. It is usually a loop of some kind.

3) The cleanup. This is where you report on scores and close files or peripherals. In this part, you also give the user a chance to run the program again.

© CAMERON WASSON

HOW IT WORKS

Say you're writing a program that lets the player use the joystick to drive a little man around the screen and make noises. In this case, the initialization would consist of turning on the graphics mode, setting the colors, setting up the sound (if necessary), and constructing the picture of the little man, perhaps from data statements. Then the mainline would do most of the work, checking the joystick, moving the man if necessary, and blooping. The cleanup would give the user a chance to quit.

In your first version of this program, your mainline loop might just be a REM statement: REM Mainline. This gives you a chance to test your start-up and clean up routines. The idea is to first construct a skeleton, then write and test one part at a time.

Your mainline should be divided up in the same way. You might have one subroutine for input (the joystick), another subroutine to change the position of the man, and a third to make the blooping noise. Get in the habit of writing and testing one subroutine at a time.

As usual, doing it the right way requires more work at the beginning. You have to think through your program and learn to pick out the important sections. But this method will save you a lot of time when you're actually writing, and it makes your programs easier to change later on. You'll have those spacemen beating a tune in no time.

MARK SUTTON-SMITH is an ENTER contributing editor.

ASK ENTER

BY RICHARD CHEVAT

QWERTY VS. DVORAK

DEAR ENTER: What is the Dvorak keyboard? I heard the Apple IIc has one. —Eliza Hutchinson, South Deerfield, NH

DEAR ELIZA: Believe it or not, the common arrangement of keys on typewriter keyboards was created to *slow down* typists. In the earliest typewriters, keys would get jammed because they weren't moving fast enough for a good typist. As a result, the "Qwerty" keyboard was developed to make typing more complicated. (The name Qwerty comes from six letters on one row of the keyboard.)

The Dvorak keyboard was designed to make typing easier and faster. Although it is not new, it recently has been gaining popularity. Here are some reasons:

- The fingers of a Dvorak typist travel one mile in eight hours compared to 16 miles on a Qwerty.
- Getting up to 40 words a minute takes one-tenth the time for a beginner using the Dvorak.
- Guiness Book of Records typing champ Barbara Blackburn can reach 200 words a minute with the Dvorak.

The Apple IIc comes with the keys arranged QWERTY style. But if you press a button, the IIc changes to Dvorak. Dvorak keyboards are also available for the IBM PC and the Wang PC. Software may come out soon to convert the Macintosh to Dvorak.

© COURTESY APPLE COMPUTER, INC.

The 3½" disk: A harder floppy.

A NEW TWIST TO THE DISK?

DEAR ENTER: I've read that the Apple Macintosh has its own kind of disk. It is smaller and looks nothing like a normal disk. I would like to know if you can use a normal disk on the Macintosh. —Derek Hall, Chicago, IL

DEAR DEREK: When you say "normal," you probably mean a 5¼" floppy disk. That is the size that fits most home computer disk drives. Yes, the Macintosh has a new 3½" disk drive. No, you cannot fit a 5¼" disk in it.

This new type of drive was developed by the Sony corporation, and it takes a new, smaller disk. Instead of a soft, flexible (or floppy) covering, the 3½" disk comes in a hard plastic case. Inside is the same magnetic material as the old floppy, but you can't touch it—there is no hole in the center or along the side. Instead, part of the case retracts inside the drive. The 3½" disk can hold as much or more data as 5¼" floppies.

ANY PORT IN A STORM

DEAR ENTER: What is a computer port? And what's the difference between serial and parallel ports? —Katie Mulligan, Albany, NY

DEAR KATIE: A port is the place on the computer where you plug in peripherals. A peripheral can be anything from a printer to a joystick to a telephone modem.

There are generally two types of ports—serial and parallel. These terms simply refer to the way information is sent to and from the computer and the peripheral.

Information runs through a computer in groups of eight bits. When these bits of information are travelling eight abreast, they are in a parallel formation. A parallel port can handle all eight bits at once, and so can transmit data very quickly.

A serial port, however, can only handle a single bit at a time. To transmit information between the computer and the peripheral, it must act as a kind of funnel, forcing the eight parallel bits to squeeze into a single-file line.

RICHARD CHEVAT is ENTER's Technical Editor.

If you have a question about computers, write to: ASK ENTER, ENTER, CTW, 1 Lincoln Plaza, New York, NY 10023.

RANDOM ACCESS

MY COMPUTER-CRAZY FAMILY

© KEVIN HORAN

In my family, we never fight over the computer—we've got 10!

BY LISA SUBECK, 13

In my family, *everyone*'s a hacker. My parents, my brother and I own 10 computers. All together, we've got four Atari 800s, four Atari 400s, two TRS-80s, and an assortment of disk drives, cassette recorders, monitors, printers and modems. Everything in our house—recipes, phone numbers and addresses, our finances, school grades, medical records—can be found on the computer.

My grandparents think we're completely bananas. My friends just think I'm lucky.

It wasn't always like this. Four years ago, dad was the only one interested in computers. He worked with one in his office. But one weekend, he came home with a TRS-80 Model III. He was considering getting a compatible machine so he could spend more time at home.

My brother Scott and I needed no convincing. We had worked on computers at school. Mom was the only doubter. "Why do we need one?" she asked. "Is it worth the money?"

It looked like our home computer might not happen. But then Mom started playing Scott Adams's *Adventure* on Dad's borrowed Model III. Once the game was loaded, my brother and I couldn't get *near* the machine. The very next day, we bought our own Model III.

With Mom and Dad so wrapped up, getting our homework done on the computer—forget about playing video games!—was impossible. So, soon after buying the Model III, we bought a Model I, with disk drive and modem.

Two machines were fine...for a while. Then Mom noticed Scott Adams adventures were coming out with color graphics. Before we knew it, we were the owners of an Atari 800 with color capabilities.

With all this equipment, we had everything we needed to start a bulletin board(BBS). So a year ago, we started our own.

We've all become more serious about computers. My mom now writes for *Antic*, Atari's monthly magazine. Scott and I each have a machine in our rooms for doing homework (and playing games, of course). The bulletin board is running 24 hours a day. And everyone programs in at least one computer language.

It's great being in a computer household, but there *are* drawbacks. For one thing, electrical storms make the whole family go nuts. The BBS goes down and everything has to be rebooted. There's also a space problem. We've had to rearrange the furniture with every new machine. And there are never enough outlets or extension cords for the peripherals.

Even when we leave home, there are problems. Most families go out of town and wonder if they've remembered to disconnect the coffee pot. We wonder if we've remembered to turn off the disk drives and monitors.

Life in a computer family can be complicated.

LISA SUBECK lives near Chicago.

PENCIL CRUNCHERS

HOLLYWOOD GOES COMPUTER

F O R B I D D E N P L A N E T A A R
R B C A E D I I I N A M R E P U S D
E W E S T W O R L D E C A U Z D P P
C L O S E E N C O U N T E R S C A A
D O A M S I L O P O R T E M B O C R
R G L O B W O D E S K S E T L E E I
E A H O E I H E S E E E M S U P O G
A N T N S L A M R M R N W O E A D L
M S E R R S R O A A T O B E T C Y B
S R R A O L U N W G R W L F H S S M
C U M K R N I S R R A S D C U M S E
A N A E Y T D E A A T H I L N R E V
P E N R A H E E T W S T Q U D E Y K
E C P T N E S D S P A F J R E R H N
T H E B L A C K H O L E G K R D J N
S M A E R D C I R T C E L E S E H T

It seems like you can't see a movie these days without also seeing a slew of computerized special effects. Computers and robots have become commonplace as leading...er...men.

This month, ENTER turns to Hollywood for the word hunt theme. Get a pencil and see if you can find all 20 high-tech themed films listed here. They're hidden across, up and down, and diagonally. See page 40 for the solution.

—Rebecca Herman

BLUE THUNDER
CLOSE ENCOUNTERS
COLOSSUS
DEMON SEED
DESK SET
DREAMSCAPE
ELECTRIC DREAMS
FORBIDDEN PLANET
LOGAN'S RUN
METROPOLIS
MOONRAKER
SLEEPER
STAR TREK
STAR WARS
SUPERMAN III
THE BLACK HOLE
TRON
(2001) A SPACE ODYSSEY
WARGAMES
WESTWORLD

COMPU-TALK WORD SCRAMBLE

How's your computerese these days? Before you answer, take this hacker talk test. All you've got to do is rearrange the mixed-up letters in the five words below so they match the definitions on the right. Ready? Run. *(Answers on page 40)*

1. **TYMEAGEB** ____ ____ ____ ____ ____ ____ ____ ____ — One million bytes.
2. **SOEMU** ____ ____ ____ ____ ____ — Gadget that attaches to a computer and controls the cursor.
3. **DARPOSWS** ____ ____ ____ ____ ____ ____ ____ ____ — Code of letters and/or numbers that gives you access to a file.
4. **KEEP** ____ ____ ____ ____ — Read contents of a memory location.
5. **LIOCISN** ____ ____ ____ ____ ____ ____ ____ — Material used to create microchips.

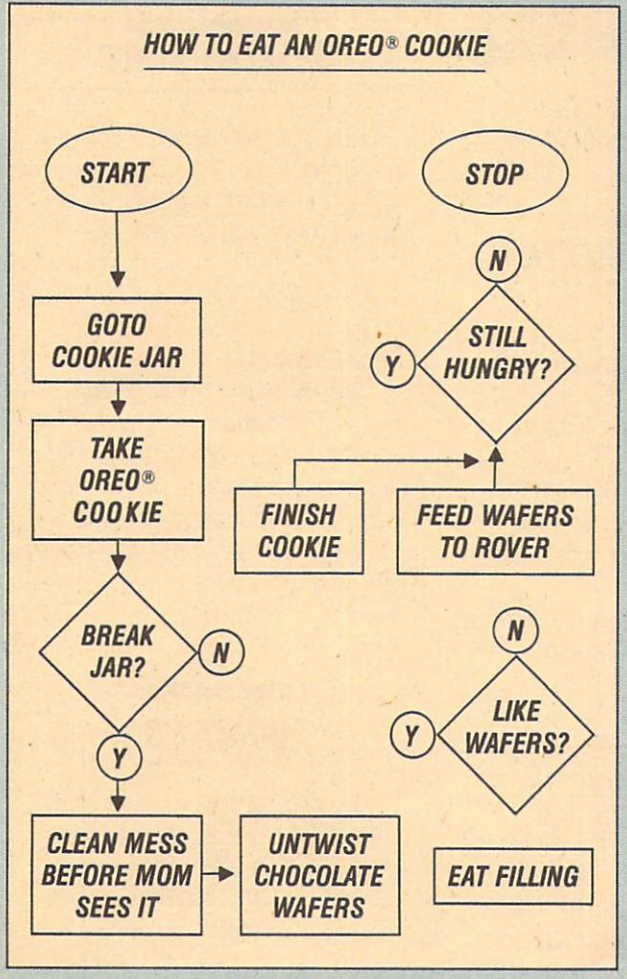
PENCIL CRUNCHERS

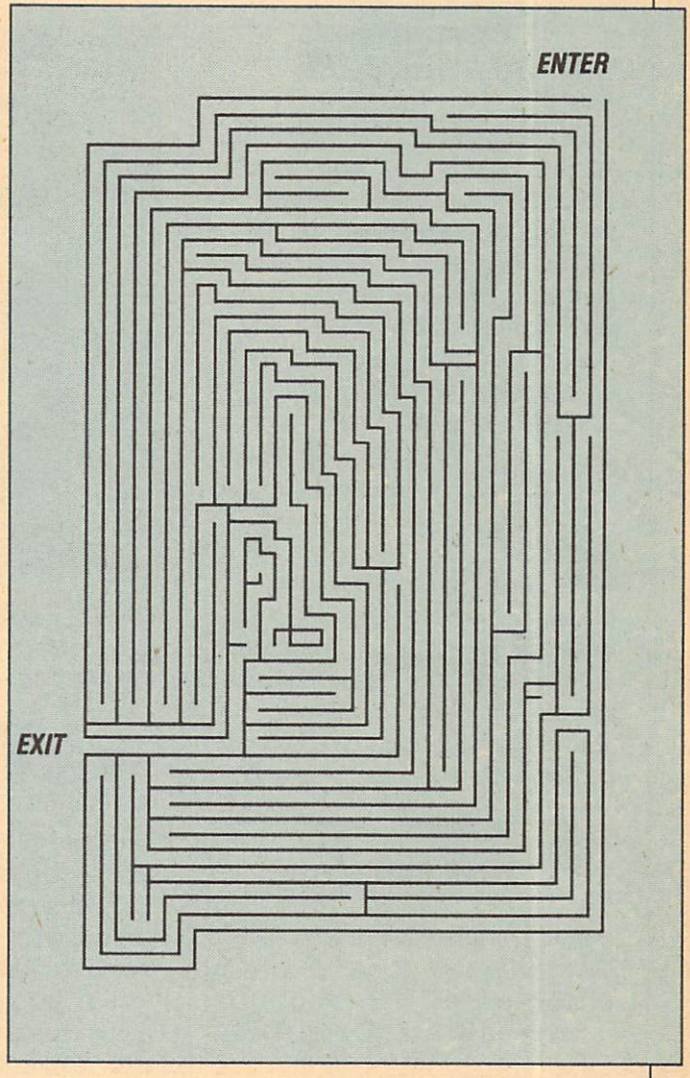
FRACTURED FLOWCHARTS

If there are arrows, boxes and decision points, you *know* what you're looking at—a flowchart. You've probably written a few of these computer roadmaps yourself to help you structure a program. You may have even played "Mystery at Flowchart Manor" in December's ENTER.

Well, here's a *fractured* flowchart. As if they weren't confusing enough, we're giving you a comical chart with problems. Some of the key arrows in this program map are missing. Your mission, should you accept, is to put them back where they belong.

Check your answers on page 40. Happy charting!





MADE TO A-MAZE

By now, you're probably familiar with ENTER Youth Advisor Bela Selendy's computer-generated mazes. Here's one of Bela's more modest creations, made on an Apple IIe. Can you find the one path that leads from ENTER to EXIT? Good luck!

FEEDBACK

NO NERDS HERE

I'm writing about the "Random Access" article ("I'm Not A Nerd") in your October issue. We have computers at our school and the situation is exactly the opposite of your story. The kids who use computers aren't nerds. Anyone who *doesn't* like computers is considered a nerd. I find this confusing. What do you think?

—Lori Summers
Janesville, WI

Dear Lori:

We think that people who use computers are not nerds, and that people who don't use computers are not nerds. The only nerds are people who call other people nerds. Does that clear up the confusion? —Ed.

TIME FOR T.I.

How come in your "User Views" section there are no games for the T.I. computer? —Shawn Smith
Dallas, Texas

Dear Shawn:

We try to cover the newest games in "User Views." Since Texas Instruments stopped making home computers, there haven't been many new T.I. games released. But we're still trying to help T.I. owners like you. Our January/February "Connections" column ("Disappearing Computers") should help you stay in touch with the latest news about T.I. software. And, of course, you'll find T.I. programs in every issue in our "BASIC Training" section. —Ed.

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CRUNCHER CORRECTION

In the "Pencil Crunchers" of your Jan./Feb. 1985 issue of ENTER, there was a mistake in the answer. In order to correctly complete the puzzle ("Perplexing Pixels," page 57), on the first line of the puzzle you must only go eight blocks from the left instead of nine blocks.

—Kim Edger
Philadelphia, PA

Dear Kim:

The problem with perplexing pixel puzzles is that even the puzzle planners can be perplexed by the pixel plan. Which is to say, you're right. We goofed on the answer page. Thanks to all the sharp-eyed readers who wrote in with this correction. —Ed.

I AM NOT A NERD, PART II

I read the "Random Access" "I'm Not a Nerd." And I agree with Shelley Zulman.

The people who are against the kids who like computers don't know what fun they are missing. You don't have to be smart to use a computer, just ready to learn. Computers are terrific learning tools. They can be fun, too.

—Melissa Maxson
Zephyrhills, FL

MISSING 'STATE'

I love your magazine. But I have one objection: I haven't seen your "State of the Art" feature since April. Could you bring it back?

—Michael Dumas
Washington, MI

Dear Michael:

Thanks for the compliment, and rest assured that we've got several "State of the Art" articles in the works. For instance, you'll soon read about the latest wristwatch technology—tiny high-tech wrist radios and TVs that would make even Dick Tracy jealous. —Ed.

WRITE US!

ENTER wants to hear from you! Our CompuServe ID is 72456,1776. Or write to us at ENTER, 1 Lincoln Plaza, New York, NY 10023.

INPUT

ENTER POLL #8

We'd like to find out about you, your experiences with computers, and how you liked (or didn't like) this month's issue of ENTER. We'll send ENTER T-shirts to 25 of you, picked at random.

Mail your questionnaire by March 10, 1985, to: ***INPUT #8, ENTER Magazine, P.O. Box 777, Ridgefield, N.J. 07657***

I. Tell us about yourself:

Name_____

Address_____

City_____ State & Zip_____

Grade___ Age___ Male___ Female___

T-shirt size Kids L ___ Adult S ___ M ___ L ___

II. We'd like to know about you and computers:

A. Does your family own a computer?
___ No, but we plan to buy one in the near future.
___ No, and we have no plans to buy one at this time.
(If you answered "No," GOTO section ***III.***)
___Yes. What kind?

Adam___ Apple___
Timex/Sinclair___ Atari___
IBM___ Commodore 64___
T.I. 99/4A___ VIC-20___
Other (Indicate make and model)_____

B. What peripherals does your family own? (Check all that apply)

Video game player___ Cassette drive___
Disk drive___ Joysticks___
Light pen___ Modem___
Speech Synthesizer___ Mouse___
Touchpad___ Printer___
Other___ (Explain)_____

III. Have you, or anyone you know, ever used an electronic bulletin board? Yes___ No___
(If you answered "No," GOTO section ***IV***.)

A. What got you interested in using a bulletin board?
Article in a magazine or book___ Another user___
Other___ (Please specify)_____

B. How long have you been using bulletin boards?
Less than 1 year___ 1-2 years___
More than 2 years___

C. What types of information do you exchange with other bulletin board users? (Check all that apply)
Programming___ Game playing___
Computer equipment___
Other___ (Please specify)_____

D. Do you or your family subscribe to an information network? Yes___ No___
If yes, which one? The Source___ CompuServe___
Other___ (Please specify)_____

IV. We'd like your opinion about stories in this issue.

	Liked It	OK	Didn't Like It
Bill Budge	____	____	____
StarTech: Space Shuttle	____	____	____
Keyboard Camping	____	____	____
Picking a Printer	____	____	____
Cursor, Foiled Again!	____	____	____

Have you ever gone to a computer summer camp?
Yes___ No___
Are you planning on attending one this summer?
Yes___ No___ If yes, which one?_____

Do you like the new ENTER Center section?
Yes___ No___
Did you try any of the programs in BASIC Training?
Yes___ No___ If yes, which ones?_____
_____
Did you get them to work? Yes___ No___

V. Last, but not least: In future issues of ENTER, I'd like to read about _____
_____
_____
_____

ANSWERS

HOLLYWOOD GOES COMPUTER (Page 36)

F O R B I D D E N P L A N E T A A R
R B C A E D I I I N A M R E P U S D
E W E S T W O R L D E C A U Z D P P
C L O S E E N C O U N T E R S C A A
D O A M S I L O P O R T E M B O C R
R G L O B W O D E S K S E T L E E I
E A H O E I H E S E E E M S U P O G
A N T N S L A M R M R N W O E A D L
M S E R R S R O A A T O B E T C Y B
S R R A O L U N W G R W L F H S S M
C U M K R N I S R R A S D C U M S E
A N A E Y T D E A A T H I L N R E V
P E N R A H E E T W S T Q U D E Y K
E C P T N E S D S P A F J R E R H N
T H E B L A C K H O L E G K R D J N
S M A E R D C I R T C E L E S E H T

COMPU-TALK WORD SCRAMBLE (Page 36)

M E G A B Y T E

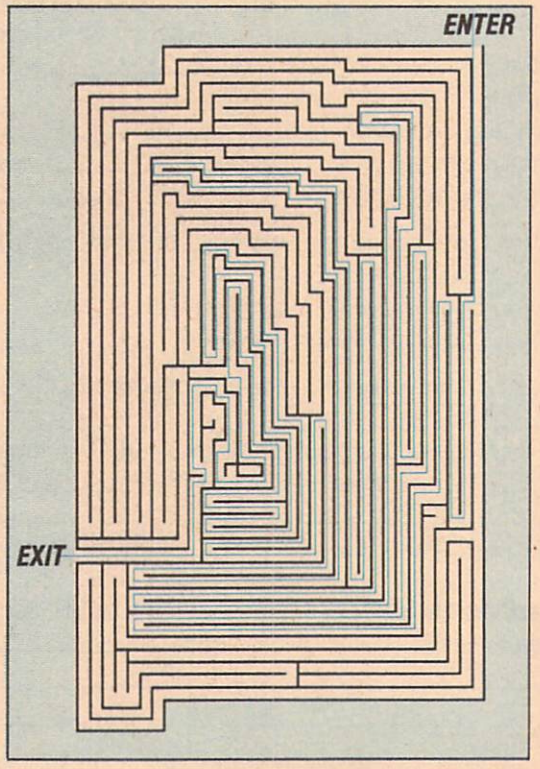
M O U S E

P A S S W O R D

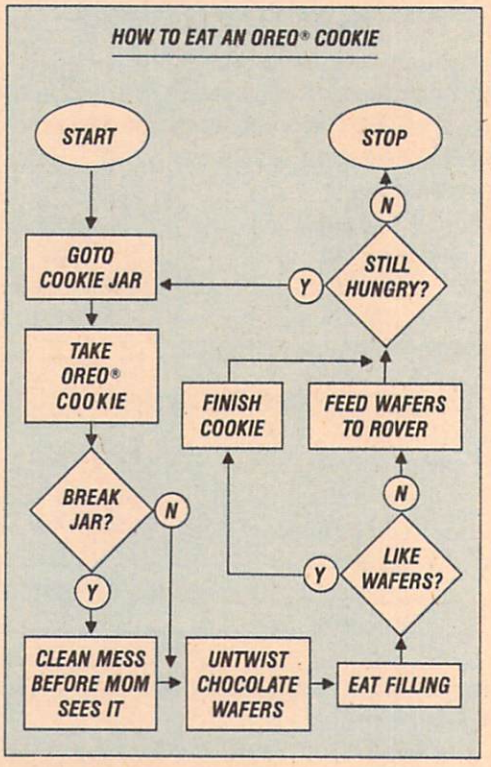
P E E K

S I L I C O N

MADE TO A-MAZE (Page 37)



FRACTURED FLOW CHARTS (Page 37)



(Continued from page 7)

SPELUNKER

(Brøderbund; Atari, Commodore 64, $29.95)

Remember *Pitfall II* and *Montezuma's Revenge*? Well, here's another underground treasure hunt. Unfortunately, *Spelunker* adds nothing new.

There are six levels of caverns to explore, each made up of dozens of different "rooms" connected by tunnels, ropes, and elevators. Your character can walk, jump, climb, shoot ghosts, scare off bats with flares, and remove rockpiles with dynamite.

The game offers variety. But

once you've done these things in other games, there's nothing special about doing them here.

WRAP-UP

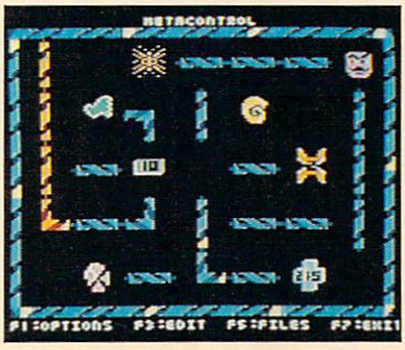
BERNIE: The world of *Spelunker* is strategically deep. If only there were something new to the experience, I would have enjoyed it.

PHIL: The maze itself is complex, but it's just the same game again.

LIGHTWAVES

(CBS Software, Commodore 64, $34.95)

[Because ENTER's Bernie DeKoven was the designer of *Lightwaves*, Phil wrote this review alone.]



Lightwaves is a system for creating and playing maze games. You guide your "light rider" to a single light source, but you do not move him. Instead, you rearrange light beams to create a path for the rider to follow. There are pre-programmed rectangular tracks around the screen. The light rider automatically moves in the direction of the track it is on. With a certain amount of fidgeting, you can create a pathway that will lead the light rider to the light source.

Lightwaves is a nice combination of mental and physical dexterity. Graphics could have been better, but the music is excellent.

WRAP-UP

PHIL: There are lots of ways to play with *Lightwaves*. It isn't just another mindless exercise.

PQ: THE PARTY QUIZ GAME

(Suncom, Commodore 64/Atari; $69.95; Apple II, $74.95; IBM version planned.)

How do you review a game called *The Party Quiz Game*? You throw a party, of course. As dedicated game reviewers—and partygoers—the ENTER staff recently sat down to play this trivia game software. Here's what happened:

JIM: This was just like being on a TV game show. I expected to get hugged by Richard Dawson at any moment. Questions flash on the screen and you've got to be the first to hit the right button on your special controller.

RICHIE: The four controllers, which come as part of the *PQ* package, really add to the game. You have to know the right answers *and* have quick reflexes.

IRA: I also liked the fact that you could only guess once. If you picked the wrong answer, you couldn't play again until the next question.

PAT: Sometimes, all you could do was guess. As in any trivia game, you have to know a wide range of trivial facts—from old movies to the number of knees on a giraffe.

JESSICA: But some questions were too obscure. And sometimes you'd be paying so much attention to the question, you hit the wrong answer button.

RICHIE: Suncom is coming out soon with new entertainment and sports questions on separate disks. As long as you can plug in new questions, it will be fun to have your own TV game show at home.

PAT: How many knees does a giraffe have, anyway?

AN ADVENTURE INSIDE THE COMPUTER

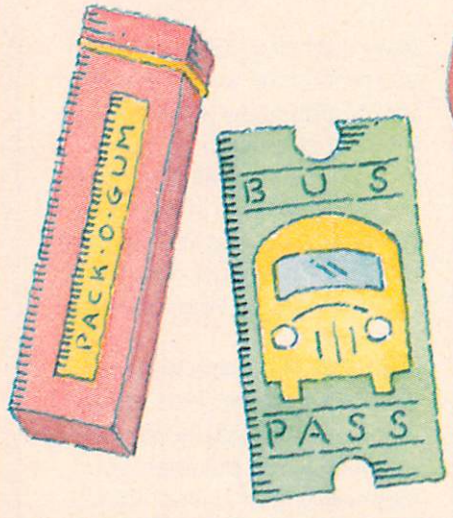
CURSOR,

BY JIM LEWIS

You are about to embark on the adventure of a lifetime. This month, a confrontation with Cursor awaits you. Next month, we'll show you how to program this adventure into your computer.

Before you start, a few words of advice:

- Keep track of where you go.
- When asked to choose to take this or that, choose carefully. Remember what you've taken.
- Don't just stand there! Head to Box 1...and be ready to jump to the following pages, where your fate may be decided!



1 You're standing in the school's computer room when... ZAAAAAAAAAAAAAAAAAP!!!!

...a blue beam of light zings you from behind. At first you think it's "Mean" Marty Kochunkle, the school tough guy. But wait—"Mean" Marty zaps with erasers, not blue beams.

Suddenly, you notice that the chairs, desks and computers are growing bigger. But it's not the furniture, it's you. You are getting smaller. Yikes!

Smaller and smaller. Tinier and teenier. Mini and micro. Yes, you've shrunk to the size of a microchip. And then you realize what's happened: you've been attacked by Cursor, the evil one-eyed overlord of the computer underworld. Cursor makes Marty Kochunkle look like a boy scout.

You've heard about this evil Cursor. You've even seen his eye blinking behind the computer screen. The users' manual isn't going to help. You'll need to get in the computer, track down Cursor, and find the reverse-blue beam that will bring back the wonderful full-sized version of you.

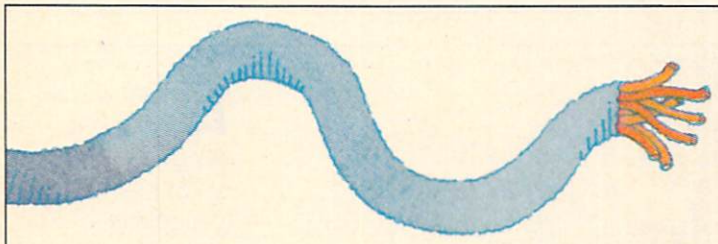
Rrrrrrring!!!! Classes are changing. Better get going or you'll be trampled. You'll have to pick up some help along the way. Remember to keep track of what you take. Now, take one of these things:

- a pack of chewing gum;
- a bus pass, or
- a rubber band.

Take one. Hurry! Try to figure out which computer Cursor is hiding in. It's either the Widgee Model X, the Loopins 1-2-3 or the Fazoozle XT computer.

- If you choose the Widgee, go to Box 11
- If you choose the Loopins, go to Box 18
- If you choose the Fazoozle, go to Box 14

FOILED AGAIN!



2 A blue beam comes from a blue box. It's dark inside the Loopins computer, but you're on the right track. Up ahead you see...

A blue wire.

Take it—and remember where and when you got it.

Following Cursor's blink you turn a corner and... Disk must be the place. Disk Drive, that is. Cursor went into the Loopins' built-in disk drive. But it's so dark it's difficult to see. You need to find some light before someone boots a floppy disk and sets you spinning. The green glow of a computer display sure would help. In fact, it would be key!

But as you bump along, all you find are three ports. You can barely make out the letters: MDM, KBD, CRT. Which one do you want to go through?

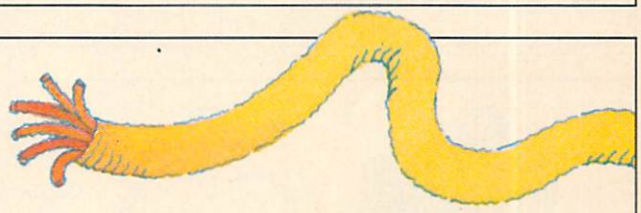
- If you decide on the MDM port, go to Box 16
- If you decide on the KBD port, go to Box 9
- If you decide on the CRT port, go to Box 8

3 With the input key you can turn on the screen. By the glow of the screen you see... *A green wire.*

Take it—and remember where and when you got it.

There's also a message on the screen: "Cursor was here!!!" And there's something else written—a riddle: "If you want again to be full-sized, then catch me at the database where you find the pie." A pie database? Ridiculous, you say. But then you see a listing of three databases to choose from: The Q-Circle, the R-Square or the S-Diagonal database.

- If you choose Q-Circle, go to Box 19
- If you choose R-Square, go to Box 21
- If you choose S-Diagonal, go to Box 13



4 Cursor is more than evil. He's got a *baaaad* sense of humor. Pie R-Square (πr^2). Get it? Nyuk-nyuk-nyuk. A very old math joke. But the joke's on Cursor. You solved the riddle! Now you've passed through the screen to the other side, and you see...

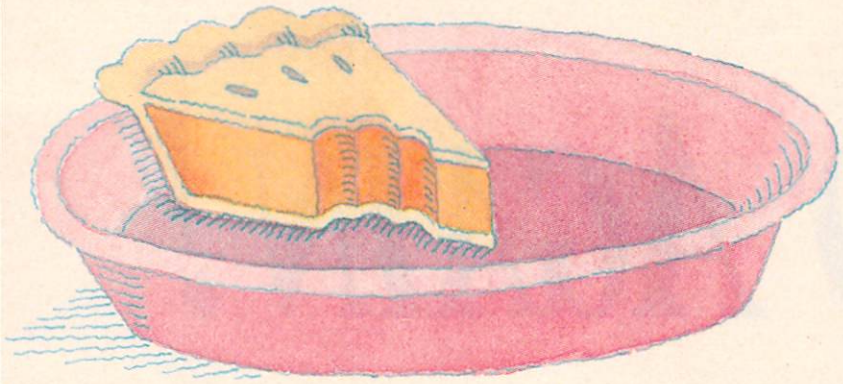
A yellow wire.

Take it—and remember where and when you got it.

Now you see Cursor himself! You put on your most menacing look and say: "OK, Cursor, zap me back to size or I'll give you a power surge you'll never forget."

"But it's too late," snaps Cursor. "The reverse-blue beam is stored in this computer's brain, its Central Processing Unit (CPU). And the beam is set to self-destruct in 20 seconds." Cursor howls: "There's only one way to get there in time!" You can take a bus, a train or a plane.

- If you hop on the bus, go to Box 20
- If you hop on the train, go to Box 10
- If you hop on the plane, go to Box 7

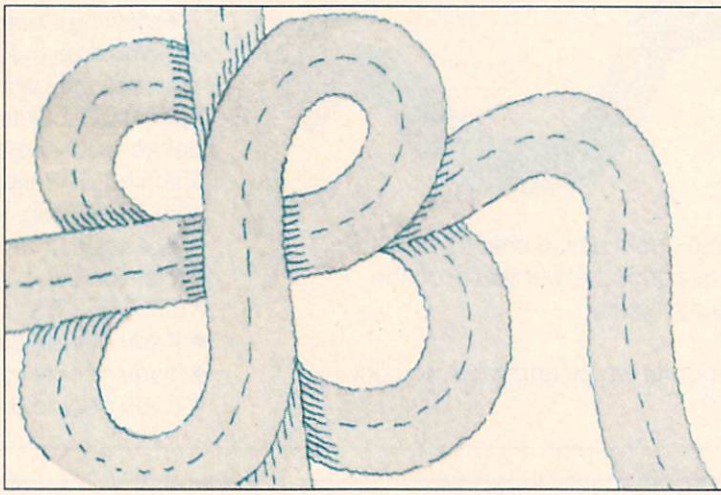


13 Everyone knows an S with a diagonal line through it is an 8. And, sorry to say, somebody "ate" the pie. But we won't be crumb-y. Return to Box 3.

23 The escape button didn't get you out. But it did give you a chance to rewire the reverse-blue beam. If you have all four wires, go to Box 6. Otherwise go to Box 1.

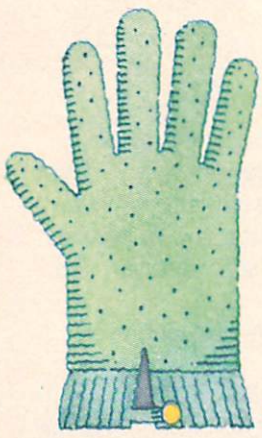
11 An evil guy like Cursor wouldn't even spend downtime in a computer named Widgee. Return to Box 1.

7 Sorry small fry. This is a Mainframe Plane. You're winging your way back to the classroom floor. Start again back on Box 1.



19 That was a pie-in-the-sky guess. Sorry. No pie here. Q-Circle is where they store the programming loops. You're going round and round with no break in sight.

Game Over.

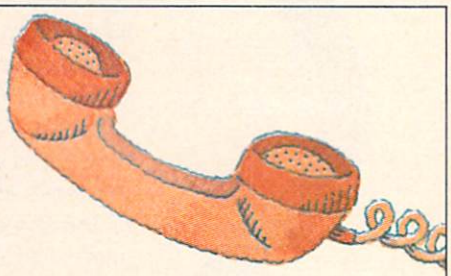


9 Hope you're wearing your letter sweater, cause the KBD port puts you on the keyboard. It's time to make another choice:

- a key, or
- a glove.

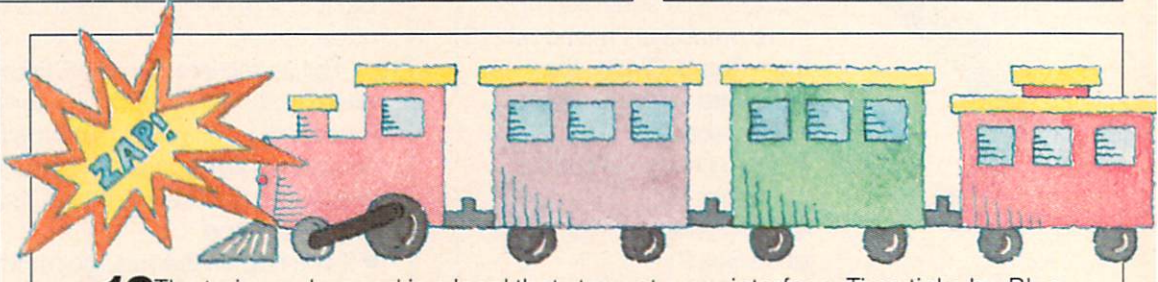
Take one.

- If you took the glove, go to Box 22.
- If you took the key, return to Box 2.



16 Oh no! MDM stands for modem. You're being transmitted through the phone lines back onto the floor of the classroom. You return to Box 1.

18 Don't be blue. You're right on-line. Hurry now to Box 2.

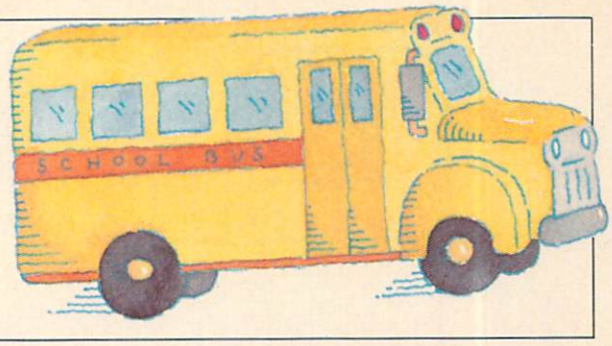


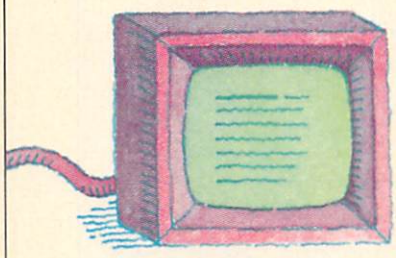
10 The train you hopped is a local that stops at every interface. Time ticks by. Blue beam blows up. You're stuck inside this micro for a long time. Game over.

20 You can only get on the bus if you took the bus pass back at the very beginning. If you didn't, go to Box 1.

If you've got a pass, just hop on the Bus, Gus, and get there in time. You're no newcomer to micro mass transit. You know that bus is the name for the system of electrical lines inside a computer. This gets you to the CPU in a nanosecond.

You're ready to go to Box 5.





8 CRT is short for Cathode Ray Tube. A CRT is a computer monitor. You're on Cursor's track. But you need a key item.

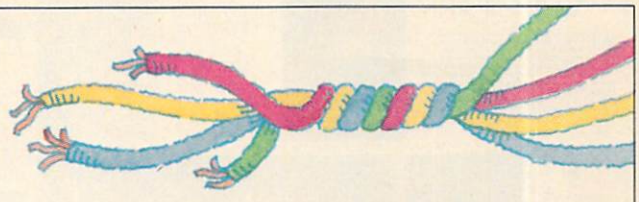
Have you already picked up the key? If so, go to Box 3. Otherwise, go back to Box 2.

15 I'd be blue, too, if I chose like you. It was a blast while it lasted. Cursor is the victor. Game Over.

24 Uh-oh, you reset the computer's memory. Now, *you're* just a memory. Game over.

12 It makes sense to choose the same sequence that got you this far. The reverse-blue beam zaps you back to full size. Cursor is foiled. And the beam works so well you're bigger than when you began. "Mean" Marty Kochunkle better beware!

22 Yikes! The furious fingers of a harried hacker are hitting the keyboard. Trapped beneath a semicolon, the game ends.



6 You should have all four wires now. (If you don't, go back to Box 1....oh, no!) With these wires, you must rewire the machine in order to get away from Cursor. You've got to hurry! Think of the how, the where and the when of getting here. Then remember this hint: you have to rewire in a sequence that makes sense in order to return to full size.

- If you rewire yellow-green-blue-red, go to Box 17
- If you rewire blue-red-green-yellow, go to Box 15
- If you rewire blue-green-yellow-red, go to Box 12

14 No Cursor here. The class nerd mistakes you for an error statement and is trying to delete you. Go back to Box 1. And hurry! Deletions hurt.

21 You aren't square for choosing R-Square. Get along to Box 4.

17 You don't have to wonder where the yellow went, you're going to blast to the past. Sorry, wrong sequence. Game Over.

5 Good to see you at the CPU. Your reward... *A red wire.* Take it—and remember where and when you got it.

Now you've got 19 seconds to figure out how this reverse-blue beam works or it will self-destruct. There is an Escape button and a Reset button here. Which will you press?

- If you press Escape, go to Box 23
- If you press Reset, go to Box 24

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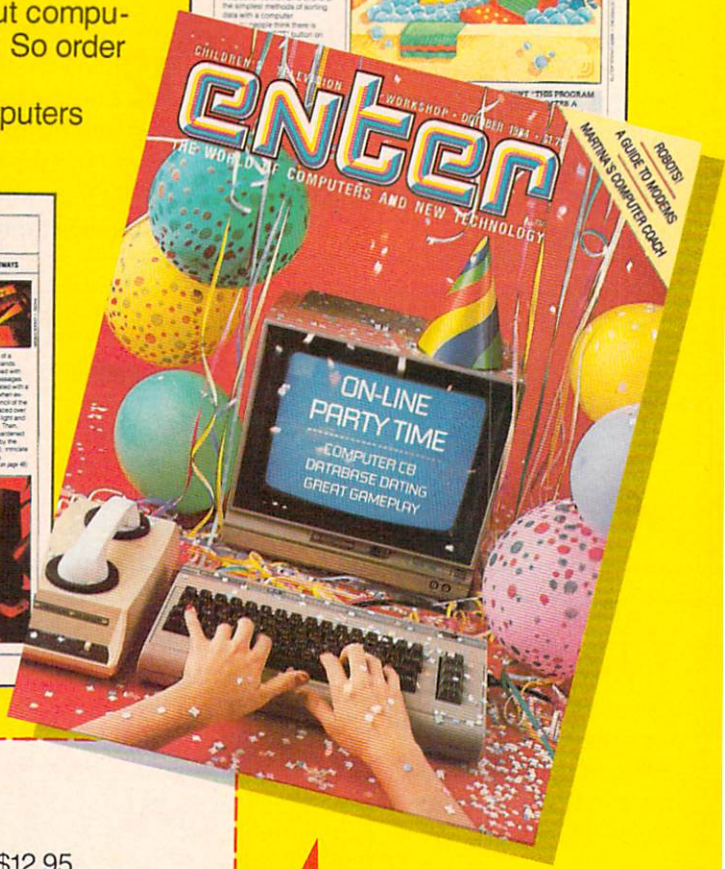

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KEYBOARD CAMPING

CHOOSING THE COMPUTER CAMP THAT'S RIGHT FOR YOU

BY ELIZABETH HETTICH

Jennifer Sturm, 12, really loves computers. When she went away to summer camp last year, she chose a computer camp. "It was a great place to learn more about computers and also have fun," she says.

Leslie Schorr, 15, wasn't very interested in computers. "I didn't really want to go to computer camp," she recalls. "But my parents and I thought I should go to learn about computers, because I'd never worked on one before. I thought I might be bored. But I never did get bored, and I really learned a lot."

Whatever your level of interest in computers, you can have fun with them this summer. Want to stay at home? Choose from computer classes or day camps with computers. Thinking of going away? There are regular sleep-away camps that have some computers, and more than 100 camps that specialize in computers. Don't have a lot of money to spend? There are low-cost computer camps and other ways for you to learn about computers.

The choice is yours. To begin choosing between camps, you need to decide what you're looking for in a camp. Then, you've got to go out and find one that matches your interests. *(Continued on next page)*

Classes and day camps are alternatives to sleepaway computer camps.

© NEW ENGLAND COMPUTER CAMP

Camps offer outdoor activities, too.

In addition to choosing a camp that suits you, it's important to pick one that's dependable. This year, that's more important than ever.

Last summer started out as boom time for computer camps. The boom, however, suddenly went bust. There were many more camps, but not that many more campers. Some camps went out of business—in a few cases, before kids got there. Other kids found themselves at "computer" camps that didn't have adequate facilities.

Will it happen again this year? "This is a difficult time for computer camps," according to American Camping Association (ACA) spokesperson Jim LeMonn. "Some will survive and others won't."

What does that mean to you? Simply that you have to do some serious research before you sign up.

CHOOSING A CAMP

So how do you go about choosing a computer camp? Very carefully! There are a number of steps you must take before you put down a deposit.

1. Start off by figuring out what you want. Ask yourself questions like: "How much money can my family spend? What type of computers do I want to work on? Do I want time put aside for activities besides computers? Which activities are most important to me?" The only person who can answer these questions is you.

"I went to Original Computer Camp because it seemed like they offered more recreational facilities than other computer camps," says 13-year-old Daren Bleuel. On the other hand, one reason Leslie Schorr decided to go to Marist Computer Camp was its concentration on computer time. "Since I had never worked on a computer before going away to camp, I wanted to learn a lot," Leslie explains. "At Marist, we spent six hours a day on the computers."

2. Once you've decided what you want, get specific information on different camps. There are two camp guides that can help you. The first is the American Camping Association's *Parent's Guide to Accredited Camps*, which lists all the camps that are approved by the ACA. You can get this by sending $8.95 to: American Camping Association, 100 Bradford Woods, Martinsville, IN, 46151.

The other book, *Camps 'n Computers*, gives a brief description of camps all over the country, including less expensive YMCA and day camps. *Camps 'n Computers* is available for $2 by writing: Verbatim, Camps 'n Computers, 4920 El Camino Real, Los Altos, CA, 94022.

3. Talk to the director and get specific

© BARBARA HADLEY

Computer camps give campers a real opportunity to learn from each other.

information about the camp. Besides getting the camp's promotional literature, call or write the director and ask some hard questions. Here are some of the most important ones:

HISTORY: How long has the camp been running? How successful has it been—have enrollments increased, decreased or stayed the same?

RE-ENROLLMENT: What is the percentage of campers and counselors that have returned for second and third summers? Many computer camps are new, so sometimes it's difficult to establish its track record. But it's a plus if a high percentage of a camp's campers and counselors return.

FACILITIES: Is there a swimming pool or lake? Where do kids eat and sleep? What kind of recreational facilities are available? If possible, visit the camp site. See for yourself what the camp's facilities are like. If they need a lot of repair, avoid that camp.

COMPUTERS: Where is the camp getting its computers from? If they're on loan from a computer company, has an agreement been established? How many computers will there be? Are they the type of computer you want to work on?

If a camp boasts one computer per camper, find out how firm the figure is. Are the computers new? Are they in good shape and readily available to campers? One computer per camper is great—unless it's one *broken* computer per camper. (See the checklist on this page for more questions that will help you compare camp facilities.)

FORMER CAMPERS: Can you get the names and phone numbers of former campers and counselors? Call and ask them about their experiences. These people will give you an idea of what camp life is like.

BEYOND COMPUTERS

At the average computer camp, you'll spend two to five hours a day learning about and using computers. Some is class time, and some is free time. What happens after you leave the computer room depends entirely on the camp you choose.

More and more camps are responding to slumping enrollments by expanding their recreational programs. "We're finding that kids want more than just computers," says Clark Adams, Director of New England Computer Camps. "They want to get involved in other activities and have a more well-rounded camp experience."

Cort Shakelford, 12, who went to Camp Summerlife in Vadito, New Mexico, agrees: "Working on

How can you pick a camp? You have to ask questions, get answers and be the final judge.

CAMP CHECKLIST

Here are important questions to ask camp directors and counselors.

HARDWARE: What types of computers and peripherals does the camp own? Will you have access to all of them?

SOFTWARE: Does the camp have a software library that includes utility software as well as games?

COMPUTER/STUDENT RATIO: What is the ratio between computers and campers? It shouldn't exceed two campers per computer at class time. Will there be time to work alone on a computer?

INSTRUCTION: What is the instructors' training? A teaching background for senior instructors is preferable. Assistant instructors are usually college computer science students or former campers.

INSTRUCTOR/CAMPER RATIO: What is the instructor/student ratio? There shouldn't be more than five campers per instructor.

WHAT LANGUAGES DO THEY TEACH?: Does the camp focus on languages that you're interested in learning?

COMPUTER ACTIVITIES: Do they teach you how to do graphics? How to program a robot? Use utility software? Do they have people from computer companies come to talk?

HOUSING: Would you prefer to live in dorms or cabins? How many kids will be assigned to your dorm/cabin?

OTHER ACTIVITIES: What other activities *besides* computer instruction does the camp offer?

the computer was my favorite activity, but I'd get sick of doing just that."

Most camps offer at least some of the more traditional camp activities, like swimming, arts and crafts, canoeing, horseback riding, tennis, hiking and team sports. Other camps publish their own newsletters, put on plays and talent shows. Still others arrange to have speakers from various computer-related fields come in and talk. All of these activities add a new dimension to camp. "Being the editor of my camp's newsletter was one of the highlights of my summer," says Jennifer Sturm, who attended New England Computer Camp.

Evening hours can be some of the most fun at camp. At Original

BASIC TO BACKPACKING: ENTER's 1985 Guide to Computer Camps

NAME	LOCATION (CONTACT ADDRESS)	SESSION LENGTH, COST*	NO. OF CAMPERS, AGE RANGE
NATIONAL COMPUTER CAMPS	Simsbury, CT; Cleveland, OH; Baltimore, MD; Atlanta, GA; St. Louis, MO; 203-795-9667	1-6 weeks $395 per week	125 campers 9-18 years old
REGIONAL CAMPS			
EAST			
CHAMPLAIN COLLEGE COMPUTER CAMP	Champlain College P.O. Box 670 Burlington, VT 05402 802-658-0800	Four 2-week sessions or one 4-week session $885 and $1725	120 campers 10-16 years old
COMPUTER-ED CAMPS	Wellesley, MA; Long Island, NY; Day Camps in MA and RI (Contact 800-341-4433)	2-week sessions $895—residential $425—day camp	130 campers 8-17 years old
NEW ENGLAND COMPUTER CAMP	Banner Lodge Moodus, CT 06469 203-873-1421	2-week sessions $945 per session	125 campers 8-17 years old
MARIST COLLEGE COMPUTER CAMPS	Marist College Poughkeepsie, NY 12601 914-471-3250, ext. 345	Three 2-week session $890 per session (Day camp, $515 includes lunch)	80 campers 9-17 years old
MIDWEST			
ABILENE CHRISTIAN UNIVERSITY COMPUTER CAMP	Box 8195 Abilene, TX 79699 915-677-1911, ext. 2125	1-week sessions $200—day camp $300—residential	30 campers 9-14 years old
BLACK HILLS COMPUTER & SCIENCE CAMP	Rapid City, SD 512-396-5248	2-week sessions $1950 per session	20 campers 12-17 years old
CULVER COMPUTER CAMP	Box 6C, Culver, IN 45611 219-842-3311	One 2-week session $565	40 campers 9-15 years old
MIDWEST COMPUTER CAMP	9392 Lafayette Road, Indianapolis, IN 46278 317-297-2700	1-, 2-, 4- and 6-week sessions 1-week session $400, each additional week $350	60 campers 8-18 years old
UNIVERSITY COMPUTER CAMP	Lapeer, MI (Contact: 2480 Crooks Road Troy, MI 48084 313-362-4499	Five 2-week sessions $750 ($700 each additional session)	100 campers 9-18 years old
WEST			
EXPERCAMP	Santa Barbara, CA; Tahoe, NV (Contact 800-235-6965)	Four 12-day sessions $895 per 12 days	75-125 campers 7-15 years old
COMPUTER TUTOR CAMP	Stanford, CA (Contact 800-227-2866)	1- and 2-week sessions $550 and $895	70 campers 9-17 years old
UNIVERSITY OF OREGON COMPUTER CAMP	University of Oregon, Eugene, OR 97403 503-686-4231	One 12-day session $485	60 campers 9-16 years old

*Unless otherwise noted, costs are for sleep-away camps. All information current as of December 1984.

Computer Camps in California, evenings were devoted to "anything from counselor hunts and kick the can to marshmallow roasts and sing-alongs," says camp director Mark Zacovic. "It's really a time for the whole camp's participation."

CHOOSE CAREFULLY

If you take the time to chose your camp carefully, your summer at computer camp might turn out to be the most fun you've ever had.

But watch out—when you're not looking, you might even learn something!

ELIZABETH HETTICH wrote the "Computer Camps" article in last year's ENTER (March, 1984).

HARDWARE; CAMPER-COMPUTER RATIO	LANGUAGES TAUGHT	TYPE OF INSTRUCTORS; HOURS PER DAY	OFF-LINE ACTIVITIES
Apple IIe, II+, TRS-80; 2:1 ratio	Assembly, BASIC, FORTRAN, Pascal	Certified schoolteachers; 4 hours training/2 hours lab daily	Board games, computer bingo, movies, swimming, tennis
Commodore-64, IBM PCjr; 1:1 ratio	Assembly, BASIC, Pascal	High school teachers and grad students; 4 hours daily	Aerobics, photography, racketball, sailing, windsurfing, water sports
MA: Apple, IBM, Commodore, Acorn; NY: IBM 1:1	BASIC, Logo, Pascal C, Assembly, Lisp, robotics, AI	Public school teachers and graduate Computer Ed students; 3 hours daily/1-4 hours lab time	Racket sports, skating, swimming, sailing, aerobics, crafts, soccer, field trips
Apple IIe, IIc, Macintosh, IBM PC, PCjr; 1:1 ratio	BASIC, C, Forth, LIST, Logo; Assembly by request	Experienced computer teachers and college students; 5-8 hours daily	Complete circus program with professional instructor, golf, swimming, writing program
Apple IIe, IBM PC, IBM 431 mainframe; 1:1 ratio	APL, BASIC, Logo, Pascal	Computer teachers from Marist College; 3 hours instruction/ 3 hours lab	Bowling, field trips, indoor swimming, racketball, tennis
TRS-80 Models III and IV; 1:1 ratio	BASIC, Pascal	Public school teachers and university computer science majors; 6 hours daily	Badminton, tennis, soccer
Apple IIe, IBM compatible Coronas, TI 99/4A; 1:1 ratio	Assembly, Basic, COBOL, FORTRAN, Logo, Pascal	Doctorate and master professors, and upper-level undergrads; 2-4 hours daily	Archery, camping, cave exploration, hiking, horseback riding
Apple IIe, DEC 16 mainframe, Macintosh; 1:1 ratio	BASIC, Apple Logo, Pascal	Math teachers from Culver Academy; 4-5 hours daily	Dances, golf, hay rides, lake swimming, tennis
Apple II, IIe, Atari 400/800/XL, C-64, IBM PC XT, TRS-80, VIC 20; 1.3:1 ratio	APL, Assembly, BASIC, COBOL, FORTRAN, Logo, Pascal, Pilot	Professional year-round computer staff and college students; 6 hours daily	Archery, arts and crafts, basketball, swimming, wilderness camping
Apple IIe, Macintosh; 1:1 ratio	BASIC, Logo, Pascal (Also, graphic arts, music, robotics, word processing)	Public school and college teachers; minimum 4 hours daily	Arts and crafts, boating, fishing, hiking, swimming, tennis, volleyball
Apple II+, Commodore 64; 1:1 ratio	Assembly, BASIC, Logo, Pascal (also, robotics, artificial intelligence)	Instructors have extensive computer background, 3-6 hours daily	CA: beach trips, swimming, sailing; NV: canoeing, horseback riding
IBM PC, PCjr, Apple IIe; 2:1 ratio	BASIC, Logo, Pascal (also, game design, spread sheet use word processing)	School teachers and industry professionals; 4 hours daily	Aerobics, crafts, field trips, swimming, tennis
Apple IIe, Macintosh (also, peripherals including graphic tablets, and light pens); 1:1 ratio	All campers learn Logo (BASIC and Pascal available)	Doctoral and post-doctoral students; 4 hours training/2 hours open lab daily	Baseball game field trip, Pacific Ocean trip, movies, theatre

INFORMATION COMPILED BY ANDREW GIANGOLA

PICKING A PRINTER

AN EASY GUIDE TO HARD COPY

BY FRED GEBHART

A computer without a printer is about as useful as a bicycle with one wheel. What good is writing a letter if you can't mail it? Your graphics software may allow you to draw with ease, but without a printer you can't produce a single drawing.

TYPES OF PRINTERS

So if you use your computer, sooner or later you'll think about buying a printer. But there are even more models and makes of printers than there are types of home computers. How do you choose one that's right for you? This ENTER buyer's guide will point you in the right direction.

There are four major types of computer printers. The one you choose will depend on *why* you need a printer in the first place. Do you need letters that look like they've been typed on a high-quality typewriter? Then you'll need a letter-quality printer. Do you want to be able to print out graphics? Then you'll have to look at a dot matrix. If all you want is a printed copy of your BASIC program, you may only need an inexpensive thermal printer.

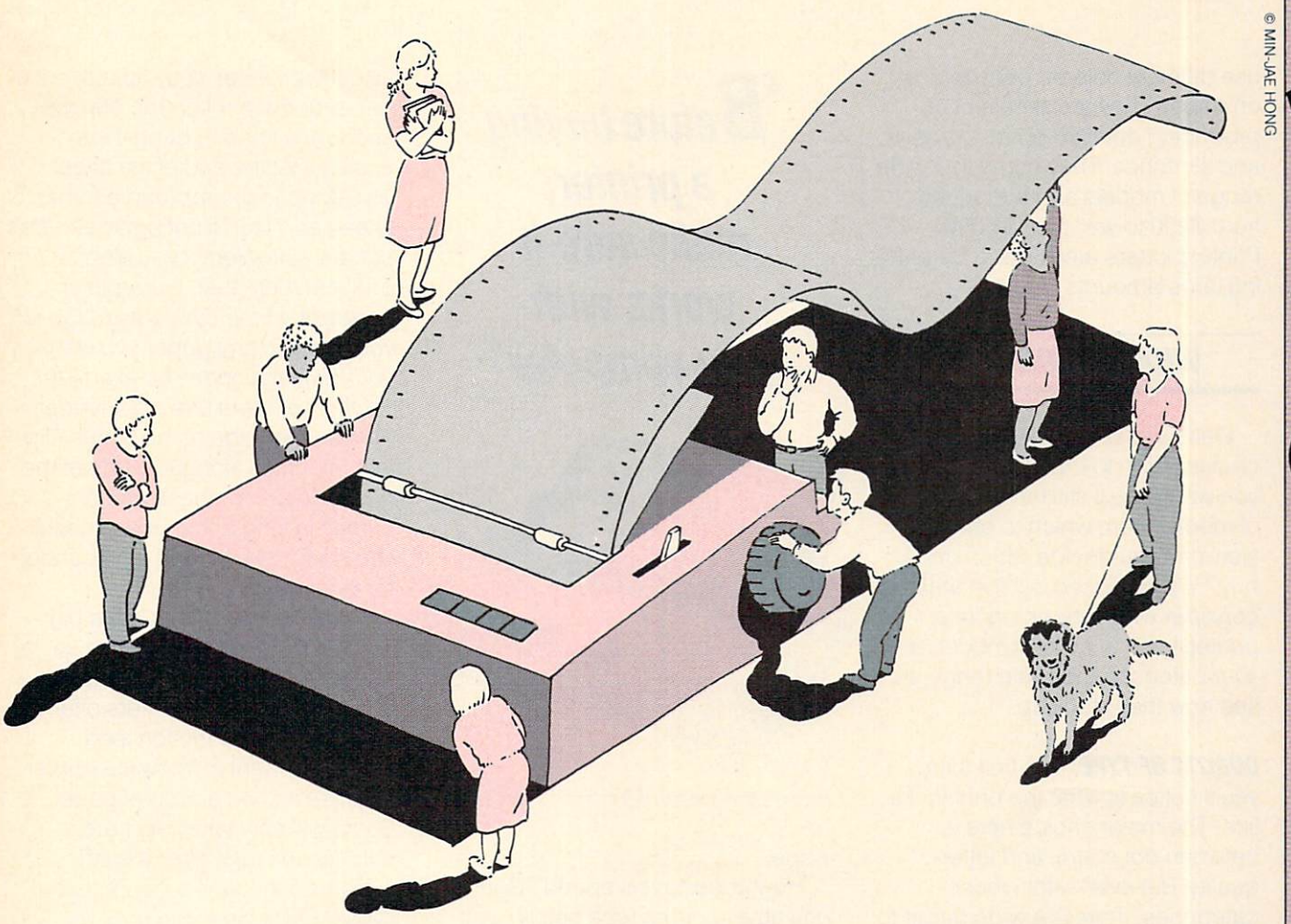
Below you'll find a short description of each category of printer. You can also look at our Printer Sampler chart for examples of each. Remember, there are hundreds of printers in each group, many that are just as good as the models in our chart.

THE FOUR MAJOR TYPES

THERMAL: Thermal printers use heat instead of ink. Hot pins burn heat-sensitive paper to create letters or graphic designs made up of small dots.

The one big advantage of thermal printers is their price. They usually cost under $200. However, thermal printers tend to have slow printing speeds and poor print quality. They also require special paper, which is relatively expensive and hard to find.

DOT MATRIX: Dot matrix printers form dots by using pins to strike regular paper through a ribbon. The print quality depends on how many pins are used. A group



© MIN-JAE HONG

(matrix) of pins nine dots high by nine dots wide (9x9) is the most common. More expensive printers use a 28x28 dot matrix for better print.

Dot matrix printers offer the widest choice in price, speed and quality. They are especially good at printing lots of readable pages quickly. They can print graphics as well as regular letters. Many dot matrix printers give you a choice of different typefaces. However, even the best dot matrix print-out still has a "computer-y" look to it.

You can get a good dot matrix printer for under $400. In recent months, several companies have introduced good low-cost dot matrix printers for as little as $200.

'A computer without a printer is like a bicycle with one wheel'

LETTER-QUALITY: If your documents must look like they were typed on an expensive typewriter, letter-quality is your only choice. Letter-quality printers are basically fancy electronic typewriters. Metal letters strike the paper through a ribbon to form an image. On a daisy wheel printer, the letters are arranged around a wheel like petals on a daisy.

Letter-quality printers tend to be slower than dot matrix and more expensive. A good one will cost about $1,000. Because they use fixed letters, letter-quality printers can't print graphics. You can, however, get different typefaces by changing the daisy wheel.

PRINTER/PLOTTERS: These printers

use different colored pens to draw on paper. They are excellent at producing detailed charts, graphs, and sketches. They come in a wide range of models and are priced from $200 to well over $1,000. Printer plotters aren't good for printing large amounts of text.

WHAT TO LOOK FOR

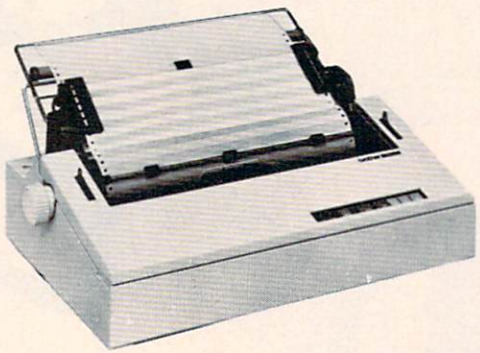
Once you've narrowed your choice down to the type of printer you want, you'll still have hundreds of models from which to choose. How can you decide which one to buy? We've picked out five areas to consider when shopping for a printer. Look at several models in your category and price range and see how they stack up.

QUALITY OF TYPE: The first thing you'll notice is what the print looks like. The major choice here is between dot matrix and letter-quality. But even within those categories, there is a wide range to choose from. Some dot matrix printers produce letters that are good enough for almost every use. Others produce type that is very readable, but has a "computer-y" look to it. Thermal printouts will sometimes look smudgy and blurred.

On a letter-quality printer, you will also want to find out how many typefaces are available. If you're interested in graphics, you'll want a dot matrix that can print in color.

SPEED: Printing speed is measured in characters per second (*cps*). At 160 cps, a printer can produce a full page in about 20 seconds. At 40 cps, a printer takes about 45 seconds to produce the same page.

'Before buying a printer, make sure it works with your computer'



How *important* is speed? Unless you have a buffer (see below), you can't use your computer while it's telling the printer what to print. And it can be tedious waiting for a 10-page report to be printed one page per minute. On the other hand, you have to pay more for a faster printer.

One solution is a printer buffer, a memory unit outside the computer. The computer dumps whatever is to be printed into the buffer, and you can go back to computing. Then the buffer tells the printer what to print.

PAPER: There are really two points to consider here. First, how is the paper fed into the computer? Second, does the printer require a special kind of paper?

Some printers use *friction* feed. Like a typewriter, you slip a sheet of paper under a roller (the platen) and turn a knob to bring it into position. At the end of the sheet, you stop the printer, load another sheet, and start printing again. This can be a problem if you plan to print out more than a couple of pages at a time. The advantage is you can use any paper you want—your own stationery, for example.

Other printers use a *pin* feeder. Pins on the edge of the platen slip into the holes along the side of the paper. Paper for these printers comes in long continuous sheets. You don't have to load a new sheet for every page.

A *tractor* feed works like a pin feed, but the tractors can be set to accept almost any width paper. The most versatile printers offer both tractor and friction feed.

It's important to know if a printer requires a special kind of paper. Some will only take very narrow rolls like the tape from a cash register. Others need a coated paper, because of the printing process they use.

CONNECTION: There are two ways to connect a printer to a computer: serial and parallel. Serial means the computer sends out information in a string, one bit after another. In parallel, the computer sends out eight bits (one byte) of information at once.

The cable from the printer connects to the computer at an interface or a port. Most printers for less than $500 need parallel connections. Most computers either come with both parallel and serial ports, or are able to add them. Newer computers have both serial and parallel ports.

Some computers have special

interfaces that make it hard to connect a printer from an outside company. Atari and Commodore, for example, want you to buy Atari and Commodore printers. To use any other brand, you have to buy a special interface from a third company.

COMPATIBILITY: Before buying any printer, make sure that it works with your computer. There are dozens of printer-computer combinations. Some combinations work, some can be made to work, and some never will.

The best way to avoid getting stuck is to see your computer and printer at work before you buy. Make sure you're seeing the same equipment you're taking home.

HOW TO BUY ONE

Buying a printer is like buying a computer. First, decide what features you need. If you want to print graphics, a letter-quality printer won't do the job. If you want to print in color, get a printer with multi-colored ribbons.

Remember to go over our checklist of points: quality; speed; paper feed; connectors; compatibility. With the wide range of printers on the market today, you won't have any trouble finding a model that fits your needs in each category.

FRED GEBHART wrote ENTER's guide to modems in our October, 1984, issue.

ENTER's Printer Sampler

These are just a few of the hundreds of printers available. Use this chart to get an idea of the different types of printers. Before buying, you should do a more in-depth comparison of all the models available.

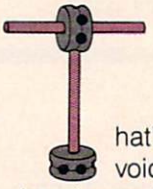
TYPE	COMPANY/MODEL	PRICE	SPEED	PAPER FEED	CONNECTORS[1]	PRINT QUALITY
THERMAL	Okidata/ Okimate 10	$200	60 cps	Friction, tractor	Commodore 64, Atari	Good; color graphics
	Alphacom, Inc/ Alphacom 81	$169	100 cps	Friction[2]	Parallel	Fair
DOT MATRIX	Star Micronics/ SG-10	$299	120 cps	Friction, tractor	Parallel, serial	Good
	Centronics/GLP	$299	60 cps	Tractor	Parallel	Good
	Epson/ RX-80 F/T	$380	100 cps	Friction, tractor	Parallel	Good
LETTER QUALITY	Brother/ HR-25	$995	23 cps	Friction, tractor[3]	Parallel, serial	Very good
	NEC/ Spinwriter 2000	$900	20 cps	Friction, tractor[3]	Parallel, serial	Very good
	Juki/6300	$995	40 cps	Friction, tractor[3]	Parallel, serial	Very good
PRINTER/ PLOTTER	C. Itoh/CX 4800	$695	8 cps[4]	Friction, tractor	Parallel, serial	Very good color graphics

NOTES: 1. Options available 2. Requires heat-sensitive roll paper 3. Costs extra 4. For text-sized graphics

COMPUTER CONSTRUCTION WORKER

BILL BUDGE WANTS TO HELP YOU BUILD THE ULTIMATE COMPUTER GAME

BY SUSAN MEYERS

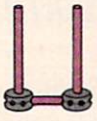


"That's him," whispers a voice in the crowd. A tall, handsome 28-year-old walks into the computer store, sits down at a table and begins signing autographs.

His face is familiar. You may have seen it on T-shirts and posters, or in magazine ads. If you didn't know better, you might think he was a hot new celebrity. But this isn't a rock or movie star. This is software designer Bill Budge—one of the first real computer celebrities.

Budge is best known for two best-selling computer games. His *Raster Blaster* is a computerized pinball game that was a big hit in 1981. In 1983's *Pinball Construction Set*, he created a software package that lets you create your own computer pinball game. Bill's most recent release is *Mousepaint*, a graphics program. *Mousepaint* uses a mouse controller and brings Macintosh-style graphics to the Apple IIe and IIc.

Bill's newest project isn't a computer game. It's an idea for software that could change the way we control the power of our computers.



ULTIMATE BUILDING BLOCKS

"What I want to do," Budge says, "is build a construction set that people can use to construct other construction sets."

If Bill's idea seems difficult to grasp, don't worry. He doesn't completely understand it himself...yet.

"I'm thinking of a primitive parts box," he explains. "This software would contain elements that could be used to construct more complex parts. Sort of like a sophisticated tinker toy set. You could use these parts to build anything you wanted to build."

Bill's "Construction Set Construction Set" would require a "graphic" programming language. This language would use symbols to represent computer commands. It would let someone with *no* programming knowledge really use the power of the computer. Users could manipulate on-screen symbols to construct computer models of robots, vehicles, galaxies,or almost anything. And these models would behave according to the physical laws of the real world.

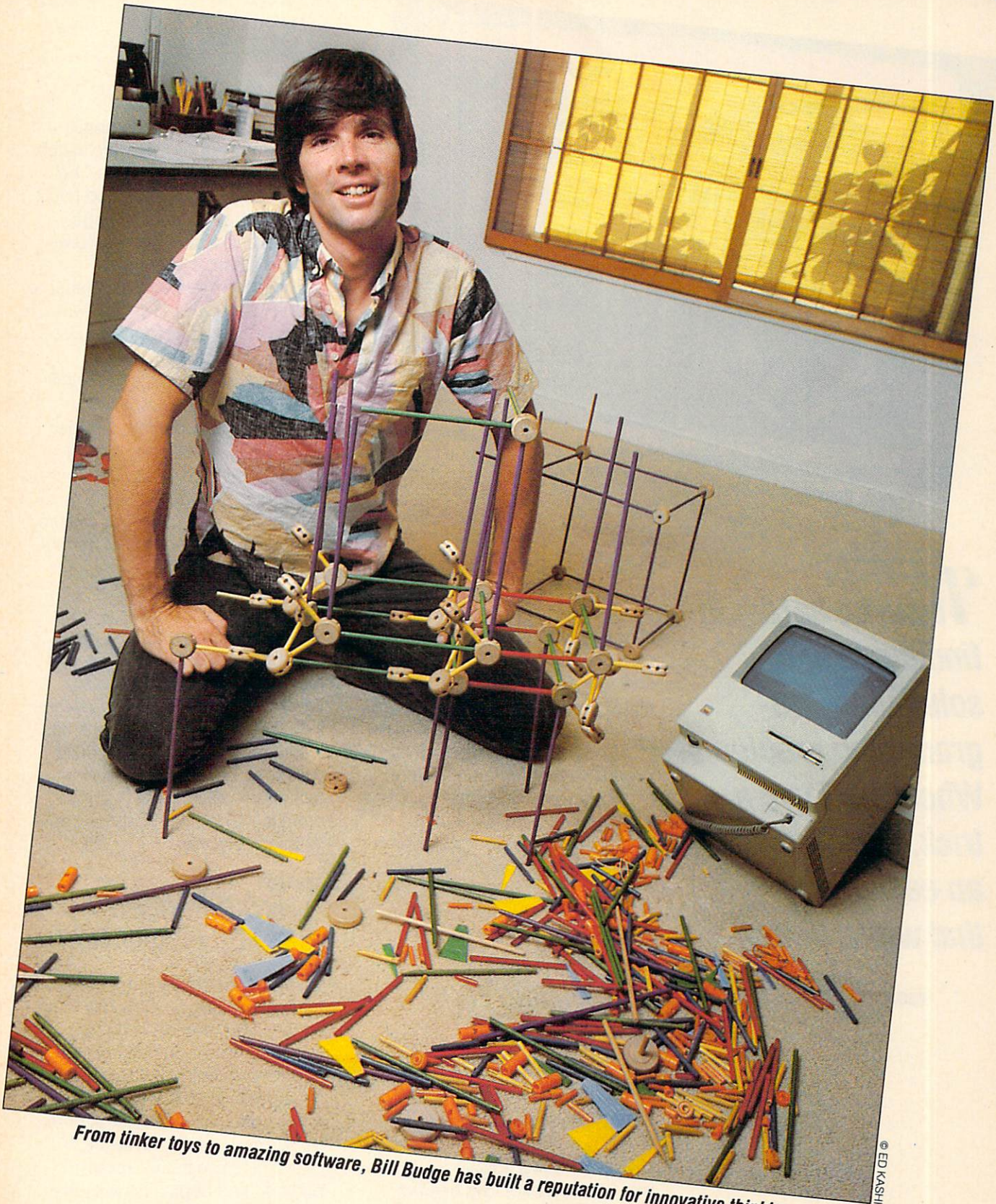
Similar computer models *can* be constructed today. But highly skilled programmers must use high-level code to bring them to the computer screen. Bill wants to give everyone this kind of computer power.

BRAVE NEW WORLDS

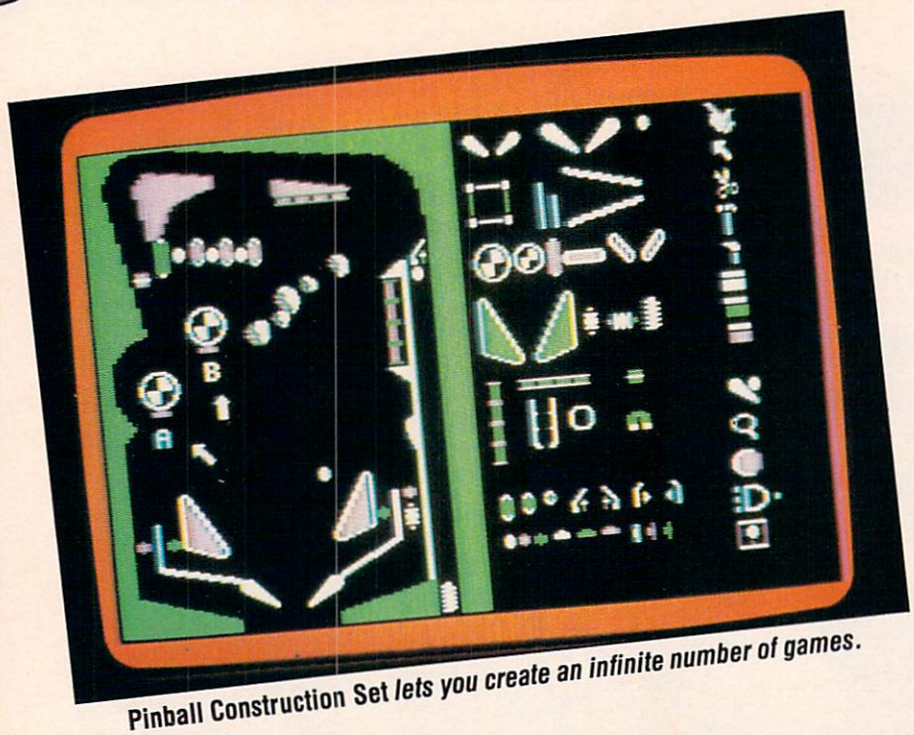
This talk about an ultimate computer software construction set might sound wild. But Bill has built his reputation breaking the rules of what computer software can be.

His *Pinball Construction Set (PCS)*, for instance, is more than a game. It's a toolbox that lets you construct and play your own games. *PCS* uses on-screen symbols ("icons") such as a hammer, scissors and paintbrush to let you create your own unique pinball games.

PCS even lets you do something you could never do with a real pinball game—change the laws of



From tinker toys to amazing software, Bill Budge has built a reputation for innovative thinking.



Pinball Construction Set *lets you create an infinite number of games.*

"It can be harder to find the simple solution to programming problems. Whenever I use a trick, there's usually an easier way that works better."

nature. Bill added a unique feature to *PCS* called the "world icon." This actually lets users adjust the force of gravity and alter the speed of the ball. It even lets users change the springiness as well as the bounce of the pinball game board.

This freedom of choice makes *PCS* seem almost limitless. Even Bill isn't sure how many different game creations are possible. When asked recently, he took out a pocket calculator and punched in some figures. A row of nines flashed across the screen.

"Looks like it's close to infinite," he said with a satisfied grin.

BUILDING FROM SCRATCH

Long before these software inventions made him famous, Bill Budge loved to build things. As a young boy (in a family that included triplets!), he was always building with blocks, tinker toys or erector sets. As he got older, his building blocks became more complex.

"In high school, I was into astronomy and I built a telescope," he remembers. "My friends and I built some pretty dangerous things—rockets and stuff. It's amazing we didn't kill ourselves."

Bill admits he eventually became a 'computer nerd.' "The last two years [in high school], I was just programming all the time."

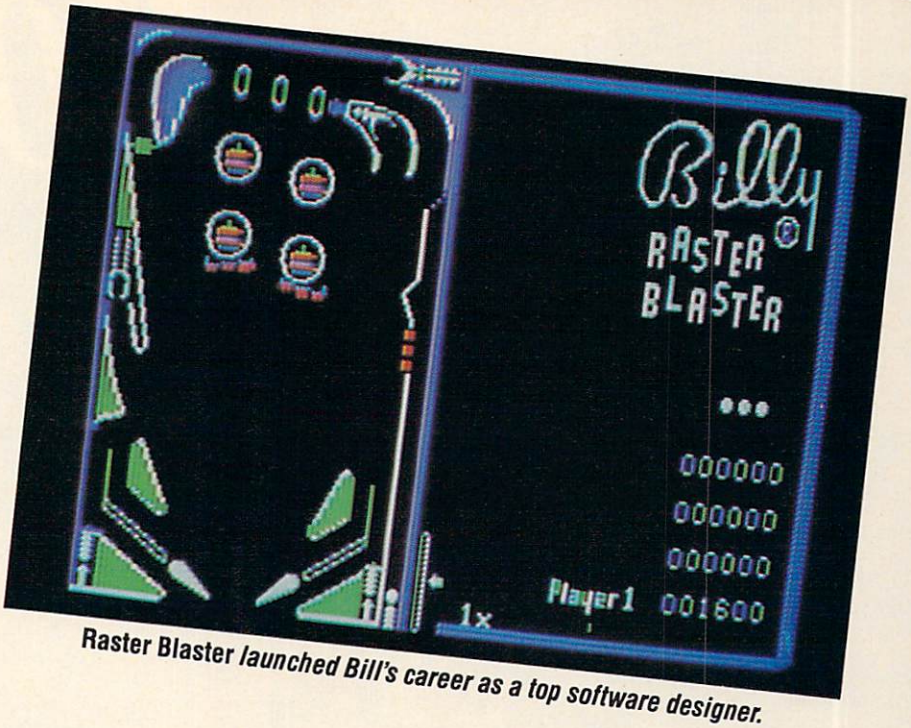
But even this didn't completely satisfy his creative urge.

"When I first went into college, I didn't do any programming at all for more than two years," Bill recalls. He went to college at the University of California at Santa Cruz, majored in English and dreamed of becoming a novelist.

In the end, his talent with computers won out. He transferred to Berkeley, earned a degree in computer science, then got a job with the Apple Computer Company. While there, he used his spare time to design *Raster Blaster*—the hit that launched his career. Almost overnight, he was a hot software designer—with poster, T-shirts, promotional tours and all the trappings of celebrity.

PROGRAMMING FOR PERFECTION

When those tours are over, Bill returns to his workroom. This room, on the lower level of his house in the Piedmont hills, is just 45 minutes from Silicon Valley in California. It is littered with books, papers, toy robots, and bits of erector set. As Budge switches on an IBM PC—one of his more than 20 computers—and begins to work, the world outside seems far away.



Raster Blaster *launched Bill's career as a top software designer.*

"I'm kind of glad when I don't have anything new out and people forget about me," he admits. "Then I can think about the things I want to do next.

"Games have been really primitive up until now....Games are flat and two-dimensional. Eventually (as computer memory expands) we'll even be able to do 3-D games," says Budge. "There's so much potential. The only thing that'll limit us in creating software is our own imagination."

As Bill works toward creating his ultimate software construction set, he knows imagination alone won't be enough. He understands that every programmer—from the beginner to the best—must overcome a great obstacle.

"The thing about any program that you do is that everything has to be perfect....You make one wrong move and the whole thing is liable to crash," he says.

That's why it can take months—or even years—for Bill to complete a new program.

"I can't hold the whole program in my head at once, so I make lists of things to do," he says. "I do them and then I see other things that have to be done. So I make another list. It goes on and on."

Bill understands that creating a good program can take a long time, and that shortcuts usually don't work. "Everyone's interested in tricks they can use," he says. "But every time I think of a cute trick to get around a problem, it turns out that there is a straightforward way of doing it better. Sometimes it's a lot harder to think of a simple way of solving a programming problem."

"So," he advises, "beware of hacks. Too many hacks means you're out of phase with the natural flow of the universe." To stay "in phase," says Bill, you must try to develop your own programming style.

Just as each artist's work is unique, says Bill, "no two programmers work alike...Each one has an individual style."

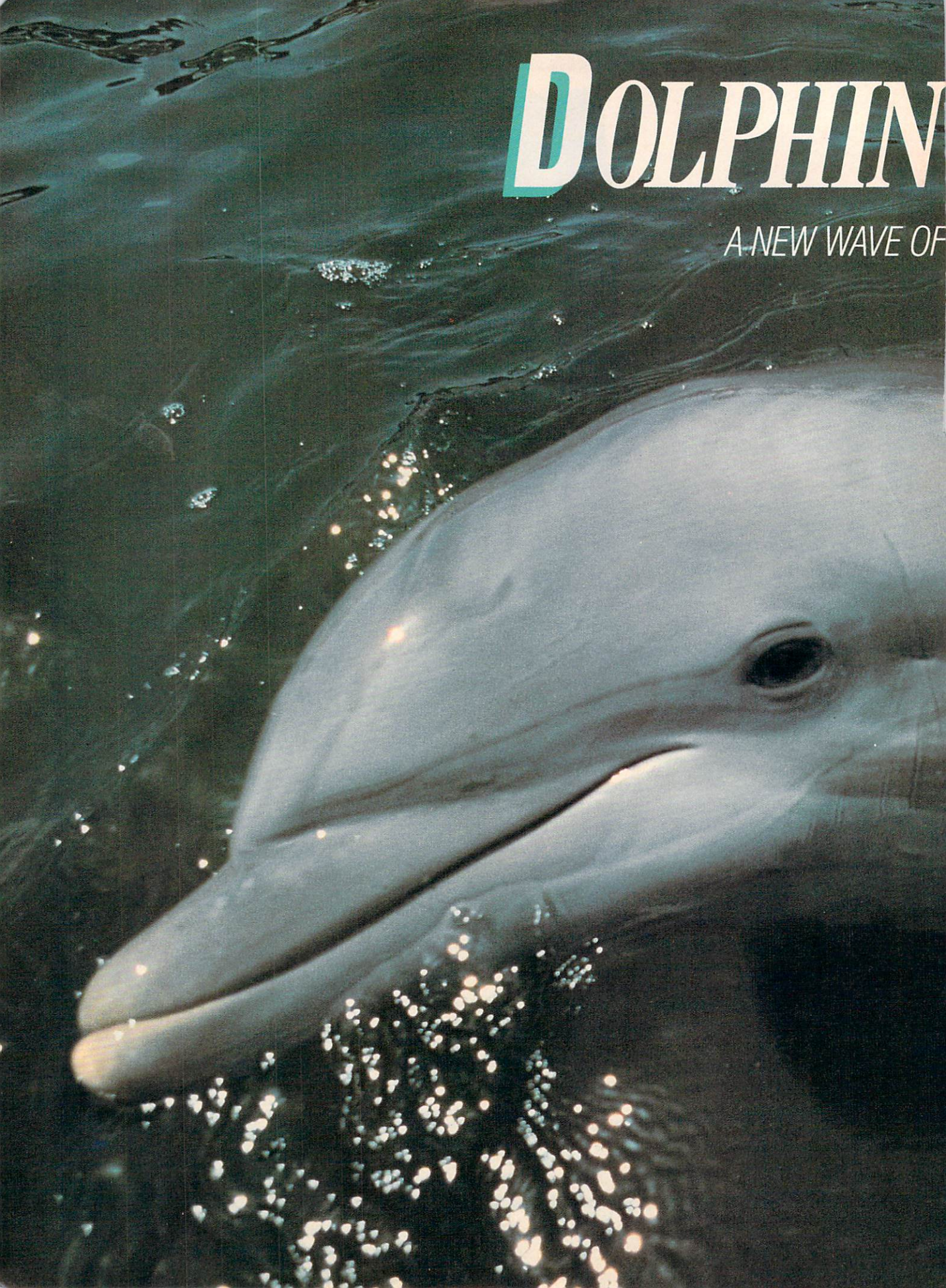
He picks up a thick stack of paper, the size of a telephone book. It's the printout of the source code—the programming commands—for *Pinball Construction Set*. "Look at this," he says, pointing to a column of letters and numbers that move the program from one point to another.

"That's a beautiful loop, and no one else would have done it quite that way.

"For me, it's the process that's important," says this celebrity software designer, as though repeating something he wants to be sure to remember. "Not the end result." ⊡

SUSAN MEYERS is ENTER's West Coast editor.

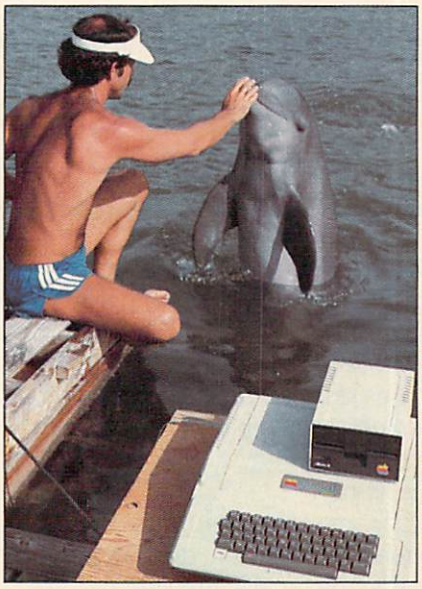
Programming is a delicate art, says Bill. "Everything has to be perfect. You make just one wrong move and the whole thing is liable to crash."


DOLPHIN
A NEW WAVE OF

DIALOGUES

COMPUTER COMMUNICATION

BY DICK ROBINSON

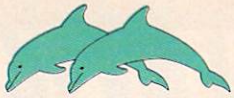


ALL PHOTOS © STEPHEN FRINK

On a tropical island near the Florida coast, Ron Reisman hits three computer keys. A high-pitched whistling sound shoots through the clear waters of the Gulf of Mexico. In an instant, a 420-pound bottlenose dolphin named Nat swims up to Mandy Rodriguez.

"Thatta boy, Nat," shouts Mandy, tossing a herring fish to the 420-pound dolphin. The fish is Nat's reward.

Mandy and *Ron's* reward is Nat's quick response to the computer-generated signal. This is a small, but important, step in bringing humans closer to real communication with another species. It's a step that Reisman, Rodriguez, and a few



From Florida to Hawaii, computers are helping bring us closer to true communication with another species.

other researchers at the Dolphin Research Center are taking with the help of computers.

DOLPHIN TALES

Dolphins have always fascinated Ron.

As a student, he would read ancient Greek stories that told how dolphins rescued people from drowning, carried a poor man's son to school every day, and led lost ships home.

"I became fascinated with the creature's friendly attitude toward humans," he recalls. Inspired by these tales, Ron began studying the way that dolphins can communicate. After completing school, he joined the Dolphin Research Center in Grassy Key, Florida.

For the past six years, Ron, Mandy and others at the Institute have been trying to develop a "language" that can be understood by dolphins and humans alike. It is not a language of words like we use, but a language made up of whistle-like sounds that stand for different objects or actions.

"Computers are a breakthrough," says Ron, who is studying for a master's degree in computer science from the University of Miami.

Three years ago, he began using an Apple II to aid in his research efforts.

"I couldn't conceive of doing research on dolphins without a computer," he now says. "Everybody I know involved in this research is using computers extensively....Computers affect almost every aspect of [our] program—from training dolphins, to orientation of trainers, to the way data is collected and analyzed."

Before computers, dolphin communication research was awkward. Researchers would use spoken commands, hand signals and mouth whistles that mimicked the dolphins' own sounds.

Computers have improved these methods, says Ron. They've made the research more precise and scientific.

"Computers change human whistles to a high-pitched range dolphins can hear and easily imitate," he explains. Computers have the ability to *exactly* reproduce the whistling sounds. "Without a computer," says Ron, "the sound comes out a little different each time and confuses the dolphins."

Computers also eliminate the possibility that human researchers will tip off a whistled command with body movement or tone of voice. Now researchers at the Institute

With a computer's help, Ron is able to "talk" to Nat in simple sentences.

"I couldn't conceive of doing dolphin research without a computer," says Ron Reisman. "Computers are a breakthrough."

can be out of sight when they send the dolphins computer-generated commands.

HOW COMPUTERS TALK TO DOLPHINS

The Dolphin Research Center's system consists of an Apple II computer, an underwater microphone, a custom-designed audio input board and a modified Mountain Computer synthesizer.

Here's how it works: First, a whistling sound is picked up by the microphone. This sound is then processed through the audio input board and displayed on a computer monitor. The monitor shows the sound's volume and pitch as a curved graph. "Now we can *see* high-pitched dolphin sounds that we couldn't even hear before," says Ron.

The custom-built audio input board that makes this possible was designed by Charlie Kellner and Eric Larson of the Apple Computer Company. "We took some 20 existing [computer] chips that record loudness, frequency and time...and put them together in a combination that was never done before," Ron says. "Everyone told me what I wanted to do was impossible. But we did it for $175 in parts ....Others have spent $40,000 on equipment to get a similar system."

Once the dolphin sound is stored in the computer memory, the synthesizer can play the sound back at a human or dolphin's hearing range.

The synthesizer which does it all —a modified Mountain Computer MusicSystem 2—is similar to synthesizers found in many electronic musical instruments. Using a special communication program, researchers can create a file of dolphin sounds. They can also use the system to rearrange these sounds, stringing them together to form simple "sentences."

A computer-generated signal is sent out and Nat the dolphin leaps to action.

DIGITAL DOLPHINS

Using this system to create "sentences," Ron has taught Nat to follow simple commands correctly more than 80 percent of the time. Even with 5 other distracting dolphins in Nat's seawater pen, this eight-year-old dolphin has learned a dozen "words."

"Nat, over speaker," commands the computer-generated whistle. Nat obeys by jumping over the floating speaker in his pen. He also obeys "Nat, under towel" and "Nat, retrieve towel."

Most important, says Ron, this dolphin isn't just following commands; he's demonstrating

"Imagine," says Ron Reisman, "a dolphin composing and communicating a unique sentence to a human."

language-like communication. Nat *seems* to know that the way the sounds are combined changes their meaning. For example, Nat followed the command: "Nat speaker fetch-to towel" by moving a floating speaker to a towel. This showed that Nat knew the difference between that command and a similar sounding command—"Nat, towel fetch-to speaker" — in which he takes a towel to the speaker. The sounds are the same. But, as with words in a sentence, their meaning changes when they are put together in different order. Demonstrating that a dolphin can understand the meaning of different sound combinations is a big step in human-dolphin communication.

The Dolphin Research Center is not the only place making such progress. Other researchers are also reporting computer-aided advances:

- At the University of Hawaii's Kewalo Basin Marine Mammal Laboratory, two dolphins named Akeakamai and Phoenix have demonstrated even more sophisticated language ability. "As far as I know, only three dolphins on earth show understanding of object words and syntax," says Ron. "Nat in Florida, and Akeakamai and Phoenix in Hawaii.
- In Redwood City, California, pioneer dolphin researcher Dr. John Lilly is using an Apple II microcomputer and a PDP 1104 minicomputer in his effort to create a similar human-dolphin dialogue. "It's not stretching at all to say that computers make much of our work possible," says Lilly's assistant, Bob Swanson.

THE NEXT STEP

But researchers admit much work must be done before dolphins and humans can communicate on anything more than a primitive level.

Ron Reisman is moving ahead, planning development of a special underwater "keyboard" and monitor that will enable the dolphins to interact more directly with the computer. Ron believes the early steps that have been taken with the help of computers *are* bringing us closer to truly talking with the animals: "If dolphins can understand syntactical behavior [words put into meaningful order], then there is a very good possibility that the dolphins should be able to produce it.

"Imagine," he says, "a dolphin composing and communicating an intelligent, unique sentence to a human."

DICK ROBINSON, president of the Florida Chapter of the American Medical Writers Association, wrote "The Light Fantastic" in ENTER's November 1983 issue.

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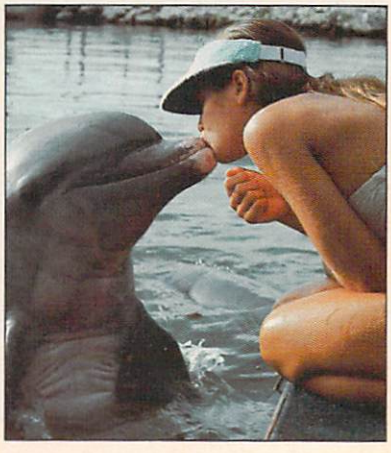

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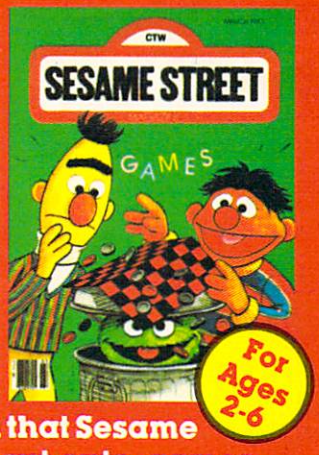

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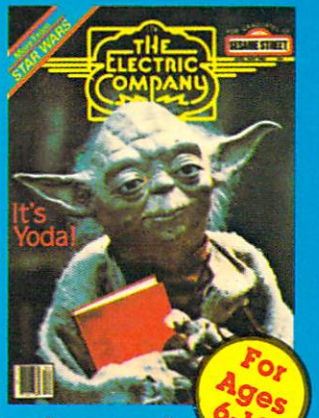

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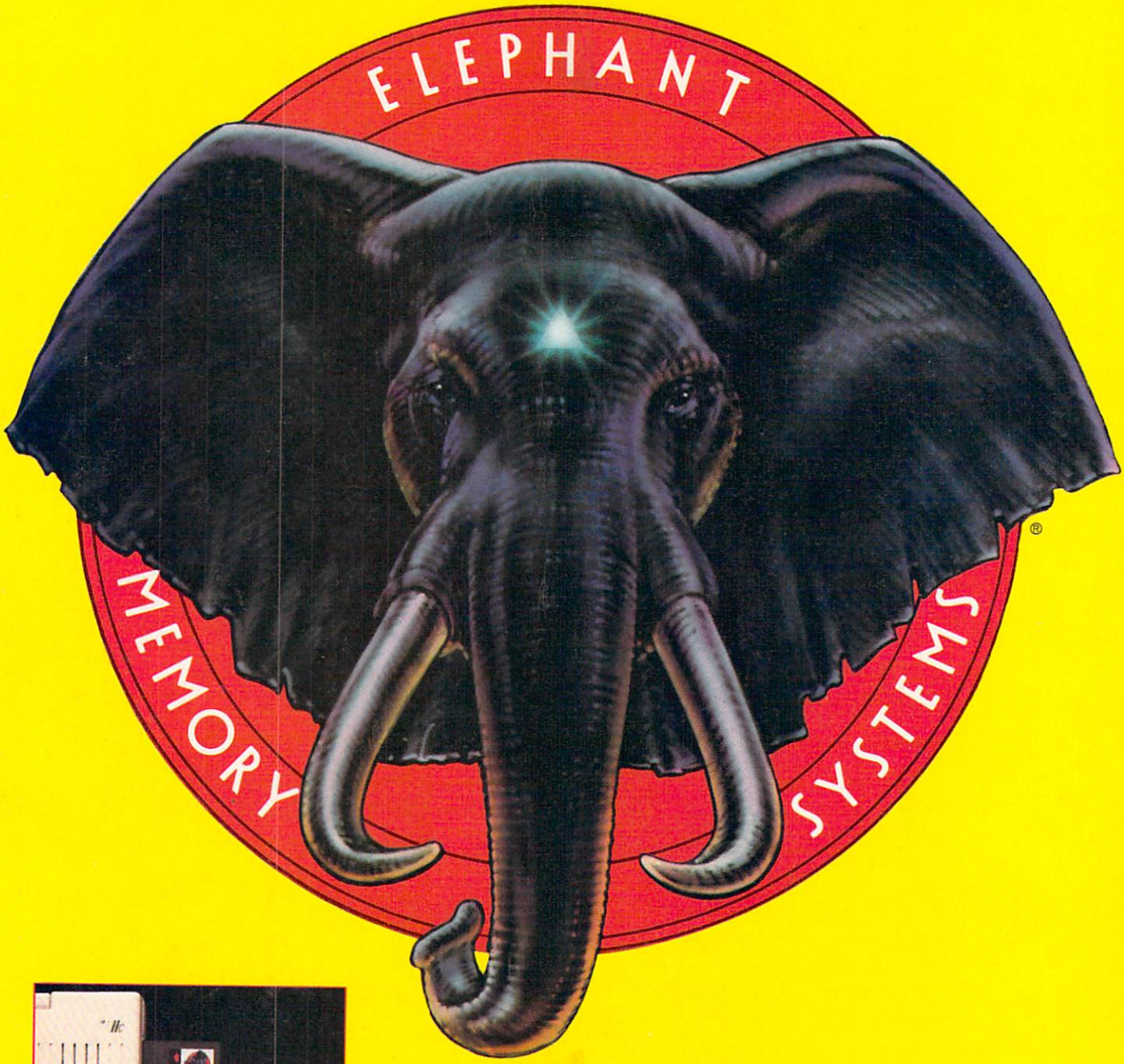

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