CHILDREN'S TELEVISION WORKSHOP • NOVEMBER 1984 • $1.75

enter™

THE WORLD OF COMPUTERS AND NEW TECHNOLOGY

BUYING A COMPUTER
An Exclusive, In-Depth Guide

PROGRAMMING
Apple, Atari, IBM, Com. 64, VIC, TI, Timex, TRS-80

INSIDE 'KNIGHT RIDER'
Special-Effect Secrets Of TV's Computerized Supercar

David Hasselhoff and his computer car K.I.T.T.

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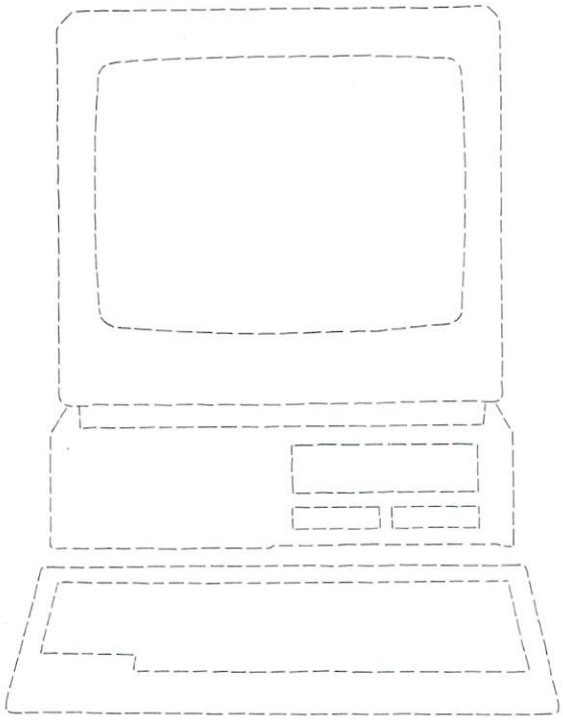
Picture a computer under $1000 that runs over 1000 of the best programs written for the IBM PC.



Now picture this.

There's a lot that's new about PC*jr* and it's all good news for you.

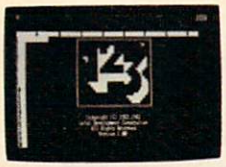
PC*jr* now has a lower price.

A new typewriter-style keyboard.

A new option that can give user memory a dramatic boost.

And new business and personal programs to add to its fast-growing library of up-to-date programs.

All of which can make PC*jr* the most useful computer a little money can buy.



Right now, PC*jr* can run the powerful Lotus 1-2-3™ on diskette (with Lotus 1-2-3 PC*jr* Installation Kit and additional memory). The new cartridge version, requiring no additional memory, will be available this fall.

Managing Your Money™ by Andrew Tobias, new on cartridge for PC*jr*, is a comprehensive personal financial advisor and manager.

Turn your screen into a canvas. The new cartridge program, PC*jr* ColorPaint, lets you create with the added dimension of color.

It comes standard with 128KB of user memory—twice the memory of its most popular competitor. An advanced 16-bit processor. And a double-sided diskette drive that can store over twice as much information as most single-sided drives.

With all these features, PC*jr* can run over a thousand of the most popular programs written for the IBM PC. And with the new optional 128KB Memory Expansion Attachment, it can run over a thousand more.

PC*jr* also runs a growing number of powerful cartridge programs. They work faster than diskettes, and don't take up a bit of user memory. The three newest examples being Lotus 1-2-3,™ the fascinating PC*jr* ColorPaint and Managing Your Money™ by financial expert Andrew Tobias.

As its library of software keeps growing, PC*jr* keeps growing, too. By leaps and bounds. Because IBM designed it with 13 ports for add-on options. And a modular construction that will accept new capabilities down the road. Even those that haven't been invented yet.

All this in a computer that weighs a mere 10 pounds.*

Takes up just a bit over a square foot of desk space. And costs less than $1,000†, without monitor.

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The new PC*jr* Memory Expansion Attachment can give memory a quick lift to 256KB. Or, along with a PC*jr* Power Expansion Attachment, all the way to a hefty 512KB.

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Diskette Drive
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Keyboard
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Detached; cordless

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Software
Runs over 1,000 programs written for the IBM PC
Runs both diskette and cartridge programs

Display
40- and 80-column
Resolution:
4-color: 640h x 200v
16-color: 320h x 200v

Expandability
Open architecture
Optional 128KB Memory Expansion Attachment(s)
13 ports for add-ons, including built-in serial interface

PC*jr*'s new typewriter-style keyboard adds a nice touch to business, home or educational computing.

IBM PC*jr*

Growing by leaps and bounds.

Managing Your Money is a trademark of MECA. 1-2-3 and Lotus are trademarks of Lotus Development Corporation.

*Weight does not include power pack and monitor.
†IBM Product Center price.

Little Tramp character licensed by Bubbles Inc., s.a.

From the Stone Age to the Space Age in one afternoon.

Having CBS Software for your home computer is like having a time machine.

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In fact, CBS Software has so many other exciting programs you'll want to write for our catalog! (Write to CBS Software, One Fawcett Place, Greenwich, CT 06836.*)

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MENU

NOVEMBER 1984

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VOLUME 2, NUMBER 2

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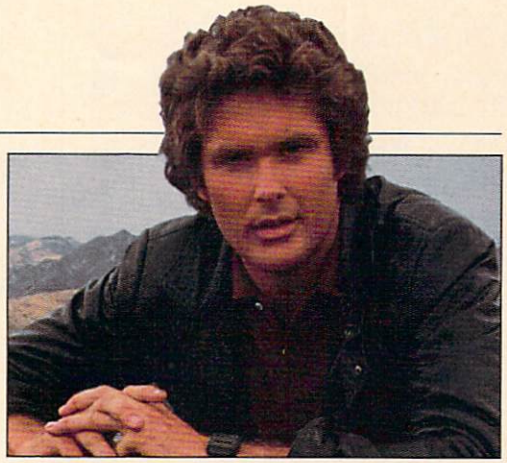

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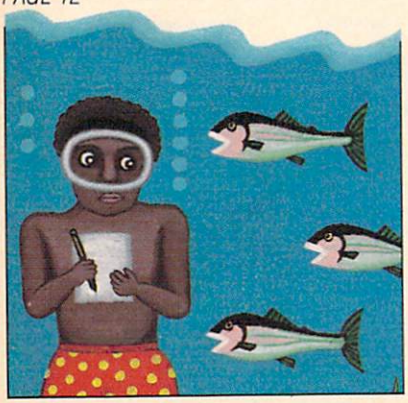

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DEPARTMENTS

PROGRAMMING

Cover: Photo courtesy of NBC.

INSIDE STORY

Ever since I started working on ENTER, I've *hated* going to parties. You see, now when people ask me, "What do you do?" I have to answer, "I work for a computer magazine." The next thing I know, they're telling me how computers are taking over the world and how their second cousin's kids are computer geniuses. Then comes the big question. "Uh, like, so ...should I buy a computer?"

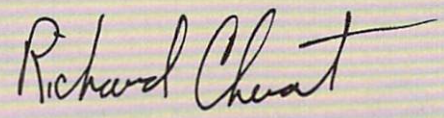
You might be surprised to learn that at least half the time I say "No." A lot of people really *don't* need a computer. Businessmen need computers for record keeping, and writers use them for word processing. But what else *is* a personal computer really good for?

Games! Of course, computers are great to play games on. But what do you do after you've eaten your millionth dot?

That question is harder to answer than you might think. In my opinion, the computer industry really hasn't answered it yet. But I'm willing to bet that plenty of you have. I'm sure a number of our readers know people who are using computers in new and interesting ways. For example, a group of young people in Los Angeles used their computers to help plant over one million trees in preparation for the Olympics. Have you come across anything like this? Are computers being used in your school or community to help people or to make life easier?

If so, we'd like to hear about it. Tell us about the way the computer is used, who developed the idea, and what software and hardware he or she used. Send your notes to: "Great Ideas," ENTER, 1 Lincoln Plaza, New York, NY 10023.

You see, I really *do* think there are a lot of reasons to own a computer. Some of them just haven't been discovered yet. It's up to you to help us find them.



Richard Chevat,
Technical Editor

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CREATE A FAMILY LEARNING CENTER AT HOME AND SAVE $40

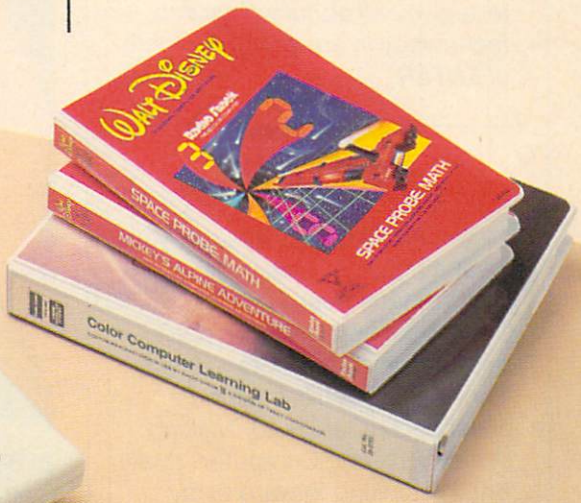
Connect your television to a Color Computer 2 from Radio Shack to make a family learning center in your home. Then watch what happens: Your set will be on more and more, but your family will be watching fewer TV shows.

A Valuable Education at Home. Our Color Computer 2 and educational software from Walt Disney and Sesame Street make a tempting alternative to television for children age 3 and up. You'll enjoy knowing that you've provided the first step in a computer education for your children and that the Color Computer 2 can handle your home computing needs, too! In fact, the learning center could become the busiest spot in your home, as you and your children enjoy programming and home computing together.

It's Easy to Start! The Color Computer 2 with Standard BASIC is now just $119.95 (16K Standard was $159.95 in 1984 catalog). The Color Computer 2 with Extended BASIC is just $159.95 (16K Extended was $199.95 in 1984 catalog). Both models use the easy-to-understand BASIC language, and the Color Computer 2 with Extended BASIC makes high-resolution graphics using simple one-line commands. With either model, Radio Shack makes it easy to start computing with your family even if you've never used a computer before. Our tutorial manuals are easy to read and can have you programming right away.

Come By Today! Only Radio Shack offers nationwide sales, service and support for the Color Computer 2. Why not come by your nearest Radio Shack today and see how easy family home computing can be!

Prices apply at participating Radio Shack stores and dealers. Walt Disney is a registered trademark of Walt Disney Productions. Sesame Street is a registered trademark of Children's Television Workshop.



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FEEDBACK

WRISTWATCH WATCH

Is it true that a computer can be made the size of a wristwatch? Can scientists and technicians now actually program circuitry to make such things as wristwatch TV sets and calculators?

Tell me more on this please.

—Luke L. Stepp
Chicago, ILL

Dear Luke:

It sure is true. And we'll be telling you all about wristwatch technology in an upcoming issue of ENTER. —Ed.

MONEY TALKS

I would like to thank you for your great magazine. I like your programs the best. I own a Commodore 64, and your magazine got me started with it. All my friends like ENTER. I started a printing job after I read "Making Money with Your Computer" (May '84). I'm looking forward to my next issue. —Lee Supercinski
Longview, TX

DISAPPOINTING 'DRAGON'

When I heard about *Dragon's Lair* being in ENTER Magazine (April '84), I borrowed it from my teacher. I was reading it in the car when my mom pulled over for lunch. When we went in, I saw the game in front of me. I just had to play it. When I did, I was disappointed to see that the game was too difficult to play, and I think it wasn't worth the 50 cents. But I have to admit the graphics were awesome. —Gregg Lagambina
Wilton, CT

CONTEST IMPOSSIBLE

We like your magazine a lot. We read all the issues. Our favorite articles were "Computers Come to Bat" and "Games Gone Gonzo" (both May '84). We will read your magazine for a long time.

© SUSAN FAIOLA

The contest "Win a Computer" is something we want to do, but it is too hard. —Barbara D. Lacy
Andrea Ross
Windermere, FL

Dear Barbara and Andrea:

We're sorry if our April "Win a Computer" contest had you too boggled to enter. But there'll be plenty of contests in the months ahead to keep you busy. Why not try them all?

And while you're at it, take a look at this month's contest. All you need is a sense of humor. If you tickle our funny bones, you could win a color monitor and a whole library of First Star software. —Ed.

MORE ABOUT ADAM

Your article "All About Adam," in the April issue of ENTER, said that in the word-processing mode you could only make changes to the text at the bottom of the screen. That is not true. If you had read the instruction manual or tried all the screen options, you would have seen that there is another screen format, "Moving Window," where you may make changes to the text anywhere on the screen. —Willy Pim
Mattituck, NY

Dear Willy:

You're right. When we wrote the review, we only had a few hours to use the Adam. A few weeks later, Coleco finally provided us with a review model. We also made an error in saying you cannot line edit BASIC statements on the Adam; you can. We're sorry if these errors caused confusion. —Ed.

(Continued on page 61)

WRITE US!

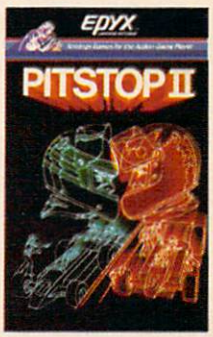
ENTER wants to hear from you! Our CompuServe ID is 724556,1776; our Source number is BBI113. Or write to us at ENTER, 1 Lincoln Plaza, New York, NY 10023.

PITSTOP II™. BECAUSE AUTO RACING IS NOT A SOLO SPORT.

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

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

One or two players: joystick controlled; disk or cassette.



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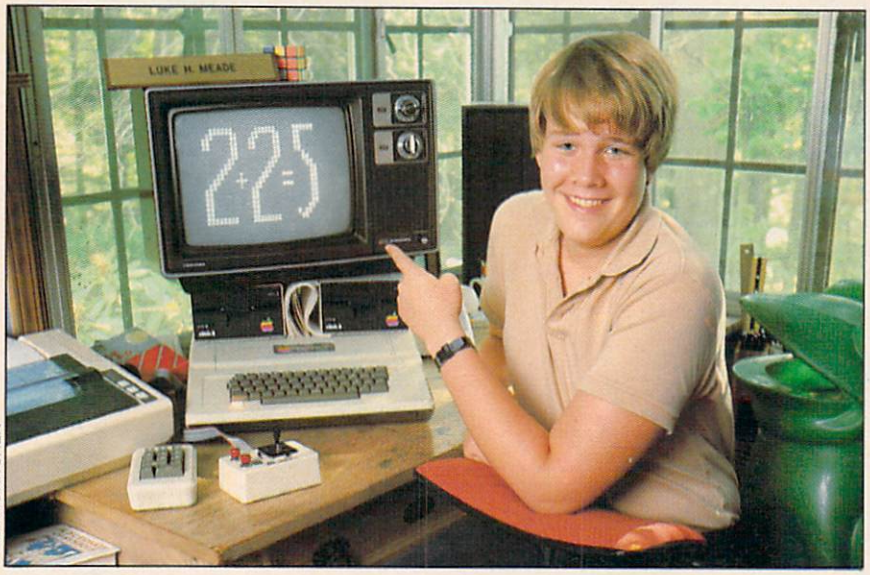
Strategy Games for the Action-Game Player

RANDOM ACCESS

COMPUTERS ARE STUPID



© DENNIS KITCHEN

"Can you believe it...my computer can't do *anything* without me."

BY LUKE MEADE, 13

Computers are stupid. That's right, stupid. Think about it: They can't learn from their mistakes. They *never* have original thoughts. They can't do *anything* but what people tell them to do.

If a computer was a person, you'd think he or she was really D-U-M-B.

So why do so many people—including kids, who should know better—think of computers as superbrains? Why are they sure that the computer's smart and that they're not?

I really don't know. I can understand why some adults might feel this way—a lot of them are afraid of computers for some reason. But you'd think that kids who have played and worked on computers—and even programmed them!—would know better.

Let me give you an example. Last year at my school, there was a class on BASIC for beginners. Lots of kids who knew nothing about computers took the class. Since computers and BASIC really aren't that difficult, many kids received A's. But some of these kids didn't want to go on with computers. I think it was because they didn't understand how the computer works. They could make the computer do things, but they didn't understand how it got them done. As a result, the computer seemed mysterious to them, capable of doing things on its own.

I've also noticed that people have a funny attitude toward mistakes made on the computer. Many people think that when a computer botches something up, it's being mean, like a villain in a science fiction movie. They get furious at the machine, as though it had some say over what it did. They forget that computers can do only what they've been programmed to do—and that any mistake it makes is the fault of the programmer or some electrical failure.

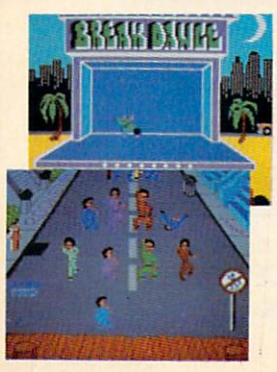
I'm not sure what it is about computers that makes people respond this way. After all, humans must know they are superior to computers in almost all ways. Computers can't walk the dog, cook a meal or paint a picture.

Maybe these people have just seen too many science fiction movies. Or maybe it's that computers speak a different language than we do. I guess that can make them seem intimidating. But this impressive other language—whether it's BASIC, Pascal, Assembler or something else—is really just evidence of the computer's stupidity. It can't learn any language but its own. Type a full sentence into any computer that's not running *Zork* and it will respond with an error message. In computer language, that's the equivalent of a bewildered groan.

So, the next time the computer you're using makes a mistake, don't take it out on the machine. Go find the programmer. After all, it's the people who do all the thinking, not the computers.

LUKE MEADE, 13, does his computing on an Apple.

BREAKDANCE.™
BREAKIN' MADE EASY.



The hottest craze in the U.S. this fall is Breakdancing, and you don't have to miss it. Now anyone can Breakdance. Just grab your joystick and control your Breakdancer in poppin, moon walking, stretching and breaking...all on your computer screen.

Breakdance, the game, includes an action game in which your dancer tries to break through a gang of Breakers descending on him, a "simon-like" game where your dancer has to duplicate the steps of the computer-controlled dancer and the free-dance segment where you develop your own dance routines and the computer plays them back for you to see. There's even a game that challenges you to figure out the right sequence of steps to perform a backspin, suicide or other moves without getting "wacked."

Learn to Breakdance today! Epyx makes it easy!

One or two players; joystick controlled.

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Strategy Games for the Action-Game Player

ASK ENTER

BY DAVID B. POWELL

MODEMS & PHONE BILLS

DEAR ENTER: How much does it cost when you use a modem to call a friend in the same city? Is the cost more than a normal phone call?

—Guy Kitchell
Madison, WI

DEAR GUY: In your state and most others, the charges for a 300-baud modem call are the same as they are for a voice call.

In many areas, however, there is a special charge for using a modem of 1200 baud or higher. For example, according to the Wisconsin Public Service Commission, your calls would draw special fees if you used a modem faster than 2400 baud. To work properly, these require special phone lines, for which the phone company charges extra.

COMPUTER HOUSEWORK?

DEAR ENTER: Does anyone make a home computer that can control devices and appliances in a house?

—Nikki Bagli
Brooksville, FL

DEAR NIKKI: We know of no computers made exclusively for that purpose. Until recently, you would have had to write your own programs and build special hardware to link your computer to electrical switches and appliances.

However, software is now appearing which will put regular

© BRAD HAMANN

personal computers in command of your front door, toaster or television. Here are two examples:

- *Smarthome I,* a security monitor and appliance controller for Apple or IBM PC computers. Price: $600 and up. For information, write to CyberLynx Computer Products Inc., 4828 Sterling Dr., Boulder, CO 80301.

- *VIC Relay,* for home monitoring and control with Commodore 64 or VIC-20 computers. Price: $39.95. For information: Handic Software, Suite 7, 5090 Central Highway, Pennsauken, NJ 08110.

TRS-80 SPEECH?

DEAR ENTER: Can a person with a TRS-80 Color Computer use a speech synthesizer and light pen? If so, can you print some information about them?

—Gerardo Casanova
Vega Baja, Puerto Rico

DEAR GERARDO: Yes, these devices are available for the Color Computer. Here are some companies that sell them:

- *Alpha Products,* 79-04 Jamaica Ave., Woodhaven, NY 11421. Synthesizers and text-to-speech software.

- *Colorware,* 78-03 Jamaica Ave., Woodhaven, NY 11421. Synthesizers, light pens and software.

- *Symtec,* 15933 W. 8-Mile Rd., Detroit, MI 48235. Light pens.

- *Tech-Sketch Inc.* 26 Just Rd., Fairfield, NJ 07006. Light pens.

- *Spectrum Projects,* P.O. Box 21272, Woodhaven, NY 11421. Synthesizers and "talking" application software.

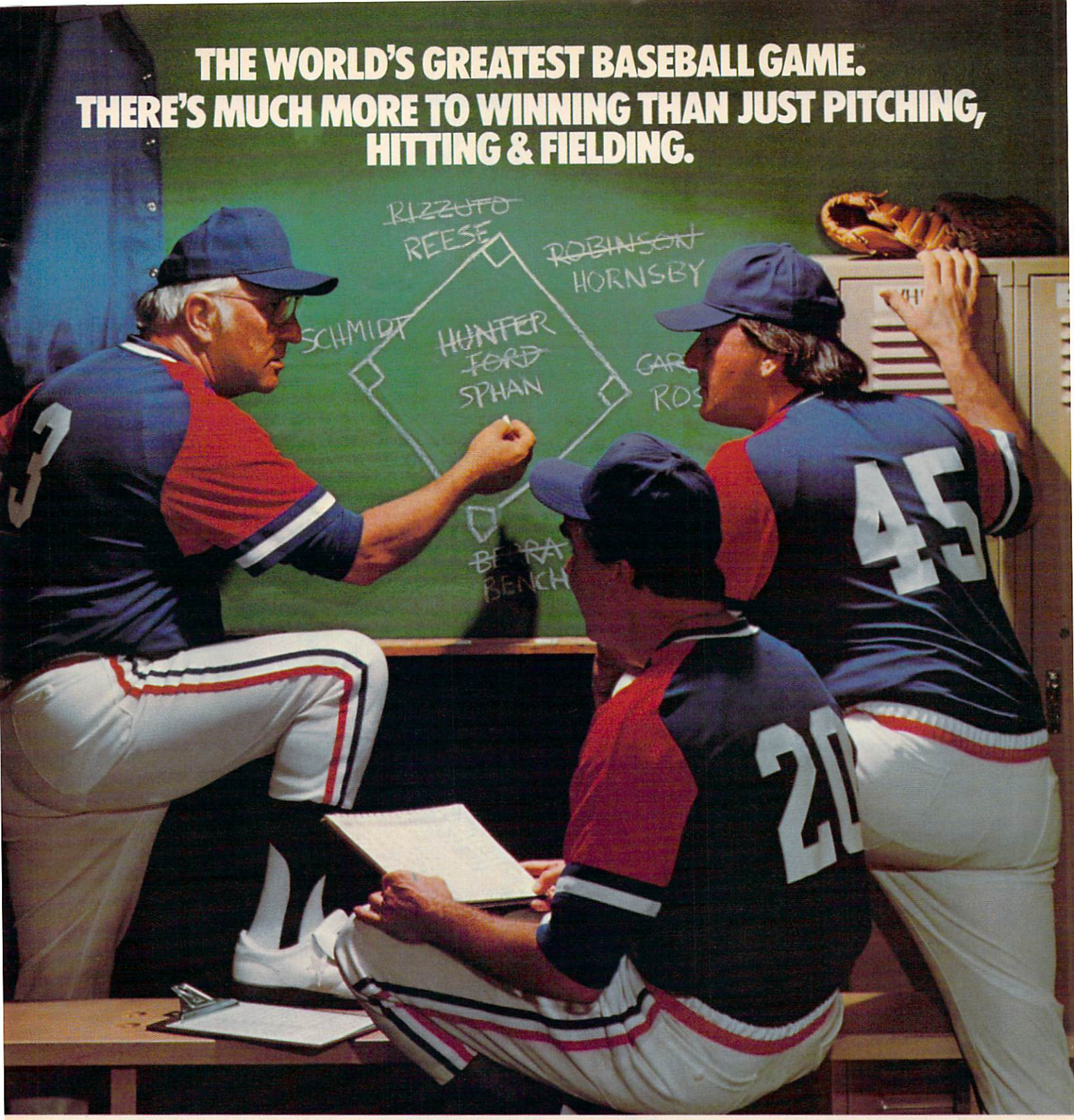
- *Speech Systems,* 38W255 Deerpath Rd., Batavia, IL 60510. Synthesizers and talking software.

- *Jarb Software/Hardware,* 1636 D Ave., Suite C, National City, CA 92050. Talking software.

DAVID B. POWELL is an ENTER contributing editor.

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

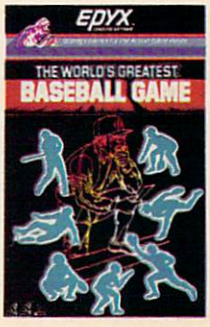
THE WORLD'S GREATEST BASEBALL GAME.
THERE'S MUCH MORE TO WINNING THAN JUST PITCHING, HITTING & FIELDING.



Real baseball is more than just hitting, pitching and fielding. It's also your favorite major league teams, the great stars of today and the All-stars of yesteryear. It's statistics and coaching, and it's managing your own game strategy. With the World's Greatest Baseball Game, you have it all. Pick your major league line-up using the actual player and team stats. Then watch the action unfold against an opponent or the computer.

Two modes let you choose between managing and controlling your team or managing only. The World's Greatest Baseball Game—everything you could ever want except the hot dogs and peanuts.

One or two players; joystick controlled.



EPYX™ COMPUTER SOFTWARE

Strategy Games for the Action-Game Player

BITS

DATING DATA

ILLUSTRATIONS © SHIGEO OKUMURA

Being a computer whiz is the newest way to become popular—and even win hearts—at college.

"Computer nerds," according to a recent story in *The Wall Street Journal,* "are now big men [and, we expect, women] on campus." It appears that students confused by computers really appreciate the help that campus computer pros give them. Sometimes, the story points out, that can lead to friendships and dates for high-tech whizzes.

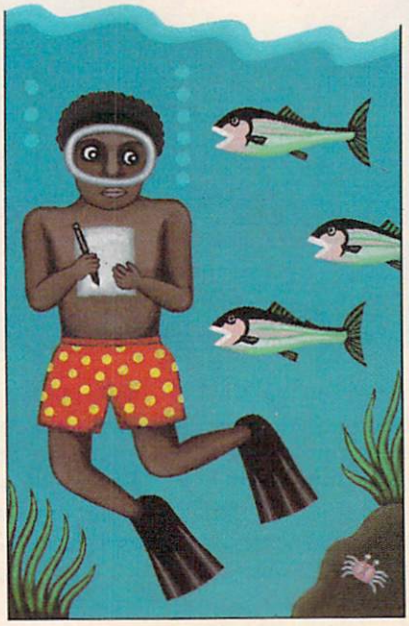
Computers can even help shy students meet their dream dates. According to the *Journal* story, Harvard University sophomore Martin Picard programmed a school computer to call his dorm room whenever a certain female student logged on. When the computer called, Martin headed over to the computer room to offer assistance...and, just maybe, to get a date.

SILICON SALMON

You've probably heard of fish and chips, the British dinner dish. Well, how about chips *in* fish?

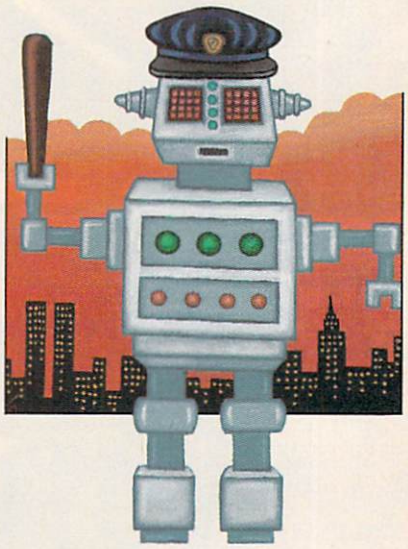
Antenna-equipped microchips are being placed in 1,500 salmon by researchers at the National Marine Fisheries Service in Manchester, Washington. The chips send out a signal that lets researchers keep track of where these salmon travel after they are released from hatcheries.

Why are these researchers so interested in where salmon go for a good time? Fishing is a big industry in the Pacific Northwest, explains Brian Gorman of the Fisheries Service. The more that researchers know about salmon habits and habitats, the more salmon will be available for fish-hungry fishermen.



BEEPING ON THE BEAT

People were surprised when New York City announced its "Cop of the Month" last April. It wasn't that this officer was four feet tall and weighed 230 pounds, or even that it had a strange name



like RM13.

What surprised people was that the top cop in New York City was a robot.

RM13, the first robot to ever receive such an honor, won the award after venturing into a crime scene.

New York City isn't the only place with robot police officers. Across the nation, many cities are starting to use robots for handling explosives and other hazardous jobs.

But robots are good for more than dangerous work, according to Chief Michael Hanrahan of the New Berlin, Wisconsin, Police Department. His town's remote-controlled robot, Safety Sam,

doesn't battle criminals. But Sam has an important job—teaching safety tips at local schools.

LOUNGE ROBOT

The guy at the piano plinks the keys and begins to sing: "Feelings. I don't have any feelings. I'm just a robot. What did you expect? Whoa, whoa, whoa."

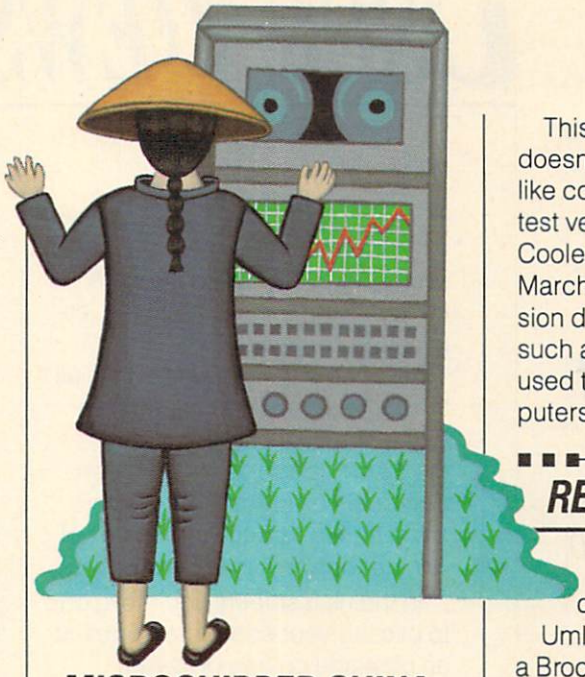
Whoa! A robot lounge singer? That's right. That's Sammy Sands, a robot singer and music machine at Gadgets Cafe in Tucker, Georgia. Sammy, who was created and programmed by Warner Leisure, Inc., sings songs, makes music and even talks to the customers. "You remember World War II," he says. "It was in all the newspapers."

Sammy seems to be popular with the customers, according to Kevin Brown, a manager at Gadgets. "One night we found $15 in his tip jar."

BOO-HOO BUFFER

After 16 hours of non-stop programming, you've created the ultimate computer game. All you have to do is type R-U-N, press ENTER and...burp...Oh no! The computer ate your program!

That can mean only one thing: it's time for the Programmer's Crying Towel. This cotton towel, created by the Alpha-Byte Co. of Quebec, Canada, won't bring back your program. It will, however, soak up your tears. The towel features a drawing of a computer, along with such dreaded computer statements as "File Error," "System Lockup" and the ever-popular "Disk Too Soft."



MICROCHIPPED CHINA

In China, they think rice is nice. But, until recently, it took a lot of work—and workers—to grow a good crop. Now computers are changing all that.

In August, a village outside the Chinese city of Shenyang installed a microcomputer to control irrigation. This computer helps the village control the amount of water in each rice paddy.

"Two now work in two shifts to operate 10 electric pump wells," say Chinese officials. Before the computer, they add, it took 20 workers to do this same job.

SPACE REFRIGERATORS

You've heard of frost-free refrigerators. Well, how about a wear-free refrigerator in space?

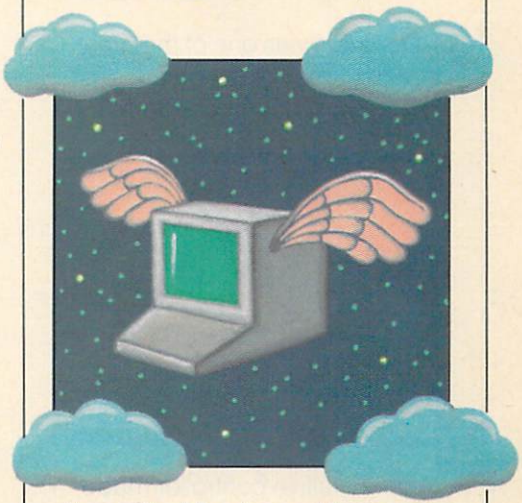
This invention from NASA, the U.S. space agency, isn't designed for chilling interplanetary popsicles. It's called the "Cryogenic Cooler" and it will be used as a cooling system aboard satellites. It will keep satellite equipment at an even temperature.

This refrigeration system doesn't wear down from friction like common refrigerators do. A test version of the Cryogenic Cooler has been operating since March, 1982. If the satellite version does this well, says NASA, such a cooler could someday be used to help cool down computers and robotic machinery.

REBORN BYTES

Jack Umland believes in computer reincarnation.

Umland is president of Di-Core, a Brooklyn Park, Minnesota, company that recycles old computers. The company takes apart obsolete computers in search of reusable parts (like switches and breakers), precious metals (tiny amounts of gold and silver) and



other valuable pieces. The reusable parts can be sold back to computer makers. The gold will be bought by jewelers and silver can be used in making film.

"Before Di-Core," says Umland, "obsolete computers were usually dumped in scrap yards or landfills." Now, they're refined, recycled and reborn!

USER VIEWS

NEW COMPUTER GAMES

BY PHIL WISWELL AND BERNIE DEKOVEN

STAR WARS: THE ARCADE GAME

(Parker Brothers, Atari computers, $30; also for Commodore 64, ColecoVision, Atari 2600 and 5200).

Star Wars was one of the great arcade games of the recent past. Its graphics, sound effects and

touch-sensitive controller made the arcade game a very special playing experience. We knew it would be tough for a home version to match this game. Unfortunately, this home version doesn't come close.

The arcade version had sharp graphics and outstanding sound effects. A home computer version just can't give you the same sense of excitement. And a home joystick controller doesn't offer the control of the arcade original's jet-pilot-like controller.

This home version does have all the same screens as the arcade game. The first screen, where stars scroll past your first person perspective view and tie-fighters zip in from all sides, reminds us of another home game, *Star Raiders*.

In the next screen, you move on to piloting your spacecraft against an obstacle course of towers. Then you arrive at the final screen, in which you must maneuver through the trenches and catwalks of the Death Star. As in the arcade game—and the movie—you have to bomb a reactor port to destroy the Death Star and move to the next wave.

WRAP-UP

PHIL: Too much shooting! I lost count of the number of fireballs and tie-fighters that I was expected to kill in the first wave. But my wrist remembered the pain long afterwards.

BERNIE: This game requires great graphics—arcade-style graphics—to give the illusion of space action. The graphics on these computers can't create that illusion.

OPERATION WHIRLWIND

(Brøderbund, Commodore 64, $34.95; also for Atari computers)

This is very much like a beginner's board wargame, an exercise in military strategy and tactics. The big difference, of course, is that it is not possible to lose the pieces or spill soda on the board, because everything happens on screen.

The game puts you in command of an armored task force. Every member of your group has specific abilities that must be coordinated into a single drive for

the enemy camp, 15 kilometers away.

Between you and this main battle are many small enemy units. You need to travel down open roads for speed, and must send ahead your recon units to scout the terrain. There are also two rivers to cross.

Each turn is divided into four phases. The first is the command phase, where you signify which units will dig in and which will be combat ready. In the movement phase, you try to position your units to draw enemy fire (lets you know where they are) and set up for attack. During the combat phase you order units to fire at enemy positions, and then try to overrun them in the assault phase.

WRAP-UP

PHIL: I think *Operation Whirlwind* is successful because it isn't as broad and complex as most strategy wargames. It is a training ground game, a scaled-down ver-

sion of more elaborate games of this kind.

BERNIE: I wanted to just drive a tank around in a high-resolution wargame. I didn't get that here.

VIKING RAIDER

(Interphase, Commodore 64; $44.95 includes cartridge and disk)

This animated adventure game is contained on both a cartridge and a disk. It has some unique features. Using the joystick, you can move your character between scenes to explore the terrain, objects, and people of Norway. Then, using the keyboard, you can type in verb-noun sentences like ENTER INN or GET LONGSHIP.

Your character, Leif, has a number of weapons to use against a multitude of enemies. Leif faces particular danger whenever he is injured, hungry, tired, cold, or carrying too large a load. So make sure he eats and sleeps and wears his mittens in the snow.

WRAP-UP

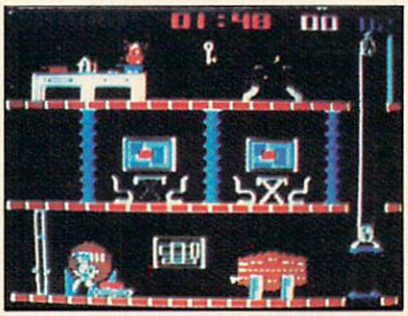
PHIL: There are many places to go

and weapons to use. But this is one of the unfriendliest adventures I've ever taken. Not just difficult, but downright unfriendly.

BERNIE: Yes, the game structure is crude, making its logic difficult to understand. And I expected high-resolution graphics. There are objects in this game I cannot take because I can't tell what they are from the graphics. And you're not allowed to EXAMINE anything!

THE HEIST

(MicroFun, Apple; also for Commodore 64, Adam, ColecoVision; disk, $35, cartridge, $40)



The action and scenery of this game reminds us of Activision's *Keystone Kapers*, even though there are differences.

In *The Heist*, you are the crook making your way through an art museum. The ultimate quest is a secret microdot hidden somewhere among the games many rooms. (The Apple version has 144 different rooms, others have 90 rooms.)

You don't have to fight off any kind of menace, but you do have to beat the clock. This means you can't take it easy. There is a timer that begins counting down from two minutes every time you grab a treasure or a key.

WRAP-UP

PHIL: I found little that was unusual or interesting enough to hold my attention here. It's just another variation on the familiar *Keystone Kapers, Loot & Ladders* games.

BERNIE: Each room fills an entire screen, and as you move across an edge, the next screen scrolls into view. That's good. Unfortunately, the brief pause between scenes is enough to ruin the illusion and break the continuity of the action.

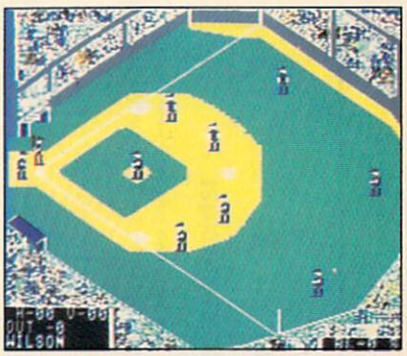
THE WORLD'S GREATEST BASEBALL GAME

(Epyx, Commodore 64, around $40)

The title of this game holds up —at first. In the initial setup of a game, you select a historical team of real players and real statistics from a list of two dozen choices.

Actual facts about pitchers, batting percentages, and other vital statistics give the game a flavor or real baseball strategy.

However, several minutes after



you take the field, the promise begins to fade. Batting is simple; you just press a button. But once you start running for a base, you no longer control your player.

There are other problems, too. You can't run backward or even dodge a tag. Meanwhile, getting fielders to chase and throw the ball is a complicated combination of joystick pointing and button

(Continued on next page)

USER VIEWS

(Continued from previous page)

pressing. It can get tiring.

The graphics are okay, though the perspective on the field is strange. (You're looking down the first base line.) But sound effects are almost non-existent, and that's a terrible mistake.

WRAP-UP

BERNIE: I am still very excited by the statistical accuracy of the great teams you can create. I think any hard-core baseball fan would feel the same way.

PHIL: Fair enough. But for an exciting, state-of-the-art computer ballpark, look elsewhere.

THE DUKES OF HAZZARD

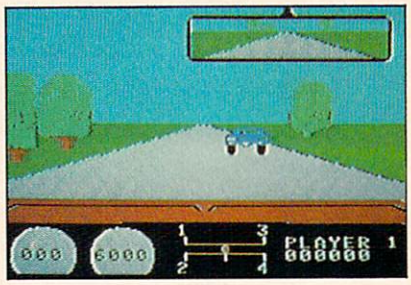
(ColecoVision and Adam, $30)

Believe it or not, this game *is* good. You drive the Duke boys' car, the General Lee, over winding country roads and through maze-like city streets, attempting to catch a car that contains Daisy Mae, who has been kidnapped. As you maneuver after the kidnappers, you've got to watch out for the car driven by Boss Hogg.

We were worried that this game would only appeal to *Dukes of Hazzard* fans, and not be much fun to play. But, in fact, we think you'll like this game whether or not you care for the Duke boys and their TV show. It's a tough driving game that challenges you from start to finish.

There are plenty of obstacles to avoid, and you have to be mighty careful about how fast you drive. Drive too slow and Boss Hogg gets you. Drive too fast and your recklessness does you in.

The only way to win the game is to pass the kidnappers' blue car—no easy feat with all of the traffic. You lose by either crashing into another car or being



caught by Boss Hogg.

You look both forward and behind while you're driving, thanks to the rear-view mirror through which you can see Boss Hogg and any cars you pass. The rear-view mirror is a neat idea, though you don't get to use it enough.

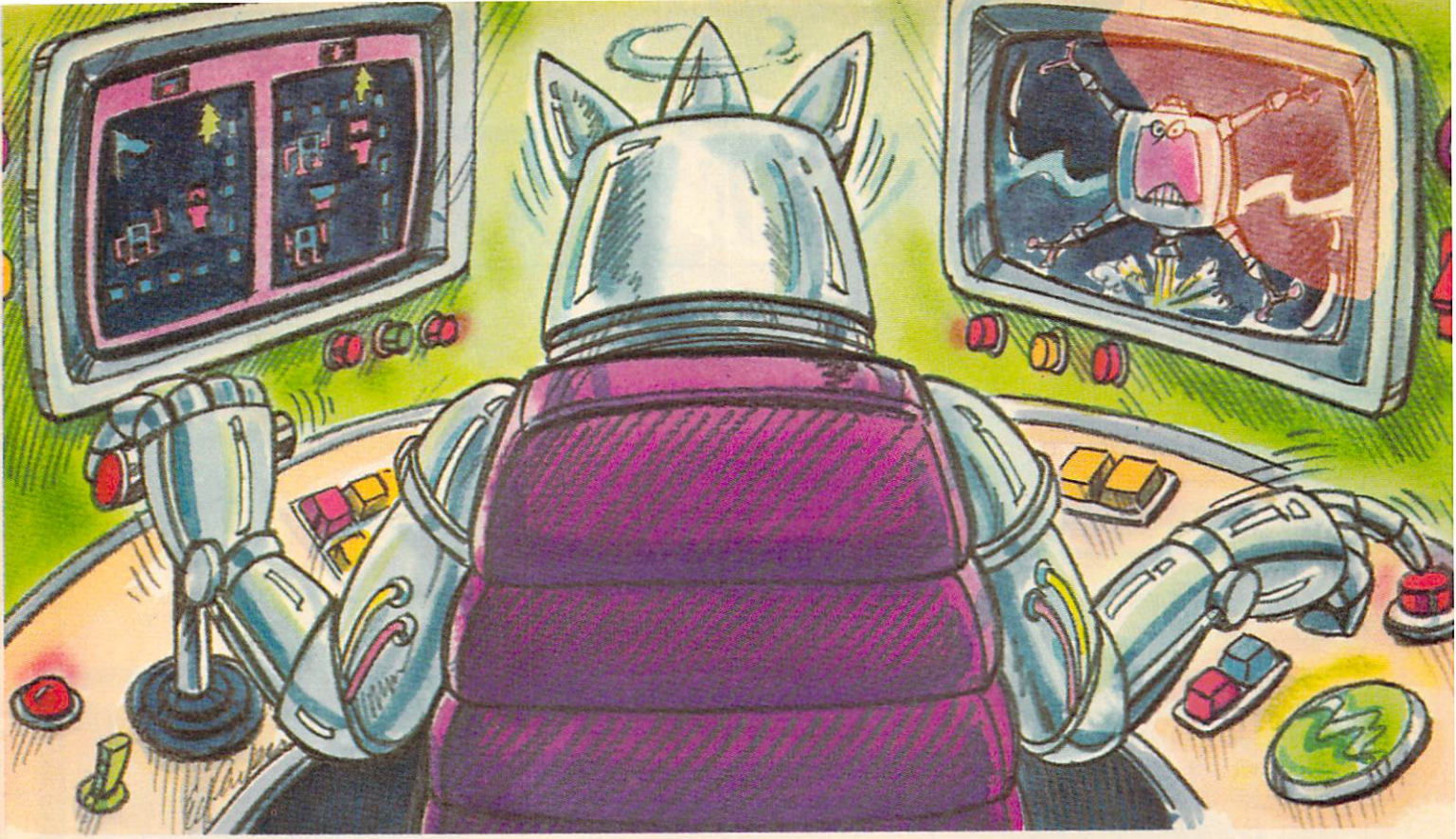
This *Dukes of Hazzard* is designed for use with the steering wheel attachment sold with the game *Turbo*. Steering the two-lane roads is pretty straightforward. We just kept our gas pedal to the floor. But gears are another story. You really have to learn how and when to shift through all four, or you'll lose a lot of valuable time—and the game.

WRAP-UP

BERNIE: It is amazing that this game plays so well. The simulation of driving with wheel, gear shift, and accelerator feels just right—even though I thought the animation is a bit weak.

PHIL: I found that the little extras—like picking up enough speed to leap over bridges—put this *Dukes of Hazzard* game right up there with other top computer driving games.

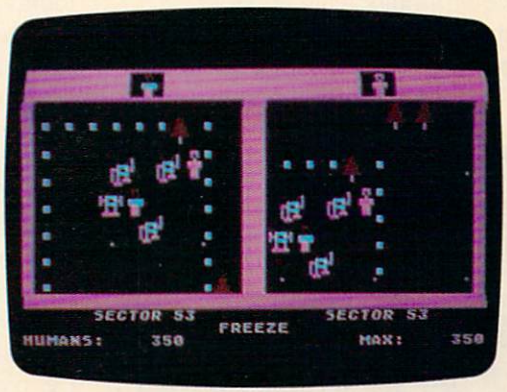
PHIL WISWELL lives in Cross River, New York. BERNIE DEKOVEN lives in Palo Alto, California. Both are ENTER contributing editors.



Show us the face of Max the Master Robot. And you may win your own talking robot.

Team up with a friend to defeat Max and his robot raiders in Bannercatch.

Only a handful of people have ever seen the face of the robot leader Max. Defeat Max and his demon robots and you'll join this elite group. And you and your teammate can win two walking, talking robots you can program yourself.



You'll battle Max and his robot marauders in a field bigger than any you've ever seen. Your team must invade robot territory and grab their flag before they take yours. But be careful; Max has devised a fiendish strategy against you. And, of course, you can't expect mercy from robots.

To make things even tougher, Max has taken a vow not to reveal his face until you conquer all his robots. Including Zweli the Invisible.

You'll need to learn binary numbers, map reading and, above all, how to work with your teammate if you want to win. But even if you go down to defeat, you may win two tickets to your favorite local sports event. See the package for contest details.

You can pick up Bannercatch where you buy software. Or write to Scholastic Inc., Dept. EW, 730 Broadway, New York, NY 10003.

But please remember, only a handful of people have gone face-to-face against Max and survived.

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SOFTWARE SCANNER

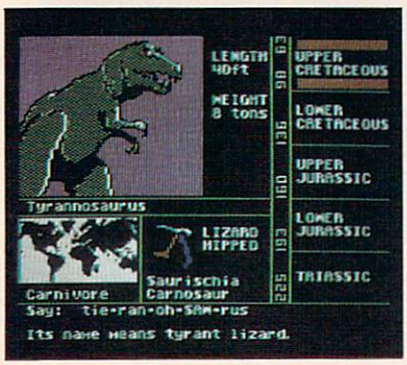
BY HILDE WEISERT

DINOSAUR DIG

(CBS Software, Commodore 64 and all Apple computers; $49.95)

See the amazing Stegosaurus swing its mighty tail! Watch Pteranodon and Plesiosaurus slug it out in the first recorded food fight! With this two-disk program, it's like walking into a 32-dinosaur carnival.

Disk 1, an "electronic book," tells the story of the dinosaurs' rise and fall. The dinos' colorful animation—they hatch, they talk, they bare their skeletons!—keeps you turning "pages." Disk 2 includes a dino-at-a-glance file and four quiz-type games (one or two players). You'll learn who lived when and where. You'll learn how big



(up to 40 tons) or small (at under 100 pounds, Psittacosaurus could borrow your clothes) they were.

The nifty vinyl "Easykey" overlay covers your keyboard with dino names and game commands. You won't have to type in finger-twisters like "Struthiomimus." (But keep the overlay away from pointed objects and the hot sun.)

Dinosaur Dig is an entertaining way to learn basic dino facts. (For more depth, the software comes with a manual and bibliography.) And think of this: You will never again insult a Pterodactyl (gigantic prehistoric bird) by confusing it with the truck-headed lizard Pachycephalosaurus.

CELL DEFENSE

(HesWare, Apple computers, $34.95; Commodore 64, $29.95; requires joystick)

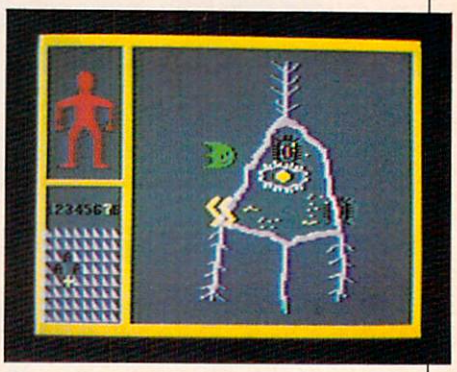
Doctors have compared the body's fight against infection to a medical version of *Pac-Man*. Now there's *Cell Defense*, a fast-paced gobble-'em-up game that really does simulate the immune system at work.

The object is simple: you have to defend body cells against viruses. The rules are complicated—but then again, so are the body's defenses.

You choose from 32 levels of difficulty. Every member of your joystick-controlled defense team has a different personality type. You've got to learn the difference between attacking viruses and the different types of cells. You also have to learn how to zip between the Scanner (a grid that shows the whole picture), and close-ups of individual cells (where the action happens).

Macrophages eat up loose viruses, so expect a few untimely deaths at first. But as the game goes on, you'll be busy saving a life, defending cells and dashing around looking for wonder drugs. Thank heavens for the pause command. (Why isn't there one of these when you're *really* sick?)

Although the "Help" screens and lab-notebook manual are



useful, they don't give any tips for success.

Cell Defense is a terrific game as well as solid science. And it's enough of a challenge to last you into medical school.

ELECTRONIC FLASHCARD MAKER

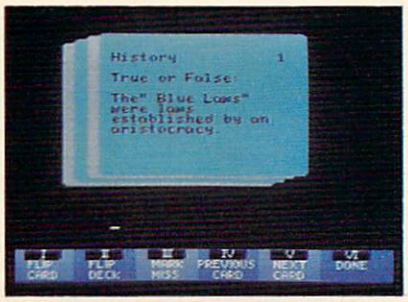
FLASH FACTS

(Coleco, Adam; Flashcard Maker approx. $29.95; Flashcard Facts—Vocabulator, Trivia and Flash Facts—approx. $15.95 each)

These programs bring an old reliable teaching aid into the age of high-tech...almost.

The heart of the series is *Flashcard Maker*. With it, you can create your own cards or use the separate *Flash Facts* "decks" (*Vocabulator, Trivia*, and *Flash Facts*).

The program is capable of doing a lot of fancy on-line shuffling. You can make cards (up to



120 characters per side), make sub-decks, flip from answers to questions, and so on.

But if you count on computers to know the score, this program will surprise you. You have to tell Adam to mark your errors, one by one. And although the timer does pace the cards, there's no on-screen clock to pace *you*. It can get boring waiting for the clock to say your time is up--even if you answered the question in just two seconds.

The pre-made Flash Facts decks are loaded into *Flashcard Maker*, so they work the same. But their content is good, and tough. *Vocabulator* quizzes you on a thousand words (40 to a deck) with true/false, short-answer, and multiple-choice questions.

BASIC JR.

(Courseware; IBM PC, XT, PCjr, Compaq; $49.50)

Here's a handsome BASIC tutorial for IBM computer (and compatible) users. The program has three parts. First, two tutorials cover computer innards and elementary BASIC concepts.

Second, "Graphics" introduces draw and paint commands. In this section, "Graphics Jr." lets you write simple programs. Third, "Games" shows you how a game—"Runtime"—is programmed, and then lets you play it.

There are some nice features. Function keys review important concepts at any time. Cute symbols spotlight main ideas and common "bugs." But until "Graphics Jr." and "Runtime," about all you get to do is read along and type what you're told to type. The concepts are well laid out, but you could fall asleep before you reach "For/Next Loops."

BASIC Jr. is easy to use and has no manual. This was no problem until I got an "ILLEGAL

FUNCTION CALL" message, and had nowhere to look it up.

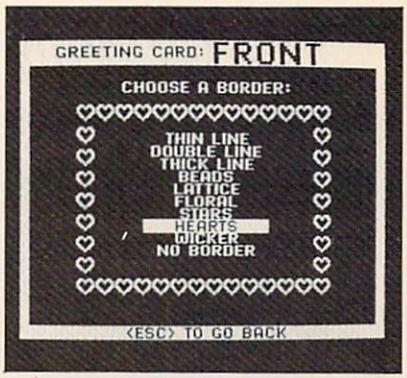
If you can stay tuned in until "Graphics Jr." and "Runtime," this program will teach you useful BASIC tools. Otherwise, you might as well buy a book.

THE PRINT SHOP

(Brøderbund, Apple computers, Commodore 64, printer; joystick or Koala Pad optional; $49.95)

This program doesn't just print signs; it turns your home into a print shop. Your services include greeting cards, jumbo banners, letterheads, and a choice of eight type styles.

You don't have to be an artist to create handsome graphics. *The Print Shop* includes pictures for



almost every occasion: birthday cakes, Christmas trees, menorahs, pumpkins, hearts, rockets, and more.

If you *are* an artist, you can customize a pre-made picture, or create your own. (Koala Pad or joystick draw more easily than the arrow keys.) For background drama, you'll be able to print kaleidoscope swirls or hi-res pictures from other graphics programs.

The Print Shop's lay-out lettering choices are terrific, and a bonanza for clubs: You can create headlines, banners for pep rallies, school election flyers, and awards. (To buy the banners would probably cost you about $1 per letter.) But make sure your printer and interface card match its "set-up" options.

Simple menus and an excellent manual and reference card guarantee that you will fill all your Christmas card orders well before Thanksgiving.

After that, there's February 14th. With a jumbo banner saying "Be My Valentine," who could possibly refuse?

HILDE WEISERT is an educational consultant and writer.

NEWS BEAT

BY RICHARD CHEVAT & SUSAN JARRELL

GRAPHIC GATHERING

© MAGI MOVIE GROUP

At SIGGRAPH '84: A juggling clown created and animated by computer.

Top computer animators, special effects creators and graphic artists from around the world gathered this summer at SIGGRAPH'84, the eleventh annual conference of the Special Interest Group on Computer *GRAPH*ics.

More than 30,000 attended the conference, held in Minneapolis, Minnesota. Among those demonstrating their work were graphics experts from Lucasfilm *(Indiana Jones, Star Wars)*, Digital Productions *(Last Starfighter)* and MAGI *(Tron)*. In addition, designers from several leading computer companies were showing off their newest products.

For some, SIGGRAPH '84 was a place to exchange ideas and show off the latest computer animation sequences. For others, it was an opportunity to catch up on state-of-the-art graphic technology.

One of the highlights of the conference was an exciting medley of new computer graphic videos and films. At SIGGRAPH's Electronic Theater, more than 60 computer-animated films and videos were being shown. These included Lucasfilm's *The Adventures of Andre and Wally B.*, and *Bio-Sensor* from Toyolink, Inc., of Osaka University in Japan. Other impressive demonstrations were Raster Master's *Technological Feets*, a dance and computer video performance, and a laser show by Laser Fantasy, Inc.

And at the Minneapolis Omnimax Theater, the first entirely computer-generated film—made up of clips created for SIGGRAPH '84 by several artists—was shown on a domed screen that was more than eight stories high.

The effects were, to say the very least, magnificent. *—Elizabeth Hettich*

ELECTION SPECIAL: With the help of a network of TRS-80 computers, some students and parents across the U.S. will vote for president five days *before* the rest of the country. The votes, however, are only predictions, and part of the "National Student/Parent Mock Election."

These votes will be cast in schools, then sent on electronically to the "National Mock Election headquarters" in Fort Worth, Texas. Results will be announced on the night of November 1.

To enroll in the program, send a 40 cent stamped, self-addressed 9 x 12 envelope to: Teachers Guide to Television/Family Institute, 699 Madison Avenue, NYC, NY 10021.

AUTHOR, AUTHOR!!: If you've ever wanted to be a published author, this software is for you. The Playwriter Series from Woodbury Computer Associates lets you use your computer to create your own book—complete with illustrations and hardcover binding.

You write the Playwriter story by answering a series of questions and filling in the names of family, friends, or yourself as the story's heroes. The software also has an option that lets you change parts of the story. The packages cost $39.95 each and are available for Apple II series computers, as well as the Commodore 64, IBM PC and the PC*jr*.

A new 64K Epson: the PX-8.

EPSON'S NEW NOTEBOOK PORTABLE: In September, ENTER reviewed four notebook-sized computers, including the Epson model HX-20. Now Epson has brought out a new notebook-size machine, the Geneva/PX-8.

Priced at $995, the new Epson is $200 more than the HX-20. But it will have several new features—including 64K RAM (the HX-20 comes with only 16K), and 8-line by 80 character tilt-up screen, and built-in BASIC, word processing and scheduling software.

Like the HX-20, the PX-8 has a built-in microcassette drive. But, unlike the earlier portable, the PX-8 does not have a built-in printer. Optional peripherals for the PX-8 include a 3½" disk drive and RAM expansion to 184K.

AN EXPANDED, IMPROVED PCjr: For many people, IBM's PC*jr* was a big disappointment when it was introduced last January. The *Jr*'s chiclet-style keyboard and its 128K memory limit left many computer users asking for more. Now IBM has taken care of both complaints with a new keyboard and new memory expansion units.

The new keyboard is a smaller version of the one used with the IBM PC. It has 62 full-size, fully programmable typewriter-style keys. Like the original PC*jr* keyboard, it can communicate with the computer either by infrared signals or with a cord.

If you've already bought a *Jr*, you can get the new keyboard for free. Just take the old one back to the store you bought it from, with proof of purchase. (This offer is only good at authorized IBM dealers).

The memory expansion units are modules that hook on to the side of the *Jr*. Each unit adds 128K to the computer's RAM memory and costs $325. You can expand up to 512K by adding three modules to a 128K *Jr*. And each expansion unit comes with software that will allow the extra memory to function like an extra disk drive. This means you can run software that requires two disk drives, even though the *Jr* only has one.

IBM PC*jr*.'s new keyboard.

With these improvements, the *Jr* will run virtually all IBM software.

Other companies are also making 128K memory expanders for the *Jr*. Microsoft Software makes one that also comes with a "mouse." Called the PC*jr Booster with Mouse*, it sells for $495.

SHOW BEAT

EDITED BY PATRICIA BERRY

'V': ON-LINE LIZARDS

COURTESY OF NBC

V's alien mothership has stowaways: Apples and other earthly computers.

The Visitors are back, and they've brought their computers. But this time, Earth is prepared!

In last year's hit mini-series ***V*** and ***V: The Final Battle,*** the lizard-like aliens lost the war for the control of Earth. In their hasty retreat, the aliens made a critical error. They left behind the mothership, a vessel equipped with computers full of secrets.

The Final Battle was so popular that *V* has been turned into an NBC series. The lizard creatures return to battle Earth again, once each week. But despite *V*'s space theme, don't expect many computer-generated effects like the ones in ***The Last Starfighter*** in this show. The computers in *V* are the ones you'll be *seeing*.

"Computers are not used to any great length to create computer graphics," says Steven E. De Souza, *V*'s supervising producer. "But both the Visitors and the humans make extensive use of computers in their battle plans. It's not just a battle of warriors, it's also a battle of human, alien and computer intelligences," he adds.

"There *will* be computer-controlled camera tricks for space scenes, especially those involving the aliens' new weapon—the Triax," says de Souza. "But most of the action takes place on Earth."

Even though the Visitors are supposed to be 500 years ahead of humans technologically, the micros aboard their ship can be purchased today in many Earthling stores. The Visitors use Apple, Sony, and T.I. Professional computers. Of course, you won't see these familiar names on the ship's elaborate monitors. These machines are run off-camera to control the on-screen readouts. The monitors display information in a computer language dubbed "Visitor-ese," which is comprised of "strange alien symbols."

While the characters are manning the computers, what will happen in the continuing battle between the Visitors and the Earthlings?

"You'll get the sense that the war for control of the Earth could go either way each week," claims De Souza. The plots are filled with double agents like *V*'s newest character, Nathan Bates, a human scientist. "He's a J.R. type of guy," says de Souza, referring to the oil tycoon in the CBS series ***Dallas.*** Bates tries to retrieve the secrets from the captured ship as leverage for his sinister dealings with the aliens. Meanwhile, the resistance leader introduced in the mini-series, Julie, moves in as Bates' assistant. Her mission: to secretly report alien maneuvers to the Earthling rebel forces.

De Souza promises that the entire cast of the *V* mini-series will return, but he won't guarantee their survival. In science fiction thrillers, he admits, key characters (like ***Star Trek***'s Spock and ***Star Wars***' Obi Wan Kenobi) have a way of dying and then coming back through incredible resurrections.

But he *will* guarantee one thing: "Just as ***The Incredible Hulk*** [TV

show] had one 'hulk-out' per week, *V* will have one gross-out!"

Computers and all, be prepared. The final battle? No way! This is just the beginning.

MORK MOVIE: With the success of computer movies like ***War Games*** and ***Electric Dreams***, it's no wonder that everyone seems to be getting into the act. Word has it actor/comedian **Robin Williams** is waiting for the re-write of a movie script that pokes fun at computers and other high tech gadgets. Williams, an avowed video game freak, is the proud owner of a Macintosh and an Atari—and may soon introduce computer comedy into his stand-up routines.

BROADWAY BASIC: Can a musical show about a 19th-century painter include high-tech? If the musical is ***Sunday in the Park with George***, it can.

Sunday is about Georges Seurat, a French artist who had revolutionary ideas about color and light. The musical uses lasers to bring Seurat up-to-date. In a scene that introduces Seurat's great-grandson, the young man unveils his own artistic creation. It is a mechanical structure called a Chromolume, and it sits on a pedestal. Suddenly, the device sends rods of lasers shooting out over the audience.

This computer-controlled mechanism combines explosive charges with laser beams to create an effect that is very "state-of-the-art," according to **Bran Ferren**, the Chromolume's real creator. Ferren has devised special effects for the movies ***Altered States*** and ***The Tempest***, and has made a computer-generated tornado for a soon-to-be-released

© MARTHA SWOPE

***Sunday*'s George: Broadway lasers.**

movie tentatively titled ***The Texas Picture***. He says the Chromolume's kind of laser effect "has never been seen on any stage before." Seurat, a revolutionary artist himself, would be impressed.

MOOG MUSIC: One man created the **Moog synthesizer.** The other invented the **Kurzweil Reading Machine** (KRM), a device that reads books out loud. Now these two technical wizards have joined forces...and who knows what they will develop?

Their names are Robert Moog and Ray Kurzweil. Recently, Moog became chief engineer for Kurzweil Music Systems (KMS). KMS's newest invention is a digital synthesizer, called the Kurzweil 250. This synth creates an amazing variety of sounds.

"Kurzweil is looking to me to give his engineers the benefit of my experience," says Moog, who created his breakthrough synthesizer in the 1960s. "They're a talented, hard-working group... but young."

PACESETTERS

EDITED BY ELIZABETH HETTICH

BUILDING A BETTER ROBOT

© KEVIN GALVIN

William's wish: creating a robot that's more than just another cute machine.

The one-armed robot wobbles across the kitchen floor. It stops, lowers its arm, and picks up a *Star Wars* cup in its claw. "It's always been my dream to build a mechanical human," says William Cross as he watches his robot in action. "Even when I was only six years old and my room was really messy, I wanted a robot that could clean up for me."

At 17, William has already completed four robots and is building a fifth. His newest ones, like the one-armed robot he finished last year, can be programmed to walk around, pick things up, and perform simple tasks. His latest effort, still unfinished, will be capable of even more impressive feats.

William works in the bedroom of his home in Burlington, Massachusetts. "I build robots because I love to. But there are times—especially when something doesn't work—when I hate it."

William built his first robot when he was nine. That year he was given a remote control toy car that could go forward, turn and go back. "It wasn't very impressive," William recalls. "So I decided to see if I could make it better."

He added a motor to the car, which gave it the ability to travel forward, backward and make turns. Then he rebuilt it in a way that let it pick up objects. "It was a mess of sticks and cardboard," William remembers. He went on to make another robot out of plywood, then hooked it up to his TRS-80 Model 1 computer.

The TRS-80 connection enabled him to write a program in BASIC to command his robot. William's father, Tom Cross, recalls that that robot looked "like a crab, but it had soul."

William still wasn't satisfied with his creation. Its movements were clumsy. Its arms had no joints, so they couldn't bend to pick up objects. He decided to build a more powerful machine with a working wrist.

Robot number three could do more than its predecessors. In between school, skiing, programming and being an active member of the Boston Computer Society, William spent more than 360 hours building, tinkering and improving this robot.

"As always, it started out very rough and got smoother as I set it up," remembers William. "I kept making it easier to control." The finished product is a two-and-a-half foot tall, one-armed, remote-controlled robot shaped like a garbage can.

William quickly moved on to robot number four. This one features an on-board computer that can be programmed to make the robot perform all sorts of tasks. "This new robot has the ability to learn by doing," he explains. "Once it has been programmed to complete a task, the directions remain in its memory forever. It never has to be re-programmed to complete the same task in the future."

"When it's your baby," says David O'Hearn, William's science teacher, "you continually want to improve it. At least that's the way William's mind works."

Someday, William hopes to be able to design robots that are able

to do all the tasks that humans do. "But," he admits, "that's not easy. Even something that seems simple, like picking up the telephone, is extremely complex. To program a robot to do it is very difficult—besides which, it would take a computer with lots of memory."

For the time being, however, William has to think about getting into college. And after that? "Well, eventually I'd like to start my own company devoted to designing robots. I'm a very good programmer and I enjoy that but my real interest lies in building robots that are more than simply novelty items."

Who knows? At this rate, William's next robot may be that cleaning robot he wished for so long ago. —*Jeffrey Seglin*

Leader of the Group

Two years ago, 12-year-old Amy Demars decided to start a T.I. Users Group for kids in the Minneapolis, Minnesota, area. Today, Amy's "T.I. Youth Group" meets every month, has more than 60 members, and is still growing.

The group started slowly. Only six kids showed up for the first meeting. "Some kids just wanted to talk about current games. Others wanted to learn more about computers and how to program," Amy recalls.

A year later, Texas Instruments stepped out of the home computer business. "It hasn't hurt us," Amy claims today. "In fact, more people have joined the group since then."

Members range in age from 4 to 16. "Everybody has input as to what we do, but I usually organize the meetings," says Amy. The group invites speakers from high-tech companies, and shares tips about adventure games and programming. "We've also organized game and program writing contests where winner receives software," she notes. "It's just a great place to meet people and swap games and talk about programs."

© ELIZABETH HETTICH

Amy keeps the T.I. tradition alive.

The best part of starting a users group, according to Amy, "is meeting so many kids who have T.I. computers. It was also fun for me because I learned how to organize a group and be in charge." She goes on, "I can't think of anything I haven't enjoyed about starting the group."

Are you a pacesetter? Send a short note, explaining what you do, to: Pacesetters, ENTER, 1 Lincoln Pl., N.Y., NY 10023. If we write up your story, you'll get an ENTER T-shirt.

CONNECTIONS

EDITED BY SUSAN JARRELL

We asked ENTER Youth Advisor Eric Babinet to look over some new books about computers. He sent back the following reports.

HOMEWORK HELPER *(Atari),*
ITTY BITTY BYTES OF SPACE *(Atari),*
41½ FUN PROJECTS FOR YOUR ATARI *(Reston Publishing, $6.95 each; All three books also available in Commodore editions)*

If you've got a computer stashed away in the closet, these "Creative Pastime" series books will get it back onto your desk.

All three books feature short, well-organized, error-free programs. The programs in *Homework Helper* and *Itty Bitty Bytes of Space* include a calculator, a sketch pad and a history quiz.

The programs in *41½ Fun Projects For Your Atari* range from a mug shot memory test to one that creates "relaxing images." (What's a "½ project"? A section that suggests 15 ideas, then leaves the programming to you.)

I highly recommend all three books. I especially liked *41½ Fun Projects* for its range of programs.

THE BYTES BROTHERS PROGRAM A PROBLEM;
THE BYTES BROTHERS INPUT AN INVESTIGATION *(Bantam Books, $2.25 each) By Lois and Floyd McCoy*

Barry and Brent Bytes are brothers who use their computer to solve mysteries. For example, in *The Bytes Brothers Input an Investigation,* Brent writes what he considers the perfect computer program to win a local contest. When he doesn't win, Brent suspects foul play. He goes on to find that...no, I won't spoil the fun.

The stories *are* fun, and include a computer program that relates to the action. (You don't *have to* do the programs to figure out the mysteries, however.) Each program is explained in a special "debug" section. However, the programs, as listed, will not run on every computer. And while the books offer suggestions for converting the programs for every home computer, I found the conversions were not complete.

One suggestion: If you're interested in programming, make sure that the programs will run on your computer.

THE GADGET FACTOR *by Sandy Landsman (Atheneum, $11.95)*

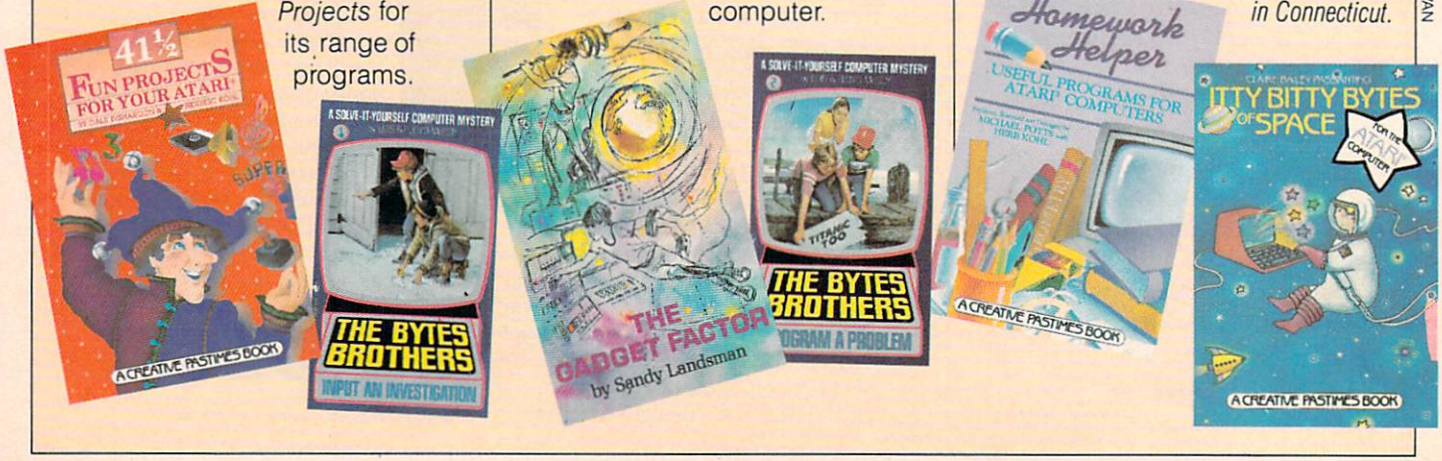
Two teenagers develop a computer program that could destroy the world. No, this time it's not by nuclear war; *The Gadget Factor* is about, among other things, the dangers of time travel.

Mike, 13, is a precocious college freshman. He's introduced to computers by Worm, a devoted 17-year-old hacker. Soon, these two geniuses are spending all their time in the college's computer lab.

Then trouble starts. Mike invents a computer game called *Universe Prime,* and develops a time travel formula that he thinks will help him win the game. But the formula works *too* well. Mike realizes that his fooling around with the past may end up endangering *this* planet's future.

The author does a nice job of mixing reality and fantasy. Mike is both a real kid and an unpredictable genius. He helps make *The Gadget Factor* worth reading.

ERIC BABINET, 16, lives in Connecticut.



GADGET FACTOR—© TOM O'SULLIVAN

Help Agent U.S.A. stop the fuzz plague. And you can win a trip to Washington, D.C.

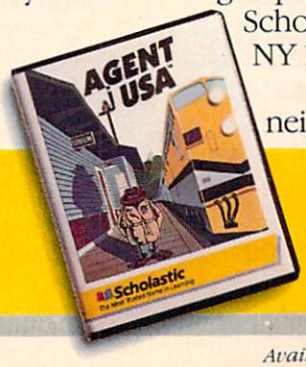
The FuzzBomb is turning millions of men, women and children into mindless fuzzbodies. And Agent U.S.A. can't stop the devious plague spreader without your help.

But don't accept the assignment unless you're really prepared to stretch your mind. Because sharp eyes and quick reflexes aren't enough to stop the fuzz plague. You'll have to outthink and outplan the FuzzBomb as you pursue him around the country in super-fast rocket trains. And you'll have to remember state capitals, learn the time zones and figure out the quickest routes across the nation. If you don't, the fuzzbodies will turn you into one of them.

Become one of the few super-agents to defeat the FuzzBomb and you may win a trip to intelligence headquarters in Washington, D.C. What's more, even if you never catch the evil one, tell us what you like about the game and you can become an instant winner of an Agent U.S.A. knapsack (see package for contest details).

Agent U.S.A. needs you now. So sign up where you usually buy your software. Or write to Scholastic Inc., Dept. EW, 730 Broadway, New York, NY 10003.

Do it before the fuzz plague comes to your neighborhood!



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THE INSIDER'S KNIGHT RIDER

BY NORA ZAMICHOW

"This looks like Darth Vader's bathroom," says Michael Knight the first time he gets into his new car.

He's right that *something's* different. This car, named K.I.T.T. (Knight Industries Two Thousand), is not a typical black Pontiac Trans Am. Its blinking, talking, computerized dashboard has features like auto pursuit, emergency eject, and x-ray surveillance systems. K.I.T.T. can turbojet into the air over obstacles like trucks and trains, and accelerate to 300 miles per hour. It also comes with a super-tough exterior.

Most drivers are satisfied with AM/FM radio and air conditioning. But Michael Knight (played by actor David Hasselhoff) is no ordinary joyrider. He and K.I.T.T. battle the forces of evil on NBC-TV's *Knight Rider.* Every week, K.I.T.T. displays his computer-powered prowess.

©NBC

But could such a super car exist?

ENTER wanted to separate fact from fiction. So we went behind-the-scenes and talked to the creators of *Knight Rider* and to computer experts. We found out what technology it would take for a car to really do all those stunts. And we discovered how *Knight Rider's* creators make the impossible *seem* real.

A top-notch stunt crew, 12 different look-alike stunt cars, and all kinds of camera tricks put K.I.T.T. through its amazing paces. Without this Hollywood help, K.I.T.T.'s wizardry might never get off the ground.

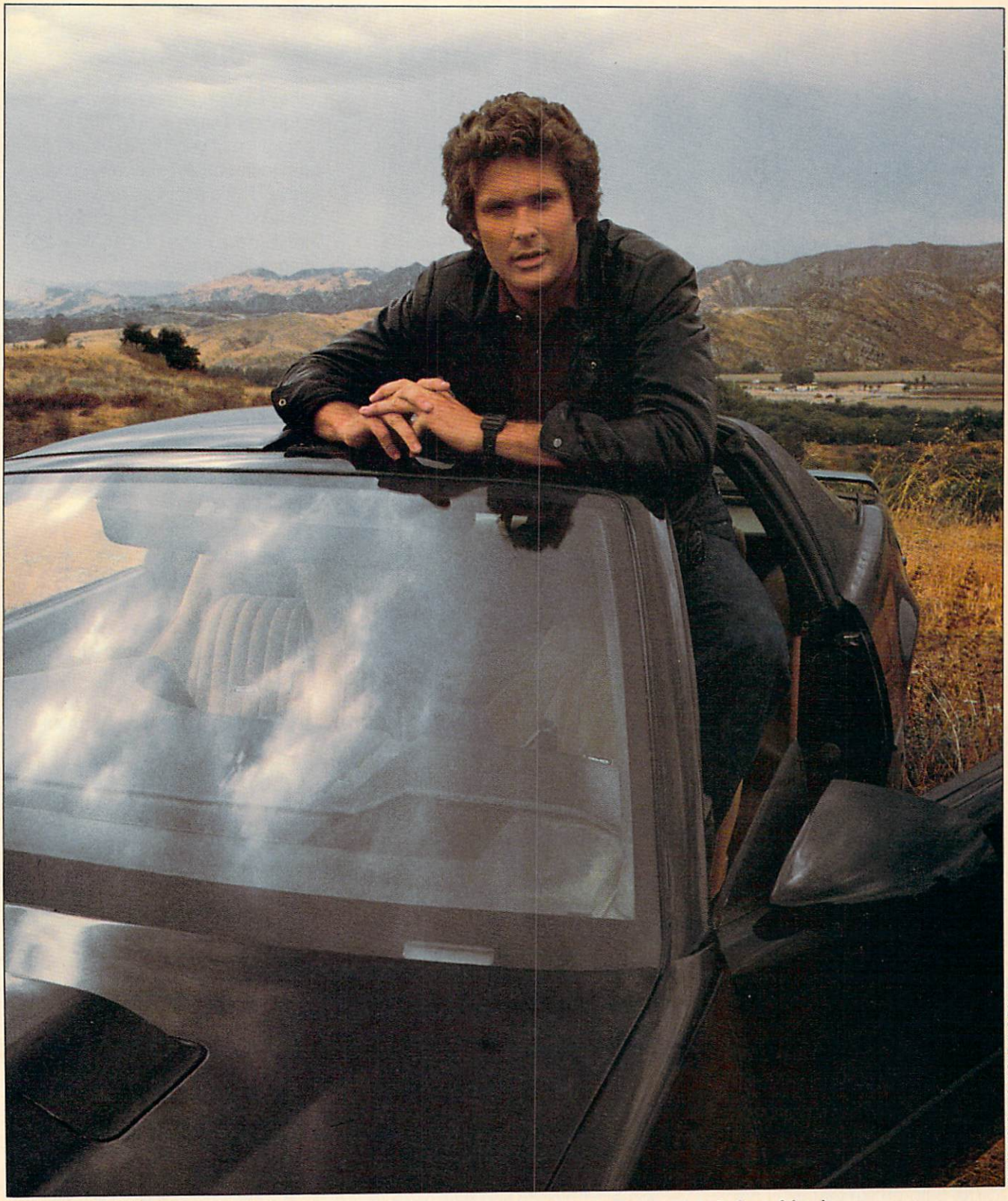
For example: In nearly every episode of *Knight Rider,* K.I.T.T. retro-rockets over a tractor-trailer or a train, then lands back on the ground. Nifty—but could it really happen?

"In a car K.I.T.T.'s size, there's no room for a jet engine big enough to send the car up," says Dr. Jearl Walker, professor of physics at Cleveland State University. "Furthermore, neither car nor driver would survive the impact when it comes in for its landing." Ouch!

But the *Knight Rider* stunt team does several of these leaps every week, says Bob Ewing, the show's associate producer. The car and driver *always* survive.

"We have two jump cars," says Ewing. These cars look identical to K.I.T.T., but are made of lightweight fiberglass and contain high-powered engines. A stunt driver races this fiberglass car at high speed toward a hidden ramp. That ramp sends the car up into the air, then

WITH K.I.T.T. THE COMPUTER CAR



Michael Knight's supercar, K.I.T.T., zooms, leaps and talks—with help from friends.

What would it take to build a computer car like K.I.T.T.?

A specially built stunt car performs K.I.T.T.'s incredible leaps.

down to another hidden ramp angled for a safe landing. The car leaps over real trains and trucks. The stunts are timed to the split-second to make certain no one is in danger.

"We've never had an accident," Ewing says proudly. "If a stunt is too dangerous, we don't do it."

How *does* the driver survive? Jump cars can be specially built to survive leaps—but why doesn't the driver get thrown out of the car by the impact? That's easy, says Ewing: "Our stuntman is tied into that car every which way but Sunday."

Of course, sometimes K.I.T.T. doesn't even have a driver. When Michael is in trouble, he simply radios his four-wheeled sidekick. K.I.T.T. goes into its auto-cruise mode and races to the rescue.

The auto-cruise feature is *not* impossible, according to Dr. Walker. Airplanes, for instance, can operate on "automatic pilot," using radar and computers to navigate to their destination. However, a plane doesn't have to pass intersections or buildings while flying across the sky.

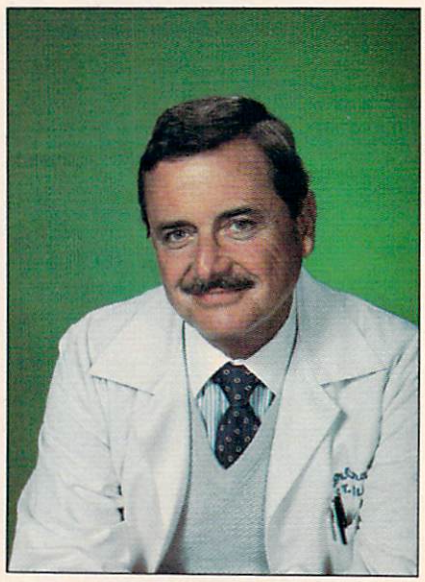
"You'd need a structure the size of a truck to hold a computer large and fast enough to make the decisions K.I.T.T. makes while auto-cruising down the block," says Dr. Walker. "Whether or not you'd want to trust your safety to such a [computer] program is another question."

The *Knight Rider* crew gets around this question by using two tricks that make it *look like* K.I.T.T. is driving itself. In some scenes, explains Bob Ewing, K.I.T.T. is filmed so you can't tell that the car is actually being towed by a truck. In other scenes, where a towing cable might be visible, K.I.T.T. has a backseat driver. The driver is hidden in the back seat behind dark glass. The glass acts as a kind of two-way mirror. The driver can see out, but the camera—and the audience—can't see in.

THAT'S THE BRAKES

Some K.I.T.T. effects are easy. K.I.T.T. is supposed to be able to go up to 300 miles per hour (MPH). To make the car appear to go this fast, K.I.T.T.'s creators show the speedometer spinning higher and higher. Then, they switch to a shot of the car zooming down the road at high—but *not* 300 MPH—speeds.

In reality, the idea of such a high-speed car is not farfetched, says Terry Thiel, an electronics engineer with the Ford Motor Company. After all, stock car racers often travel at



NBC PHOTO BY FRANK CARROLL

K.I.T.T.'s voice: William Daniels.

'Electronic wizardry' and a lot of cash, says one auto expert.

speeds up to 160 MPH. But while 300 MPH *is* possible, putting on the brakes at that speed is another matter.

NBC boasts that K.I.T.T., going 70 MPH, can stop in 14 feet. "That's a little out of this world," Thiel responds. "A car going that speed couldn't keep the tires on its wheels if it tried to stop so abruptly. It'd be like somebody's sneakers getting caught as they were running—the sneakers would stop and the person would keep going."

But K.I.T.T. doesn't worry about stopping, or about fender benders, bullets or crashing through walls. That's because the car's exterior is supposedly made of super-tough material. Such metals exist, but none are light enough to be used on today's cars.

The *Knight Rider* crew uses some Hollywood tricks to make K.I.T.T. appear invulnerable. Whenever you see someone trying to smash the car, says Ewing, they're using rubber crowbars and hammers that bounce harmlessly off the car. When someone shoots at the car, there are no bullets in the gun. Instead, the *Knight Rider* crew uses small explosive charges mounted on the car and detonated off-camera from a control board. These charges release sparks that look like bullets ricocheting off the car. When K.I.T.T. crashes through a wall, that wall is made of balsa wood or other breakaway material.

The show has a dozen K.I.T.T. look-alikes to use for these various stunts. "K.I.T.T. survives everything," says Ewing. "It's the other cars that get smashed."

K.I.T.T. also comes equipped with personality. This talking computer gets angry and upset when Michael Knight is in trouble. Can a machine really have feelings and personality?

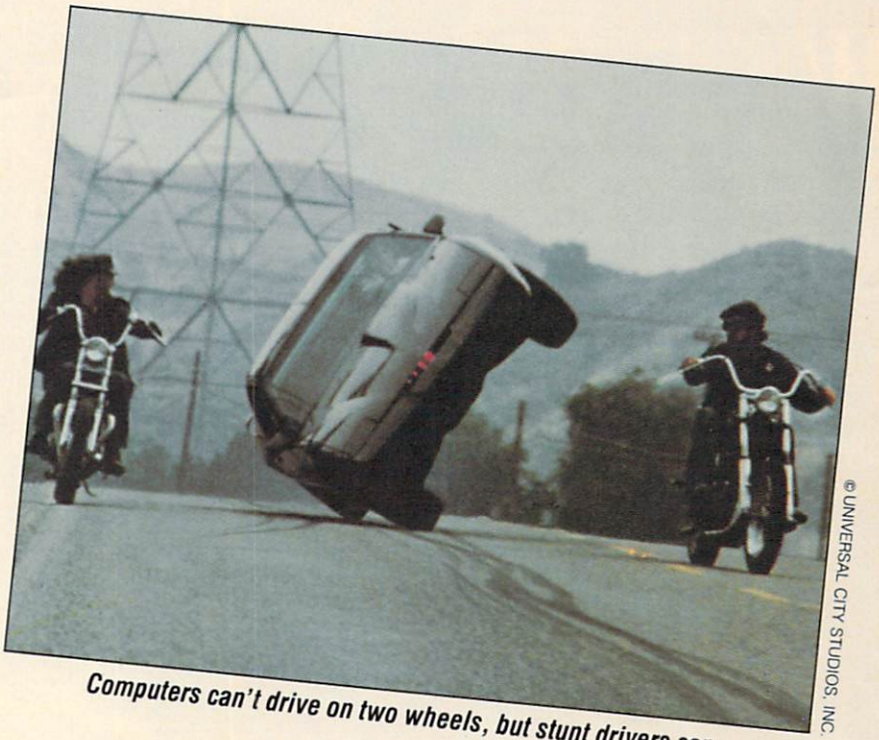
"Sometimes a computer seems to have a mind of its own—for instance, when you don't know what it's doing," says Margaret Dean, a computer affairs coordinator with the City College of New York. "But a computer does not *feel* emotion."

K.I.T.T. definitely has a personality. That personality comes through in its voice—which is really the voice of actor William Daniels. "I see K.I.T.T. as a Renaissance man. He has a sense of moral values and justice," the actor says. You'll be pleased to know Daniels doesn't have to hide in the trunk to speak his lines. He goes to the studio and tapes his part. Later, these lines are spliced into the show's soundtrack.

Yet, for all these stunts, special effects and high-tech tricks, the question remains: Could a car like K.I.T.T. really exist?

Some computer experts believe you could create a vehicle with today's technology that can do just about anything K.I.T.T. can. But, according to the experts, that vehicle wouldn't look much like a sleek black Trans Am. It would have to be an enormous truck with super-thick steel plating, reinforced tires, extraordinary shock absorbers and a jet engine inside. It wouldn't be very pretty, but it is conceivable.

"Most of K.I.T.T.'s features are just electronic wizardry that can be done or developed if you want to spend the money," says Ford engineer Terry Thiel. "The bottom line is that it's possible."



Computers can't drive on two wheels, but stunt drivers can.

NORA ZAMICHOW is a writer in New York City.

TODAY'S CARS DRIVE INTO THE FUTURE—AND

BY MARTIN F. KOHN

"Who remembers where we left the car?" asks Dad, scanning the vast parking lot at the local shopping mall. "I think the sign said P-45, but I'm not sure."

"No," says Mom. "That wasn't a 'P.' It was a 'B.' The car is in Area B."

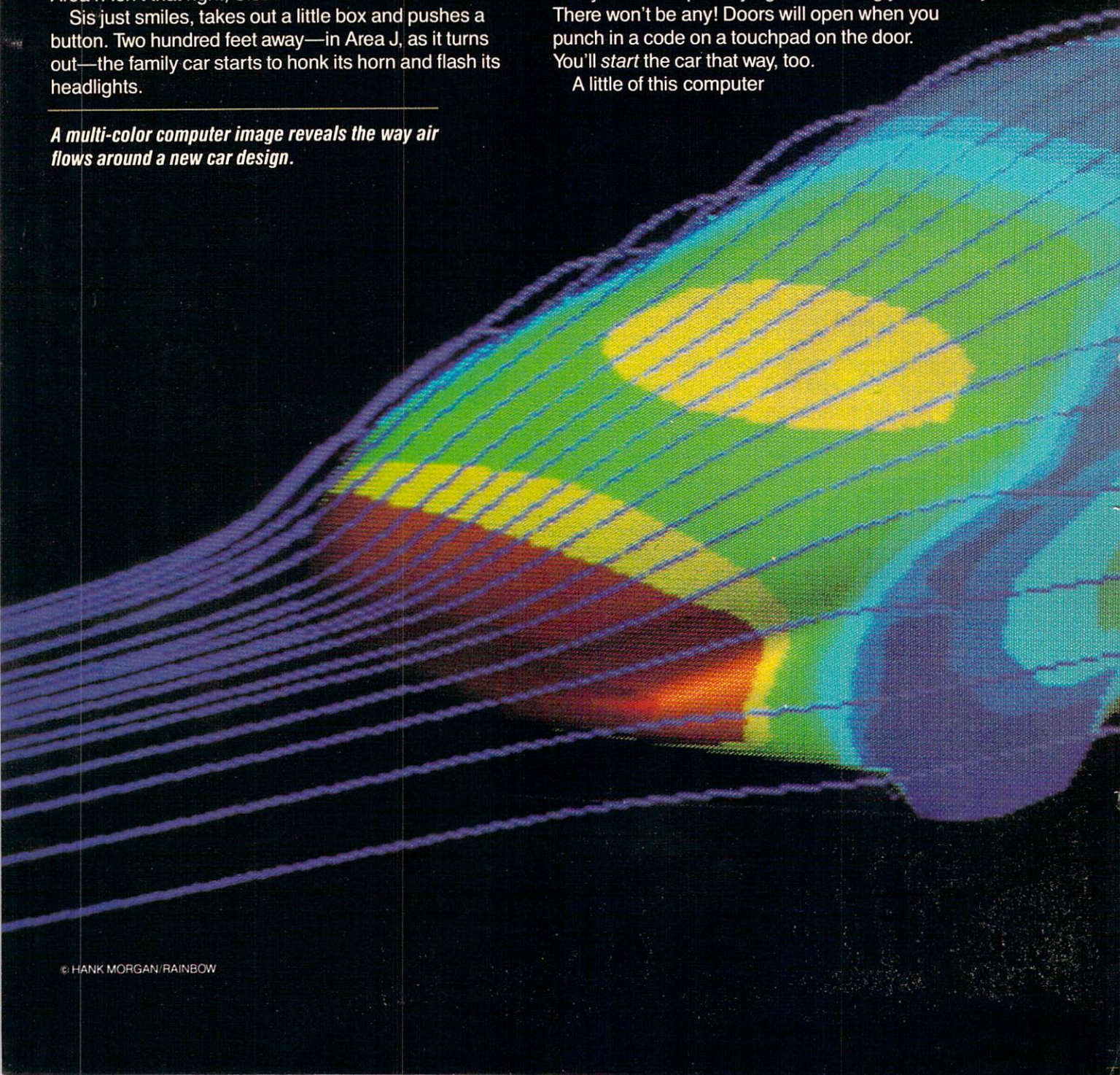
"No way," says Brother. "It wasn't a P or a B. We're in Area F. Isn't that right, Sis?"

Sis just smiles, takes out a little box and pushes a button. Two hundred feet away—in Area J, as it turns out—the family car starts to honk its horn and flash its headlights.

Among other things, the car of the future will literally blow its own horn.

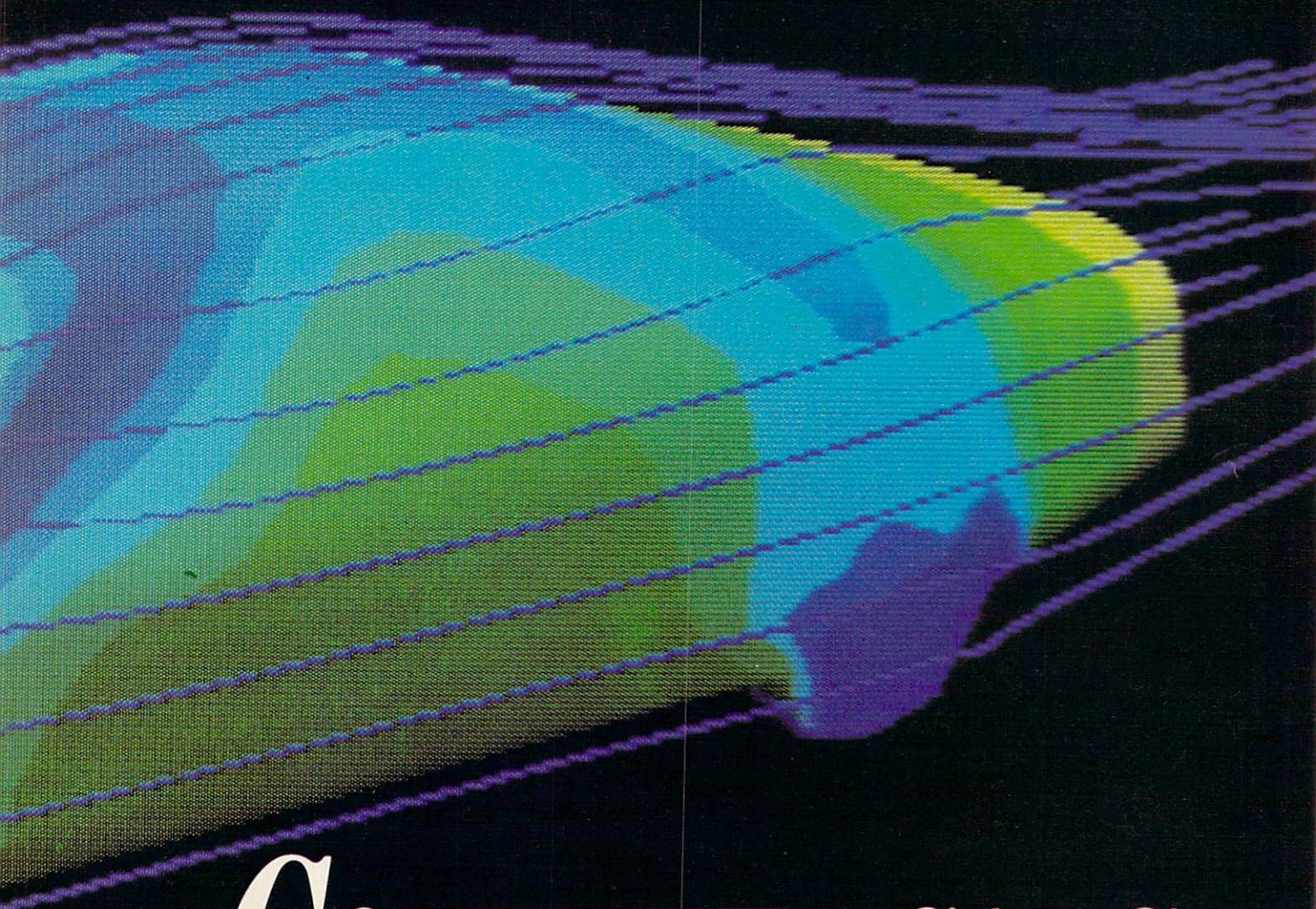
That's not all. Thanks to computers, the car of the future will pinpoint its location on a video map in the dashboard, and let you know how far you are from where you want to be. It will let you turn on the radio and windshield wipers with the sound of your voice. And you can stop worrying about losing your car keys. There won't be any! Doors will open when you punch in a code on a touchpad on the door. You'll *start* the car that way, too.

A little of this computer



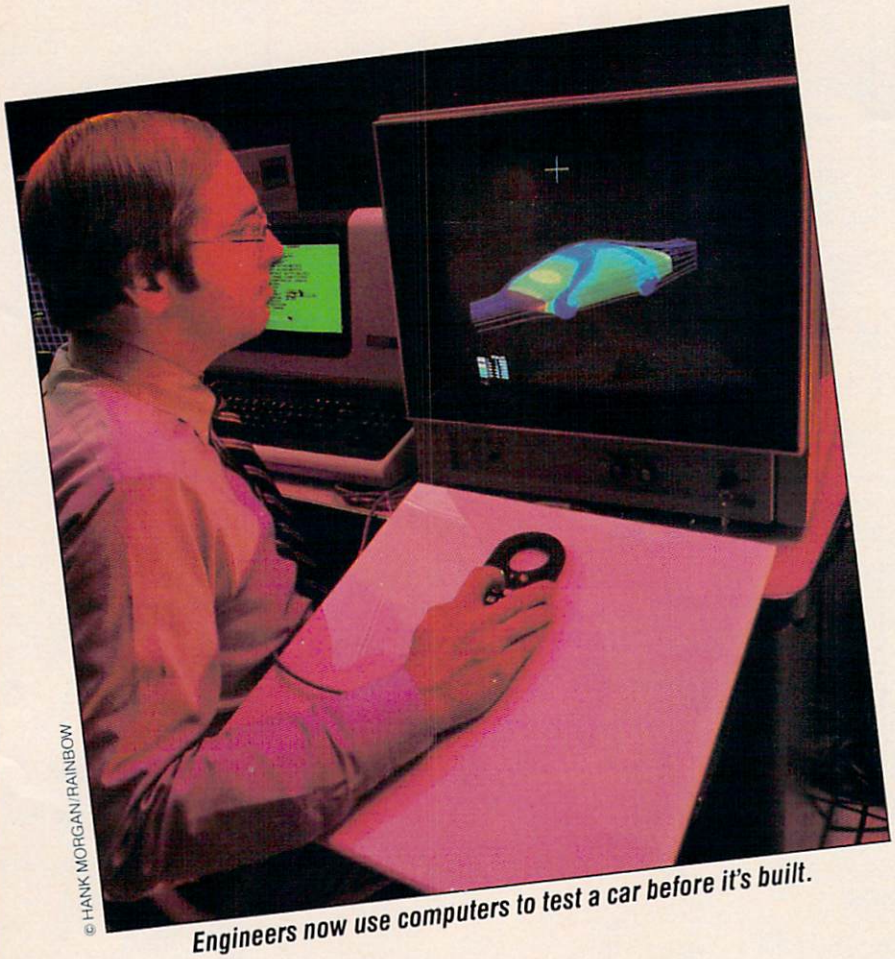
A multi-color computer image reveals the way air flows around a new car design.

COMPUTERS COME ALONG FOR THE RIDE.



COMPUTER CARS HIT THE ROAD

Tomorrow's cars are being designed today...



© HANK MORGAN/RAINBOW

Engineers now use computers to test a car before it's built.

car future is already here.

Some of today's cars—like the Dodge Daytona and Chrysler Laser—are equipped with computers that can tell you everything you want to know. How many miles' worth of fuel remain in the gas tank? Push a button and a computer answers. These computers can even give you your estimated time of arrival. Not every new car has a computer. But in those that do, computers are constantly regulating engine functions. Ford's latest computerized engine control system is called EEC-IV. It features an under-the-hood computer that can process as many as a *million* commands a second.

The EEC-IV system works *very* quickly. According to Ford, the computations performed during a minute of driving would take a person using a hand-operated calculator 45 *years*.

The computer is also being used very extensively to design cars at General Motors, Ford and Chrysler. A highly visible example of this computer-aided design is found "in the area of overall vehicle configuration," says Leonard Groszek, a principal design engineer at Ford. In other words, computers are helping engineers to design the way a car looks. As they've done for decades, car designers create a small model of a new car. But now, once that step is completed, sensors are placed on the model's surface. The computer records the location of each sensor. It uses this information to create an on-screen image of the car model. A designer can then make changes in the shape of that image on the screen —without having to build a new model for every single change that is made.

Once a car is designed, computers are used to test the design. Before computers, engineers tested cars by placing them in wind tunnels. Now, "with computers, we can simulate a wind tunnel without going through the expense of building parts and running them through the tunnel," says Leonard Groszek. "The real benefit (of computers) is to help us do it faster and more efficiently."

Groszek, who's been at Ford for 14 years, says he's "really grown up with" computers on the job. When he started at Ford, computers were relatively new and "there were none on cars."

Courtesy of Ford

A future car's computer control panel.

...With help from state-of-the-art computers.

TAKE A RIDE

So, you've already located your car in the parking lot. And you've opened the door by punching in the right codes. What's that? You've got the kind of car with the laser key system? Well, go ahead. Take out the laser key, about the shape and size of a garage door opener, and watch the door open and the seat, floor pedals and steering wheel adjust to your personal settings.

Step in. Sit down. Looks like you're ready for a ride in the car of the future.

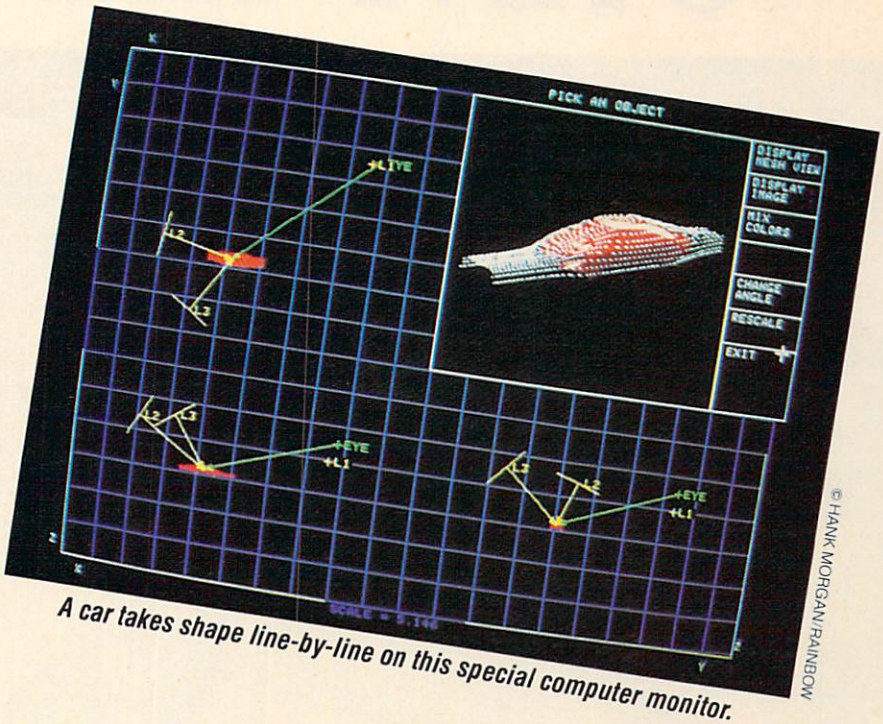
Time for your "pre-flight check." On your dashboard's video display screen, you'll see if battery power is adequate, if you need more anti-freeze or if the brakes are worn.

Don't bother looking for your outside mirror; it's no longer necessary. Instead, take a look at your rear-view television monitor. This TV gives you a wide-angle view of what's behind you.

Perhaps the car is equipped with a front-and-rear sonar detection system. That helps you spot objects in your car's path, like a pet or a tricycle left in the driveway. And thanks to the system, curbside parking is a breeze. If something is in the way, the system will signal your brakes to stop your car.

While your passengers in the back seat amuse themselves with video games, you're looking at the video screen that serves as your navigator. It shows where your car is on a map, and which way you're headed.

The navigation system uses radio signals from the Coast Guard's LORAN (Long-range aid to navigation) network to plot your course.



© HANK MORGAN/RAINBOW

A car takes shape line-by-line on this special computer monitor.

LORAN transmits low frequency radio signals from more than 40 towers around the world. Your car's computer registers the signals of the three nearest transmitters and measures in a matter of microseconds. The computer calculates the time it takes for each signal to reach your car to determine exactly where you are. Once you've identified your car on the map, you can adjust the map to show only a few blocks, or an entire state. You'll never have to worry about getting lost—or re-folding a road map.

Is that rain? Say "Wipers on," and your windshield wipers go to work. It's getting dark? Say "Headlights on."

You say that despite all these advances you're still running late? The folks may be getting worried? It's time to use your voice activated radio-telephone. Just touch a switch on the steering wheel. A computer voice says "Number please" and you recite the telephone number you want to call.

The computer does the dialing. You have to do the explaining.

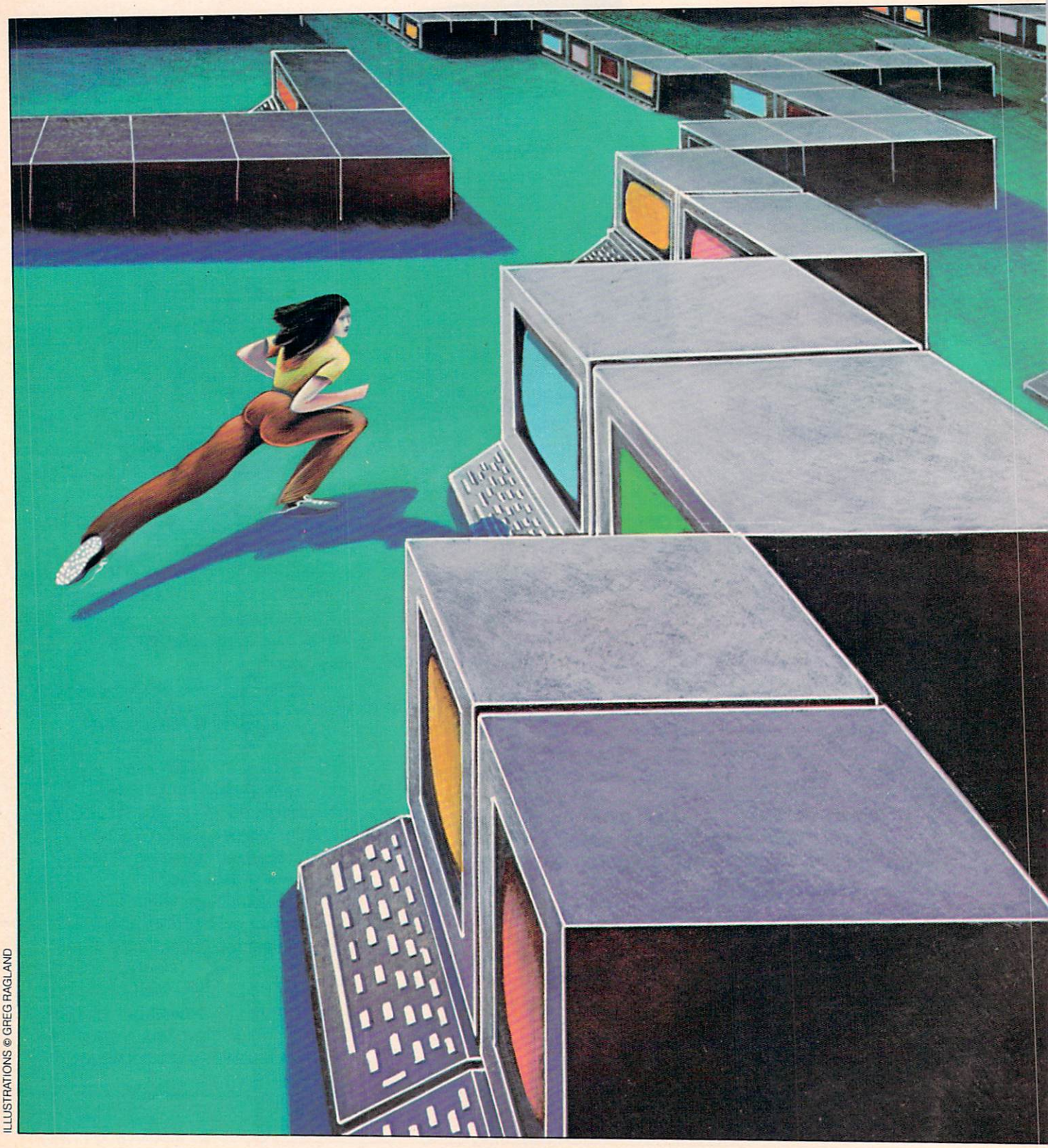
MARTIN F. KOHN is an editor with The Detroit Free Press.

YOUR FUTURE CAR

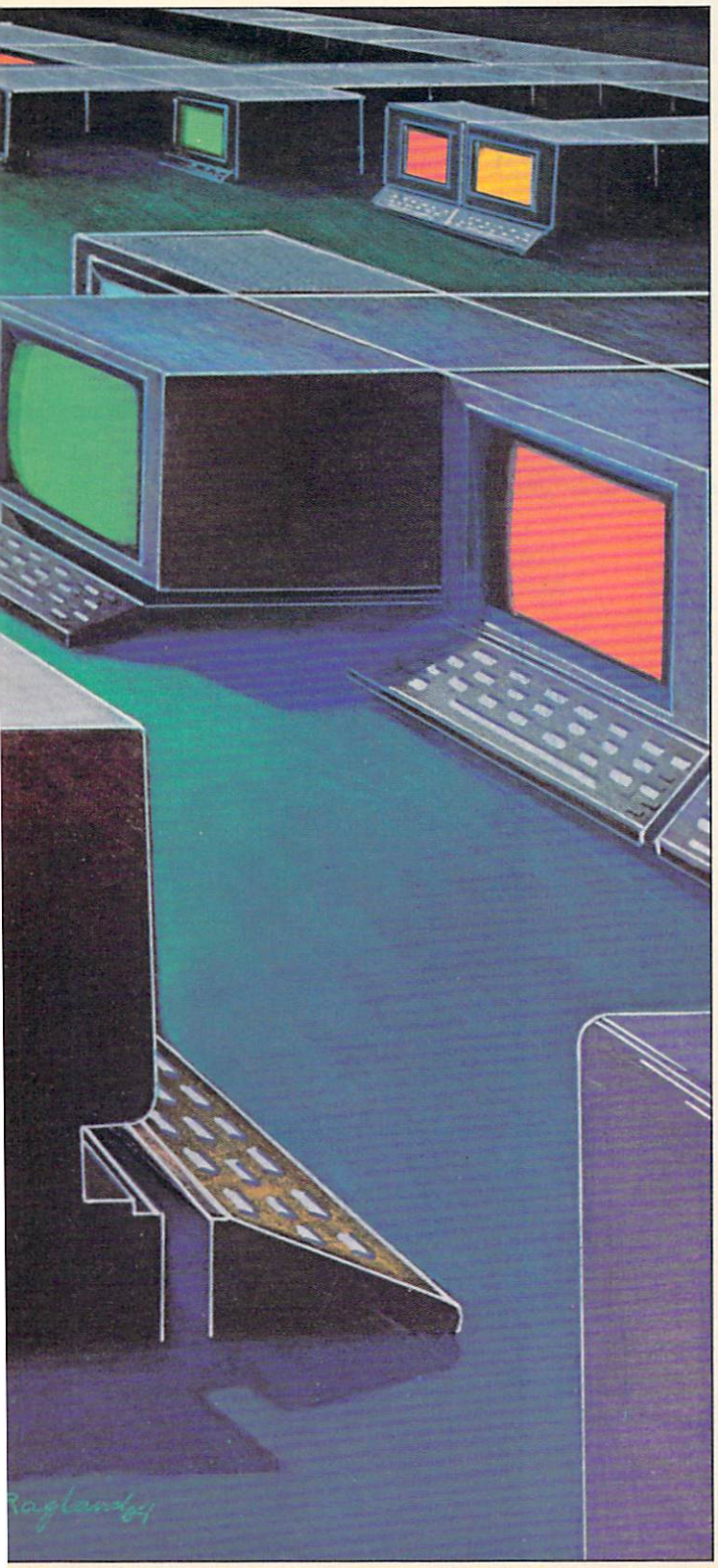
You've heard from the experts. But what do *you* think the car of the future will look like? Will it have wings, run on seawater, or fold up into a tiny package?

Use your imagination. Draw a picture or write a story about your car's spectacular features. Then send your creation to: Future Cars, ENTER, 1 Lincoln Plaza, New York, N.Y. 10023, by November 15, 1984. We'll print our favorites. If we print yours, we'll send you a T-shirt.

BUYING THE RIGHT



COMPUTER



ENTER'S ANNUAL GUIDE THROUGH THE MAZE OF MICROS

You're planning to buy your first computer? That's great. You'll have fun playing games, learning programming, and more. So why do you look so nervous? What could possibly go wrong?

Plenty, you say. What if I get the wrong kind of computer—one that won't do everything I want? How do I know what I *really* need, anyway? Should I buy now or wait?

The first thing to do is...relax. Buying a home computer is not as difficult as you think. The second thing to do is realize that there isn't *one* answer to these questions—if there was, everyone would buy the same computer.

Spend some time thinking over what *you* want your computer to do. Remember: when you select a computer, what you're really selecting is the group of programs it is able to run.

List your needs in order of importance. Are you interested most in a game player or a word processor? Do you want something your parents can use for business or something you'll use to learn how to program? Think this over carefully. Talk to everyone who will be using the computer. Your list will be your guide.

You can buy a computer that will let you play games, learn programming and use educational software for less than $300. If you want more power, you can pick up a good computer that does just about *everything* you want for less than $1000. You can, of course, spend more. It's really up to you to figure out your needs.

Most of the models you will be looking at can be divided into three categories—low, middle, and high-end. This is based on their price, and also on the kinds of things they can do. *(Continued on next page)*

BY PHIL WISWELL

Low-cost computers are generally good game players.

LOW-END MACHINES: These are computers like the Commodore 64, the Atari 800 XL and the TRS-80 Color Computer. They sell for $250 or less. These are generally good game machines. They also let you explore other applications of home computers, like word processing or programming.

For the cost of the computer, a joystick and a game cartridge, you're ready to play. There's also lots of educational software available for these machines, including beginners' programming packages.

These computers tend to be pretty good at simple word processing or business applications. However, if that's what you're really

MICRO MENU: ENTER's Guide to Home Computers

COMPUTER	PRICE*	YEAR INTRODUCED	RAM (MAX-RAM) ROM	HARDWARE INCLUDED
ATARI 800XL	$250	1983	64K (192K), 16K	Keyboard/CPU
COLECO ADAM	$750	1983	80K (144K), 48K	Keyboard/CPU/Digital Data Drive/Printer
COMMODORE VIC-20	$100	1980	5K (32K), 20K	Keyboard/CPU
COMMODORE 64	$200	1982	64K (64K), 20K	Keyboard/CPU
COMMODORE PLUS 4	$300	1984	64K (64K), 32K	Keyboard/CPU
COMMODORE 16	$100	1984	16K (64K), 32K	Keyboard/CPU
TRS-80 COLOR COMPUTER 2	$160	1983	16K (64K), 8K	Keyboard/CPU
APPLE IIe	$895	1983	64K (128K), 16K	Keyboard/CPU
APPLE IIc	$1,295	1984	128K (128K), 16K	Keyboard/CPU/disk drive
IBM PCjr	$750	1983	64K (512K), 40K	Keyboard/CPU
IBM PC	$1,995	1981	64K (640K), 40K	Keyboard/CPU
APPLE'S MACINTOSH	$2,495	1984	128K (256K), 64K	Keyboard/CPU/Monitor/Mouse

Peripherals may cost two or three times more than your computer.

interested in, the cost of your low-end system can double or triple. Peripherals may cost more than the computer itself. A disk drive alone can cost $250. The more you want to do with your Commodore or Atari, the more you will find yourself adding to it, or trying to get around its limitations, especially the size of its memory.

Even though it costs $700, the Adam computer is in this category. The bigger price tag does not mean the Adam is more powerful or versatile as a computer. What you get for the extra money is the equivalent of an Atari or Commodore system—but with a printer and a special tape drive included.

MID-PRICED MACHINES: There are

**Prices are common retail prices as of August 1984 for the "stripped-down" computer with no options added. Many prices have been reduced further.*

SOFTWARE INCLUDED	NO. OF KEYS	NO. OF COLORS	SCREEN RESOLUTION	STORAGE MEDIA	LANGUAGES AVAILABLE
Atari BASIC	62	256	320x192	cartridge, cassette, disk	Pilot, Logo, Assembler, Microsoft, BASIC
SmartBASIC, SmartWriter, Buck Rogers: Planet of Zoom, Blank Tape	75	16	256x192	cartridge, Digital Data Pack	SmartLogo
BASIC	66	8	176x184	cartridge, cassette, disk	Forth
BASIC	66	16	320x200	cartridge, cassette, disk	Pilot, Logo, Fortran
BASIC, Word Processing, spread sheet, Database	67	128	320x200	cartridge, disk	Pilot, Logo
BASIC	66	121	320x200	cartridge, disk	Fortran
BASIC	52	8	256x192	cartridge, cassette, disk	Logo
AppleSoft BASIC	63	16	280x192	disk	Logo, Pascal, Fortran, Pilot
AppleSoft BASIC, 5 instructional disks	62	16	280x192	cassette, disk	Logo, Pascal, Fortran, Pilot
Cassette BASIC	62	16	160x200	cartridge, cassette, disk	Logo, Pascal, Fortran, Macro Assembler
Cassette BASIC	83	16	320x200	cassette, disk	Logo, Pascal, Fortran, Macro Assembler
MacWrite, MacPaint System disk Guided Tour of the Macintosh	58	B&W 432 shades	512x342	disk	BASIC, Fortran (more to come)

Using a computer is the best way of seeing if it's right for you.

two computers we would put in this category— the Apple IIe (and IIc, which is basically a IIe portable) and the IBM PC*jr*. You can get both in their stripped-down form for under $1,000. These computers play games well, and give you a big step up in their ability to handle all other kinds of computer applications.

They have some real advantages over the lower-end computers. The PC*jr* and IIe/IIc have more memory, and can run more powerful word processing and business programs. There's also a wider variety of features you can use with them. For example, you can display text in 80 columns instead of 40 columns with either of these computers—without having to add extra cards or cartridges.

Although the IIe and the PC*jr* are close in price and in some of their capabilities, there are differences. Right now, there is much more software available for the IIe than the PC*jr* in the category of games and education. You can expand the *Jr.* and the IIe, but the IIc is limited to 128K RAM.

HIGH-PRICED COMPUTERS: This category includes the IBM PC and the Macintosh. It also includes dozens of business-oriented and IBM-compatible machines. Consider machines in this category if you have a couple of writers in the house, or if Dad or Mom plans to use the computer for business.

These are definitely *not* the computers to buy if you want to play games or use animation software. The Macintosh doesn't have color at all, and the IBM graphics card costs an extra $250.

By now, you should begin to see where your needs match up with the kinds of computers that are on the market. You should have a good idea of which category you're interested in. But we're not finished. The next step is the buying itself. Here are a few rules to follow.

RULE #1—Do your homework. Go to the store armed with enough information. Have a list of the kinds of software you want to use—even brand names! That way, you won't feel pressured by a salesperson. Read as much as you can about the computers you are interested in. Talk to your friends and relatives who own computers. See if you can use their computers and software.

RULE #2—Ask questions. Try things out. Don't just nod your head while the salesperson talks to you. Above all, get your hands on the equipment in the store. Ask to use the computer and software you are interested in. Concentrate on the type of software on your list.

Use your shopping trip as an opportunity to try out computers you haven't considered. Maybe you'll learn something that will make you change your list.

RULE #3—Know what you really need. Once you've settled on a basic computer, there's a lot more that may be necessary. Learn about hidden costs. What kinds of peripherals will you need to get the job done? Does the computer come with them? If not, how much extra will they cost? Everything from a printer to a pair of joysticks should be figured into the final price, if you need them.

If you'll be doing a lot of graphics or gameplaying, ask about screen resolution. If you are going to do your own programming, things like screen editing will be important to you. Also, you'll want to be able to use other languages besides BASIC for programming. Is Logo available for that computer? Pascal? (We've included some of this information on our chart).

RULE #4—Shop around. Go to several stores. This will give you a chance to compare prices, and to use the software and computers as much as possible. Whatever you do, take your time. It's usually a good rule not to buy the first or second time out, until you're really sure of your choice.

Use our chart, or make a copy that you can take to the various stores. Circle the models that you feel best suit your needs, regardless of prices. Write down all extra information you dug up by paying atttention to Rule #1. Write down any "facts" the salesperson offers. Ask about them at other stores.

The most important thing is to get the computer *you* want, not the one that has the best commercials on TV. Take your time. Keep your eye on your list of needs. If you do, you're sure to end up with a computer that's right for you. ◘

PHIL WISWELL is an ENTER contributing editor.

YOU GOTTA SHOP AROUND

ONE KID'S SEARCH FOR THE RIGHT COMPUTER

BY CYNTHIA ELIAS, 14

I was pretty nervous about going shopping for a computer, even though I'd worked with computers in school and done a bit of programming. I had already narrowed my choice down to either an IBM PC or an Apple IIc. I picked those two because I wanted a computer that had had plenty of software and memory. Neither the PC nor the IIc is cheap, but I was ready to invest money in a computer I could grow with.

So it wasn't computers I was worried about. It was salespeople. What if they didn't take me seriously, or used a lot of technical terms I didn't understand?

I decided to take along a friend who knows a lot about computers. We made up a list of questions we wanted to ask. That turned out to be a very good idea. We also decided that I wasn't going to buy anything until I had gone to several stores.

The first place we went to was a computer store. It was big and quiet. I noticed that there wasn't one person my age in the store. A salesman came up and asked if he could help us. My friend got out his list and started asking questions. To my surprise, the salesman took our questions seriously and answered them in detail.

© JOHN MARRIOTT

Cynthia's secret—a list of questions.

He let us use the two computers, and didn't seem to be pushing us to buy one over the other. Instead, he explained the good and bad points of each one. And he gave me a cost estimate for both computers with a complete system.

I was impressed. I really hadn't expected to be treated so well. But I think the salesman was impressed, too, because we were well prepared.

Next, we went to the computer section of a big department store. It was noisy and there were lots of kids playing games on the machines. I felt a lot more comfortable there than I had in the computer store.

I wondered if it was such a good place to *buy* a computer, though. The salesman I talked to didn't seem to know as much about computers. What's more, he didn't make any comparisons between computers. I felt like he was pressuring me to buy a IIc, rather than helping me choose the best computer for my needs.

In the end, my shopping trip helped me decide. I discovered I really liked the small size and convenience of the IIc. The PC is a good computer, but I don't plan to use any of the business software that would make it a necessity.

I feel more confident now. I learned that if you prepare carefully for a computer shopping trip by thinking about what you want, there's nothing to be nervous about. If you're serious about what you're doing and if you ask good questions, you'll probably be treated well—no matter what your age.

CYNTHIA ELIAS is a member of ENTER's Youth Advisor Board.

MOVING ON UP

WHAT TO DO WHEN YOU'RE READY FOR MORE COMPUTING POWER

BY DAN LHAMON, 14

© JOHN MARRIOTT

Dan gets a grip on peripherals.

I got my first computer—a basic Texas Instruments 99/4A keyboard—two years ago. I soon realized that there was a lot more I wanted to do than I could with the basic TI. I wanted more computing power, but I wasn't sure how to go about getting it. If you're at the same stage as I was back then, this article—and these questions—should help you.

Should I sell my first computer and get a better one instead?

This is absolutely the first question anyone considering upgrading must ask him or herself. You can stick with your first computer and upgrade it by adding peripherals like a printer, disk drive, modem or extra memory. Or you can sell it, and move up to a more expensive and more versatile machine.

Each solution has its advantages. If you decide to stick with your old machine, you get to expand your computing abilities right away with your new peripherals. You won't have to learn a new BASIC, or get used to the quirks of a new machine. But keep in mind that if you end up moving on some day to a more expensive machine, all those peripherals will be useless.

In my case, I did a little of both. At first, I looked into peripherals for my TI. I bought a disk drive for my 99/4A and extra memory. But then last fall, Texas Instruments stopped making the 99/4A. So TI sort of made my decision for me. It didn't make sense to invest money in a computer that was no longer being made. Now I'm looking into a whole new system, probably an IBM PC or PCjr.

If you're interested in adding peripherals to your system, then the

Stay away from all of those flashy and expensive gizmos you'll never use.

next question is "What jobs do you need them for?" Let's go over common peripherals, and what you should consider before buying.

Do I need a disk drive, or is a cassette recorder enough?

Probably the first thing you'll want to add is some kind of external memory. You'll have to choose between a cassette recorder or a disk drive. Cassette recorders are cheaper (as low as $70), and will work with almost any computer. But disk drives are much faster, more reliable, and allow you to do much more. If you're only going to be playing games and writing some short programs, a cassette recorder is fine. But if you're interested in word processing, serious programming, and the newest and most advanced games, you probably should buy a disk drive.

Do I need a printer?

If you want to do any kind of word processing, or if you want to print out the magnificent graphics you've created on your computer, you have to buy a printer.

There are two basic kinds of printers: dot-matrix and letter-quality. Dot-matrix printers are faster and cheaper than letter-quality printers. They create letters that are made up of many small dots, like the letters on a computer screen.

Letter-quality printers work a lot like a typewriter, and print clean, typewriter-style letters. They aren't as fast as dot matrix printers, and prices start around $1,000. *(ENTER will run a buyers' guide to printers in an upcoming issue.)*

Should I get a monitor or can I use my TV?

For most beginners, a television set is just fine as a monitor. But if you are doing word processing or more involved graphics work, special computer monitors will make a big difference. Monitors have more *pixels* (points of light per line) than normal TVs. As a result, their pictures are clearer and easier on the eyes.

You have a choice of one-color *(monochrome)* and *full-color* monitors. You can get a good monochrome monitor for about $200. They have the best resolution of all. The resolution on a color monitor is better than a TV's, but not as good as that on a monochrome monitor. Color monitors also cost as much as $400 *more* than monochrome monitors.

Do you want a modem?

The modem (from MOdulator/DEModulator) is a device that allows your computer to send and receive data over the phone. You can use your modem to talk to someone with a computer across the country, to get information from mainframe data bases, to play games, and more.

You can get a good modem for under $100. Of course, once you have a modem, you'll want to talk to another computer. This leads to several other expenses, including joining information services like CompuServe and The Source. *(For an in-depth survey of telecommunications, see the October, 1984, issue of ENTER.)*

How else do I want to increase my computer's power?

There are many more ways to expand your computing ability. If you're getting serious about programming, you might need to expand your computer's memory. Or you might want to run software that requires 128K or 256K. In either case, you'll want to investigate memory expansion cards.

If you're an artist, you should consider buying a graphics tablet like the Koala Pad or Chalkboard. If you want your computer to talk, then you'll want to purchase a speech synthesizer.

However you decide to expand, just remember to match your purchases to your needs. Stay away from the $100 gizmo that looks flashy now but won't be used after the first few hours. With a little planning, you can expand your computing horizons. That keyboard will never look the same. ◘

DAN LHAMON is a member of ENTER's Youth Advisor board.

And the Winner Is...

The results of the ENTER Presidential Poll are in!

A record number of ENTER readers—nearly 12,000 of you—told us who you'd vote for in next month's presidential election. You also told us what kind of computer you use, what size city you live in, how old you are and what issues are most important to you. We ran all this data through our computer to show who you think should win on election day.

THE WINNER...

When our Presidential Poll was taken, the Democratic Party had not picked Walter Mondale as its nominee. (And Mondale had not picked Rep. Geraldine Ferraro as the first woman vice presidential candidate.) So our ballot had President Ronald Reagan facing three Democratic contenders—Mondale, Gary Hart and Jesse Jackson.

Against this line-up, ENTER readers picked President Reagan for re-election. Reagan received 46 percent of your vote. Hart was second with 24 percent, Mondale was third with 19 percent, and Jackson received 10 percent of the votes cast. All together, Democrats got 53 percent of the vote. That's enough to top Reagan *if* ENTER's Hart, Mondale and Jackson voters all support the Mondale-Ferraro ticket.

About two percent of you didn't like any of these candidates and decided to write in your presidential choice. Senator John Glenn won this write-in vote, Senator Ted Kennedy came in second, and music superstar Michael Jackson was third. Other write-in choices included former President Jimmy Carter, Kermit the Frog, Ricky Schroeder, William F. Buckley and Donald Duck. A few of you even voted for yourselves.

THE COMPUTER VOTE

Polls can do more than show who's likely to win or lose. Thanks to the computer's ability to store and compare a lot of information, polls can also show what voter is likely to support which candidate.

For instance, our poll showed that President Reagan got the strongest support from ENTER readers who own Commodore (C-64 or VIC-20) computers. He also received a lot of votes from readers who own more than one computer. The Democratic candidates—Mondale, Hart and Jackson—got most of their support from Adam, Atari and Timex/Sinclair owners. They also picked up a hefty share of votes from readers who don't yet have a computer. In general, those who have IBM, Apple, TRS-80 and Texas Instruments computers were just as likely to pick either Reagan or one of the Democratic candidates.

The presidential race wasn't your only concern. Our poll shows that a great many of you (45 percent) are most concerned over the nuclear arms race. About 25 percent of you were most concerned about foreign relations and 14 percent thought unemployment was the greatest problem we face right now.

By comparing computer owner-

ship with concern about the issues, we also learned that:

- IBM owners are most likely to be concerned about the nuclear arms race;
- Adam and VIC-20 owners concentrated on foreign relations;
- Timex/Sinclair owners were most likely to be worried about energy and conservation.

The ENTER Presidential Poll also turned up other interesting results. For instance, you may have heard politicians talk about a "gender gap"—that is, a difference between the way men and women vote. Well, we also discovered a "gender gap" among ENTER readers. By a slight margin, girls responding to our poll were more likely than boys to vote for Democratic candidates.

We also found a "Country-City Split." President Reagan, the Republican candidate, won strongest support in towns with populations under 50,000. The Democratic candidates did best in cities where 500,000 or more people live.

WINNING THE ENTER VOTE

What's the point of collecting all these poll results?

Well, if you were an advisor to a presidential campaign, our poll might help you figure out how to win ENTER votes. (For more on how professionals use polling results, see the next page.) By using the computer to help analyze polling data, you could create a profile of those most likely and least likely to vote for your candidate. Remember, not everyone who fits this profile will vote the same way. Polls are simply designed to spot trends.

Imagine, for example, that you are advising the Reagan-Bush campaign. From our poll you can say that the ENTER reader most likely to vote for the Republican ticket is a 15-year-old male who lives in a town with a population under 50,000. He owns a Commodore computer and is most concerned about the nuclear arms race. You can also warn them that the ENTER reader *least* likely to support Reagan-Bush is an 11-year-old girl living in a city of more than 500,000 people. She owns an Atari or Timex/Sinclair computer, and considers unemployment the most important election issue.

If you were advising the Mondale-Ferraro campaign, you could use the poll to profile probable supporters and non-supporters. The data show that those *most* likely to vote for a Democratic candidate are precisely those *least* likely to vote for the Reagan-Bush ticket (11-year-old girls from big cities). The poll results also showed that the weakest support for Democratic candidates is among 13- and 16-year-old males who live in towns with 100,000 to 500,000 people. These are readers who own an Adam or IBM computer and consider foreign relations and inflation the top issues of the election.

With this information, your candidates should be able to decide which policies can help them win the votes of ENTER readers.

There's some other information your candidate should know. First, the results of a poll of ENTER readers will not necessarily predict the way all young people would vote. ENTER readers are a select group of kids interested in computers and new technology. To get a more accurate idea of how *all* young people might vote, you would have to look at a more representative group of kids from across the U.S.

The other thing you should tell your candidate may be even more important: Most ENTER readers aren't old enough to vote. —*Jim Lewis*

Some chose Reagan or Mondale; others picked Michael Jackson or Kermit the Frog.

PLAYING POLITICS: Want to hit the campaign trail? These computer games let *you* become the candidate.

- ***Campaign '84*** from Sunrise Software, Dallas, TX. Available for Adam ($19.95), C-64, Colecovision, VCS, Atari 800XL ($17.95).
- ***President's Choice*** from Spinnaker Software, Cambridge, MA., is available for IBM PC and Apple computers ($39.95). C-64 version to be released this Fall.

Bytes & Ballots

BY VAN WALLACH

Who will be the next President of the United States?

We have to wait until election day to know for sure. But pollsters across the country are trying to predict the winner by asking people questions and running answers through a computer.

You took part in a poll if you responded to ENTER's Presidential Poll. (The results are in "And the Winner Is...")

Pollsters use computers in many ways. ENTER talked with R. Harrison Hickman, vice president of Hamilton & Staff, a polling firm. His company has done polls for John Glenn and other politicians.

Q: What's the point of taking a poll?

A: Polling is a way for candidates to find out what voters are thinking. Through a poll, a candidate can find out what issues the voters are interested in. A candidate can then explain how he or she would deal with those problems.

Q: How was polling done before computers?

A: In the 1930s and 40s, pollsters would go out and ask a random group of voters questions. Then they would stack the answers in piles. They'd sort out voters by variables, like region and candidate choice. Next, they would sort answers into different boxes and then count by hand how many fell into each box.

Q: How have computers changed the way polling is done?

A: Computers are involved in almost every step of the polling process. Computers select phone numbers at random and help us choose which people we poll. Then, once we have voters' answers, computers help us handle data *fast*. Polling that used to take six weeks can now be done in days. Computers also let us combine data in different ways to see what pops up.

Q: What kind of computers do you use? Do you need much computer knowledge to be a pollster?

A: We use terminals hooked into a Hewlett-Packard 3000. We're thinking of switching to IBM PCs.

As for technical knowledge: you don't need to be a computer whiz to be a pollster. We have computer experts on staff and we mostly use ready-made software packages. But you do have to know how to use that software effectively.

Q: How did you get started as a pollster?

A: I started in high school. I ran for class office and got beaten. The next year, I helped advise a candidate for class office, and he won. I decided then I'd rather be an advisor than a candidate. I figured the best way to have an impact on public policy is to help candidates know what the public wants.

Q: As a pollster, what do you think of the ENTER Poll?

A: ENTER's Presidential Poll shows many of the things our professional polls show. Ronald Reagan does best with males outside urban areas on the upper end of the income scale. He does worst with females in urban areas in middle income brackets.

The division of the vote shows the Democrats' problem: convincing Hart and Jackson supporters that Mondale would be a better president than Reagan. Reagan's best opportunity to win comes from these divisions; Democrats are strongest when they stand behind one candidate.

VAN WALLACH is a freelance writer.

Give The Gift Of Education

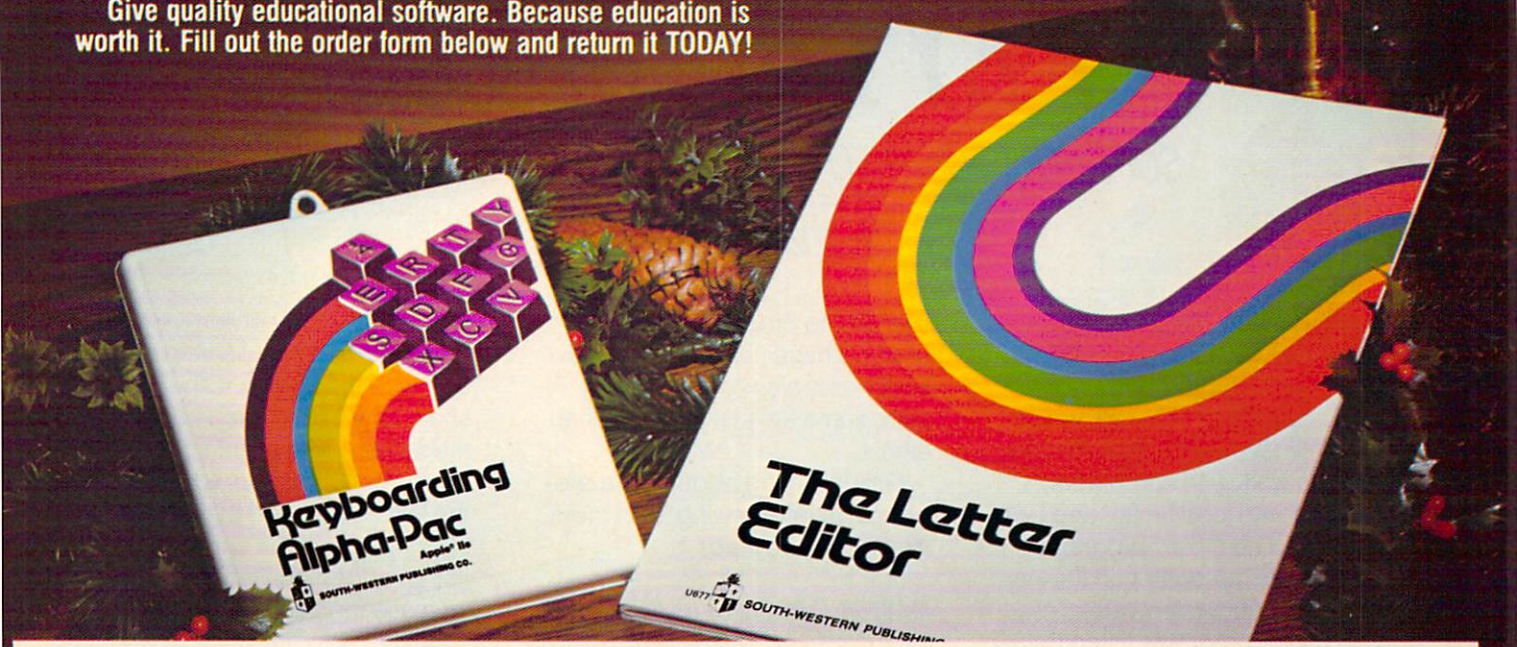
The holidays are coming. That means parents will be shopping for computer gift items for kids...and for each other.

If you're looking for more than just another video game, take a look at these educational software packages from South-Western Publishing Co.–a must for anyone with a microcomputer. They're perfect for giving and receiving. And for learning that will last the whole year long!

You can make keyboarding easy with KEYBOARDING ALPHA-PAC. This user-friendly program will teach you the keyboard letters one step at a time, at your own pace. Through the use of animated graphics, it shows you which fingers should strike which keys and the correct way to position your hands over the keyboard. The 2-diskette program is available for Apple® IIe, Apple® IIc, IBM PC, and TRS-80™ microcomputers.

Put your microcomputer to work for you with THE LETTER EDITOR! In just 4 easy lessons, this program instructs you on the use of the following commands: enter, browse, change, delete, edit, file, help, insert, justify, load, print, replace, set, move, and save. With these newly acquired commands, you will be able to key in and edit all kinds of reports, essays, term papers, and school assignments. Available for Apple® IIe and TRS-80™ microcomputers.

Give quality educational software. Because education is worth it. Fill out the order form below and return it TODAY!



ORDER FORM

Please send me_____ **KEYBOARDING ALPHA-PAC** diskette package(s) for the following: ☐ Apple® IIe or Apple® IIc, 64K minimum ☐ TRS-80™ Model III or 4, 48K minimum ☐ IBM-PC, DOS-1.1, 64K minimum 2.1 or 2.0-128K and _____ **THE LETTER EDITOR** diskette package(s) for the following hardware: ☐ TRS-80™ Model III or 4, 48K minimum ☐ Apple® IIe, 64K minimum

NAME_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

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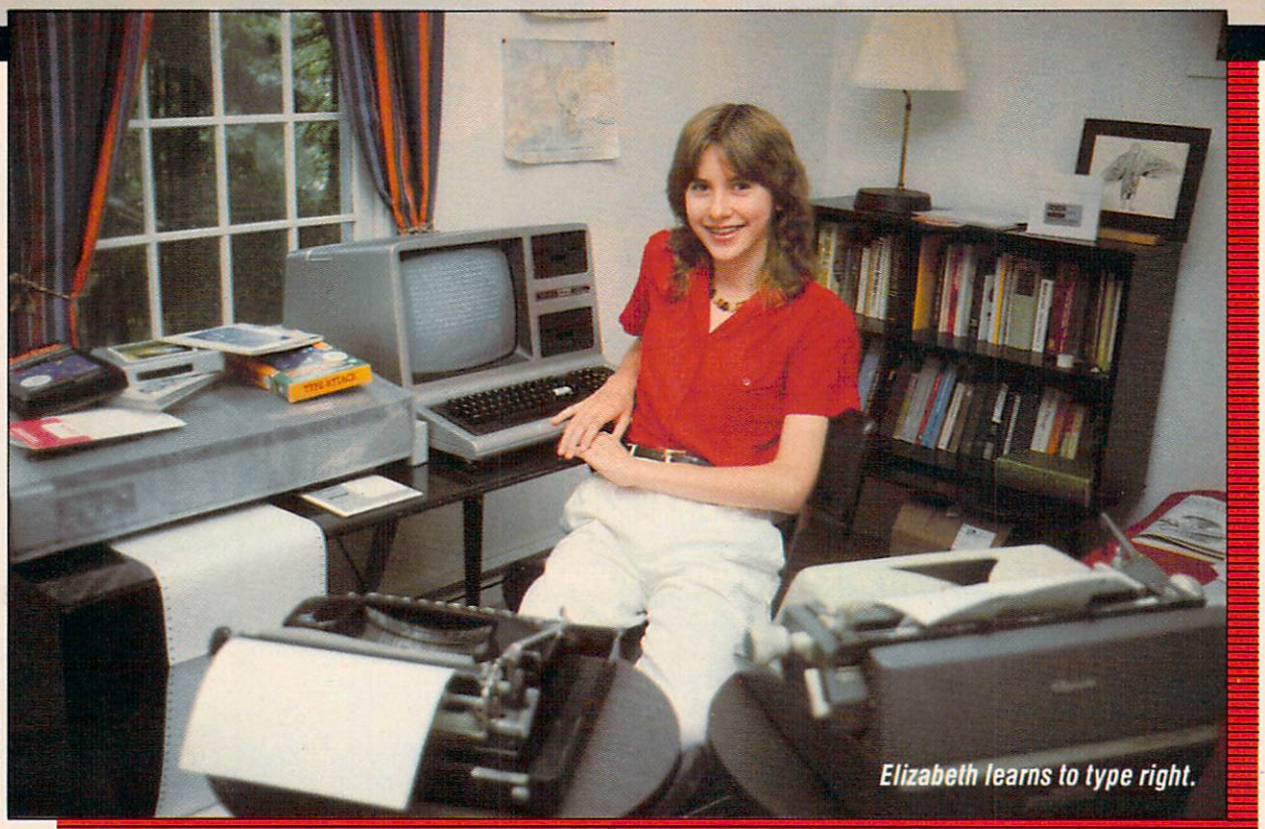

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Elizabeth learns to type right.

KEY PROGRAMS

SOFTWARE THAT HELPS YOUR FINGERS DO THE TYPING

BY ELIZABETH DISNEY, 14

Tip...Tap...Tip...Tap...Tip. Is that what it sounds like when you're typing? If so, you need help. After all, you *have to* know how to type if you're going to work with computers.

I'm a fairly good typist, and I was convinced no typing program could make me swifter on the keyboard. But after a few weeks of work on the programs listed below, I'm better than ever.

Nearly all the typing tutorial programs listed here include games, exercises, and a special feature that enables you to create your own drills. They're not all the same, however. Some programs are easier to use and more flexible. Some have better graphics and gameplay. Finally, some are just more fun than others.

One last thing about these programs: after reviewing all of them, my fingers are *tired!*

MASTER TYPE *Scarborough Systems; Apple II computers, $39.95; Macintosh, IBM PC & PCjr, $49.95.*

This is a good all-around program—fun to play, effective, and easy to use. It is so user-friendly, in fact, that I give it the Miss Congeniality prize.

The main body of this program is a game. You control a ship in the center of the screen. Other ships shoot at you from each corner of the screen. To prevent your ship from being blown up, you must type the letter displayed by the attacking ship before the shots reach you. For an added challenge, you can increase the number of letters an attacking ship displays. To work out bugs in your typing style, you can create your own lessons to focus on the weak spots.

TOUCH TYPING TUTOR *Taylormade Software; Commodore 64, disk $24.95, cas-*

sette $19.95; VIC-20 cassette 19.95.

I had some problems with this program. To begin with, it includes no games, only exercises. The color-coded keyboard, which is supposed to make things easy to understand, is actually very confusing.

There are letter, word and sentence exercises. The word exercises are a little frustrating. Instead of giving you real words to type into the computer, you're given a random combination of letters. Since the "words" aren't real, they're difficult to read. I found this very annoying.

TYPE ATTACK *Apple, Atari, IBM PC, Commodore 64 and VIC-20. (At the time of this review, the new distributor of this software had not been determined.)*

This is a really fun program. There are different game modes—"Character Attack" and "Word Attack."

During "Character Attack," a *Space Invader*-type array of letters descends slowly upon you. To retaliate, you type single letters which eliminate the enemy. During "Word Attack," you type words as they fly sideways across the screen.

This program has a terrific lesson-creator feature. You get to work on words, as well as letters, that you need more practice with. My only complaint with *Type Attack*: the game jumps to the next lesson without asking you first.

TYPING STRATEGY *Behavioral Engineering; All Apple computers, IBM PC $39.95; Commodore 64, disk $34.95, cassette $34.95; VIC-20 $24.95.*

This was the most original program I tried. The lessons are simple typing drills. But the two games ("Drag Racing" and "Time Bomb") were different from any of the others I used. I liked "Drag Racing" the best. In this game, you make your car move by typing a sentence that's displayed on the screen. To pass the computer-controlled car and win the race, you must type quickly and accurately.

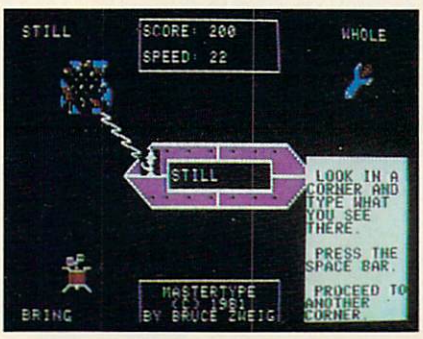
The one feature I didn't like is that it is impossible to change from, let's say, "Drag Racing" to "Time Bomb." You have to take out the disk and boot up again. Still, if you want a program that's effective, entertaining, and a little different, this is it.

TYPING TUTOR *Radio Shack; TRS-80 Color Computer $29.95.*

This program is an early ancestor of *Typing Tutor III*—a no-frills version, you might say.

The game objective is to protect your bases from an onslaught of falling letters. Unfortunately, there are no graphics and minimal sound effects. I found myself getting bored. And a little more bored...and then I started to think up excuses to wander away from the keyboard....

There is one very good feature, however. Your speed is monitored by the computer. Based on your strengths and weaknesses, you're given lessons. So, if you can manage to sit at the keyboard for long enough, you'll surely learn something.



Master Type: fun and easy to use.

TYPING TUTOR III *Simon & Schuster/ Electronic Publishing Division. Reviewed on IBM PC; also available for Apple and Commodore $49.95; Macintosh, $59.95.*

This game is quick-paced and entertaining. It uses the familiar device—type letters falling from the sky before you get zapped—but it's well done. An added bonus is that it keeps track of how long it takes you to type in each letter and number. Then, on the basis of this record, it creates lessons for you. This feature also lets you chart your own progress, and that's always fun.

Though the graphics of the IBM version were a little dull, this program is fun, very easy to use and really helpful.

WIZTYPE *Sierra, cartridge and disk for Commodore 64, disk for Apple, IBM PC and jr; disk, $34.95; cartridge, $39.95.*

Wiztype, which uses *Wizard of Id* characters, includes a game and exercises. The best feature is its wonderful animation.

The game is a lot of fun. You take part in a battle between the Wizard and the Spirit. The exercises are fun, too. Bung the Jester bounces from word to word on a pogo stick. He paces you by moving at an even rate, from 10 to 60 words per minute. I accelerated my typing to keep up with him, and that really helped me to improve.

ELIZABETH DISNEY, a member of the ENTER Youth Advisor Board, lives in New Hampshire and works on a TRS-80 Color Computer.

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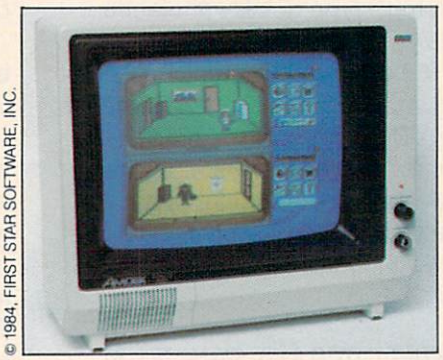

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BASIC TRAINING

PROGRAMS FOR YOUR COMPUTER

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

Click. Good morning, ENTER reader. You are looking at the start of eight pages of programs, contests, advice and reviews, also known as BASIC Training. Your assignment, should you choose to accept it, is to find the programs that are compatible with your computer, type them in and have fun. As usual, if you are caught, ENTER magazine will deny any knowledge of your activities. Good luck. This page will self-destruct before 1987.

Remember that great old TV show *Mission: Improgrammable*? Well, don't worry. This month BASIC Training is very programmable.

Our special feature for this issue is a Reader Roundup—two pages of programs written by our readers. We also have the second installment of our new column, BASIC Plus, with more tips on debugging, a new programming Challenge and more.

Meanwhile, we'll catch up on some of our old television favorites—*My Friend Floppy, Father Knows BASIC* and *My Mother the Modem.*

—Richard Chevat, Technical Editor.

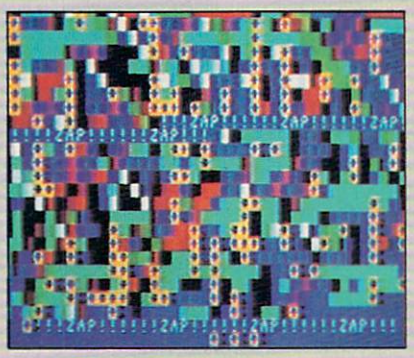
READER ROUNDUP

Every month, BASIC Training receives hundreds of programs. Some are entries in our BASIC Training Challenges, but many are just programs that you think are good enough to share with other ENTER readers. In this first Reader Roundup, we've gathered together some short graphics programs that are easy to type in, and fun to watch.

C-64 DOODLER: COMMODORE 64

A lot of readers send in variations on the "draw with your joystick" theme. This one, by Steve Murphy, 11, of Fairfax, Virginia, has a couple of nice twists. By pushing the joystick down, you can scroll in that direction. And, hitting the fire button makes the word "zap!" appear.

NOTE: In lines 110, 130, and 210-280, *italics* mean press the combination of keys indicated. COM means the key with the Commodore symbol on it. *CRSR-UP* means press *SHIFT* and the up/down *CRSR*. *CRSR-L* means press *SHIFT* and the right/left *CRSR*.



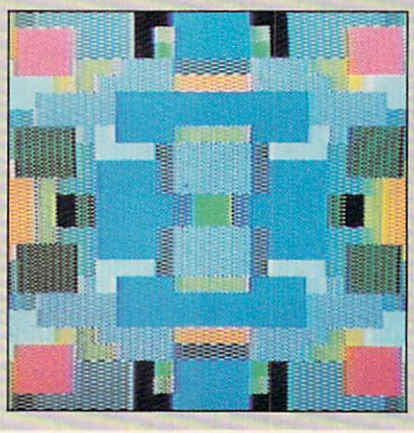
```
10   REM DOODLER
20   PRINT CHR$(147)
30   PRINT "AFTER START, PRESS
     F1 TO CLEAR SCREEN"
40   FOR D = 1 TO 1000:NEXT D
50   PRINT CHR$(147)
60   JV = PEEK(56320):FR = JV
     AND 16
70   JV = 15 - (JV AND 15)
80   IF JV = 0 THEN 100
90   GOSUB 200
100  GET B$
110  IF B$ = " F1 " THEN 50
120  IF FR = 16 THEN 60
130  PRINT " CTRL-2 CTRL-0
     !!!ZAP!!!";
140  GOTO 60
200  REM CHOOSE COLOR
210  IF JV = 1 THEN PRINT
     "CTRL-1 CRSR-UP CRSR-L
     CTRL-9    ";
220  IF JV = 2 THEN PRINT
     "CTRL-8 CRSR-DN CRSR-L
     CTRL-9+    ";
230  IF JV = 4 THEN PRINT
     SPC(39) "CTRL-4 CRSR-L
     CRSR-UP CTRL-9    ";
240  IF JV = 5 THEN PRINT
     "CTRL-6 CRSR-UP CRSR-L
     CRSR-L CTRL-9    ";
250  IF JV = 6 THEN PRINT
     "CTRL-3 CRSR-DN CRSR-L
     CRSR-L CTRL-9    ";
260  IF JV = 8 THEN PRINT
     "CTRL-5 CRSR-R CRSR-L
     CTRL-9 SHIFT-Q";
270  IF JV = 9 THEN PRINT
     "COM-1 CRSR-UP
     CTRL-9    ";
280  IF JV = 10 THEN PRINT
     "CTRL-2 CRSR-DN
     CTRL-9    ";
290  RETURN
```

—Steve Murphy

TI MIRROR: TI 99/4A

This program for the TI 99/4A was written by Russell Vallelunga, age 15, of Mesa, Arizona. It draws random blocks of color in a kaleidoscope pattern across your entire screen.

```
5   REM MIRROR
10  RANDOMIZE
20  CALL SCREEN(2)
30  CALL COLOR(15,2,2)
40  CALL HCHAR(1,1,144,780)
50  FOR X=1 TO 14
60  CALL COLOR(X,X+2,X+1)
```



```
70  NEXT X
80  FOR X=32 TO 136 STEP 8
90  CALL CHAR(X,"AA55
    AA55AA55AA55")
100 NEXT X
110 X1=INT(RND*16+1)
120 Y1=INT(RND*12+1)
130 X2=32-X1-1
140 Y2=24-Y1-1
150 A=(INT(RND*14))*8+32
160 CALL HCHAR(Y1,X1,A,3)
170 CALL HCHAR(Y1+1,X1,A,3)
180 CALL HCHAR(Y1+2,X1,A,3)
190 CALL HCHAR(Y2,X1,A,3)
200 CALL HCHAR(Y2+1,X1,A,3)
210 CALL HCHAR(Y2+2,X1,A,3)
220 CALL HCHAR(Y1,X2,A,3)
230 CALL HCHAR(Y1+1,X2,A,3)
240 CALL HCHAR(Y1+2,X2,A,3)
250 CALL HCHAR(Y2,X2,A,3)
260 CALL HCHAR(Y2+1,X2,A,3)
270 CALL HCHAR(Y2+2,X2,A,3)
280 GOTO 110
```

—Russell Vallelunga

BOUNCING LINE: ATARI

This program draws a line. Then it bounces it around your screen. Then it makes a noise every time it bounces. Doesn't sound like much? Try it and see. Leave it running for a while and watch the way the line moves and changes. "Bouncing Line" was written by Christopher Young, age 15, of Miami, Florida.

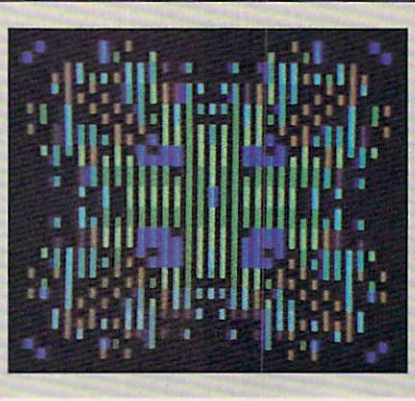
```
10  GRAPHICS 7+16
20  G=1:A=3:B=13
30  X=10:Y=2
40  C=RND(4)*5
50  D=RND(2)*5
60  S=RND(4)*5
70  T=RND(2)*5
80  IF A+C>159 OR A+C<0
    THEN C=-C:FL=1
90  IF B+D>95 OR B+D<0
    THEN D=-D:FL=1
100 IF X+S>159 OR X+S<0
    THEN S=-S:FL=1
110 IF Y+T>95 OR Y+T<0
    THEN T=-T:FL=1
120 COLOR 0
130 PLOT A,B:DRAWTO X,Y
140 A=A+C:B=B+D:
    X=X+S:Y=Y+T
150 COLOR G
160 PLOT A,B:DRAWTO X,Y
170 IF FL=1 THEN SOUND
    2,130,10,10:SOUND
    2,1,10,10:FL=0:G=G+1
180 IF G>3 THEN G=1
190 GOTO 80
```

—Christopher Young

KALEIDOSCOPE: TRS-80 COLOR COMPUTER

This program is exactly what its name says—a computerized kaleidoscope. Stephen Cobb, age 18, of Sheffield Lake, Ohio, wrote it for the TRS-80 Color Computer.

```
5   REM KALEIDOSCOPE
10  CLS(0)
20  D1=0:D3=1:D4=1
30  A=RND(4):B=RND(10)
40  GOTO 90
```



```
50  IF RND(0)>.6 THEN 70
60  DA=RND(2):DB=RND(3)
70  A=A-DA+D3:
    B=B-DB+D4
80  IF RND(0)>.2 THEN 100
90  CL=RND(8)
100 IF ABS(A)>15 OR ABS(B)>
    15 OR D1>8 THEN 230
110 IF ABS(A)<=12 THEN 130
120 D3=-D3:D1=D1+1
130 IF ABS(B)>12 THEN
    D4=-D4
140 SET(31+2*A,15+B,CL)
150 SET(31+2*A,15-B,CL)
160 SET(31-2*A,15-B,CL)
170 SET(31-2*A,15+B,CL)
180 SET(31+2*B,15+A,CL)
190 SET(31+2*B,15-A,CL)
200 SET(31-2*B,15-A,CL)
210 SET(31-2*B,15+A,CL)
220 GOTO 50
230 IF RND(3)>1 THEN 20
240 FOR K=1 TO 4000:NEXT K
250 CLS(0):GOTO 20
```

—Stephen Cobb

(BASIC Training continues on next page)

(BASIC Training cont. from previous page)

THE PARTY PROGRAM

APPLE, ADAM, ATARI, COMMODORE 64, IBM, TI 99/4A, TIMEX SINCLAIR 1000, 1500, 2068, TRS-80 COLOR COMPUTER, VIC 20

What's better than Spin the Bottle, Charades, or Trivial Pursuit™? It's the new Party Game Program from BASIC Training!

It's easy to play. The computer picks people at random, gives them a command and tells them where to perform their task or whom to do it with. Before you play, the computer will ask you to enter the names of everyone in the room. When you're done, hit return and the computer will ask for "things to do." Everyone gets to enter one command, whether it's "do the twist" or "quack like a duck."

When everyone has entered one or more things to do, hit return and the computer will ask for "places." Then everyone gets to enter a phrase, like "under the table" or "around the yard."

When you've entered the last one, just hit return and the computer will randomly combine a person, place and thing to do. Sometimes, it will tell the "victim" to do a task with someone else.

The program works by building up three separate arrays: N$, T$, and P$. (What's an array? See this month's BASIC Glossary.) Each subroutine fills in a different array or list. For example, subroutine 1000 asks for the names and puts them in array N$. N keeps count of the names.

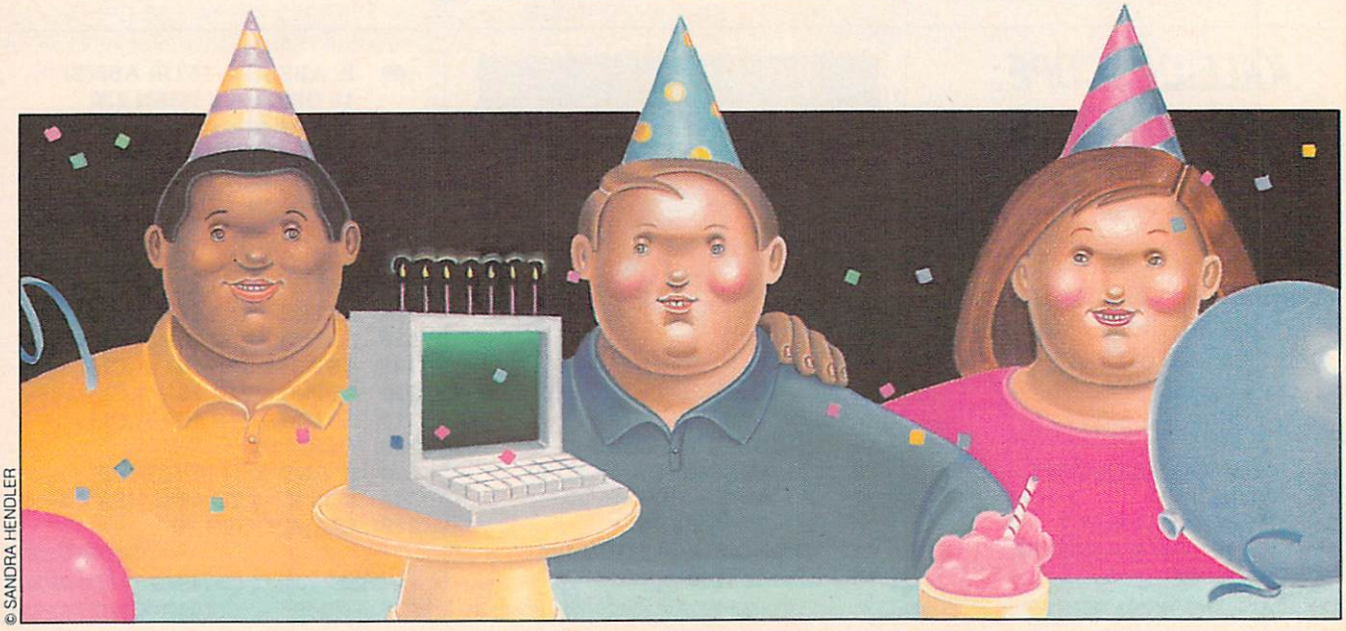
When the program has completed all three subroutines, it returns to line 130. Then it randomly selects items in each array (lines 150-170).

Below is the program for Apple II and Adam computers and adaptations for other home computers.

APPLE, ADAM:

```
5     REM PARTY
10    DIM N $ (30),T $ (30),P $ (30)
20    LET N = 0
30    LET T = 0
40    LET P = 0
50    HOME
60    PRINT "WELCOME TO
      PARTYGAME"
70    FOR D = 1 TO 1000
80    NEXT D
90    HOME
100   GOSUB 1000
110   GOSUB 2000
120   GOSUB 3000
130   LET P $ (P) = "WITH"
140   LET P = P + 1
145   REM RANDOM CHOICES
150   N1 = INT ( RND (1) * N)
160   T1 = INT ( RND (1) * T)
170   P1 = INT ( RND (1) * P)
180   PRINT N $ (N1); "YOU
      MUST";
190   PRINT T $ (T1);" ";
200   PRINT P $ (P1)
210   IF P $ (P1) < > "WITH"
      THEN GOTO 240
220   N1 = INT ( RND (1) * N)
230   PRINT N $ (N1)
240   PRINT "PRESS RETURN TO
      CONTINUE"
250   INPUT X $
260   GOTO 150
1000  REM ENTER NAMES
1010  HOME
1020  PRINT "ENTER NAME AND
      PRESS RETURN"
1030  PRINT "WHEN DONE WITH
      NAMES, JUST PRESS
      RETURN"
1040  LET X $ = " "
```

(Program continues on next page)



(Program continued from previous page)

```
1050  INPUT X$
1060  IF X$ = " " THEN RETURN
1070  LET N$(N) = X$
1080  LET N = N + 1
1090  GOTO 1000
2000  REM THINGS TO DO
2010  HOME
2020  PRINT "ENTER THINGS TO
      DO AND PRESS RETURN"
2030  PRINT "WHEN DONE, JUST
      PRESS RETURN"
2040  LET X$ = " "
2050  INPUT X$
2060  IF X$ = " " THEN RETURN
2070  LET T$(T) = X$
2080  LET T = T + 1
2090  GOTO 2000
3000  REM OBJECTS AND
      PLACES
3010  HOME
3020  PRINT "ENTER PHRASE
      WITH OBJECT OR PLACE
      AND PRESS RETURN"
3030  PRINT "WHEN DONE, JUST
      PRESS RETURN"
3040  LET X$ = " "
3050  INPUT X$
3060  IF X$ = " " THEN RETURN
3070  LET P$(P) = X$
3080  LET P = P + 1
3090  GOTO 3000
```

COMMODORE 64 AND VIC 20: Change lines 50, 90, 1010, 2010 and 3010 to: PRINT CHR$(147). Change these lines:

```
150  N1=INT(RND(0)*N)
160  T1=INT(RND(0)*T)
170  P1=INT(RND(0)*P)
220  N1=INT(RND(0)*N)
```

IBM PC AND PCjr: Change lines 50, 90, 1010, 2010, 3010 to: CLS.

TRS-80 COLOR COMPUTER: Change lines 50, 90, 1010, 2010, 3010 to: CLS. Change these lines:

```
150  N1=INT(RND(N))-1
160  T1=INT(RND(T))-1
170  P1=INT(RND(P))-1
220  N1=INT(RND(N))-1
```

TI 99/4A: Change lines 50, 90, 1010, 2010, 3010 to: CALL CLEAR. Add or change these lines:

```
15   RANDOMIZE
70   FOR D=1 TO 600
150  N1=INT(RND*(N))
160  T1=INT(RND*(T))
170  P1=INT(RND*(P))
200  PRINT P$(P1);"    ";
220  N1=INT(RND*(N))
```

TIMEX-SINCLAIR 1000, 1500, 2068: NOTE: In the Timex-Sinclair version, phrases must be less than 30 characters. Change lines 50, 90, 1010, 2010, 3010 to: CLS. Add or change these lines:

```
5    RAND 0
10   DIM N$(30,30)
11   DIM T$(30,30)
12   DIM P$(30,30)
20   LET N=1
30   LET T=1
40   LET P=1
70   FOR D=1 TO 150
150  LET N1=INT(RND*(N+1))+1
160  LET T1=INT(RND*(T+1))+1
170  LET P1=INT(RND*(P+1))+1
220  LET N1=INT(RND*(N+1))+1
1030 PRINT "WHEN DONE,
     TYPE D"
1060 IF X$="D" THEN GOTO 1100
1100 RETURN
2030 PRINT "WHEN DONE
     TYPE D"
2060 IF X$="D" THEN GOTO 2100
2100 RETURN
3030 PRINT "WHEN DONE
     TYPE D"
3060 IF X$="D" THEN GOTO 3100
3100 RETURN
```

ATARI: NOTE: In the ATARI version, phrases must be less than 30 characters. Change lines 50, 90, 1010, 2010, 3010 to: ? CHR$ (125). Add or change these lines:

```
6    ?CHR$ (125); "PLEASE
     WAIT"
10   DIM N$(900), T$(900),P$(900),
     X$(30)
15   FOR G=1 TO 900
16   N$(G)="    ":T$(G)="    ":
     P$(G)="    "
17   NEXT G
130  P$(P*30+1,
     P*30+30)="WITH"
150  N1=INT(RND(0)*N)
160  T1=INT(RND(0)*T)
170  P1=INT(RND(0)*P)
180  ?N$(N1*10+1,
     N1*10+10);"YOU MUST  ";
190  ?T$(T1*30+1,
     T1*30+30);"    ";
200  ?P$(P1*30+1,P1*30+30)
210  IF P$(P1*30+1,
     P1*30+4)<>"WITH"
     THEN GOTO 240
220  N1=INT(RND(0)*N)
230  ?N$(N1*10+1,N1*10+10)
1070 N$(N*10+1,N*10
     +10)=X$
2070 T$(T*30+1,
     T*30+30)=X$
3070 P$(P*30+1,
     P*30+30)=X$
```

—*Jim Clark*

(BASIC Training continues on next page)

BASIC GLOSSARY: ARRAYS

An array is a method of organizing long lists of numbers or other information in a computer program. Think of it as a piece of graph paper, a chart or a table. Each item or *element* goes into one box in the table.

For example, suppose you have a list of names you want to input and alphabetize. You could give each name its own variable like this: :A$="MOE" :B$="LARRY" :C$="CURLY". Or, you could put each name into a box in an array called STOOGE$. Then they would be identified like this: STOOGE$(1)="MOE": STOOGE$(2)="LARRY": STOOGE$(3)="CURLY".

The numbers in parentheses are called subscripts. Each element in an array has the same variable name and its own subscript which identifies its position in the array.

The size and structure of arrays are defined with DIM statements.

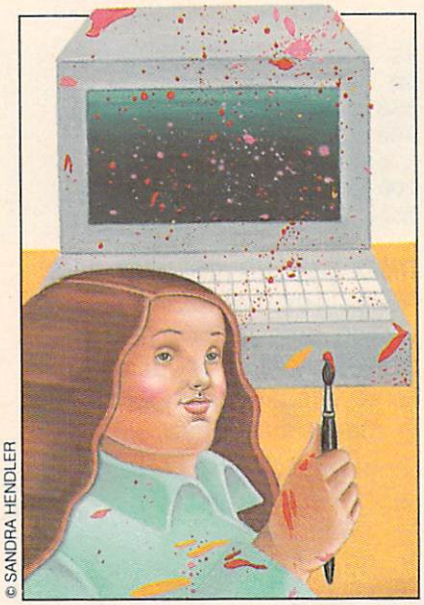
BASIC TRAINING

(BASIC Training cont. from previous page)

CHALLENGE #9: VINCENT VAN GOSUB?

Gone are the days when an artist had to live in a garret filled with canvasses, paint, and brushes. Today, some artists use computers, software, light pens and touch tablets to create their masterpieces (and they don't even have to live in garrets).

For our programming Challenge #9, we'd like you to create a program to help these modern-day REMbrandts. It can be a program that draws designs by itself, like TI Mirror in our Reader Roundup. Or it can be one that helps you create your own designs. Maybe you can make it easier to use some of the features of your computer, like sprites or user-defined characters.



We'll pick the best programs and print them in BASIC Training. The winners will receive $50 and an ENTER T-shirt.

Send your program to CHALLENGE #9, ENTER Magazine, CTW, 1 Lincoln Plaza, N.Y., N.Y. 10023. All entries must be postmarked no later than November 23. We read every program that is sent in, but because we get hundreds of entries every month, we cannot reply to each of you.

Programs can be for any home computer, but you must keep them under 75 lines, because our space is limited. 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.

And remember, if you've written other programs you think belong in ENTER—a short one for our reader round-ups, for example—send them to BASIC Training at the address above. We pay between $25 and $50 for programs we publish.

WINNERS OF CHALLENGE #6: LET THE GAMES BEGIN!

DOWNHILL RACER: ATARI

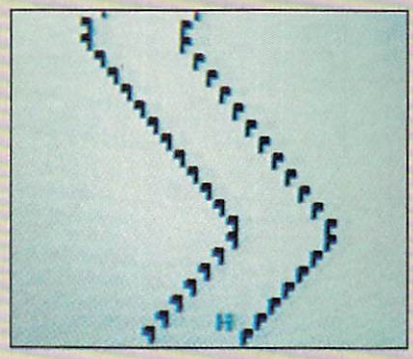
For Challenge #6 some of you sent in games that were based on the Olympics, like this great skiing program by 14-year-old Brian Crawford of Woodinville, Washington. You use your joystick or arrow keys to maneuver downhill between the rows of flags. As long as you stay in the middle of the two rows, the race goes on. The "shooshing" noise of the snow going by is a nice touch.

```
5    REM RACER
10   OPEN #1,4,0,"K:"
20   POKE 752,1:POKE 82,0
30   PLT=1:DIM SC(2)
40   SC(1)=0:SC(2)=0
50   GRAPHICS 0:SETCOLOR
     1,0,0
60   SETCOLOR 2,0,14:
     SETCOLOR 4,0,14
70   POSITION 17,0:PRINT
     "SKIING"
80   POSITION 0,3
90   PRINT "IF YOU HAVE
     JOYSTICKS, USE ONE FOR
     EACH"
100  PRINT "PLAYER. IF NOT, USE
     THE LEFT AND RIGHT"
110  PRINT "ARROW KEYS"
120  PRINT:PRINT "HOW MANY
     PLAYERS (1 OR 2)?";
130  GET #1,P:P=P-48
140  IF P<1 OR P>2 THEN 120
150  POKE 752,1:PRINT
     CHR$(125)
160  GOSUB 1000
170  POKE 764,255
180  SC(PLT)=0:R1=0:R2=0
190  POSITION 16,8:PRINT
     "PLAYER"; PLT
200  FOR T=1 TO 500:NEXT T
210  SOUND 0,4,0,2
215  REM MAIN PROGRAM LOOP
220  R1=INT(RND(0)*29)
230  IF R1<R2 THEN 220
240  FOR M=R2 TO R1
250  GOSUB 400:NEXT M
260  R2=INT(RND(0)*20)
270  IF R2>R1 THEN 260
280  FOR M=R1 TO R2 STEP-1
290  GOSUB 400:NEXT M
300  GOTO 220
400  REM FLAG PLOTTING
410  POSITION M,23
420  PRINT CHR$(11);
     CHR$(22);"  ";
```

(Program continues on next page)

(Program continued from previous page)

```
430  PRINT CHR$(2); CHR$(12)
440  SC(PLT) = SC(PLT) + 1
450  GOSUB 500
460  GOSUB 700
470  FOR T = 1 TO 3:NEXT T
480  RETURN
500  REM JOYSTICK AND
     KEYBOARD READING
510  J = STICK(PLT - 1):
     K = PEEK(764)
520  IF J>8 AND J<12 OR K = 6
     THEN HP = HP - 4:CL =
     CL - 1
530  IF J>4 AND J<8 OR K = 7
     THEN HP = HP + 4:CL =
     CL + 1
540  POKE 53248,HP:RETURN
700  REM CHECK TO SEE IF
     SKIER HIT FLAG
710  IF CL<=M OR CL>=M + 8
     THEN POP :GOTO 800
720  RETURN
800  REM SCORE DISPLAY
810  SOUND 0,25,6,14
820  FOR T = 1 TO 200:NEXT T
830  SOUND 0,0,0,0:PRINT
     CHR$(125)
```



```
840  POKE 764,255:POKE 53248,0
850  IF SC(PLT)>HSC THEN
     HSC = SC(PLT)
860  POSITION 17,2:PRINT
     "SCORE"
870  POSITION 0,5:PRINT "THE
     HIGH SCORE IS ";HSC
880  PRINT:PRINT "PLAYER 1'S
     SCORE IS ";SC(1)
890  PRINT:PRINT "PLAYER 2'S
     SCORE IS ";SC(2)
900  PRINT:PRINT:PRINT
     "PRESS THE TRIGGER
     OR SPACE BAR TO
     CONTINUE"
910  IF P = 1 THEN 940
920  IF PLT = 1 THEN
     PLT = 2:GOTO 940
930  PLT = 1
940  IF STRIG(PLT - 1) = 0 OR
     PEEK(764) = 33 THEN 150
950  GOTO 940
1000 REM PLAYER-MISSILE
     SET UP
1010 PM = 256*(PEEK(106) - 24)
1020 FOR I = PM + 1024 TO
     PM + 1280
1030 POKE I,0:NEXT I
1040 RESTORE
1050 FOR I = PM + 1224 TO
     PM + 1232
1060 READ X
1070 POKE I,X:NEXT I
1080 POKE 54279,PM/256
1090 POKE 53277,2
1100 POKE 53256,0
1110 POKE 53248,60:
     HP = 60:CL = 4
1120 POKE 559,62:POKE 704,168
1130 IF PLT = 2 THEN POKE
     704,200
1140 RETURN
1150 DATA 9,9,9,15,9,9,9,9
```

—Brian Crawford

AIRPLANE!: APPLE

This program isn't a complete game, but we can think of a dozen ways it could be used as the basis of one. It uses a shape table and the DRAW and ROT commands of the Apple to move an airplane around your screen. You use the left arrow key to rotate clockwise and the right arrow key to rotate counter-clockwise. On the IIe, you press the Apple key to move forward. On the II or II+, you must use a joystick or paddle.

Airplane! was written by Brian Noble, age 15, of Jackson, Michigan.

```
5    REM AIRPLANE!
10   HOME
20   CB = 1: SCALE = 3:A = 64
30   FOR I = 24576 TO 24597:
     READ ZZ
40   POKE I,ZZ: NEXT I: POKE
     232,0: POKE 233,96
50   X = 139:Y = 79
60   DATA 1,0,4,0,36,52,42,
     45,52,54,196,27,63,39,
     54,38,104,49,54,47, 13,0
70   HGR
80   HCOLOR = 3
90   X = X + XC:Y = Y + YC
100  IF X > 270 THEN X = 9
110  IF X < 9 THEN X = 270
120  IF Y > 150 THEN Y = 9
130  IF Y < 9 THEN Y = 150
140  XC = 0:YC = 0
150  ROT = A: DRAW 1 AT X,Y
160  FOR I = 1 TO 3:MO = PEEK
     (49168): NEXT I
170  TH = PEEK (49249)
180  IF TH > 127 THEN GOSUB
     230
190  IF MO < 128 AND XC = 0
     AND YC = 0 THEN 150
200  IF MO = 149 THEN A = A
     + 4: IF A = 68 THEN A = 4
210  IF MO = 136 THEN A = A
     - 4: IF A = 0 THEN A = 64
220  HCOLOR = 0: DRAW 1 AT
     X,Y: GOTO 80
230  ON A / 4 GOTO 250,260,
     270,280,290,300, 310,320,
     330, 340,350,360,370,
     380,390,400
240  RETURN
250  XC = 2:YC = - 4: RETURN
260  XC = 4:YC = - 4: RETURN
270  XC = 4:YC = - 2: RETURN
280  XC = 4: RETURN
290  XC = 4:YC = 2: RETURN
300  XC = 4:YC = 4: RETURN
310  XC = 2:YC = 4: RETURN
320  YC = 4: RETURN
330  YC = 4:XC = - 2: RETURN
340  YC = 4:XC = - 4: RETURN
350  YC = 2:XC = - 4: RETURN
360  XC = - 4: RETURN
370  XC = - 4:YC = - 2:
     RETURN
380  XC = - 4:YC = - 4:
     RETURN
390  XC = - 2:YC = - 4:
     RETURN
400  YC = - 4: RETURN
```

—Brian Noble

(BASIC Training continues on next page)

(BASIC Training cont. from previous page)

PATH PANIC: TIMEX-SINCLAIR 1000, 1500, 2068

In this game for Timex-Sinclair computers, you must maneuver a black box through a series of gates. You move the box from side to side with the 5 and 8 keys. Each gate is numbered, and there is no limit to how far you can go. But don't hit the walls as they scroll up the screen toward you!

```
5    REM <<PATH PANIC>>
10   LET M=15
15   CLS
20   LET X=32
30   LET C=1
40   LET B$="▮▬▬▬▬▬▬▬▬
     ▬▬▬▬▬▬▬▬▬▬▬▬
     ▬▬▬▬▬▬▬▬▬▬▬▬▮"
50   LET I=1
60   LET R1=INT (RND*24+4)
70   LET R2=INT (RND*4)
80   PRINT AT 20,0;B$( TO R1);
     TAB R1+R2+1;B$(R1+R2
     +1 TO );C
90   FOR N=1 TO 10
100  SCROLL
110  PRINT TAB 31
120  FOR J=0 TO I*ABS (M-R1)/3
130  LET X=X+(2 AND INKEY$=
     "8")-(2 AND INKEY$="5")
140  PLOT X,22
150  NEXT J
160  NEXT N
170  LET C=C+1
180  LET M=R1
190  LET I=.9*I
200  IF X>=R1 +R1 AND
     X<=R1+R1+R2+R2 THEN
     GOTO 60
210  PRINT AT 18,3; "YOU
     CRASHED"
220  PRINT AT 19,3; "TRY AGAIN
     Y/N?"
230  INPUT A$
240  IF A$="Y" THEN GOTO 10
```

—*Michael Allen*

VIC BLACKBOARD: VIC 20

Here's a short program that uses the VIC 20's character set to draw on your tv screen. Use the I, J, K, and M keys to move the characters around, the space bar to change the character and the Q key to start over. This program was written by Charles Ardai, 14, of New York City.

```
10   PRINT CHR$(147)
20   P=7910:Q=7985
30   POKE 36879,8
40   GOSUB 600
50   X=0:GET D$
60   IF D$=" " THEN GOTO 50
70   IF D$="    " THEN GOSUB600
80   IF D$="I" THEN X=-22
90   IF D$="J" THEN X=-1
100  IF D$="K" THEN X=1
110  IF D$="M" THEN X=22
120  IF D$="Q" THEN RUN
130  P=P+X:Q=Q+X
140  GOSUB 500:GOTO 50
500  IF P<7680 OR P>8185 THEN
     P=P-X
510  IF Q<7680 OR Q>8185 THEN
     Q=Q-X
520  POKE P,F:POKE Q,F
530  RETURN
600  F=INT(RND(0)*255)
610  POKE P,F:POKE Q,F
620  RETURN
```

—*Charles Ardai*

CORRECTIONS

In our September issue line 240 of the Commodore and VIC 20 version of "Food Line" should read:

```
240  IF A$<>CHR$(32) THEN 300
```

In the IBM adaptation of "Micro Mind Reader," line 300 should read:

```
300  LOCATE 1,6*G+3
```

BASIC RECOMMENDS

There seem to be two kinds of computer books—the ones that give you game programs, and the ones that are boring. But here's a book that doesn't have game programs, is a lot of fun, and yes it's even *educational!*

It's called *Science Computer Programs for Kids and Other People,* but don't let the boring name put you off. You don't have to be a nine-year-old Ph.D. candidate in astrophysics to enjoy this book. The programs are short, easy to understand, and fun to use.

In the section titled "Astronomy and Space," you'll find a program that simulates the docking of two space capsules. The section called "Instrumentation" has a program that turns your computer into a strobe light. And under "Biology," there's a game that tests your skill as an algae farmer of the future.

There are 14 chapters, each on a different subject—including Architecture, Chemistry and Psychology. Each of the 50 programs is based on a scientific principle that is clearly and briefly explained. Most are fun to use, even if you're not interested in science. And who knows? You just might decide to go for that Ph.D. after all.

Science Computer Programs for Kids and Other People sells for $9.95, and is put out by Reston Publishing. Versions are currently available for Apple II, Commodore 64 and VIC-20.

BASIC PLUS

Debugging: Part Two

BY MARK SUTTON-SMITH

Last month we gave you tips on how to type in programs you see in books or magazines like ENTER. But no matter how careful you are, you're still going to come face to face with a program that just won't work. So this month we'll give you more tips on debugging.

Try to think of the "bug" as a mystery. You are the detective. Be observant! Are your aliens going to the left when they're supposed to go to the right? Is the program just stopping after the first line? Why would it mess up in that particular way?

Unless you're in a swamp, there are only two types of bugs you will run into. When you're in trouble, you've either hit a syntax error or an error in logic.

SYNTAX ERRORS. These are mistakes in the grammar your computer follows. They are easy to spot. Almost every computer will tell you when you've committed a syntax error, and which line it occurs on.

In fact, error messages are one of your biggest clues to what is going wrong. Get to know them. There's usually a list of them in your computer's manual that will explain what all the codes and numbers mean.

ERRORS IN LOGIC. This second kind of bug is trickier. It is the error that makes your program do something other than what it is supposed to.

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The key to debugging logic errors is to be active. If your aliens are going the wrong way, don't just sit there. Do something! A simple test will eliminate some possibility you might other wise waste ten minutes thinking about.

(One note: Before you start testing and changing your program, make a copy on disk or cassette, if you can.)

What you want to do is watch the program, step by step. But it usually moves too quickly for you to do this. So insert END or STOP statements at strategic points. If your program never stops, you'll know that that line was never executed. Then you can move the STOP statement until you find out just how far your program is getting.

Most BASICs leave the variables intact when the program ends. This makes it possible for you to print out each variable in turn and see what was in it when the program crashed. Maybe the variable called "**$MYNAME**" turns out to contain the word "**glybggkc.**" There may be a clue there. You can also insert **PRINT** statements to print out the variables as the program runs. If they appear too quickly, put in a time delay **FOR/NEXT** loop.

You can also insert changes to isolate the problem and eliminate possible culprits. If you're not sure whether section A or section B is at fault, put in a **GOTO** statement to jump around one of the sections and see if the problem persists.

When in doubt, test one statement at a time. If you get an error on a line that has more than one statement on it, simply put the statements on separate lines. Then run it again and see where it crashes.

That completes our short introduction to debugging. It's not fun, but do it right and you'll spend more time playing with your computer and less time fighting it. ◘

MARK SUTTON-SMITH is an ENTER Contributing Editor.

PENCIL CRUNCHERS

BOOK HUNT

BY REBECCA HERMAN

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

Hidden in the box at left are the names of 14 sci-fi stories and their 14 authors. Once you've found them, go back and, beginning at the left, read the uncircled letters from top to bottom. You'll find two riddles.

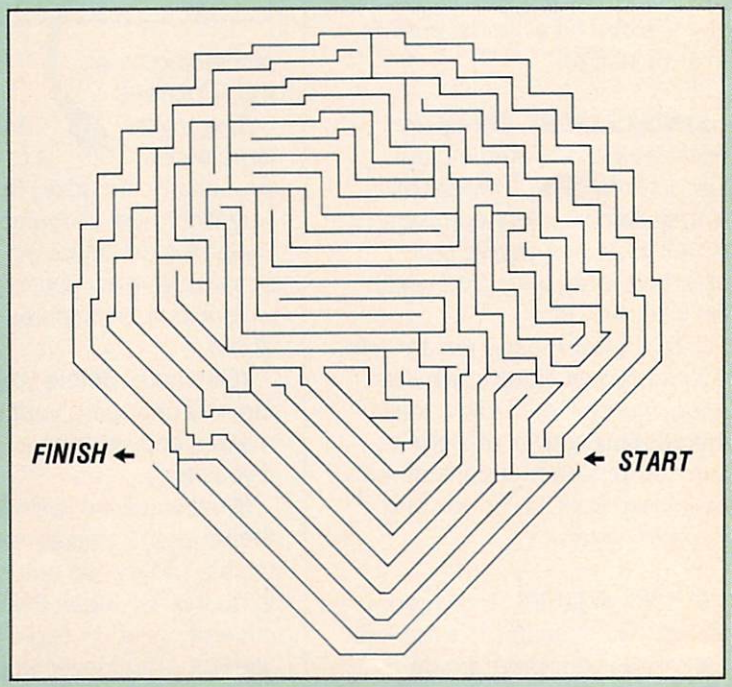
THE THINKING MACHINE by ISAAC ASIMOV
THE DIGITAL VILLAIN by ROBERT M. BAER
ESCAPE by BEN BOVA
THE ANSWER by FREDERIC BROWN
RUNAWAY ROBOT by LESTER DEL REY
ROBOTS HAVE NO TAILS by PAUL W. FAIRMAN
HARDCASTLE by RON GOULART
DUNE by FRANK HERBERT
THE ELECTRONIC OLYMPICS by HAL HIGDON
THE LATHE OF HEAVEN by URSULA K. LE GUIN
THIS PERFECT DAY by IRA LEVIN
UNIVAC TO UNIVAC by LOUIS B. SALOMON
EPICAC by KURT VONNEGUT
THE TIME MACHINE by H. G. WELLS

COMPU-MAZE

BY BELA SELENDY

How quickly can you find your way through this maze? ENTER's Youth Advisor, Bela Selendy, created it on his school's Apple II. Bela works very hard to fill his mazes with lots of bends and dead ends. Can you find the one path that leads all the way from start to finish?

(All Answers on page 64)



FEEDBACK

(Continued from page 6)

MOVE 'INSIDE' INSIDE

I really love your section called "Inside Story," but I think it should be put somewhere else in the magazine. It is not in the table of contents, and I usually miss it when I open the magazine.

I think your magazine is simply spectacular. I loved your song called "BAS-IC." —Michael Bell
Palm Bay, FL

Dear Michael:

You're right. We probably should list "Inside Story" in our menu. As for moving it farther into the magazine, well, it just seems to make sense to put a piece about what's in ENTER somewhere near the front of the book. But maybe we'll try it your way one day.

Oh, yes, one more thing. Technical Editor Richie Chevat thanks you for the compliment about his hit song adaptation. He's very proud of it! —Ed.

CONSUMER-FRIENDLY

I'm 11 years old, and own a Commodore 64. We got our computer last winter and have had to send it back to the factory once. I was surprised that they sent us a brand new one with no extra charge!

I'm very satisfied with our computer. But I wish the software didn't cost so much. I liked the article in "Connections" about how to order software for Commodore (May '84), and I'm writing to Public Domain, Inc.
—Elizabeth Coley
Montgomery, AL

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BY ELIZABETH HETTICH

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PENCIL CRUNCHERS

POSTAL PETE

BY RICHARD CHEVAT

Postal Pete was excited about his new job as a mail sorter at the Smudgeville Computerized Postal Center. But when he showed up for work, Pete found out that the only thing in Smudgeville that's computerized is his boss. Now Pete's problem is following the instructions given him by his computer-manager.

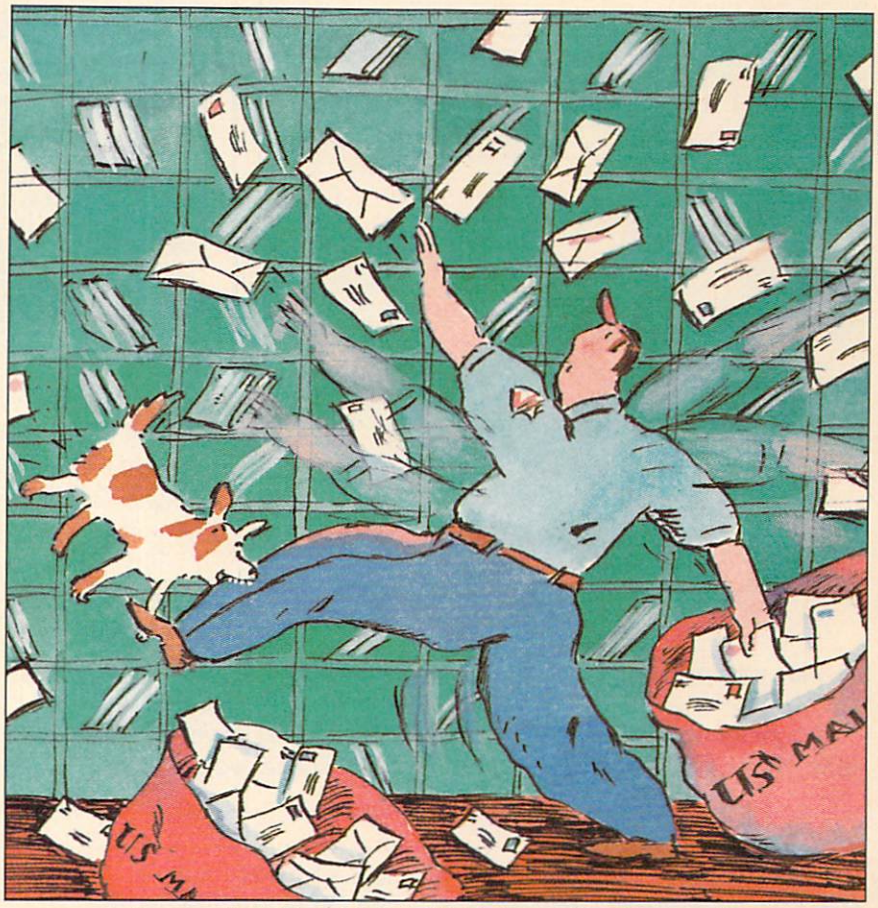
Pete has to sort 100 letters into six boxes, and he has to sort them *exactly* the way the computer wants them sorted. The rules he has to follow are printed below.

If he starts on a Monday, can you figure out how many days it will take Postal Pete to sort 100 letters? You can work it out with a pencil and paper or a computer.

Pete managed to get a copy of part of the program his boss runs on. It's the beginning of a sorting program and it's printed below. Can you finish the program and use it to solve the problem?

```
10  DIM B(6):REM BOXES
20  LET D=0:REM DAY
30  PRINT "ENTER # OF
    LETTERS TO BE
    SORTED";
40  INPUT L
50  LET D=D+1:
    REM NEW DAY
55  REM INSTRUCTION 1
60  LET L=L-20
70  LET B(5)=B(5)+20
75  REM INSTRUCTION 2
80  LET B(5)=B(5)-8
```

Answers on page 64



Can you help Postal Pete with his Parcel Post Program?

POSTAL PETE'S PROCEDURES

1. Put 20 letters in Box 5.

2. Take 8 letters from Box 5 and put them in Box 2.

3. Put 2 letters in Box 6.

4. Put the number of letters in Box 6 in Box 3.

5. If it is Tuesday, put 4 letters in Box 4.

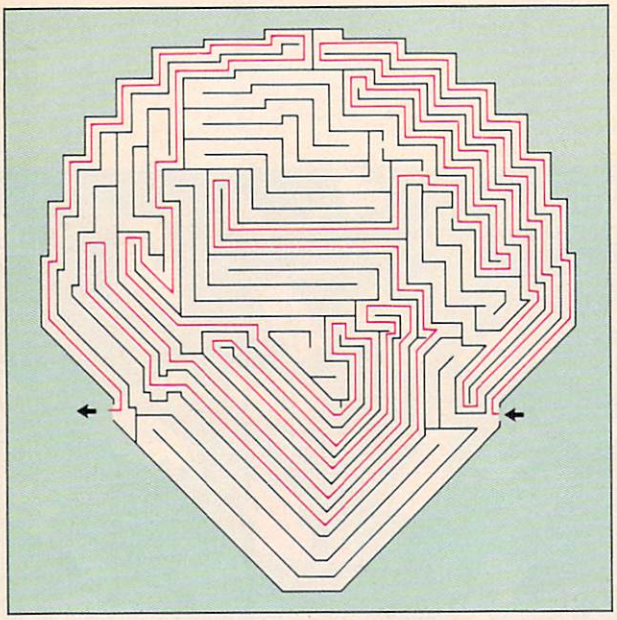
6. If it is Wednesday, skip instruction 7.

7. Put 8 letters in Box 1.

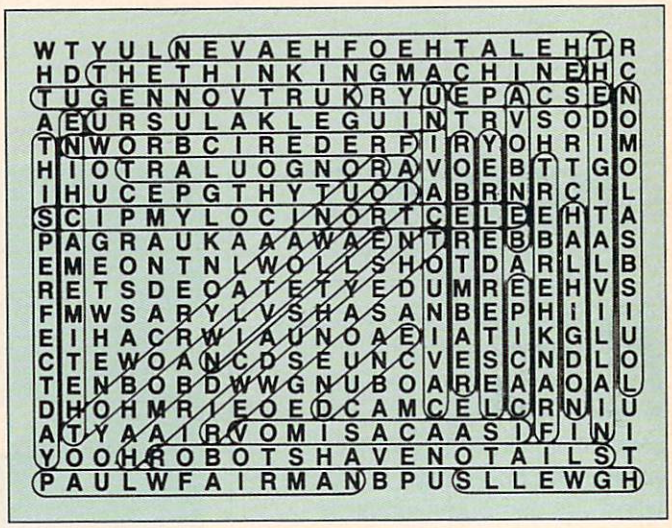
8. If you have any letters left, take all the letters out of Box 5, go home and start over tomorrow.

ANSWERS

COMPU-MAZE *(Page 60)*



BOOK HUNT *(Page 60)*



WHAT DO YOU GET WHEN YOU CROSS A WHALE AND A COMPUTER? A BIG KNOW-IT-ALL.
WHAT DO YOU GET WHEN YOU CROSS A BABY AND A COMPUTER? A SHORT CIRCUIT.

POSTAL PETE *(Page 63)*

Pete will finish on Thursday.

This program will run on Apple, IBM, TRS-80, C-64 and VIC-20 computers. For TIMEX-SINCLAIR and T.I. without Extended BASIC, you'll have to do a little work. These two guidelines should help. 1) All multiple statements must be broken up. 2) IF THEN statements can only branch (or GOTO) a line number.

POSTAL PETE'S PROGRAM:

Don't forget to type in lines 10 through 80.

```
 90  LET B(2)=B(2)+8
 95  REM INSTRUCTION 3
100  LET L=L-2
110  LET B(6)=B(6)+2
115  REM INSTRUCTION 4
120  LET X=B(6):LET L=L-X
130  LET B(3)=B(3)+X
135  REM INSTRUCTION 5
140  IF D=2 THEN L=L-4:B(4)
     =B(4)+4
145  REM INSTRUCTION 6
150  IF D=3 THEN 165
155  REM INSTRUCTION 7
160  LET L=L-8:LET B(1)=B(1)+8
165  REM PRINT STATUS
170  PRINT "DAY";D;" LETTERS
     LEFT- ";L
180  FOR F=1 TO 1000:NEXT
185  REM INSTRUCTION 8
190  IF L>0 L=L+B(5):B(5)=0:
     GOTO 50
200  PRINT "SORTING COM-
     PLETED"
210  FOR I=1 TO 6
220  PRINT "BOX ";I;" CONTAINS
     ";B(I)
230  NEXT
240  END
```

COMING IN OUR NEXT ISSUE:

VISIT TO OTHER WORLDS: Two of the greatest science fiction fantasies of all time, *2010* and *Dune*, are coming to the big screen—and computers are there.

HOLIDAY BUYER'S GUIDE: An ENTER look at gifts you should buy for your computer.

CONTEST ROUND-UP: Find out who won the first two ENTER contests.

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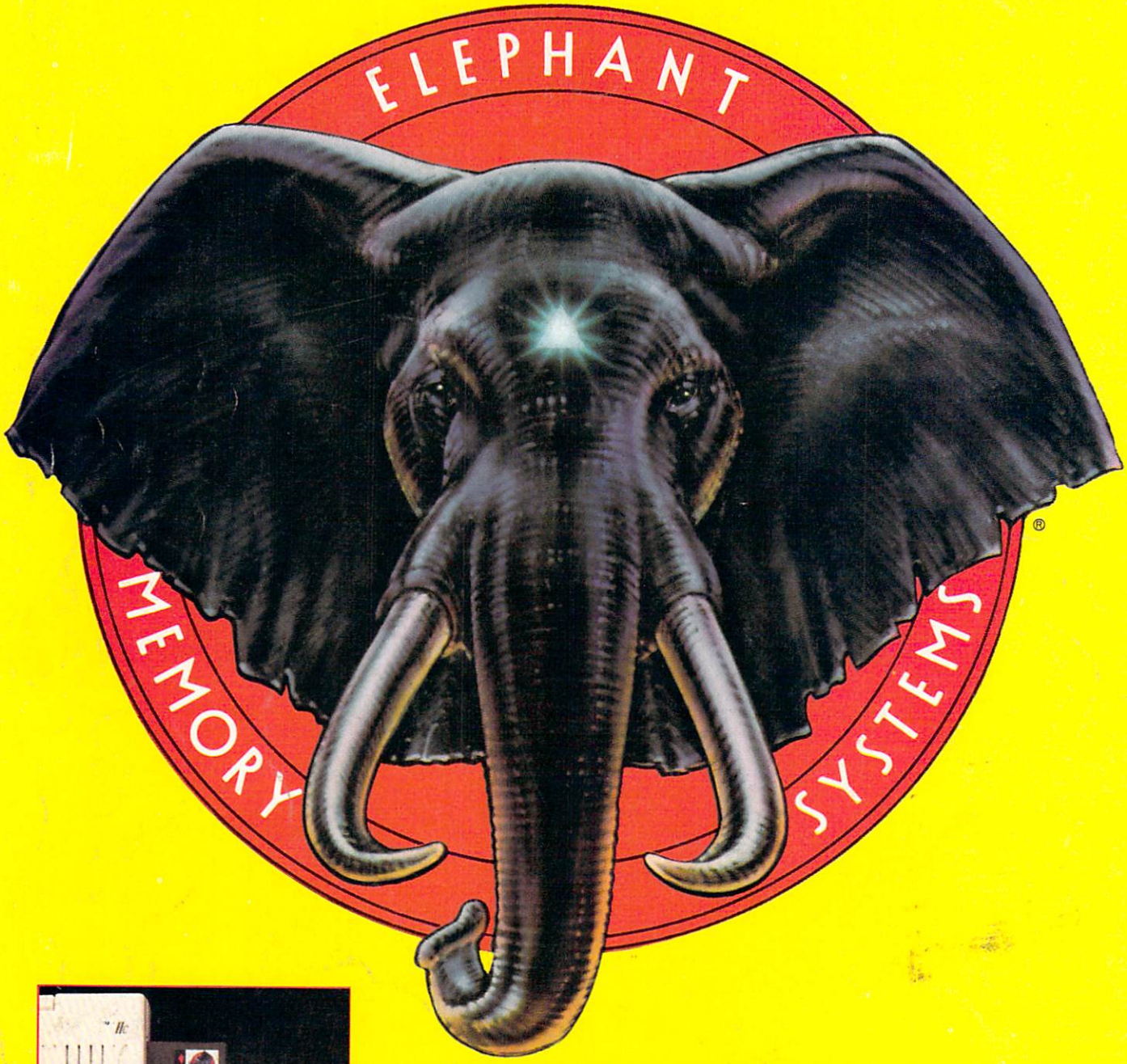

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