December 1983 PREMIERE ISSUE Volume 1, Number 1
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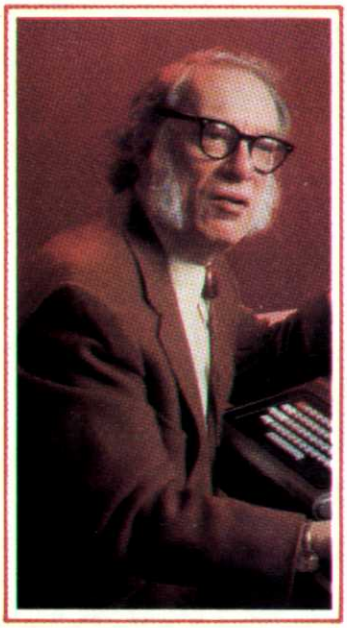

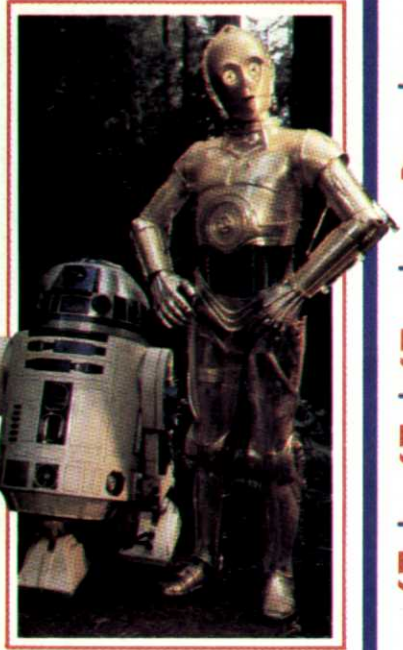

Feature Articles

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Departments

FIRST, THE GOOD NEWS.

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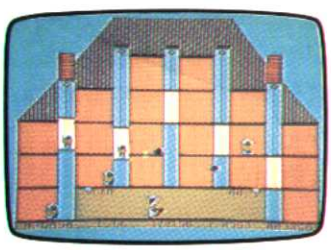

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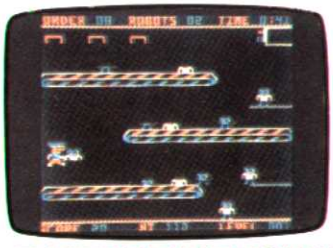

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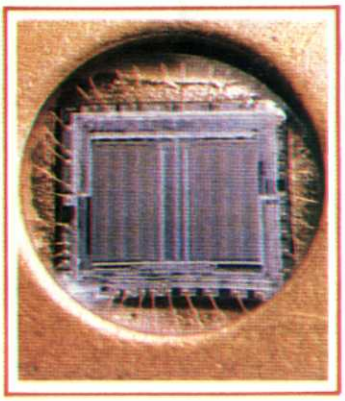

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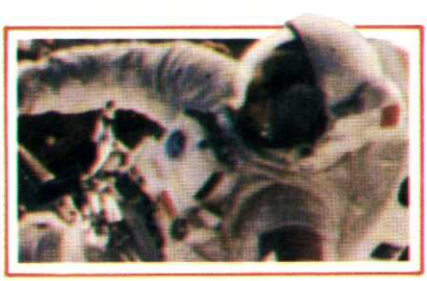

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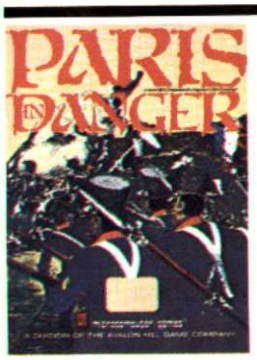
Wargames

Not the movie . . . . the real things!

The Avalon Hill Game Company, America's premiere strategy game maker, has combined their years of experience designing military strategy board games with the latest in artificial intelligence for home computers. The resulting computer games are designed to assist you, the player, with combat results, lines of fire and double hidden movement in two player games and provide a worthy opponent in solitaire games.

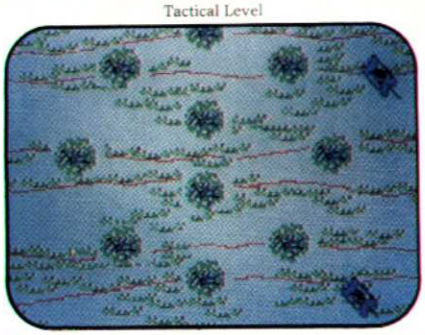


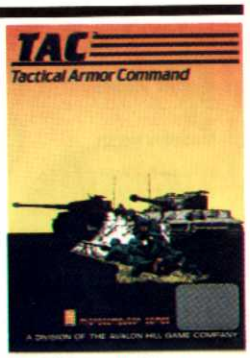
Strategic Level

Paris in Danger: A simulation of Napoleon's 1914 campaign in France. One of Napoleon's finest, against the invading Allied Armies. (Austrian, Prussian and Russian). You can choose to take the role as Napoleon, Commander Schwarzenberg, or play both sides to re-create the actual campaign. PARIS IN DANGER is unique, in that it allows the players to compete on both the strategic and tactical levels, on a full-color scrolling map of France and surrounding countries.

For all Atari Home Computers, 48K Disk: $35.00

Tactical Level





T.A.C.: Tactical Armor Command during World War II. You control individual tanks, anti-tank guns, and infantry squads. For one or two players featuring outstanding Hi-Resolution graphics, enhanced sound, and stimulating challenge. Five different scenarios are available from Meeting Engagement, Rear Guard, and Static Defense, to Breakout and Stalemate. The players control up to eight vehicles, guns and squads simultaneously, utilizing the equipment of either the German, British, Russian or American forces.

Atari & Apple Disks (48K): $40.00

LEGIONNAIRE (by Chris Crawford):

Consumer Electronics Showcase Award for Innovative Programming
Wargame of the Year, VIDEO GAMES PLAYER Magazine
Nominee for Wargame of the Year, Game Manufacturers' Association

"On a scale of 1 to 100, this is a 95" SOFTLINE Magazine, March '83.
"Legionnaire is a wonderful game that combines the graphics and movement of arcade games with the depth of strategy games" BYTE, March '83.
"An entertaining, attractive game in which thinking is more important than fast reflexes" COMPUTE!, July, '83.

For all Atari Home Computers, 16K Cassette: $35.00
32K Diskette for Atari Home Computers: $40.00
Apple II Computer Diskette (48K): $40.00

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Atari 4/800 (40K), TRS-80 (48K) cassettes: $30.00

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EDITOR'S NOTE

Congratulations! By picking up a copy of this magazine, you've automatically become a member of the new computer generation, a group made up of the best, the brightest and probably the most insatiably curious teenagers in the country.

You should be proud of yourself and, we hope, delighted with your magazine. We're glad to have you as a reader and, frankly, delighted with ourselves for creating a magazine that can capture your interest. Because we didn't come up with MICROKIDS for ourselves. It's really for you.

What is MICROKIDS? It's a magazine that celebrates the joy and the sheer fun of computing. It's a fact-filled, good-time magazine designed to inform, to enlighten and to entertain you. And in so doing, we hope to open up the whole wide world of computing to you, your family and your friends.

In this our premiere issue, we've got articles on everything from artificial intelligence to the newest Z80-based computers, Coleco's Adam and the Spectravideo SV-318. We've got stories about computers in space, computers in the movies, computers in virtually every phase of human endeavor.

We've also managed to enlist as contributors some of the finest computer writers in the land, including famed author Isaac Asimov. But the contributors we value most are teenagers like Michael Hyman, Tim Knight and David Lewis, kids who are not just writing about the computer revolution but are actually living it.

Of course, man does not live by programming alone—he needs games to help him relax and rekindle his spirit. And we've rounded up some great ones for you, both to review and to try your hand at.

Our goal is simply this: to set things up so that you'll run into something to do, to study, to solve—or something amazingly engaging—just about every time you turn another page.

Please write and let us know how we're doing. Too much of this? Too little of that? Something you can't live without? Let us know. Shout it out! MICROKIDS isn't just a magazine about computing. It's about you, for you and by you, too. If it's working, you'll see something of yourself in every issue. So let us know what keeps you glued to your CRT. Let's share in the magic of this new phenomenon.

Robert Cubbedge

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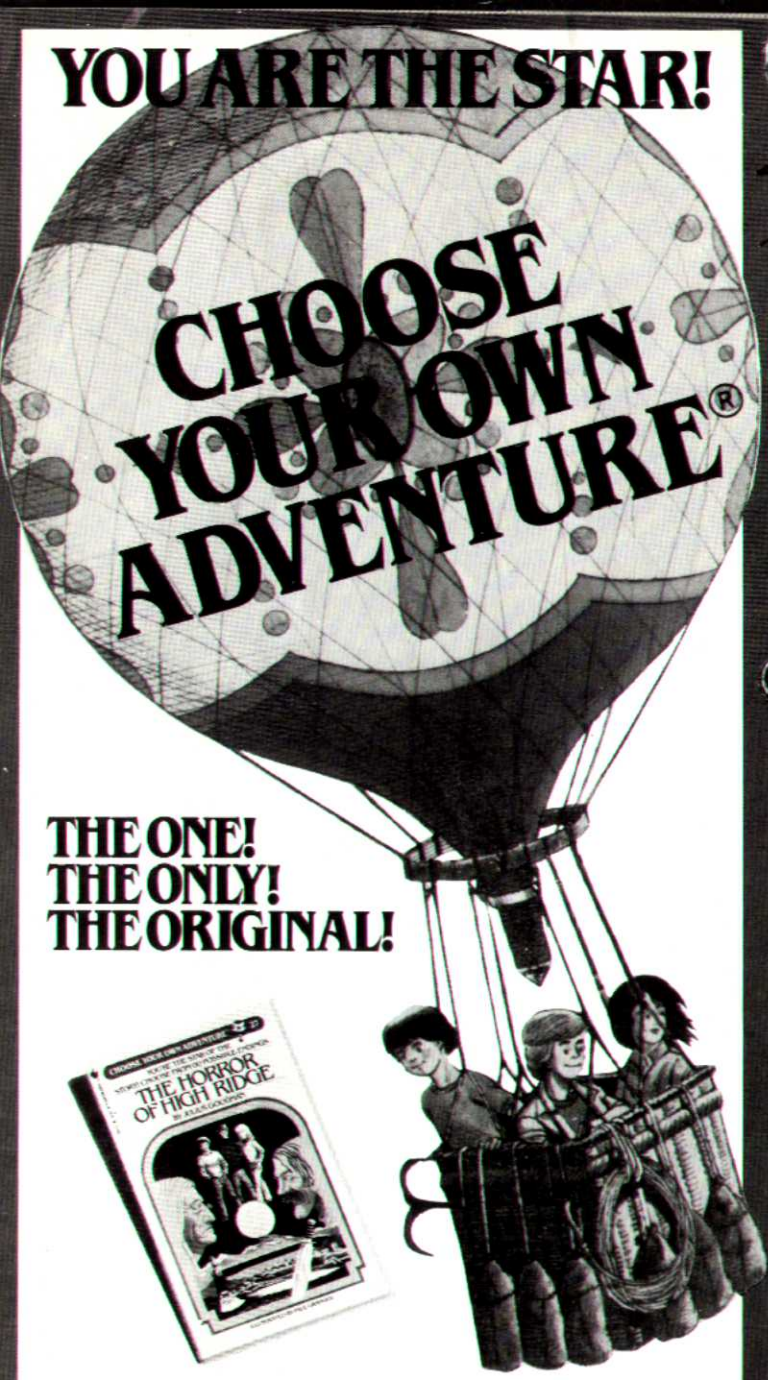
CHOOSE YOUR OWN ADVENTURE®



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The realism of Carol Shaw's River Raid is utterly amazing.

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But you strike back.

Keeping one eye on the ever-changing terrain.

Bridges. Mountains. Canyon walls. Islands.

One false move and it's curtains.

And if you're up to it, now you can skip easier sections of the river and get right to the heart of the battle.

Everything that made River Raid such a smashing hit is here. And tons more.

Kaboom!®, the award-winning game of catch with buckets and bombs.

Larry Kaplan's Mad Bomber is back. The buckets are back.

But now, in Paul Willson's adaptation, you can drop the bombs, while someone else tries to catch them.

Imagine dropping bombs. Faster and faster.

To the ever-quickening pace of the 1812 Overture.

You shift right. Left. Back again. All the way right.

He misses! You win!

Now it's your turn to catch. The pressure mounts.

The bombs start flying. You dash to catch them.

And so it goes on into the night.

And everytime you hit a new high score, it's displayed after the game, just like at the arcade.

Kaboom! and River Raid for your Atari home computer.

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Just for the fun of it.

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BITS AND BYTES

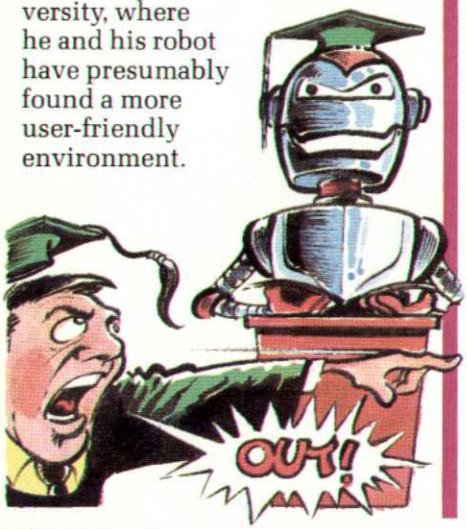
SPEAK FOR YOURSELF, HO

Afraid of getting up and speaking in front of a large group?

A 17-year-old Florida youth by the name of Ming-Hang Ho, salutatorian of his graduating class at North Miami High, solved the problem by means of a talking robot he built himself. Ho simply programmed the robot to deliver his (Ho's) commencement address.

It was not to be, though. School principal Nicholas Borota pulled the plug on Ho and his robot, saying "there's too much dignity in a commencement" to let a robot do the talking. The robot's role thus was limited to congratulating students at the end of the ceremony.

Ho's reaction? He said later he was "very frustrated." But he's enrolled now in a seven-year medical program at Brown University, where he and his robot have presumably found a more user-friendly environment.



TODAY'S SCOUTS: PREPARED

The Girl Scout motto is still "Be Prepared," but in 1983 Scouting is more than just cookies and camping.

What are the Scouts up to now? Computers, of course.

In an attempt to bring Girl Scouting up to date, officials have introduced a new Computer Fun badge. And although it is still too early to gauge the popularity of the new program, it's now one of the badges most frequently ordered from the Scouts' national headquarters.

To earn the Computer Fun badge, a girl must complete six out of twelve assigned tasks. These include inviting computer pros to speak at troop meetings, translating a binary code message, and finding five different uses for computers. The badge itself is a small orange circular patch with 00111/10011 stitched on it — binary for G.S. (Girl Scouts).

What's next for the Scouts? Who knows? Soon they may be peddling not just chocolate chips but silicon chips as well.

LIKE FATHER, LIKE SON

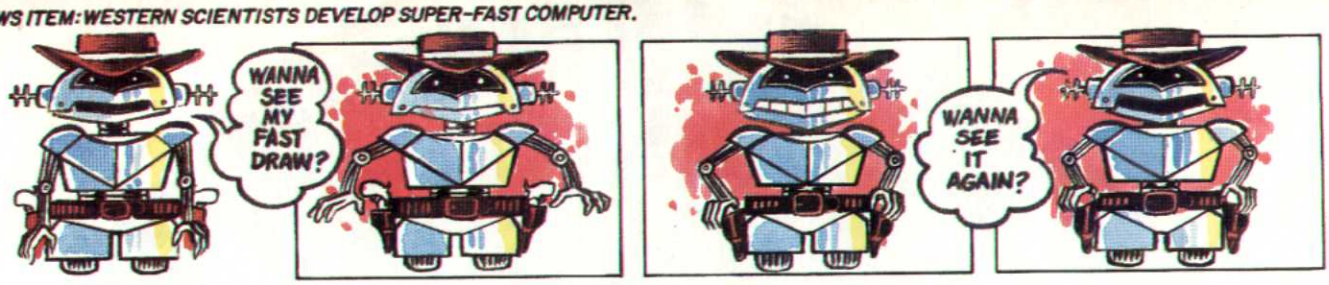
Sometimes a family dream can turn into a nightmare—or, as in the case at hand, a Cosmic Nightmare.

Professional programmer Ward Rehling of San Jose, Calif., was the man with the dream. He wanted his 13-year-old son Clay to try and help him design a new space adventure game. Clay agreed, and together they worked long and hard.

The result: Cosmic Nightmare, a new game that combines fantastic graphics and joystick control with an end-of-the-world theme. It's also one of the first games written specifically for the business-oriented IBM Personal Computer.

Moving quickly on, the Rehlings, father and son, are now hard at work on a new batch of games, including one called Jungle Madness and another called Falkland Fury, which should be on the market soon. Their dreams have clearly come true.

NEWS ITEM: WESTERN SCIENTISTS DEVELOP SUPER-FAST COMPUTER.

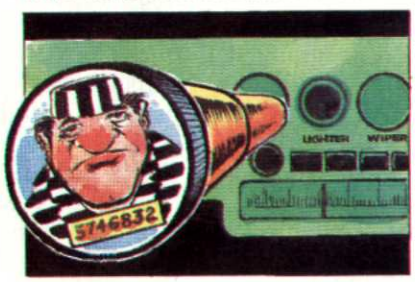


WANTED: COMPUTER DETECTIVES

The next time you walk into a post office, don't be surprised if you see a video display terminal where the mug shots and "Wanted" posters used to hang.

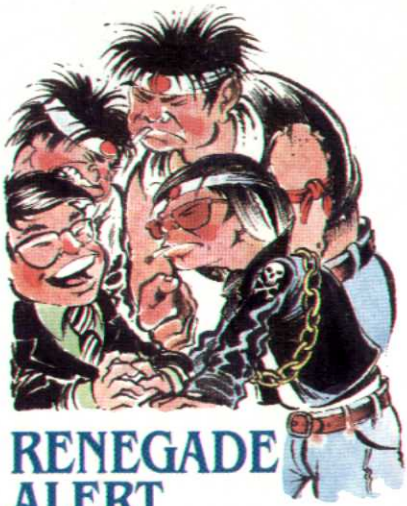
Sound farfetched? Not at all. A few police pioneers have found a number of exciting new ways to take advantage of microcomputers in the area of crime-solving.

San Diego police, for example, have used a computerized system to help solve at least 50 cases. Their program links nine different data files and automatically cross-references to match crooks with crimes. A similar program developed by Solon Inc. pairs up suspects' records with criminal records filed on



disk. This system, compatible with the Apple II microcomputer, is now used by 12 law enforcement agencies—and the list keeps growing.

Perhaps the most innovative match of cops and computers, however, is in Angola, Ind. Angola police chief Russell Long has invented a converter that allows him to plug a Timex Sinclair 1000 into the cigarette lighter of his patrol car. He uses a 1½-inch Panasonic television screen, enlarged with a magnifying glass, to display local crime statistics. "It's a little small," Chief Long reports, "but it does its job."



RENEGADE ALERT

"C Students Wanted." "Juvenile Delinquents Please Apply." Can you imagine ads like that appearing in American newspapers? Hardly!

But that's the kind of ads a Japanese businessman has been running — with excellent results. He's Masaya Nakamura, president of a company called Namco, which is one of the world's largest producers of video games. And the people he's looking for with his novel approach to advertising are potential game-inventors.

Super students and super game-creators are different breeds, it seems, at least in Japan. "For designing games," Nakamura says, "the knowledge acquired in school is not helpful. I want people who think in unusual ways, whose curiosity runs away with them — fun-loving renegades."

Better still, Nakamura's theories have proven themselves in practice. One of the first C students he pulled in with his colorful ad campaign was a 27-year-old underachiever named Toru Iwatani. The name may be unfamiliar, but the first hit game he created is now known just about everywhere. It's Pac-Man.

THE ELECTRONIC CAMPUS

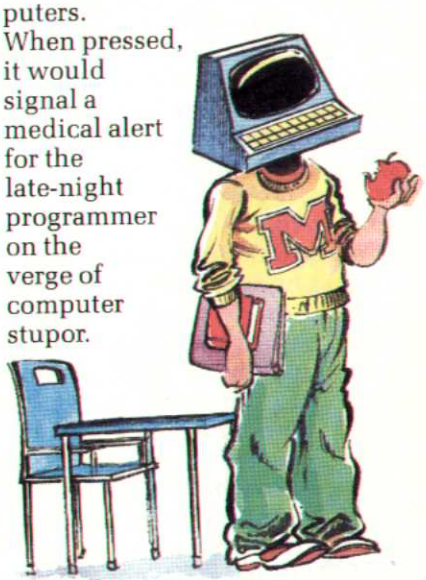
College requirements are generally a drag. One from Column A (English, French), two from Column B (math, bio). Sort of a sadist's Chinese menu. But now, more and more, there's a new requirement — a personal computer.

Clarkson College in Potsdam, N.Y., was the first to impose a computer requirement. Freshmen in the fall of '83 were issued Zenith Z-100s during orientation week. Drexel University in Philadelphia and Stevens Institute in Hoboken, N.J., soon followed suit.

Pittsburgh's Carnegie-Mellon University is further laying the groundwork for a computer network that will cover its campus with custom-designed IBM terminals.

With so much hacking going on in the dorms, Dr. Edward Sites of the University of Pittsburgh suggests the addition of a new single-stroke key command on all college computers.

When pressed, it would signal a medical alert for the late-night programmer on the verge of computer stupor.



BY MICHAEL HYMAN

Q: How can I convince my parents to buy a computer?

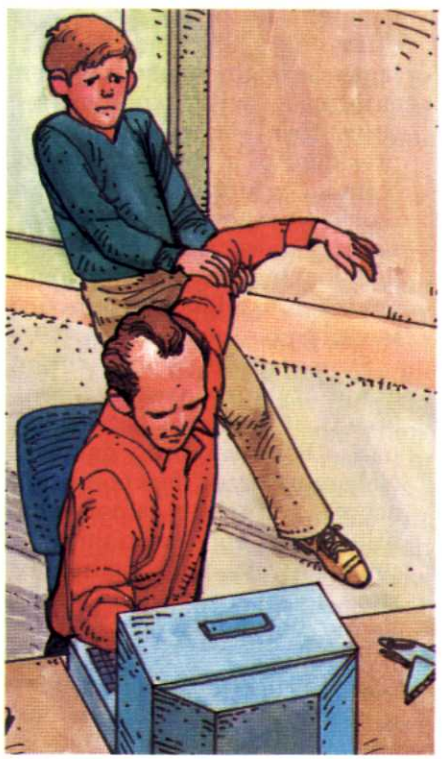
A: The answers to this question are many and varied. First, you might try to show your parents how useful a computer can be for word processing, balancing checkbooks, projecting insurance and mortgage expenses, estimating costs and following investment portfolios. Anything involving repetitive calculations or file management is handled well by a home computer.

Second, you should emphasize the computer's power as an educational tool. Tell your parents about the many tutorial programs now available in fields ranging from math to geography to typing. Point out that computer use helps develop logical thinking skills. And remind them that computer literacy and programming will be invaluable skills in the future.

Then, if possible, set up a demonstration for your parents, preferably in a relaxed atmosphere, such as a friend's house, where they won't be embarrassed about appearing stupid. Get them to "man the keyboard." Have them run some programs, especially user-friendly ones. I found my father only mildly interested in computers when I spoke to him about them, but when I actually sat him down with a word processing program, he became quite enthusiastic about buying one. Good luck!

Q: How can I keep my dad off the computer?

A: It may be too late, especially if you've followed the suggestions I've listed above. If it isn't, though, try to keep him away



from word processors, financial analysis programs and video games. And above all, don't ever let him learn how to program.

Q: Articles and ads I read frequently mention RAM and ROM. Every now and then I see PROM, EPROM, and EEPROM. What do these terms mean?

A: All of these—RAM, ROM, PROM, EPROM, EEPROM—are the names given different types of integrated circuits used for computer memory, where the computer stores information.

RAM, which stands for random-access memory, can be read and changed by the user. When you type in a program, it is stored in RAM. Data for variables are also stored in RAM, and RAM is used for input/output buffers. RAM is like a bookshelf—you can put in information, take it out and rearrange it at will. Generally, when the computer is turned off, any information stored in RAM disappears.

ROM is an acronym for read-only memory. Unlike RAM, ROM is used to store things permanently. It can be read, but not changed or moved around. Most computers have a language, or rather a program to understand a language, built into ROM. This is typically BASIC. Many peripheral boards use ROM, as do all cartridges.

PROM, EPROM, and EEPROM are all types of ROM. PROM stands for programmable read-only memory; EPROM stands for erasable programmable ROM; and EEPROM or E^2PROM stands for electrically erasable PROM. They're all achieved in different ways, but the end result is essentially the same.

Q: I have an Apple computer. Sometimes, in the middle of a program, crazy characters start appearing randomly across the screen. Quite often the computer then crashes. What should I do?

A: When this happens to me, the first thing I do is clean the computer's peripheral cards. Humidity can cause build-up along the metal contacts, resulting in a bad electrical connection between the cards and the computer.

To do this yourself, start by turning off the computer. For extra safety, pull out the plug. Remove the lid, then touch the metal case of the power supply (located along the left side; it's the only metal box in the machine) to remove static charge from your body. Pull out one card at a time, holding it by its sides.

Then, with a clean eraser (I use a pencil eraser), rub both sides of the metal contacts along the bottom of the card. After removing any eraser traces left on the board, reinsert the card, making sure it fits securely into its slot, and then repeat the procedure with each card.

Also check to make sure that all cables are connected securely and properly. When you are finished, try the computer again. If the problem persists, see your dealer. In fact, if you don't feel comfortable working with computer hardware, that's probably the first thing you ought to do, and forget all the rest.

Q: I'm thinking about getting a computer, and I have been reading many computer magazines lately. I often see great prices for computers and peripherals from mail-order houses. Should I buy from them if they're cheaper than my local dealer?

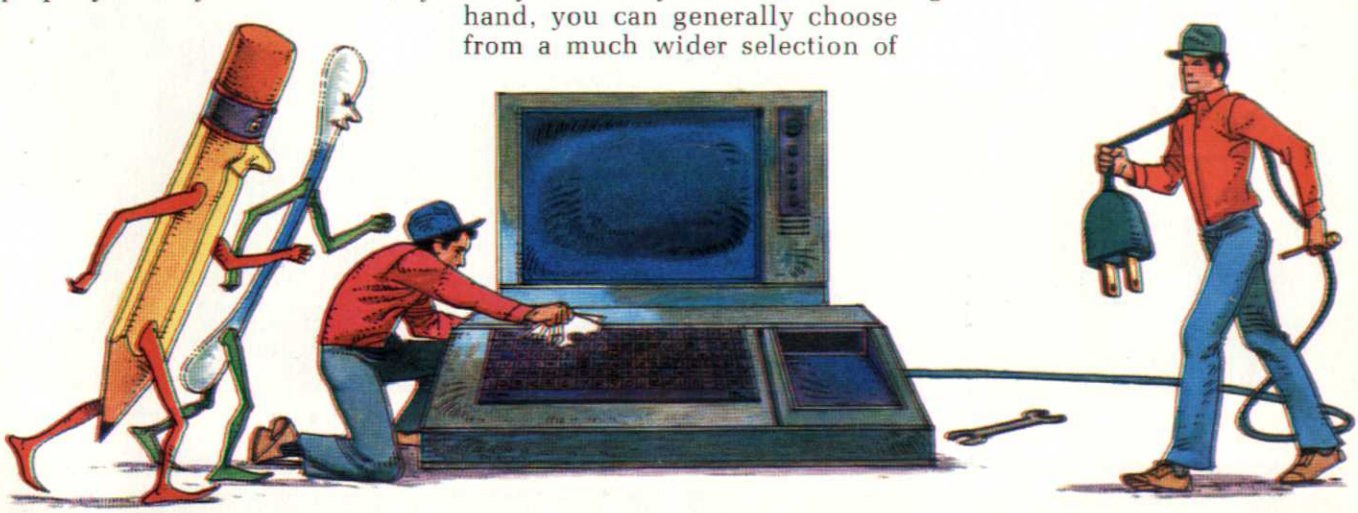
A: Local retailers and mail-order houses have both advantages and disadvantages.

If you're a first-time computer buyer, retail stores may be better. They will help you through difficulties that might otherwise curdle your computer experience, and you can see and try the equipment before you buy it. Many will do in-house servicing or replace faulty equipment rather than make you wait for repairs or replacement parts. Some will offer extended warranties and other services, such as helping with your inevitable questions and problems.

If you order by mail, on the other hand, you can generally choose from a much wider selection of computers, all of them listed at "bargain" prices. Unfortunately, it's easy to misinterpret advertisements. An ad that offers "an IBM PC including Color Graphics Card and Monochrome Monitor" can be misleading since it does not really identify the manufacturer of the graphics card or the monitor. They may be just what you want, and then again maybe not. You'll want to find that out before, not after, you make your purchase. The same holds true for shipping and handling charges, if any, and estimated delivery time. If there's any question, ask the advertiser to state in writing exactly what he's offering.

It's important, too, to look carefully into warranties. Some require you to return defective materials to their place of manufacture. This can be costly and time consuming. You also need to know exactly what the warranty covers, be it hardware, software, service, mechanics or whatever.

To sum up, if you're a beginner, you probably ought to start out with your local retailer. But if you feel you don't need all that much service, and a mail-order firm can save you money—hey, you might as well go for it. ■



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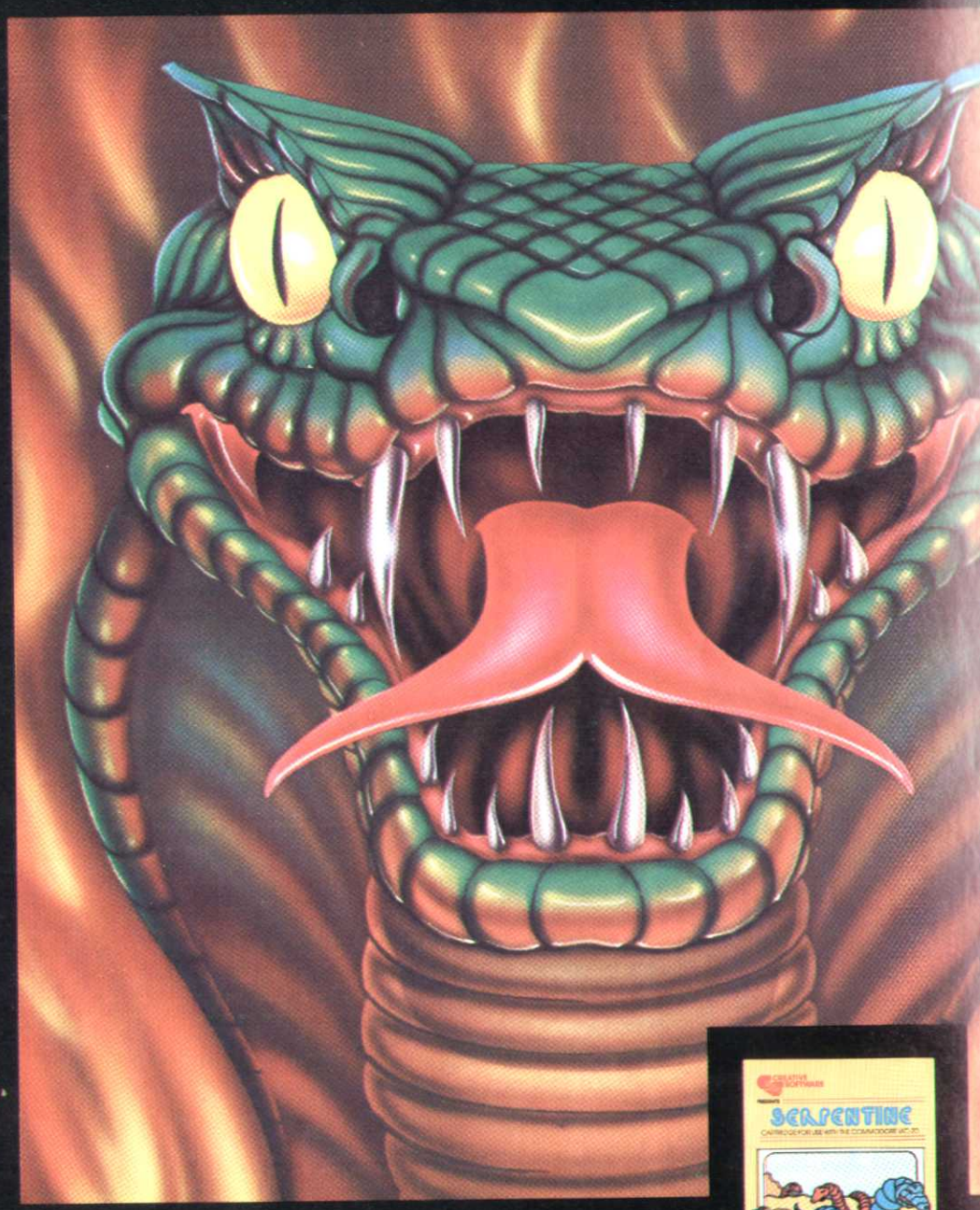

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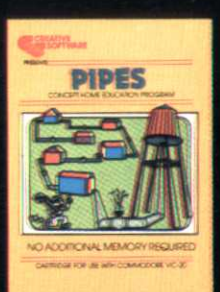

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S O F T W A R E

FROM THE APPLE BARREL

First crack out of the barrel, let's discuss some techniques that will enable you to edit your Apple programs without retyping entire lines.

To begin with, use the CATALOG command on your Apple to display the names of all the programs stored on one of your disks. If you haven't written any of your own programs yet, you can simply catalog the Apple disk that contains some sample programs.

To execute one of these programs, you would usually type RUN and the program name, and then press RETURN. This time, however, we want to use the ESC key and the cursor movement keys to achieve our goal, so type RUN at the cursor position, but do not type the program name as you usually would. Instead, press the ESC key.

You will not notice any immediate difference on the screen, but you have put the computer into a cursor-movement mode. You can now use the I, J, K and M keys to move the cursor around the screen. (If you have an Apple IIe, you can also use the arrow keys.)

Now move the cursor to one of the program names still displayed on the screen by your earlier CATALOG command. Press the I key to move the cursor up, and the K key to move it to the right until it's smack-dab on the first letter of the program name. If you move the cursor too high, you can use the M key to bring it back down; if you move the cursor too far to the right, you can use the J key to bring it back to the left.

Once you've positioned the cursor correctly, *push the space bar or any key other than the I, J, K and M keys.* That puts the computer back in typing mode. Now you can use the forward arrow key to move over the characters in the program's name, and the computer will think you are simply re-entering what's already there. When you reach the end of the name, push RETURN, and instantly, automatically, the program is loaded and ready to run.

Taking this one step further, let's say now we want to move the cursor while editing a program. Load a program and use the LIST command to put a part of it on the screen. Push the ESC key and then press the I key several times (or the up-arrow key on the IIe) to move the cursor up to a program line as if you were about to edit it.

Next move the cursor to the *first digit* of that line. Now push the space bar to release the computer from its cursor-movement mode and, using the forward arrow key, move across the line to the part you want to correct.

When you reach the place where you want to be, simply type in your change (PRINT for PRONT, for instance) and then use the arrow to move the cursor to the *end of the line.* Press RETURN and you have corrected the line without having to retype it.

Just one more thing: You have to be very careful when you use this technique to correct a single program entry that runs across several lines. If you move the cursor over the blank spaces in the margin of any one line, the computer will assume that you're typing in blank spaces and that they belong in the character string.

You can avoid that problem, though, by always using a machine language command before editing a program. Type the command POKE 33,33 and press RETURN before you begin editing. This command will cause the cursor to skip over the margins, and you won't need to worry.

—Bill Shirley

TUNING IN ON TI

The TI99/4A is an excellent computer for creating graphics. Elaborate shapes can be formed with characters of your choosing by filling in the different blocks on a grid.

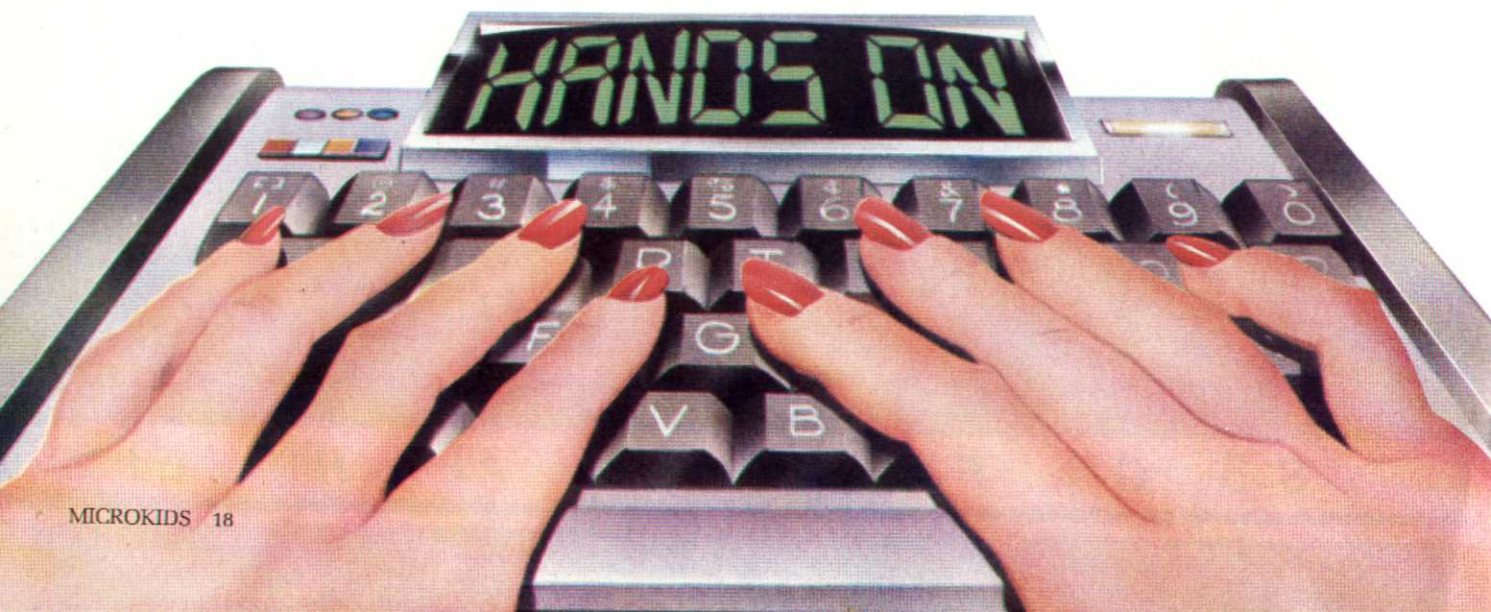
You don't actually see the grid on the screen, but if you can imagine a hypothetical checkerboard—34 blocks wide by 24 blocks high—you can also imagine how a figure or a pattern might be created by selecting characters of a certain color (or colors) to stand out against a contrasting background.

The location of these characters is selected by number. If you want to use the TI BASIC character set, you type in something like this:

```
CALL HCHAR(8,24,65,6)
CALL VCHAR(8,24,65,9)
```

This means that the letter A (ASCII code 65) will be printed at screen coordinate 8,24 and repeated 6 times in a horizontal direction (HCHAR) from left to right, and 9 times in a vertical direction (VCHAR) from top to bottom. Indeed, you can print any ASCII character this way (any letter, number or punctuation mark)—forming any shape you choose within the dimensions of the screen.

But suppose you want to generate characters that are not a part of the TI BASIC character set. This requires you to fill in whole blocks of



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color so that you can form your own characters with them.

The CALL CHAR subprogram is designed to do just that. By selecting an ASCII code letter and following it with the letter F, printed 16 times, you can fill in a solid block, and then position it on the screen by using the VCHAR and HCHAR coordinates mentioned above.

But positioning a block (or several blocks) can be tedious. What you need is a program that lets you move the blocks around with a joystick.

Remember the x,y coordinates from algebra? Right! Any position on a plane (or screen) can be specified by using them. That brings us to the following program, which allows you to select eight x,y positions to be accessed with a joystick (or other game controller). Ready?

```
NEW (REM: Do not press ENTER.)
100 CALL CLEAR
110 CALL CHAR(42,"FFFFFFFFFF
    FFFFFF") (REM: Use
    capital F.)
120 INPUT "SCREEN COLOR?":S
130 INPUT "BLOCK COLOR?":F
140 CALL CLEAR
150 CALL SCREEN(S)
160 CALL COLOR(2,F,1)
170 CALL JOYST(2,X,Y)
180 A=X*2.2+16.6
190 B=Y*1.6+12.2
200 CALL HCHAR(B,A,42)
210 GOTO 170
RUN
```

At this point, the screen will clear, and the computer will ask:

SCREEN COLOR?

Now type in any number from 1 to 16, and see what you get.

The computer then asks:

BLOCK COLOR?

Pick another number from 1 to 16. Now move your joystick around and watch how the colored block follows your every move.

—**David Weber**

TIPS FOR TRS-80S

This may come as a surprise, but your computer can speak Greek and Japanese. The TRS-80 Models III and 4 have special character banks that are filled with these alphabets and with many other special characters. They can be used in your own programs.

The first bank is hidden under the characters numbered from 192 to 255. Normally, these characters are used for "space-compression." CHR$(193) generates one space; CHR$(194) generates two spaces; CHR$(195) generates three spaces, and so on up until CHR$(255), which generates 63 spaces. Oddly enough, these codes are generally used to *save* space—one code can be substituted for a whole line of blank characters.

But when you type PRINT CHR$(21), 64 special characters are switched in. There are things such as card signs, math symbols, the Greek alphabet, little people, a rocket and even a pointing hand that spreads across three spaces. To see all these characters, just run this short program:

```
10 CLS
20 FOR J=192 TO 255
30 PRINT J;" "; CHR$(J);
40 NEXT
```

You can also combine these characters in unusual ways to lend a little life to your programs. Try this, for instance:

```
10 CLS
20 H$=CHR$ (244)+CHR$(255)+CHR
   (246) :REM HAND
30 C$=CHR$(196)+STRING$
   (10,234) :REM FUNNY BUG
40 PRINT"THIS IS A
   CATERPILLAR ";H$;" ";C$
50 PRINT"DO YOU LIKE IT";CHR$(252)
60 PRINT"I AM IN ";CHR$(193);" WITH
   IT.": REM I ALSO CHR$(193)
   NEW YORK.
```

As if that weren't enough, there is even an *alternate* special character set composed of the Japanese Kana characters. Once you have entered the alternate mode, type in PRINT CHR$(22) and run that first program again to display the characters. Now type PRINT CHR$(22). Keep your eyes on the characters, and then press ENTER. The Japanese characters become Greek!

CHR$(22) is a "toggle." It is either on or off. The first time you entered CHR$(22), you entered the Kana character set. The second time, you exited it. The Kana characters reverted to Greek because the Model III cannot display both sets at the same time. However, you can, if you wish, have both space-compression codes and special characters displayed simultaneously. CHR$(21) is also a toggle. If you type it again, you will be back in the space-compression character mode.

Actually, it's kind of hard to tell when you are entering or exiting this mode, so here are some POKEs that you can use instead:

- To enter the special character mode, POKE 16420,1
- To enter the alternate Kana mode, POKE 16912,32
- To exit the Kana mode, POKE 16912,40
- To exit the special character mode, POKE 16420,0]

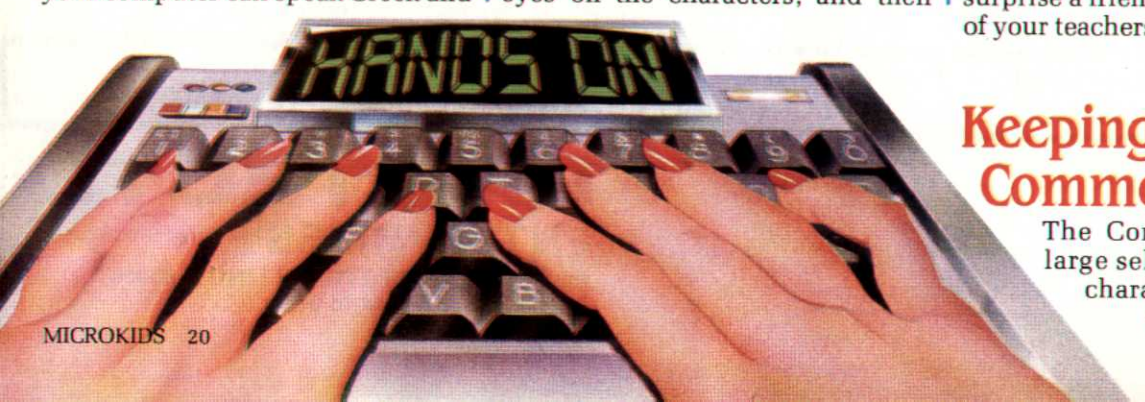
But wait! There's more. The designers of the Model III apparently weren't satisfied with just Greek and Japanese and all those other special characters, so they added *still another* alternate character set, numbered from 0 to 31. Because the normal characters in that range are control codes, the special characters cannot be PRINTed. Instead, they must be POKEd into the area of memory that appears on the screen. Try this short program:

```
10 CLS
20 FOR J= 0 TO 31
30 POKE 15360+J*16, J
40 NEXT
50 PRINT @640,;: REM PUT CURSOR
   TOWARDS BOTTOM.
```

As you can see, this displays things like the sign for odd-looking characters with strange accent marks.

These alternate characters are fun to explore. They can also be used to liven up a program—or maybe to surprise a friend or maybe even one of your teachers.

—**David Lewis**



Keeping Up With Commodore

The Commodore 64 has a large selection of graphics characters, numbers and alphabet characters

that you can display on your video monitor. What many people don't know, though, is that you can put these characters on any part of the screen very easily, and in any of the sixteen colors available on the 64.

To do it, first of all you have to understand the POKE command. This command is entered as "POKE memory location, number". Here "memory location" is the area of memory you want to put a piece of information in, and "number" is that piece of information.

The "information," in this case, is the individual graphics and alphanumeric character available to you. By POKEing part of the screen with a number, you can put any character in that location. The area of the screen is specified by the memory location you give the computer, and the character put there is determined by the number with which you POKE the memory location.

The screen has 1000 memory locations. These locations start from the upper left-hand corner of the screen, location 1024, and continue left to right, top to bottom (just as you read) to the very end of screen memory at the bottom right-hand corner, location 2023.

If you POKE a location from 1024 to 2023 with a number, the character corresponding to that number will appear in that location.

To change the color of a character at a particular location, you use color memory. Color memory is arranged like screen memory, except that it ranges from 55296 (the top) to 56295 (the bottom).

Of course, color memory also has 1000 locations. So, if you want to POKE certain characters onto the screen in certain colors, all you have to do is POKE the desired location with the character's number, then POKE the desired location in color memory with the number of the color you want.

The numbers for characters and colors can be found in your *Commodore 64 User's Guide*.

—**Tim Knight**

Do you have a special tip on how to get the most out of your favorite computer? If so, and you'd care to share it with us, please send it to: Hands On, Microkids, 133 Fifth Ave., New York, NY 10003.

GI/GO

GARBAGE IN... GARBAGE OUT...

BY GENE BROWN

A CLASSIC EXAMPLE of an infuriating glitch that kept one person in misery for several months running happened a few years ago; it involved a credit card company.

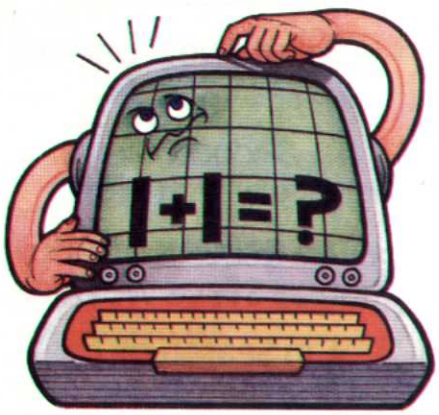
The customer had been paying his bills promptly, but you couldn't tell the company's computer that. Every month the machine sent this person a bill for $00.00. When the bills were — understandably — ignored, the computer issued overdue reminders, and, predictably, the next month would bring another bill for that nonsensical amount.

Correspondence with the company didn't help, so finally, growing tired of this silly game, the cardholder complied with the machine's request for payment and sent in a check for $00.00. The computer acknowledged his check and promptly sent him another bill, this one charging him a fee for his late payment.

CAUGHT IN THE ACT

The IBM Personal Computer, a prestigious machine that has sold well from the day it was introduced, is a product of a company whose image is one of efficiency and accuracy; we don't usually expect errors from IBM. But several months after it went on the market, the PC drew criticism from a buyer named David S. Walonick, who complained that when told to divide 10 into .1, the machine responded with .001, instead of .01. Walonick called IBM to tip them off.

"They told me inexperienced programmers often have such problems," Walonick reports. An interesting comment, to be sure, but hardly relevant since Walonick is an experienced computer consultant. IBM soon realized, though, that it had in fact goofed, and it quickly sent out replacements for the machine's interpreter (that's the



computer's built-in program for translating BASIC statements into machine code), which had clearly been at fault.

SILICON VALSPEAK

While computers have been programmed in languages that have gotten successively closer to English over the years, the machines still have trouble dealing with the subtleties of human expression. Coca-Cola discovered that some two decades ago when it programmed a computer to come up with possible names for its new diet soft drink.

The machine was given rules for word formation and instructions for combining letters so that the delectable qualities of the new product might be suggested in its name. The computer then produced 325,000 possible names, including "Burp," "Flug," and "Gaag." Management went for none of these, however. Falling back on old-fashioned marketing skill and imagination, it named the drink "Tab."

Language—the human kind—has also proven to be a stumbling block in some experiments involving artificial intelligence. One example is FRUMP, a program used at Yale University to summarize news stories, that occasionally gets hung up on the meanings of certain words. Thus, in 1978, when dealing with an account of how the assassination of the Mayor of San Francisco had "shaken" the city, FRUMP reported the occurrence of an earthquake.

TIME WARP

Brevity and clarity are the hallmarks of good writing, and some programs have been developed to clean up human prose with that in mind. But there's such a thing as going too far, as proved by Writer's Workbench, a program produced by Bell Labs to deal with the muddled memos and letters of its own executives.

Writer's Workbench is fine for changing "utilize" to "use," but Lincoln's Gettysburg Address was fed to it once and got a real working over. Writer's Workbench took the opening lines, perhaps the most eloquent ever written in the English language, and turned them into this mush: "Eighty-seven years ago, our grandfathers created a free nation here." ■

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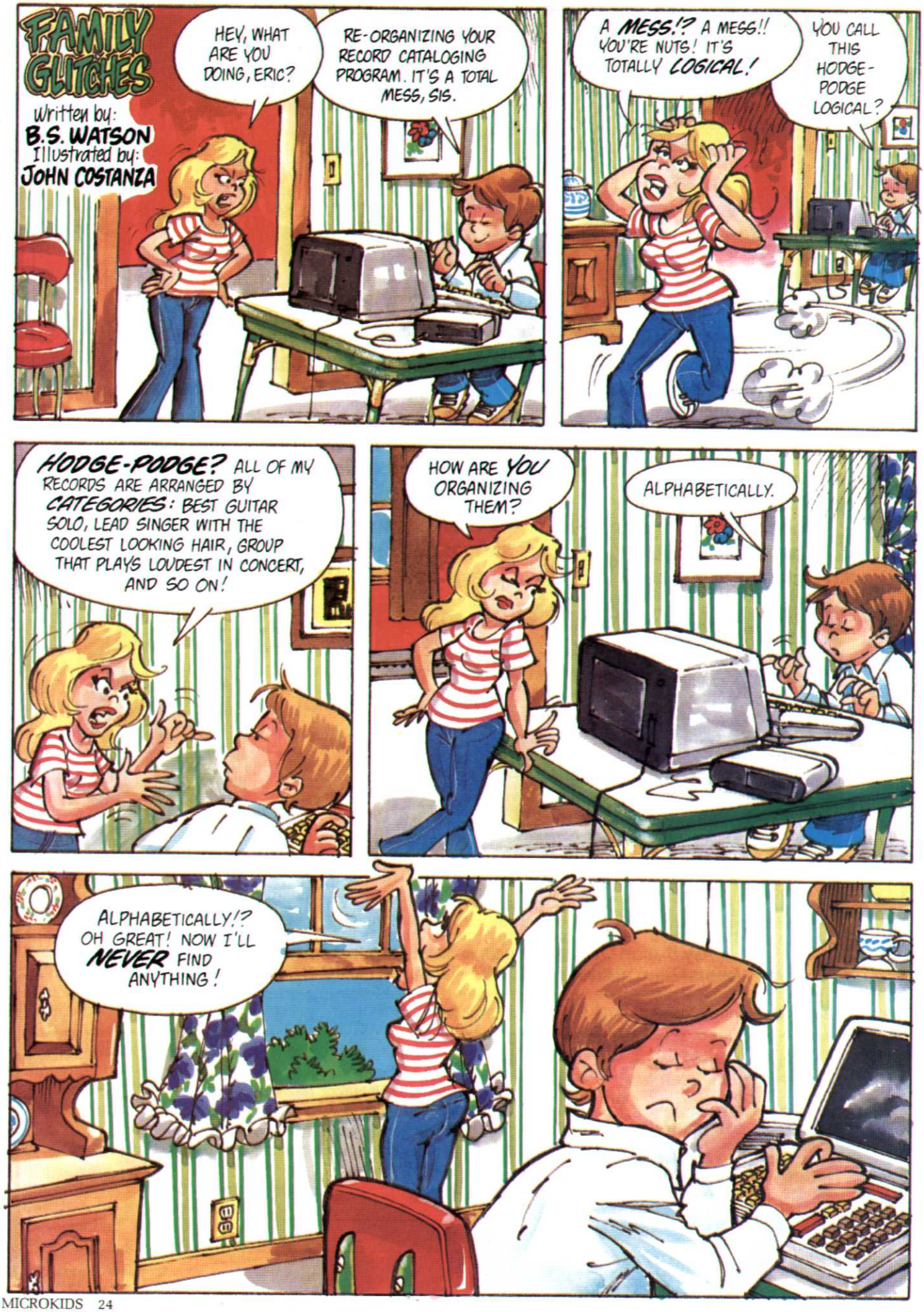
FAMILY GLITCHES
Written by:
B.S. WATSON
Illustrated by:
JOHN COSTANZA
HEY, WHAT ARE YOU DOING, ERIC?
RE-ORGANIZING YOUR RECORD CATALOGING PROGRAM. IT'S A TOTAL MESS, SIS.
A MESS!? A MESS!! YOU'RE NUTS! IT'S TOTALLY LOGICAL!
YOU CALL THIS HODGE-PODGE LOGICAL?
HODGE-PODGE? ALL OF MY RECORDS ARE ARRANGED BY CATEGORIES: BEST GUITAR SOLO, LEAD SINGER WITH THE COOLEST LOOKING HAIR, GROUP THAT PLAYS LOUDEST IN CONCERT, AND SO ON!
HOW ARE YOU ORGANIZING THEM?
ALPHABETICALLY.
ALPHABETICALLY!? OH GREAT! NOW I'LL NEVER FIND ANYTHING!

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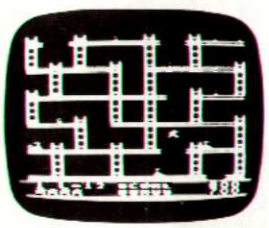

JUMPMAN
If you like Donkey Kong, you'll love Jumpman. Over 30 different screens with 8 speeds and 5 skill levels make this the fastest action game in the country. You must leap girders, climb ropes, and scale ladders to reach and diffuse bombs while avoiding robots, birds, bullets, explosives, crumbling walls, vanishing escape routes, and many other obstacles. (Truly a fantastic game!)
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Search for the wondrous sword in the depths of an ever changing dungeon. Make yourself invisible, teleport to a new location, drink a healing potion or use enchanted treasures, but watch out for traps and hideous creatures who will try to stop you. (Fantastic dungeon adventure)
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Choose one of six monsters or create your own, and use your monster to destroy one of four unsuspecting cities. The cities aren't totally defenseless, they call on police, national guard, and even a mad scientist, complete with helicopter, to save humanity from the relentless threat.
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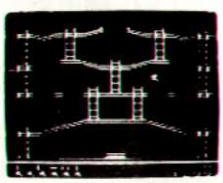

JUMPMAN JUNIOR
The devilish ALIENATORS are back! And they have overrun the Jupiter Command Substation. In this cartridge format sequel to the best-selling Jumpman, players must leap through 12 all new screens featuring electrocution traps, moving walls, hellstones, and dangers much too bizarre to be believed. How many screens can you master? Twelve different screens, 8 speeds.
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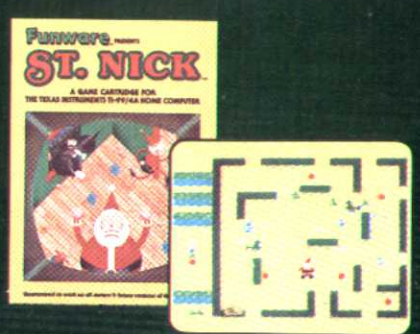
Wicked witches, banished from Halloween, have swooped down on poor old St. Nick for Christmas. And cranky, as they usually are, they've cast their evil spell on the elves, who are scattering toys everywhere with wild abandon. Christmas itself is in dire jeopardy! Help St. Nick ward off the witches and get his workshop back in order. If this sounds like jolly good fun, just try the challenge of 42 screen levels!

(CAUTION: Don't smile while playing. The elves may scatter your teeth!)



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RABBIT TRAIL.
All you want is a few carrots to nibble on... and the whole world's trying to stop you. Run through a maze of rabbit holes as you dodge weasels, hawks, traps and cars. Seven different screens provide an unending challenge that'll leave you hopping mad!

RABBIT TRAIL

AMBULANCE.
Helpless citizens are dropping like flies... somehow you've got to get them all to the hospital before they expire! Speed through city streets, dodging runaway cars, trains, and traffic in a fast-paced strategic adventure guaranteed to get your pulse racing!

AMBULANCE

PIPES.
A simple problem becomes an incredibly complex strategic challenge: Help Arlo, the Absent-Minded Plumber, create a water-supply system for the whole neighborhood. Select the right pipes from the factory, plan your delivery system, hook up the joints and pray that poor Arlo hasn't left the valves open!

PIPES

DRIVING DEMON.
Arcade-style auto racing for the TI 99/4A, in a desperate race against the clock and the competition. Weave through the cars, skid through the oil slicks, then floor it down the straightaway. Your long-range scanner warns you of obstacle cars in your path, but you'll need lightning reflexes to react in time. Mile-a-minute thrills!

DRIVING DEMON

S O F T W A R E

Micro Money Makers

BY BRUCE LEWENSTEIN

WHILE IT'S fun working with a computer—solving problems, designing graphics, devising games, writing programs—it's well to remember that very often you can also use your computer to earn money.

There's a long list of youngsters who have turned their skill at the keyboard into dollars. A few have even achieved notable success. How?

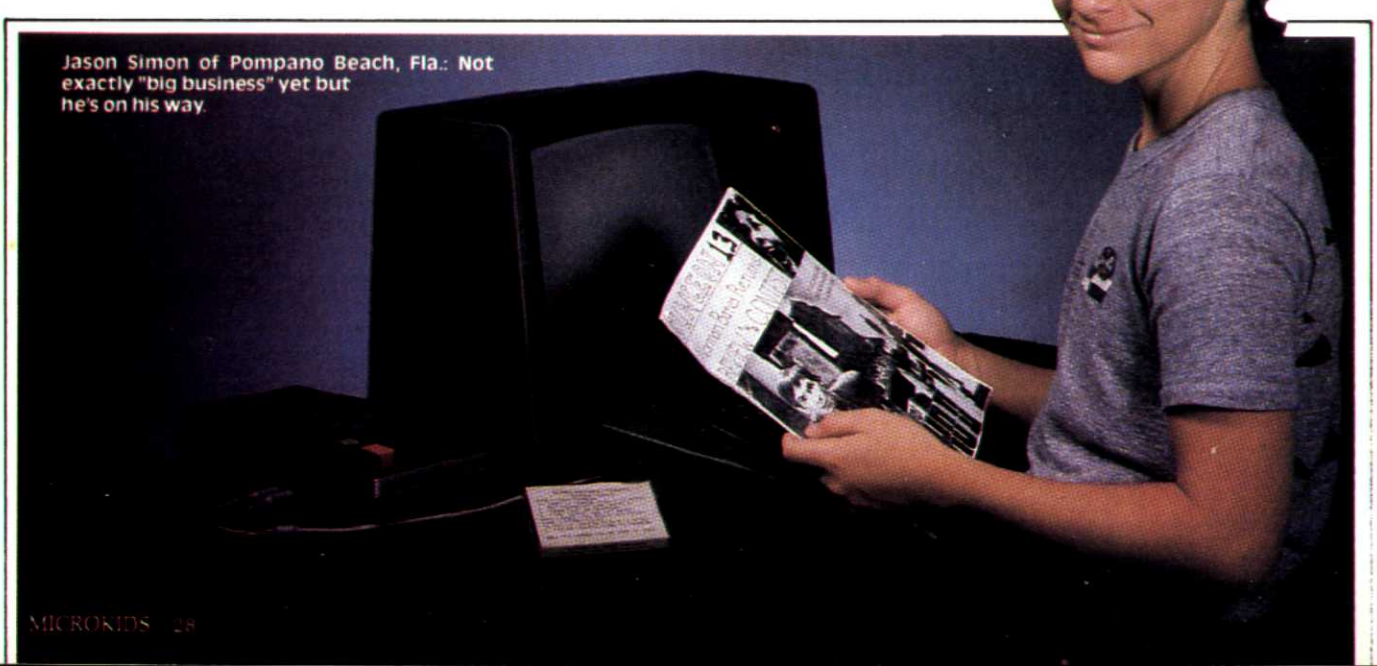
Consider, for example, Michael Hyman of Howard County, Md. At 17, Michael has won more than $50,000 in college scholarships as a direct result of his computer wizardry, mainly in the area of 3-D graphics. For a look inside his brain and a printout of his expertise, you'll want to read "Meet Michael Hyman, A Demon in 3-D," beginning on page 69 of this issue.

Rawson Stovall of Abilene, Tex., is another example. Only 11, he's already the author of a newspaper column called "The Vid Kid," which is syndicated nationwide by Universal Press. To see the kind of work he does, check out "The Vid Kid: News and Views," starting on page 52 of this issue.

Tim Knight, 17, of Moraga, Calif., is following still another route to fame and fortune. A prolific author, he's written 10 books on computer programming and created 15 software programs, all of which he markets himself through Knight Software Inc. For Tim's own story, read "Confessions of a Teenage Computer Whiz," starting on page 46 of this issue.

Others, too, have hit the big money while still in their teens—a new breed of glamour kids spawned by the boom in computers and video games. Mark Turmell of Bay City, Mich., created his first hit game, Sneakers, when he was 18. He now works full time for Sirius Software Inc. in Sacramento, Calif., the company that bought and marketed his initial brainchild.

David Buehler, 17, of St. Paul, Minn., created another game called Typo Attack and entered it in the



Jason Simon of Pompano Beach, Fla.: Not exactly "big business" yet but he's on his way.

Now from Timex...a powerful new computer.

72K COLOR SOUND UNDER $200

TIMEX SINCLAIR 2068

annual Atari Program Exchange competition, where it was named "the best home computer program of the year." The prize that went with the title: $25,000 in cash.

Jeff Gold, 16, of Saratoga, Calif., found himself still another route to the big bucks. Jeff is president of Double-Gold Software, which markets pirate-proof programs that sell for as much as $1000 apiece. His company grosses more than $2000 a week.

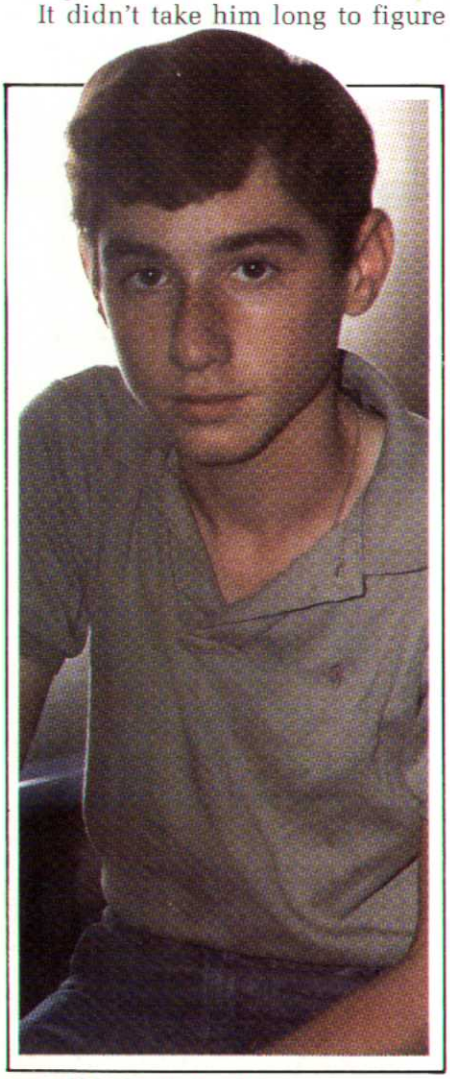
You don't have to be a certified genius, though, to make money. All you have to do is think of something the computer world doesn't have, and then provide it.

A couple of years ago, Jason Rich, 15, of Irvington, N.Y., was trying to see how much he could do on a handheld computer. Only trouble: There was hardly any software for the model he owned, or any other models for that matter. So Jason developed his own.

It didn't take him long to figure

out that since his programs filled a need, there must be a market for them. The next step was to go into business. Now he's the president of Software Riches, which offers 24 programs for seven models of handheld computers.

David Beckelman of Bethesda, Md.: Donating his talent and his services.



Jason Rich of Irvington, N.Y.

Along with commercial success, there often comes something equally important: recognition and respect. For Jason, this arrived in the form of an invitation to lecture at a Computers in Education Conference at Rutgers University last June. His subject was "The Amazing Pocket Computer—A Preview of the 21st Century Computer."

Developing and selling games and software is an obvious way to make money, but maybe you aren't ready for that yet. Actually, in a world full of computer illiterates, what you have taught yourself just fooling around with your machine might well be worth money if you know how to apply it.

Vincent Price, 17, of Hempstead, N.Y., hires himself out as a consultant. Acting on his advice, the Hempstead school system purchased 76 computers and then hired Vince to train teachers how to operate them. Some 30 additional school systems have since shared the benefits of his wisdom, and paid for it gladly.

Maybe you don't quite have Vince's computer mastery. Whatever knowledge you do have, though, you can bet that somewhere there's somebody willing to pay for it.

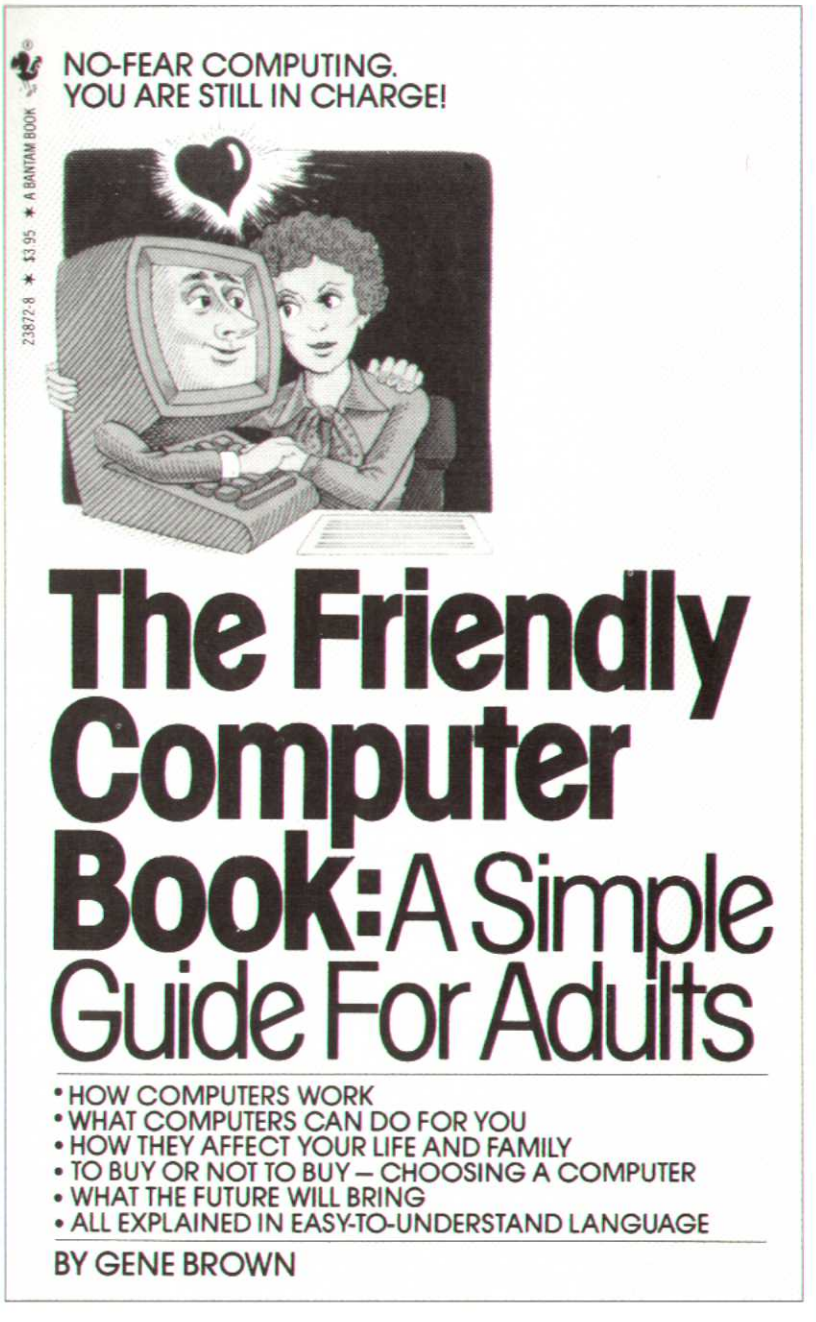
Jason Simon, 14, of Pompano Beach, Fla., generates labels with his computer and then sells them. It isn't exactly "big business," but the money it brings in enables Jason to indulge in one of his great passions — watching horror movies at local theaters.

David Beckelman, 13, of Bethesda, Md., is similarly a couple of years ahead of his friends in computer experience. So this past summer he worked as an assistant teacher in BASIC at a Montgomery County summer school for gifted children. Although he could be getting paid for his work, David prefers to donate his talent and services.

Whatever your goal, the potential is there if you'll just reach out and go for it. ■

Have you discovered a novel or unique way of capitalizing on your computer expertise? If so, we'd like to hear about it. Send a brief note or letter, please, to: Micro MoneyMakers, Microkids, 133 Fifth Avenue, New York, NY 10003.

O.K., *you're* on line.
But what about Mom and Dad?



This user-friendly book de-mystifies computers for would-be Microparents.

A terrific gift idea!

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

WORD PROCESSING

BY LOUIS SABIN

ACROSS

1 Remove the top item in a stack
4 Golfer's aim
7 Arcade subject
10 Broadcasts
12 Earth's imaginary line
14 Gold to Manuel
15 Drawing command
16 Allows a line to be read again
18 Take _ _ _ _ _
20 June 6, 1944
21 They steal computer secrets
23 Air-quality problem
25 Baseball or football
26 Memory bank's function
27 Double zeros
30 Organization of computer operators
32 Word with Super or Spider
33 Place for a boot
35 Arcade shoot-outs
37 Color
38 Mental
39 What disks do
41 Kills
43 Computer's operational commands
45 And others: Latin
49 Cey or Reagan
50 England's Princess or actress Bancroft
51 Data holder
52 Grid gains: Abbr.
53 European beetle
54 FYI only

DOWN

1 Baby food
2 Lubricant
3 NFL-AFL _ _ _ Bowl
4 April in _ _ _ _ _
5 Chopped down
6 _ _ _ _ _ _ _ the top
7 Some computer contests
8 Kind of code
9 Pink, like the dawn
11 Step
13 Matthew, Luke or John: Abbr.
17 Smell
19 Used to end a line
21 X marks it
22 Moves to a specific point on a video screen
24 _ _ _ _ _ _ Night Baseball
25 Signal for help
26 Small taste
27 Strong wind
28 Scanner has two
31 _ _ _ _ _ _ _ bolts
34 _ _ _ _ Dings
36 David's conquest of Goliath
38 Super light beam
39 Lively
40 Urge
42 K-P connectors
44 Two-thirds of random-access memory
46 Road surface
47 King Kong, for one
48 Moon vehicle

MIX AND MATCH

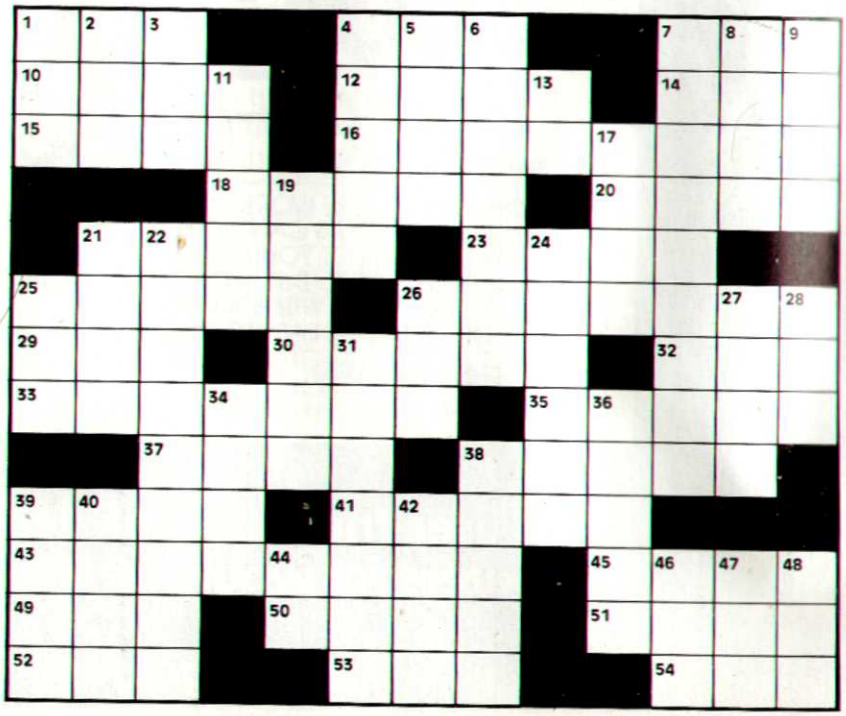
BY MICHAEL A. BANKS

Hidden in the box of words below are 10 terms commonly used in computing. These terms may be printed backward as well as forward, and may appear horizontally, vertically or diagonally. Take a look and see if you can find them. Good luck!

WORD LIST

COMPUTER, MONITOR, KEYBOARD, RAM, ROM, INPUT, PRINT, BASIC, PROGRAM, DISK

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

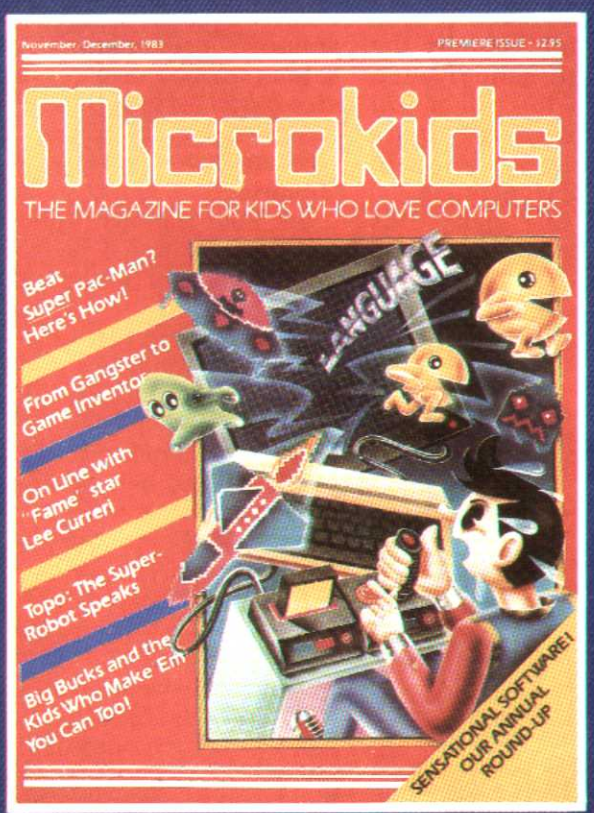


Answers on page 96

AT LAST!

Microkids

THE MAGAZINE FOR KIDS WHO LOVE COMPUTERS



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

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

BE FIRST!

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

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

BY GENE BROWN

KIDS AND TELEPHONES— parents are always complaining about that seemingly inseparable combination. They don't like the way their kids tie up the line for hours on end; they like it even less when they have to pay the phone bill. But kids and telephones and *computers* are a mixture that few parents can object to.

Why? Because with telephones and computers, you are broadening your education far beyond the boundaries of the schoolroom. Learning becomes fun when you can acquire knowledge more rapidly than anyone ever before in the whole history of civilization.

The ingredient that makes this recipe work is the consumer on-line information service — commonly called a data bank. On-line information services resemble distant electronic libraries. Your library card is your personal computer. Hook it up to your telephone by means of a device called a modem, and you're in business.

What can you find in these "libraries?"

For your parents, there's investment information — facts about the performance of individual stocks, for example — plus airline schedules, a shop-at-home service, recipes, personal health and home decorating hints, and all kinds of goodies.

For you, there is information, first of all, that can help you immensely with your homework. Two popular services — CompuServe and The Source — can supply you with copies of newspaper and magazine articles on almost any subject you can imagine.

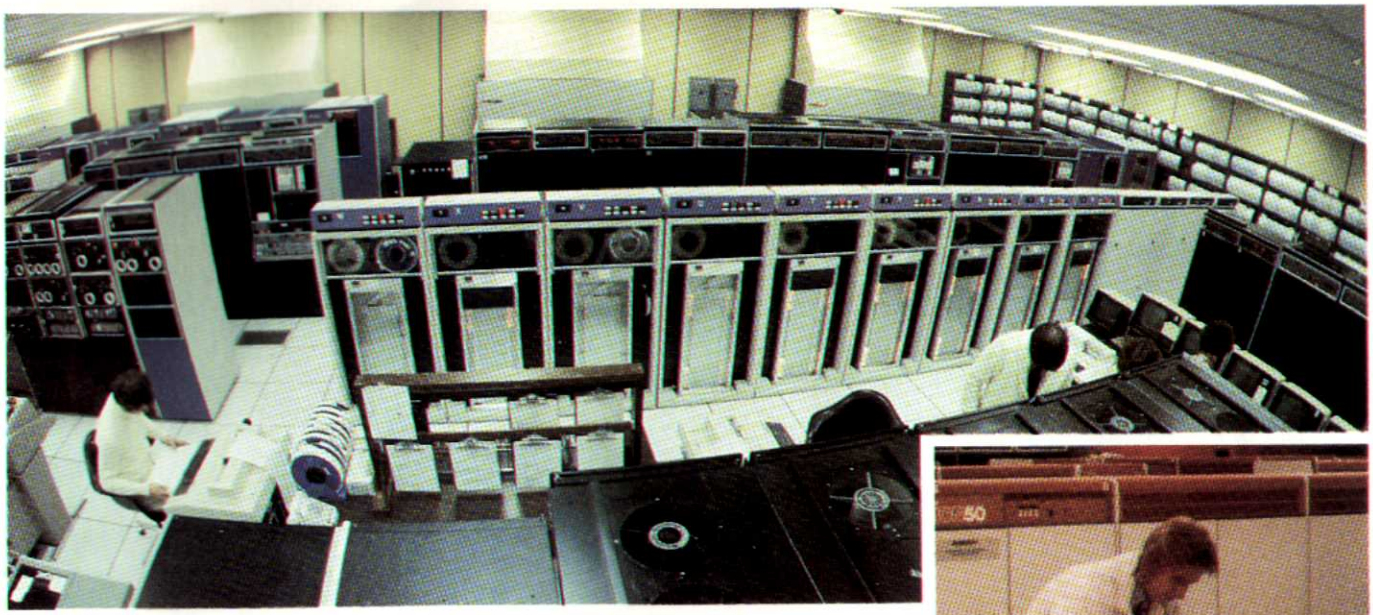
CompuServe also carries Associated Press (AP) news dispatches and The Source offers United Press International (UPI) stories. This information remains available for about a week after it first appears.

CompuServe also has the *World Book Encyclopedia* on-line, so you can easily obtain any additional background information that you may need. The computerized *World Book* contains the same information as that in the printed version, which consists of 22 volumes and about 10 million words.

The Source has approximately 25,000 subscribers, and CompuServe, about 40,000. You can call The Source for subscription infor-

At a local library, it's "easier to use a keyboard than books."

John McGrail/TIME MAGAZINE



A "goldfish-bowl" view of CompuServe's main bank of computers.

A CompuServe worker "just checking" to make sure everything's O.K.

mation toll-free at (800) 336-3366, or write: 1616 Anderson Rd., McLean, VA 22102. CompuServe can be reached at (800) 848-8890, or write: P.O. Box 20212, 5000 Arlington Centre Blvd., Columbus, OH 43220. Subscriptions to CompuServe can also be purchased at many Radio Shack stores.

A one-time fee—$50 for CompuServe, $100 for The Source — gets you a password and an identification number. You are then billed according to how much time you spend on-line and which data bank you wish to access. Time rates vary depending on exactly when you tap into their big mainframe computers. But evenings and weekends, when hourly rates are only about $6, are obviously cheapest.

To hook yourself in, you simply dial the correct number (CompuServe or The Source), wait for a high-pitched tone, enter your password, and bingo! You're on. You can then pick from a series of menus that will lead you step-by-step to wherever it is that you want to go.

If the experience of other subscribers holds true, though, the features of these services that you're likely to use most may surprise you. These include being able to play the latest computer games, or buying software simply by having it transferred to your computer over the phone. But the most popular activity by far on both CompuServe and The Source is *electronic communication.*

This is accomplished through the use of electronic bulletin boards. Using them is a lot like putting a note in a bottle and tossing it into the ocean with instructions on how the finder can find you. But even so, they've proven a big hit for both services.

Each board is a message exchange devoted to one topic—specific and narrowed-down information and advice, or broad, with plenty of space for differences of opinion. In fact, subjects on which you may wish to converse can range from Atari computers to American politics.

If you want to leave a message, simply enter it by means of your keyboard and sign it with your identification number in case somebody wants to respond. You can also look at messages left by others and reply with one of your own.

Let's say you think there might be someone on-line out there who has some information or special knowledge that you might need. Just leave a message on the appropriate bulletin board and that person can get in touch with you by following the same procedure in reverse, or by sending you a message via electronic mail. (Electronic mail is private; unlike a message on a bulletin board, only you can read it.) At that point, not only have you gotten some valuable assistance; you may also have found a new and interesting friend in a distant part of the world.

If you like, once you've made contact, you can then communicate more directly with this person through a service that corresponds somewhat to CB radio. Here you can "talk" to your new electronic "pen pal" by typing in your remarks, viewing the response, and then immediately replying with more thoughts of your own.

One nice thing about meeting other people through computer communications is that any prejudices you may have (whether you know it or not) simply fail to apply. It doesn't matter how a person looks or sounds because you only know your fellow hackers by their words on a screen.

A case in point is that of Air Force Capt. Vincent Landry, 33, who exchanged messages with a person named John for several months, and then discovered almost by accident that John was only 13 years old.

Of course, by the time Landry found out, it made no difference. A friend is a friend, at any age. ■


COMPUTER Capers
NOW YOU BOYS STAY OUT OF TROUBLE.
TRY USING THAT COMPUTER FOR HOMEWORK, INSTEAD OF PRETENDING YOU'RE SHERLOCK HOLMES, FOR A CHANGE, AND MAYBE YOU'LL GET OUT OF HIGH SCHOOL!
DON'T WORRY ABOUT US, DAD. YOU JUST HAVE A SAFE FLIGHT AND A TERRIFIC TRIP!
CENTER CITY AIRPORT. STEVE AND MATT SAMSON SAY GOODBYE TO THEIR DAD, WORLD RENOWNED CIVIL ENGINEER ARTHUR SAMSON. HE IS ON HIS WAY TO ITALY TO SUPERVISE THE CONSTRUCTION OF A NEW BRIDGE.
YEAH, AND BRING US BACK A DAVINCI OR TWO. O.K.?
IN THE PARKING LOT, IGNITION KEYS ARE TURNED...
... GEARS ENGAGED, AND TWO-WHEEL STEEDS ROAR TO LIFE-- THESE BIKES ARE ONE OF THE SAMSON BROTHERS' SEVERAL PASSIONS...
AS BLACKTOP RIPS BY BENEATH THEM, THEIR THOUGHTS TURN TO SOME OF THEIR OTHER PASSIONS --THEIR HOME COMPUTER...
... AND THEIR "CAREER" AS AMATEUR DETECTIVES!
HOME... AND THE GARAGE OF THEIR APARTMENT BUILDING.
YOU BOYS BACK FROM ONE OF YOUR ADVENTURES?
YES. WE WERE OUT ROUNDING UP ALIEN INVADERS WHEN--
ONE DAY THESE "HOBBIES" OF YOURS ARE GONNA GIT YOU INTO A HEAP O' TROUBLE!
NOW, MR. KEEVER--
BUT I WISH I COULD BE RIGHT THERE GETTIN' INTO IT WITH YA!


SOON, UPSTAIRS...
HI! WE'RE HOME TO MESS UP THE APARTMENT!
HI, MRS. WILKENS. WE'RE JUST GOING TO DO SOME WORK IN THE "TECH ROOM."
OH! DAD GOT OFF O.K.!
OH, GOOD!
HEY, THE NEWS IS ON IN A FEW MINUTES, MRS. WILKENS.
BUT ARE YOU BOYS GOING TO WASTE ANOTHER BEAUTIFUL SATURDAY STAYING INSIDE WITH THAT MACHINE? WHY DON'T YOU GO OUT AND GET SOME FRESH AIR?
YEAH. YOU WOULDN'T WANT TO MISS THAT.
OH, YOU'RE RIGHT. THANK YOU, MATTHEW. THANK YOU, STEVEN.
"THANK YOU, STEVEN." HEY! IS THAT "ALIEN BONECRUSHERS FROM GORP?!"
COME ON, MATT! THIS IS A PROGRAM ON COMPARATIVE CIGARETTE ASHES AND REGIONAL SOIL SAMPLES. ARE YOU SERIOUS ABOUT BECOMING A DETECTIVE OR DO YOU JUST WANT TO PLAY GAMES ALL DAY?
UH... LET ME THINK... JUST KIDDING... JUST KIDDING!
SHUT THE DOOR. I'LL LOAD THE FLOPPY.
YES, SIR!
I WONDER WHAT'S EATIN' STEVE?
...WORKING...
HI, GUYS! WHAT'S UP?
... COLLECTION OF CLASSIC PAINTINGS WILL BE EXHIBITED AT THE CENTER CITY MUSEUM, ON LOAN FROM NEW YORK'S METROPOLITAN...
ELSEWHERE...
... MUSEUM OF ART. THE PAINTINGS WILL BE ARRIVING TOMORROW MORNING, AND...
NO THEY WON'T! BY THIS TIME TOMORROW, THEY'LL BE MINE!
B.S. WATSON: STORY
ART: ROBIN HART
NEXT ISSUE: ART FOR THEFT'S SAKE!

Mind Benders

BASEMENT BLUES

BY DAVID LEWIS

My basement is unusual—not for its size, which is perhaps a little greater than most, but for its dimensions. I cleaned it all out last week, including the furnace, and just for the fun of it I measured its volume in cubic meters by multiplying its height by its length by its width. I also figured out the surface area—the sum of the areas of the four walls, the floor and the ceiling, all of which are rectangular.

Now my mom says that as long as I've taken out everything in the basement, including the furnace—and measured it, too—I might as well paint it, and she doesn't want any paint wasted. Unfortunately, I've lost my tape measure, and I've quite forgotten all the measurements I made. All that I remember is they were very remarkable because the surface area in square feet was exactly the same as the volume in cubic meters. And oh, yes—there was no wall longer than 10 meters. Before Mom gets mad, can you help me figure out the possible dimensions of this basement so I'll know how much paint to buy?

Need help? The following program may be of assistance.

```
 5 REM (TRS-80 VERSION)
10 FOR A = 1 TO 10
20 FOR B = A TO 10
30 FOR C = B TO 10
40 V = A*B*C
50 SA = 2*(A*B+B*C+C*A)
60 IF V = SA THEN PRINT A,B,C
70 NEXT
80 NEXT
90 NEXT
```

AMAZIN' GRAZIN'

BY RICHARD AMYX

A man has bought a horse that needs a one-acre area (43,560 square feet) in which to graze. He looks in the classified ads and finds a rancher who is willing to lease one acre of a 10-acre field. There is, however, one hitch: The 10-acre field is circular, and the grazing horse must be tethered to one of the fence posts around the perimeter of the field. How long must the horse's tether be to reach from the tip of its nose to a fence post and allow it to graze over just one acre?

Do you have a problem or puzzle of any sort that might be appropriate for use in this column? If so, and you'd care to share it with us, send it, please, to: Mind-Benders, Microkids, 133 Fifth Avenue, New York, NY 10003.

FREE VERSE

BY CAPTAIN CRYPTO

The following is a piece of poetry we've all heard before. Do you recognize it?

TM/TLAHECHRIE/OEUD/HM/S/
TAEW/GIS/ASI/TKAINXO/NNBS/
OYGUATF/SMYA/T/JALMHIZY/OE/
/E/FSSAAW/ /HNLASAIDIXHNP/N/
ODSSGB/OBANOPFANGUL/
GDSXWCE/ /VBASKWWPB/IRNT/
AYS/N/N/EBGHDTAO/U/H/
IHDWEILOGH/SITF/
AEPANONTIVGJDHGESB/ES/ /
WWR/WWTH/HIVF

What's that? You can't figure it out? Well, of course not—it's in code. But before you give up and go look for the answer, here's a program that may help you decode it.

```
100 '     CAPTAIN CRYPTO
110 '          CIPHER
120 '
130 DEFINT A-Z
140 '********** SET UP
    SCRAMBLERS **********
150 M=6:N=M:D=M*M
160 DIM S(D), U(D)
170 ' GENERATE SCRAMBLER AND
    UNSCRAMBLER
180 K=I:L=2:X=M*N
190 FOR I=1 TO X
200 S(I)=K:K=K+M
210 IF K>X THEN K=L:L=L+1
220 NEXT I
230 FOR I=1 TO X
240 U(S(I))=I
250 NEXT I
260 '********** GET MESSAGE AND
    PAD IT **********
270 LINE INPUT "ENTER TEXT: ", T$
280 IF LEN(T$) MOD 36 <> 0 THEN
    T$=T$+" "
290 INPUT "ENTER S TO SCRAMBLE
    OR U TO UNSCRAMBLE: ", M$
300 IF M$<>"S" AND M$<>"U"
    THEN 290
310 ' ELIMINATE SPACES
320 C$=""
330 FOR I=1 TO LEN(T$)
340 IF MID$(T$,I,1)=" " THEN
    C$=C$+"/" ELSE
    C$=C$+MID$(T$,I,1)
350 NEXT I
360 IF LEN(C$)>=D THEN
    T$=LEFT$(C$,D) ELSE T$=C$
370 ' PAD MESSAGE
380 FOR I=LEN(T$)+1 TO D
390 T$=T$+CHR$(65+25*RND)
400 NEXT I
410 '********** PROCESS MESSAGE
    **********
420 X=LEN(T$):S$=""
430 IF M$="U" THEN 490
440 ' SCRAMBLE MESSAGE
450 FOR I=1 TO X
460 S$=S$+MID$(T$,S(I),1)
470 NEXT I
480 GOTO 530
490 ' UNSCRAMBLE MESSAGE
500 FOR I=1 TO X
510 S$=S$+MID$(T$,U(I),1)
520 NEXT I
530 '********** PRINT **********
540 PRINT
550 PRINT T$
560 PRINT S$
570 IF LEN(C$)>D THEN
    C$=RIGHT$
    (C$,LEN(C$)-D):GOTO 360
```

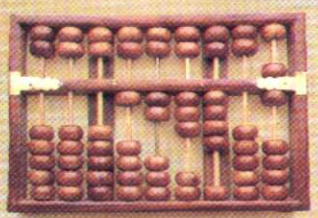

Answers on page 96

It writes, rates, creates, even telecommunicates. Costs less, does more- the Commodore 64.

When Commodore introduced the 64, the industry suddenly realized that there would be a computer in every home, school and business years before anyone ever dreamed.

That's because Commodore 64 halved the price of high technology: while you can compare the 64's capabilities with those of any sophisticated business PC, you can compare its price with that of an average television.

What can you do with it? Create with its high resolution Sprite Graphics. Add a printer and type with it. Add a disk drive to use spread sheets and other financial programs. Learn and play music through your home sound system on the 64's professional quality music synthesizer.



Add a modem, and hook up with the vast computer networks through your telephone. In short, the Commodore 64 is the ultimate personal computer, at a price you can afford.

COMMODORE 64

ISAAC ASIMOV ON THE DAWNING OF A NEW ERA

THERE ARE those who feel at home with computers, who are growing up with them—but there are also those who fear them.

It is quite reasonable to fear being replaced. A job or a profession may well disappear once someone discovers that it can be done more simply, more quickly, and better by a properly programmed computer.

To be sure, it is the routine, repetitive work that is most likely to disappear: the assembly-line job; the not-very-demanding clerical work. But once the process starts, where does it stop? After all, computers are growing more versatile and more capable at a fearsome rate. Are there any jobs that will not be threatened in the end?

Is it possible, in fact, that one day computers may make the human race obsolete—that computers will so far surpass the natural intelligence of human beings that there will be no place left for us? Will we die out for lack of any purpose in existing? Or will we be killed off (in some devilish science-fiction scenario) by computers who are out of patience with us? Or will a few of us be kept in zoos or as pets because computers feel a certain kindliness toward us?

I don't think we need fear that sort of end. Yes, certain kinds of jobs will disappear, or grow less important, but other kinds will grow more important and will *not* disappear. We will go through a difficult transition period in which human beings will have to learn to reorganize their educational systems and their social attitudes. But humans and computers will not be competing for control of the world. We won't be fighting to see who will be master. We will be friends and allies.

The reason—to me, at least—seems fairly obvious. Let me explain.

To begin with, there are a great many *different* talents (different kinds of "intelligence," if you will) among human beings, and every one of them is useful. It takes a remarkable mix of all these talents to build and maintain the marvelous human society we now have.

The computer, for its part, simply adds a new type of talent that is altogether different from anything human.

The particular talent of a computer is to handle operations of numbers with enormous speed and ease and without error. Even the simplest computer can far outstrip human beings in this respect. But does that make computers *smarter* than human beings? Hardly!

The kind of thinking that is and will remain particularly human is *creative* thinking. We can guess at solutions when we don't have all the data. We have hunches, feelings, insights, intuitive guesses, new ideas. Computers don't. We also have *esthetic* feelings. Artists simply know when a certain combination of lines and colors is right. Musicians have a feeling for the blending of sounds. Writers can tell when they have the proper combination of words. Computers cannot.

"Aha!" you say. "As computers grow more complex and more versatile, isn't it possible that they, too,

may become more creative and esthetic?"

In the first place, it won't be easy. A computer does what it is programmed to do, and human beings devise the program. Can we devise a program that will make the computer creative and esthetic? Right now, we can't, for the simple reason that we don't even know how *we* do it. I can write an article like this as quickly as I can type, choosing the right words to represent the correct flow of ideas without any noticeable effort, *but I don't know what it is that I do to be able to do that!* How could I possibly instruct a computer to do it?

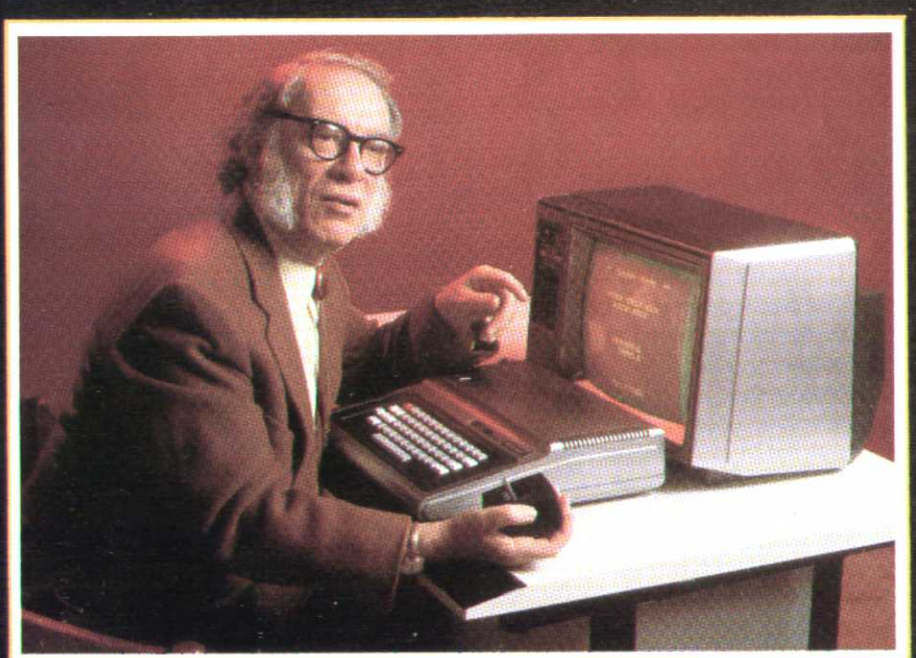
Maybe the day will come when we will learn how to devise such a program. Maybe we'll simply learn to write a program that will make a computer creative or esthetic, even if we don't know exactly why or how such a program can accomplish its task.

Perhaps, but why bother? It would probably take an enormously complex program to get a computer to be even slightly creative. Moreover, human beings do what they do so easily that there would be no sense in doing it all over again with a computer. What's the point?

In years to come—I'm certain of it—computers will have talents that will fit their structure and place in society, talents that we can't easily duplicate ourselves. But we humans will have talents that fit our own structure and place in life, talents that we can't easily program computers to have.

And then, just as human beings blend their unique talents to complete enormous tasks, computers will blend their own entirely different kinds of talents to do enormous tasks of another sort, tasks that perhaps we haven't even thought of yet.

When that day comes, human beings *plus* computers, as friends and allies, will build a total society far beyond anything we can imagine today. Neither one will replace the other—or will want to. ■



Famed author and scientist Isaac Asimov

COMPUTER

IS IT FANTASY OR COULD IT BE REAL?

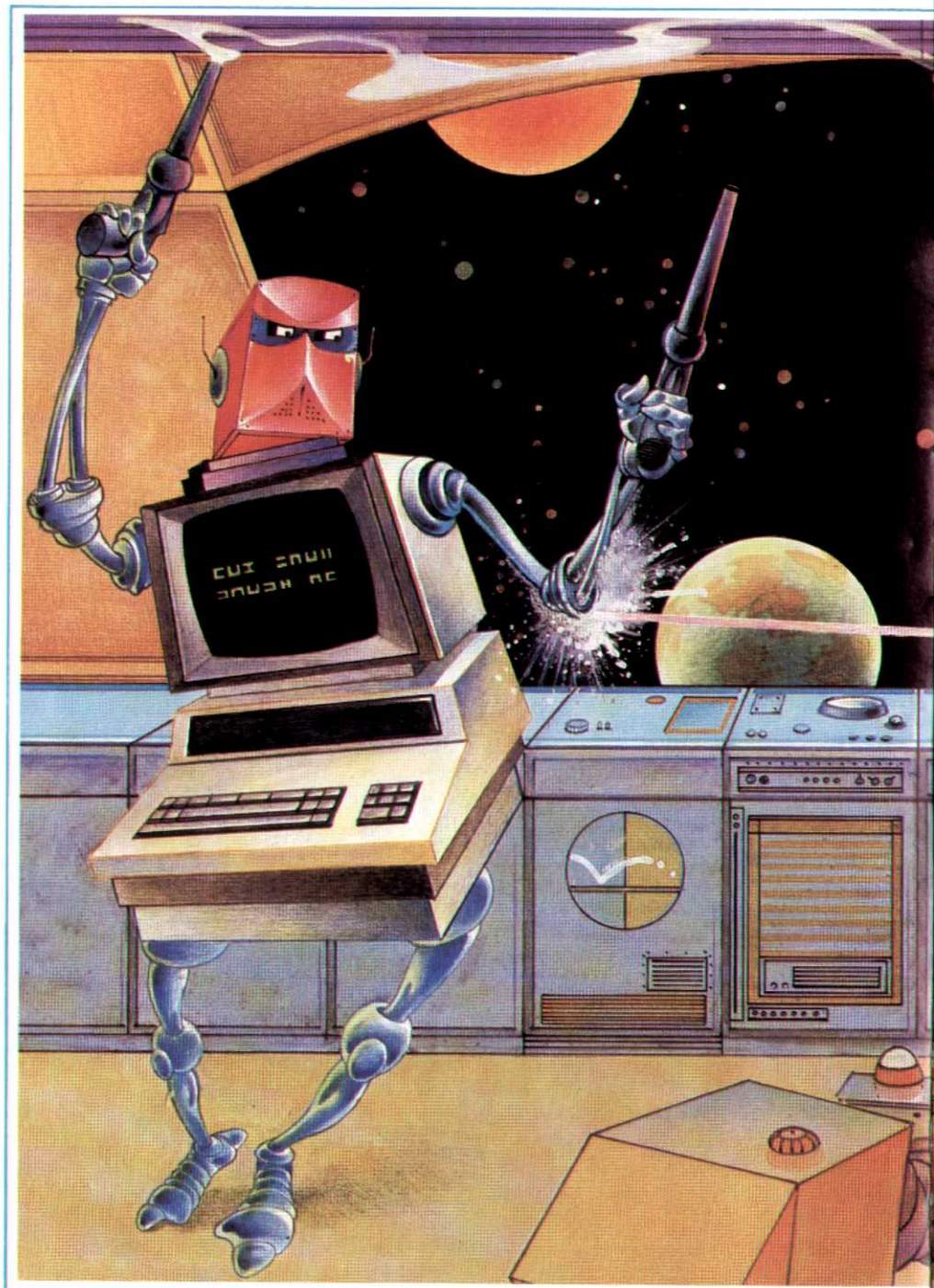
BY JOSEPH GELMIS

THE MOVIE VERSION of H.G. Wells' classic "The Shape of Things to Come" was the first big science-fiction success back in the early 1930s, and moviemakers have been cashing in ever since on the near-universal appeal of sci-fi adventures.

Whether we've seen them in movie theaters or only on television, who among us could ever forget "The Day the Earth Stood Still," "War of the Worlds," the original "Invasion of the Body-Snatchers," "Planet of the Apes" and dozens more like them?

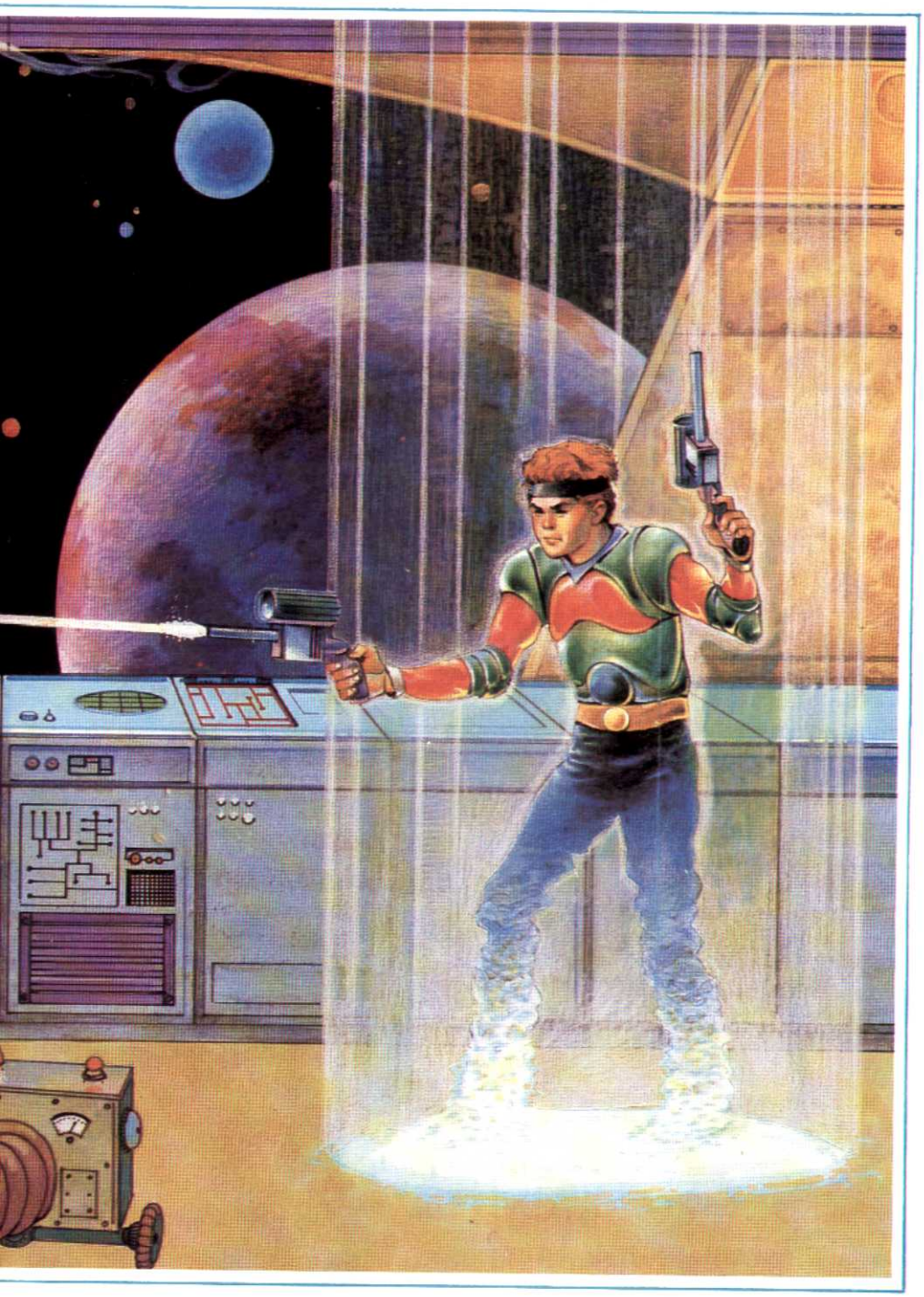
With the advent of the computer in the past generation or so, the pace has only quickened. "Forbidden Planet," "2001," "Star Trek, The Movie" and, most recently, "Superman III" have all dealt with the deranged genius and/or the crazed computer bent on enslaving or destroying mankind—or saving it, as in the case of R2D2 and C3PO of "Star Wars" fame.

If there was a common thread to these movies, it was the fact that *we knew* each of them was sheer fantasy—at times fascinating and often exciting, but still just a movie; it simply couldn't be. All that has now been changed, though, by "WarGames," an early-summer release that was still playing in first-run movie houses throughout the



PIRACY

HOLLYWOOD STYLE



nation as this was being written in early fall.

Seldom has a film sparked as much controversy as this one. The debate over its message has raged through the scientific community, through the military establishment, all the way to the White House. In its advertising, "WarGames" asks the question: "Is it a game, or is it real?" In real life, concerned citizens are asking: "Is it a fantasy, or could it be real?"

The line between fact and fiction

Matthew Broderick and Ally Sheedy, co-stars of the movie "War Games."

has become so blurred here that even the President seems to have crossed it at least once. While briefing a group of Congressmen recently on his efforts to achieve a nuclear arms limitation treaty, Mr. Reagan cited the clear and present danger of a nuclear accident as typified by "WarGames."

"I don't understand these computers very well," the President is quoted as saying, "but this young man obviously did. He tied into NORAD (North American Aero-

COMPUTER PIRACY

WOPR at work in the "war room at NORAD headquarters in Colorado."

space Defense Command)."

In the movie, that's exactly what teen-age hero David Lightsman does. While trying to swipe an advance copy of a new video game by phone, he accidentally ties into a giant NORAD computer called WOPR (for War Operations Plan Response); he cracks its code, again almost by accident; he instructs the machine to join him in playing what he thinks is a game called "Global Thermonuclear War," and in so doing he nearly sets off World War III.

Ridiculous, isn't it? Or is it? Certainly not while you're watching it. The movie is riveting almost to the end. But the most troubling aspect of the film is that much of what we see on-screen has already occurred in the real world.

Can a youngster break into a school computer and change his grade almost at will? He sure can. It's been done many times. Could he tie into a computer miles away by telephone for the purpose of obtaining secret information—or perhaps something more tangible? No question. A California bank employee by the name of Stanley Mark Rifkin actually stole $10 million that way before they caught him.

Computer piracy has, in fact, become so commonplace that 20 states have enacted laws making it a crime to gain unauthorized access to government, business or school computers—or to the telephone company's telecommunications network, which is nothing more than a lot of computers all tied together. The laws vary, of course, from state to state, but the penalties can range from two to five years in jail, plus a fine of $5000.

Still, it happens. And since the advent of "WarGames," it's apparently happening more and more. For example, a group of young Milwaukee hackers were recently found to have penetrated a computer at the Los Alamos National Laboratory in New Mexico. Fortunately, the computer contained only non-classified material, so there was no breach of national security. But there were a lot of red faces, notes Joseph Weitzenbaum, a professor of computer science at the Massachusetts Institute of Technology.

"It was something of a shock to the computer community that they [the Milwaukee youngsters] found a pinhole in the system," said Weitzenbaum. "The likelihood of such pinholes is very, very high."

But surely the military has taken steps to safeguard its computers against tampering, wouldn't you think? You bet. Yet Washington reporter Ted Szulc, writing in *Parade* Magazine last year, told of intelligence reports indicating that the Soviet Union had already dialed its way into the computers of a top-secret U.S. defense installation in Sunnyvale, Calif. If true, that installation was probably the Air Force Satellite Control Facility, from which most military satellites are "flown."

Sort of begins to scare you, doesn't it?

Another factor that heightens the seeming realism of the film is the interplay between David Lightsman and WOPR—again, all based on existing technology. When the machine says, "Hello . . . would you like to play chess?" it's doing what computers the world over are routinely programmed to do. The machine asks a question—one that usually results in a yes or no answer—and then provides an appropriate but actually preprogrammed response. This sort of interchange goes on in business and industry time and time again, day after day.

When WOPR speaks, taking on a personality all its own, that too is terribly close to reality. Speech synthesizers are readily available for most computers, enabling them to "talk" after a fashion. Indeed, computer scientists are working hard even now to perfect computers that will not only talk to you but will respond to voice command.

So believable are the movie's characters, so accurate its details, so authentic its settings that even the respected New York Times was moved to take note of its impact.

"Skeptics," said the Times, "worry that mistakes made here by man or machine [inside the NORAD command post, as shown in the

Co-conspirators Matthew and Ally . . .

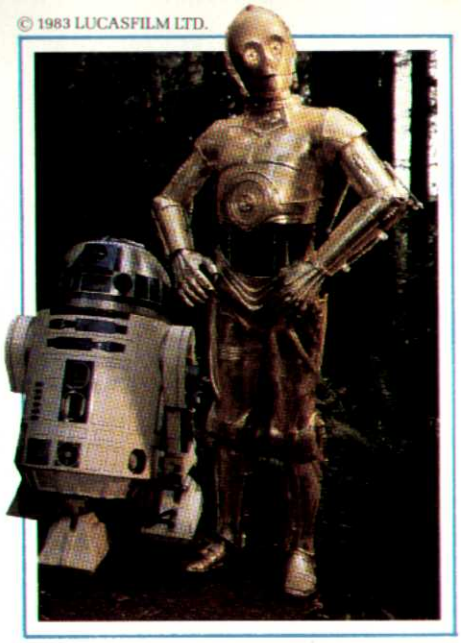
film] could make a false alarm look like an attack. That might lead, they fear, to an erroneous assessment reported to Washington, and could contribute to a Presidential decision to fire United States missiles in retaliation, thus possibly starting a nuclear war by accident."

The movie is not without its flaws, though, as dedicated computerists have been quick to point out.

"The majority of the complaints," say screenwriters Lawrence Lasker and Walter F. Parkes, "are nitpicking. For instance, we made a minor error in having the computer give David a list of games it can play *before* he logs on. And there are people who say a military supercomputer wouldn't include a private menu of games. Yet most programmers play games with the biggest computers. And some programmers can't resist setting in their own private passwords so they'll always have access, no matter who owns the computer.

"The only legitimate gripe anyone can make against our supercomputer is the intelligence it shows at the end. We're many years away from that. Our supercomputer deduces for itself that war is a no-win stalemate. That kind of learning has not yet been achieved."

"WarGames" director John Badham also shrugs off the criticism of those who question the film's plausibility. "'WarGames,'" he says, "is a what-if movie." Ask him further how the nation's top defense computer could possibly be accessed via public telephone, and he replies: "Somebody screwed up."



R2D2 (left) and C3PO of "Star Wars" fame: Man's best friends.

It's no more astonishing, he adds, than the reality that the military actually does conduct VIP tours of the NORAD war room, as shown in the movie.

In the end, though, where the movie really falls short—where it flat-out fails the acid test of reality—is in its basic premise that the President or anyone else would allow a computer to have the decisive word on whether to launch an all-out nuclear attack.

Indeed, the real NORAD commander-in-chief, Lt. Gen. James F. Hartinger, was initially hostile to writers Lasker and Parkes when he first met them. "But when he heard what the theme of the movie was," Lasker recalls, "that in fact we were coming down on the side of human control, as opposed to turning things over to computers, he fell in love with us."

Lasker quotes the general as saying: "You know, these guys from these big defense corporations keep coming around and saying, 'Hell, we can do it for $350 million, but you've got to get the humans out of the loop.' I don't want to get the humans out of the loop."

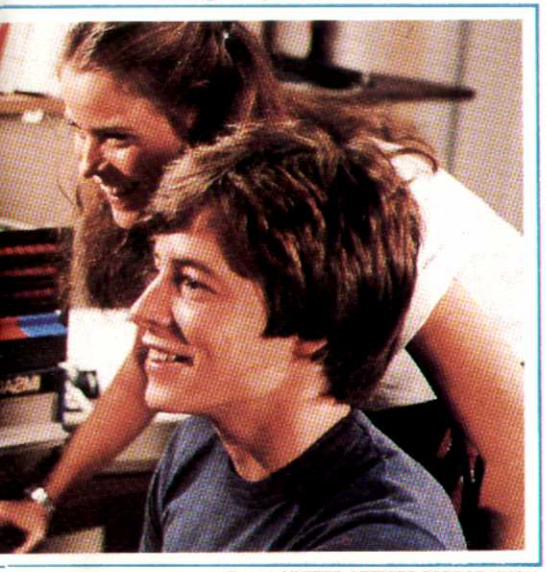
It would be nice to end on that note, but there's another objection to "WarGames," and that's in the way a youngster who is really breaking the law ends up being portrayed as a hero.

"Some people say it's O.K. to do things like that because the kids are learning so much," says Don Parker, author of a new book called *Fighting Computer Crime*. "I totally reject that concept. We are creating a subculture with the wrong values. These kids are going to be programming things like banking systems in five years."

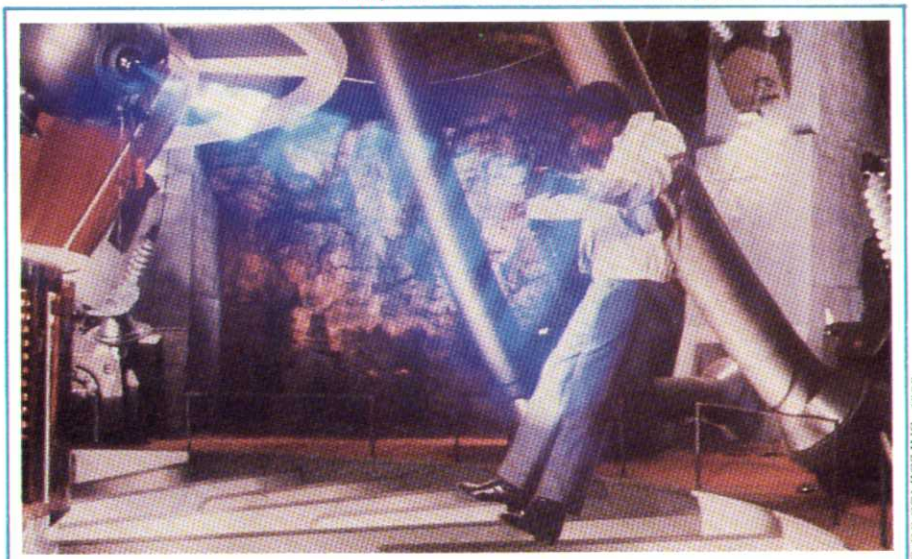
The final word goes, though, to writers Lasker and Parkes, who respond by saying:

"When we meet David at the beginning of the movie, he is still a boy playing with toys. By the end, he has taken a giant step into the adult world. David was our attempt to create a new kind of hero for movies. Not the unthinking American hero—in the tradition of Brando, Pacino, DeNiro and, lately, Sean Penn and Matt Dillon—but a kid who uses his brains to solve problems, a kid who has a positive relationship with the new computer technology." ■

. . . cracking the government's NORAD code



"Computer whiz" Richard Pryor getting his in "Superman III"



CONFESSIONS OF A TEENAGE COMPUTER WHIZ

BY TIM KNIGHT

IT WAS BARELY 7 a.m. one bright and sunshiny California day when the bell rang on a private telephone line into the world headquarters of Knight Software Inc. The firm's chairman and chief executive officer, expecting a call from back East about a new publishing deal, quickly grabbed the phone. But the conversation had barely begun when the firm's president knocked on the door, stuck her head in and told the chairman and CEO he'd better get off the phone and out of bed or he'd be late for school.

Hard to believe? Perhaps. But that's actually a pretty common occurrence at my house, since I'm the chairman and chief executive officer of Knight Software and my mother is the president. Our "headquarters," what's more, is simply my bedroom, where I also keep the possessions that I prize most in life: my computers.

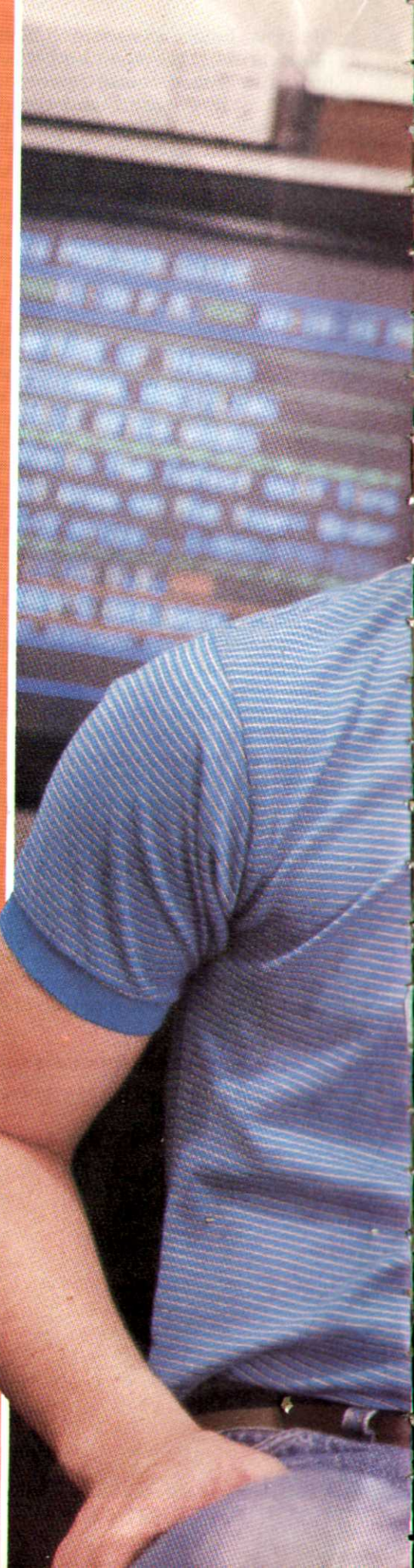
I'll admit it's a little strange for a 17-year-old boy to have his own corporation. Not many people in high school have written eight books, either. Even fewer have completed 10 software programs that are sold all across the country. Still and all, I've grown sort of used to it. The only problem is the fact that there are a lot of people who can't seem to understand what a supposed "whiz kid" is really all about.

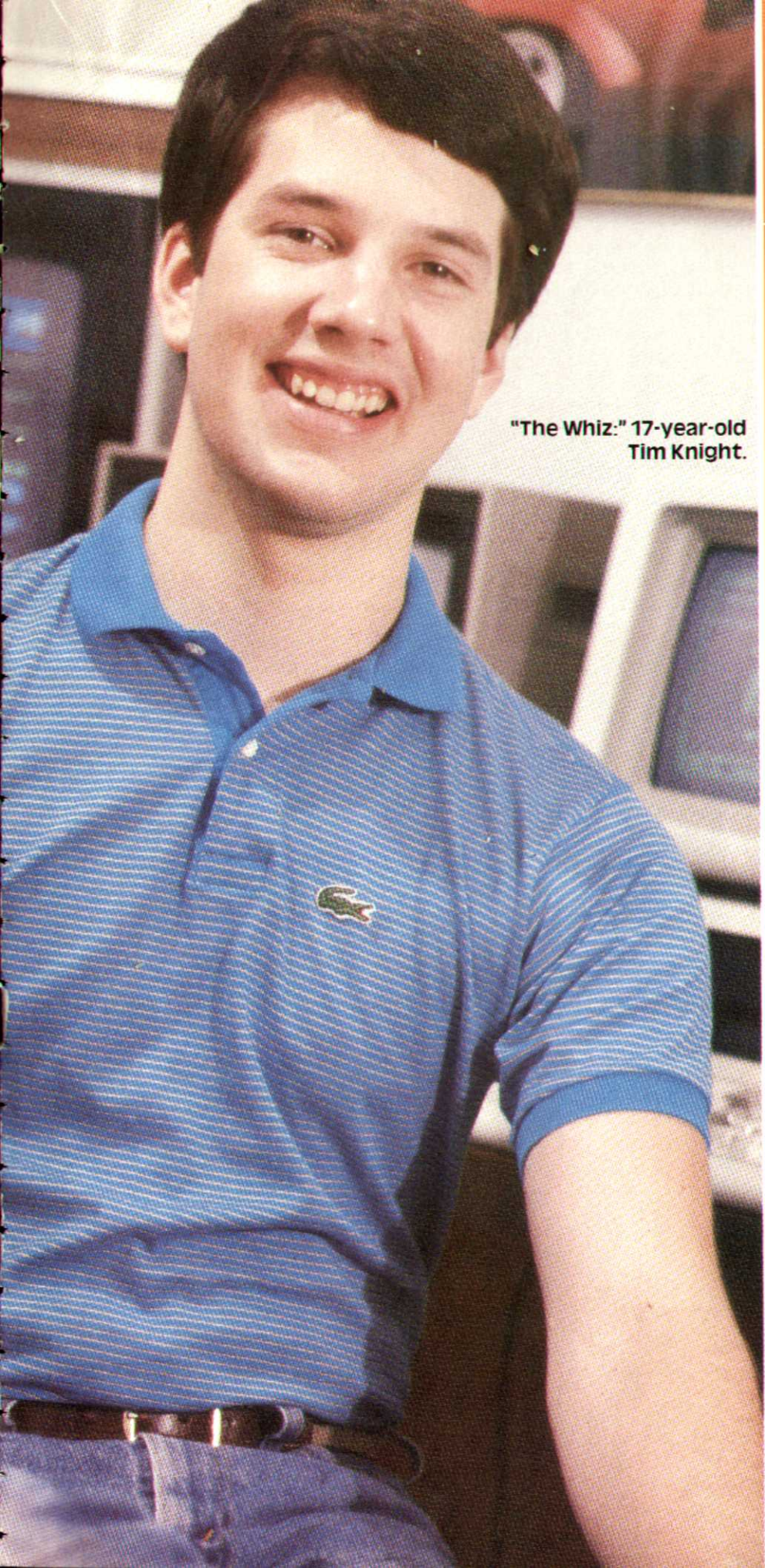
What do I mean by that? Well, in the past I have been asked to do interviews with newspeople, I've appeared on television, and I've even "starred" in a German TV special. But the way I'm always basically portrayed is as a kid who has nothing but money on his mind. In fact, almost every story I've ever seen on "kids and computers" seems to indicate that these young people have only one interest: money.

This is simply not true. Money is nice to have and nice to spend, but I don't sit up at night worshipping my bank book. I don't buy every Lamborghini Countach S I can find just to be as ostentatious as possible.

Computers *have* brought me happiness, logical thinking and money, that's true. But they don't rule my life. Computer "whiz kids" have other loves, too. One of mine is named Yen-Chi, the most beautiful girl in the world next to my mother. I also have many of the same interests that other people have. That is what this story is about—the *real* side of what the media loves to call the whiz kid.

There's always a beginning for every person who works with computers. Usually, you'll find a whiz kid started out by teaching himself computers and then began to enjoy himself so much he had a very difficult time pulling himself away. My beginning was something like that, but not quite.

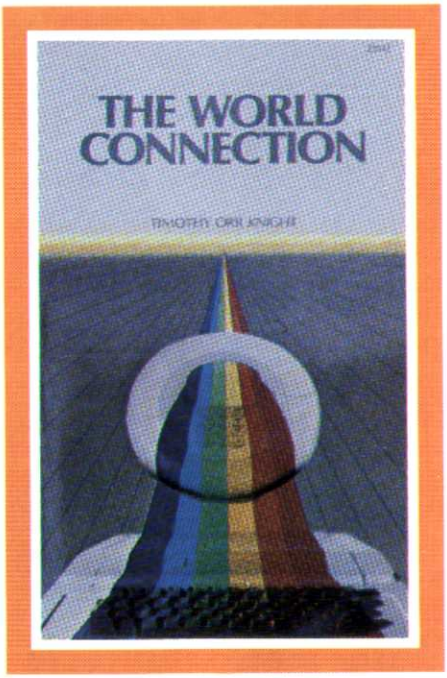




"The Whiz:" 17-year-old Tim Knight.

When I was in the eighth grade, four years ago, my algebra teacher, Mr. Contino, brought in some PET computers for students to use. Although I didn't fall in love with computers at first sight, I did have an interest in using them. I taught myself some things about the programming language BASIC and learned to write some fairly respectable programs on my own.

One day, Mr. Contino offered these computers for sale at a very reasonable price. I excitedly told my father about the computer sale, but



One of the books upon which Tim Knight has built his reputation.

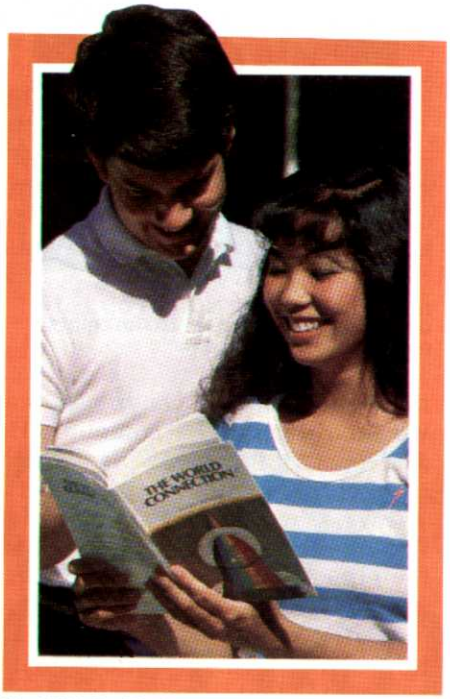
he wasn't entirely convinced that we should get a PET computer. He said, "Let's think about this," which seemed to me to be simply a "No!" answer. I was wrong, though, for two months later, in April of 1980, my father bought me my very first machine: a TRS-80 Model I.

At that point, I began to realize how much I liked working with computers. I mastered the language of the TRS-80, began writing larger and more complex programs, and soon began to wonder whether I might be able to sell some programs on my own. Though this idea seemed a little ridiculous at the time, I decided to give it a try anyway.

The first program I had written

TEENAGE COMPUTER WHIZ

was Super Sign, a "marquee program" that accepted messages from the computer user and scrolled them in huge letters from the bottom of the screen to the top. To advertise this program, I went to a book I had discovered called *The TRS-80 Software Sourcebook*, which was kind of like a giant classified ad section for computer software in book form. I filled out one of the *Sourcebook* forms in which I described my program, its price, where it could be purchased and so on, and then sat back to wait and see if I'd get any orders.



The "Whiz" with the second-most beautiful woman in his life.

I didn't expect much. After all, how many people could want a program, made by an unknown company, that simply scrolled large letters up the screen? In addition to that, my listing was only one among 2,000, so what chance did I have?

To my amazement, though, the orders swarmed in, and after three years, I am still getting orders. I had no idea the response would be that good, so I immediately began writing more programs and putting them in the *Sourcebook*. As business continued to grow, I began to realize that taking orders, duplicating programs and shipping software packages was getting to be a little too much for me, so I decided to market my programs through other companies. In this way, I could write a program, they would market it, and I would receive a percentage of what they made.

This is exactly the way I sold my first 'major' games, including Eureka, SPOX, Space Chase, Laser Blazer and Pirates of the Planets. And then, strangely enough, I received in the mail a booklet called "How to Write for Wayne Green Books" by Wayne Green Inc., a publishing firm for which I was writing computer-related magazine articles at the time. I don't know how I got this booklet; I never asked for it. Nevertheless, the idea struck me that maybe I *could* write a book related to computers. What subject did I know well enough, though, to write a book about? The answer came to me almost immediately: computer communications.

At that time, there simply were no books on computer communications, so I decided to write one myself. My first book was entitled *The World Connection*, and I worked on it for ten solid days, trying my best to put a bunch of words together and call it a book. In the end, it turned out better, I thought, than I could have hoped, so I fired it off, naturally, to Wayne Green Books, the company that had inadvertently started me out.

There was nothing to do then but wait, which I did—until at last I got a large envelope in the mail from Wayne Green Books telling me on the outside as well as the inside, "NO."

I was pretty hurt, but I don't give up easily, so I decided to send the book to an even larger publisher, Howard W. Sams, the oldest and largest technical book publisher I could find. Within a month, Sams decided to publish my book and sent me a contract.

That was the beginning of my book career, which now includes titles such as *Megabucks from Your Microcomputer*, *BASIC Programs for the Commodore 64* and *Excel on the Atari 1200XL*. And currently I'm working on a proposal for a book called *PROBOT: The Age of the Personal Robot*, which is to me certainly the most exciting thing I've ever done.

What are my plans now? Well, I'm 17 years old; I'm writing programs and books and loving every minute of it, so what else could I want? Actually, I have quite a few plans for the future. I hope to complete 25 books before entering Stanford University, as well as finish a total of 15 programs.

Beyond that, my money goal is simply to be a millionaire when I am 21 years old. I think I'll make that one, too, but there are a lot of other rewards that come from this work besides money (and taxes). I am going to continue to write and program, but I believe I will also be expanding my corporation so other people may work with me on as-

sorted projects, especially those involving robots.

In the meantime, many people ask me for advice. There are also those who get slightly angry because they can't write books and programs and own all the nice things that I do. They say things like, "If I had the equipment you had, I could do the same thing."

What many people don't understand is that I didn't have anything given to me on a silver platter. I started work like practically everybody else, pulling weeds. I purchased the component television in my room with my own savings. I've paid for everything I've got—my Commodore 64, my video game systems, my robots, my stereo, my car—all by myself. I've also paid for my phones, my corporation fees, my accountant's fees.

My parents aren't rich—they didn't just buy me a computer room and say, "It's all yours!" I had to start at the beginning, and as simple as that may sound, that's the best advice I have to offer anyone who wants to get ahead in computing.

If that's you, please, don't expect instant success. I have mentioned some of my successes, but believe me, I've also had a ton of failures. Just remember that through every failure, you're bound to learn just a little bit more.

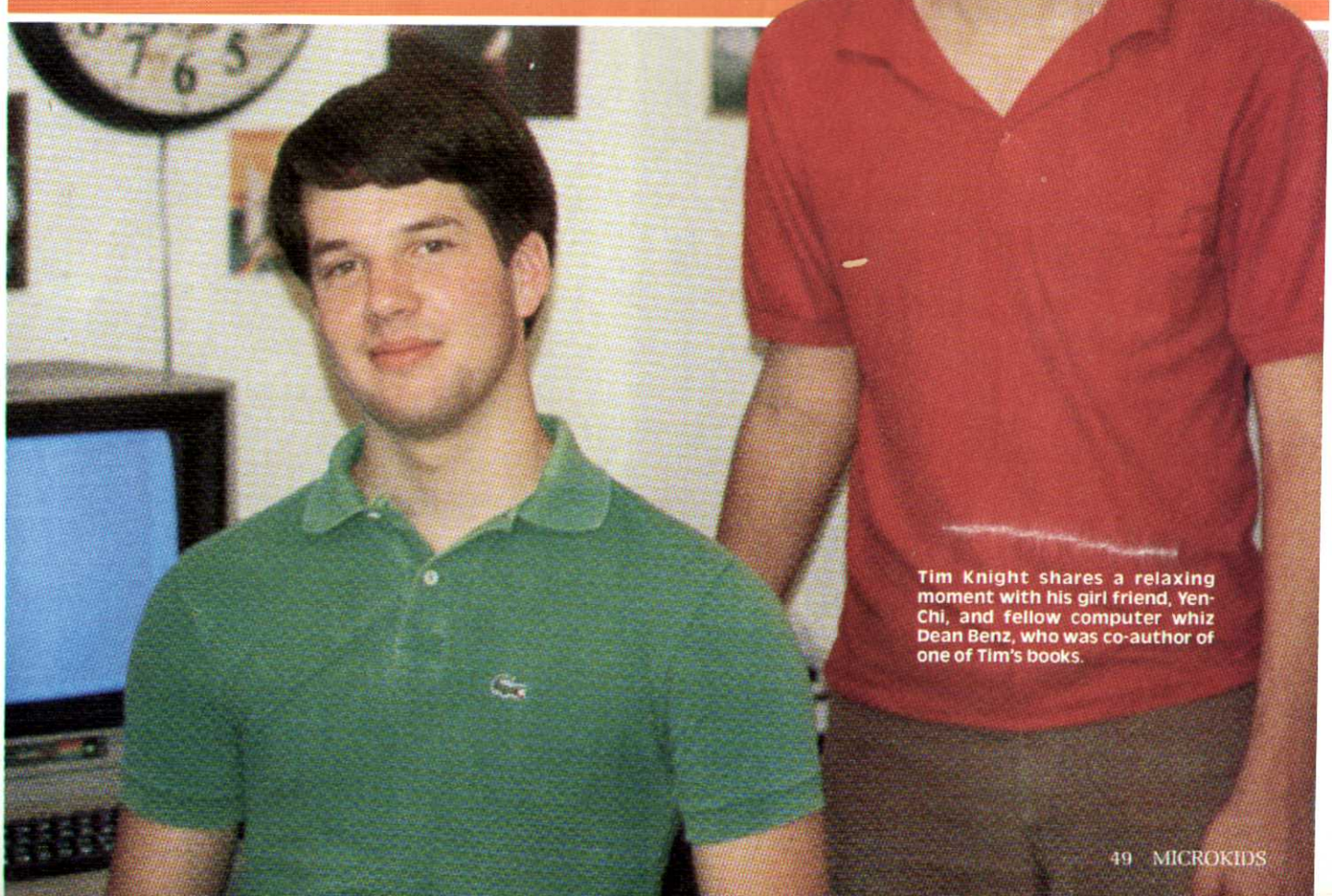
I wouldn't say that if I didn't know it was true, either. For instance, I worked quite a long time on a couple of game books telling how to master the ColecoVision and the Atari 5200 game systems. Publisher after publisher turned them down, until I finally just threw the books away.

However, in the process of working those two books over and over, I managed to come up with enough new ideas to sell four totally different books that I never would have thought of before. In addition, two new publishing houses took me in as a regular author, and I made a great number of new contacts. Though the failure of those first two books hurt a lot, the many successes that followed made it all worthwhile.

So now it's up to you. Find that original new angle. Work on it till you get it right. And most important of all, don't let anyone think of you as a "nerd" just because you work with computers.

I love working with computers, but that certainly doesn't make me a nerd. If you think *you* can work with computers in some way, go ahead and give it a try.

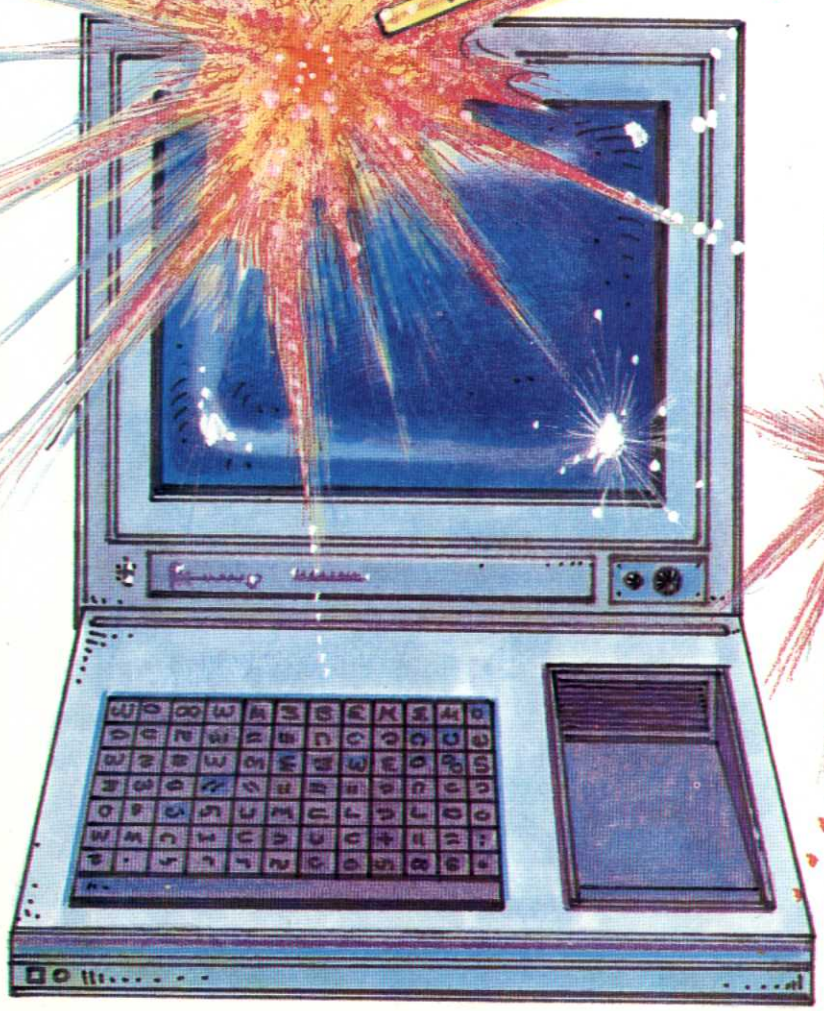
If you work hard enough, long enough, you're bound to succeed. And if you do eventually become a "compu-whiz," be proud of that title—you'll have earned the right. ■



Tim Knight shares a relaxing moment with his girl friend, Yen-Chi, and fellow computer whiz Dean Benz, who was co-author of one of Tim's books.

An Introduction to GRAPHICS MAGIC

It's nice to be able to program a computer to do anything you want it to do, but you don't have to be an expert to create graphics magic. All it takes is the ability to type in a program exactly as you see it on the printed page.
Try it and see with the following graphics spectaculars, written for TRS-80 Models I, III and 4, and the Commodore 64.

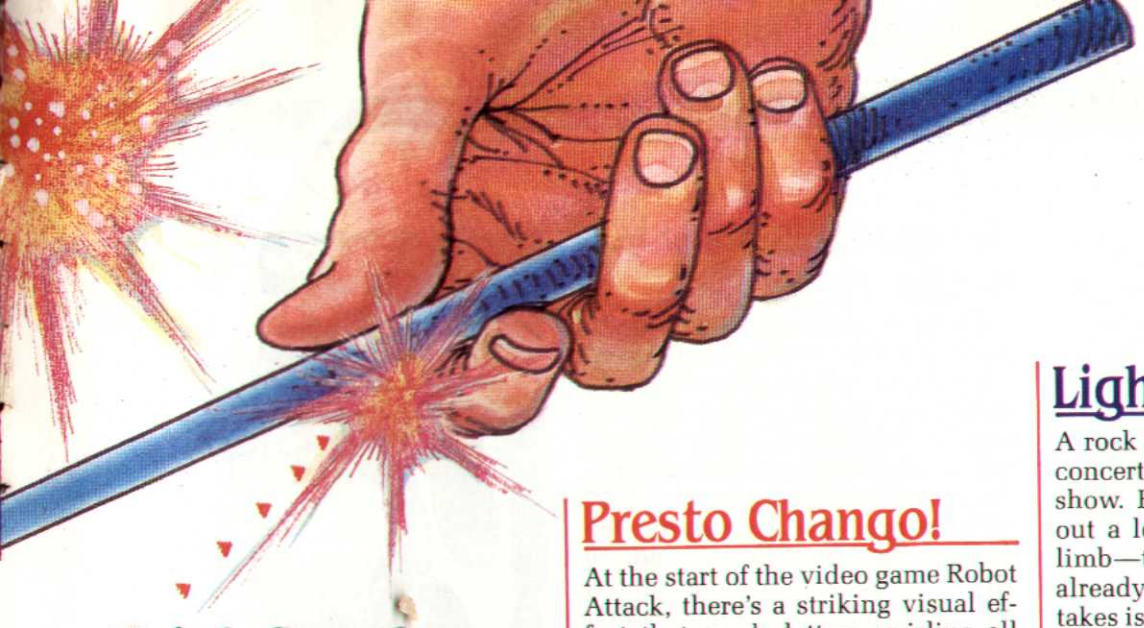


Look! Up in the Sky!

Have you ever seen a flying saucer? Neither have we. If you have a Commodore 64, though, it's easy to create your own UFO. Here's how.

```
5 REM SINGLE COLOR SPRITE
7 S = 54272:FOR L = S TO S
  + 24:POKE L,0:NEXT
8 POKE S + 24, 15:POKE S,220:POKE S
  + 1, 68:POKE S +
  5, 15:POKE S + 6,215
9 POKE S + 7, 120:POKE S + 8,
  100:POKE S + 12, 15:POKE S +
  13,215
10 PRINTCHR$ (147)
20 FOR I = 0 TO 62:
   READ A:POKE 832 + I, A: NEXT
30 V = 53248
35 POKE V + 33,0
40 POKE V + 21,1
50 POKE V + 39,1
70 POKE V + 16,2
80 FOR X = 1 TO 199
90 POKE V,X:POKE V + 1,X
93 POKE S,X:POKE S + 1, X + 1
95 POKE S + 4,33:POKE S + 5,32
100 NEXT
110 RUN
10000 DATA 0,0,0,0,0,0,0,0
10001 DATA 0,0,0,0,0,0,0,0
10002 DATA 0,0,0,0,126,0,31,255,248
10003 DATA 250,170,175,15,
      255,248,0,126,0
10004 DATA 0,0,0,0,0,0,0,0
10005 DATA 0,0,0,0,0,0,0,0
10006 DATA 0,0,0,0,0,0,0,0
```

—Tim Knight



Think Snow!

In the colder climes, winter will soon be here, bringing with it a new ski season. If you're a skier or merely an après-skier—and also have a TRS-80 Model I, III or 4—here's a program that's sure to please.

```
1 CLS
10 PRINT @31, CHR$ (188)
20 PRINT @94, CHR$ (191)
30 PRINT @96, CHR$ (191)
40 PRINT @157, CHR$ (191)
50 PRINT @161, CHR$ (191)
60 PRINT @220, CHR$ (191)
70 PRINT @226, CHR$ (191)
80 PRINT @283, CHR$ (191)
90 PRINT @291, CHR$ (191)
100 PRINT @346, CHR$ (191)
110 PRINT @356, CHR$ (191)
120 PRINT @409, CHR$ (191)
130 PRINT @421, CHR$ (191)
140 PRINT @472, CHR$ (191)
150 PRINT @486, CHR$ (191)
155 PRINT @535, CHR$ (130)
157 PRINT @551, CHR$ (129)
160 FOR X = 536 TO 550
170 PRINT @X, CHR$ (131)
180 NEXT X
190 PRINT @543, CHR$ (191)
200 PRINT @730, "THINK SNOW"
210 FOR A = 1 TO 1000
220 NEXT A
230 FOR X = 1 TO 500
240 LET B = RND (48)-1
250 LET T = RND (128)-1
260 SET (T,B)
270 NEXT X
280 GOTO 280
290 END
```

by Pat Cassidy and Jim Close (from *Basic Programming for Kids* published by Prentice-Hall Inc.)

Presto Chango!

At the start of the video game Robot Attack, there's a striking visual effect that sends letters swirling all over the screen. If you have a TRS-80 Model I, III or 4, here's a program that'll enable you to achieve a similar effect.

```
10 GOSUB 1000
20 T = 127
30 B = 32
40 C = SGN (B-T)
45 D = 100
50 FOR G = T TO B STEP C
60  J = USR (G)
70  FOR F = 1 TO D
80  NEXT
90 NEXT
95 END
1000 H = -288
1002 IF H<0 THEN H = H + 65536
1005 MS = INT (H/256)
1007 LS = H-MS* 256
1009 IF H > 32767 THEN H = H-65536
1010 FOR V = H TO H + 16
1020  READ B
1030  POKE V,B
1040 NEXT
1050 IF PEEK (16396) = 201 THEN
     POKE 16526,LS: POKE 16527,MS
     ELSE DEFUSR = H
1060 RETURN
1510 DATA 205, 127,10,125,33,0,60,
     119,17,1,60,1,255,3,237,176,201
```

Note: This program was written for a computer with 48K of RAM. If all you have is 32K, the value of H in Line 1000 should be changed to 49104; if all you have is 16K, it should be changed to 32704.

—David Lewis

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

Light Show

A rock concert is simply not a rock concert these days without a light show. But you don't have to shell out a lot of cash—or risk life and limb—to get the same effect. If you already have a Commodore 64, all it takes is the following.

```
1 REM RANDOM PATTERNS
5 S = 53248
6 REM BLACK SCREEN OUT
7 POKE S + 33,0
10 REM PATTERNS
20 REM BY TIM KNIGHT
30 REM CLEAR SCREEN
40 PRINT CHR$ (147)
50 REM SET UP LOCATION
   (MIDDLE SCREEN)
60 L = 55796
65 REM GET KEYBOARD INPUT
67 CH = 101:GOTO 150
70 A = INT (RND (0) *7) + 1
75 REM GO UP
80 IF (A = 1) AND (L>55335) THEN :
   L = L - 40:GOTO 150
85 REM GO DOWN
90 IF (A = 2) AND (L<56256)
   THEN L = L + 40:GOTO 150
95 REM GO LEFT
100 IF (A = 3) AND (L>55296)
    THEN L = L-1:GOTO 150
105 REM GO RIGHT
110 IF (A = 4) AND (L<56295)
    THEN L = L + 1:GOTO 150
115 REM GO UP/RIGHT
120 IF (A = 5) AND (L>55335)
    THEN L = L-39:GOTO 150
125 REM GO UP/LEFT
130 IF (A = 6) AND (L>55337)
    THEN L = L-41:GOTO 150
135 REM GO DOWN/LEFT
140 IF (A = 7) AND (L<56256)
    THEN L = L + 39:GOTO 150
141 REM GO DOWN/RIGHT
142 IF (A = 8) AND (L<56258)
    THEN L = L + 41:GOTO 150
149 REM POKE CHARACTER
    INTO MEMORY
150 POKE L, INT (RND (1) *15):
    POKE L-54272, INT (RND (1)
    *100) + 155
152 REM CHANGE ALL COLORS
153 FOR XX = 32 TO 36:POKE S
    + XX, INT (RND (0) *15):NEXT
155 REM REPEAT PROCESS
160 GOTO 70
```

—Tim Knight

The VID KID NEWS & VIEWS

SECRET MESSAGES IN GAMES

Many people score millions of points on their home video games, learn them inside out and backwards, play them for hours a day for months and months, and never even realize that their games might contain secret messages.

These messages are usually the designer's name or initials and are almost never mentioned in the games' instructions—thus leaving the player the job of finding them for himself.

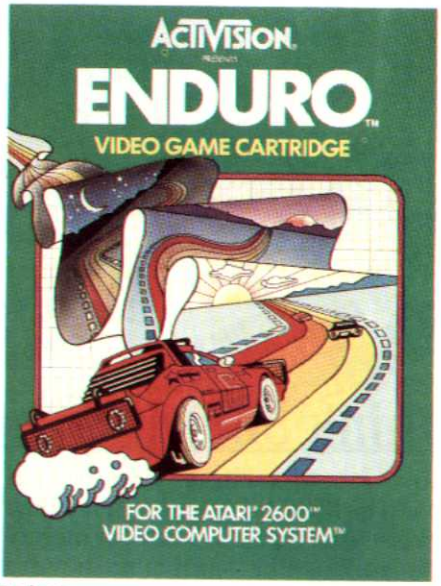
Probably the best-known secret message is the one found in Atari's Adventure for the 2600 VCS. The Adventure message is displayed in a room that is frequently called the "programmer's room." The player reaches the programmer's room by first getting a small dot that is found in the black castle. Next he gets any two objects and places them next to the barrier on the left side of the great corridor. He then travels to the right side of the great corridor, still holding the small dot.

The player must now hold his breath because, if he's done everything just right, he can now magically pass through the barrier on the right side and—behold!—in flashing letters is the full name of Adventure's programmer. To find out his name, play the game.

Atari isn't the only company that puts secret things in its games. In fact, there are a lot of games that have secret messages in them. The trouble is they just haven't been found yet. Discovering them can give you the feeling of being like Matthew Broderick, star of the movie "WarGames," when he tapped into the U.S. missile defense system.

ACTIVISION'S ENDURO FOR THE ATARI 2600

If the Indianapolis 500 makes you want to race, then I have just the game for you. It's Enduro, Activision's new driving game for the Atari 2600. Enduro is a combination of the outstanding graphics of Coleco's Turbo and the super sounds of Atari's Night Driver.



Enduro

In Enduro, the player controls a racing car (a super-charged roadster) competing against 200 other cars in a 24-hour race. On the lower quarter of the screen is a scrolling odometer that racks up the miles endured (the player's score) and a gauge that counts the number of cars passed. In the first 24 hours, 200 cars must be passed to reach the next day's race. On Day 2 and every day thereafter, 300 cars must be passed.

The event begins at sunrise on a wide open road twisting across a field of green grass. On the horizon are rugged mountains. This scenery appears on the top three-quarters of the screen.

After the promising blue of morning comes the bright sun, which lights up the sky as it rises. But soon, the roadster hits snow. The slick snowpack causes the driver to have a slight loss of control. I've been told it really feels as if you're driving on ice. This snowpack lasts for most of the day. When it finally melts, the sun sets behind the mountains—ah, what a gorgeous view!

After the sun has set, the only vision the player has of the other cars is their taillights. Soon, during the

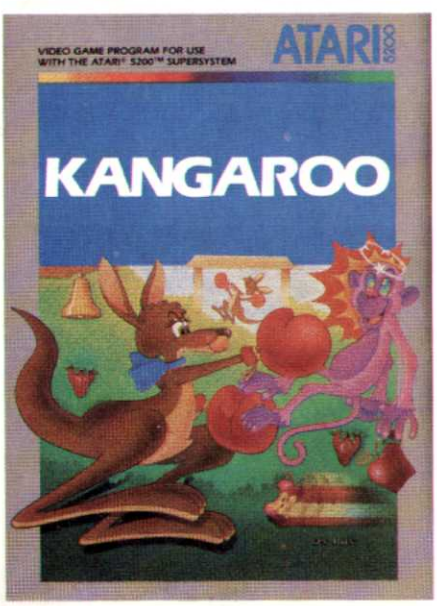
wee hours of the morning, heavy fog sets in. The fog cuts visibility to almost zero; however, it's soon gone, and the sun rises again over the horizon. If the required number of cars have been passed, then the player will enter the next day's race.

Enduro looks more like a game that would be played on the ColecoVision or the Atari Super System (5200), yet it's for the Atari 2600. Enduro is more than a graphically pretty game—designer Larry Miller did an outstanding job capturing the thrill of being a racer. I predict Enduro will soon be on the top-selling list, if it isn't already.

KANGAROO FOR THE ATARI 5200

Kangaroo is a first for me—the first game I'm reviewing for the Atari 5200 Super System! A lot of you like playing the coin-op Kangaroo. If so, you'll like the 5200 version, too. For those of you who haven't played the arcade game, it's simple to play, yet very challenging! It's one that both children and adults can enjoy.

Mother Kangaroo is trying to save her baby, who has been kidnapped by a gang of evil monkeys. She has to jump from branch to branch, climb up ladders, jump over logs, avoid apples thrown at her and punch out menacing monkeys with her boxing glove.



Kangaroo

The No. 1 threat is, of course, the monkeys. These monkeys crawl down from the top of the screen (where Baby Kangaroo is), armed with apples that they throw at Mother Kangaroo to stop her from saving her baby. Before throwing an apple, a monkey stops, takes aim, rears back and then throws. Mother Kangaroo must hop over the apple if it is rolling, or duck under it if it is in the air. If Mother Kangaroo saves her baby, she then goes on to the next screen. There are four different screens in all.

In the second screen Mother Kangaroo has to jump over large gaps in stairways of logs. After several hours of combined play, I finally made it to the third screen, where Baby Kangaroo is in a cage at the top of a column of monkeys. Mother Kangaroo must make this column lower by punching out the monkeys one by one. The fourth screen is a deluxe version of the second, except that the monkeys now not only roll or throw the apples, they can "drop" them on top of Mother Kangaroo.

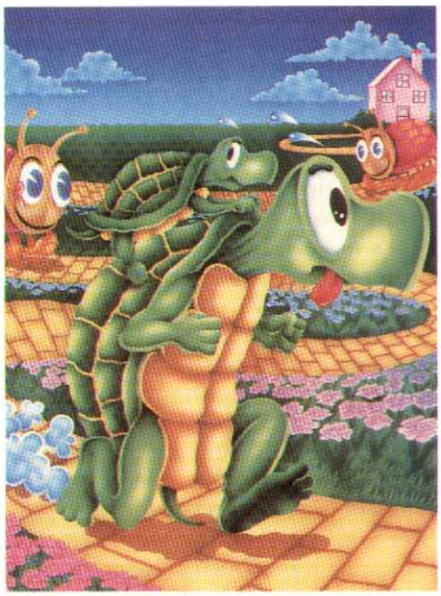
The Atari 5200 has a lot of advantages over the Atari 2600 (VCS). One thing is that the games for the 5200 have a better arcade-look and play to them. The pause button is also another advantage. By pressing it, all action automatically freezes. This is really great if the phone or doorbell rings—or if your mom calls you to take out the trash—*sigh!*

CLIMB ABOARD ODYSSEY'S TURTLES

At most of the hotels I've stayed in, the doorman greets his guests at the door, or the cashier says, "Good morning, how are you?" But the hotel I'm going to tell you about here is most unfriendly.

Fortunately, it isn't for real. It's Turtle Towers in Odyssey's latest game, Turtles. The game can be played with or without the voice adapter on the Odyssey 2.

The hero of the game is a brave turtle who goes around saving little baby turtles. The game is played in a maze similar to the maze in Ladybug by Coleco, but in Turtles, there are "hotel rooms." In each room, there is a question mark that will turn into either a baby turtlet or an evil beetle. If a turtlet is found, it will climb on the back of the player's turtle and a house will randomly appear in one of the four corners. The player then has to guide his turtlet-carrying turtle over to that house.


Turtle Towers

Saving helpless turtlets isn't easy! Beetles (not the rock group) chase the player's turtle around the maze. The touch of one means instant death, but the player has three extra turtles per game. The longer it takes the player to rescue turtlets, the smarter the beetles become. So beware!

The player's defense against these beetles is a "bug bomb" that appears in a little "X." The turtle can place a bomb in the path of a beetle to "debug" him. The player starts the game with three bug bombs. To pick up more, the player must cross over a large flashing "X" at the center of the screen.

With some practice, anyone should make it to the second floor of Turtle Towers. It's not terribly hard, but it's not exactly easy either. I give Turtle Towers an overall rating of B on the three Rs (Rawson's Reliable Ratings). ■

Mastering SUPER

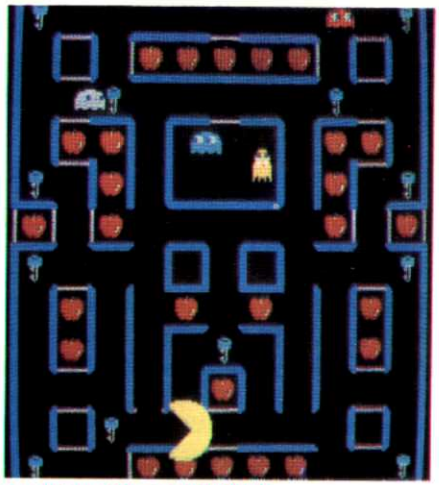
MOVE OVER Clark Kent; there's a new Superman in town. He's Super Pac-Man, newest addition to the Pac-Man clan, who wages a never-ending battle against fruits, objects and the ultimate American maze.

Sound too much like the original Pac-Man or Ms. Pac-Man? Have no fear; this Bally/Midway Mfg. Co. creation is no ordinary caped crusader. By eating two green "super" dots, Super Pac-Man grows to 10 times his normal size! But that's not all. Like every super hero, Super Pac-Man has many powers.

To learn how to use these powers, let's highlight the game's special features and then discuss the best ways of mastering them.

MUNCHIES. Just as in all other Pac-Man games, the object of Super Pac-Man is to keep this hungry gobbler well fed, but the game's manufacturer has finally learned that Pac-Man does not live by yellow dots alone. As Super Pac-Man blazes his way through the maze, he gobbles up everything from apples to old tennis shoes. Each screen offers a different menu, and it all adds up to a *super* feast.

GATES AND KEYS. As noted earlier, Super Pac-Man's maze is lined with all sorts of goodies, but getting at them is not easy. Each screen has



Super Pac-Man playing field

36 pink gates protecting the various fruits and other delicacies.

There are two ways of opening these gates. Each series of gates is controlled by a light blue key. When Pac-Man devours this key, the pink gate disappears and Pac-Man is free to enter that section of the maze and continue his meal. The second way he can get through the gates is by gobbling one of the green dots mentioned above. Now Pac-Man becomes *Super* Pac-Man and can use his special power to pass through the closed gate unimpeded.

A first-time Super Pac-Man player who reaches this point is often trapped by enemy monsters lying in wait near the pink gates. Keep reading and we'll discuss a super plan to thwart these monsters.

ENERGIZE ME. As in other Pac-Man games, Super Pac-Man can attack his enemies and devour them with ease after snapping up one of the four energizers strategically placed within the maze. Just remember: The best time to eat an energizer is when the enemy monsters are closing in on you. That's the time to gulp one down and then swallow those helpless blue monsters.

SUPER DOTS. I've mentioned these green dots before; they're located near the center of the screen. But now let's go into a little more detail. By munching one of these dots, our mild-mannered Pac-Man turns into the all-powerful *Super* Pac-Man. Suddenly armed with special powers, he can run through any locked pink gate and even pass through enemy monsters without being eaten. Not only that, but he grows to *10 times* his normal size, and nothing can stop him—nohow!

SPEED BUTTON. During the super phase of the game, which lasts for about 25 seconds after our hero has downed a super dot, you can speed up his movements simply by pressing a speed button. Located next to the joystick, this button causes Super Pac-Man to move around the screen much faster than

other video heros. (In the Super-Pac Attack section coming up a little later, we'll tell you how to use the speed button to increase your scores.)

FLASHING STAR. Every so often during the game, a star will begin to flash under the "cage" that is home base for the enemy monsters. The flashing is accompanied by a noisy alarm. While the star is flashing, objects such as apples or fried eggs begin to appear in boxes on either side of the star. When Super Pac-Man gobbles up the star, you're awarded a sum of bonus points based on whatever objects were in the boxes at the time.

BY ABBOT NEIL SOLOMON

PAC-MAN

PAC-MAN

BONUS ROUND. Every third screen is a bonus round. During this round, there are no enemy monsters on the screen. Instead, the number 20,000 appears in their cage. For 20 seconds now, Super Pac-Man can race around the screen gobbling up everything in sight. This is the best time to use your super speed button, to get the most out of the bonus round that you can.

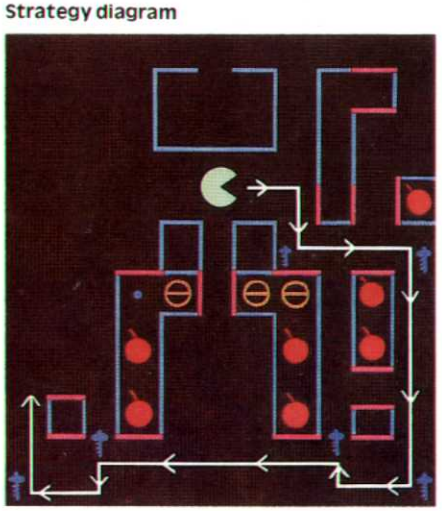
Now that you've learned the fundamentals of Super Pac-Man, it's time to master the Super-Pac Attack. Remember, as in other video games, the object here is to rack up points without being destroyed.

"KEYS" TO THE GATES. The most common problem a new player has is getting trapped against a locked gate. We know, of course, that each screen has 36 of these protective pink gates. We also know that Super Pac-Man, in his regular form, must eat up the keys to these gates to get through them. Ah, but here's the "key" to the keys. When the round begins, concentrate on eating *only* the keys. For the time being, don't worry about the apples or other objects or anything else. Just race around the board, gobbling up the keys that open all those pesky gates. This makes the maze easy to beat. Once all the gates are open, the screen is yours. Reward your caped crusader with all those tasty tidbits, now ripe for picking.

A good way to begin eating these keys is to start at the lower right-hand side of the screen. By following the route shown in the diagram at the right, you can eat up four keys and open up seven gates before any enemy monsters can get near you. When the enemy begins to close in, no need to panic. Simply follow the pattern shown here and the blue enemy will actually *retreat* from your advancing Super Pac-Man.

Super Pac-Man, coin-op version

Strategy diagram



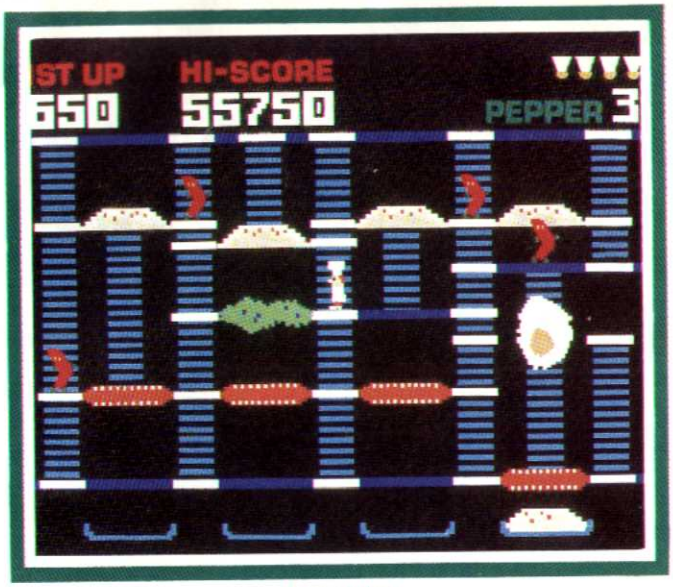
TO SPEED OR NOT TO SPEED. After Super Pac-Man eats a green super dot, you can increase his speed by pressing the speed button, as we indicated earlier. Although the beginning player will jump at the chance, it is sometimes better to hold back on the speed button. Remember, the faster Super Pac-Man moves around the screen, the harder it is to control him. The secret then is to use the speed button only when you have a *long straight path* to travel. If you do have to make a sharp turn, release the speed button, make your turn and then re-press the button to shoot along the next straight path. In this way, you can increase your score without risking costly mistakes.

FLASHING STAR TRICKS. When the flashing star appears, don't be in too much of a hurry to gobble it up. Move Super Pac-Man to a spot near the star and then be patient. Keep your eyes on the objects that appear in the boxes next to the flashing star, and when the object in the left box is the same as the one in the right box, bingo! It's time to strike to get the most points.

SUPER DOTS & ENERGIZERS. You already know about the special powers Super Pac-Man gets when he eats those green dots. But the secret to getting an even better score during the super phase is to get him to eat one of the four regular energizers *after* eating a green super dot. Each monster he devours is now worth double its regular point value. And don't forget to use your speed button.

O.K., have you got all that? If so, you're well on your way to mastering Super Pac-Man. All it takes from here on out is practice, practice, practice.

Happy chomping! ■



Burgertime

Fantastic Voyage

RATING THE NEW GAMES FOR CHRISTMAS

BY DAWN GORDON

VIDEO GAMES are as big as ever, with dozens of new action-packed adventures appearing without fail each month. Color, graphics and astounding ingenuity are the keys to creating a successful game, and the latest products emerging from Silicon Valley are chock full of all that and more. So strap yourself in, rev up your warp drive, and get ready for a blast.

BURGERTIME

Highly detailed graphics and superb color are the prime features in Intellivision's new "Supergraphics" games. You don't need any special adapters to run them; you just pop them into the console. Burgertime is one of the best of these new offerings.

As the merry chef of this game, Peter Pepper, it's your job to cook up hamburgers that would make a McDonald's-lover drool. As you run through the colorful maze, though, assembling the various ingredients, you have to watch out for the menacing Mr. Hot Dog, Mr. Eggs and Mr. Pickle, who are out to ruin your meal. If you're good—and lucky, too—you can bury them under beef patties, lettuce and buns, or perhaps knock them out with a dash of pepper. Build four burgers without making a mess, and it's on to the next level, ad infinitum.

FANTASTIC VOYAGE

Designed specifically for the Atari 400 or 800 computer, this is a game that re-creates the plot of the award-winning 1966 super sci-fi movie of the same name. You and your submarine are reduced to the size of a microbe and injected into the bloodstream of a hospital patient. Your mission: to disintegrate, with your sub's laser beam, a blood clot that is threatening to kill him. But you only have a limited amount of time before your patient "kicks the bucket," so you must hurry.

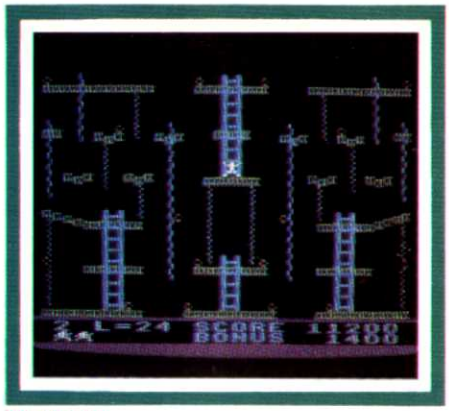
Be careful, though, for you yourself are fair game for dangerous bacteria and deadly white blood cells. Enzymes and red blood cells, on the other hand, should be dealt with gently, as your patient needs these to stay alive. Keep a steady hand on the wheel, mate, or you're liable to face a malpractice suit.

JUMPMAN

Also built for the Atari 400 and 800 computers, this is a delightful game from Epyx that can keep you going for hours without stopping. It's a lot like Donkey Kong in many ways, but instead of trying to save poor Fay from a giant gorilla, your job here is to save the Jupiter Command Center from numerous bombs strewn about the structure.

Your Jumpman can do all sorts of neat things, such as jump straight up or to the right or left. He can even

RATING THE NEW GAMES



Jumpman

No Escape

jump from girder to girder with the ease of a trapeze artist, but keep a lookout for strange monsters such as vampire bats, UFO s, jumping blocks, robots and little white balls that can send you tumbling — without a parachute.

Best of all, there are 30 different screens to choose from, each one completely different from the next.

JUPITER LANDER

The Commodore 64 computer is growing in popularity each day, and with games like Jupiter Lander coming along, it's easy to see why. You're a space pilot in this one, and your assignment is to land your spacecraft on the only solid landing site, if you can find it, on the Planet Jupiter (mostly a gaseous world).

As long as your fuel holds out, you can make as many test-landings as you want to try to find a solid place. But be careful; you must land below the yellow zone or your ship will crash. And remember, the atmosphere on Jupiter is mostly methane and ammonia. You won't last too long without a spacesuit.

LOOPING

Flying a small plane can be pretty tricky, and the same is true of Coleco's new game, Looping. Seated at the controls of a fast-moving plane (really your ColecoVision console), you're required to release a gate control secured inside a flight terminal — all the while dodging a barrage of hot-air balloons — and then you fly inside.

That's only the half of it, though, for once inside, you have to find your way through a wild maze filled with menacing beasties. The play is fast and action-packed, and it takes a real pro to reach the end.

MISSION X

Mission X is another winner from Mattel for the Intellivision system. In the cockpit again, you're flying a top-secret bombing raid over enemy territory, and your mission is to wipe out the enemy's ships, tanks, artillery and bridges as they come into view.

Watch out, though, for enemy flak and gunfire. One hit and you're dead. Fly during the day, or try a dangerous night mission instead. Either way, it's loads of fun.

NO ESCAPE

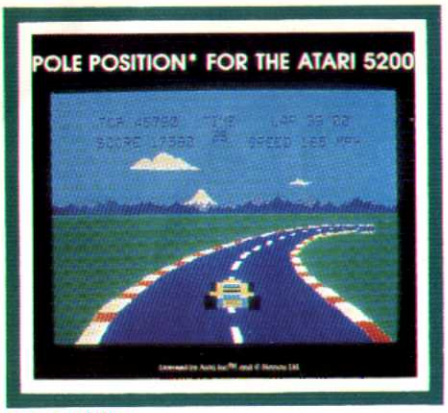
Imagic is never at a loss for new game ideas, and if you don't believe it, take a look at No Escape. It may sound like a San Quentin-type game, but, in fact, it more closely resembles Greek mythology.

In this Atari VCS game, the player must fight off attacking Furies by banking his shots off the walls and roof of his temple stronghold. The better you are, the faster the action, because each hit only angers the

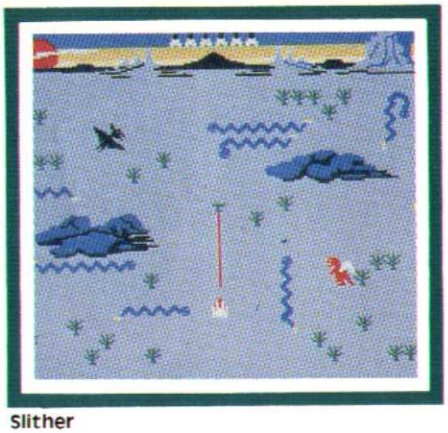
Jupiter Landing

Looping


Mission X



Pole Position



Slither

Furies more and they respond by multiplying into an even greater force. Fight the good fight, though, and you can expect a winged Pegasus to pick you up and carry you off to your next adventure.

POLE POSITION

The Atari 5200 Supersystem provides graphics and sound capabilities very similar to those of the Atari 400 and 800 computers. The ultra-sophisticated games you can play on it really do approach the arcade experience, so you'd better tune up your reflexes before powering up this one. Pole Position puts you in the driver's seat for an incredibly realistic Grand Prix race.

Important data — such as how many laps you've completed, your speed and your elapsed time — are flashed on the screen to help you plot your strategy, and the use of color and sound is first rate. Don't crash too many times, though; you only have 206 bones in your body!

SLITHER

ColecoVision is fast becoming everyone's favorite arcade-style system because of the way in which it combines superb graphics with fast-action strategy. Another big plus for ColecoVision is its new Roller-Controller track-ball for fast and precise control. Slither takes advantage of all these attributes to provide you an unforgettable encounter with deadly snakes and other equally obnoxious creatures.

You must elude these baddies by maneuvering all over a colorful desert landscape. And, as you snake away from your pursuers, always remember to blast them before they corner you.

SOLAR STORM

The Atari VCS version of Solar Storm from Imagic is an earth-shattering experience. You, the player, must defend your planet (sound familiar?) from an armada of not-so-nice attacking alien spacecraft. If they get too many shots in, your world overheats and blows up. Fortunately, you do have a fast and powerful ship, and if you're good, you can get them before they get you.

Oh, by the way, there are fragments from an exploded sun that can shower the planet with harmful debris; better stop that as well.

SPACE DUNGEON

Space Dungeon is yet another Atari Supersystem standout. In this one you're surrounded by neon-glowing enemies as you cautiously search for lost treasure. Not only that, but you have to contend with different types of beasties lying in wait for you along the way, and each turn becomes more hazardous as the game progresses.

Believe it or not, there are 99 different floors for you to explore. You'll need all the luck you can muster to get through to the treasure. Luckily, though, the game comes with a dual-joystick holder that can prove the winning edge.

And in conclusion . . .

Whichever of these new games you choose, you can hardly go wrong. They're all pretty great. The proof is in the playing, though, and there, my friends, may the force be with you.

If it's not, that's the beauty part. You can always flip the switch and try, try again. ■

Solar Storm

Space Dungeon

FOR PARENTS ONLY:

10 GREAT GIFT IDEAS For Christmas

BY PAUL KUHN

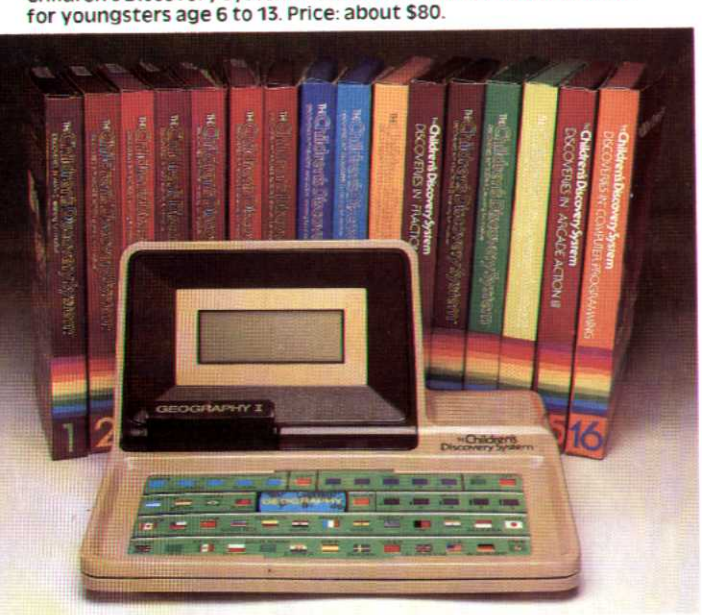
Don't look now, but another holiday gift-giving season is almost here, and soon you'll be faced with the question of what to give your Tommy or Nancy or Little David. Of course, if they're the ones who've shown you these pages, you already know what to get them. It's one or more of these 10 great gift ideas for Christmas.

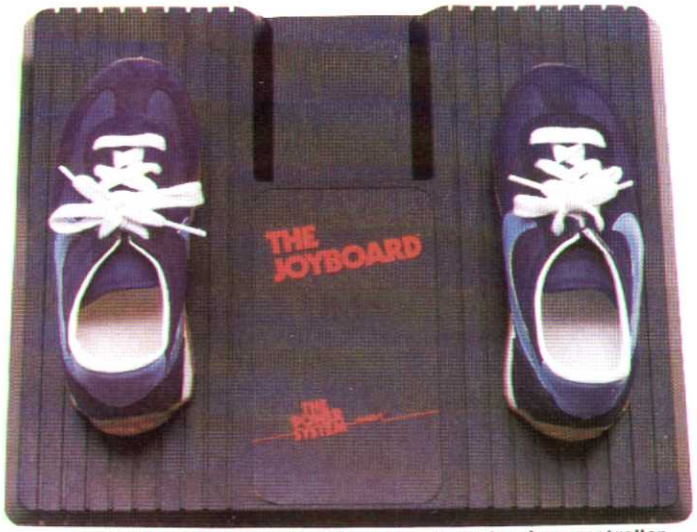
Ideal for helping a youngster to clean up his computing equipment is the new Micro Maintenance Kit (above) from PerfectData. Price: $39.95.

Sure to please game fans is Suspended, a Cryogenic Adventure (above), one of the first interactive board games, from Infocom. Price: $49.95. If someone's expecting a handheld computer, here's one of the best — Texas Instruments' Compact 40. Price: $249.95.

A graphics device that works like a mouse but costs far less is the new Graphics Tablet from Koala Technologies. Price: $125.

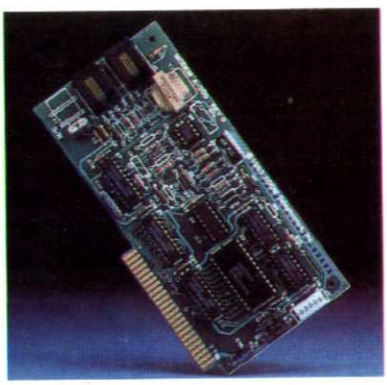
Especially appropriate as a child's first computer is the Children's Discovery System (below) from Mattel, recommended for youngsters age 6 to 13. Price: about $80.





The Joyboard (above) from Amiga is a new stand-on controller that gives a youngster the real "feel" of games like Mogul Maniac (skiing) and Surf's Up (surfing). Price: $40.

What you're looking at here (below) is the insides of a new Networker modem from Zoom Telephonics for the Apple II. Price: $129, or about half what you'd normally expect to pay.

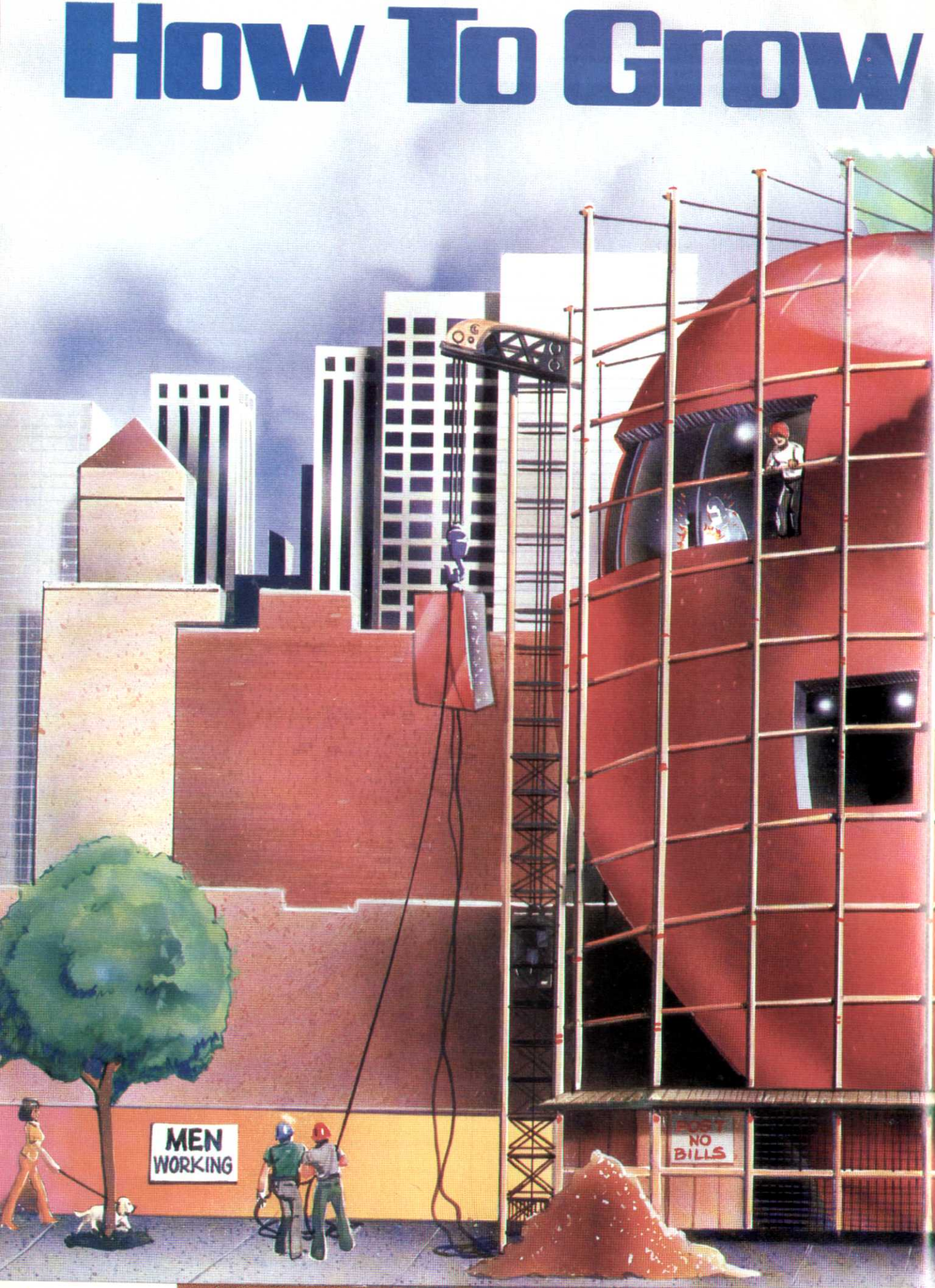


Rated by many the best briefcase-sized computer for under $1000 is the Tandy/Radio Shack TRS-80 Model 100 (above). Price: $799.

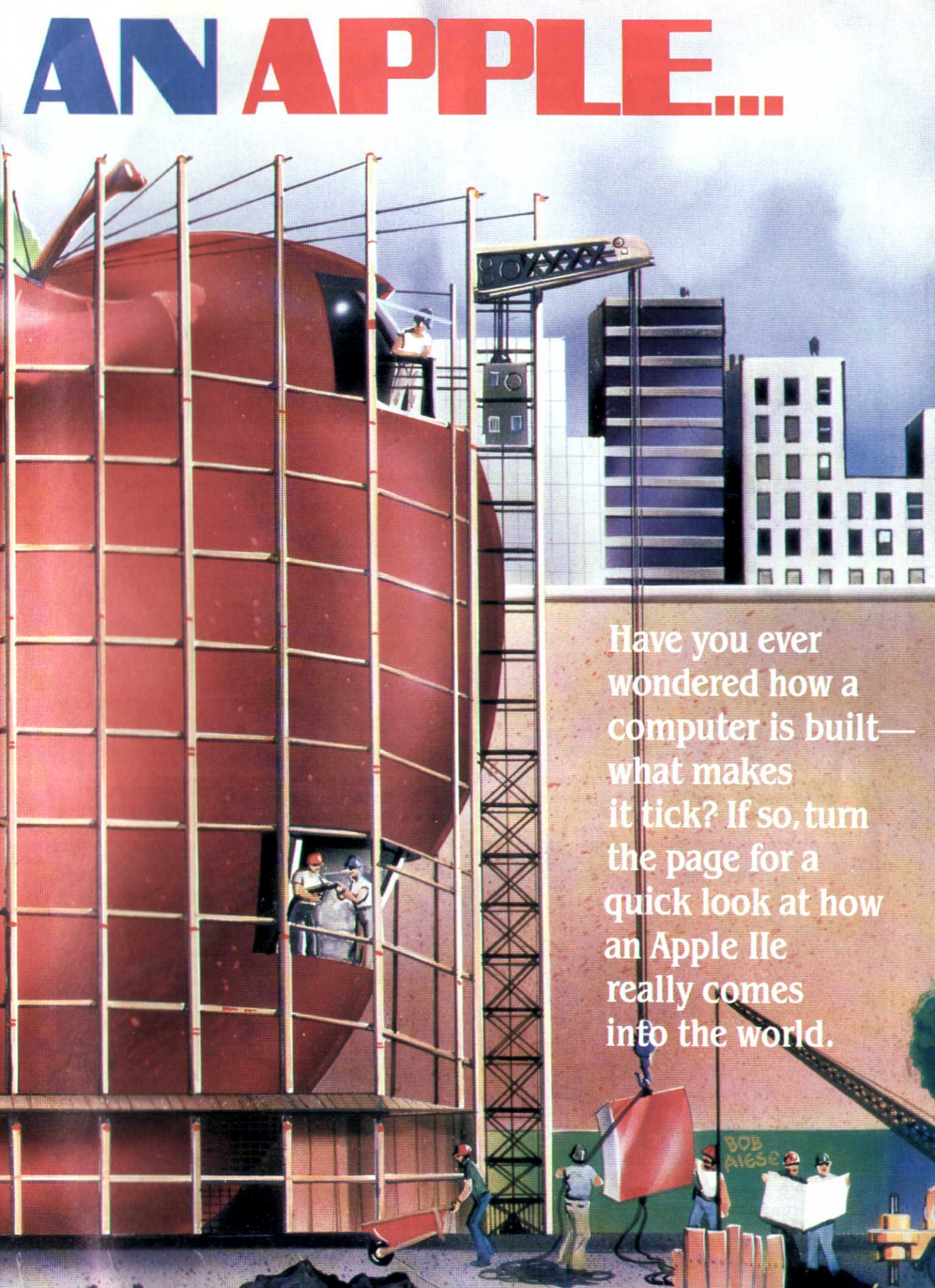
Another handheld computer that's sure to please the young computer user is this Tandy/Radio Shack TRS-80 PC-4, complete with cassette interface and printer. Price: about $200.

If you really want to go all out, this is what you've been waiting for (right). It's the Gavilan, a 9-pound, 16-bit briefcase-sized computer that could well be the only machine your teenager will ever need. Price: $3995.

How To Grow

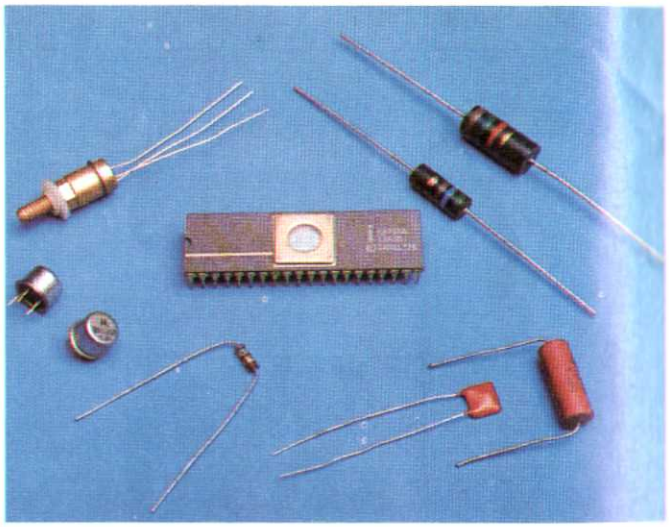


AN APPLE...

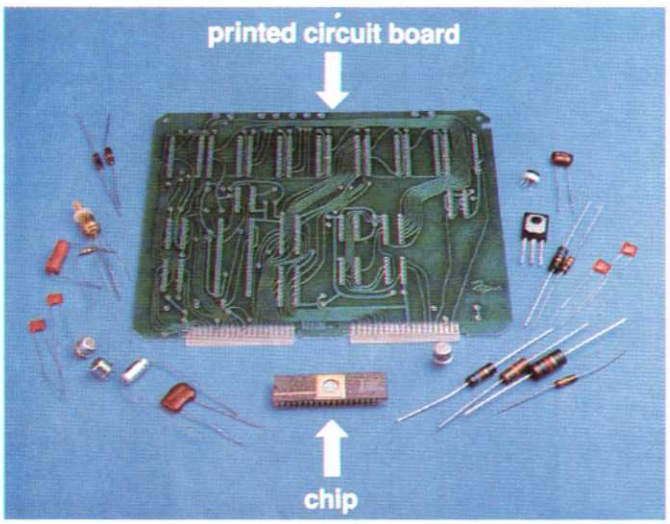


Have you ever wondered how a computer is built—what makes it tick? If so, turn the page for a quick look at how an Apple IIe really comes into the world.

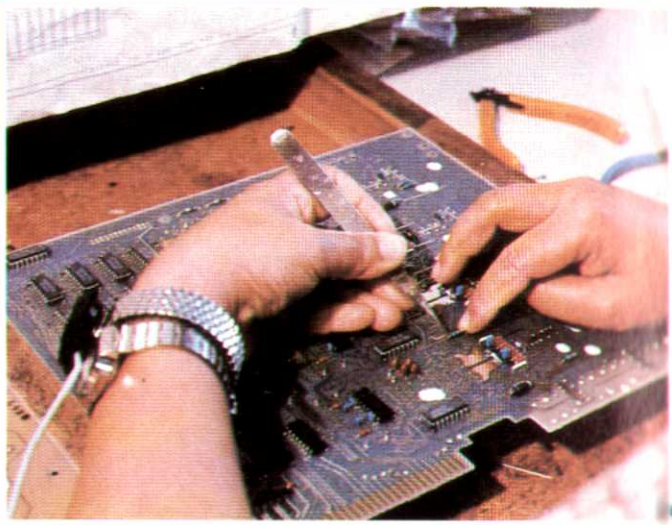
1. This is a typical Apple plant where the process of building an Apple IIe really begins.



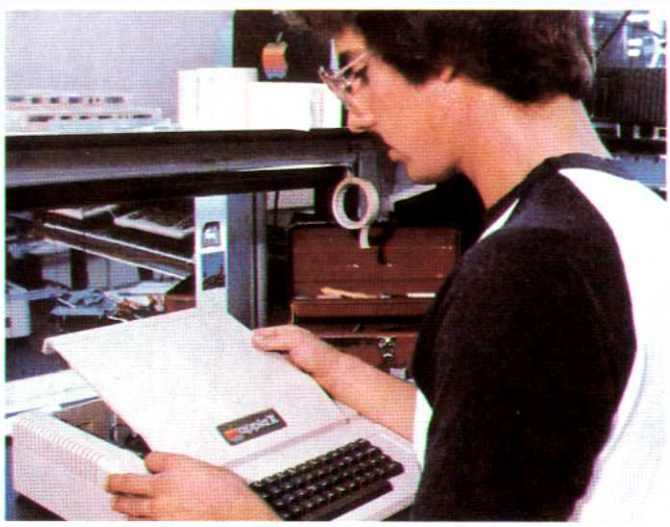
2. Here are some of the parts that go into the making of an Apple—resistors, capacitors, transistors and a microprocessor, or chip (center).



4. The chip and a lot of other parts like these are assembled and then attached one-by-one to a printed circuit board.

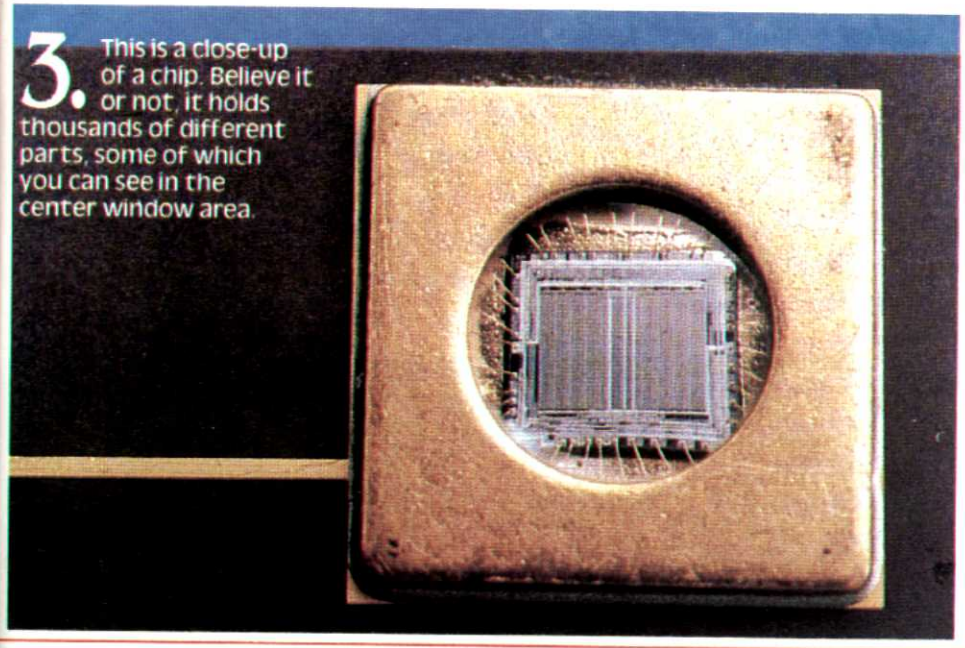


5. This is called "stuffing the board." Once the parts are all in, they're soldered securely in place.



8. The last step in the assembly is putting a new cover on the computer.

9. Once the computer is fully assembled, it undergoes final testing and check-out. As incredible as it may seem, each computer is run continuously for four days to make sure it's fit. This is called "burning in" the computer.



3. This is a close-up of a chip. Believe it or not, it holds thousands of different parts, some of which you can see in the center window area.

6. The printed circuit is then attached to a cabinet base, as you see here.

7. The speaker, keyboard assembly and power supply are all attached to the same cabinet base, and the computer is then hooked up to a monitor for testing.

Grow An Apple

10. And here it is fully assembled—a brand, spanking new Apple IIe. Ta-da!

"Fame's" Lee Curreri
KING OF THE HILL

"FAME" WAS A HIT movie that went on to become an award-winning television show due mainly to the talents of a remarkable group of young performers. Not the least of these was Lee Curreri, "Fame's" celebrated king of the keyboards. The role he plays is that of Bruno Martelli, and one of the reasons he's so good at it is that he's not only playing the part—he's living it.

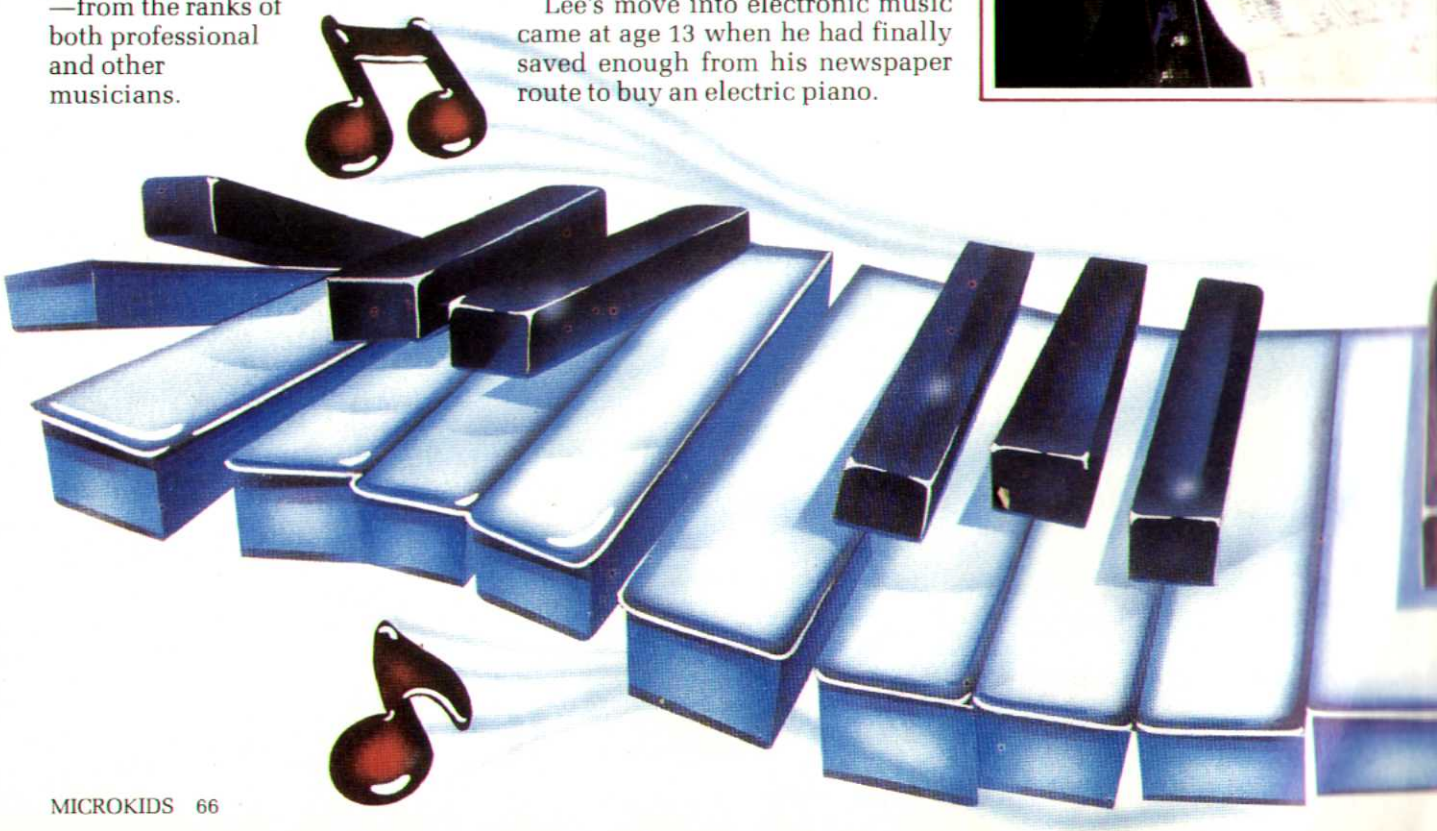
"Just like Bruno," says Lee, "my interest in electronics and computer music wasn't always appreciated by my more classically minded music teachers. Bruno's run-ins with Professor Shorofsky on the show are similar to experiences in my own training as a musician. But that didn't stop my interest in computer music—it's tremendously exciting with amazing possibilities for everyone in music."

Computer music today is indeed gathering more and more followers—from the ranks of both professional and other musicians. The cost of the hardware and software needed has dropped to the point where it's now within the reach of almost anyone, and the opportunities for making music with computers are almost limitless. Lee is in the forefront of this movement, thanks to "Fame." All of which comes as something of a surprise because he certainly didn't plan it that way.

Lee started his formal music training almost by chance. A neighbor gave his family an old piano—"the size of a Buick," he recalls—and he started taking lessons at age six.

"I had to use a cooking timer when I practiced," he says, "and I was forever pushing the time ahead. But my teacher didn't care much about teaching me scales or the note-for-note approach. Other kids had teachers who whacked them with rulers. Mine didn't, so I kept going with my lessons when other kids would probably quit after three months."

Lee's move into electronic music came at age 13 when he had finally saved enough from his newspaper route to buy an electric piano.



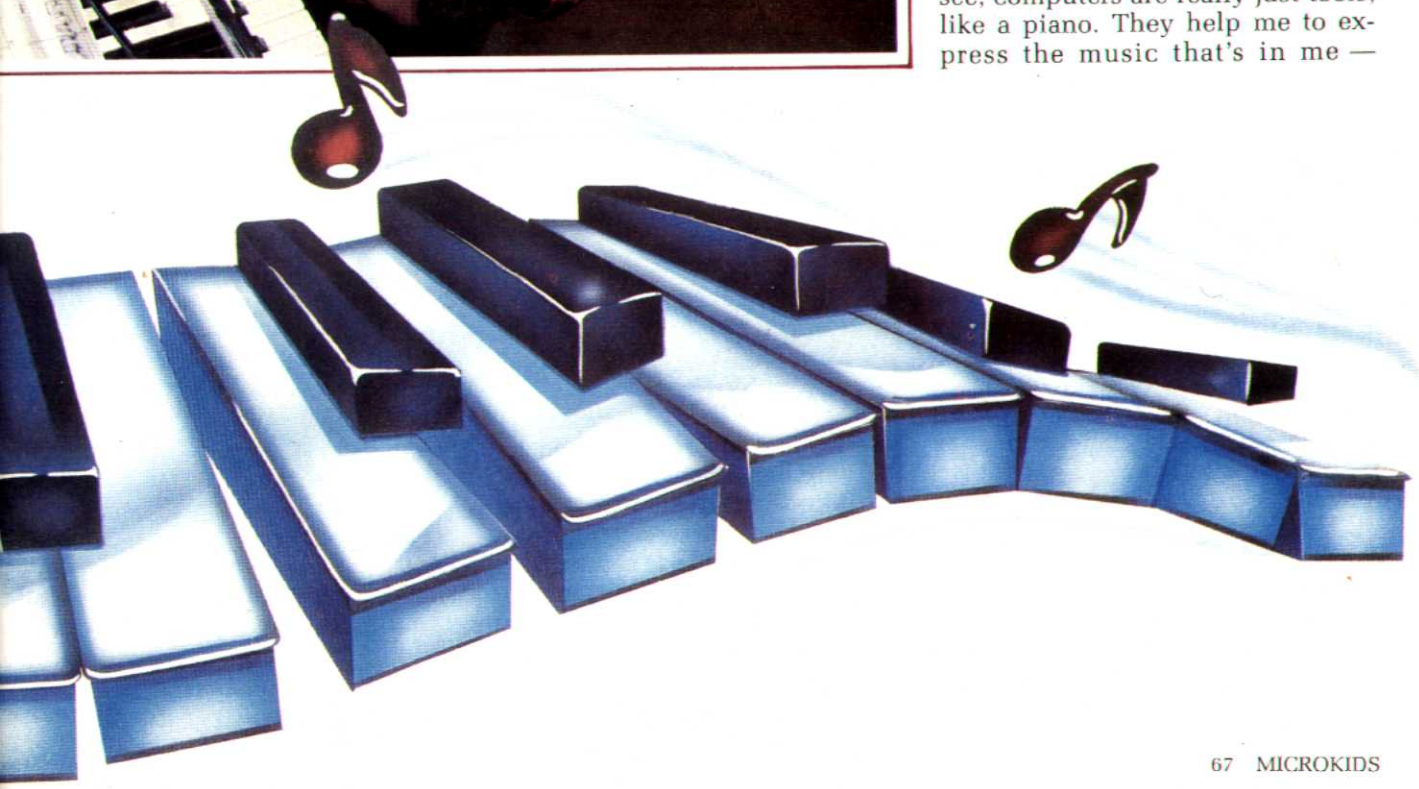
BY CATHERINE WREN

KEYBOARDS

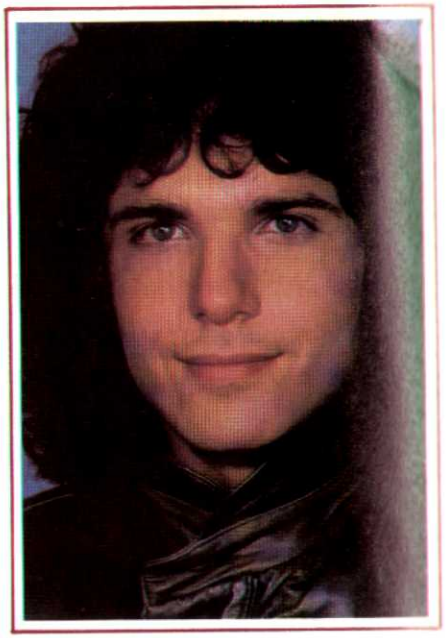
"I always liked the sound of synthesized music," he says. "This is when sounds are generated by using oscillators and voltage control filters, and these wave patterns are converted through an electronic circuit into a signal and then amplified. Now I have an Emulator, which is a keyboard instrument that I can put a disk in and it imitates a flute, a cello or the sound of any instrument I want."

Lee has thus branched out into a form of music based on digital synthesis, which is the technical term for what happens when a computer takes a mathematical representation of a sound wave and then reproduces it on command as music. But make no mistake; it's Lee, not the computer, who writes the songs.

"Composing," he says, "is putting together combinations of sound — and that can be done on a subway train, anywhere. I can compose a song in my head and then program my computer to reproduce it. You see, computers are really just tools, like a piano. They help me to express the music that's in me —



Lee Curreri



nothing more, nothing less."

Lee is convinced therefore that computers will never replace composers. But musicians? That could be another story.

"For me, to a large extent, they already have," says Lee. "I have a Lynn Drum Computer and it sounds exactly like drums. It's based on digital technology, and there is absolutely no difference in the sound from real drums. I just program in anything I want to accompany me, and I have an instant drummer."

So if Lee is up late composing music, he can use his computer to create a backup band to hear what a piece of music will really sound like when it's fully orchestrated.

Lee Curreri (left) with some of his co-stars on the hit TV show "Fame."

"I can make music using computers that is equivalent to actually hiring four or five musicians to do the same thing," he says. "I can write out a bass part on my synthesizer, lay down any kind of keyboard parts or instrument parts by using my Emulator, program my drum computer, and I'm set to go.

"Computers provide me with a great deal of freedom—the freedom to work when I want to work, plus I don't want or need to own all the many instruments I can imitate by using computers. But when I get my own act together, I'll get a band. I think trying to play to live audiences—and traveling around with just my computers—could get a little lonely."

As you can see, the computer to Lee is just another way to express himself musically, but there are others, he notes, who have adopted the new technology body and soul.

"Techno-rock is one example," he says. "It's music that has an electric sound. The focus of the music is on the hardware — the computers — rather than using computers to help orchestrate the music. It can be repetitious, and is very experimental in terms of sound. I like some of it, like a group called Painted Load.

"But what's important to me is the music. And as I said, my computers are my tools. When people visit my home for the first time, they are amazed at all the hardware I own. I tell them it's just my tool shed."

Computer music has also caught the attention of many musician-artists who create "performance art." These presentations are usually a mixture of multi-media effects, including film, sound and light. They usually involve a great deal of experimentation with computers, the performers changing their voices, trying different combinations of sounds, and just generally "playing" with the computer.

"It's very easy to change the way your voice sounds with a computer," Lee says. "You get an MSR pitch transformer, talk into it, and your voice goes through an analog delay. This is how the little girl's voice in 'Poltergeist' was done when she was inside the TV set. As more people gain access to computers, performance art will seem less avant-garde in the future."

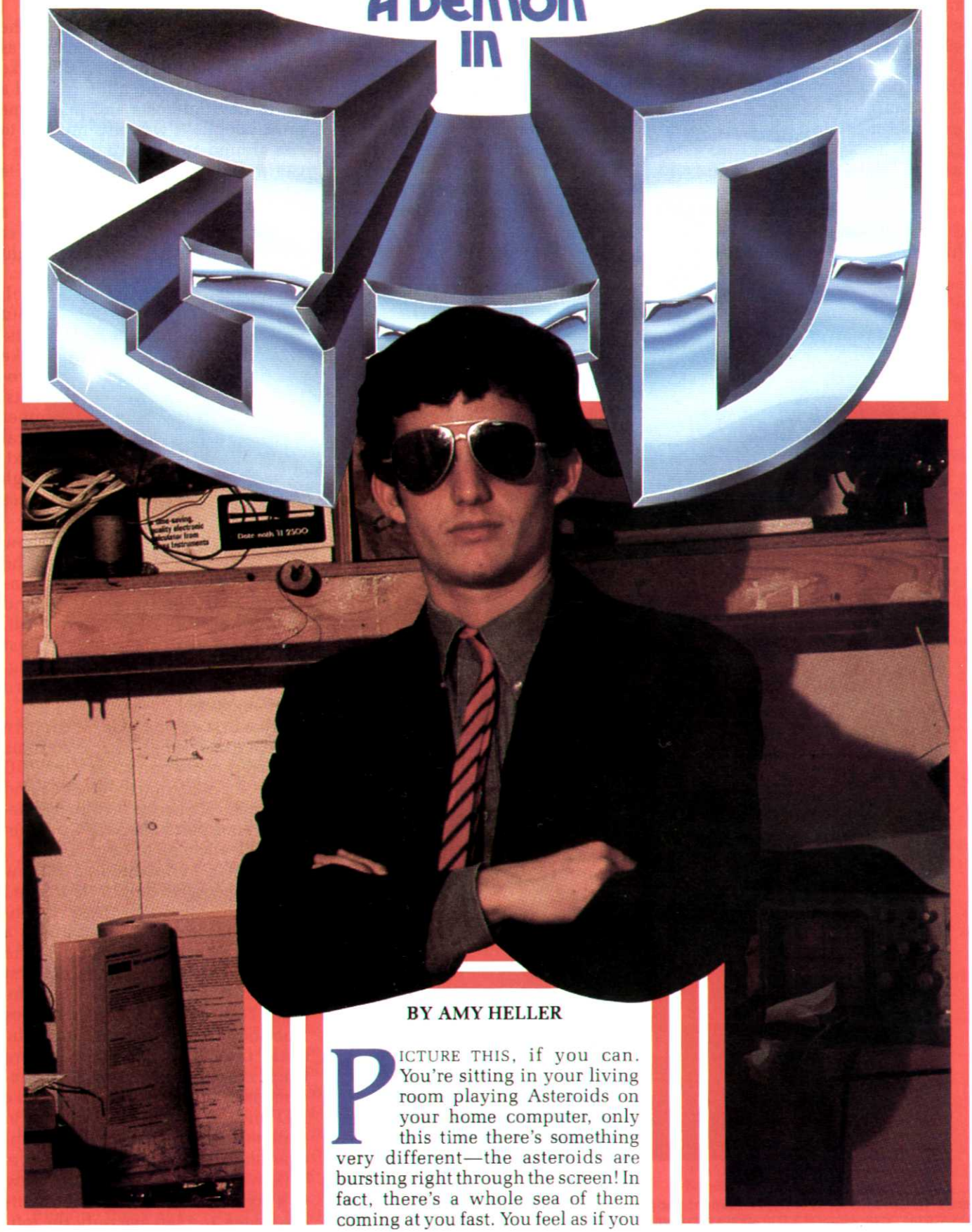
Right now, though, computers themselves are still way out to much of the general public. So much so, in fact, that Lee wrote a script last season about computer phobia.

"It was about Miss Berg, the older woman in the front office, who was going to be replaced by a computer," he recalls. "I wanted to get across the idea that computers aren't around just to replace people, that they can help us and greatly expand what we are all capable of doing."

Lee did this by writing the script so that Bruno would end up programming the computer to be used in a dance performance complete with computer graphics. He showed how the computer could be used in ways other than that of merely replacing a favorite school employee.

"People frightened of computers, including musicians, are really just people who haven't had the exposure," Lee says. "But the kid today who has grown up with an Emulator or a mini-Moog since he was five can be just as musical and expressive with that instrument as a kid who grows up with a Stradivarius violin. It's all in the exposure." ■

MEET MICHAEL HYMAN: A DEMON IN 3-D



BY AMY HELLER

PICTURE THIS, if you can. You're sitting in your living room playing Asteroids on your home computer, only this time there's something very different—the asteroids are bursting right through the screen! In fact, there's a whole sea of them coming at you fast. You feel as if you

should duck, but there's just no time.

Instead, you call on all your game-playing skills to maneuver up, down, left, right, forward, and backward at lightning speed. You zap this one, that one, the other — never giving an inch. You feel as if you've entered some new dimension. And you have. But this is not the Twilight Zone. It's the world of 3-D computer graphics — in the example described above, a world created by a 17-year-old inventor named Michael Hyman, of Howard County, Md.

In March, Mike was awarded a $10,000 scholarship by the Westinghouse Science Talent Search, a national competition for high school seniors, for his work in 3-D computer graphics. In June, he was also awarded a $40,000 National Energy Foundation – U.S. Steel scholarship to Princeton University, again for his work in 3-D computer graphics.

Quite a haul! But for Mike, the best part of all this was the five days he spent in Washington, D.C., this past spring with the other 39 Westinghouse winners. There they met with President Reagan and two Nobel Prize winners. But that was just the beginning.

"It was really neat to talk to the other kids about ideas in science as well as about life in general," Mike explains. "I learned a lot. I found a lot of new interests and met some great people. It was also fun just to run around and have a good time." Getting there, though, was quite a job.

Mike Hyman might be called a "self-made" computer whiz. Ever since he was 12 years old and taught himself how to use a microcomputer in his middle school, Mike has been figuring things out for himself. As soon as he had mastered that first computer, Mike started teaching a class in programming to his fellow students. For three years, he took summer courses in computers at the local vocational-technical school. Next, he took mail-order courses through the Maryland Academy of Sciences and Johns Hopkins University.

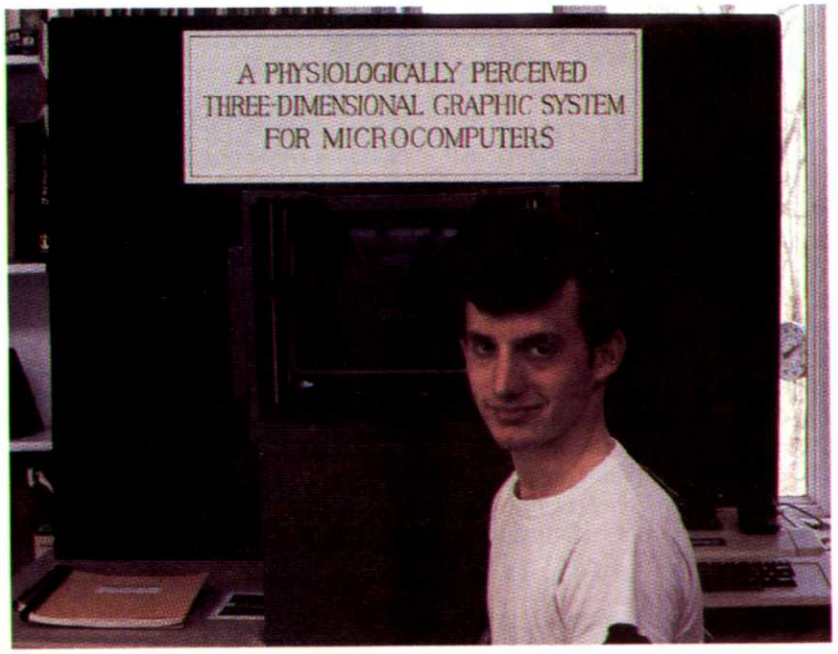
When he wants to learn a new computer language, Mike says, he normally just sits down with a manual, reads over the commands, and then figures the rest out for himself. "A lot of times," he reports, "I just say, 'Well, I need to do something. Go out and do it.' And I find I learn more that way."

Mike first got the idea for his own 3-D computer graphics system some two years ago when he saw two 3-D films—a Three Stooges comedy and an Alfred Hitchcock thriller. He decided then that he would try to get the same effect on a computer.

He began by reading up on how the eyes perceive depth. He learned that we see things in three dimensions because the right eye sees a slightly different image than the left. (Try looking at your finger first with one eye closed, and then the other. Notice the shift?) The images from both eyes travel through the optic nerves to the brain, where they merged, creating a three-dimensional effect. So to achieve 3-D on his computer, Mike had to generate two slightly different images on the screen, one for each eye. Then he had to ensure that the viewer's right eye saw only the right-eye image, the left eye only the left.

Mike Hyman with some of the equipment and paraphernalia that enabled him to create his prize-winning 3-D graphics program.

After toying with a number of techniques, he finally solved the problem of how to generate left- and right-eye graphics simultaneously through the use of a piece of sophisticated optical hardware called a beam-splitter. To make sure that each eye would receive only the proper graphics, he then turned to the same type of polarized filter glasses he had first used to see the 3-D Three Stooges. Now all Mike had to do was write the program. As you might expect, though, that was easier said than done.



A brief pause at the Smithsonian Institute in Washington.

Because he doesn't own a computer, Mike spent the next two years working on any Apple II Plus computer he could "beg, borrow or steal." When he could, he worked at home on a borrowed unit. Other times, he worked on Apples at work (a computer consulting firm), at school, or at friends' houses.

Now that it's done, Mike feels that the possible applications for his 3-D system are almost limitless. "It could be used to help students learn about geometry, chemical structures, crystals and engineering," he says. "An architect could even plan a whole building on his home computer. Eye doctors could prescribe special eye exercises using the system. And, of course, it could add a third dimension to home video games." Indeed, Mike is now working on a 3-D game for the Apple.

But one thing Mike won't do, now or ever, is spend all of his time in front of a computer screen.

"I do lots of things—I try to keep very busy," he says. And he's not kidding. Living as he does in rural Maryland, he thoroughly enjoys the outdoors. He runs two and a half miles a day and goes hiking and canoeing whenever he gets a chance. He likes all kinds of music and plays the synthesizer for relaxation. His parents are both artists so Mike also paints and sketches with a certain degree of skill. In fact, his interest in art, he feels, helps him in his work in computer graphics.

In school, Mike excels in all subjects and he graduated first in his class of 220 at Howard County's Centennial High School. At Princeton, he plans to major in electrical engineering. Eventually, he'd like to get a doctorate and work in research.

His success, though, is not without its problems. When he returned to school after winning the Westinghouse award, for instance, he got a mixed reception from his fellow students. Some congratulated him, but others began to avoid him.

"I guess I sort of frightened them away," Mike observes. "But I can understand how they feel. Meeting the *other* Westinghouse winners made me feel very stupid, very fast."

That's Mike Hyman — a unique blend of energy, intelligence and initiative, but still just a "good kid" at heart. ■

How To Get Started

If you have a science project that you think has award potential, you might want to enter the Westinghouse Science Talent Search, as Michael Hyman did. Or you might consider entering a school or local science fair. Mike took this route, too, and ended up winning a computer prize at the 1982 International Science and Engineering Fair. For information about either of these contests ask your science teacher or write to: Science Service, Inc., 1719 N Street NW, Washington, D.C. 20036.

Or perhaps you'd like to enter your region's Student Exposition on Energy Resources fair—after all, this was Mike's first step to winning a $40,000 college scholarship. Students in grades 7 to 12 are eligible; the five regions for this competition are New York, Washington D.C., Los Angeles, San Francisco, and New Jersey. For further details, write to: National Energy Foundation, 366 Madison Avenue, Suite 705, New York, New York 10017.

For those with loftier ambitions, the National Science Teachers Association and the National Aeronautics and Space Adminstration run a yearly contest in which high school students across the country propose experiments to be run on board the space shuttle. If you've got a suggestion that's out of this world, write for information to: National Science Teachers Association, 1742 Connecticut Avenue NW, Washington, D.C. 20009.

If what you really want to do, though, is write the Great American Computer Program, take heart — there's a contest for you, too. Students in grades 7 to 12 are eligible to enter the Association for Educational Data Systems' computer programming contest. For more information, contact: Association for Educational Data Systems, 1201 16th Street NW, Washington, D.C. 20036.

Good luck! ■

If you'd like to experience the magic of 3-D for yourself and also read more about the subject, check out *Amazing 3-D* by Hal Morgan and Dan Symmes, published by Little, Brown and Company ($24.95 hardcover, $13.95 paperback). Every book comes with a pair of red and blue 3-D glasses and 135 eye-boggling 3-D illustrations.

TUNE IN TOMORROW ...TODAY

BY JOSH MARTIN

"WHO KILLED millionaire industrialist Derrick Reardon?" That's the question thousands of amateur detectives are asking themselves these days due to Murder Anyone?, a fascinating new home video game. But equally fascinating is the new television technology that has made this game possible.

Murder Anyone? is, in fact, only one of a whole new generation of video games utilizing the spectacular effects that game-makers can achieve through the use of something called "interactive television" in combination with videodiscs.

Videodiscs we know, of course, but what exactly is interactive television? How does it work? What can it do? Hang on, and we'll try to explain.

Put most simply, interactive television is television that's based on the principle of two-way communications. At four points in Murder Anyone?, for example, you're given two possible choices as to how you think private eye Stew Cavanaugh should conduct his investigation into the Reardon murder. You have the option, in effect, to alter the course of the game.

You can do this because Murder Anyone? is recorded on an interactive videodisc system that operates like a computer system. That means you can random-access any point in the game—

Murder, Anyone?, one of the first interactive television games.

jump from any one spot to any other or back again—as often as you choose. Not only that, but you can advance the TV picture frame by frame, freeze the action, or speed it up as fast as you like.

Sounds great, right? It is. So why haven't you ever heard of it before? Well, that gets a little complicated.

The first interactive videodiscs, you see, were designed for teaching military personnel how to man their posts in complicated and often secret situations. It didn't take long, though, for someone to see the entertainment value in this new technology. The result was How to Watch Pro Football, released in 1981, that attempted to explain the game step by step. Or should that be yard by yard?

At any rate, viewers were asked to decide what plays to call and, depending on the plays they chose, were then directed to other parts of the game. This was soon followed by a videodisc for kids, The First National Kidisc, and then another, Fun and Games, which were predicated on the videodisc's ability to freeze-frame the action or alter speeds.

Murder Anyone? from Vidmax Inc. was the first game, though, to take full advantage of the new technology, and is selling so well that it's already spawned a sequel called Many Roads to Murder. And that's only the beginning.

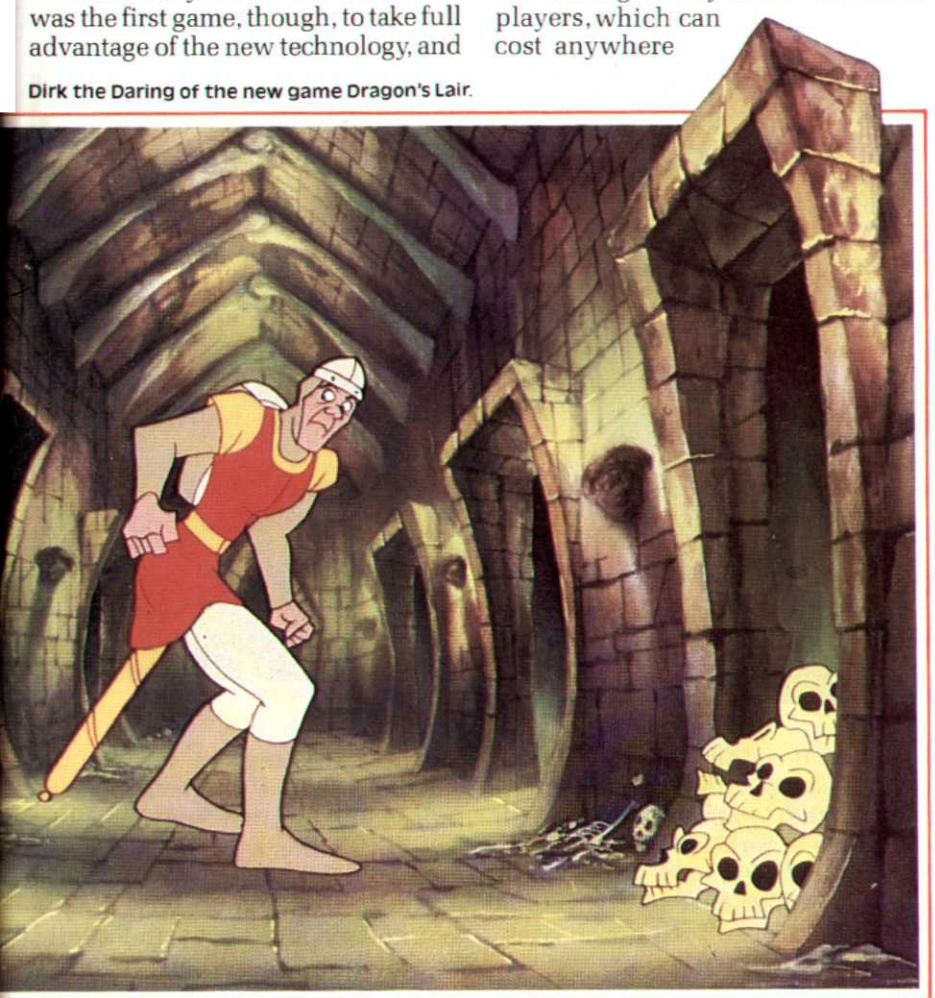
San Francisco's Leviathan Studios recently introduced two videodisc games. One is called The China Basin Murders; the other, In Vision and Dreams. Another new release is Sega's Astron Belt, which blends live-action images with computer-generated graphics to produce scenes reminiscent of "Star Wars." The National Football League is also getting into the act with a live-action, sports arcade game, produced in cooperation with Advanced Video of California. And then there's Don Bluth's new game, Dragon's Lair.

Dragon's Lair is the first *animated* interactive game. The story line is simple—a prince must slay a dragon and rescue a princess—but the animation is absolutely out of this world. Unfortunately, you won't be able to buy it just yet, for Dragon's Lair is making its first appearance in the arcades.

The reason is a simple matter of economics. While many people like playing interactive videodiscs, few are willing to buy home videodisc players, which can cost anywhere from $500 to $700. Dragon's Lair creator Bluth, who started out with Walt Disney, is confident, however, that the number of home videodisc consoles will increase dramatically in the next few years. Coleco feels the same and is therefore planning to introduce a home version of Dragon's Lair in 1984.

Dragon's Lair creator Don Bluth

Dirk the Daring of the new game Dragon's Lair.



Can Hollywood be far behind? Not on your life. Industry sources say major studios like Warner Brothers and MGM are greatly interested in the new technology, or at least in the idea of placing interactive videodiscs in arcade settings.

You don't have to be a movie mogul, though—or own a videodisc player—to enjoy interactive television. Citizens of Columbus, Ohio, have enjoyed interactive television since 1977, when Warner Communications introduced its QUBE Cable Television system. QUBE subscribers can literally talk back to their TV sets—or use them to go shopping, or even to keep track of friends and neighbors without ever leaving their homes.

CBS has also been working on a similar "teletext" service that allows a cable subscriber to call up printed information on his home screen by punching in a number on a decoder. Teletext is not interactive; viewers are just intercepting information already being broadcast. There is, however, an interactive system called videotex, in which viewers can call up whatever information they want from a central data bank.

TUNE IN TOMORROW

There is yet another type of television so new that the Federal Communications Commission hasn't really figured out how to handle it yet. It's called Low Power Television (LPTV) and was first approved by the FCC in 1980. LPTV was intended to fill a video gap somewhere between cable and the networks by allowing the creation of local stations capable of sending a signal up to about 10 miles. The FCC wants LPTV to be the video equivalent of CB radio—low cost, nonrestricted and basically unregulated.

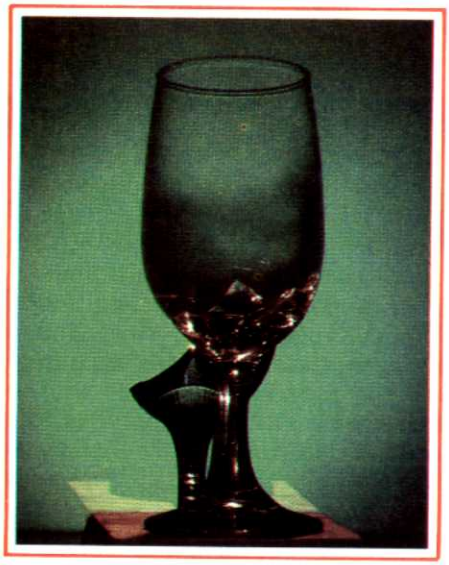
The most interesting aspect of LPTV is that almost anybody can get involved, because it can cost under $100,000 to set up an LPTV station (as opposed to millions of dollars for normal full-power television). The FCC estimates that some stations could actually cost as little as $13,000. And they tell us that when LPTV is fully activated, there will be 15,000 new television stations for Americans to choose from.

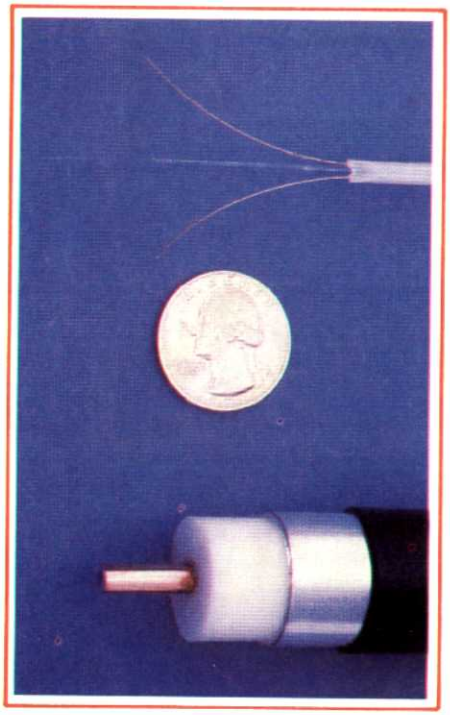
As the number of television stations grows, the variety of images you can see on them grows, too, thanks again mainly to the development of computer-aided production techniques. Take Atari's new Battlezone video game; through the use of simulated 3-D, it's giving home video players a glimpse of something really new and exciting.

State-of-the-art computer graphics have in truth become so solid and realistic that it's sometimes hard to tell if you're looking at 3-D animation or a real object. You may not have noticed, but 3-D computer graphics were used dramatically and extensively in recent films such as "Return of the Jedi," "Star Trek II" and "Krull." Also in "Tron," but that, of course, you couldn't help but notice.

The only problem with 3-D computer graphics is that they're too expensive at present for commercial TV—partly because of the fancy equipment required but mostly because it takes so much time to record all the visual information you need to put on the video screen. According to Rebecca Allen, animation director of the Computer Graphics Lab at the New York Institute of Technology, 3-D animated images cost $1500 to $2000 a second. So true 3-D is confined mainly to the movies, where image is all.

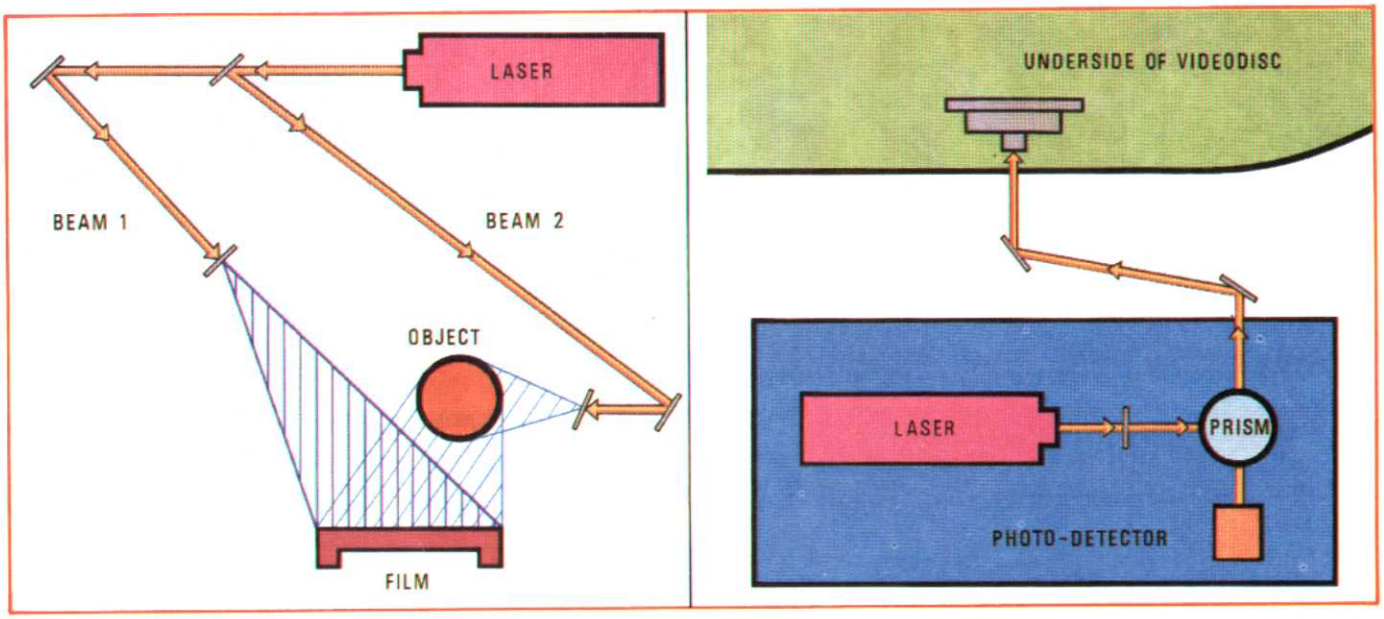
In the meantime, not only are TV images changing; so too are the sizes and shapes of television sets. Indeed, the day may well come in a few years when a TV set will be no thicker than a paperback book, and its output will be powered by a technology similar to the liquid crystal display (LCD) currently popular in digital watches.



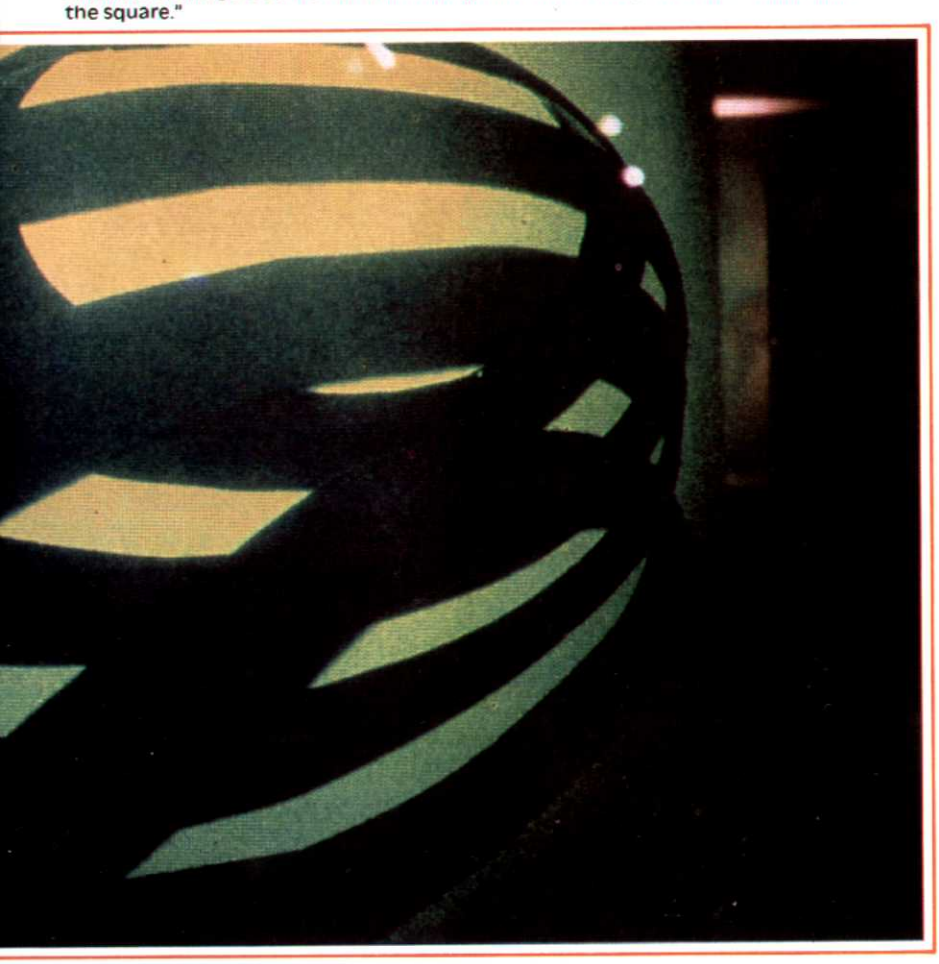


"The Meeting" (above), an art hologram by Rick Silberman. Below: A holographic laser and the fibre optics that go into it.

"The Seed" (above), an art hologram created by Dan Schweitzer. "The Rind" (below), by S. A. Benton.



At left, an illustration of how a holographic image is created. At right, an illustration of how that image is converted into a hologram—in essence, "the cube rather than the square."



Beyond that, one of the most mysterious and glittering possibilities for television of the future is the prospect of video holography. What's that? The Museum of Holography in New York defines it as "the space in front of and behind the plane of traditional visual recording . . . the cube rather than the square." In layman's terms, that's a 3-D image you can view from any angle and it still looks absolutely lifelike.

Holography as we know it was originally developed to improve the magnification images produced by the electron microscope. A hologram is created by optically splitting a laser beam into two separate shafts of light. One of them, the object beam, illuminates an object, while the other, a reference beam, illuminates a film plate onto which the hologram is to be recorded. When the object beam reflects from the object to the film plate, the colliding light waves create an interference pattern. This pattern is then illuminated and captured on film, and *voila:* a hologram.

There are several different types of holograms, all based on this process. Brief holographic "movies" already exist (including some that are said to be X-rated!). These "movies" are actually a series of sequential holograms. Most contain between 360 and 800 successive movie frames pressed onto a single plate, each of them covering 7 to 15 seconds of real-time action.

Holographic television is far more difficult to produce. According to Edward Bush, editor of the Museum of Holography's magazine, *Holosphere*, the main reason is that holography is not compatible with other imaging technologies. "It would take 256 days," he explains, "to transmit a hologram on standard television bands. Television is 525 lines to the inch, whereas a holographic image is 10,000 lines to the inch."

That's a formidable problem to overcome. Fiber optics may provide a solution—in a decade or so. For now, though, we'd prefer to deal with the problems facing private eye Stew Cavanaugh in Murder Anyone?. As a matter of fact, we know who it was that killed Derrick Reardon. It was . . . oops, sorry, we just ran out of space. ■

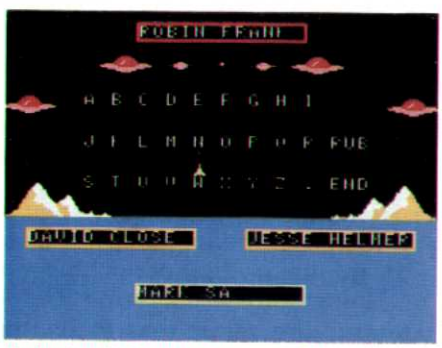
COLECO

EVERYTHING YOU

BY STEVEN S. ROSS

"HEY, DAD, could you hurry up with your accounts? I've got a book report to do." "How about me, Sis? I gotta finish my math." "Now wait a minute, gang. Mom wants to get out the labels for our Christmas list." "Gee, Dad, how about me? You said I could play Buck Rogers on the Planet of Zoom. When do I get a chance?"

If Coleco has its way, that scene—or one very much like it—will soon be played out in thousands of homes



A playing field on The Planet of Zoom.

across the nation, thanks to the new Coleco Adam computer. Billed as a complete family computing system, the Adam really does have just about everything a family could need to get started in computing.

It comes standard with 64K of RAM, plus 16K more to run its graphics display. It has a professional-style keyboard, a high-speed tape drive and a built-in word processing program. You also get "free" the above-mentioned Buck Rogers game and all connecting cables, including a six-foot coiled cord for the keyboard. And if that's not enough, there's plenty more, all of it topped off by a letter-quality daisy wheel printer.

But the best part is the price—less than $600 for the whole works, or somewhere around $450 if you already own a ColecoVision game-player. That would be a bargain if all you got were the computer. Throw in the printer, worth $500 or so in itself, and the price is truly phenomenal.

How does Coleco do it? A good question. But ours is not to reason why; ours is but to enjoy. And with the Adam, that's easy.

The machine is built around a powerful Z80A microprocessor such as that originally used in the ColecoVision game-player (now you know why it worked so well). This is the same type of chip that has become virtually an industry standard for new CP/M-based 8-bit computers.

As noted earlier, 64K of RAM is standard. But Coleco will offer an extra plug-in expansion module later this year that will add another 64K for a grand total of 128K. The extra memory will act as a buffer to speed up mathematical equations. Coleco also promises "super games" to make further use of the extra memory, including a 128K Donkey Kong with more game screens and better graphics than you can find even in the arcade version.

The Adam obviously has a lot going for it, and it shows right down the line. Take the keyboard, for example. Even professional typists can expect to feel comfortable with this one. It features full-travel,

ADAM

NEED AND MORE

sculpted keys with tactile feedback to give you the feel you need for touch-typing. In addition to the standard typewriter keys for letters, numbers and punctuation, it also has a cluster of cursor-control keys, six keys reserved for word processing commands, and nine more user-programmable function keys.

Numerical entry might seem a problem at first glance. The number keys on the main keyboard are placed typewriter-style across the top. But the Coleco game controller (included) takes care of that. It contains not only a joystick but a numeric keypad that gives you a grand total of 89 keys.

And the joystick itself is a joy to use—especially in word processing. You can use it to send the cursor here or there— wherever you want—much, much faster than you could with cursor-control keys alone. It's the next best thing to the mouse that you get with the Apple Lisa, which, of course, you pay for through the nose.

Did I mention the housing yet? I should have. It's made of hard plastic, the same as most computers, but it's 30 percent thicker than most, which is an important consideration when you're buying a computer to be used by younger members of the family. In other words, it's virtually indestructible.

As for the printer you get with the Adam, that's perhaps its biggest selling point. It's intended to be almost as easy to use as a typewriter,

ADAM

and it is. It also has few moving parts, which means it should be easy to maintain. The only compromises here are in speed and versatility.

The Coleco printer is a bit slower than more expensive units; it has a printing speed of only 10 characters per second. Even so, it will print out an entire page in less than two minutes, and that's as fast as or faster than anything in a comparable price range. Coleco further promises that multi-tasking software will be available early next year so the computer can be used for calculations (or playing Pac-Man) while the printer is doing its thing at the same time.

The printer is available, however, in only one type size— 10 pitch, which gives you 10 characters per inch. And it comes with only a standard pica typeface. But others, including script, can be substituted. It should be noted, though, that you'll have to buy an optional circuit board to print out a full 80-character line. Otherwise, you're stuck with 36 characters.

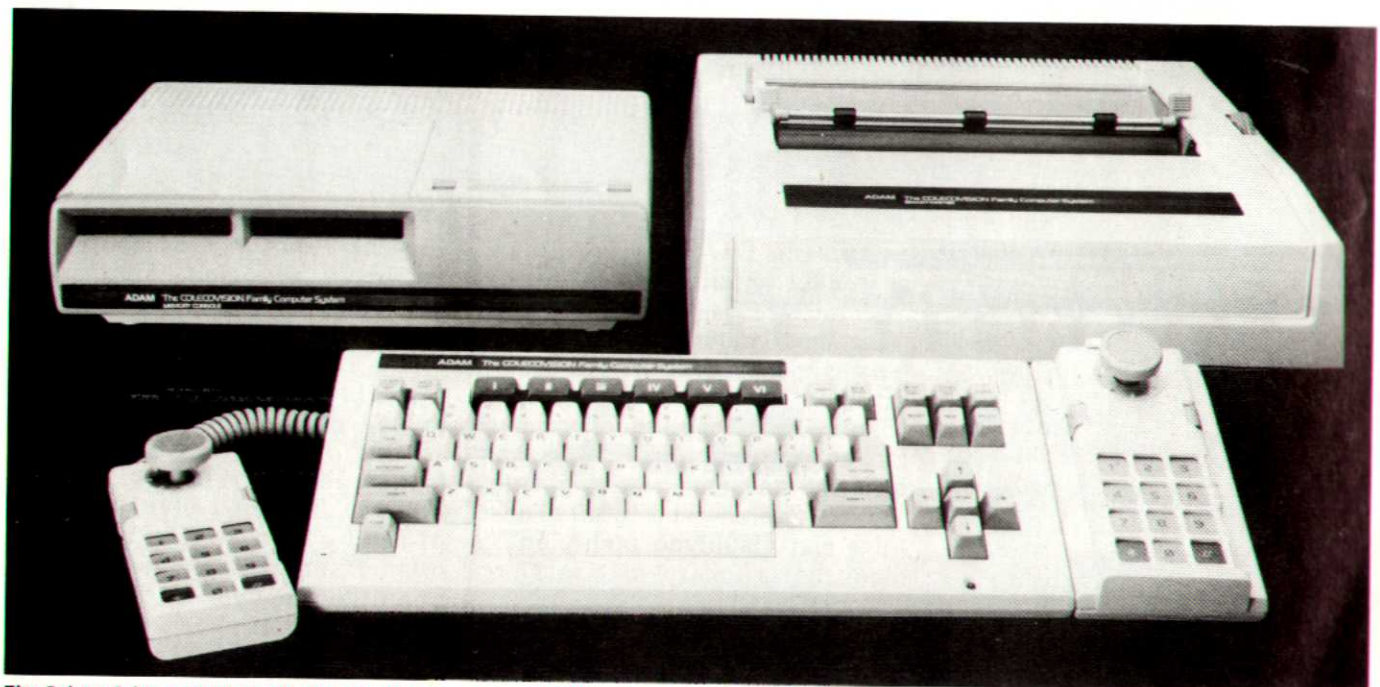
On the positive side, the printer produces fully formed letters, just like an office typewriter. And its easy-to-change print wheels and cartridge ribbons are interchangeable with those of Diablo printers costing $1500 or more.

The Coleco printer is further designed to accept computer fanfold paper (up to 9½ inches wide) or regular paper in single sheets. Conventional friction feed— like the feed on a normal typewriter— is standard, but Coleco promises an optional tractor feed soon. Price: about $150.

To seasoned computer users, it may come as a surprise to find that Coleco has decided to go with a 500K tape cartridge, or "digital data pack," instead of a disk drive. In fact, disk drives will be available early next year. But Coleco says that by then most users will be more than satisfied with the speed and versatility of the tape.

That's because the Coleco cartridge can transfer data into and out of the computer at a speed of about 1500 characters per second. That's 20 times faster than a conventional tape drive, and as fast as some disk drives. The cartridge is also a lot more rugged than a disk—again, an important consideration where younger kids are concerned. A disk can be destroyed by a single fingerprint pressed into the slot left open for "reading" purposes; the tape cassette is almost entirely sealed.

Since most families buy a computer mainly for typing— or so we're led to believe—Coleco has put a great deal of attention into its word



The Coleco Adam complete family computing system, including printer, keyboard, controllers and keypads.

processing program. The company describes it as "almost instruction-free" and "almost like a typewriter." Indeed, when Adam is turned on, it works exactly like a typewriter, typing letters out on the printer exactly as they are keyed in. You don't even have to display them on your TV screen.

Press one key, though— WP/ESCAPE— and the Adam becomes a word processor as well. Most common commands are made at the touch of a single key—and the six "SmartKeys" at the top of the keyboard even have little lamps that blink on and off when they need attention.

With this word processing program, which Coleco calls SmartWriter, a user can insert and delete characters, words and whole sentences or paragraphs. Words, sentences and paragraphs can also be moved around within a short note to Grandma— or inside a multi-page book report (the screen will scroll across 78 lines of type, or about three pages, before swapping from tape or buffer).

The screen displays tabs and margins— much like Tandy/Radio Shack's SuperSCRIPSIT. Unlike SuperSCRIPSIT, however, SmartWriter includes a great deal of user instruction right on the screen. The one drawback here, as noted earlier, is the fact that it shows only 36 characters per line. What you see—due to the limitations of your TV set, not the Adam—is not necessarily what you'll get.

Once the writer is satisfied, though, the whole thing can be printed out automatically. Or it can be stored on tape for recall and modification later. Once a letter or manuscript is stored on cassette, the computer can be used to print out as many copies as the writer wants. Yet the letter or story will still be on tape until the writer decides to erase it.

One very important feature of the word processing program is that it will not let writers make "destructive" changes, like deleting a whole paragraph, unless the writer confirms that the paragraph really *should* be deleted. If the writer does not confirm, the computer restores everything as it was.

And if the writer *does* confirm such a change by mistake, the Adam offers yet another chance— an "undo key" that restores deletions automatically.

One for all, and all for Adam.

Also supplied free with the Coleco system is a powerful version of the Microsoft BASIC programming language. This version is compatible with Applesoft BASIC, originally designed by Microsoft for the Apple II computer. As a result, the Adam will run many BASIC programs— including educational programs—that were written originally for the Apple.

If a user wants to, of course, he can write his own programs— even game programs— and trade them with friends. BASIC is also more than adequate for handling complex technical and business calculations. Because Microsoft BASIC is an industry standard, programs written with it on the Coleco can be run on many other machines as well.

The big problem here, though, was that software suppliers had not been convinced by early fall that Coleco could deliver its Adams in quantity. Consequently, not a lot of software was available as yet in the tape format that the Adam uses. To run that Apple II program from school, for instance, you had to LIST it on a printout, and then keyboard it yourself into your Adam.

Nevertheless, Adam's operating system is a jazzed-up version of the old reliable CP/M, and a CP/M board to pair with the optional disk drive has been promised. Coleco thus expects to offer a wide range of optional "personal productivity tools" covering a broad range of applications.

One such tool is an "electronic spreadsheet" for fast manipulation of long columns or rows of numbers. A user will be able to make a calculation on the spreadsheet, then switch to word processing and insert the calculation directly into a typed report. But CP/M is machine-specific, so software designers will have to modify their programs a bit to run them on the Adam. Expect the list to grow throughout 1984.

Also available: The famous LOGO software, which allows even young children to learn computer programming by telling the computer to draw complex shapes and pictures; the Adam Homework Helper Series, consisting mainly of drills; and Coleco's Early Learning Series, which uses Dr. Suess and Smurf characters to develop reading and number skills.

Coleco is also preparing a computer graphics package said to be "simple enough for adults to use"—Colorforms Electronic Crayons. With it, an imaginary "crayon" can be moved across the TV screen to "paint" a multicolor picture— for fun or to illustrate a business report.

There's also a "data base" package for electronic filing of information. Everything from Christmas card lists, to phone numbers, to favorite recipes can be filed on it. The data base program can then direct the computer to print out anything that's needed or show it on a television screen. Even mailing labels can be produced quickly and easily.

Like any good computer system, the Adam is expandable. A second tape drive can be added easily— there's already space for it inside the memory console. Other modules due next year will allow a half-dozen additional peripherals. With Adam's four interface ports, it will be possible to add a modem, additional printers and disk drives.

Coleco's optional game add-ons all work with the system. These include Coleco's Expansion Module #1, which allows the Adam to play Atari-compatible game cartridges; its Turbo game controller, which includes a steering wheel and a floor-mounted accelerator pedal; and its Roller Controller, which has an arcade-quality "trac ball" with 360 degrees of movement.

As you can see, there's something here for almost everyone. So if your family has to line up to use your new Adam, there's a simple solution: Get Dad to buy another one. At only $600 a throw, who knows? He may just go for it. ■

THE SPECTRAVIDEO

BY IVAN BERGER
AND MORGAN R. SCHWEERS

LIST-PRICED AT $299, the new Spectravideo SV-318 is hardly the cheapest computer on the market. At that price, though, it's clearly the most versatile.

It can accept software from Spectravideo cassettes, from CP/M-based disks, from its own ROM cartridges, from Coleco cartridges (with an $85 adapter), and from the new, highly-touted MSX operating system coming soon from Microsoft. (Microsoft, in case you didn't know, is the same firm that developed the MS DOS operating system used in the IBM Personal Computer.)

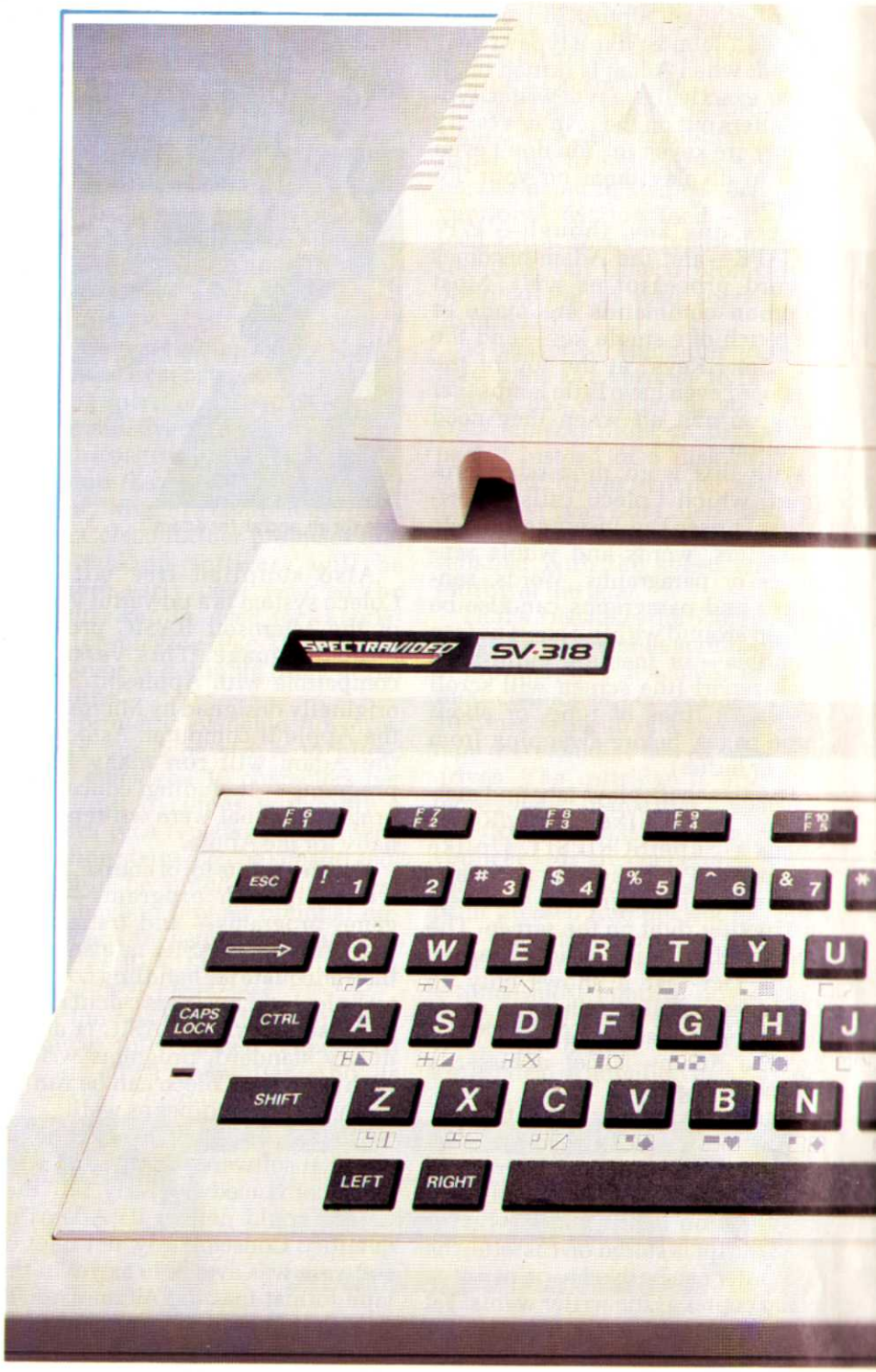
The SV-318 is also expandable to the nth degree, but comes already equipped with extended game and graphics capabilities, plus a powerful form of Microsoft BASIC and an upper- and lower-case screen display well-suited to almost any kind of computing need.

As if that weren't enough, it's also the easiest computer to spot in a crowd. Why? Because it's the only one we know with a built-in joystick right on the keyboard. Not only that, but you can connect the SV-318 to your home TV set or into a CRT for higher resolution—a choice you don't often get.

Unfortunately, it has a few drawbacks, too. But before we get to that, let's take a closer look.

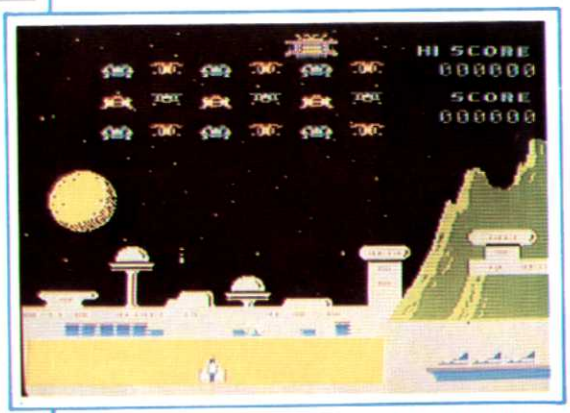
Built around a powerful Z80A microprocessor, the SV-318 comes standard with only 16K of user-accessible RAM (random-access memory), but it's expandable to a whopping 256K through the use of add-on expansion modules. Its standard 32K of ROM (read-only memory) can also be expanded to 96K the same way.

That's a lot of juice. But where the SV-318 really shines is in its game-



playing capabilities, right from the start. And that's true whether you buy your games off the shelf or intend to build your own.

The Coleco adapter is a big help here, giving you instant access to Coleco's huge library of games. But Spectravideo's initial release of 57 programs included no less than 20 of its own games. Some are board-type games that were popular before anybody ever heard of computers; others are right out of the 21st century.



Super Cross Force

Three that we particularly liked were Armored Assault, a tank duel on cassette list-priced at $29.95; Super Cross Force, a Space Invader-type game on cartridge list-priced at $45; and Alpha Blast, another Space Invader-type game, available on both cassette and cartridge and list-priced at $45 either way.

All were fun to play, but Super Cross Force especially intrigued the junior member of our evaluation team; he spent literally hours at that one, finally hitting a high of 200,000.

Not many people are capable of writing their own games, but if you are, you'll be happy to hear that the SV-318's Microsoft BASIC has some really exciting graphics capabilities, including 16 colors and 32 graphics sprites (such as animated

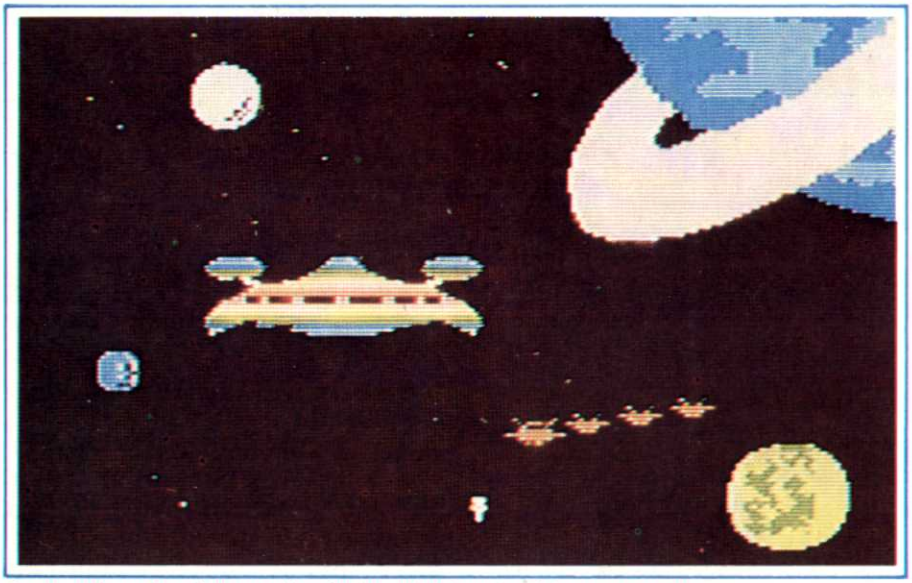
SV-318: A Breed Apart

SPECTRAVIDEO SV-318

characters or attacking spaceships).

These sprites you have to create yourself, of course. You do that by setting up a pattern of 1s against a background of 0s (in a DATA statement), which enables you to see the shape of your creation as you lay it out. We had no trouble writing our own, but to make it doubly easy, Spectravideo also offers a Sprite Generator tape program for $29.95.

The joystick *can* be used with telling effect, though, to move the cursor around when you're using the machine's word processing capabilities or running other programs. Spectravideo has also announced plans for a sensor-touch graphics tablet to be used in conjunction with the joystick to simplify the drawing (or tracing) of an image onto the screen and thus into



A screen from Spectron, another fast-moving Spectravideo space game.

The SV-318's sound capabilities, so important to game-playing, are equally impressive. You can actually generate three separate sounds at once—to create a harmony or even more complex sound effects. The range of tones covers eight full octaves, the same as a piano. And you can control not only the pitch, length and volume of a tone, but also its "envelope"—the rate at which it builds up and then dies away again.

On a Spectravideo demo cassette, we heard tones so rich and so sonorous that they almost seemed to come from an organ.

As for the SV-318's built-in joystick, it's handy enough, but it's not really as sturdy as it ought to be. However, you can plug in two other joysticks—the ports accept any Atari-compatible brands, including, naturally, Spectravideo's own. We used Wico sticks, which worked fine.

memory.

Like the joystick, the SV-318's keyboard also leaves something to be desired. It's a "Chiclet-style" keyboard, which means it's basically a membrane keyboard with rubber keys over it to add a certain amount of "feel." These keys are, however, much more wobbly than those of comparable models. This, and their slightly wider-than-normal spacing, may prove a problem to experienced touch-typists.

The keyboard *is* unusually complete, though, including—besides the usual alphanumerics and symbols—double brackets, double braces, a tilde (~), a caret (^), and a reverse single open-quote. This is in addition to the usual ESCape, Caps Lock (with indicator light) and Control keys.

It also has nine function keys, which allow for twice that many functions. The STOP key "pauses" the program when pressed by itself, but doubles as a BREAK key, stopping the entire program when pressed at the same time as the CTRL key. The shift key selects between each of the other eight keys' two functions.

As we noted earlier, the SV-318 boasts a powerful form of Microsoft BASIC, and one of the best features of this BASIC is its screen editor. Instead of calling for complex editing commands, as in most Microsoft BASICs, this one lets you edit any program line by moving the cursor to the edit point, then overtyping mistakes, deleting them (with the DELete key) or inserting new material (with the INSert key).

You can even edit a line number, and the renumbered line will move into its new place in the program automatically. This felt so natural that we soon took it for granted and almost forgot to mention it here.

The problems we did have in programming were again chiefly related to hardware. Besides its wobbly keys, our evaluation unit suffered from a wobbly power cord (it often fell out and crashed our programs). The machine also developed some worrisomely high operating temperatures.

Admittedly, the computer ran 12 hours at a stretch without heat-related problems. But over a few months or years of operation, continual overheating would almost surely make the unit less reliable.

The reasons for the heating problem were obvious when we looked inside. The main circuit board is wrapped in a metal shield to keep it from interfering with TV and radio, but this bottles up much of the heat, especially when the holes in the bottom of the case fail to match the holes in the bottom of the shield, as they did on ours.

We also had some problems with the lid on our sample cassette, which jammed a lot (until we learned to leave it open).

In all fairness, though, we should note that our unit was either an early production model or a prototype, so problems such as these may have been corrected by now.

If so, the Spectravideo is well worth a look. For versatility, expandability and ease of use, it's one of the best of the so-called home computers that we've yet seen. ■

Ivan Berger is Technical Editor of *Audio* Magazine. Morgan R. Schweers, 14, provided technical and tactical support.

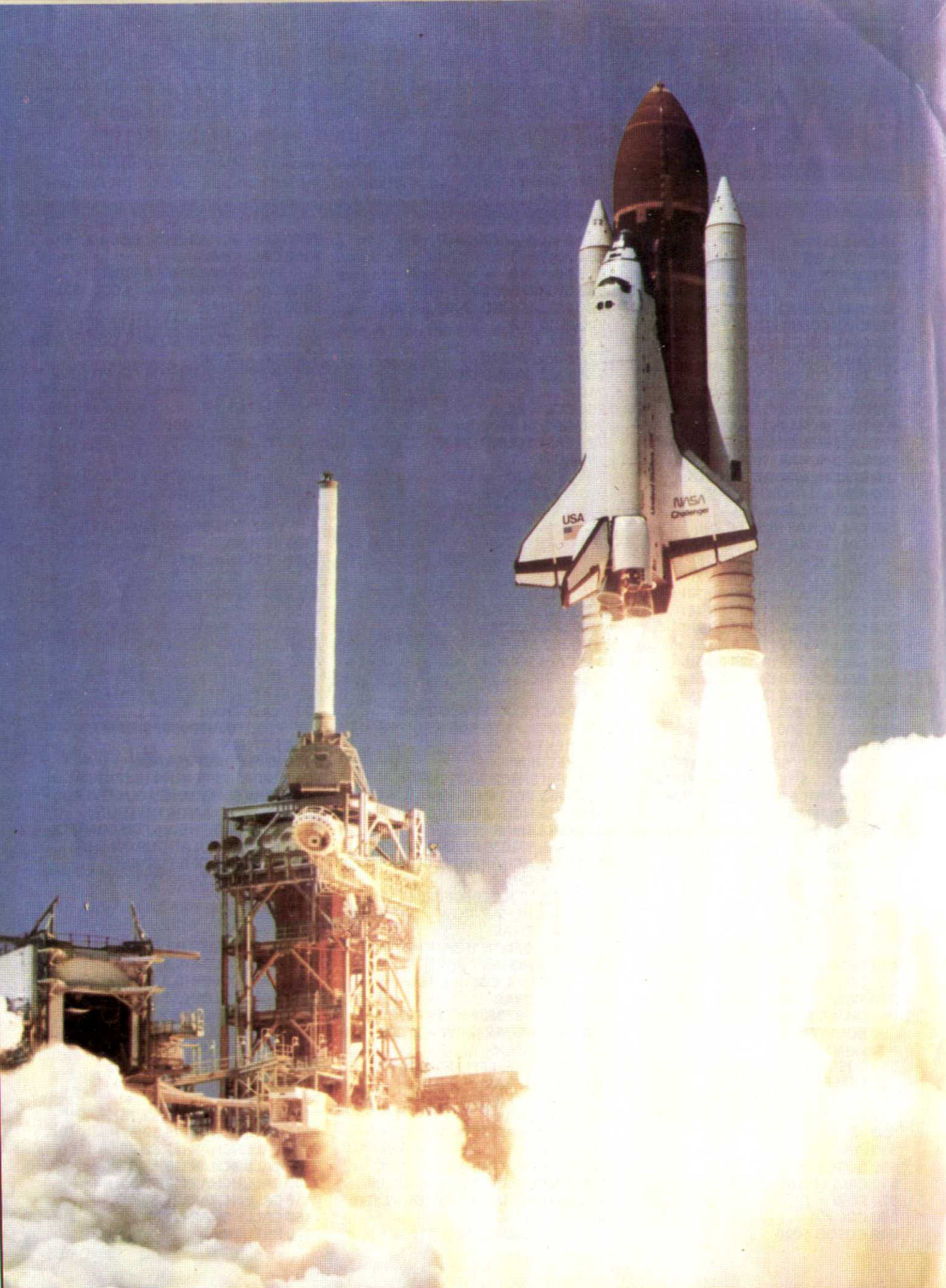
3...2...1... BLAST OFF!

WOULD YOU like to send your own spacecraft blasting off into the blue? In the following program, written for the Texas Instruments 99/4A computer equipped with a Terminal Emulator II and a speech synthesizer, you can do just that.

The sights, the sounds, the chills and thrills—they're all here. Try it and see!

```
10 CALL CLEAR
20 ROW = 20
30 COL = 3

100 REM LAUNCH PAD
110 CALL COLOR (3,15,15)
120 CALL COLOR (10,7,15)
130 CALL COLOR (8,7,15)
135 CALL COLOR (11,7,15)
140 CALL HCHAR (19,6,110)
150 CALL HCHAR (20,6,94)
160 CALL HCHAR (21,6,115)
170 CALL HCHAR (22,6,94)
180 CALL HCHAR (19,5,55)
190 CALL HCHAR (23,3,55,4)
200 REM ATLANTIC OCEAN
210 CALL COLOR (4,6,5)
220 CAL VCHAR (4,32,60,20)
230 CALL VCHAR (6,31,60,18)
240 CALL VCHAR (6,30,60,18)
250 CALL VCHAR (7,29,60,17)
260 CALL VCHAR (10,28,60,14)
270 CALL VCHAR (12,27,60,10)
280 CALL VCHAR (13,26,60,7)
290 CALL VCHAR (15,25,60,5)
300 CALL VCHAR (17,24,60,5)
310 CALL VCHAR (20,23,60,3)
320 CALL VCHAR (22,22,60,2)
330 GOSUB 7000
340 GOSUB 2000
400 REM COUNTDOWN
410 OPEN #1: "SPEECH", OUTPUT
420 PRINT #1: "FINAL COUNT DOWN
    FOR SPACE SHUTTLE LIFT OFF
    COMMENCING."
430 PRINT #1: "TEN SECONDS AND
    COUNTING."
440 PRINT #1: "9"
450 GOSUB 1200
460 PRINT #1: "8"
470 GOSUB 1200
480 PRINT #1: "7.
    ALL SYSTUHMS ARE GO."
490 PRINT #1: "6"
500 GOSUB 1200
510 PRINT #1: "5.
    UH WE HAVE
    BOOSTER FIRE."
520 PRINT #1: "4"
530 GOSUB 1000
550 REM BLAST OFF
560 CALL SOUND (4000,-7,0)
570 CALL SOUND (4000,-7,0)
580 ROW = 14
590 COL = 3
600 GOSUB 2000
610 CALL SOUND (4000,-7,0)
620 ROW = 7
630 COL = 4
640 GOSUB 3000
650 CALL SOUND (2500,-7,5)
660 ROW = 3
670 COL = 10
680 GOSUB 3000
690 CALL SOUND (2000,-7,10)
700 ROW = 2
710 COL = 17
720 GOSUB 4000
730 CALL SOUND (2000,-7,15)
740 ROW = 1
750 COL = 24
760 GOSUB 4000
770 CALL SOUND (2000,-7,18)
780 ROW = 1
790 COL = 30
800 GOSUB 4000
810 CALL SOUND (3000,-7,25)
820 GOSUB 5000
830 GOTO 830
1000 REM MUSIC TO LIFT OFF BY
1010 CALL SOUND (1500,131,10)
1020 CALL SOUND (1500,196,10)
1030 CALL SOUND (1500,262,10)
1040 CALL SOUND
     (250,311,5,262,5,196,5)
1050 CALL SOUND
     (1500,330,5,262,5,196,5)
1060 RETURN
1200 REM DELAY SUBROUTINE
1210 FOR D = 1 TO 300
1220 NEXT D
1230 RETURN
2000 REM SPACE SHUTTLE
2020 CALL COLOR (13,16,1)
2030 CALL HCHAR (ROW,COL,128)
2040 CALL CHAR
     (128, "0103030707070707")
2050 CALL HCHAR (ROW, COL + 1, 129)
2060 CALL CHAR
     (129, "80C0C0E0E0E0E0E0")
2070 CALL HCHAR (ROW = 1, COL, 130)
2080 CALL CHAR
     (130, '0F0F1F1F3F3F7F7F")
2090 CALL HCHAR
     (ROW + 1, COL + 1, 131)
2100 CALL CHAR
     (131, "F0F0F8F8FCFCFEFE")
2110 CALL HCHAR (ROW + 2, COL, 132)
2120 CALL CHAR
     (132, "FFFFFFFFFF070707")
2130 CALL HCHAR
     (ROW + 2, COL + 1, 133)
2140 CALL CHAR
     (133, "FFFFFFFFFFE0E0E0")
2150 RETURN
3000 REM SHUTTLE #2
3010 CALL COLOR (14,16,1)
3020 CALL HCHAR (ROW, COL+1,136)
3030 CALL CHAR
     (136, "0000000000010307")
3040 CALL HCHAR (ROW, COL +2,137)
3050 CALL CHAR
     (137, "00000030F8F8F0E0")
3060 CALL HCHAR (ROW+1,COL,138)
3070 CALL CHAR
     (138, "00000001071F3F7F")
3080 CALL HCHAR (ROW+1, COL+1, 139)
3090 CALL CHAR
     (139, "0F1F7FFFFFFEFCFC")
3100 CALL HCHAR (ROW+1,COL+2,140)
3110 CALL CHAR
     (140, "E0C08000000000000")
3120 CALL HCHAR (ROW+2,COL,141)
3130 CALL CHAR
     (141, "7F1F0F0707070301")
3140 CALL HCHAR (ROW+2,COL+1,142)
3150 CALL CHAR
     (142, "F8F8F0F0E0E0E000")
3160 RETURN
4000 REM SHUTTLE #3
4010 CALL COLOR (15,16,1)
4020 CALL HCHAR (ROW,COL,144)
4030 CALL CHAR
     (144, "E0FE7F3F1FFFFF00")
4040 CALL HCHAR (ROW,COL+1, 145)
4050 CALL CHAR
     (145, "0000C0FFFFFFFF00")
4060 CALL HCHAR (ROW,COL+2,146)
4070 CALL CHAR
     (146, "00000080F0FCFFFF")
4080 RETURN
5000 REM CONVERSATION
5010 PRINT #1: "SHUTTLECRAFT IS
     NOW SIXTY MILES OUT OVER
     THEE ATLANTIC OH SHUN."
5020 PRINT #1: "HEW STON CONTROL
     CONGRATULATIONS ON THAT
     FINE LIFT OFF. TURNING
     CONTROL OVER TO YOU,
     OVER."
5030 CLOSE #1
5040 RETURN
7000 REM NAME THE ATLANTIC
7010 CALL COLOR (5,3,5)
7020 CALL COLOR (6,3,5)
7030 CALL COLOR (7,3,5)
7040 CALL HCHAR (8,32,65)
7050 CALL HCHAR (9,32,84)
7060 CALL HCHAR (10,32,76)
7070 CALL HCHAR (11,32,65)
7080 CALL HCHAR (12,32,78)
7090 CALL HCHAR (13,32,84)
7100 CALL HCHAR (14,32,73)
7110 CALL HCHAR (15,32,67)
7120 CALL HCHAR (17,32,79)
7130 CALL HCHAR (18,32,67)
7140 CALL HCHAR (19,32,69)
7150 CALL HCHAR (20,32,65)
7160 CALL HCHAR (21,32,78)
7170 RETURN
```


USA
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Challenger

COMPUTERS IN SPACE

GETTING OUT OF OUR SPHERE

BY JACQUES VALLEE

THE MOST beautiful sound I have ever heard was the sound of the memory drum of an IBM 650 when the computer died.

All power would go out. The motors would be still. Lights would stop blinking and, of course, the program was lost. But it would take ten minutes or more for the big drum to slow down to a complete stop. The high pitch would gradually turn into a sustained, thrilling note, unnoticeably shifting to a hum, a rumble, then just a murmur as the drum joined the rest of the computer in death.

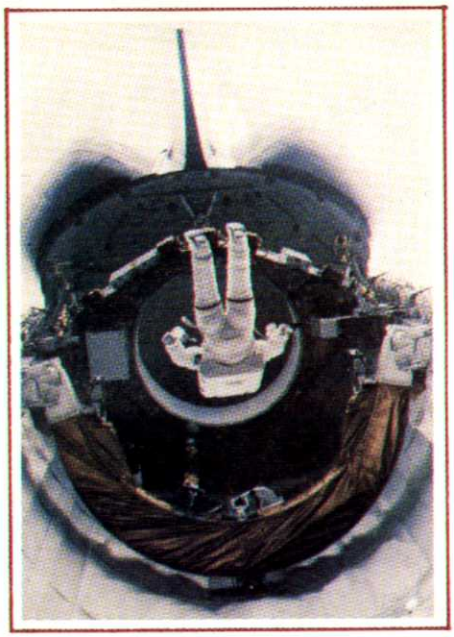
This kind of incident happened to us once or twice a day when I was working at the Paris Observatory because our power supply was unreliable. The year was 1961, and the machine was located in what once were the stables of the King's mistress in the castle of Meudon.

We used the machine to compute orbits of artificial satellites. The satellites went around the earth in 90 minutes. It took our computer two hours to do the computation, so we were always hopelessly behind, even when we were lucky and the machine didn't die. When it did, my only consolation was the opportunity to listen in wonder to the eerie sci-fi sound of that big drum slowly dying.

So shrill and inhuman was the chant of the spinning drum loaded with magnetic data and tracks of hopeless numbers, I could close my eyes and imagine that I was sitting at the console of a spaceship, slowing down as it returned to earth after a tour of the galaxy—not at the console ruling a mass of electronic circuits in an old French castle.

Astronaut Joseph Allen has it "wired" during a biomedical experiment aboard the space shuttle Columbia.

Photographs courtesy National Aeronautics and Space Administration



Astronaut F. Story Musgrave hangs suspended in space.

GETTING OUT OF OUR SPHERE

Computers and space science were closely associated. In those innocent years of the space program, when man had not yet orbited the earth, space scientists were still classified under their original professions: They were called astronomers, physicists, propulsion engineers.

Computer science was not recognized either. Young people foolish enough to fall in love with the machines were lucky if they qualified as "applied mathematicians" (the implication being that you weren't good enough to be a *real* mathematician) or little more than engineers, which was the worst thing they could call you on any campus.

At the Paris Observatory we had the same sort of problem getting astronomers to accept satellites as valid research tools. Again, conventional wisdom, amplified by the media, has popularized the image of the scientific community as solidly united behind the daring pioneers dreaming of exploring the solar system. Again, conventional wisdom is totally misleading and the record should be set straight.

Most scientists in the late '50s and early '60s thought satellites were another extravagant example of military waste, with no possible application to their work. The most embittered of all were the astronomers, who should have been more excited than anybody else. The fact is that Sputnik I, launched by the Russians in October 1957, not only caught the world public completely unprepared, but created total consternation among the astronomers and their calculating experts.

I was 18 when the Sputnik went up. My father refused to believe the announcement for several days. He was an educated man with a good knowledge of math and a World War I officer's understanding of ballistics. Yet he just kept fuming about the journalists' inability to see through what he regarded as the most ridiculous Communist propaganda in years.

Even when American reports confirmed that the cotton-picking Russians really *had* sent the orbiting curiosity into the Heavens, my father's opinion was that Man would never be able to inhabit a space capsule, much less the moon, because "Man cannot get away from his Sphere." I found this expression striking, but could never get a definition of what "Man's Sphere" was.

Such reactions were the rule rather than the exception among the educated public in France and elsewhere. No less an authority than the Astronomer Royal of Great Britain had said, a mere four months before Sputnik, that "space travel is utter bilge."

As soon as the news of the strange stellar wonder hit the observatories, computer teams were asked to produce an orbit for the intruder. All the experts who were "in the know," or thought they were, had confidently expected the first satellite to be launched several years later and, of course, to be American. As a result, nobody had bothered to start studying seriously the problem of orbit computation for satellites made on earth.

Amidst the confusion that night, some bright scientist suggested that the planetary astronomers would probably have the embryo of a program that could reduce Sputnik to numbers in a hurry. Alas, the programs they did have were all designed for the large distances of the solar system. They assumed that the mass of the earth could be reduced to a point. Not a very practical assumption when the satellite was a mere 200 miles above ground. This placed it *inside the earth* as far as the computer was concerned!

The astronomers chuckled once again over the uselessness of computers while the experts hit on another bright idea: Why not ask the comet specialists? They found one fellow with a program, all right. Unfortunately, for convenience in representing the observations, the program assumed that the earth was flat! Not a very practical assumption either, when you were trying to track an object that kept going around and around the globe.

Many years later, I had lunch in Hollywood with Steven Spielberg, who was then working on his movie "Close Encounters" and was looking for a way to describe the moment when human experts would decipher the first message from the

Astronauts Vance Brand (left) and Robert Overmyer check out one of three CRTs installed on the flight deck of the Columbia.

approaching saucers. He told me he had spent useless hours at the Jet Propulsion Lab listening to the projections of long-haired scientists playing with multimillion dollar machines, but he couldn't make any sense of their technical jargon. Yet the scene had to be graphic and, if possible, funny.

Recalling the early days of satellite computations, I told Spielberg that if such a momentous event did take place, it would be very unlikely that the "experts" would be ready for it. I told him how, in the office of Dr. J. Allen Hynek at Northwestern University, I had seen a photograph of three astronomers who had climbed up ladders to fit a piece of string around a big globe. They were trying to find out where Sputnik was going, while their computer programmers were frantically attempting to figure out a more elegant solution to the problem!

That scene was later re-created in "Close Encounters." The space experts of a multimillion dollar secret team are unable to find a simple map that will tell them where the extraterrestrials' landing site is situated; they end up breaking into the director's office, forcing a world globe out of its precious sockets, rolling it down the hall to the room where the hopeless computers sit, and finally discovering that the aliens are landing at Devil's Tower, Wyoming.

The recent history of both space science and computers is full of the kind of foolishness displayed by the "experts" the night of Sputnik I. Thus, the man who directed our project in Paris recorded the beeps of the satellites and played them back during his lectures to the French Astronomical Society, dutifully attended by old ladies who had fallen in love with astronomy in another era.

"BEEP-BEEP-BIP — BI-BEEP," the tape would go for fifteen minutes to almost passionate attention. That sound, after all, came from the vast expanses of void beyond the earth. Then another Sputnik or Explorer would be announced by the lecturer for another fifteen minutes of "BEEP-BIP-BEEP."

A few heads would begin to fall lower and lower; the entranced audience would be lulled, slowly, into a soft reverie by this meaningless voice from the heavens, and I would watch the rows of aristocratic dowagers swaying under the waves of the hypnotic little voice that issued from the puny transmitter in orbit, as totally irrelevant and misunderstood as the slow dying hum of the computer that tracked the satellite from the stables of the King's mistress.

A short time later, I heard the big drum of the 650 sing its agonizing song one last time. Then I resigned from the Paris Observatory because nothing was changing there, nor would it ever change. I worked for a while at an electronics firm that manufactured large-scale military radars and used computers heavily in its research. We had IBM equipment and were trained by IBM engineers in well-lit offices, where everyone wore white shirts and had a clear view of the mission. Even so, the effects were amazing because the European industrial system could not cope with the rate of change imposed on it by the new technology. A gap—indeed, an abyss — was appearing between those who ran the computers and those who did not.

I decided to leave Europe, and a few months later found myself on an American campus. Here were computers of the third generation using transistors and printed circuits, which had replaced the banks of vacuum tubes that I would occasionally find in a garbage can outside the engineering building, now the largest building on campus.

Managers and accountants always justify the purchase of a new machine on an economic basis. Yet the real test of a new technology like computers is not that it perform the same task faster or cheaper than before; it must do something that one could not even conceive of doing before.

For that reason, computers and space exploration are linked in my mind, because one is really the test of the other. The computers enabled us to get out of our sphere. ■

COMPUTERS IN SPACE

FLYING SOLO ON THE STARSHIP ENTERPRISE

BY FRED D'IGNAZIO

TOM DWYER IS a teacher and computer scientist at the University of Pittsburgh. He has taught computer courses there and at local high schools. Dwyer's most famous project, however, is the Soloworks Laboratory, in operation since 1969. The project gets its name from Dwyer's goal of having every student learn things by flying solo.

In most classrooms, Dwyer says, teachers and students fly dual. The student is a novice pilot and is always under the teacher's complete control.

In the Soloworks Lab, the teachers train students to take off and fly using the wings of their imagination. On their own, they explore new subjects, perform experiments and discover new ideas. The vehicle the students "fly" is the classroom computer.

The Soloworks Lab, recently renamed the Solo/NET/Works Project, has installed a classroom network of small computers. A network is a group of computers all plugged into each other and talking to each other. On the Solo network, each student has his own computer. He can use the computer to send messages to other computers on the network, or he and his computer can play games with other computer users.

The student and his computer are like teammates or buddies. They compete together in network contests. They work together to complete classroom assignments and projects.

Margot Critchfield is an author, illustrator and educator who works closely with Dwyer and the new project. A computer, she says, can do more than process information or do arithmetic; it's like a chameleon changing color—it can change into many shapes. A computer can be taught to act like any other machine ever invented.

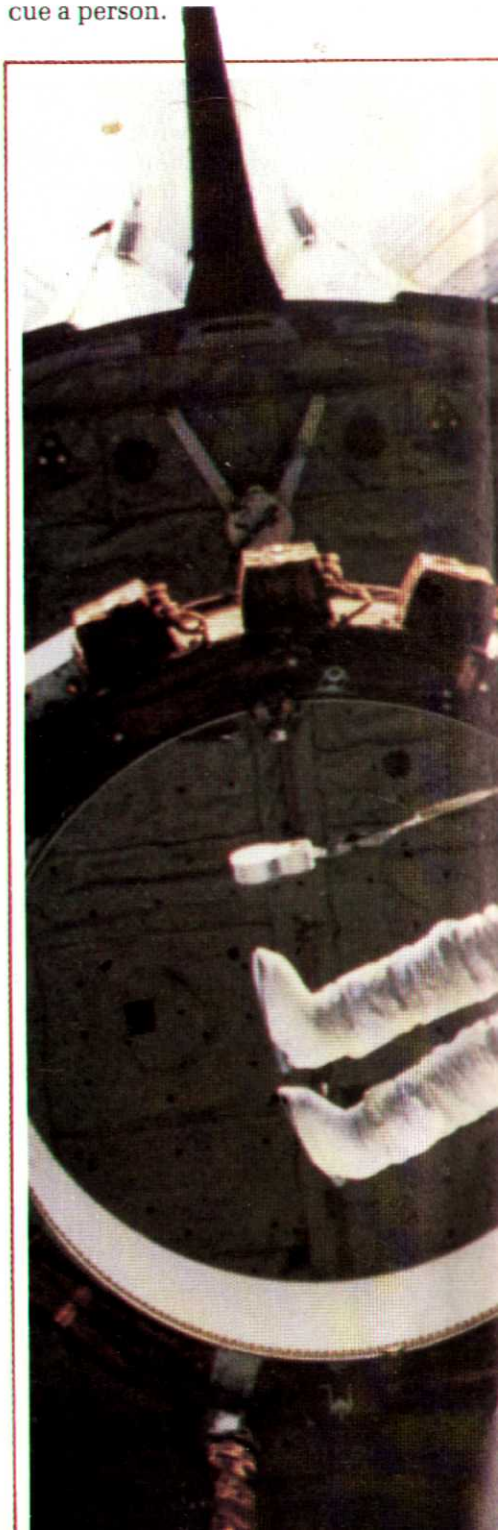
As part of their work on the project, students are asked to teach the computer to play the part of other machines. One machine the computer can act like is a spaceship in a game called N-Trek, a version of the popular Star Trek computer game.

In N-Trek, the computer has been told to act like the starship Enterprise. Each student sits at a computer and acts as if he or she is a member of the Enterprise crew, sitting on the bridge in front of a computer console. Together, the students operate their computer consoles and launch the Enterprise into outer space on missions of science and exploration.

N-Trek is what Tom Dwyer calls *inventive learning*. Each student has to write the program that runs on his or her console and talks with all other consoles aboard the Enterprise. During takeoff or exploration of a new solar system, the student has several tasks to perform. Some he performs alone. Others he performs in cooperation with the rest of the crew.

For example, during any particular flight, a person may have to cope with an emergency equipment malfunction, or an incident of food poisoning in the Enterprise mess room. Or he may use the computer to perform arithmetic calculations to load and unload some important cargo. Or he may need to plot coordinates on the screen to navigate the starship. Or he may plan with other crew members how best to send a landing party down to the mysterious, potentially dangerous planet they are now orbiting.

To perform all these tasks, the student must learn to be inventive and self-reliant, yet also be a good member of the team. In addition, he must learn to communicate his ideas and needs effectively to other crew members via the computer keyboard and screen. When an emergency arises, he must be able to find information in the computer's library that can save the ship or rescue a person.



Dwyer and his crew of teachers and students have great plans for the future. They are going to expand their N-Trek game. They are also working on an air-traffic control simulation in which students will play the parts of air-traffic controllers and pilots of large airplanes that are trying to land and take off from a major airport.

Dwyer also hopes to organize computer contests between students in different schools. It will be a new kind of sport, like a football game or a soccer match. But the entire game will be fought on the computer—on lots of computers.

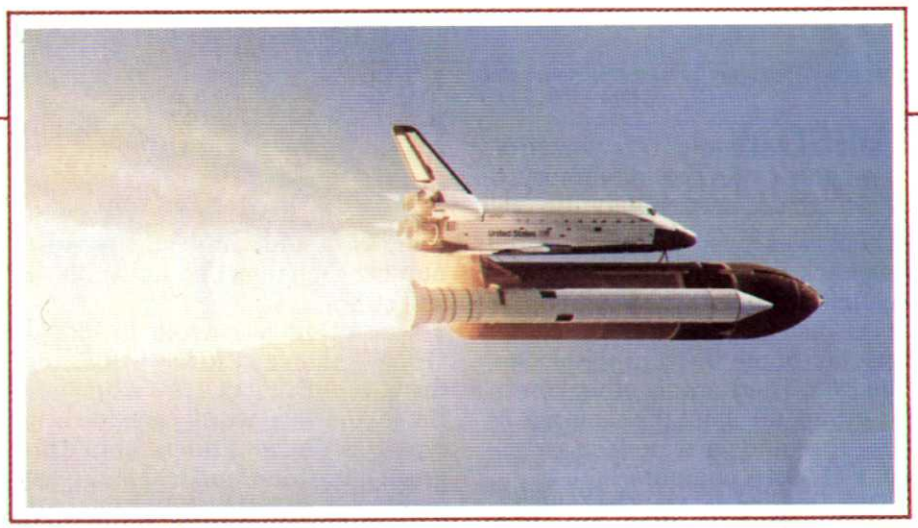
Imagine that it is a Saturday morning in the near future. Four crack teams of computer pilots from four different schools are sitting in front of their computers. All at once they see the word "GO!" flash on their computer screens. They keyboard a command or two, power up their computer spaceships, and blast off.

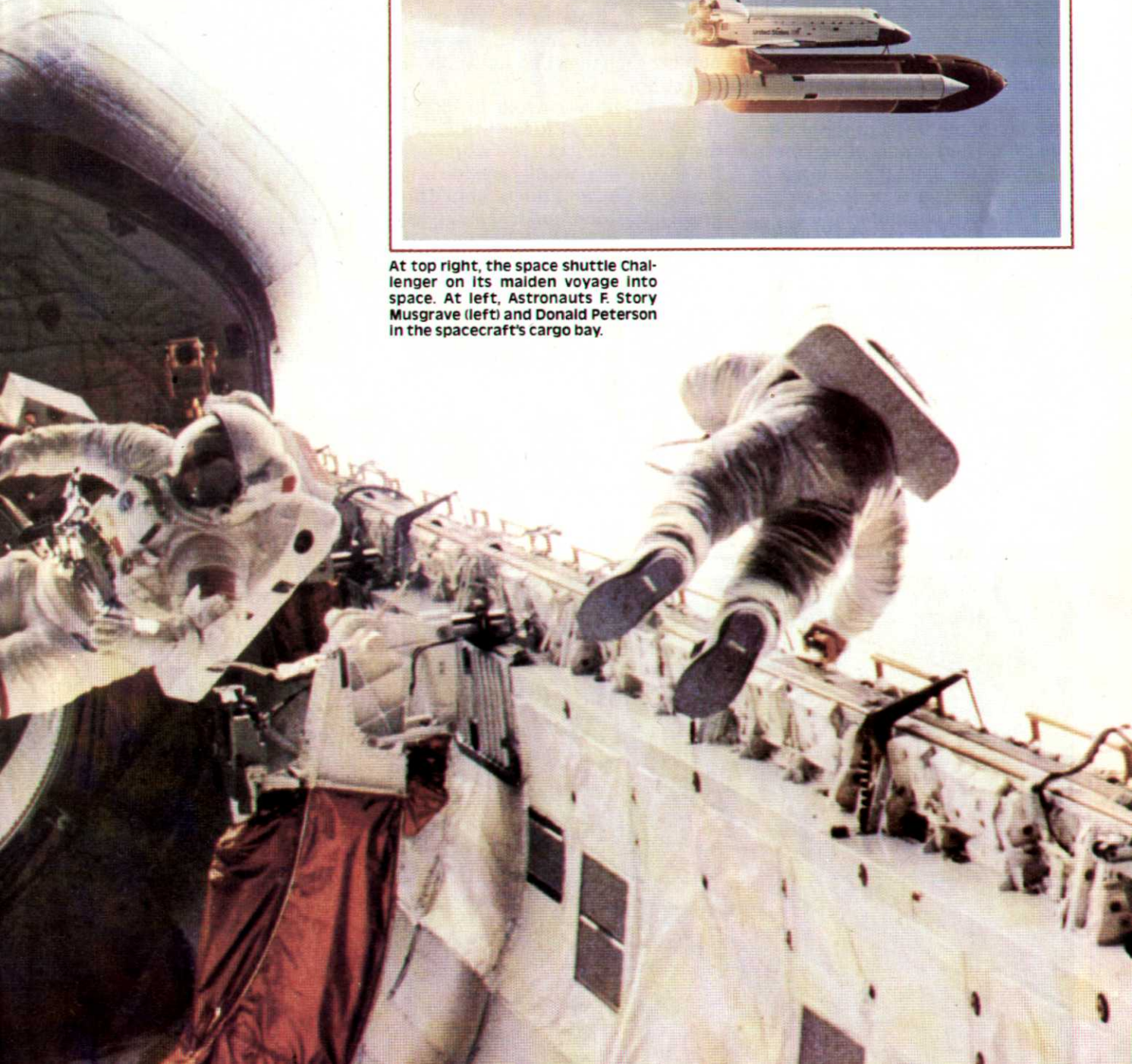
Each team's goal is to be the first human beings to plunge through Saturn's rings and return safely.

As they work feverishly, the students' ground-based controller (their coach) reminds them to watch out for the asteroid belt between Mars and Jupiter. He warns them about the radioactive tail of a comet whooshing toward Earth.

Then he wishes them good luck, and they're on their own—each of them boldly going where no man has gone before.

William Shatner—eat your heart out! ■





At top right, the space shuttle Challenger on its maiden voyage into space. At left, Astronauts F. Story Musgrave (left) and Donald Peterson in the spacecraft's cargo bay.

TI DIARY

TUESDAY
June 21, 1983

School was over yesterday, but I was back in class today. I went to my first programming lesson in the Texas Instruments training center near my home in Huntington Station, N.Y. There are six other kids in my group, all about the same age as me—10— and we were each assigned a TI 99/4A computer.

Our teacher is Mr. Gessner. He started out by showing us all the things on the computer keyboard—all the buttons, command modules and stuff like that. He told us most people think a computer is smart, but it's really stupid. You make one teentsy-weentsy mistake and it throws off everything.

Then he began showing us how to do stuff. We learned to make entries in immediate mode, where everything comes out all at once as you type it in, and we learned to do things in programming mode, where you have to program one thing at a time and you have to number each line, like 10, 20, 30, 40 and so on.

First of all, we wrote 10 PRINT "HOW", then 20 PRINT "ARE" and then 30 PRINT "YOU?". When you finish the last word, you have to type in RUN, and the screen turns green, then blue, and it shows what you typed in: HOW ARE YOU? We then programmed in some silly things on our own — anything we wanted — like YOU ARE A JERK and stuff like that.

THURSDAY
June 23, 1983

In the beginning today, we played some games like Parsec and Munch Man. Parsec is like Atari Defenders and Munch Man is like Pac-Man, only both are better—especially the sound. Then we got our workbooks, *Texas Instruments Programming Discovery in TI BASIC Student Guide* — a big name, but it's easy to read and it seems to cover anything you'd ever want to know about the TI 99/4A.

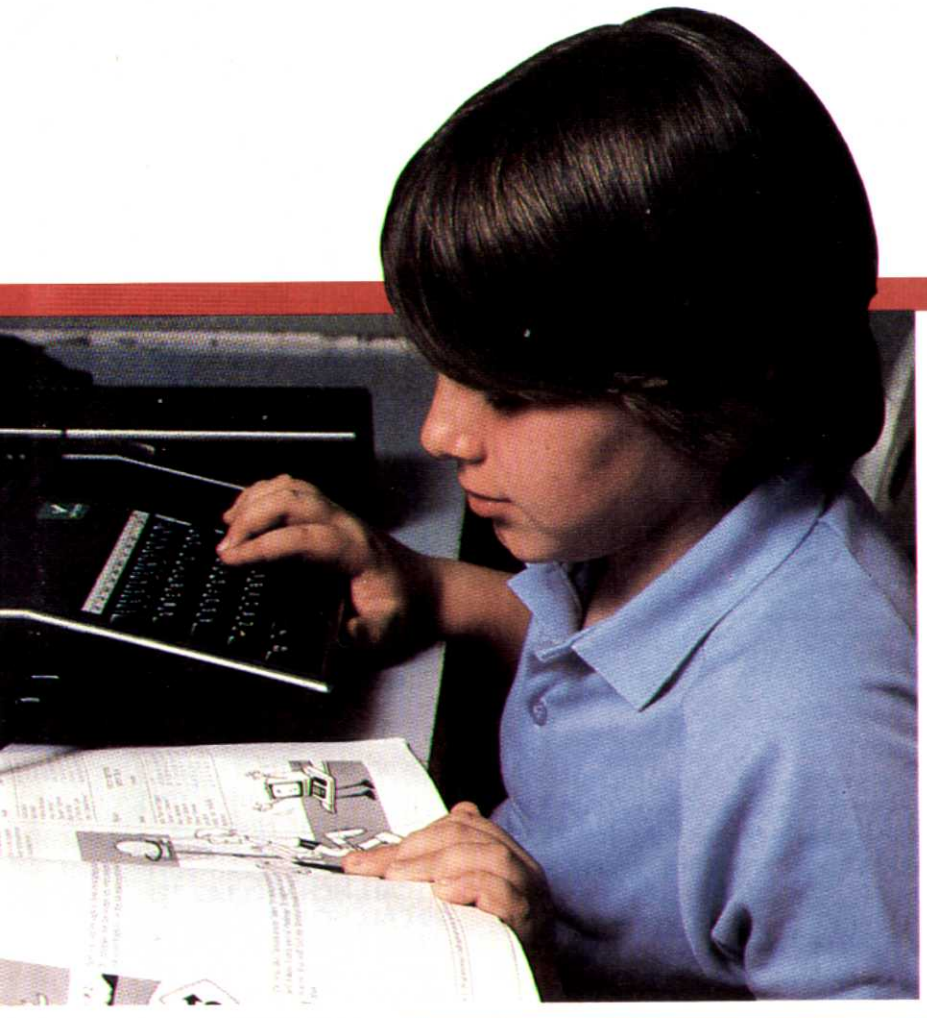
The first thing we talked about was CALL CLEAR, which clears the screen, and things like that. Then we started to program in different colors. Mr. Gessner gave us some stuff to write down, like CALL CLEAR and CALL COLOR, and then you write in the color you want. Like No. 1 is transparent, No. 2 is shaded, 3 is yellow, 4 is light yellow. We then typed in the alphabet — you know, ABCDEFGHIJ and the rest, and when we ran it off it came out half in white on a blue background and half in yellow.

After that, we started using the computer's speech synthesizer. Mr.

"I get by with a little help from my little friends."

A PROGRAMMING PRIMER

BY DAVID PATE



"Quiet, please! Genius at work. Let's see now . . . YOU ARE A JERK."

Anyway, my mom got me my own computer today, and now I can play different games. I can learn electronic stuff. I can be a genius!

TUESDAY
June 28, 1983

Mr. Gessner had to go to a meeting today, so we had a substitute. Her name was Helen. She let us play games for a while and then we started reviewing what we'd done last week.

She showed us how to change the color of the whole screen. You type in CALL SCREEN and then the number of the color you want. Then we typed in this quiz game where the computer prints PICK A NUMBER FROM 1 TO 10. If the number you picked is too high or too low, the computer prints THAT'S TOO HIGH or THAT'S

Gessner gave us some numbers and stuff to type down, like OPEN SPEECH, the number 1, INPUT, and a whole bunch of mumbo-jumbo. Then the computer would say TYPE A PHRASE, and so you'd type a phrase and the computer would say it back.

Sometimes we had to type words in the way they sound rather than the way they are really spelled — sort of phonetically — so the computer would say them back right. If you wanted to, instead of writing a phrase you could change the code and the computer would whisper it, or say it in a high voice or a low voice. If you put in a lot of Hs, you can make the computer laugh. Put in a lot of Ks and you can make it sound like a train.

SATURDAY
June 25, 1983

My mom bought me my own TI 99/4A today. They say you don't need one to take the course, and that may be, but if you want to practice at home, how can you?

"Mr. Gessner (our teacher) sees all, knows all, tells all."

Photography by John McGrail

TI DIARY

David Pate with fellow graduates: TI's Class of '83.

TOO LOW.

We then learned about CALL SOUND, where you can make the computer make sounds even if you don't have a speech synthesizer. Those we learned today were called "hills and valleys and plains." If you want to try to do the same, here's a sample program:

```
NEW
10 FOR X=110 TO 2000 STEP 50
20 CALL SOUND (-100,X,0)
30 NEXT X
40 FOR X=2000 TO 110 STEP -50
50 CALL SOUND (-100,X,0)
60 NEXT X
70 CALL SOUND (1000,-7,0)
RUN
```

If you'd like to make the sound of an explosion, that's easy, too.

```
NEW
10 CALL SOUND (1000,440,2)
20 CALL SOUND (1000,440,2,659,2,
   880,2)
30 CALL SOUND (500,-7,0)
RUN
```

Pretty neat, huh!

THURSDAY
June 30, 1983

We played some games first today, and then we typed in some programs for sound, only this time it was like music. You have to type in a million things, but if you do it just right you can even play a song.

Then we made a list of names and telephone numbers. It was kind of like a data base. You could type in a name and the computer would immediately give you the number that goes with that name.

Then Mr. Gessner showed us how to type in some things so it looked like an airplane on one side of the screen. At first, it just sat there, and then he showed us how to type in some more stuff and change some things and we could make it move across the screen and flash on and off in different colors. It was like writing your own game just for the fun of it.

We then did some things in LOGO. We typed in a whole lot of stuff—to show and to tell and stuff like that — and that made a big, black circle come to the center of the screen, and then it would go up a few lines and explode into a bunch of different colors.

We also learned about the CALL CHAR statement. You see, the screen has little dots all over it and if you type in VCHAR and a number, you can make a dot appear in one of the horizontal rows. There are 32 columns and 15 rows. Depending on how you program in the dots, you can make all kinds of designs.

Then the photographer came in and took our pictures. That was the best part of all.

MONDAY
July 4, 1983

I wrote my first real program today. I was fooling around with my computer, putting in a whole bunch of asterisks, and I finally made a grid — you know, a whole bunch of squares. My grandfather came in and he said it looked almost like a flag. That sounded pretty neat, so I took out some of the vertical lines and added some more asterisks (for stars) and it really did look like a flag.

Then my grandfather said, "Gee, wouldn't that be great if you could make it flash red, white and blue?" So I worked on it for a long time and finally figured out a program to make it do that. Here it is.

```
NEW
10 CALL HCHAR (1,1,42,32)
20 CALL HCHAR (3,1,42,32)
30 CALL HCHAR (6,1,42,32)
40 CALL HCHAR (9,1,42,32)
50 CALL HCHAR (12,1,42,32)
60 CALL HCHAR (15,1,42,32)
70 CALL HCHAR (18,1,42,32)
80 CALL HCHAR (21,1,42,32)
90 CALL HCHAR (24,1,42,32)
100 CALL VCHAR (1,1,42,24)
110 CALL VCHAR (1,32,42,24)
120 CALL HCHAR (12,1,42,15)
130 CALL HCHAR (11,1,42,15)
140 CALL HCHAR (10,1,42,15)
150 CALL HCHAR (9,1,42,15)
160 CALL HCHAR (8,1,42,15)
170 CALL HCHAR (7,1,42,15)
180 CALL HCHAR (6,1,42,15)
190 CALL HCHAR (5,1,42,15)
200 CALL HCHAR (4,1,42,15)
210 CALL HCHAR (3,1,42,15)
220 CALL HCHAR (2,1,42,15)
230 CALL HCHAR (1,1,42,15)
240 CALL SCREEN (7)
250 CALL SCREEN (16)
260 CALL SCREEN (5)
270 END
RUN
```

I didn't do it right then, but later on I added some noises that sound like fireworks, and now I'm working on adding in some patriotic music.

I know I'm not a computer genius . . . yet . . . but it's a beginning. ■

LOOPING THE LOOP

BY SHELLEY LIPSON

DID YOU TAKE out the garbage yet? Did you mow the lawn? Did you finish your homework?" These are repetitive questions you probably could do without. They often border, in fact, on nagging.

But when it comes to computing, repetition is the staff of life. It allows the computer to reuse a specific set of instructions over and over again in an endless variety of applications. This process is called looping. It is one of the most powerful tools you can use in any programming language.

In BASIC, the easiest way to create a loop is through a three-step FOR/NEXT instruction using the following format:

1. line FOR variable = start value TO final value
2. Computer instructions you want repeated.
3. line NEXT same variable as in FOR

Here, FOR and NEXT are the boundaries of the instructions you want repeated. The variable is assigned its start and final values in the FOR statement, but also keeps track of how many cycles you have completed. Think of the variable as a ball that keeps bouncing from FOR to NEXT and back up to FOR again. For each bounce at NEXT, its value is raised by 1 (unless another number is indicated).

Meanwhile, FOR checks to see if the actual number in the variable is higher than the final value. When it is, processing skips to the line following NEXT. Otherwise the program continues to get closer to the final value.

Let's say then you wanted to display simply the number of hours on a clock. How to do it? Like so:

```
100 FOR H = 1 TO 12
200 PRINT H ":00"
300 NEXT H
```

The variable H, which keeps track of the hours, is our "bouncing ball." As indicated on line 100, it will bounce 12 times between the FOR and NEXT instructions. There is only one instruction within this loop, line 200. It will print whatever is the current value of H. So run the program, and here's what you get:

```
1  :00     5  :00     9  :00
2  :00     6  :00     10 :00
3  :00     7  :00     11 :00
4  :00     8  :00     12 :00
```

Let's say now you want to indicate all 24 hours of the day. No problem. You merely expand your original program to read as follows:

```
 90 LET A$ = "AM"
100 FOR H = 1 TO 12
200 PRINT H ":00";A$
300 NEXT H
400 IF A$ = "PM" THEN END
500 LET A$ = "PM"
600 GO TO 100
```

With a little effort this program can be further expanded to simulate a digital clock, as in the following:

```
 90  LET A$-"AM"
100  FOR H = 1 TO 12
150  FOR M = 1TO 60
200  PRINT H":M;A$
250  NEXT M
300  NEXT H
400  IF A$ = "PM" THEN END
500  LET A$ = "PM"
600  GO TO 100
```

Here, lines 150 and 250 form the boundaries of the inner loop that counts minutes. Now there are two bouncing balls. H waits for M to bounce off its boundaries before counting off the next hour. Thus H is incremented and again waits for M to complete its full cycle from 1 to 60. This continues until line 100 finds the value in H greater than 12. Line 400 is processed and the entire double-looping procedure begins again, this time to count off every hour and minute in the PM cycle.

Notice, too, how the brackets help to define the outer and inner boundaries. These brackets also help to find any programming bugs. If the brackets intersect, the loops are incorrectly designed; the inner loop must be totally contained within the outer loop.

Finally, some of you may be wondering by now about the possibility of indicating seconds. Because seconds are the smallest time measurement on a clock, their loop must be nested within all the others, as in the following:

```
 90  LET A$ = "AM"
100  FOR H = 1 TO 12
150  FOR M = 5 TO 60 STEP 5
175  FOR S = 10 TO 60 STEP 10
200  PRINT H":M;A$
225  NEXT S
250  NEXT M
300  NEXT H
400  IF A$ = "PM" THEN END
500  LET A$ = "PM"
600  GO TO 100
```

The ability to keep track of seconds, minutes and hours is usually of little consequence in computing. But the principles you've seen here can be used time and again to facilitate the most complicated of computations. ■

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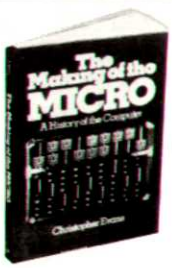

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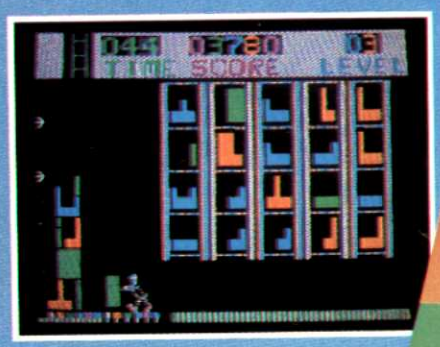

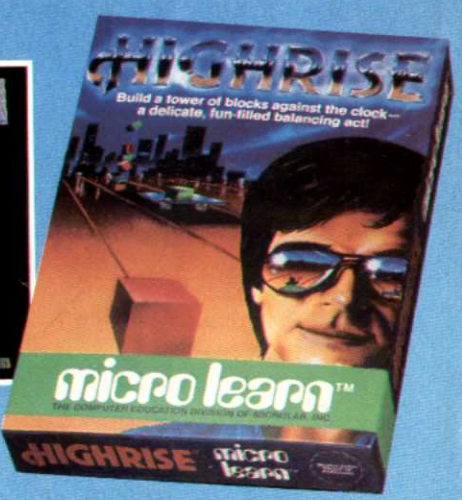

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