PUBLISHED BY SCHOLASTIC INC.

APRIL 1984

VOLUME 2
NUMBER 4

IBM PCjr
A HANDS-ON REVIEW

FAMILY COMPUTING™

$1.95

Computers and Careers

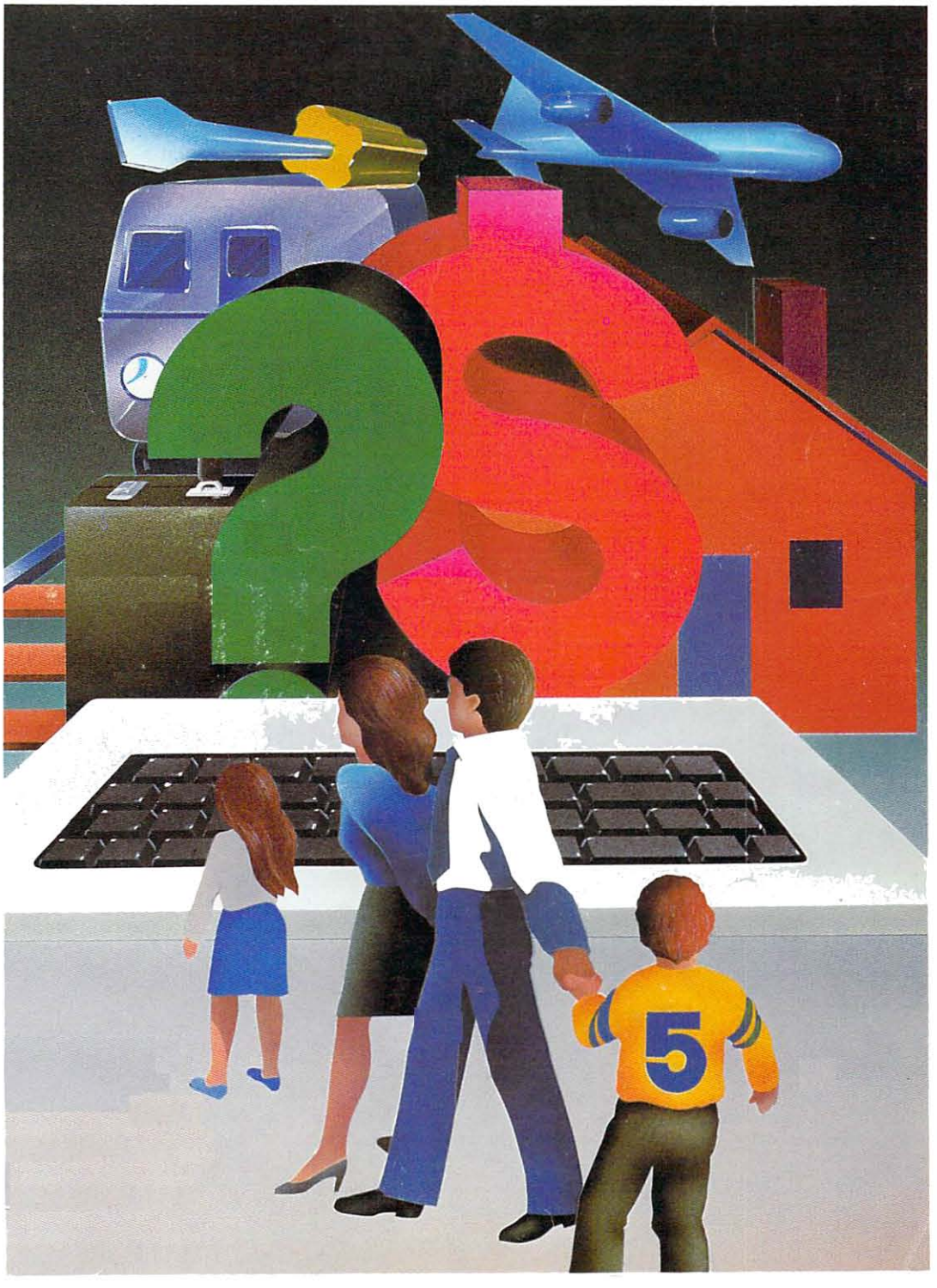
Computer Camps

How to Make Your Taxes Less Taxing with Software

Buyers' Guide to Used Computers

Herbie Hancock Talks About Making Music with Computers

Original New Programs for Adam, Apple, Atari, Commodore 64 & VIC-20, IBM, TI, Timex, and TRS-80s



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FAMILY COMPUTING™

FEATURES

APRIL
1984

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DEPARTMENTS

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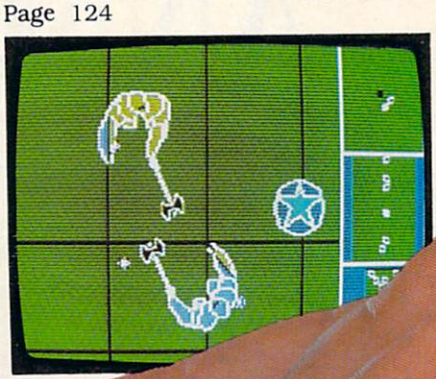

ANNOUNCING A PROUD ADDITION TO YOUR FAMILY.

The next addition to your family could be the bright little newcomer in the growing family of IBM® personal computers.

Name: PC*jr*. Weight: 12 pounds. Heritage: more than 30 years of computer experience.

"Junior" is a powerful tool for modern times. Yet it's simple enough for a child to enjoy.

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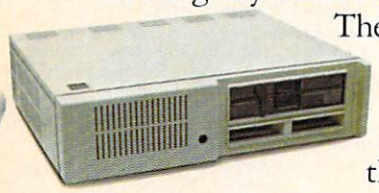

The surprises begin the moment you open the carton.

Surprise #1 is the IBM "Freeboard"—a keyboard that doesn't need a connecting cord. The Freeboard frees you to move around and relax.

Then there's the Keyboard Adventure—an instructional exercise for first-time users. It's built into the computer and explained step-by-step in the Guide to Operations. It will help anyone begin learning as soon as PC*jr* is hooked up to a TV set.

In systems equipped with a diskette drive, there's a program that lets you explore computer fundamentals at your own pace, with PC*jr* as your teacher.

And to get you off and running from the very first day, a sample diskette with eleven useful mini-programs (ranging from a spreadsheet for monthly expenses to a word game and a recipe file) is also included.

But there are still more surprises.

FAMILY COMPUTING MADE EASY

Many IBM software programs written for other IBM personal computers will run on PC*jr*. And inexpensive new ones written especially for PC*jr* are being released.

An easy-to-use diskette word processing program, for example, uses pictures as well as words to guide you along. A comprehensive IBM home budget program makes keeping track of money easier. There's also a selection of educational programs for children at home and at school.

And when the work is finished (or perhaps before), the fun can begin. Just slip in a game cartridge and stand back.

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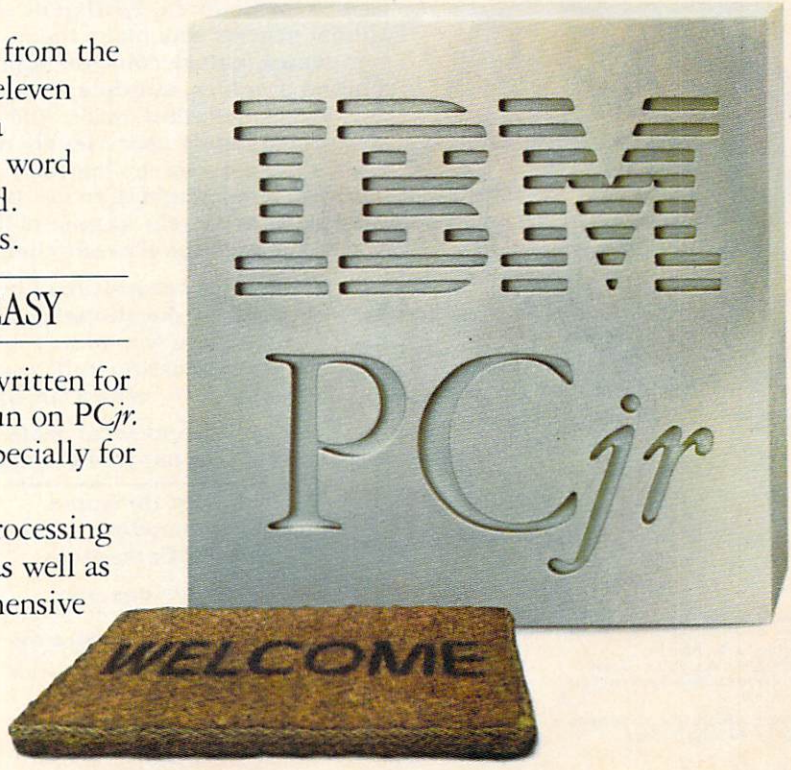
SEE JUNIOR RUN

Junior's starting model includes a 64KB cassette/cartridge unit and Freeboard for about $700. A 128KB model with diskette drive is about $1300. (Prices apply at IBM Product Centers. Prices may vary at other stores.)

Your local authorized IBM PC*jr* dealer proudly invites you to see this bright little addition to the family. For the store nearest you, just call 1-800-IBM-PCJR. In Alaska and Hawaii, 1-800-447-0890.



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EDITOR'S NOTE

CHANGE AND EXCHANGE
Computers and Careers

I'd bet money that on most magazines, the editor's note is usually the last piece written. That is certainly the case with FAMILY COMPUTING. Sometimes I know for months what the theme of a given note will be; other times I wait and wait in the shower for inspiration, and that is where it usually comes.

This month I was just too close to see the topic until it was almost too late. There it is, our cover story—Computers and Careers—a personal story for our entire staff. (See page 47.)

I am writing this note on just about the first anniversary of the day the Scholastic Board of Directors approved the idea of proceeding with the plan to publish FAMILY COMPUTING. Since then, everyone on staff has made a career change. I was editor-in-chief of some 30 or so classroom magazines, devoting the early hours of the morning to writing proposals for FAMILY COMPUTING and drawing up plans for a year's worth of issues. It seems unbelievable to me now that when 1983 began, I had no idea that I would soon make a dramatic change in my life, and that computers would be behind it.

For the rest of the staff of FAMILY COMPUTING, the change was equally dramatic. Some of us were new to computers; others were new to magazines, or to publishing of any kind. Laura Bernstein, our senior editor, was working on *Los Angeles* magazine when I called to ask her if she remembered our meeting a year and a half earlier and if she would still consider moving to New York. Features Editor Nick Sullivan was working on a magazine called *Ad Forum*, and Lifestyles Editor Sarah Kortum, was upstate in Rochester, writing for the local paper and a regional magazine. Not one of them thought they'd ever look to a computer for more than its word-processing prowess. Certainly not for a job!

Computers were familiar objects for the technical staff, but the thought of a magazine was new. Now, thanks to the computer, here we all are: Writers and editors learning about computers and the time it can take to debug a program; technical experts learning about publishing and the quick pace with which everything on a magazine must be done.

Now, Nick seems comfortable with four computers in his office and a modem on his desk. Sarah plunges right into the stack of reader-written programs she receives every day. Laura is an avid *River Raid* fan whose score gets higher with every game she plays. And Managing Editor June Rogoznica is getting faster and better at renumbering programs in the lab whenever she pitches in. Everyone is pretty much at home now with the new tasks we face.

Authors of our cover story, Mindy Pantiel and Becky Petersen, also changed their lives because of the computer. Formerly journalists and teachers, they are now contributing editors to FAMILY COMPUTING, authors of a computer textbook for teachers, and teachers of Logo.

Jazz musician Herbie Hancock has changed the way he works as a result of his involvement with computers. He talks about these changes in an exclusive interview with FAMILY COMPUTING, page 54.

Every day we get letters from people whose lives have changed because of their computer. Judging by what they write, it seems that everyone has the same thing to say: "It's a little scary at first to think about working with computers. Change is always hard to accept, but I've never had a moment's regret."

Claudia Cohl

CLAUDIA COHL
EDITOR-IN-CHIEF

Upcoming Features in FAMILY COMPUTING

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An Interview With Top Game Designers

Telelearning

Buyers' Guide to Popular Computer Brands

Women and Computers

More Original Programs

May Issue On Sale April 17

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Computers are here to stay. KIDS & THE IBM-PC/PC*jr* prepares the computer generation by solving the mysteries of the IBM-PC and PC*jr* in entertaining and enjoyable ways!

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LETTERS

HOPE FOR NOVICES

I am a beginner in computers, but I have found FAMILY COMPUTING to be very interesting. I do not feel intimidated by it, and now I feel there is hope for me! I read each issue from cover to cover as soon as I get it.

MRS. ROBERT SLAGLE
Newalla, OK

PROGRAM PLEASURES

I love your magazine. What I like the most about it is the way you make programs for most of the computers. I tried your *Jack-O'-Lantern*, *Turkey*, and *Christmas Tree* programs. They look great on my Commodore 64. Your articles are one in a million. The article on adventure games (October 1983) was the best. Keep up the good work.

PETER FREEMAN, *age 14*
Staten Island, NY

AN EDUCATIONAL TOOL

My husband and I read your magazine's (November 1983) article "Little Programs for Little Kids" with great interest. We currently have a Texas Instruments 99/4A that our five-year-old son finds very entertaining. It has helped him tremendously with his early math problems and, more important, with his alphabet.

ANDREA E. PAUL
Philadelphia, PA

SHORTCHANGING TI?

I was dismayed to find, after the excellent article on word-processing programs in the December 1983 issue, that only the *TI Writer* program was listed for the TI-99/4A computer. While that is the most widely known program, several independent companies market WP programs that do not require the full-expansion system and that cost considerably less. These programs are advertised in the *99'er Magazine* [*now titled* Home Computer Magazine], produced by the TI Users' Group.

The departure of TI itself from the home computer market means that more than one million [*now approximately two million*] of us who own TI systems will increasingly need to be aware of the creative work of these third-party companies. While they do advertise in the *99'er Magazine*, their products are often overlooked in hardware and software reviews in general-interest magazines. Many of the products are excellent.

As TI-produced software becomes scarce, I hope you will expand your reviews to include other producers.

ERNA-LYNNE BOGUE
Chicago, IL

EDITOR'S NOTE: *Thank you for correcting us. Our information came from several sources, including TI. Owners of TI-99/4As looking for products—either hardware or software—should be receiving catalogs from March Direct Marketing. (See "The TI-99/4A Lives" in Behind the Screens.) If you aren't on the TI mailing list, send your name, address and computer serial number to P.O. Box 53, Lubbock, TX 79408.*

A BAD PITCH

I have enjoyed your first two issues. I am sure your magazine is off to a good start, and you will certainly meet with competition in the future.

In your second issue (October 1983), I enjoyed your article "Crunching Numbers for the Little League." At the end of the article a letter from RAL-II Software Systems was reprinted. This letter stated, and I quote, "Notify readers that they may obtain a copy of *BASES*, including graphics and pitching statistics . . . by sending a self-addressed, stamped envelope to . . ." I wrote to RAL-II on October 18 and asked for my *free* copy of this software. I had planned to show it to the local little league organizations as an instrument to create interest in computers by the individual players. I was very disappointed by the reply I received from Robert A. Locke, Jr., president of RAL-II. The letter stated various prices and charges for a copy of *BASES*. He said that his letter was misquoted by you!

I feel this was misleading to your readers. In the future, I suggest a clearer representation be made by you and your advertisers.

RANDAL M. HILL
Ellisville, MS

EDITOR'S NOTE: *We printed the letter from RAL-II Software Systems as it was sent to us. We're sorry if there was a misunderstanding between them and us, or a change of mind on their part. As far as we are concerned, they were "contributors," not "advertisers."*

A BURSTED BUBBLE

Ever since we bought our Apple IIe last February, I have been looking for a magazine like yours. I have five children, ages eight to 18, and your magazine interests them all. I find the articles clearly written and easy to understand.

But—shame on you! How could you print—not once, but twice—the picture of Jeffrey Woods sitting at his computer blowing a bubble with sticky, gooey gum? (Home-School Connection, Premier issue.) After all the time teachers and parents spend instructing children and adults not to eat or drink near the computer, you print a "cute" picture of a child doing a NO-NO.

Keep up the good work as far as your articles go, but please try to watch silent messages you are sending to computer users. Our sign above our computer will remain: "No eating, no smoking, no drinking, and no gum chewing near the computer."

SARA PRELLWITZ
Fond du Lac, WI

EDITOR'S NOTE: *Sorry about the silent message. We have sometimes "overlooked" our own good computing rules in order to create interesting images for our readers.*

CORRECTION

In our story on Michela Alioto, "64 Inches of Courage" (February), we incorrectly gave credit to her mother, Michele Alioto, as the sole founder of the American Paralysis Association. Michele joined with about 15 other hard-working people around the country to help found the organization. We regret the error.

FAMILY COMPUTING *looks forward to letters from all our readers. Please direct your correspondence to: Letters to the Editor,* FAMILY COMPUTING, *730 Broadway, New York, NY 10003. Include your name, address, and phone number. We reserve the right to edit your letters for length and clarity.*

See jane™ run

Once there was a time,

before the written word, when people used pictures to communicate. Symbols representing entire ideas were easy to see and understand. And the people were comfortable with this language. And they were happy.

But then came the computer.

And symbols were replaced by complicated commands. Soon data processing meant learning a whole new vocabulary. And the people became frightened of the new computer language. And they were sad.

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Absolutely, positively, unequivocably, unquestionably, the most simple way to operate a computer.

Jane does away with the keyboard . Instead, a simple, hand-held device called a mouse selects from a variety of applications. From letters to lists, to calculations and spreadsheets. Jane does them all.

Jane does away with complex command words.

Instead, simple, easy-to-understand pictures tell the computer what to do.

From one operation to many, all on one screen at the same time.

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And they Jane. You can too.

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See Jane run at Softcon '84.

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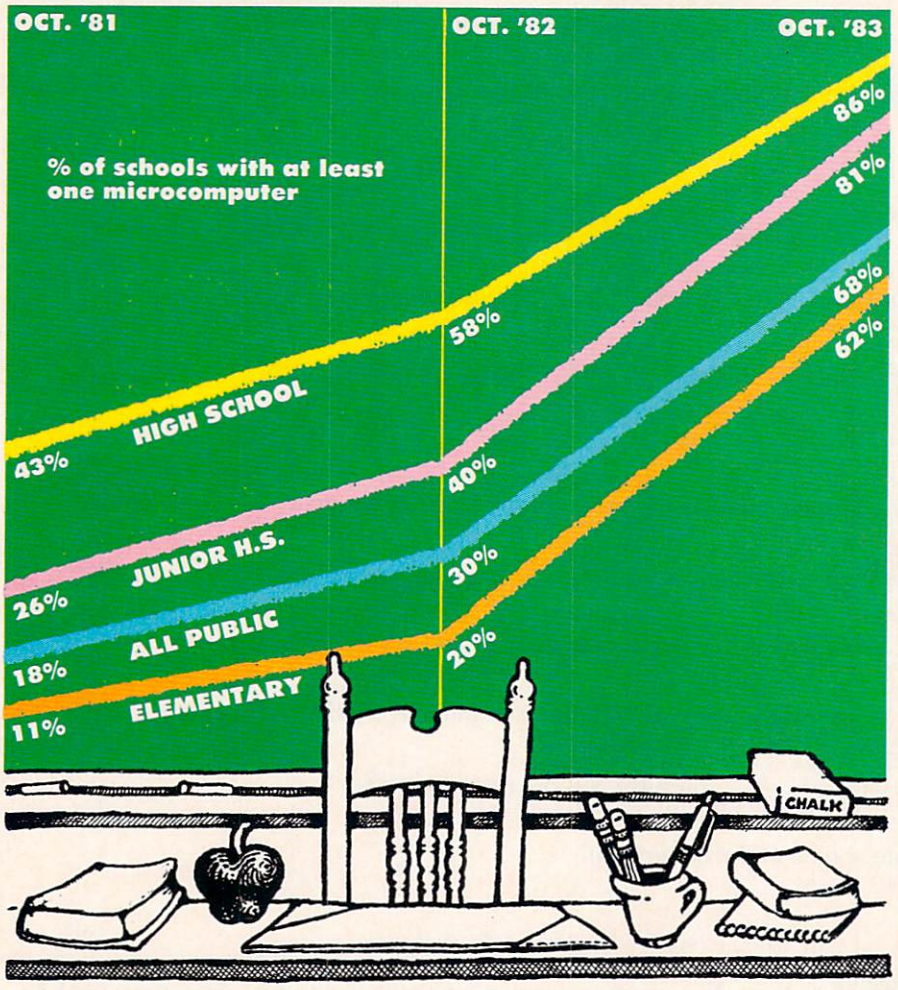
BEHIND THE SCREENS

PEOPLE, NEWS, AND TRENDS

EDITED BY BILL CAMARDA

A School Computer Explosion



STATISTICS SUPPLIED BY MARKET DATA RETRIEVAL

In a single year, the number of public schools with computers has more than doubled. Suddenly, a public school without computers is the exception, not the rule.

The percentage of public schools owning at least one microcomputer has soared from 18.2 percent in October 1981 to 68.4 percent last October, according to Market Data Retrieval (MDR), a Westport, Connecticut, research firm. By the end of 1984, almost every American public school will have bought into the computer revolution, according to MDR's Sharon Sanford.

The October 1983 survey found that although poorer districts have made rapid headway in buying at least one computer, they're still substantially behind wealthier districts.

The survey noted rapid increases in computer ownership at all levels, and especially in elementary schools. Only one out of five elementary schools owned computers in October 1982; the figure a year later was three in five.

Schools owning computers usually have more than one, MDR found. Elementary schools average 3.5 computers, junior high schools average seven computers; high schools average 11.

Of course, simply owning hardware is no guarantee that a school has a high-quality computer-education program. The challenge now for educators is to make the most of all this machinery. We've reached a milestone, but it's only the first on a long road.

[FAMILY COMPUTING *reports on the challenges now facing educators, in this month's Home-School Connection, page 18.*]

The TI-99/4A Lives

If you own a Texas Instruments 99/4A home computer, you're probably wondering what the future holds, now that TI has departed from the home computer market.

First of all, Texas Instruments is still mailing newsletters and other information to 99/4A owners. If you own a 99/4A and are not on TI's mailing list, send your name, address, and computer serial number to P.O. Box 53, Lubbock, TX 79408. TI's toll-free help line will continue to operate, probably at least through the end of the year. The number is 1-800-TI-CARES. The number is often busy. Try calling on Saturday.

TI will continue repairing the 99/4A at its service centers.

At last, TI has agreed to license the technology and sell the special chips used in 99/4A cartridge software. Now other companies can produce cartridges for the 99/4A, something TI has for years refused to allow. And March Direct Marketing has begun publishing a catalog of software and hardware for the 99/4A.

TI has negotiated agreements with Imagic, Sierra On-Line, and other software producers, allowing those companies to market the software they had previously licensed to TI.

PERCOM Data Corp. of Dallas, Texas, will keep selling a disk drive for the 99/4A. The company has, however, raised its prices. Corcomp, a California manufacturer of 99/4A add-on boards, says it will produce a new 64K computer that will run all 99/4A software and have built-in speech. It will cost less than $500.

An estimated two million TI-99/4A computers are in circulation. Half of them were bought after the 99/4A's price dropped to $50 last winter.

Demand for 99/4A-related prod-

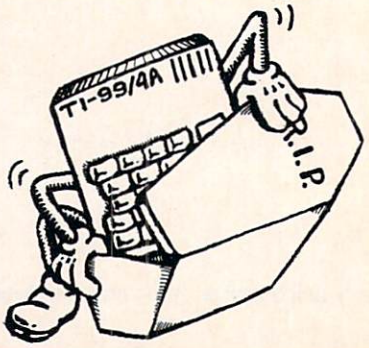


ILLUSTRATION BY HOLLY KOWITT

AT LAST! EDUCATION PROGRAMS YOUR KIDS CAN'T OUTGROW.

At Timeworks, we know that kids' minds and curiosity never stop growing. So we create educational software for kids of all ages. Little kids. Big kids. Even teenagers, too.

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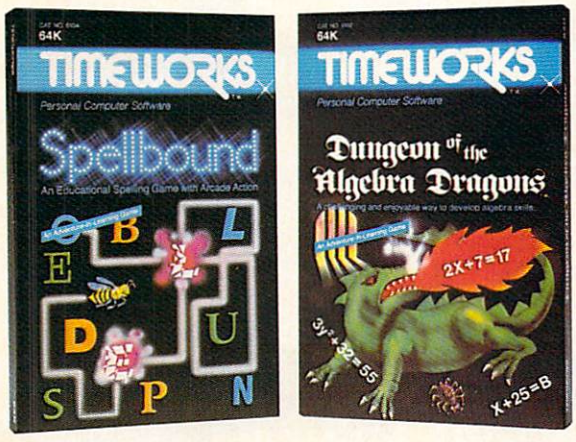
Timeworks **Dungeon of the Algebra Dragons** for instance. A challenging and enjoyable way to develop algebra skills, with 3-D graphics, 5 skill levels, for ages 14 and up. You have been locked in the infamous Dungeon of the Algebra Dragons. To make your way to freedom, you must search through the Dungeon for the two Magic Keys...But beware of the Algebra Dragons. If they find you, you must use your Algebra skills to outwit them or your escape may be foiled.

Timeworks **Spellbound** is an educational spelling game with arcade action and ten skill levels for ages 6 to 18. Spellbound is a captivating combination of Education and Strategy, to keep your child Spellbound while learning basic spelling skills.

Timeworks learning systems are super easy to understand and play. Because helping kids learn is something Timeworks is deeply committed to doing. We believe the substance of success is thinking and learning. So we create educational software with substance—for everyone.



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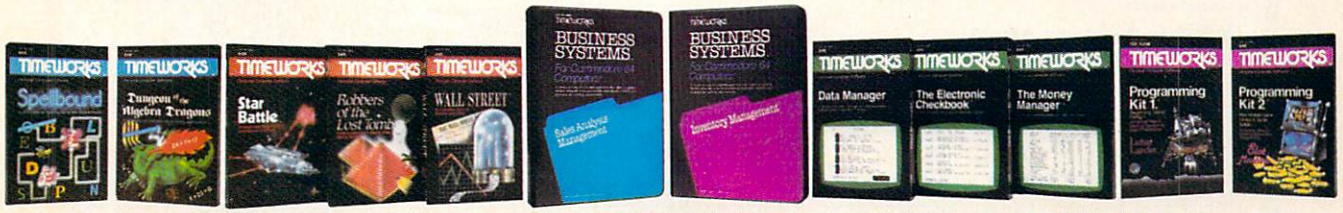

commodore 64

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Radar Rat Race: Beat the maze. Eat all the cheese. Beware deadly cats/rats. Cartoon action fun for all ages.

NEW **Lemans:** Multi-obstacle road racing at its best. Arcade action and graphics. Night, water and divided highway hazards.

NEW **Star Ranger:** Fight your way through hoards of space enemies. Avoid asteroids and land safely. Superb graphics and space action.

NEW **Frogmaster:** Unique sports challenge. Train animals to play football and rugby. Over 100 variations. Play against, computer, friend or yourself.

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Zortek and the Microchips: Award winning program teaches children BASIC through games, graphics and stories.

Easy Lesson/Easy Quiz: Take the drudgery out of writing tests and quizzes. Answer keys provided. 7 categories per test.

NEW **Number Nabber/Shape Grabber:** 2 Learning games in 1. Build both math and object identification skills. Lively graphic and sound effects.

Visible Solar System: Fly the solar system. Land on planets. Calculate age and weight. Astronomy for home and school. Award winner.

Speed/Bingo Math: 2 games in 1 teach children 4 to 10 basic math skills. Beat the clock or your friends.

Bally Midway

NEW **Gorf:** 4 Space action games in 1. Fly your fighter defeat "The Empire". Multi-skill levels. IT TALKS! (with Magic Voice)

NEW **Wizard of WOR:** Fight your way through 30+ mazes. Defeat the Wizard and Worriors. Multi-skill. IT TALKS! (with Magic Voice.) Award winning conversion.

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Omega Race: Fast space race action. Many skill levels. Avoid deadly mines as you eliminate droid forces.

Clowns: Amazing action under the "Big Top". Help clowns "pop" balloons. Colorful acrobatics. Fun for all.

Kickman: Ride the unicycle and catch falling objects. Multi-skill levels. Tuneful sound. Watch out! Don't fall!

NEW **Blueprint:** Help J.J. build the "Ammo Machine". Parts are stored in a colorful maze of houses. Multi-skill and difficulty levels.

NEW **Lazarian:** 4 different screens. Multi-skill level space action. Rescue, evade obstacles and destroy a one-eyed leviathan.

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Zork I: Fantasy adventure in a dungeon. Find all the treasure and escape alive.

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Music Machine: Play piano or organ melodies and percussion rhythms together. Music staff shows notes on screen. Vibrato, tempo and pitch controls.

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ucts has been strong. "Our dealers have been begging us for more products," said PERCOM Data Vice President of Marketing Bob Gerwer.

TI may have given up on the 99/4A, but the computer has developed a life of its own.

Airport '84: The Terminal

If you're stranded in Boston's Logan Airport, stop off at the videotex booth and leave your family an electronic message.

New England Telephone is installing its first public-access videotex terminal—made by Quazon—this month. If it proves popular, it will be the first of many, according to company spokesman Dave Tibbetts.

"You'll be able to access anything public there, including CompuServe, Dow Jones, and electronic-mail services," Tibbetts says. "You'll be able to call your personal computer. And we won't charge any more than an ordinary phone call would cost."

The Quazon terminal includes a full, plastic-covered keyboard and a color video display. According to Quazon, it will feature special applications for the deaf and hearing-impaired, including access to the Deafnet Network. Until now, in order to use Deafnet, a deaf person has had to carry communications equipment and hook it up to an ordinary phone. The Quazon terminal eliminates the need for the extra equipment.

And it gives a new meaning to being on line at the airport.

Now, you can log on at Boston's Logan Airport.

MASSPORT

Franklin/Apple Settlement

Franklin Computer Corp., which rose to prominence by selling an Apple II compatible computer, or "clone," has agreed to pay Apple $2.5 million and to stop using Apple's operating system. This ends a legal dispute that was headed for the U.S. Supreme Court.

Using Apple's operating system, Franklin computers are able to run nearly all of the vast library of Apple software. Franklin says it has sold more than 80,000 Apple compatibles in less than 18 months, at prices lower than Apple's.

Franklin President Avram Miller says the company has developed its own operating system, which will still be compatible with Apple software. Compatibility is a touchy issue, though, and only time will tell whether Franklin's system will run Apple software as well as Apple's did.

An independent arbitrator will settle any future disputes between the two companies. Meanwhile, the important legal debate over whether an operating system can be copyrighted remains unsettled.

Tomorrow's Library, Today

Whither the book?

This is a question of great concern to libraries. Will they become museums for printed relics? Will the book of the future be read screen-by-screen on a home computer?

Some libraries aren't waiting and worrying. They're building on their traditional expertise in dealing with information, and are adapting wholeheartedly to computers.

In Colorado Springs, Colorado, a library card is a ticket to the information age. The library, working with several public and private agencies, serves as a community information center. Its on-line files include a community events calendar, and listings of all local clubs and organizations, public agencies, and adult education classes.

The library also provides computer information on car-pooling and tutoring programs, mass-transit schedules, and day-care centers. But for these you must either call up and speak to a human being or use a terminal in the library. These services will become accessible from the home later this year.

The Pikes Peak Library District even has a complete on-line card catalog.

So far, more than 1,000 home computer users access the library's computer by phone, and there are 96 terminals in the library system.

Within a year, the library may begin planning a full-scale community electronic-mail service, with the goal of serving 6,000 home computer users a day.

Library Director Ken Dowlin acknowledges the need to change old methods. "The purpose of the library is to provide public access to information and knowledge," he says. "I know and love books dearly. And the book remains the primary source of knowledge that takes time to create. But directories and other continuously updated information belong in an electronic-information system, and the library is the perfect vehicle for disseminating this information."

—ROBIN RASKIN

Computer Heroes

Do you know a computer hero? If so, tell the Gusdorf Corporation.

Gusdorf, a manufacturer of computer electronics and furniture, has established an annual "Computer Hero" award, "to salute individuals who have contributed to the improvement of society and the quality of life through use and application of computers." Part of the award is $2,000 in cash.

Company Chairman Paul Gusdorf said, "We want this to be the Nobel Prize of the computer field.

"Our hero may be well known to all, or hiding in the shadows of modesty. It could be a young whiz kid or an experienced scientist with pages of credentials."

Until April 30, Gusdorf welcomes your nominations. But you must submit them on an official ballot. Write: Gusdorf Corp., 6900 Manchester Ave., St. Louis, MO 63143.

If you've got a good bite-sized piece of computer-related news involving people, trends, or innovations, let's hear it. We will pay $25 for each item we publish. Write to Behind the Screens, c/o FAMILY COMPUTING, *730 Broadway, New York, NY 10003.*

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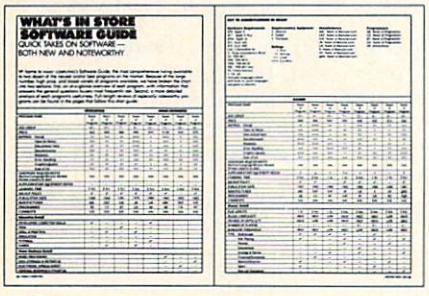

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HOME-SCHOOL CONNECTION

SCHOOL COMPUTING PROGRAMS: STILL A LONG WAY FROM UTOPIA

BY BETH POWELL

ILLUSTRATION BY DAVID ANSON RUSSO

Computers are streamlining and energizing education across America, and we now have the evidence to prove it. But are they really meeting their potential? That's open to serious question.

"You walk into a classroom where children are working on computers, and they don't even notice you," says Martin County, Florida, School Superintendent V. James Navitsky. "In a regular classroom, every head turns." Navitsky's district hosts an experimental program for kindergartners called Writing to Read, which will be profiled in FAMILY COMPUTING soon.

Navitsky's observation comes as no surprise to those who have studied computers and children.

In 1982 Dr. Mary Alice White, director of the Electronic Learning Laboratory at Columbia University Teachers College, compared children's attention span at the computer with attention to other classroom tasks. She found that computers significantly add to children's average working time on each task.

White also found that students' conversations with one another at the computer tend to be more directly task- or learning-centered than conversations elsewhere in the classroom.

And, White says, children tend to interact and cooperate more when working around the computer.

Many teachers have found their students' self-esteem is boosted tremendously when they're able to "make the computer do something"—and get immediate results.

SOME HARD REALITIES

With all this good news, what's the problem?

Computers are now being welcomed into schools—56,000 schools so far, more than half of them elementary-level. But having computers and knowing what to do with them are two very different things.

Educators are still trying to figure out just what to make of this new machine.

Is the computer just another teaching tool, the latest and most sophisticated in a long line that includes the overhead projector and the calculator? Or is it something altogether new, an electronic teacher that can itself impart new ideas, new ways of thinking?

In general, studies completed so far on computers in the classroom have indeed shown students making educational gains. But a number of evaluations show that these gains are no greater than those of students whose classwork is supplemented with traditional aids, such as flash cards, workbooks, or tutors.

Dr. Marjorie Ragosta, psychologist with the Educational Testing Service, which runs the S.A.T. and other standardized exams, spent four years studying computer-using elementary-school children. She found that children who used the computer just 10 minutes a day for drill and practice in basic skills were consistently able to improve their performance. If they doubled their time at the computer, they doubled their improvement.

An enviable outcome, yet Ragosta also found that similar results could be achieved through tutoring.

SOFTWARE OR DULLWARE?

Computers could do much, much better, say some computer educators, if they were used to their full potential. Rather than taking advantage of the computer's full interactive and graphics capacities, many schools only serve up repetitious drill-and-practice programs designed to supplement classroom instruction. They use the computer as an "electronic workbook."

"You can call that computer-assisted learning, but I say you're playing scales with a symphony orchestra," says Dr. John Henry Martin, creator

BETH POWELL *is a freelance writer living in Jacksonville, Florida. She is a regular contributor to* Jacksonville Monthly *magazine.*

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of the Writing to Read system. "Composing educational material for the computer is comparable to composing for simultaneous, multiple-instrument presentation," Martin adds. "It isn't Johnny-one-note."

Computers can be programmed to vary their responses according to the responses of the human being at the keyboard. That is a crucial difference between computers and previous teaching tools—a difference that should be exploited more fully, according to supporters of the new technology.

Students can not only interact with the computer, but control it. And that is a powerful incentive for learning. "Children resent being patronized by a computer that says, 'Let me help you,' " Martin says. "They get much more of the heady thrill of learning when they're in control and can say, 'I did it all by myself.' "

NOT ENOUGH MONEY, NOT ENOUGH PLANNING

The narrow, "electronic workbook" approach is common because, in order to do more, a school needs good software, plenty of expertise, and enough flexibility to make room for creative computer uses.

These are all items in short supply.

The computer boom itself has complicated matters. Overenthusiastic (and overanxious) parents and community leaders have plied already overburdened schools and teachers with computers, without providing them with the time or the money to meet the challenge.

"Many schools are yielding to parental impatience and are purchasing hardware without sound educational planning, so they can say, 'Okay, we've moved into the computer age,' " says Kenneth Komoski, executive director of the Educational Products Information Exchange Institute (EPIE).

"Computers are not the silver bullet," adds Marc S. Tucker, director of the Project on Information Technology and Education. "It depends on the people using them and the curriculum with which they are used."

The unimaginative drill-and-practice programs are easy to use, offer easily measured results, and fit neatly into existing lesson plans. Admittedly, they also do seem to work, if no better than flash cards.

With some notable exceptions, much educational software has been turned out quickly to meet the frenzied demand and as a sideline to the much-more-lucrative home computer market. The results have been limited, inflexible, and simplistic.

"Schools represent a pitifully small segment of the software market," Tucker says. "And schools have a notorious reputation for copying programs. You can't expect people to invest money if there's not going to be a return. That's basic marketing."

Komoski believes increased involvement on the part of both families and schools may be the only solution to the software dilemma. "Home software is the big boom market right now," he says. "Schools have got to encourage parents to demand—and buy—the better-quality educational software." Parents should demand that the schools do likewise.

Komoski suggests that schools allow parents to buy home computers under school-discount programs, not only to encourage home use but also to ensure that schools and homes are using compatible software.

SQUARE PEGS, ROUND HOLES

Some companies have invested in producing more imaginative programs. A few widely respected examples are Spinnaker's *Snooper Troops*, The Learning Company's *Rocky's Boots*, and McGraw-Hill's *Search* series. But programs like these often don't fit neatly into standard curricula and are thus ignored by many school systems.

In a new report, Drs. Frederick and Victoria Williams of the University of Southern California write that "most available course ware is piecemeal, leaving the planner the task of locating suitable materials and, further, having to integrate these materials into the existing curriculum.

"At the other extreme," the Williamses add, "are the totally packaged curricula, which, although often well-planned, require that the implementing school adopt a new curriculum in a subject area as well as the use of computers to carry it out. This, in practice, is a large order."

Even at Palm City, where Martin's Writing to Read program is offering ample living proof of the benefits of a sophisticated computer program, many teachers are resigned to giving their students either drill and practice or no computers at all. "We want to see computers carried throughout our school," says Jan Reed, a first-grade teacher, "but most of us wouldn't use them much because it's so demanding on our time trying to sandwich them in."

Another first-grade teacher at Palm City, Lynette Walker, says many teachers are prisoners of their own lack of knowledge. "We've got a computer program moving now, but only one person at our school is really getting good computer training, and she's studying it to get out of teaching."

The Williamses report finding the majority of teachers "cautiously enthusiastic" about computers, but "we also heard, 'Please, leave them in the computer lab and don't tell me where it is. I think I can make it to retirement before I have to face one.'

"Technologies tend to appropriate people's jobs. No wonder teachers are particularly fearful of computers that excel at tasks that have traditionally been part of a teacher's job description," they add. "Instead of taking an adversary role, teachers must see how they can use computers as teaching assistants."

COMPUTER LITERACY

Further complicating the introduction of computers is the issue of computer literacy. What is computer literacy? There are widely varying opinions.

To achieve "computer literacy," many schools have jumped feet-first into the teaching of programming, which they believe will help develop students' problem-solving skills and their ability to reason systematically. Recent studies of children who've been taught programming, however, show that they may be relatively unsuccessful in transferring programming skills to other areas of learning.

"Research is showing no strong connection between programming and problem solving in the real world," according to Tucker. He discourages the emphasis on programming for this reason, and because, "teachers end up teaching programming in a very unstructured way," as a result of their own lack of training.

Instead of programming, Tucker says, students should be exposed to programs that simulate, or model, problems and situations. "Say we

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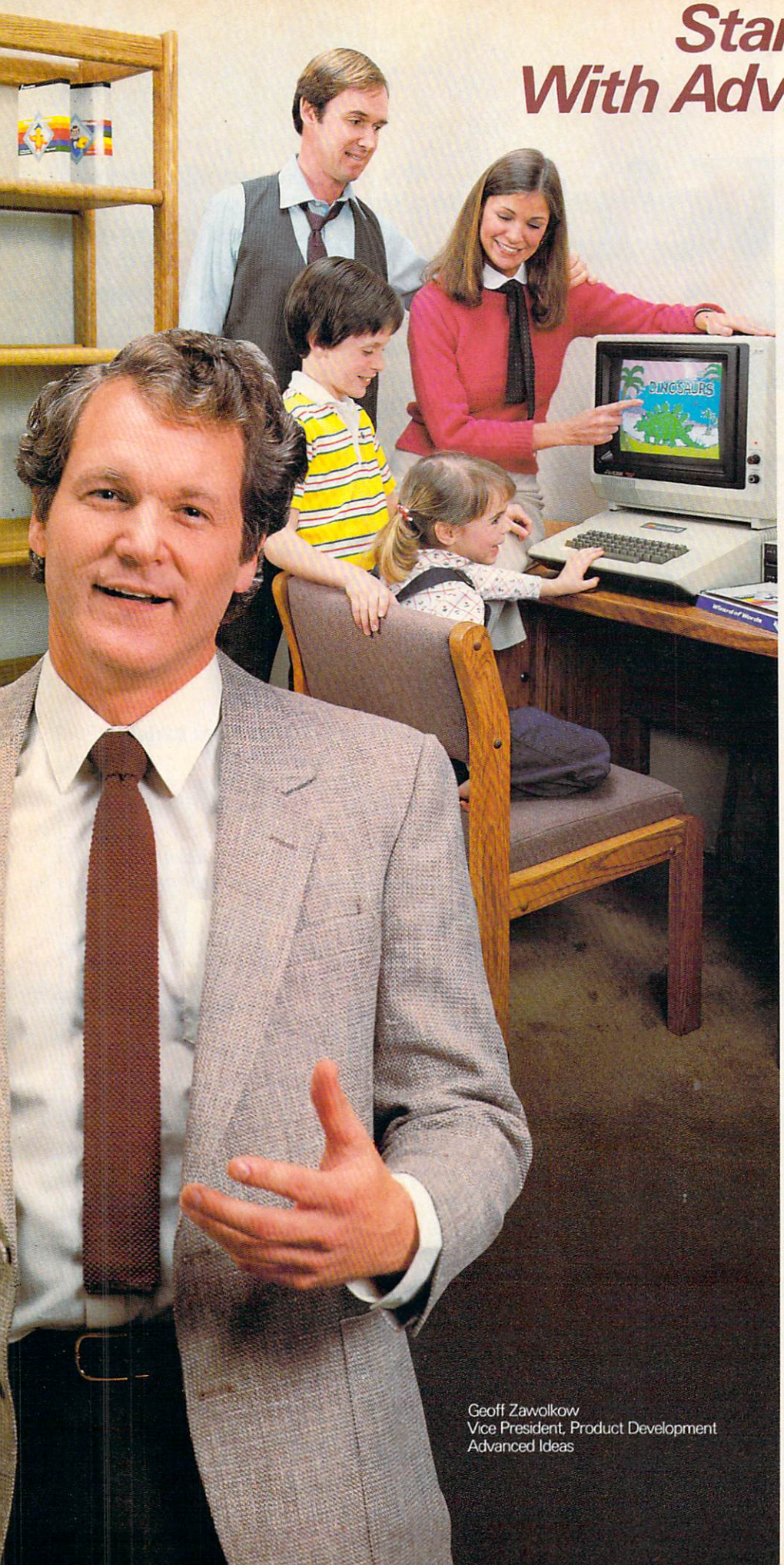

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The ability to modify a program is another form of extendability. Authoring systems can let you create lessons on your own topic areas for any age level and allow children to create and save original work, giving a sense of completion and pride vital to learning."

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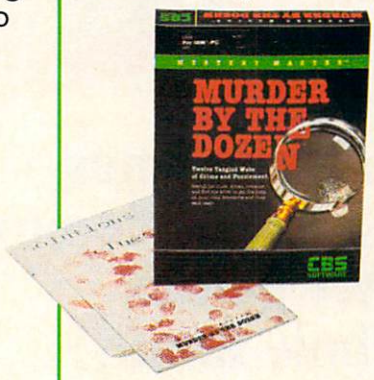

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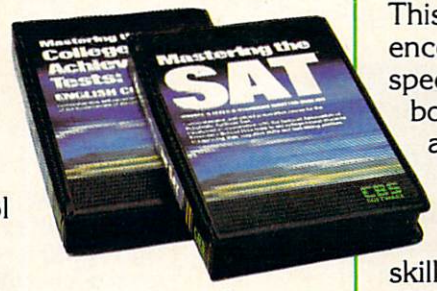

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HOME-SCHOOL CONNECTION

have a simulation of the Great Depression's macroeconomic causes and effects," Tucker says. "Students would be asked to pose a series of 'What if?' questions, such as, 'What if there were less money in circulation?' or 'What if margin requirements had been at different levels?'

"The computer will tell the students what difference their changed variable would have made," Tucker says, "thus giving the student a sense of the dynamic relationship between the variables. That's where they really begin to learn the material."

Tucker says that learning to use application programs, such as word processors or data bases, will require students to develop high-level skills in order to define and structure problems.

"Good application programs also teach as they go along," he says. "The strands will start to come together: computer as tutor, tutee, and tool. It's what we call Intelligent Computer-Assisted Instruction."

But these uses are "years and years away," Tucker says. They won't happen until schools are willing to invest in much more extensive training for teachers, and until teachers and administrators are willing to rebuild their curricula to incorporate computer learning more effectively.

IT'S JUST BEGINNING

For all the publicity, we're still only at the beginning when it comes to school computing. While more than half of America's public schools now own at least one microcomputer, student access is still very limited. Only 10 percent of all high-school students use computers every week.

That number will increase dramatically in the coming years. Computer manufacturers are fueling this growth in a variety of ways, from donating computers to developing course ware.

We are beginning some sort of revolution. Dr. John Henry Martin thinks it can be a glorious one. "The computer may strip the school of its drudgery and inefficiency, elevating it to a beautiful sustaining function within our society . . . as a socializing institution for the humanization of the race."

Before that can happen, though, educators and parents will have to make some very hard decisions and do some very hard work. FC

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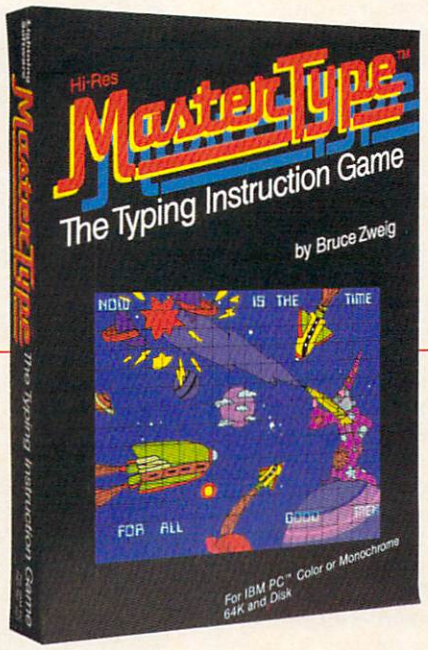

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GAMES

BRINGING HOME THE BLIPS AND BLEEPS
Arcade Translations for the Personal Computer

BY JAMES DELSON

Visit the neighborhood video arcade sometime and drop a few quarters in pursuit of beeps, buzzes, and blips. If you've wondered or forgotten about the origins of that computer sitting in your living room, you'll find such a visit worthwhile. For besides being a reminder of the computer game's roots, the video arcade also offers a bit of a glimpse into its future. Today's popular arcade games are sure to be picked up and translated for use in the home tomorrow.

The first home game systems from Atari and Intellivision were spawned by the incredible success of the modern arcade experience. To game-making companies, crowds flocking to consoles stationed in pizza parlors and arcades across the country meant hordes of potential home arcade-game players. Only thing was, home systems were limited in their ability to accurately re-create the more intricate arcade games. Something better was called for.

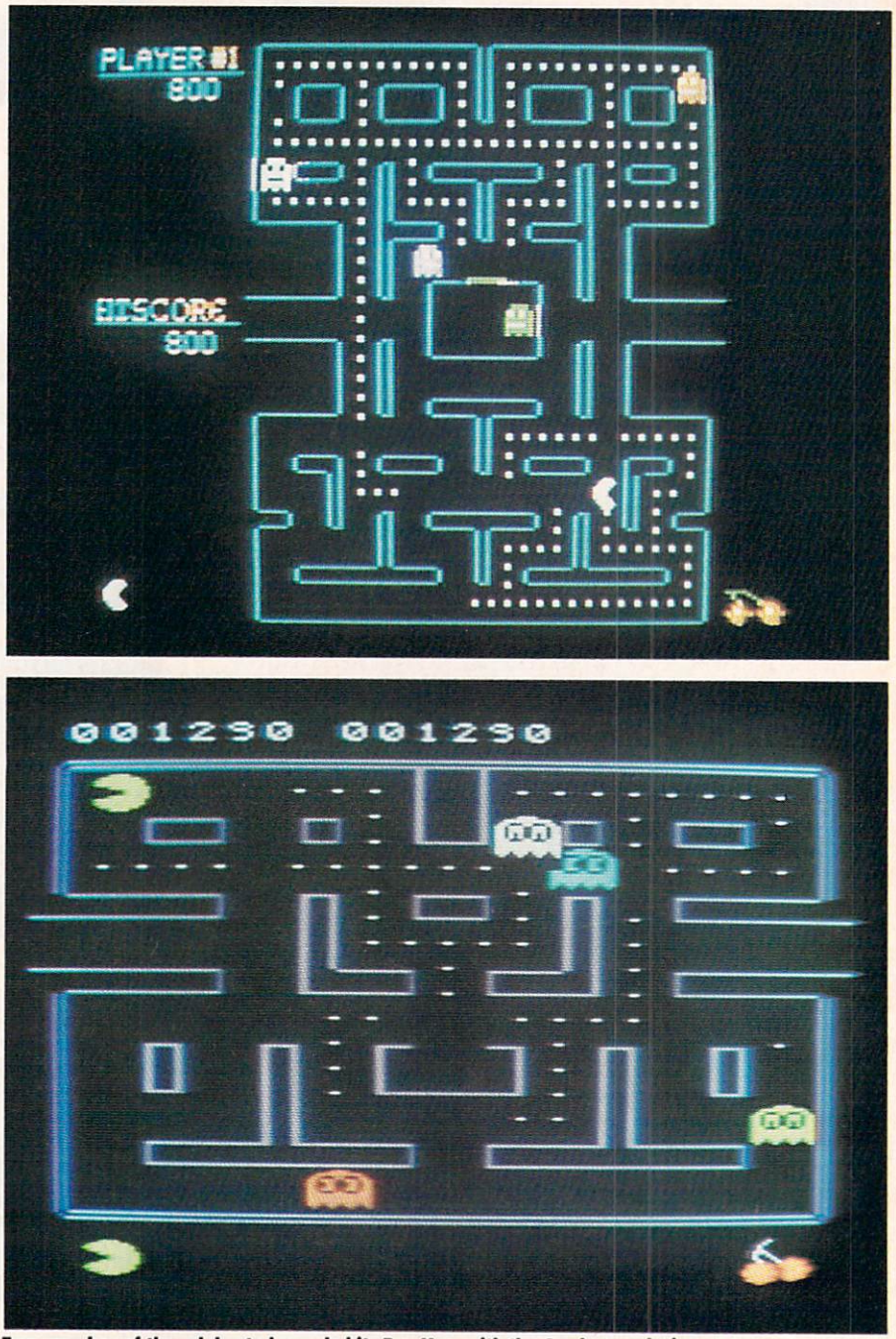
Enter the home computer, a breakthrough that finally provided owners the opportunity to sample their arcade favorites.

PAC-MAN IN THE REC ROOM

The field has grown enormously in the past two years. Of special note is Atari's decision last fall to go ahead and manufacture licensed arcade titles for most of the popular home computers, not just their own systems. Understandably, many families will breathe a collective sigh of relief at the prospect of *Pac-Man* in the rec room. The latest addition to the arcade library could pay for itself within months, in terms of quarters saved.

But just because a game is familiar and it has a thrilling video arcade ancestor doesn't mean it will automatically be a hit. What you saw at the arcade may have been fast-paced and hard-hitting, but if its personal computer translation doesn't live up to your expectations, your new acquisition will wind up in the closet.

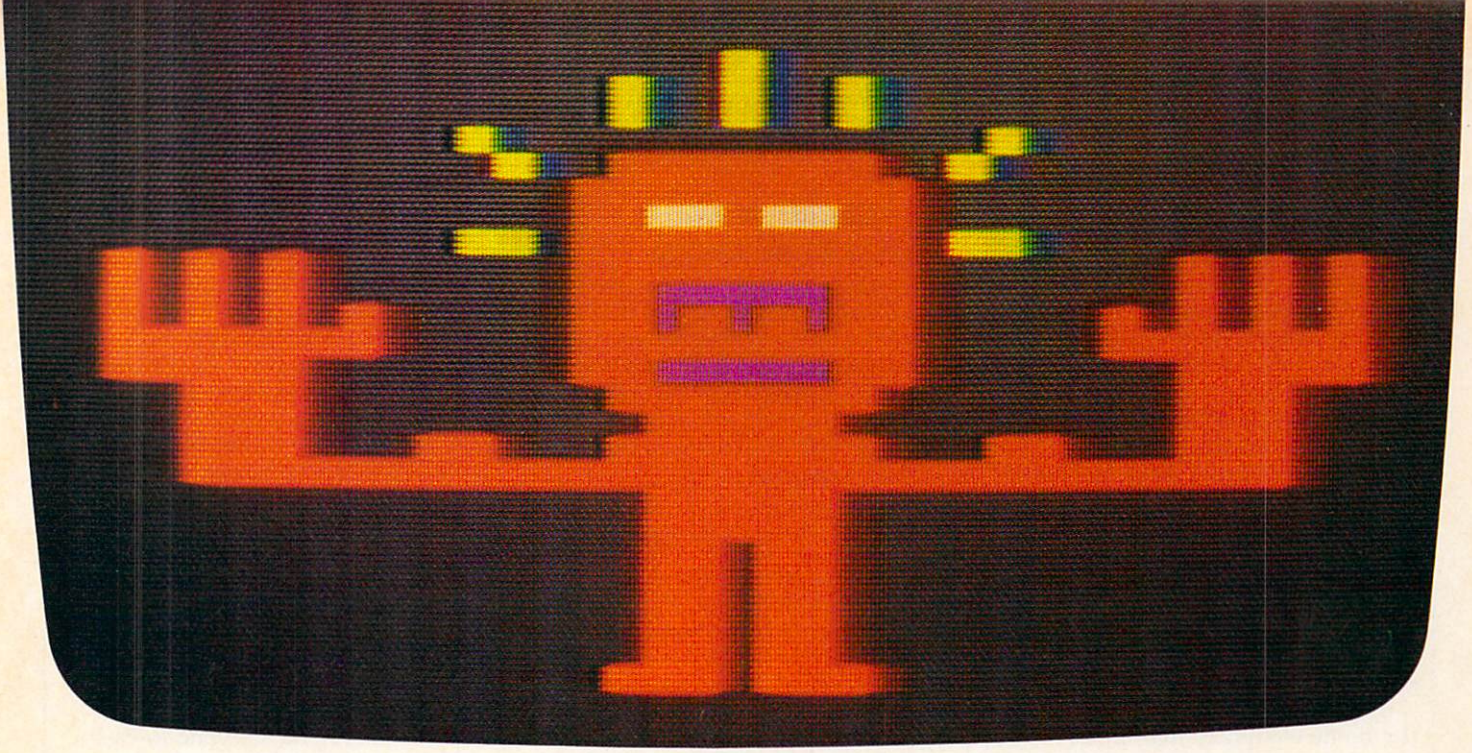
I recently play-tested a bunch of home computer translations of arcade games. On the whole, they faithfully duplicated their forebears: They had the look and feel, the timing and graphics, of the originals. I'm talking about the actual licensed versions of the real thing, not the thinly disguised clones that pass through my home-testing grounds month to month. Included among the games I played were IBM, Apple, Atari, and Commodore VIC-20 versions of *Pac-Man;* Atari, Apple, and



Two remakes of the celebrated arcade hit, *Pac-Man,* with the Apple translation on top and the VIC-20 version underneath.

PHOTOGRAPHS BY WILLIAM P. GALLAGHER

JAMES DELSON *is* FAMILY COMPUTING*'s games critic. He welcomes the opportunity to discuss the state of the art with anyone who has strong opinions.*



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VIC-20 versions of *Centipede;* Commodore 64 and VIC-20 versions of *Q*bert;* Commodore 64 translations of *Robotron* and *Frogger;* VIC-20 versions of *Tutankham* and *Defender;* an Atari version of *Donkey Kong;* and Coleco ADAM translations of *Subroc* and *Victory.*

This is only a small sampling of the home computer games born amid the bongs and bleeps of the arcade parlor. But it is indicative of the advantages and faults of the genre. It may give you an idea of the strengths and weaknesses of various machines and their arcade-game playing capabilities.

FORGET YOU'RE AT HOME

By far the strongest contender in the home computer market as far as arcade playability is concerned is the Atari. With *Pac-Man,* for instance, it's only when you come to the Atari version that you reach a game so similar to its original that you forget you're playing at home. The graphics and sounds (poor in both VIC-20 and IBM versions) and the play action are first-rate, as are most of the Atari adaptations of arcade games I've seen.

In contrast, Apple's *Pac-Man* is weak, with sluggish joystick response hampering play in what should be a fast-moving game. But its translation of *Centipede,* while not as fine as Atari's, is a solid little program that fans of the long-lived shoot-'em-up will enjoy. The VIC-20 *Centipede* was also a good translation, a close approximation of the real thing, though somewhat toned down due to its limited memory. The best of the VIC-20 adaptations, *Defender,* was both exciting and absorbing, a true rendition of the original's look and feel within the confines of the machine's capability.

CONTROL PROBLEMS

Some of the fault must lie with the limited playing capacity of the VIC-20, but the greatest disappointments I found were in the adaptations of *Tutankham* and *Pac-Man* for this Commodore machine. The scrolling effects on *Tutankham,* a sort of *Raiders of the Lost Ark* spin-off in which you must navigate through several levels of an ancient tomb in search of treasure, are weak. Jerky movements from its joystick operation are a definite drawback in a game that relies so heavily on character control to stay alive.

Much the same control problem exists in the VIC-20 *Pac-Man,* but it's compounded by the game's having been decreased in size to fit the VIC format. As a result, you are left with a difficult-to-handle central character, working his way through a screen that isn't really the *Pac-Man* play field at all. It's a pity, but this is worse than many uncredited *Pac-Man* clones I've played. IBM's *Pac-Man* board is similar in size to the VIC-20's. This is a drawback, but the play action is considerably better.

THE ANGLE ON *Q*BERT*

I played Commodore 64 and Texas Instruments versions of *Q*bert,* the hopping game that Parker Brothers is marketing for a number of different systems, and found both excellent in approximating the arcade game's lively colors and play action. (You have to move a hopping creature about a three-dimensional pyramid without letting it jump off the edge.)

Unfortunately, there's a drawback to both versions: You have to turn the joystick controller on a 45-degree angle to hop up, down, left, or right across the pyramid. This results in unending frustration. Your inclination to turn the joystick back the way it "should be" screws up your play and sends Q*bert over the edge time after time. The game requires extra concentration, which is bothersome when all you want is a good time, but for many, *Q*bert* is worth the additional effort.

Donkey Kong on the Atari, *Frogger* and *Robotron* on the Commodore 64, and ADAM's *Subroc* and *Victory* are all first-rate adaptations of the arcade games from which they were drawn. They all provided hassle-free play for hours. (In fact, they were so much fun that I was loath to get back to the lesser translations.) This was my first encounter with ADAM, and I found its Intellivision-like controllers easy to use. [*Next month's* FC *will feature a short review of ADAM's action game* Rocky.]

Home translations of classic arcade games will be with us for the long haul. They're fun, they're addictive (when properly translated), and they can be played as soon as you open the package. All I can say is you should be sure to test them before you shell out the money. You know the limitations of your own machine. It would be a shame to waste the equivalent of several rolls of quarters that could have been better spent on the real thing. FC

ARCADE TRANSLATORS:

AtariSoft, P.O. Box 3427, Sunnyvale, CA 94088-3427; (800) 538-8543. *Pac-Man, Defender, Donkey Kong, Robitron,* and *Centipede* for Apple II, all Ataris, Commodore 64 and VIC-20, IBM PC, TI-99/4A. [*Atari versions manufactured by Atari Inc.*]

Coleco, 999 Quaker Lane S., West Hartford, CT 06110; (203) 725-6000. *Subroc* and *Victory* for the ADAM.

Parker Brothers, 50 Dunham Rd., Beverly, MA 01915; (617) 927-7600. *Frogger* available for Atari 400/800/1200XL; *Q*bert* available for Atari 400/800/1200XL, Commodore 64 and VIC-20, and TI-99/4A; *Tutankham* available for Atari 400/800, and Commodore 64 and VIC-20.

A FEW COMMENTS AND NOTES:

In my column in January's FAMILY COMPUTING, Microsoft was erroneously credited for the creation of an outstanding IBM PC game called *Flight Simulator.* Bruce Artwick and his company, SubLogic, created it and own the rights to the program. It was recently translated into an Apple version, an outstanding program, worthy of the kudos I gave its IBM counterpart. Apologies to Bruce and his SubLogic associates for the misunderstanding. —J.D.

A review of Electronic Arts' *The Last Gladiator* appears in this month's Software Guide (see p. 122). It's an enjoyable, if difficult, game in which you take on a series of bizarre monsters, including giant snakes, vampire bats, robots, octopuses, and spiders. You also come up against a humanoid objectionably named "Mordo the Spaz," a character that flails its arms about in mad pursuit of its prey. Spastics are afflicted with a nervous disorder that causes involuntary muscle contractions. It has taken years for the handicapped to reach some level of acceptance in our society. What a shame that a company like Electronic Arts, which ordinarily produces games of such high quality, would demonstrate that kind of insensitivity. I hope that at the first available opportunity they will issue a public apology and change the character's name. It's silly, in poor taste, and never should have reached the market in the first place. —J.D.

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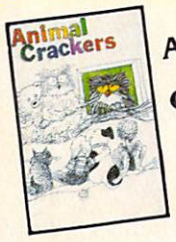

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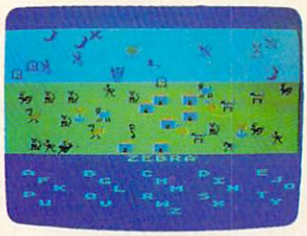

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HOME BUSINESS

RELATIVELY SPEAKING
Computerizing Your Family Ties

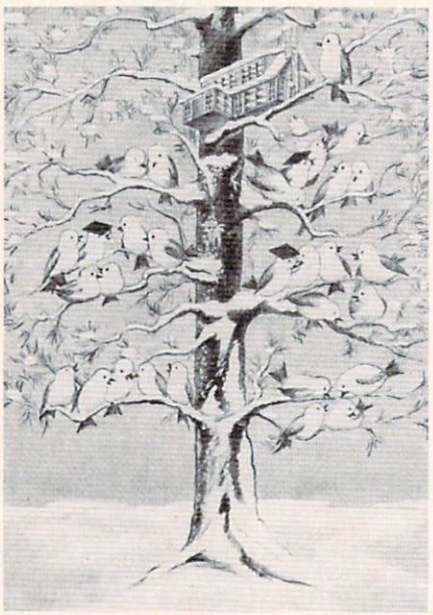
BY MINDY PANTIEL AND BECKY PETERSEN

On September 16, 1903, Jane Whittlesey Mitchell married Frederick Davis Herbert. Soon after, the newlyweds began what was destined to become a much-enjoyed family Christmas tradition. Each year, to celebrate the season, Jane Herbert sent out a card with a simple evergreen tree on the front. To commemorate her marriage, the first card depicted two small birds sitting at the top of the tree. The following year a small nest was perched on the branch directly below the birds, to be replaced, the next holiday season, with a fledgling.

As offspring wed and procreated, Jane Herbert's Christmas tree of life continued to blossom. Recipients of her yearly greeting could barely see the tree for the birds. After her death in 1967, everyone missed Jane's innovative method for keeping her loved ones up-to-date on family goings-on.

But all was not lost. Jane Herbert's son, Frederick Herbert, Jr., eventually decided to reinstate the tradition, but in his own way. About 10 years ago he initiated "The F.D. Herbert 'Holidays' " letter, which provided his kin with an update on family weddings, births, divorces, and deaths. "Holidays," which he hoped would be fun as well as informative, was sent every two years. The letter, perhaps more aptly labeled a listing, began with Frederick's grandfather, born in 1838, listed at the top. Then it recorded everyone in the family in the order in which they appeared on the scene, in the generation to which they belonged. The letter also noted, when applicable, who and when they married.

As time went by and the size of the Herbert clan increased considerably, Frederick began to find his biennial undertaking extremely cumbersome and expensive. After handwriting the latest information, he would then have it printed professionally. With the printing job complete, the family "Holidays" listing then had to be photostated and reduced so it could fit on a card for mailing.



The tree of life: Jane Herbert's 1961 Christmas card illustrated how her family had grown.

Frederick was just about to give up when his niece, Gail Trask (formerly Gail Whittlesey Herbert), volunteered to continue the family tradition, also choosing to do so in her own way. In a fashion more suitable to the modern era, Gail keeps track of the latest clan happenings with the help of her TRS-80 Model 4, kept in an office/playroom in her Boulder, Colorado home.

IT'S ALL IN THE FILING SYSTEM

The letters Gail now sends each Christmas cover only her relatives, but she plans to start a similar listing for her husband's family—so she has lots of complex record keeping to do. With the help of a software package called *Profile III Plus* (for TRS-80 Models III and 4), designed specifically for record keeping and filing, Gail is able to keep track of both families with "relative" ease.

"*Profile III* is a very expansive program, and you can set it up any way you want," explained Gail. She begins by entering each family member by their last name. Then she assigns them a five-digit code by a system she developed to keep track of the other necessary data. The first digit indicates whether the entrant is from her side of the family or her husband's. The second digit tells her if it is the paternal or maternal line. The third indicates the region of the country they're from, and the fourth digit further defines the family line from which the person descends. The fifth digit is currently blank, and Gail hopes to use it later for information concerning her own offspring.

After coding each name, Gail pulls all the information required for the holiday listing together with a Radio Shack word-processing package, *Scripsit*. Unlike her uncle, who had to rewrite the same information over and over again to include the latest updates year after year, Gail stores her findings on a permanent file and merely has to call it up when she's ready to make changes.

Once all the updates have been made, the final stage in the process is the printing. Rather than pay a professional printer's fees, Gail uses her own equipment. On her TRS-80 daisy-wheel printer she runs all the copies necessary to stay in touch with everyone on both her father's and her mother's side of the family.

WHERE TO BEGIN

Most people can't call on the amount of historical data that Gail had when she first began sending this unique Christmas greeting. For those with very little written family

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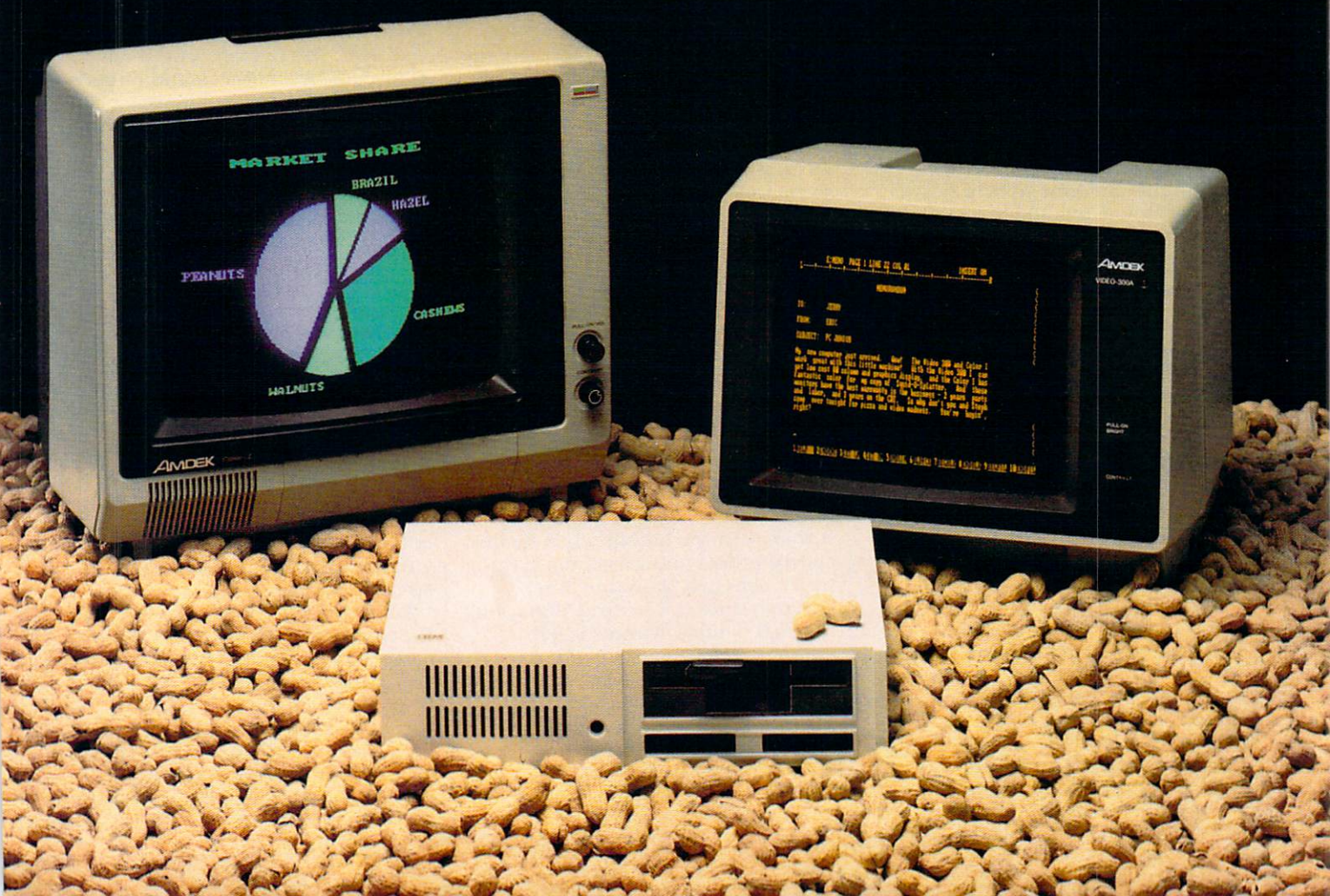

history available, Gail suggests using the method she has developed in beginning a file bank for her husband's family.

"Start by writing a questionnaire and sending it to as many people as possible. Design a letter of inquiry to send out to all living cousins, soliciting records of their parents and any other statistical information they may have," she says. "Then you have to keep branching backward, keeping track of information by family name and entering information on the computer as you find it." With luck, family members will think the project worthwhile enough to continue to supply any new or pertinent information for updating files.

I LOVE MY FAMILY, BUT . . .

Understandably, not everyone is as organized or ambitious as Gail, but many people would like to have this kind of family record for themselves and would enjoy sending a Christmas listing similar to the Herbert family's "Holidays." In response to this need, Gail has established a small home business. For a fee she organizes this kind of information for people who have either no time, no organizational skills, or no computer to help them accomplish the task.

Her services include sending questionnaires to relatives to gather the initial statistics, as well as follow-up letters to get updated information. Of course, her clients have to be willing to take the time to help her set up a complete mailing list. Once the statistics are recorded on the computer, Gail compiles a "holidays" listing for the family in question. If the client requests it, Gail will also see to the mailing of the letter to the appropriate parties each Yule season, or as often as desired.

Beyond that, Gail sees all kinds of family-related business applications for her home computer. Along the same line, she has established a service for people whose hearts are in the right place but whose memories are not. For a fee, Gail and her TRS-80 will take the worry out of birthdays and anniversaries. With information supplied by her customers, she sets up files on *Profile III* that can be cross-referenced according to last name, birthday, and anniversary. Then, at the beginning of each month, she sends clients a gentle reminder of important dates that must be acknowledged in the coming weeks. For the hopelessly forgetful, she intends to expand the business to include a complete line of greeting cards; then customers will be relieved of the responsibility of having to remember anything at all, other than to say "You're welcome" to happy mothers, children, and husbands or wives.

OPENING THE FAMILY CLOSET

Gail's interest in her heritage doesn't end with birth and wedding dates; she has much greater historical recording aspirations than that. She is fortunate to have had many ambitious relatives—on both sides of her family—who believed in both writing and passing down documents for future generations. She has become the guardian of a metal filing cabinet filled with information about her mother's family history and is in the process of entering the information into her computer, in the hopes of organizing it and having it printed and bound for all her family members.

Gail has also become the owner of some valuable family documents and recordings, such as a map of the United States drawn around 1820 by a distant relation. She has found that one of the joys of researching one's family genealogy is discovering the antics and accomplishments of one's predecessors. Her own family's closet, she discovered, is filled with an array of colorful characters that includes everyone from sailors to descendants of royalty. Those who revel in uncovering their roots are likely to uncover all sorts of amusing historical notes.

Gail mused about her great grandfather, who was a sailor named Captain Charles Burgess. Records reveal that during the Spanish-American War Captain Burgess' vessel was the sole American ship in port in Seville, Spain. In order to keep a low political profile, the consulate ordered all American ships not to fly their flags. Burgess, a strong patriot, caused quite a disturbance in the harbor when he disobeyed orders and raised his country's colors just the same. Such anecdotes are the rewards of plowing through old family records. [*To find out more about how to compute your roots, see "Castles, Cathedrals, and Computers," the story of a mother-and-daughter team that organized and wrote a family history book using a computer. The article, which appeared in the November issue, includes information on genealogical software available for most popular computers.*]

TELLING THE WHOLE STORY

Now gathering information on her own generation to include in her book, Gail is composing a questionnaire—on her word processor, of course—to send to all of her cousins. In the tradition of those before her, Gail hopes to do more than just record the latest family statistics; she wants to gather some insightful information.

The questionnaire asks relatives to tell something meaningful about themselves—what kind of work they do, what they are doing with their lives, and what their values are in life. She requests any newspaper clippings that involve family members, and she asks those who are especially busy to share their thoughts on a cassette to save time. As soon as the answers arrive, they are entered under the appropriate family file and stored for future use.

"This is the kind of information I want to leave for my own children. I have always been curious about where I came from, and I want them to understand their own heritage," Gail said. After complettng this labor of love for her mother's and father's side of the family, Gail hopes she'll still have enough steam to continue her project for her husband's lineage. The Trasks have two sons, William and James, ages four and three, and her goals include leaving a complete record of their entire family as a legacy to them. One hopes that children of future generations will see fit to continue expanding the fruits of her labor.

For those with the time and ambition, the rewards associated with charting relatives from the past or keeping up with loved ones in the present are great. If you fall into this energetic category, putting the wheels in motion as Gail suggests with a questionnaire and a computer file might be one method for beginning the hunt for your roots or strengthening existing family ties.

For those with the desire but not the required time and tools, finding someone like Gail to lay the foundation might be the perfect solution to help you reach out and touch others without all the time-consuming labor in between. Either path you choose should bring you one step closer to building the family tree. FC

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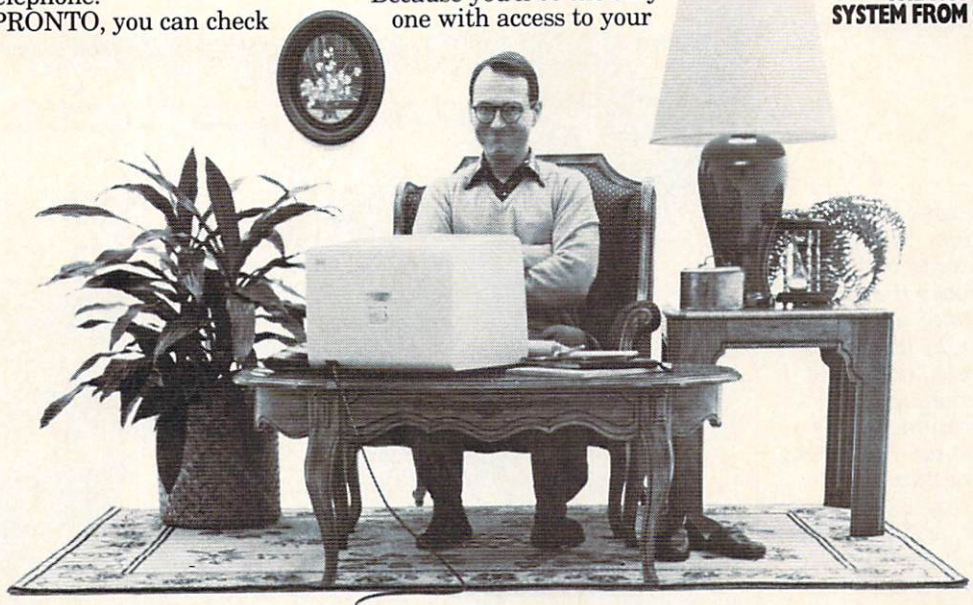


COMPUTING CONFIDENTIAL

HOW I LEARNED ABOUT COMPUTERS TO SAVE MY MARRIAGE!

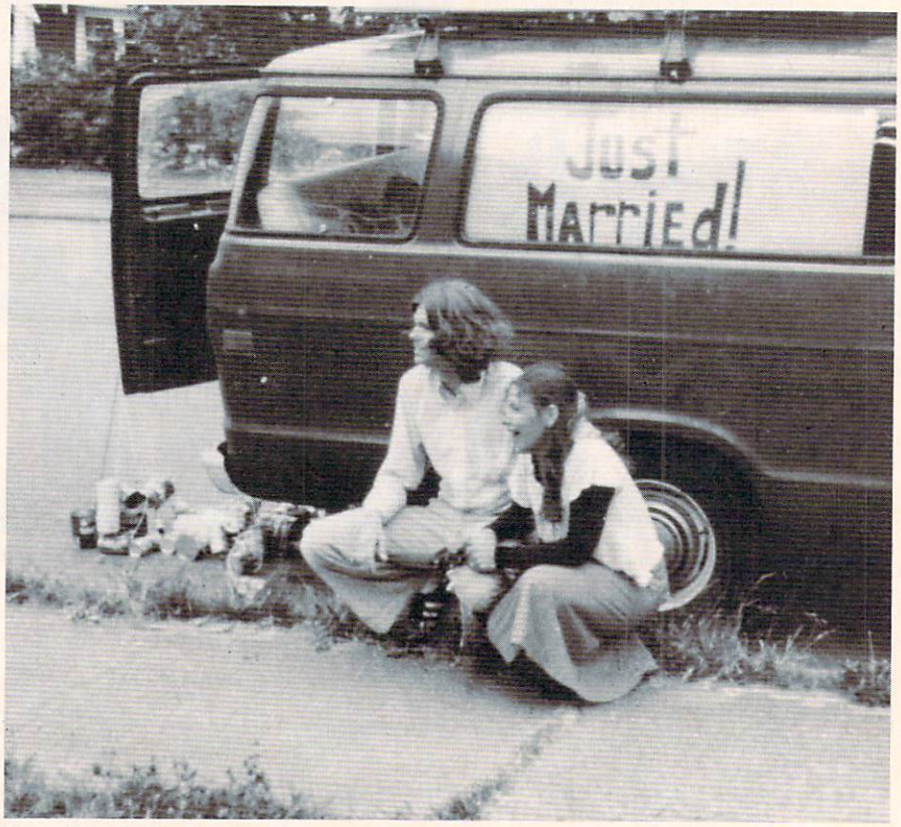
The Story Of A Reformed Computer Widow

BY SARAH KORTUM

"I had this dream that I was on our boat and it was a bright, sunny day on the river. The water is very soothing, it kind of rocks the boat. And in this trance I take a hammer and a screwdriver and I just go to work on [my husband's] computer. I pull the boards out, they kind of half melt and half crumble as I work on them, almost as if they're a little bit alive. Our boat has this rear deck and I just throw [the computer] over, bit by bit. And the parts just float away, very happily, like they're happy to be released. Once the act is completed, I'm a very peaceful person. I had this dream three or four times."

Three years ago, when Robin Raskin had this recurring dream, she resented her computer-scientist husband's absorbing interest in computers and feared that she and he were drifting apart. She was faced with a dilemma: To become a computer widow or to become a computer user. She chose the latter, and has since reaped the benefits of that decision. Now a freelance technical writer (and a frequent contributor to FAMILY COMPUTING), the computer is as much a tool for her as it is for him. And on Saturday evenings it becomes a shared tool when they sit down together to work on a computer-applications textbook they are coauthoring for McGraw-Hill.

Robin first met Kaare Christian, her then husband-to-be, in the kitchen of a communal mansion they shared with 16 others in Glen Cove, Long Island, New York, in 1978. Both 24 and two years out of college, the two couldn't have been more opposite one another. Gregarious and people-oriented, Robin was working in a backpacking-equipment store and trying to launch a wilderness-tour business. More solitary by nature ("He doesn't need anybody but his computer!"), Kaare was designing computer-graphics hardware at the New York Institute of Technology. A year later the two were married. In 1980, Robin, Kaare, and their newborn daughter moved onto a houseboat moored in a community of 150 boats midway up Manhattan's shore.



The newlyweds, Kaare and Robin, moments after exchanging vows in Kirkland, Washington.

PHOTOGRAPH BY JOE SHAPIRO, 1978

ROMANTIC NOTIONS

"When we were first married and life was rosy," begins Robin, "Kaare taught me how to wire up a [computer] board. I had a very romantic notion of how all those things worked."

The daughter of a Long Island attorney, Robin was raised in a house "where if something had to be done, you call the man to do it!" She only recalls one hammer "and maybe one screwdriver" in her parents' house, and grew up dividing the world into "two kinds of people: engineering people and nonengineering people. And my family were all nonengineering people! So I was always attracted to very logical, scientific-type people, I think because they were so different from anyone I grew up with.

"But now the story has changed," says Robin, "I'm not so romantic anymore." Living on a boat, "all of a sudden there were very real things: Kids and bills and money. I wasn't interested in computers anymore. I was very excited about just being a mother."

But motherhood on a tiny boat isn't easy. "The bathroom was smaller than one on an airplane. Everybody got one box of clothes. Every-

SARAH KORTUM *is lifestyles editor of* FAMILY COMPUTING.

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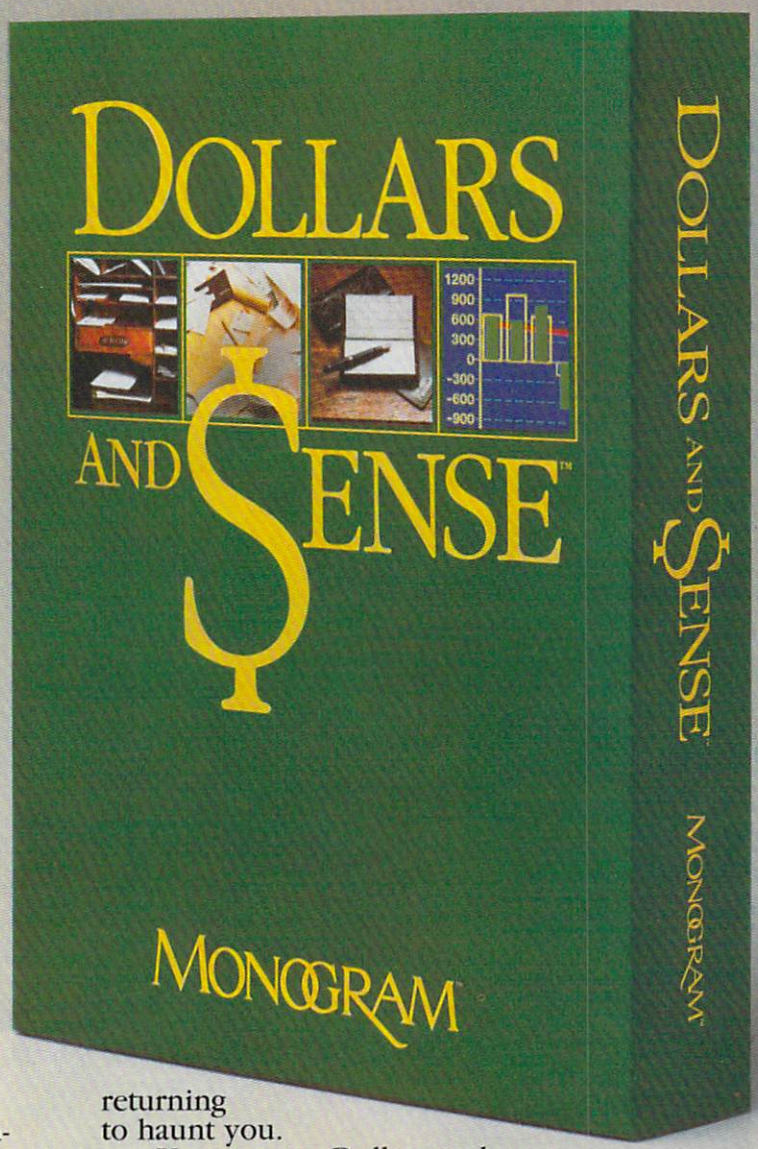

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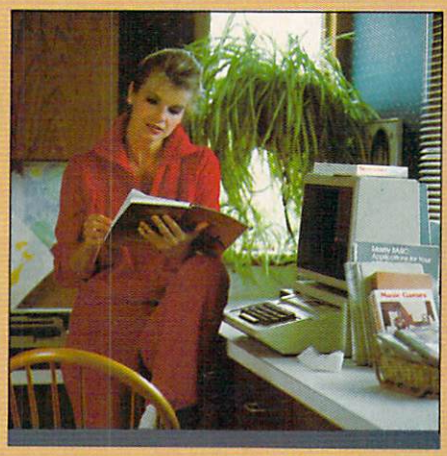

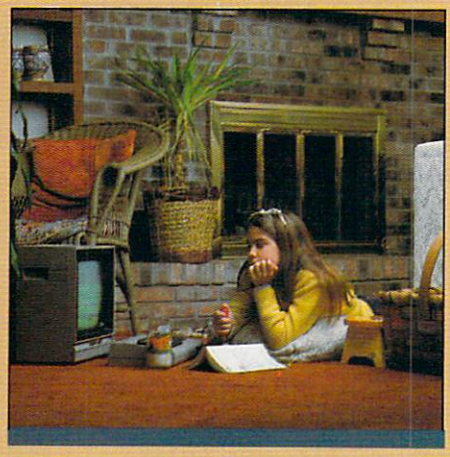

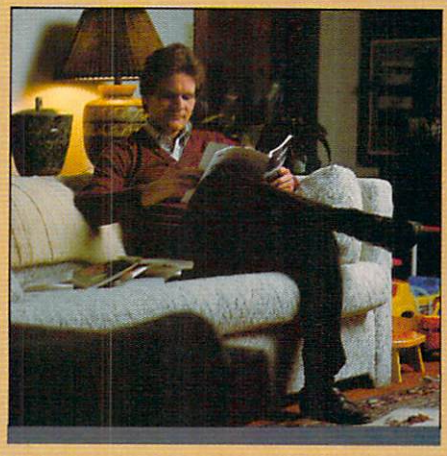

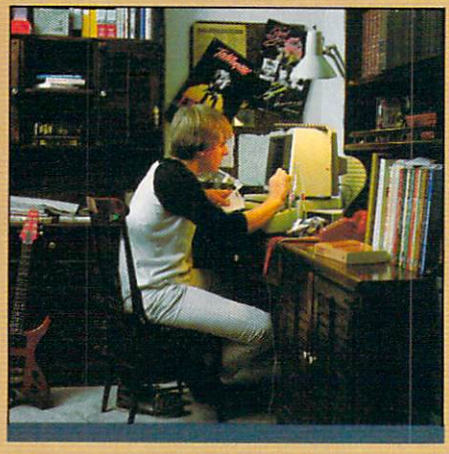

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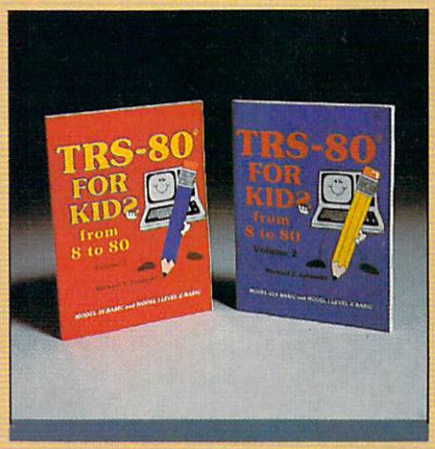

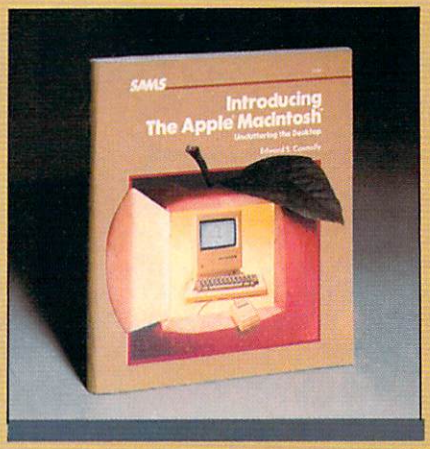

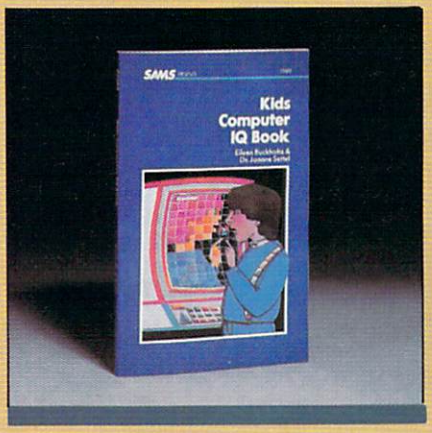

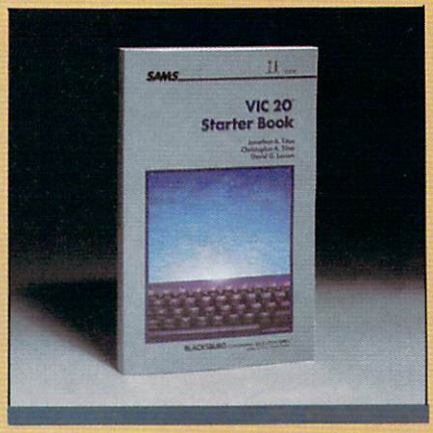

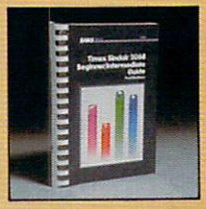

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What Technology Is All About.

thing became space," recalls Robin. So it was with little enthusiasm that she greeted the news that the boat was getting a new addition: A computer. Worse yet, "Kaare decides we're going to *build* our computer! I would have been happy to just get a standard thing!"

Six months later, in the summer of 1981, the computer was completed and placed "next to our bed in the one bit of space we had on the whole boat!" Pregnant with their second daughter, Robin would retire early while Kaare started writing a book about computers (*The UNIX Operating System*, published by John Wiley & Sons Inc., 1983). Only inches from her pillow, she could hear "that click, click, click of the keys, and Kaare's a very fast typist, so it's a really insane click! And it would just grate on me!" That's when she had dreams about smashing the computer up and throwing the pieces in the river.

But what really distressed her then was that "we started to have so little in common," she explains.

"The first symptom is when the husband comes home and the wife asks, 'How was work today?' and he says, 'Fine.' End of conversation. Or

Robin, relaxing on her houseboat deck with her ten-month-old daughter, Kari, and Sam, the family dog.

when Saturday night comes and you say, 'What should we do?' and the other says, 'I don't care, what do you feel like doing?' and that conversation goes on with 20 minutes more of 'I don't care,' 'I don't care.'

"Kaare went through this fight, too; he tried to keep regular hours, but when the guys were working late on a problem, he was there working late and I was the computer widow staying at home. I knew when I got married that I had married a weirdo–genius–computer-engineer type, and what that was going to be like. He loved his friends at work and the whole work environment. I was jealous of the computer milieu. I wasn't jealous of the computer, of the box that sits there."

CUTE IGNORANCE

And when Kaare switched to his current job at Rockefeller University, doing computer research in medical applications, his conversations about work left Robin even more out in the cold. "I didn't want to be the person who just invited [her husband's colleagues] home for dinner on Friday nights and served a meal, and talked about the weather. All of a sudden I thought, 'How long can my cute ignorance go on? What if he wants somebody who understands what he's talking about?' "

She recalls the time her worst fears arrived at her doorstep in the form of a former girlfriend of Kaare's who had come to see their baby. "Not only was she beautiful and single, but she was a math student in a graduate program in computer science!" recalls Robin. "I had put on 10 pounds, I was nursing the baby, and I was tired all the time. She looked at the baby and cooed, and we talked about trivial things for a few minutes, and then she started to talk about fractals. I just remember that word: fractals, a new way of doing computer graphics. I just remember watching the clock; I didn't think they were ever going to stop talking about [fractals]. There I was trying to keep this baby quiet, sitting in this chair, and I'd made everything look so cute and wonderful at home, and I thought, 'This is what he does when he's not in the house with me cooing at this baby; he's talking about fractals!'

"When she left, I was crushed. I said, 'Kaare, why didn't you marry somebody like that? I mean, she's really nice and she knows all these things!' And he had to reassure me for two hours: 'That's not important to me, whether my wife knows fractals!' And I said, 'Oh, I think it should be!'

"Maybe the fear is more in me than a reality; I think there's a good chance he would still be married to the person who didn't know about computers, but I don't think as happily," says Robin. "And I was determined. I knew marriage and family

PHOTOGRAPH BY KAARE CHRISTIAN, 1981

FOUR WAYS TO BREAK THE COMPUTER-WIDOW SYNDROME

1. Break Your Routine

"You've got to break the routine where after dinner the husband goes down to the computer in the basement and the wife stays upstairs and watches TV or folds the clothes. Make the first move," says Robin Raskin, a former computer widow. "Ask, 'Can you show me what you're doing?' " You may be surprised by your husband's reaction. Several husbands have told Robin, "I would love my wife to [join me], but she just isn't interested."

2. Try Everything

"Put in every piece of software that your kid or husband has," advises Robin. "Play anything," even games you consider silly. "The games might be silly, but you can't think of them as an end product of what a computer can do for you. Once you learn the basics through games," your curiosity will lead you onward.

3. Start Talking

"Marriages can go on for years without your learning anything new about each other," says Robin. The computer can help you discover new things about the way your spouse thinks, "because that's what a computer asks you to do: think about a problem." Computers are a lot more fun with two people, says Robin. "Especially in the beginning, when you've got to work through the bugs."

4. Work Together

"Think about where you might be able to cut corners and cut tedium using the computer," suggests Robin. Try doing an old task, like your monthly budget, in a new way: Together, on the computer! "At least you can have some fun when you do your home-accounting program together," says Robin. Or try joining forces to write a program from scratch for your kids.

In the end, you might surprise yourself. You may find yourself using the computer more than your husband does. And soon there may be another computer in the house: Yours! —S.K.

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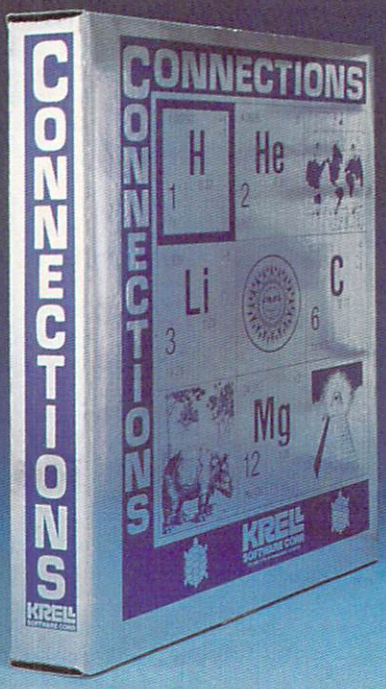

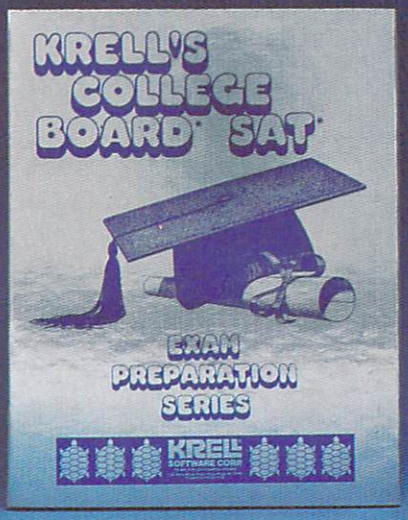

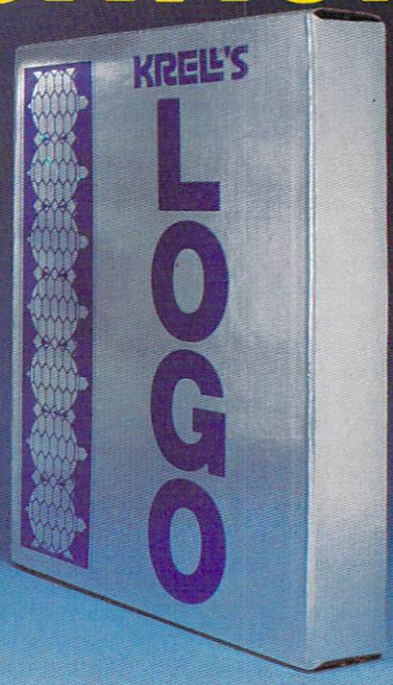

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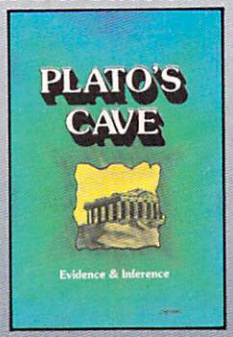

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was important to me, and I knew I was going to work at it. I knew the computer was going to be our link, and if I didn't understand what he was doing at work, I might as well kiss our marriage good-bye. So I learned about computers to save our marriage.

"Marriage is not a one-shot commitment, you don't make it and it's over. Because it can be undone very easily these days, divorces are common and easy. I think that, in these times, if work keeps your mate alive, you had better understand that work and be able to contribute to it and listen to the problems, because if you don't, there's somebody else who will."

BREAKING PATTERNS

But her interest in computers "came on me slowly, and I fought it," admits Robin. "Anybody who's married knows that you get locked into these patterns that you don't want to change. I would call it the 'stupid computer' and say all kinds of nasty things about it. I did things like hide his disks when I couldn't stand to see him work anymore. But when he'd go away, I'd turn the computer on and take out the [word-processing] manual and try things.

"Finally one night Kaare said, 'Do you want to learn *WordStar* tonight?' and I said 'Okay, I'll try it.' "

> "WE STARTED TO HAVE SO LITTLE IN COMMON."

Her conversion was instantaneous. "Once I used *WordStar*, I realized it was something I wanted to use. Then Kaare started to bring home other things that might help me in my work. I'm very lucky, because he's always been a supporter of what I can do.

"When I first learned word processing, I thought, 'That's all I ever want to know about a computer.' " But she didn't stop there, to her surprise. Last December Robin wrote her first simple music program. "Now I say I know I can write a simple program and that's all. And that may not be true," says Robin. "I may go on further with computers."

It wasn't long before Robin and Kaare began fighting for time at their computer; and seven months ago they bought a Columbia Portable computer, which has plenty of room in their new house in Riverdale, New York. The houseboat is still docked at 79th Street, and Robin has visions of eventually converting it into her office.

"A lot of women accuse me of being subservient, of following Kaare's every move like a little puppy dog. They say, 'Why don't you go do your own thing and not Kaare's?' I think that's just my personality. Kaare's kind of locked into his ways; I'm a much more malleable personality. I always drifted from one thing to another. I find everything fun."

Nor does she see the computer as solely a his-or-her interest. "I think a computer is a tool, but not like the way a drill is essentially a man's tool. It'll take on the shape of whoever is using it. If an artist is using it, it'll become an artistic tool; if a writer is using it, a writer's tool. The computer is versatile."

And for that very reason, she thinks "computers can help a marriage. You'll have an interest together, which a lot of marriages lose. Sure, a couple could go out and buy a Windsurfer, too, but it's hard to find a couple that would want to take up windsurfing at the same time. But here is something that you can tailor to each other's interests. You can start off on the same common ground and branch off to your own interests." She cites her parents as an example of a couple who learned about computers together and now maintain separate disks. "And it's available. After eight at night, when it's that time to spend a few minutes together, it's home; it's already part of your living room or your den.

"I'm old-fashioned, I believe marriage is for life," concludes Robin. "But marriage is not for life if it means being miserable, or going your own separate ways and never seeing each other. It's very easy to coexist apart. Marriage is for life if it means sharing the other person's wants and dreams and aspirations. I never thought it would end up with me sitting and writing computer textbooks with my husband, never in two million years! But I think by working together and sharing interests, you create a bond that goes beyond the romantic." FC

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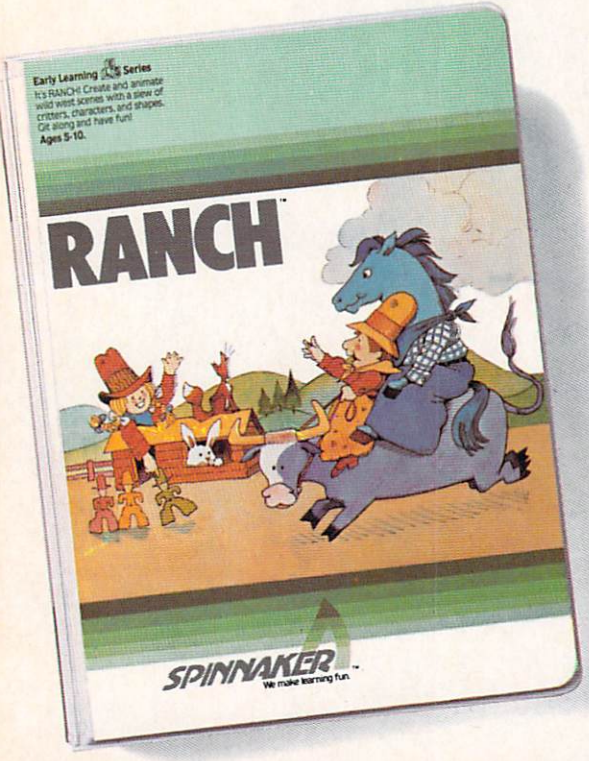

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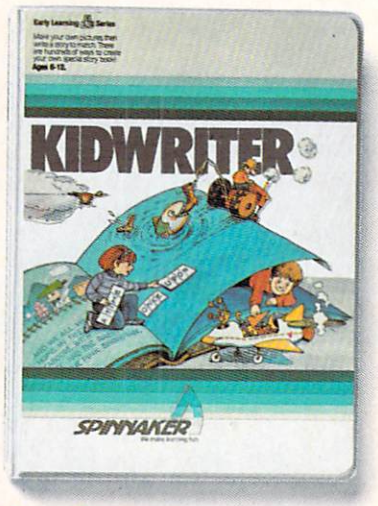

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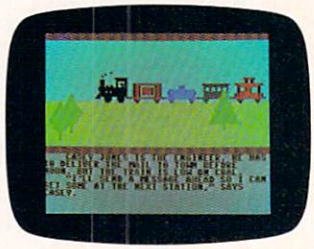

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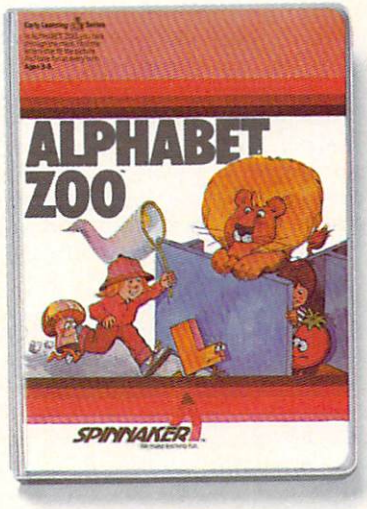
FRACTION FEVER is a fast-paced arcade game that challenges a child's understanding of fractions. As kids race across the screen in search of the assigned fraction, they're actually learning what a fraction is and about relationships between fractions.

All in all, FRACTION FEVER encourages kids to learn as much as they can about fractions—just for the fun of it!



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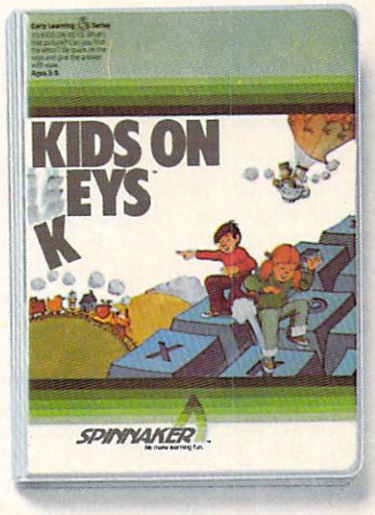
Ages 3 to 8.

It's a race. It's a chase. It's Alphabet Zoo, a game that sends your kids zipping through the maze, after letters that fit the picture on the screen.

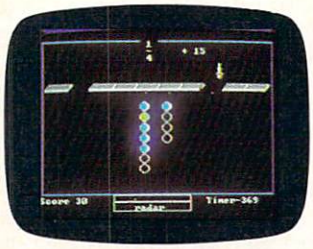
Your kids will have fun learning the relationship of letters and sounds, and sharpening their spelling skills. They'll be laughing at every turn.

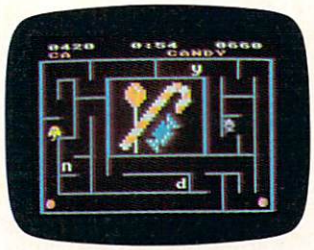


KIDS ON KEYS™ helps kids catch on to letters, numbers—and computers.
Ages 3-9.

KIDS ON KEYS offers children three terrific games that teach them the location of the letters and numbers while they have fun with the computer.

The games are fast and fun, with exciting sound effects and colorful graphics. It's a great way for kids to enjoy learning to identify numbers, letters, and words and associating them with images on the screen. And KIDS ON KEYS certainly do have fun!





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COMPUTING CLINIC

AN ATARI "CRASH"/ COMPUTER PHONE RATES/ PROGRAMMABLE FUNCTION KEYS

BY WALTER KOETKE

Does it cost more to call somebody on another computer than to just call him or her on the phone? If so, how much more?

JIM BRAYTON
South Pasadena, CA

As far as the telephone company is concerned, the rates for making a regular telephone call and making a "computer call" are exactly the same. Your computer's modem translates the computer signal into a telephone signal; you pay according to how long you use the phone lines.

If, however, you are communicating with a friend through an information service such as CompuServe or The Source, you must pay for that service in addition to the cost of your telephone call. You can usually hook up to an information service with a local phone call, and you pay about $6 an hour to use the information service. Thus, if you're communicating with someone in your area, a phone call is probably cheaper; if you're talking to someone 3,000 miles away, the "computer call" is probably cheaper.

One final thing to consider: You can say more in one minute by talking than by typing, unless you're a court stenographer. So if you have a lot to discuss, or just want to chat, I suspect a regular phone call will be far less expensive than typing your conversation on the computer.

I assume that you can program a "programmable" function key, but just what can you program it to do?

LEE AITKEN
Wichita, KS

Manufacturers often refer to programmable or "user-definable" function keys in their advertising for various computers. However, most users will never "define" these keys, unless they are serious programmers. Software producers, however, take advantage of these function keys when they are writing their programs.

When any key on the keyboard is pressed, a code is transmitted to the computer. This code is received by the hardware and processed as directed by the software (except for the RESET or BREAK keys). Sometimes certain functions are associated with certain keys. For example, when using a word-processing program, the four arrow keys are often used to move the cursor around the screen, yet the same arrow keys could be used for something entirely different in other programs. The association of certain functions with certain keys is controlled by the program, or operating system. Keyboards with function keys merely provide the programmer with some additional keys that can be programmed for special functions.

Following is a Commodore 64 program illustrating how you might detect whether a function key has been pressed. The program continuously scans the keyboard. If you press function key 1 or 3, that fact is displayed. Pressing any other key displays the word NO.

```
10 XS = "NO"
20 GET AS
30 IF AS = "" THEN 20
40 IF ASC(AS) = 133 THEN XS = "FUNCTION KEY 1 PRESSED"
50 IF ASC(AS) = 134 THEN XS = "FUNCTION KEY 3 PRESSED"
60 PRINT XS
70 GOTO 10
```

You could alter the program slightly, so that pressing function key 1 would display the American flag and function key 3 the FAMILY COMPUTING logo. All that's required is this sample program and a good graphics programmer.

On other computers, the procedure is somewhat different. You can determine whether the open or solid "apple" keys on the Apple IIe, or the Atari's OPTION, SELECT, or START keys, are being pressed by using the BASIC PEEK statement to learn the contents of certain bytes in the computer's memory. And Radio Shack's TRS-80 Model 4 features true "user-definable" function keys in that you can choose what code will be sent to the computer when they are pressed—including any control code (such as CHANGE TO BLACK CHARACTERS ON A WHITE BACKGROUND or TURN OFF THE CURSOR) or graphics character.

I own an Atari 800 computer. I occasionally "crash" the system, which is very upsetting after writing a long program. How do I avoid crashing my system? How can I restore the program lost when the crash occurs?

CLINT PASEOS
Middletown, CT

There are several reasons why your system might crash, many of which trace back to you. For example, the misuse of a POKE command or an incorrect assembly-language routine can easily produce unpredictable results. This is likely to happen when you enter programs containing long strings of numerical data that are used to represent assembly-language routines. If you incorrectly enter just one digit of one number, the routine may be completely changed. When you run your program and execute the changed routine, a system crash is often the result.

A second common cause of system failure is over-editing when you are entering a program. This is due to a well-documented bug in the BASIC screen editor. Atari suggests saving your program after every 25 edits, to protect against losing the whole program. The longer the program, the more likelihood of a crash. Fortunately, the new Atari XL computers do not suffer from this same problem. FC

WALTER KOETKE *was the first person to introduce computers to U.S. public schools, linking the Lexington, Massachusetts, system to a mainframe in 1964. In 1969, he worked with Seymour Papert, inventor of Logo, to introduce that language to the same school system. Koetke frequently lectures about computers to parents and educators.*

Send your questions, either general or machine-specific, to: Computing Clinic, FAMILY COMPUTING, 730 Broadway, New York, NY 10003. Please include your name and address.

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Computers and Careers

PLANNING YOUR COURSE

THERE WILL BE OVER A MILLION NEW COMPUTER-RELATED JOBS IN THE NEXT DECADE. SHOULD YOUR CHILD, OR YOU, AIM FOR ONE?

BY MINDY PANTIEL AND BECKY PETERSEN

Remember when you could ask children what they wanted to be when they grew up and get a nice, straightforward response like "doctor," or "football player," or "movie star"? Pose the same question to teenagers pondering their future today, and they might snap back: "systems analyst," "telecommunications technician," or "computer operator."

Times have, of course, changed. You are no doubt concerned about the impact of all this change on your children's future. What kinds of employment choices await them? Will there be enough jobs? Don't panic. You are not alone in your confusion or your concern. Your children can survive, even flourish, in the information age.

We'll look at some computer-related jobs young people can pursue, and their educational requirements. Then we'll list some steps to help determine whether an individual is suited for a career in computers, and tell you what can be done now to prepare.

TOMORROW'S JOB MARKET

First, you should understand what tomorrow's job market will be like. As you might expect, most of the fastest-growing occupations will be computer and high-technology related. Between 1982 and 1995, the number of programmers will grow by 77 percent. The number of computer service technicians will soar by 97 percent. Overall, the number of high-tech jobs will increase at almost twice the rate of the economy as a whole.

These are impressive projections, but computer and high-tech jobs will still represent only a small portion of the overall work force. There will be more new jobs for auto mechanics than for programmers and computer service technicians put together. Of course, tomorrow's auto mechanics will be servicing cars that are chock-full of computer and electronic technology. And tomorrow's new well-paid jobs will be disproportionately high-tech.

Whether suited for a computer career or not, young people are likely to be working with a computer at some point. By 1990, some estimates indicate, half of the American work force will be linked to a computer terminal. Those familiar with the equipment will probably have an edge, even as using computers gets easier.

Within the computer and high-technology industries, there are wide variations in the opportunities available, depending on which job is considered. There are also wide regional disparities—not only because of the economy, but because some states are already training young people to meet the new demand.

America's new growth industries—where the jobs will be—include not only computers and high technology, but also financial and business services, and health care, among others. Rapid growth in computer-related occupations will take place not only in the computer and electronics industries, but wherever these technologies are used. Any company with a substantial investment in computing will need a staff to support it.

What it comes down to is this: Computers won't be everybody's gold mine. Nor need they be. But, for many, they will offer a rewarding, well-paid, respected career.

YOU CAN HELP

If your children are considering computer-related careers, you can help if you know what skills and training they're likely to need. The very best thing you can do for them is to be sensitive to their interests and aptitudes. Choosing a career was never easy, but rapid change has made it tougher. Young people today not only have to decide what they want to do, but must gamble on which jobs will actually be available when the time comes.

GETTING INTO THE GAME: THE ANTE

Even in the high-tech field, not everyone will need a degree in computer science in order to succeed. Entry-level positions in data entry and computer operation will be available to high-school graduates, and often employers offer on-the-job training to highly motivated prospects. Many high schools offer courses that adequately prepare young people for these kinds of jobs.

Employers are, however, looking for employees with more and more education. It's also a good idea to get experience not only in computers but also in traditional written and spoken language skills, and in the field to which the computer is being applied. This is true in particular for programmers, according to government labor economist Thomas Nardone. He says that "as user-friendly software becomes more widespread, employers will have less need for programmers who only know how to code instructions."

MOST OF THE FASTEST GROWING OCCUPATIONS WILL BE COMPUTER AND HIGH-TECH RELATED.

Beyond high school, several kinds of training are available—up to and including university degree programs—offering varying amounts of expertise and opportunity.

Short-Term Programs. Young people interested in expanding their data-entry or computer-operating skills, or who wish to pursue a junior programming position, may consider some of the six-month to one-year programs offered by both private and public schools. Most of these provide traditional classroom study coupled with computer training time. Graduates can seek jobs as computer operators, data-entry clerks, or technicians. For the most part, the only entrance requirement for these classes is a high-school diploma.

The number of computer operators is expected to rise to 371,000 in 1995, up from 211,000 in 1982. The same cannot be said for data-entry operators, who themselves will begin falling victim to automation soon.

MINDY PANTIEL *and* BECKY PETERSEN, *contributing editors to* FAMILY COMPUTING, *wrote "Learning Logo Is a Family Affair," which appeared in the February issue.*

ILLUSTRATIONS BY ROBERT CONRAD

Associate's-Degree Programs. Two-year associate's-degree programs are offered through community or junior colleges, and often provide the best preparation for programming positions in business. For the most part, these courses of study emphasize programming languages and methods. Some companies actually prefer associate's-degree graduates to those with more advanced degrees, believing that they are more concerned with practical work than with theory. Before seeking an associate's degree, though, spend a little time investigating the local labor market. Associate's-degree holders tend not to move around all that much, so in states and regions with lots of training programs, there may already be more than enough of them.

Dr. John W. Hamblen, professor of computer science at the University of Missouri–Rolla, has studied employment trends in the computer industry and found that the annual number of associate's-degree graduates nationally now slightly exceeds annual demand.

CHOOSING A CAREER WAS NEVER EASY.

One very good reason to consider an associate's degree in a computer field is that these graduates can usually transfer to a four-year institution for more extensive training if they desire. It's a good idea to plan in advance, making sure that any courses you take will be counted for credit at the four-year college you may attend later.

Four-Year Degree Programs. There is no standardized four-year computer curriculum. Each school defines the courses offered for a particular degree. Consequently, teenagers and their parents should research schools to find one that offers the best course outline for their specific interests.

Professor Hamblen says the demand for bachelor's-degree holders in the computer field will exceed the supply for at least the next couple of years, at which point demand and supply will begin to move into rough balance.

THREE ROADS TO CHOOSE FROM

At the bachelor's-degree level, there are three basic career directions to consider: computer science, computer engineering, and management information systems.

Computer Science. This area deals with the development of the software programs that allow the computer to operate and do all the things people want it to do. Computer-science courses emphasize theories of programming and computing.

Programming is the third fastest growing occupation in America, with an estimated 217,000 new jobs to be created by 1995, according to the Bureau of Labor Statistics.

Computer Engineering. Quite simply, computer engineers create computers. They are responsible for designing the electronic boards and circuitry that are found inside a computer. To date, many students interested in pursuing this area still receive electrical-engineering degrees, but some colleges have already added computer-engineering programs. Most commonly, electrical-engineering majors take special computer courses. Electrical-engineering graduates specializing in computers are the most highly recruited engineers of all the high-technology professionals, according to one study. Electrical engineering in general is at the forefront of many high-technology industries, especially defense.

Management Information Systems (MIS). This is an umbrella term for the many programs offered through college business departments that prepare young people to work with computers in business and government. Students in these programs receive extensive training in business and organization while also taking technical courses in computing. Graduates of MIS programs design systems and eventually manage the information networks companies have in place. Connie Winkler, author of the *Computer Careers Handbook*, says that with growing use of small-computer systems and networks, people skilled at designing and running these systems will likely continue to be in high demand.

CAREER PLANNING: A STEP-BY-STEP APPROACH

How can young people determine their aptitude for a particular job, and what kind of training should they receive before they leave high school to ensure success later on?

There are no cut-and-dried answers to these questions, but there are ways to help young people in selecting a career they're well suited for and will enjoy.

Here's a step-by-step approach to helping your child determine whether he or she should seriously consider a computer career.

1. Providing Computer Access. If there's a computer in your home, make sure your child has as much access to it as possible. Encourage its use as more than a game-playing machine. If you have no computer, join forces with other concerned parents and volunteer at your child's school to help increase access to computers there. Public libraries and local resource centers are other places for teens to get computer time. You don't have to own a computer, but if your children have access to one somewhere, it will help them make an educated decision as to whether a career with computers is for them.

2. Determining Interest. Just because many teenagers spend three hours a night honing their *Q*bert* skills, or regularly break into the family piggy bank to support their *Frogger* habit, doesn't mean they have the makings of a computer programmer.

If a youngster has gone beyond games and is actively using the computer for programming and problem solving, that's a pretty clear indication of interest. If not, it doesn't prove interest . . . or lack of it.

Now is the time when opening the lines of communication is essential. Talking to teen-

agers is not always easy, but it is one excellent way to determine what their interests are. If they say they might want to do something computer-related in the future, find out what kinds of classes are available in school. If these are limited, offer to enroll them in a programming class at a local computer store or college.

If you know anyone currently working in the field, see whether they might be willing to talk to your child or perhaps even arrange for a visit to their place of business to observe firsthand.

3. Considering Aptitude Indicators. Many programmers say there is no proof that algebra and trigonometry skills are needed to be successful at programming. However, many colleges and universities look at these courses, along with any computer classes a student may have taken, as indicators of potential success in their computer programs. Good math and computer grades, as well as high scores on the math sections of the Scholastic Aptitude Test (S.A.T.) or other college entrance exams, are usually good indications that he or she can handle a rigorous college computer program. Currently, many colleges rank their computer science programs as even tougher to get into than their engineering programs.

4. Preparing In Advance. Steps two and three should offer a basis for deciding whether a child would do well in a computer career. If the answer seems to be yes, now is a good time to contact a school guidance counselor to see what to do next.

Some counselors recommend working backward to determine the best course of study for a particular student. First you decide which field to pursue and what training it will involve. Then you plan a schedule accordingly.

For example, if the goal is a computer-programming degree, study the course outline from one or two colleges that offer such programs. Based on their requirements, a student can begin building a foundation by taking the right courses in high school.

Don't forget, also, that to succeed in a technical field you also need to understand people and be able to communicate with them. The young person who ignores English to pursue COBOL is making a mistake.

A GREAT *Q*BERT* PLAYER WON'T NECESSARILY BE A GREAT PROGRAMMER.

COMPUTER JOBS: WHERE, WHAT, HOW MUCH

JOB TITLE	JOB GROWTH OR LOSS 1982–95	ANNUAL STARTING SALARY†	JOB DESCRIPTION	EDUCATION/ TRAINING	SPECIAL NOTES
Data Entry Operator	−34,000 (−11%)	$12,800*	Enters information into the computer using a data entry machine	H.S. diploma/On-the-job training	Limited advancement, declining field
Computer Operator	+160,000 (+76%)	$15,000*	Runs the computer or peripheral devices and output machines	H.S. diploma/On-the-job training	Better advancement opportunity; jobs available in banking, manufacturing, insurance, government
Production Control Clerk	N/A	N/A	Sees that necessary data and "job commands" are available for operators	H.S. diploma/On-the-job training	Good organizational skills needed
Data Processing Librarian	N/A	N/A	Categorizes, inventories, maintains all data-processing records	H.S. diploma; head librarians usually have college degrees	Positions may include trainee, librarian, head librarian
Word Processor	N/A	N/A	Uses word processor for secretarial tasks	H.S. diploma, business school/On-the-job training	Salaries comparable to standard secretarial jobs; word processors are replacing many typists
Computer Service Technician	+53,000 (+97%)	$23,900*	Installs equipment and keeps it running	One to two years training in basic electronics or electrical engineering	Also known as a service engineer; very rapidly growing field
Computer Programmer	+205,000 (+77%)	Commercial** $20,800 Mini/Micro** $22,000	Converts jobs described in English into computer language. Systems programmers maintain the system by monitoring and modifying its software	Two- or 4-year degree, depending on position; systems programmers need a 4-year degree, preferably in computer science	Increasing need for knowledge of business, communications skills. Systems programming is exceptionally technical
Systems Analyst	+217,000 (+85%)	$20,500*	Analyzes problems and devises systems that utilize computers to solve them	Four-year degree; varying subject matter, but a combination of business and computing is preferred	Must be able to deal with people as well as computers
Data Communications Analyst	N/A	$28,800** (1–2 years experience)	Develops methods for tying computers and communications lines together	Four-year electrical-engineering or computer-science degree; some assembly language experience	Relatively new and rapidly growing field
Technical Writer	N/A	$20,600**	Writes about technology in language understandable to the user	Four-year degree; good writing skills	Freelance and full-time opportunities for writers and editors
Marketing/Sales Representative	N/A	$45,000–$50,000** (Experienced)	Sells hardware and software	Varies with sophistication of product; some companies require 4-year degree or MBA	Often work on commission and must meet sales quotas
Electronics Engineer	+223,000 (+61%)	$26,831***	Designs and develops computer hardware	Four-year electrical-engineering or computer-engineering degree	Rapid growth in defense as well as computer industry

*† except where otherwise indicated * 1980 U.S. Bureau of Labor Statistics, adjusted through 1983 for inflation ** 1984 Survey by Source Edp, a national data-processing personnel service *** 1983 Survey by the Institute of Electrical and Electronics Engineers N/A: Information not available*

NEVER LIMIT YOUR CHILD'S OPTIONS ANY SOONER THAN NECESSARY.

Never limit your child's options any sooner than necessary. Many young people change their minds about career direction. (An increasing number of adults are doing so, too. See the accompanying article about changing careers.)

Young people who plan to enter a computer career straight out of high school should be sure to take advantage of any available school courses and vocational-tech training. Many school-sponsored programs can aid in the job-placement process. These should not be ignored, either.

A MOVING TARGET

Computer jobs themselves will change substantially in the coming years. Just as some jobs that are in high demand now will begin to diminish or even disappear, brand new kinds of work will accompany each new technological advance. Consequently, members of the work force of the future will have to be extremely flexible.

Anyone entering the computer field must accept the dynamic nature of this area and be able to roll with the punches. Those trained in computer technology may find much of what they know becoming rapidly obsolete. In order to remain competitive, they must be prepared to upgrade their knowledge constantly.

Whether or not your child enters a computer career, he or she will likely work with computers. So time spent developing computer skills won't be time wasted.

Finally: The challenge inherent in choosing a life's work is not that different now from what it was in generations past. One thing is certain: Young people, as always, will require parental guidance and reassurance. And that's one job computers will never be able to fill.

CHANGING YOUR COURSE

THESE THREE PEOPLE USED COMPUTERS TO TRANSFORM THEIR WORKING LIVES. YOU CAN, TOO.

Computers have invaded the workplace. They have spawned a growing number of occupations that didn't even have names a few short years ago. They have affected the way many of us carry out our jobs: Bank tellers now transfer money electronically, supermarket clerks use computers to read bar-coded prices, and nurses take computerized blood pressure readings.

Computers have created new opportunities for thousands of American workers, but they have also displaced thousands.

Many people now want to leave their current careers and get involved in computers. Some, victims of automation or caught in a declining industry, have no choice.

Here are three who made the move, and made it work.

Monica Hennig:
KNOWLEDGE IS POWER

Monica Hennig, one year out of high-school vocational training, took an entry-level secretarial position with a major corporation in her hometown. After two years, she decided to pursue a degree in business administration while at the same time continuing to work more than 20 hours a week for the company.

During her second summer as a part-timer, Monica was filling in for a secretary in the personnel department. The personnel manager was looking for someone to get a management tracking program up and running on the computer. Monica was a perfect candidate—she was interested in gaining experience related to her course work, and she was also a permanent employee, so she could handle confidential material.

The project involved getting a major personnel data base to work on both an IBM PC and a larger, more powerful IBM 5520 computer. At this point, Monica had had no more than an introductory class in computers and a little instruction in BASIC programming. She had never used either of these computer systems.

Learning as she went, Monica became, in a matter of months, the principal liaison between the computer programmer and a division of the personnel department. She helped make major project decisions.

It took many hours of burning the midnight oil, and occasionally compromising study time for computer time, but now Monica is one of the corporation's few experts on the system. She has been called upon to help others from different sites learn how to use the program. She has also been helping her new manager learn how to use the IBM PC.

By the way, Monica is still a student. She expects to graduate in June. With her degree, she will have the credentials to go into computer programming or systems analysis, but her

on-the-job training has prepared her for far more than that. Her new skills have already made her a very valuable employee in her company.

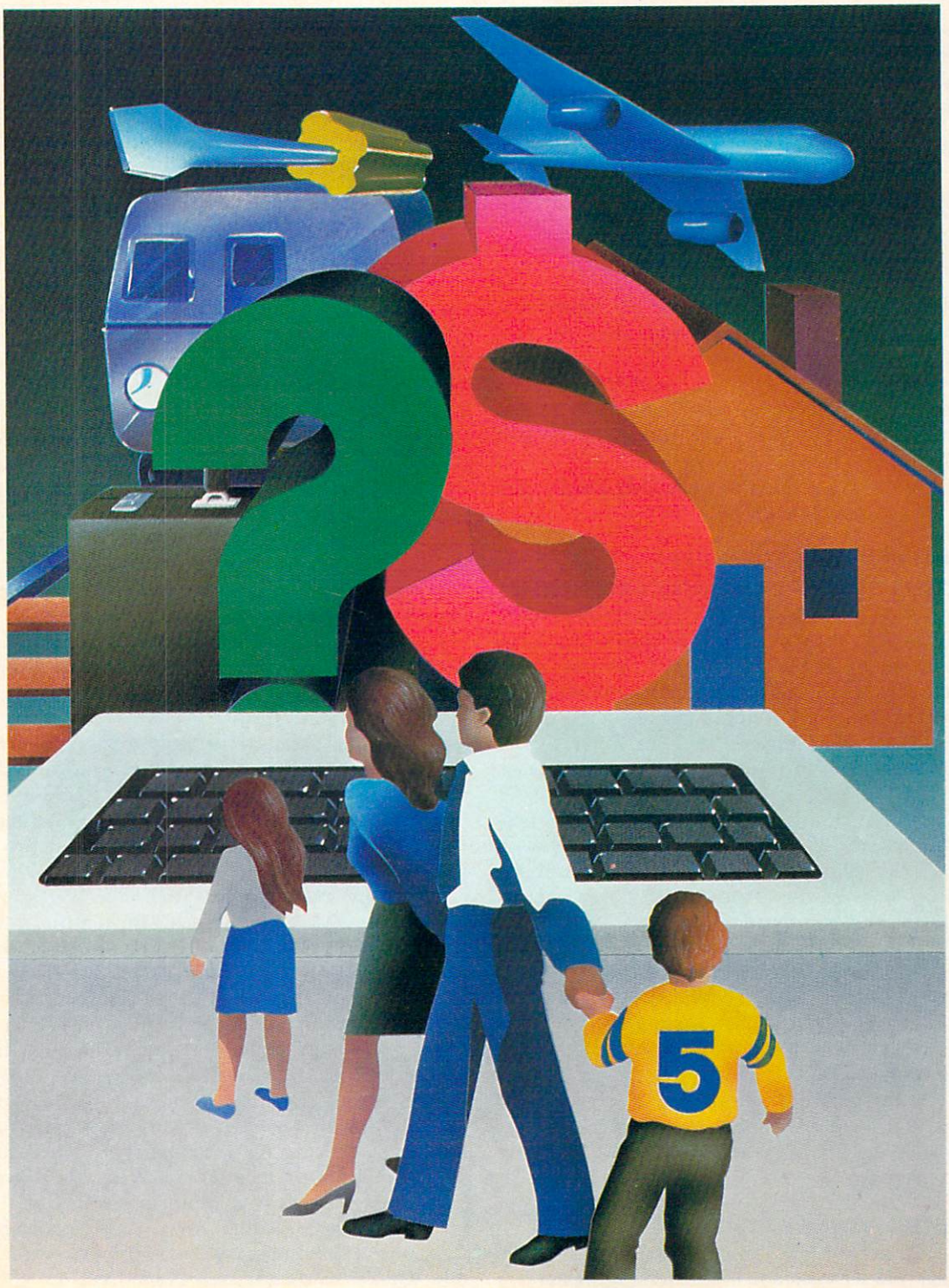
"What I have learned so far has just given me a good taste of how powerful computers can be," says Monica. "You can't go wrong learning about them."

Randy Wallace:
A TEACHER TEACHES HIMSELF

Randy Wallace became a teacher more than 20 years ago. He taught high-school math for many years, and then, just as microcomputer prices were dropping within the limits of school budgets, he moved into an administrative position, coordinating his district's math curriculum.

Here he set about learning as much as he could about microcomputers and their applications in education. Soon he was considered an expert in this new field, and school administrators and teachers from all over the region sought his advice.

Three years ago Randy decided to leave public education and job security to open a computer retail store. The gamble paid off. He now makes over 50 percent more than he made in public education. In the business plan he wrote to obtain an Apple franchise, he estimat-



THERE ARE FEW THINGS CLOSER TO OUR HEARTS THAN HOW WE EARN A LIVING.

WHAT ARE THE COMPUTER PROS LIKE? TAKE THIS QUIZ.

Close your eyes and imagine the typical computer professional. Now try your hand at this quiz, based on a 1983 Dewar's survey of 300 randomly picked computer professionals. You may be a little bit surprised.

1. In their current jobs, which aspect of work is most important to computer professionals?
a. Independence, **b.** Creativity, **c.** Job security.

2. What is their biggest complaint about their work?
a. Pressure/long hours, **b.** Paperwork and bureaucracy, **c.** Inadequate financial reward.

3. What is their most common work week?
a. Over 50 hours, **b.** 41–50 hours, **c.** 40 hours.

4. Other than computer science and math, what kinds of knowledge do computer professionals think is most important to success in their field?
a. Science, **b.** Traditional English skills, **c.** Philosophy and logic.

5. What percentage of computer professionals involve computers in their leisure activities?
a. 10 percent, **b.** 35 percent, **c.** 65 percent.

6. What social activity are they most likely to participate in at least once or twice a week?
a. Participating in sports, **b.** Attending religious services or church-sponsored event, **c.** Going to bars or nightclubs.

The answer to each question was **(b)**.

(1) Creativity was most important to the professionals, followed by learning new skills. Job security was last. **(2)** In the heart of the computer age, 42 percent of those surveyed felt that paperwork and bureaucracy were their biggest problem. Only 9 percent complained about the pay; 12 percent about the hours. **(3)** Some overtime is common, but only 31 percent report typically working more than 50 hours a week. **(4)** Of those surveyed, 77 percent felt that strong traditional English skills were very important to their success. Nothing else came close. **(5)** Thirty-five percent of those surveyed involved computers in their leisure time. The harder they worked at the office, the less likely they were to use the machines at home. **(6)** Thirty-eight percent attend a religious service or church-sponsored event at least weekly. Outdoor activities and visiting friends and family were close behind. Only 10 percent regularly attend bars or nightclubs.

One other important finding of the Dewar's survey: Seventy percent said they were very satisfied with their jobs.

ed that the store would sell 15 systems a month—180 a year. That first year, he sold 600.

Last year he opened a second store, and he now keeps 16 people busy helping business people, home users, and educators choose computer systems.

And the first step was learning about computers in his old career.

Shirley Michaels:
FROM TYPIST TO BUSINESSWOMAN

Three years ago Shirley Michaels was making $4 an hour as a temporary typist at a large government research institute. It was there that she discovered and taught herself word processing. Local temporary agencies began competing for Shirley's services, offering her more than $7 an hour—a 75 percent increase in pay.

Shirley didn't stop there. She saw the possibilities of an independent word-processing business. She could be her own boss. And she could look for opportunities to do the actual editing and communications work she enjoys much more than typing.

Shirley Michaels' company now offers a wide variety of editing, composition, and word-processing services for businesses and students. She has three employees and her own equipment.

"Now I have the option to do everything I like to do best," Michaels says, "and had I never learned word processing, I would not have gotten here."

USING YOUR ASSETS

There are few things closer to our hearts than how we earn a living. So changing careers can be a very frightening experience. Workers preparing for new careers must reassess their skills and aptitudes and, in many cases, make a commitment to gaining new skills—often, computer-related skills.

Wherever possible, the long-term employee should use current skills to gain new ones, just as Randy Wallace did when he was still an educator. He may not have gained his business know-how in the schools, but he did get to know his products—computers and software.

Ron Zemke, research editor at *Training Magazine*, says most successful career changers have done it this way. As an example, Zemke said a mechanic or factory worker might well have skills that could be used in the emerging robotics industry.

Many companies, both large and small, are supportive of their employees' getting advanced training, especially in these areas. Some employers have regularly scheduled programs on topics such as computer languages or data processing. Others provide specific training when changes are made in computer procedures or equipment. Many companies also maintain a tuition-refund plan or pay their employees' fees for attendance at professional seminars, workshops, and classes.

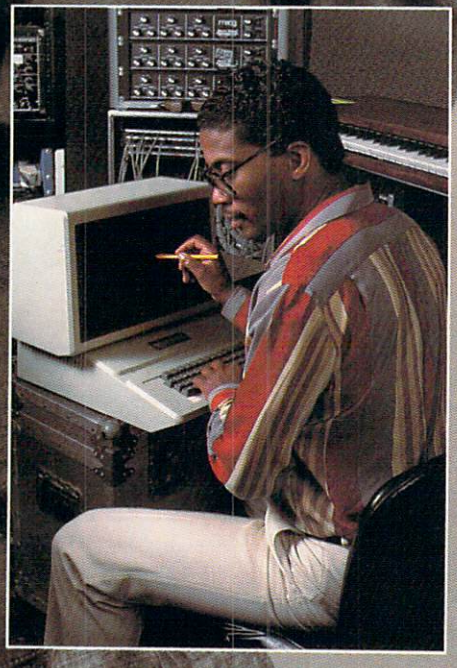
Within your company, gaining new computer skills may make you more valuable in your current job and a more attractive candidate for promotion than your co-workers who avoid taking this initiative. And it will require initiative. Waiting for a manager to schedule computer training may take forever. You must seize an opportunity, as Monica Hennig did.

According to Monica, what it comes down to is this: "The more you know, the more valuable you are to society as a whole." FC

BASIC BOOTH

PHOTOGRAPH BY WILLIAM P. GALLAGHER

Herbie Hancock:



Tickling the Keyboard

BY LIZ GANT

Herbie Hancock has always been an innovator, so he sees nothing unusual in the fact that he's one of the first well-known musicians to compose most of his work using computers.

The sophisticated, internationally known jazz musician chuckles with delight as he challenges his 14-year-old daughter, Jessica, to draw pictures with him on his Lisa computer. Herbie, relaxing in the studio of his spacious Los Angeles home, has come a long way since his early-60s hit "Watermelon Man." And from the looks of it, as he moves easily among his three Apple computers (a IIe, a III, and a Lisa) and the hundreds of thousands of dollars worth of state-of-the-art professional synthesizers and other computerized music makers, he plans to cover a lot more ground in the future.

Actually, the 43-year-old musician has been thinking ahead since his childhood. When he was growing up in Chicago, his parents scraped up the money to buy a piano for his older brother. But it wasn't long before the younger, seven-year-old son dominated the keyboard. Herbie's mother took his musical interests seriously and encouraged him to listen to the classical masters, as well as the popular music he preferred. Showing the determination that would later characterize his career, he found himself—at the tender age of 11—onstage as a soloist with the Chicago Symphony Orchestra. (The Mozart composition he played had to be modified because his small fingers couldn't reach all the notes on the keyboard.)

Now, years later, after scores of albums with everyone from Oliver Nelson and Miles Davis to Joni Mitchell and Stevie Wonder, Herbie is turning out hits of his own, as well as movie soundtracks.

But, as Herbie is quick to point out, music is his business as well as his calling. So, in the two-story garage he has converted into his studio, he shifts some of the crowded electronic gear to demonstrate how he uses his Apple III and the VisiCalc *program to keep pace with his accountant and manager as they plot future concert tours.*

His assistant, Donna, fingers the computer and laughs. "Herbie wants me to learn these things." She grimaces, then shakes her head decisively. "I think it may take a while."

Herbie's wife, Gigi, shares this view, but their daughter Jessica is not so skeptical. Although she's not as devoted to the high-tech gizmos as her father, Jessica, a ninth grader, displays considerable ability. She uses the computer to do her homework, write reports, play games, and to create short poems.

Herbie proudly shows off one of Jessica's latest computer drawings. He explains how she makes as much use of the Lisa's graphics capabilities as he does of its music-generating potential. And he shares his enthusiasm for it all in the following interview.

FC: What's the advantage of using a computer to compose music?

Hancock: The best thing is that I don't have to spend a lot of time writing down the notes I play. That kind of process can really take the spontaneity out of what you're playing. I can save the sound I'm creating temporarily in the RAM memory of my computer now, and I don't even have to think about notation. I can go with the flow.

[To illustrate the point, Herbie "boots up" his Apple III, which is hooked up to an alpha-Syntauri digital synthesizer. He punches in a couple of commands, and out comes a long, sweet note. Another command and the note changes pitch and intensity.]

By also saving the sounds onto floppies, I can literally create a "library" of sounds and store them away for future use. I have unlimited potential as to the number of them I can store, too. Then, if I want to use one—say, the horns—I just type the word RUN and I hear the new version. So there isn't any need to write notes down.

FC: You have almost a dozen different kinds of synthesizers, but just one brand of computer. Why is that?

Hancock: Because Bryan and I have been able to get the Apple to do some incredible things.

"THIS WAY, I CAN SOUND LIKE I'VE GOT A WHOLE BRASS SECTION, WHEN I'VE ONLY GOT ONE TRUMPET MAN."

LIZ GANT *is a Los Angeles-based writer who contributes regularly to magazines such as* Redbook *and* Los Angeles. *She also works as a computer consultant, teaching employees of small businesses how to use microcomputers.*

PHOTOGRAPH BY DEBORAH FEINGOLD
INSET PHOTOGRAPH BY JEFFREY MAYER/COURTESY OF COLUMBIA RECORDS

[Bryan Bell, guitarist turned software and hardware engineer, sometimes works around the clock for days to help Herbie customize patches between the Apple and other equipment for a special combination of sounds.]

I can now play every instrument from a single keyboard, for instance. My Apple III works like a terminal, so I have access to the electronics of all the different instruments. Take the III and my Syntauri: I can blend the notes from eight different keys at once. What we hope to be able to do with the Lisa soon is to program it so I can switch from instrument to instrument just by using the "mouse."

FC: Is it a good thing for you, to control so many instrument sounds at one time?

Hancock: You bet. All by myself, I can re-create sounds, not only from the piano, but also from drums, bass, strings, horns, even voices, and sound like it's a 20-piece orchestra—when it's only me! It's very expensive these days for a recording company to put out an album. Renting studios, hiring musicians and technicians, and so on—that costs. This way, I can sound like I've got a whole brass section, when I've only got one trumpet man. It stands to reason that the less you have to spend on each album, the more you can produce.

Jessica Hancock shares her father's enthusiasm for using computers.

FC: Do you get involved with the programming yourself?

Hancock: Do I! I got my first Apple over three years ago. Since then, I've plowed through all of these magazines you see around you, and a bunch of books besides. I started with programs that were already written, trying to enter them into my own computer and see what happened. They didn't always work. So I had to ask myself, was it the program's fault or mine? I've spent a lot of time learning what the word "debug" means. Before I became a music major at Grinnell College, my major was engineering, so I didn't start completely from scratch with computers.

"ONE DAY, I'D LIKE TO BE ABLE TO HOOK UP MY MODEM TO THE SOURCE AND SEND MY WHOLE TOUR OUT ON THE ROAD WHILE I STAY HOME."

FC: Since your computers are so crucial to your work, are you concerned that your daughter might create problems if she plays with them?

Hancock: No way. Of course, I don't give her my spreadsheet to play with. But I do want her to be comfortable with computers. The reason I use them is that they're the wave of the future. And my daughter's the future, too. By the way, there are a couple of good, simple music programs kids her age can use on the Apple. *[Watch for an upcoming feature on these programs in* FAMILY COMPUTING.*]* Now, I'm not trying to get Jessica to start in on a musical career. But I do think it's a nice idea for her to get a firsthand view of what her old man does for a living.

FC: Would you recommend that nonmusical parents try the same thing?

Hancock: Sure. Of course, the music programs I've seen aren't made to take the place of a music teacher, mind you, but they can sure help develop some music appreciation in a lot of kids out there. I remember when I was coming up, my mother was very careful not to allow me to listen to pop sounds all the time. At first, the classical stuff was kind of a drag, but then the intricacy of it kind of got to me. You know, I'm always into challenges. So, I would end up challenging myself to play like those guys did. And I've been challenging myself ever since. That's what I want Jessica to do, too.

FC: Do you have a lot of time to work with your daughter?

Hancock: No, but that's where the old saying about "quality time" comes in. I've tried to be patient and explain things really well to her, and then give her the space to try things. I think that's the best way to get kids to respect computers but, at the same time, not be intimidated by them.

I think the same goes for adults. There are a lot of grown-ups who could get simple music programs and have a lot of fun with them. They don't have to hook up a $30,000 synthesizer. They can make use of their computer's own sound system, or enhance the sound by adding small plug-in "boards" and speakers. I was surprised at how good the quality can be on those home computer systems. Just remember, the important thing is to get out there and try to make some music.

FC: What are you trying now in the way of computer innovations?

Hancock: I'm jazzed by something called a "light pen." It's kind of like a big pencil. I can use it with a couple of synthesizers to actually draw musical wave patterns. You see, sound comes into the synthesizer as a wave, and by changing the configuration of that wave on my screen, I can create an almost unlimited range of sounds. I've used one by a company called Fairlight and another designed by a brilliant cat named Steve Gibson. *[Gibson's light pen is now marketed by California-based Koala Technologies.]*

FC: Any dreams?

Hancock: Yeah. One day, I'd like to be able to hook up my modem to The Source and send my whole tour out on the road while I stay home.

FC: Wouldn't a lot of people argue that you're taking the heart out of music?

Hancock: That's up to them. For me, my music doesn't have any life but what I breathe into it. Sure, I'm a composer. But I'm not one-dimensional, like a machine. I'm also an artist, a father, a practicing Nichiren Shoshu Buddhist—and a man. And no matter how much I use computers to enhance that, no computer can duplicate it. FC

BUYERS' GUIDE TO USED COMPUTERS

SECONDHAND COMPUTERS ARE USUALLY SOLD AS COMPLETE SYSTEMS— WITH A FULL LINE OF PERIPHERALS AND SOFTWARE. IF THE SYSTEM FULFILLS YOUR NEEDS, YOU'VE GOT A DEAL.

Unlike used cars, used computers aren't sold by fast-talking salespeople in blue serge suits—at least not yet. But, with nearly 12 million personal computers sold in the U.S. to date, and another 10 million expected to sell this year, the day may come. Already people are trading in their 1980 for a new '84, or selling their '83 because they've found another computer that suits their needs better. And dealers may get into the act soon.

"In six months I'm quite certain there's going to be a big market for used equipment," says Abe Brown, general manager of 47th Street Photo, a large discount camera and computer store in New York City that is thinking of accepting trade-in computers.

Though a handful of dealers (and even some pawnshops) across the country will accept trade-ins, most used computers are being sold by individuals. They're sold through local or national "shopper" publications, such as *Computer Shopper*; through notices in grocery and computer stores; through announcements at users' groups meetings; or off station-wagon tailgates at computer flea markets.

In some regions of the country, you can find four or five computer "bargain shows" a year, organized by groups such as Kengore Productions (in Franklin, New Jersey) and COMPUTERFEST/USA (Palo Alto, California). COMPUTERFEST, for instance, is organizing shows in Boston, Dallas, Atlanta, Chicago, Seattle, San Francisco, and Los Angeles this year.

"The used market's growing with the new market," says John Craig, director of COMPUTERFEST/USA, who pipes 1930s and '40s swing music into his shows. "About 60 percent of our sellers are dealers or retailers, unloading excess inventory [of new products] at lowered prices, and about 40 percent are individuals. It's a nice mix. I think what we'll see before long is stores that sell used equipment *and* offer service contracts."

APPLES AND RADIO SHACKS

Most of the trading is in computers that have been around a few years, such as the Apple II plus, TRS-80 Models I and III, and the TRS-80 Color Computer. There are several reasons for this.

Both Apple and Radio Shack have good dealer networks, so you can be assured of service. Often you can buy new software that will run on these companies' old models. Also, because the parent companies are still solidly entrenched in the computer business and have attracted third-party manufacturers, you can, in some cases, still buy products to upgrade their computers and keep them up to date.

According to Stan Veit, editor of *Computer Shopper*, secondhand TRS-80s sell better in rural areas, where Radio Shack has a widespread dealer network; Apples, on the other hand, sell better in cities, where they have wide distribution.

Trailing somewhat behind Apple and Radio Shack in secondhand sales are Commodores—the PET, 64, and VIC-20. COMPUTERFEST's Craig attributes this to the large number of Commodores on the market, and the fact that the company frequently introduces new models that are quite different from their predecessors. Thus, people trade in an old model to get the newer one, or another brand.

For Atari, Texas Instruments, and Timex computers, there's not much of a secondhand market. People who bought them a year or two ago often paid at least twice what they'd pay for them new today, and could not recoup much of their initial investment and still give the buyer an alluring bargain. IBM PCs aren't heavily traded on the secondhand market either, because demand still outpaces supply.

But with new '84 models already out or coming from Apple, Commodore, IBM, Radio Shack, and Timex—inspiring experienced users to trade in and hop on the state-of-the-art bandwagon—the secondhand market may really begin to open up, attracting new sellers, new buyers, and maybe even dealers.

WHO BUYS USED?

Since the trend is just beginning, it's hard to tell the number or kind of people who buy used computers. One indication: A national market-research firm is now preparing for release a study of computer buyers that says, "About 10 percent of today's computer owners bought secondhand equipment," according to a reliable California source.

FAMILY COMPUTING's own research gives a glimpse of the type of people who are selling and buying used computers. Randomly calling people who placed classified ads in *Computer Shopper*, we found one person (a writer) who was selling his IBM PC and planning to buy a TRS-80 Model 4, because he "liked it better"; another (a Tennessee man) sold a TRS-80 Model III to buy a secondhand VIC-20, because he thought it would be better for "home control" experiments. Several programmers said they had sold and bought old computers just to try out different systems; one had sold his computer to a school. An elderly woman in Florida, who had a TRS-80 Model I, bought a secondhand TRS-80 for her granddaughter to use, so the two of them could communicate.

PHOTOGRAPHS BY STEPHEN SHAMES

"Make me an offer!" To help sell his TRS-80 Model 1 at a Kengore computer show in New Jersey, Lloyd Groveman (left) says he'll throw in "$10,000 worth of software."

At the same show, deal-seekers pore through a pile of magazines and software (right). On the opposite coast, onlookers crowd a California "bargain show" put on by COMPUTERFEST/USA (far right).

SHOULD I OR SHOULDN'T I?

To decide whether you should buy a new or a used computer, you should first decide why you want a computer. What will you use it for? Do you want to learn programming, learn how to use a computer in general, or do specific tasks, such as word processing or spreadsheet analysis? Do you want a computer for yourself, for your children, or both? Next, figure out how much this is worth to you, and how much you can afford. These time-tested questions must be answered before you decide to buy new or used; otherwise, you have no guide.

In general, you should consider a secondhand computer only if you know exactly what you want it to do. If you want to experiment and think your needs might change, a new computer will probably give you more flexibility.

ADVANTAGES

While saving money is the most obvious advantage to buying a secondhand computer, as it is with most appliances or equipment, the link here is not quite so direct. Prices go up and down without notice, and technological improvements are so rapid that it's impossible to arrive at a fair price-to-value relationship. Computers are not cars. You can't look in a blue book and see what an '81 Apple II plus is worth.

Hardware. You can, of course, save money buying a secondhand computer. A used computer is generally 20 to 40 percent cheaper than an equivalent new computer. (Often, though, there is no equivalent new computer on the market.) But the main advantage of buying used is that you can buy a full-fledged computer system with lots of extras—not just a bare-bones keyboard unit.

Most people selling out have had their computer for a while and have acquired disk drives, monitors, printers, modems, and a lot of software. They sell it all as part of a "package deal." Unless you buy a new Coleco ADAM, or pay top dollar at a full-service dealer, there's no way to buy an equivalent new computer system without spending a lot of time and money. A California man we talked to sold his TRS-80 Model III and bought the same model, used; he said that upgrading his own system would have been more expensive than buying an already assembled system.

Prices. In our random national survey of buyers and sellers, we found that prices of complete used TRS-80 Model I and III systems ranged from $600 to $1,000. A new system with the same memory and peripherals would cost well over $2,000, maybe $3,000. Prices for used Apples, ranging from $1,000 to $1,500, did not show quite the same depreciation. Again, a new system would cost between $2,000 and $3,000. For both brands, a library of software was usually part of the deal.

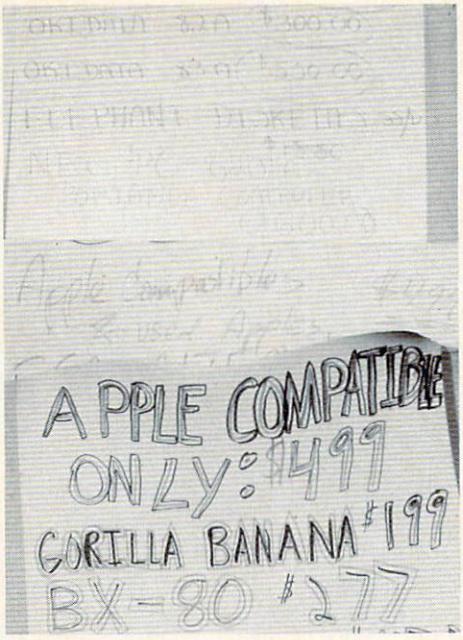
Software. Often software is the "clincher" in a secondhand deal. Because of the cost of software (prices range from $30 to $700), most new computer owners accumulate it slowly, when they can afford it. But by buying a used system, you can often pick up several thousand dollars' worth of software that is thrown in to sweeten the deal. The sellers have no use for it, since they're usually looking at a different computer that will require different software. If the software does what you want, you've got a steal.

Peripherals. Buying separate components, however, is somewhat more dangerous than buying a complete system. If people are selling the whole kit and caboodle, that means they have tired of it, need something different, or just want something new. If someone is selling a used printer, monitor, or disk drive, you should be more suspicious. Says *Computer Shopper*'s Veit, "Anyone buying a used monitor or disk drive is crazy."

SAMPLE PRICES FOR USED COMPUTER SYSTEMS*

COMPUTER	PRICE
Apple II plus and compatibles (as sold by dealers)	$500
Apple II plus (48K), disk drive(s), monitor (80 column), software	$1,500
Commodore 64 (64K), disk drive, monitor, printer, software	$500
IBM PC (64K), 2 disk drives, monitor (80 column), software	$3,000
TRS-80 Color Computer (16K), Extended BASIC, cassette, software	$200
TRS-80 Models I/III (16K), disk drive, printer, software	$850
VIC-20 (16K), cassette, software	$75

**Prices shown here are estimates by FAMILY COMPUTING. They are based on a random phone survey of dealers, computer-show organizers, and sellers and buyers of secondhand equipment in all regions of the country. They are meant to serve as a general guide only: not as definitive figures. Prices will vary, depending on the amount of hardware and software included, and the overall condition of the products offered.*



PHOTOGRAPH COURTESY OF COMPUTERFEST/USA

These peripherals are mechanical devices, and, unlike the transistors and chips in the computer itself, they wear out from use. A monitor's picture tube may be worn out, or close to it; the heads or motor of a disk drive could be going bad. So could the mechanical parts of a printer.

DISADVANTAGES

If you find a computer system in spit-and-polish condition that does what you want at a bargain-basement price, should you buy it? Yes, as long as you're aware of the dangers up front.

You won't get a warranty or a service contract. Thus, if something goes wrong, you'll have to pay for repairs. Of course, most computer warranties are for only 90 days anyway, so you will quickly find yourself in the same boat even with a new computer. Warranties are more like "security blankets" than real protection. Nonetheless, people like security blankets. We asked one person (David Perloff of New York City), who has sold a TRS-80 Model I to buy a new Apple IIe, if he had considered buying a used Apple. "Yes," he said, "but I felt the difference in price between new and used wasn't large enough to forgo the warranty."

Also, your secondhand computer may be, or become, "obsolete." This, of course, is a danger even buyers of new computers face. As always, if the computer fulfills your needs, then "obsolescence" is not a major problem. But it may mean that no new software will be written for that computer, so make sure you have the kind of software you need. (If you are exclusively interested in programming or telecommunications, the software factor is of little importance.) And if you want to upgrade the computer with new peripherals, you may find that these peripherals are no longer manufactured.

Apple and Radio Shack are quite conscientious about supporting their "installed base" of old-model computers—one reason they sell on the used market. Rumor has it that Apple, which says it's sold more than a million Apple IIs, is now developing a plug-in circuit board to upgrade the II plus to a IIe. But you can't expect this kind of backup from all manufacturers.

THE TEST DRIVE

When you've decided to buy and have found a prospect—either through a national or local shoppers' publication or at a flea market—you should ask a few general questions to feel out the seller. When was the computer originally purchased? How was it used? Who else used it? Did you travel with it? And: Why are you selling?

If the seller's answers seem honest, you're ready for a test drive. You should run every part of the system, and under different circumstances. Try a graphics or game program, a word-processing program, and a spreadsheet program. You're looking for two things: the quality of the screen display, and the speed with which the computer executes.

Then write a short program, save it to disk or tape, and load it back. Try printing it out. If possible, look inside the computer, disk drive, and printer, to see that they're clean and that there are no dangling wires or broken circuits. Finally, make sure the manuals are intact.

When it comes to price bargaining, you're in the driver's seat. The seller obviously wants to recoup as much of his or her original investment as possible, but you have several rejoinders. You might say, "Overall prices have dropped considerably since you first bought the system." Or, "It's going to be harder and harder to find software, parts, and service for the machine." Or, "I'm not getting a warranty."

At this point, you'll probably see the price drop and various accessories will be thrown in. If you still don't like the deal, you can always walk away and think it over. The computer is likely to still be there tomorrow. FC

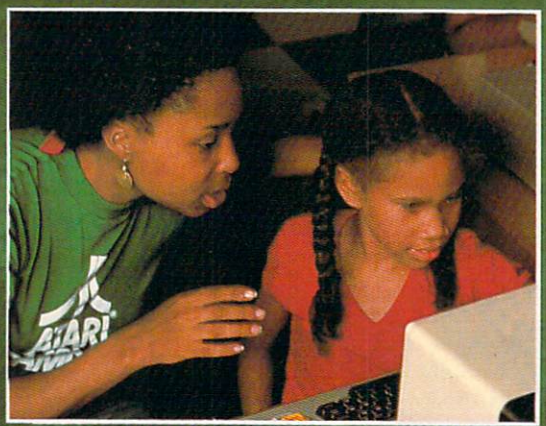
PROS AND CONS TO BUYING A SECONDHAND COMPUTER

Pros

- Savings of 20–40 percent on hardware, compared with equivalent new equipment.
- You can acquire a complete, working system, avoiding the frustration and expense of assembling components from scratch.
- A large software library is often thrown in to sweeten the deal. If the software meets your needs, this can be of inestimable value.

Cons

- No warranty or service contract included, so that you are liable for any needed repairs.
- The computer may be, or become, obsolete, meaning that new software and peripherals may no longer be made and sold. Even old products may be out of stock.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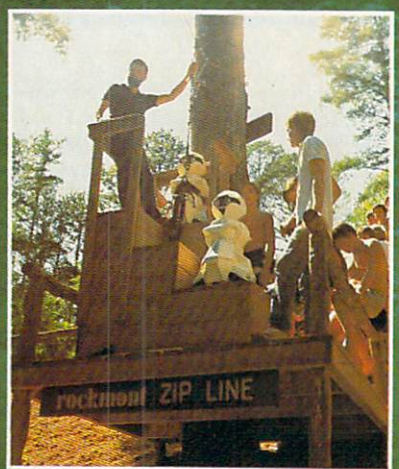
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Micro Camping

BASIC AND BACKPACKING? SPREADSHEETS IN THE SUNSET? NOW THERE ARE COMPUTER CAMPS FOR EVERYONE. HERE'S A GUIDE.

BY MIKE BENTON

Let's say your family is eager to learn about computers. You expect to spend time in a classroom doing it, but nobody said where that classroom had to be. What if it were in Jackson Hole, Wyoming, nestled in the Grand Tetons? What if you could go swimming or horseback riding between classes?

Sound appealing? That's why there are now computer camps in 40 states and eight countries.

Over 100,000 Americans plan to attend computer camp this summer. It's a far cry from the late '70s, when the first of these camps sprouted up to serve children of parents who felt the schools weren't doing their part to educate about computers, and who could afford to do something about it.

If you're considering computer camp, suddenly you've got plenty of options. You don't have to be a computer whiz; many, if not most, camps cater to beginners. You don't have to spend all your time at a keyboard; better computer camps offer as many diversions as do their conventional counterparts. You don't even have to be a kid; there are camps for parents and camps for families. And you don't have to be rich; there are some relatively inexpensive ways to attend computer camp.

In this special section, FAMILY COMPUTING looks at several different kinds of computer camps. We offer guidelines to help you decide where (and whether) to go. We also offer a detailed list of camps that cater to entire families.

SLEEP-AWAY COMPUTING

The average residential computer camp is attended by kids from about nine to 17 years of age. It runs for a week or two and offers a

Background photograph: Camp Rockmont, Black Mountain, North Carolina. Insets, left to right: Jackson Hole Personal Computer Resort, Wyoming; Atari Computer Day Camp at Capital Children's Museum, Washington, D.C.; Computime Microlearning Center, North Carolina; Camp Rockmont.

PHOTOGRAPH AND INSET AT FAR RIGHT BY ROY BONNELL. OTHER INSETS COURTESY OF THE INDIVIDUAL CAMPS

Top row, left to right: National Computer Camp, Simsbury, Connecticut; Camp Rockmont; Mt. Rainier Computer Camp for Families, Enumclaw, Washington. Middle row, left to right: Mt. Rainier Computer Camp; National Computer Camp; Family Computer Camp at Clarkson College, Potsdam, New York. Bottom left: River Way Ranch Camp, Sanger, California.

minimum of three hours per day of computer instruction.

At a well-run computer camp, your child gets plenty of individual attention. Children work on independent projects tailored to their interests and abilities. Computer instruction is accelerated, and some camps claim they can teach as much in two weeks as a school does in a semester. That depends, of course, on the camp, the school, and the child.

Well-run computer camps offer lots of time for children to experiment on computers and they often provide computer-related programs. At Timbertech Computer Camp in Scotts Valley, California, industry leaders have visited to discuss their plans with the campers. Timbertech was cofounded by Atari founder Nolan Bushnell. It was recently sold.

Most, but not all, computer camps require their campers to participate in a "healthy balance" of activities, including athletics. An exception is the several camps run by National Computer Camps. NCC's director, Michael Zabinski, believes that if a kid comes to compute, there's no point in forcing him to canoe instead.

As with other "residential," or "sleep-away," camps, kids eat and bunk together under the supervision of camp counselors. So a residential computer camp will do more than just teach them how to program and use a computer. It will teach them to cooperate, live, work, and play with others.

Residential computer camps have been populated overwhelmingly by boys, though there has been some small progress toward equity. Girls now constitute 35 or 40 percent of the attendees at some camps. According to a recent survey, the average percentage of girls was 27 percent in beginners' classes, dropping to 14 percent in advanced camp programs.

A growing number of camps organized around one special area of interest now specialize in computers as well. So you can go to a computer camp that also concentrates on sailing, or soccer, for example.

There's even one, the Legacy Computer Camp in Arlington, Virginia, that teaches children how to use computers to promote global understanding and world peace. Legacy campers from all over the world spend six weeks getting to know one another—in part, through computer networking and teleconferencing.

Needless to say, you shouldn't send your child to any computer camp unless he or she wants to go. Believe it or not, some parents do that. They think camp is a sugarcoated way to pressure their children into computer literacy. But it rarely works. A better tactic is to make the computer an integral part of your family life and wait for your child to come to it.

BYTES BY DAY, HOME BY NIGHT

If your child isn't emotionally ready for a residential computer camp—or if you aren't ready and able to pay for it—consider a computer day camp. It will cost less and offer your child the comfort of a nearby home.

About one third of residential computer camps run daytime adjunct programs, and there are scores of other computer day camps around the country. These commonly meet

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MIKE BENTON *is the author of* A Complete Guide to Computer Camps and Summer Workshops, *to be published by Bobbs-Merrill this month.*

FAMILY COMPUTING AT FAMILY CAMPS

As FAMILY COMPUTING readers know, computing is something the whole family can do together. Now there are computer camps that share this premise.

At some family computer camps, the parents and children actually share the same keyboard and instruction, at least for the first few days. Then parents and children may separate, with parents learning about business applications and kids learning to program.

"What we teach parents and children is how to learn together and discover together on the computer," says Dr. Susan Whitt, director of the Mount Rainier Computer Camp for Families. "For the parents, it's a really unique opportunity to see their children solve problems."

A few camps, observing that some kids make quicker progress than their parents, have taken to pairing the adults with children from another family. This limits the potential for long-term embarrassment.

Some parents use these family camps as a way of "tagging along" with children who still want the best of both worlds: going away to camp while keeping Mom and Dad nearby.

Many family computer camps welcome, and provide for, the spouse or child who isn't ready for a headfirst jump into computing. Clarkson College's Family Computing Camp, for example, lets nonparticipating family members stay at their week-long camps for a nominal charge of $25. These reluctant spectators have been known to find the enthusiasm contagious, however, and decide that computers are worth some effort after all.

Families that don't get to spend as much time together as they would like may find the family computer camp an appealing option. "I think there is a renewed interest in family activities in general," says Dr. Whitt. "We like to see families working together, playing together, enjoying each other. We're encouraging that in our camp format." To this end, Whitt's winter family computer camp offers skiing and tubing, two activities that can't be done while computing.

In the chart below, FAMILY COMPUTING offers details on some representative family computer camps that will be in operation this year. There are others. You should write or call the camp you're interested in, though, because this is a new business and things have a way of changing quickly.

COMPUTER COUNTRY CORPORATION RFD 3 N. Stonington, CT 06359 (203) 599-3850 **Contact:** Matthew Boisserain	**Ages:** All **Computers:** IBM PC, Columbia **Computer–Student Ratio:** 1:1 **Languages:** BASIC **Curriculum:** Courses in programming and computer awareness.	**Sessions/Costs:** Flexible. 1983 rates: $20 per three-hour class or $65 for five 2½-hour sessions. 1984 rates were not set at press time. **Description:** Not so much a camp as a family resort park, an ideal stopping place for the family on the road. Swimming, softball, shuffleboard, dancing, and other activities supplement daytime computer courses. Includes trailer and recreational-vehicle parking.
THE FAMILY COMPUTER CAMP Lake Hubert, Minnesota Mailing address: 3940 49½ St. Minneapolis, MN 55424 (612) 922-2545 **Contact:** Sam Cote	**Ages:** 8 and up **Computers:** Apple II and Apple IIe **Computer–Student Ratio:** 2:1 **Languages:** BASIC **Curriculum:** Programming skills, word processing, data base, spreadsheet, and other business applications, plus "just plain fun."	**Sessions/Costs:** One-week session in late August, $295. **Description:** Program includes instruction on buying a computer. More than 30 activities are available, including archery, riflery, horseback riding, swimming, and sunbathing. Two other camps, Camp Lincoln for Boys and Camp Lake Hubert for Girls, are computer camps for children run by the same organization in the same location.
FAMILY COMPUTER CAMP Conference & Information Center, Clarkson College Potsdam, NY 13676 (315) 268-6647 **Contact:** Estella Bray	**Ages:** 5 and up **Computers:** Apple II, Atari, VIC-20, Zenith Z-100 (IBM-compatible), campus mainframe **Computer–Student Ratio:** 1:1 **Languages:** BASIC, Logo, Pascal **Curriculum:** Programming, game-writing techniques, graphics, word processing, spreadsheets, data bases, home and business applications.	**Sessions/Costs:** Three one-week summer sessions, $225 per person for the first two attendees from a family, $175 each for additional family member. Housing cost: $120 (two-bed room), $130 (three-bed room). Meals: $56/person for the week. **Description:** Clarkson's 600-acre wooded campus is located between the St. Lawrence River and the Adirondacks. Activities include tennis, volleyball, basketball, and swimming and water sports on the nearby river. Not all family members are required to participate in computer activities; nonparticipating members may attend for $25. Children must be accompanied by a parent.
JACKSON HOLE PERSONAL COMPUTER RESORT Jackson Hole, Wyoming Mailing address: Box 362A, Star Rte. Jackson, WY 83001 (800) 443-8616 **Contact:** Patrick E. Going	**Ages:** All **Computers:** IBM PC **Computer–Student Ratio:** 2:1 **Languages:** BASIC (IBM PC version) **Curriculum:** How to use IBM PC and software. Basic components and functions, system software, spreadsheets, word processors, text editors.	**Sessions/Costs:** Four-day sessions, year-round, weather permitting, $295. **Description:** Located at the four-star-rated Jackson Hole Racquet Club resort complex. Offers mountain living in a breathtaking alpine setting. Four miles from Jackson Hole ski area; near Grand Teton and Yellowstone national parks. Computer instruction in the evening to allow you to explore the area during the day. Fully furnished condominiums available.
MOUNT RAINIER COMPUTER CAMP FOR FAMILIES Enumclaw, Washington Mailing address: 9061 N.E. 34th St. Bellevue, WA 98004 (206) 453-8790 **Contact:** Dr. Susan A. Whitt	**Ages:** 5 and up **Computers:** Commodore 64 and Apple IIe **Computer–Student Ratio:** 1:1 **Languages:** BASIC, Logo. Others by request. **Curriculum:** BASIC (beginner, intermediate, and advanced), word processing, spreadsheets, data base, graphics and sound, computer architecture, robotics, tax packages, home and business software.	**Sessions/Costs:** Weekend sessions, January to spring (depending on snow conditions). Some summer sessions. $100 per weekend. **Description:** Held at Buck Creek Lodge, 90 minutes from Seattle. Winter sports include downhill and cross-country skiing, sledding, sleigh rides, and tubing. Wide range of summer activities for children's summer computer camp; family computer camp may be extended as well. Food prepared by expert dietitians; washer/dryer available. Swimming pool, elk feeding station, miles of forests to explore.
PEGASUS COMPUTER CAMP FOR CHILDREN AND PARENTS University Extension University of California at Davis Davis, CA 95616 (916) 752-6401 **Contact:** Pegasus Coordinator	**Ages:** 9 and up **Computers:** Apple IIe, campus mainframe **Computer–Student Ratio:** 1:1 **Languages:** BASIC, Logo, Pascal **Curriculum:** Programming, graphics, computer animation, music, word processing.	**Sessions/Costs:** One-week summer sessions, $400 residential, $275 commuter. Fall camp: six consecutive Saturdays, $200. **Description:** 8:1 student/teacher ratio. Supervised on-campus housing. Air-conditioned double rooms with linens and meals provided. Evening computer activities. Many teachers are university faculty.
YMCA CAMP CROSLEY North Webster, Indiana Mailing address: 500 S. Mulberry St. Muncie, IN 47305 (317) 288-4448 **Contact:** Terry D. Jones	**Ages:** 9–16 **Computers:** TRS-80 Model III **Computer–Student Ratio:** 1–2:1 **Languages:** BASIC **Curriculum:** Programming, both general and games. Three hours of class time and one free hour on the computer each day.	**Sessions/Costs:** Weekend workshops in July for families, $60. One-week sessions for children, $185. **Description:** 16 comfortable cabins on 300 acres beside James Lake. Swimming, sailing, fishing, arts and crafts, horseback riding, tennis, canoeing, and water sports. There is also a women's facility.

from eight or nine in the morning until four or five, though there are also half-day programs.

Campers at computer day camps tend, on the average, to be a couple of years younger than their sleep-away counterparts, but there are plenty of teenaged exceptions. For the younger children, instruction is likely to be less intense. Often, two or three hours a day with the computer will be interspersed with several hours of other activities.

IT ISN'T ESSENTIAL THAT THE INSTRUCTORS BE GENIUSES THEMSELVES.

If you decide you want a day camp, make sure that's what you get. Lately, some computer summer schools have begun calling themselves camps. They may be very good schools, but if they offer only classes, are they camps?

THE COLLEGE OF HARD WARE

High school students with a serious interest in computing should consider an academic computer camp. These now operate on many college campuses around the country. At the University of Oklahoma, there is a free computer camp for students who are state residents and have good academic credentials.

Often, students spend at least six hours a day learning about computers in college classrooms and laboratories. This is serious business: The teachers are usually college professors, and the campers have access to many of the school's resources.

The academic computer camp is also an excellent introduction to college life, since campers usually are housed in dormitories and eat in the school cafeteria. Some programs even offer college credit.

TRADITIONAL SUMMER CAMPS: A BIT LESS COMPUTING

Not everyone lives, sleeps, and breathes computers. For the many kids who are merely curious about them, the best summer camp may not be a computer camp.

There are over 9,000 traditional summer camps across the country, and several hundred offer at least some computer training. But since many traditional camps are only just now adding computers, there are some questions you should ask to make sure the camp is committed to computing, and not just paying lip service to a new "fad."

- Is the time spent on the computer supervised? (Sometimes camps buy a half-dozen computers and an armful of game cartridges, and let kids play games with little or no supervision or instruction.)
- Who are the instructors? (As with computer camps, it isn't at all essential that the instructors be computer geniuses themselves. They should know enough to stay ahead of the beginners they're teaching, and to point young computer experts in the right direction for more information. Most of all, they should be good teachers.)
- How much time will your child get at the computer? Will he or she have to share a machine with lots of other children? (Some traditional camps, in starting out with computers, honestly didn't know how much machinery they'd need to serve their campers, and they underbought. They may try to compensate with large classes or strictly limited access. In

SPECIAL CAMPS FOR SPECIAL KIDS

In years past, the typical computer-camper was likely to be the young teenage son of upper-middle-income professional parents. Fortunately, computer camp opportunities are much more widely available now.

A variety of organizations run free or inexpensive computer camps. One such camp is the Boys Harbor Computer Camp Program in New York City. It is free for those who can't afford to pay. The camp serves disadvantaged and minority youth, many of whom never had access to computers before.

One of the directors at Boys Harbor says, "I think all kids must have state-of-the-art programming skills. Without them the children who are already behind in the educational system will fall even further behind."

Other children suffer from more than an economic or educational disadvantage. At the Hemlocks Outdoor Education Center for the Disabled in Amston, Connecticut, handicapped kids from ages 10 to 17 can attend one- or two-week–long computer camp sessions. The camp teaches children with musculoskeletal disorders how to become more independent and self-reliant through computer skills.

Computer campers at Hemlock Outdoor Educational Center in Amston, CT.

The Computer Camp for Children with Diabetes is held each summer by the Pediatrics Department of the University of Connecticut. Here, diabetic children are taught how to program and play computer games that will help them monitor and control their disease. The camp usually meets for one week in August, and the children are under constant medical supervision.

For information on the camps mentioned here, write:

Boys Harbor Computer Program, 1 E. 104th St., New York, NY 10029; (212) 427-2244.

Hemlocks Outdoor Education Center for the Disabled, P.O. Box 1040, Amston, CT 06231; (203) 228-9496.

Computer Camp for Children with Diabetes, Pediatrics Department, Univ. of Connecticut, 263 Farmington Ave., Farmington, CT 06032; (203) 674-2221.

general, you can't expect as much time and instruction at a traditional camp as at a computer camp, but a couple of hours per day is quite reasonable.)

A traditional summer camp with a good computer program could be ideal for a child who is uncertain about his or her interest in computers. At good camps, children are encouraged to explore their special abilities, whatever they are. Tomorrow's world will need ecologists, tennis instructors, and dancers, as well as computer experts.

WHY SHOULD KIDS HAVE ALL THE FUN?

Suddenly, the word *camp* doesn't necessarily conjure up an image of kids. There are scores of computer camps tailored specifically to adults.

Since many adults won't spend hours in the classroom learning about FOR. . .NEXT loops, adult camps often deemphasize programming in favor of immediate practical results. You'll learn to use the computer as a tool for both work and entertainment. Most adult computer camps teach about word-processing programs, accounting packages, and spreadsheets. They also offer help in picking the right software.

You will not be cheated out of your fun in the sun. Many adult computer camps offer recreational activities and adventures.

If you're rugged, you can find a camp that offers backpack trips into Wyoming's Grand Teton Wilderness. For the self-indulgent, some adult camps offer treats like wine-tasting parties and hot tubs at the end of a day of heavy computing. There are adult computer camps now in many prime vacation spots, including the French Caribbean, Hawaii, and Lake Tahoe. Club Med runs five computer-oriented camps, two of which will also teach children separately in "Mini-Clubs."

You can even get computer training on an ocean cruise.

Often, adult computer camps are selling a vacation every bit as much as they're selling instruction, so the atmosphere is deliberately made as nonthreatening as possible. There are no tests, no stern teachers, no grades. If you make a foolish mistake, it will be all right.

A FINAL WORD

Computer camps parallel noncomputer camps in many ways, and in deciding where to send your child (or yourself), you should consider those similarities.

Also, think about what you want from the experience. Are you looking primarily for a vacation or for a summer school?

Then, if you decide computer camp is for you or your family, invest some time in choosing the right camp. The more effort you put into making a good choice, the more you're likely to get out of the experience—and a wonderful experience it can be.

Common Qs & As on Computer Camps

In picking a computer camp, you should ask many of the same questions you would ask when considering any other camp. How are the facilities? Is your child mature enough to leave home?

Other questions are specific to computer camps. Here are some of the ones experts hear most often:

What will my child learn at camp? How do campers spend their time?

The typical computer-camper will spend three to four hours per day in the classroom or computer lab. During that time, the camper will learn the basics of computer operation and how to program in at least one language. Commonly, a child will select a programming project at the beginning of camp that he or she will finish before leaving. A computer-camper may also have one to three hours of "free" time on the computer each day.

MOST COMPUTER CAMPS REQUIRE CAMPERS TO PARTICIPATE IN A HEALTHY BALANCE OF ACTIVITIES, INCLUDING ATHLETICS.

Is camp worth it? Will it help my child in school or in getting a job?

As with other educational benefits, you can't put a price tag on computer camps. Sometimes computer camp can spark a slow student into doing better. Sometimes it may provide an exciting challenge for the bright child who is bored by school.

Kids at a well-run residential computer camp—like kids at any good residential camp—are taught how to cooperate in both a living and a learning environment.

Should kids at computer camps spend all their time computing? Do they?

Almost all experts agree that computers are just half of a good computer camp. Make sure the camp you select offers a healthy balance of indoor and outdoor activities. Most camps will require at least two to three hours of supervised recreational activities every day—swimming, sailing, hiking, horseback riding, archery, dance, music, drama, camp-outs, field trips . . . you name it.

How do I select a computer camp? What questions should I ask?

Ask:

- How many students per computer at camp? (The ideal ratio is 1:1; 2:1 is fine.)
- How long has the camp been in operation? (If this is the first year, ask about the credentials of the director and staff.)

- Can I contact parents of past campers?
- What are the qualifications of the computer staff? Is instruction supervised, or do the kids get to play computer games all day instead? How many hours will my child use the computer? (A minimum of three hours a day should be scheduled.)
- How were the counselors selected? (You want a camp that picked its staff more for their ability to relate to kids than for their ability to relate to computers. Kids are more important than computers.)

Obviously, you should exercise care in deciding where to send your child. And, like any new and growing field, the computer-camp industry has attracted a few operators who are in it for a fast buck. But, for some reason, there seems to be surprisingly few.

There is no organization that governs and accredits computer camps specifically. Summer camps in general, including the computer camps, are accredited by the American Camping Association. The ACA will consider only camps that have already opened, thereby excluding brand new camps. A nonaccredited camp won't necessarily be a bad one. But an accredited one is likely to be good, at least as far as health and safety go. ACA's Select-A-Camp service will provide you with information on, and specific referrals to, the kinds of camps you are interested in, but it will cost you $15. (Their toll-free number is (800) 428-CAMP.)

MANY ADULTS WON'T SPEND HOURS IN THE CLASSROOM LEARNING ABOUT FOR . . . NEXT LOOPS.

How important is it that my child's camp offer the same computer as I own or am thinking of buying?

It's rarely essential. One exception: If your child is already an expert programmer, then the machine would probably matter. The introductory language BASIC doesn't change all that much from one machine to another, but the internal machine language that experts use can be very different for different machines.

Do keep in mind that people tend to buy the brand of computer they've learned on. (That's why manufacturers are willing to supply schools with machines at reduced cost or for free.) If you send your child to an IBM PC camp, but you're going to be on a Commodore budget when it's time to buy, make sure he or she is aware of that fact.

How much does computer camp cost?

A garden-variety residential computer camp charges about $375 per week, including all meals, lodging, and recreational activities. You can find camps, however, that charge as little as $125 per week, or as much as $2,000 for a four- to six-week stay at a truly plush summer camp. See the accompanying article "Four Ways to Help Pay for Computer Camp" for ideas on defraying the costs.

Fees for adult camps vary widely, based in part on how much noncomputing fun is included. At $295 for a four-day session, Jackson Hole's Personal Computer Resort in the Wyoming ski area is almost a bargain. Club Med's prices ran last year from $530 to $850 per person per week off-season, plus membership and air fare. The clubs are in Colorado, Mexico, and the Caribbean.

When do I have to apply? When do I have to pay?

Apply quickly—at least two months in advance. Some of the most popular computer camps may already be almost full. Don't panic, though. You can often get on a waiting list and be accepted as little as a week before the opening of camp.

When you apply, you'll probably have to send in a deposit of $100 or so, depending on the cost of the camp. Most camps will require the balance a week or two before your child arrives. FC

FOUR WAYS TO HELP PAY FOR COMPUTER CAMP

For families on a budget (and what family isn't?), computer camp can be a major expense that requires advance planning. Here are some suggestions to help you meet the costs of computer camp this summer:

1. Scholarships or camperships. Some computer camps, particularly those associated with a university or a service organization such as the Scouts, offer full or partial scholarships to financially needy and academically qualified students. These nonprofit camps, run by organizations like the Scouts, tend to cost less to begin with.

Apply for aid as early as possible. Now wouldn't be a bit too soon.

2. Educational loans. Banks may lend to families and adults if they are convinced that camp can enhance career and business skills. Some banks will consider a vacation loan.

3. Family discounts. Many computer camps offer modest discounts for two or more campers from the same family. If the whole family goes, you can save up to 25 percent.

4. Tax deductions and tax credits. These won't help you up front, but next April they can take the sting out of camping costs. Adults attending camp to gain business skills may have a legitimate educational-expense deduction. Working parents who send their children to camp (especially day camp) may also qualify for a tax credit—even better than a deduction. Before deducting computer-camp expenses, check with your tax adviser to make sure you qualify.

A HANDS-ON REVIEW:

IBM PC*jr*

A COMPUTER MEANT FOR BOTH CHILDREN AND ADULTS

BY CHARLES H. GAJEWAY

The IBM PC*jr* has been the subject of curiosity and controversy since its official introduction last November. It has been eagerly accepted by some computer enthusiasts who think that IBM's first mass-market product will help stabilize the computer industry (see "Big Blue Enters the Home and Education Markets," in our January issue). But because PC*jr* is being touted as a bridge between home and office computers, as well as between home and school, skeptics have dwelled on its limitations—its conventional technology, lack of expandability, and "chiclet-style" keyboard. However, very few of these early impressions were based on any hands-on experience, so when I took PC*jr* home for a few workouts with my family, I didn't really know what to expect.

FIRST IMPRESSIONS

The first thing that struck me about the PC*jr* was its trim styling, in contrast to the hefty bulk of the standard PC. It's slim and sleek, and quite attractive in a no-frills, functional way. But, while it will blend unobtrusively into the decor of almost any home or office, its compact size allows for only one disk drive. This is definitely a limitation for business use; disk copying is an integral part of computing, and is extremely tedious with one drive.

Next, I was impressed with the variety of software released in tandem with the PC*jr*. Games, educational programs, and home management and productivity tools—a dozen or so programs are being offered by IBM, at least for the expanded PC*jr*. (A handful of cartridges are available for the basic 64K PC*jr*.) In addition, about 30 programs originally written for the IBM PC, mostly business-oriented, will also run on the expanded PC*jr* (128K). This cornucopia is in marked contrast to the meager selection of programs accompanying most newly introduced systems—including the original PC itself.

Last, I was pleased to see that IBM has taken pains to make the system convenient. When I borrowed the computer from a dealer (Future Information Systems, in New York City), I expected to spend some time dismantling connections and packing components back into shipping cartons. Instead, the dealer unplugged the cable fittings, packed the few pieces into an optional fitted carrying case the size of an overnight bag ($60), and I was on my way. Carrying the nine-pound PC*jr* was little more difficult than toting a full briefcase.

GETTING STARTED

Setting up the machine at home was a breeze; I laid out the system unit, the keyboard, and a monitor on a card table, with plenty of room to spare. After plugging in the cords for the power supply, the joysticks, and the monitor, I was ready to go.

The unit I had was the fully equipped, "enhanced" model. In addition to the 64K RAM and dual cartridge slots of the entry model, it had the 64K RAM video-expansion unit ($140), the slim-line disk drive with 360K storage capacity ($480), two joysticks ($40 each), and a parallel-printer attachment ($99). (A modem is also available, for $199.) This fully expanded model is the one being shown in most IBM product centers; with the $30 connector for a TV, the total cost of this system is $1,478, so it is not to be confused with the $669 base price of the "entry" model.

To see what it would be like to expand the basic unit, I read the operations manual to check out the difficulty of initial assembly. Nearly all of the installations are plug-in, and don't even require tools. By far the trickiest piece to install is the disk drive, which takes about a half hour to install.

I put the training disk in the drive, turned on the machine—and ran into a problem. A minute or so into the program, I began to get disk error messages. For a moment, I thought that I had somehow damaged the machine or the disk. Quickly thumbing through the operations manual, I discovered that, though I had set the monitor, in time-honored tradition, on top of the system unit, this is a no-parking zone on the PC*jr*. Moving the monitor off to the side let the disk run normally. However, the neat little system setup had suddenly doubled in size, taking up most of the card table. This annoyed me; if IBM could design a fitted carrying case for the PC*jr*, they should have found a way to shield the disk drive from monitor interference.

HANDS ON THE KEYBOARD

IBM chose not to use the large 83-key keyboard from the PC. Instead,

PC*jr* consists of a keyboard and a system unit. The infrared "eye" is to the left of the disk drive and two cartridge slots on the system unit.

PC*jr* FACTS

MEMORY: 64K RAM, expandable to 128K
USER-AVAILABLE MEMORY IN BASIC MODE: 44K (for unexpanded model)
VIDEO DISPLAY: TV, monitor, RGB monitor
TEXT DISPLAY: 40 char. × 24 lines; 80 char. × 24 lines with 80-column card
GRAPHICS: 3 modes available: 16 colors, 160 × 200 resolution; 16 colors, 320 × 200 (128K required); 4 colors, 640 × 200 (128K)
SOUND: 3 voices
KEYBOARD: 62 rubber, unmarked keys
SUGGESTED RETAIL PRICE: $669; for "enhanced" model with 128K, built-in disk drive, and 80-column card, $1,269

PHOTOGRAPHS BY STEPHEN SHAMES

CHARLES H. GAJEWAY *is an assistant vice president for Merrill Lynch & Co. in Manhattan and a frequent contributor to* FAMILY COMPUTING. *He has tested programs under development for Lotus Development and Bruce & James. He wrote "HomeCalc" and "A Hands-On Review: Coleco's ADAM" for the January issue.*

the PC*jr* has a much smaller keyboard, with only 62 rectangular chiclet-style keys. The keys are unmarked; each is surrounded by a flat area, which is where the markings for characters and functions appear. This makes it possible to use overlays to label keys for a program that uses them in a nonstandard way. *HomeWord*, a simple word-processing program, comes with such an overlay, as do other programs, and IBM sells blank overlays ($10 for five) for users who want to make their own designations. Nonetheless, the unmarked keys may make it tough for unaccomplished typists.

The keyboard is not attached to the system unit with a cord. Keystrokes are sent to the system unit via infrared transmission, similar to the wireless remote controls on videocassette recorders and TV sets. With a 20-foot range for the infrared signal, it's possible to sit on the couch and play computer games at a distance, as if you were watching TV. For applications using a lot of text, you could sit closer to the monitor, with the keyboard on your lap. An optional cable connection ($20) is available for operating conditions—a brightly lit room full of people, for instance—that make the wireless connection unfeasible.

GOOD NEWS, BAD NEWS

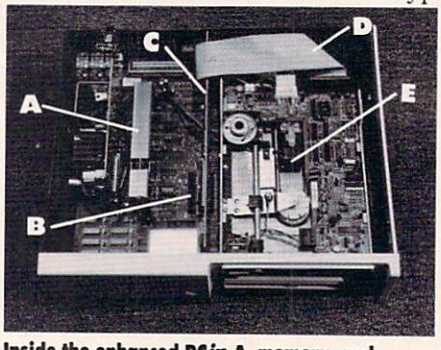
In use, the keyboard is a combination of good news and bad news. The good news is that the wireless connection to the system unit works smoothly and reliably. IBM warns of potential problems in a brightly lit environment, but I had no trouble in any sort of normal room light as long as the "eyes" on the system unit and the keyboard were facing each other.

The bad news is that the keyboard is poorly designed from an ergonomic standpoint. While the key action is smooth and has a pleasant degree of positive feedback, the keys are too small (at least for adult fingers), and the markings are small and hard to read. To add to these difficulties, the PC*jr* requires using several keys in combination with the ALT, CTRL, or FUNCTION keys to make its 62 keys duplicate the functions of the PC's larger 83-key keyboard. Despite the color coding IBM used to ease this inconvenience, I found these multiple keystrokes distracting and slow, particularly since some of them require both hands to execute.

To get a second opinion, I had my wife—who is a good typist—try out a word-processing program, giving her plenty of time to get used to the keyboard, and without telling her my feelings. She also felt uncomfortable with the small keyboard, complaining that it slowed her down and caused her to make a lot of errors. Several other adults who tried the PC*jr* keyboard had uniformly negative reactions.

On the other hand, my six-year-old daughter, who has trouble finding the letters on a full-size keyboard, loved the junior-sized unit. She jumped right into the cute introductory program that comes with the computer, becoming so involved that we had trouble getting her to leave it for dinner.

However, the PC*jr*, particularly the expanded model, is supposed to be for the whole family—equally suitable for learning, playing, and working. The keyboard makes it frustratingly slow and inaccurate for adult users, a serious drawback that even nontypists should consider carefully, unless the machine is purchased primarily for children's use. After all, anyone who uses a computer won't remain a nontypist for long.



Inside the enhanced PC*jr*: A, memory- and display-expansion board; B, slot for modem; C, disk-drive controller board; D, disk-drive cable; E, disk drive.

GUTS OF THE MACHINE

The system unit is a low-profile rectangular box with the disk drive and the cartridge slots on the right.

The ports on the back panel are clearly labeled. In use, the top of the unit gets warm, but not alarmingly so. The fit and finish are excellent, with no sharp edges, clunks, or rattles. The PC*jr* evidences all the quality construction expected from IBM.

Unlike some other computers that use plug-in ROM cartridges for program storage, the PC*jr* allows you to remove or insert cartridges while the unit is turned on. Inserting a new cartridge causes the computer to reset, automatically reading the new program with no annoying bursts of sound or video snow. The cartridges are small and easy to handle, and snap into their slots with a reassuring, positive click.

The disk drive operates in the usual fashion, except that the slim-line drive (about half the height of a normal disk drive) closes with a pivoting lever instead of the more familiar latching door. The drive is smooth and relatively quiet.

Unfortunately, the system unit's well-engineered compactness has limited the versatility of the PC*jr* rather sharply. There is no room for additions beyond the disk drive, extra memory, and modem—all of which fit inside the system unit. While these are certainly sufficient to support most home applications, many of the more recent business packages (like *Lotus 1-2-3* and *MultiMate*) require more than 128K of memory and/or two disk drives. This reduces the PC*jr*'s usefulness as a home extension of the office PC.

There is an expansion connector on the right side of the system unit, and third-party manufacturers are likely to offer additional expansion in the future—a second disk drive is to be expected—but this will compromise the trim neatness of the unit, and drive up the price.

As with many computers, most of the sound generated by the PC*jr* does not come from the built-in speaker; a separate amplifier and speaker are required. I used the audio circuit in my monitors, but not all monitors have this feature. But the PC*jr*'s sound capability, with three voice channels, is a big improvement over the PC's.

A SHARP VIDEO DISPLAY

While I did most of my testing with a monochrome monitor, I also tried a composite color unit. The video image was sharp and clear, and the colors (up to 16 are available) were bright and well balanced. As usual, the color monitor could not resolve the 80-column display mode sharply; this would hold for using an RF modulator with a color TV as well. Most of the software gets around this problem by utilizing the 40-column display mode. I would recommend using a monochrome monitor (several good units are available for $100 or less) for word processing and text-oriented programs, and a color TV for games and graphics.

Please note that many dealers are demonstrating the PC*jr* with the IBM color monitor; this is an RGB (Red-Green-Blue) unit ($680 plus $20 adapter cable) that provides extremely good color and is not to be compared with a regular color monitor or a TV. Thus, what you see in the store may not be what you get at home. Second, the 128K PC*jr*, which I tested and most stores are demonstrating, has superb resolution—much better than the 64K computer. In fact, the resolution on the 64K model (160 ×

200, the number of pixels horizontally and vertically) is lower than that on several less expensive computers.

SOFTWARE

The basic PC*jr* will run software stored on cassettes (with a $30 adaptor) or ROM cartridges. At the moment, there is little of either available, and most of these packages are games. While there is no reason that many useful programs could not be distributed in this format, it seems that IBM's emphasis is on disks. This situation limits the usefulness of the basic unit, since a disk drive is required to run the vast majority of the currently available software.

The PC*jr*'s disk drive operates under PC-DOS 2.1, a slightly revised version of the IBM PC's DOS 2.0. The new release will work with the IBM PC and XT. However, previous releases of PC-DOS may not work correctly with the PC*jr*. PC-DOS is fairly difficult to learn and can be time-consuming to use. A new, simplified user's guide helps ease the user through the technical maze, though, as does the introductory program.

Microsoft Cassette BASIC is built into the computer. The cassette version can be expanded through Cartridge BASIC ($75), which is required for several cartridge programs. (That's why there are two cartridge slots in the system unit.) It's a good implementation of the language (better than Advanced BASIC on the PC), with plenty of graphics and sound commands. But, like earlier versions, it utilizes only 64K of user memory. This is annoying, as half the potential memory is not available with the 128K model.

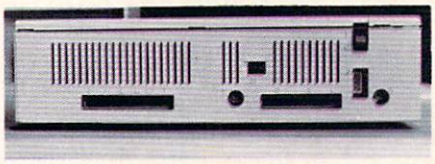
Moving on to more pleasant ground, the IBM-distributed software for the PC*jr* comes packaged in hinged plastic cases that resemble giant cassette boxes. The instruction manuals are clear and nontechnical, with lots of color graphics to illustrate keystrokes and system requirements and operation.

The PC*jr* packages are all of recent vintage, and from quality publishers. There is, however, very little that is special or unique. Nearly all of the programs I tried are currently available for other machines, though in some cases they have been improved to take advantage of the 128K capability. The most compelling software advantage for the new IBM unit is its ability to run a fair number of programs for the PC.

I tried some of these (*VisiCalc*, *Multiplan*, *PFS: File*, and *WordVision*) and they ran quite well, but considerably slower than they do on the PC. Software written for the PC*jr* did not seem to suffer from such a problem. I also noticed that PC programs ran even more slowly on PC*jr* when I used the optional keyboard cable.

PERIPHERALS

Joysticks. The optional joysticks IBM distributes for the PC*jr* are the familiar, high-quality Kraft units, with spring-loaded self-centering mechanisms that can be easily detached or assembled by the user. They worked smoothly and reliably.



The connecting sockets, or ports, on back of PC*jr* are clearly labeled: "J" for joystick, "LP" for light pen, "M" for modem, "S" for serial, etc.

Printer. The standard printer is a neat little thermal unit that couples to the built-in serial interface, works well enough, and fits in nicely with the trim lines of the basic system. A better choice, if you plan to do any word processing or business work, would be a parallel-interface dot-matrix printer (like the Epson-made unit IBM markets for the PC) or one of several low-cost daisy-wheel printers that have been introduced. (To use any parallel printer, you must add the parallel-printer attachment, which sells for $99.)

While thermal-print technology has made large strides in the past few years, thermal print tends to be low-contrast, making it hard to read and duplicate on occasion, and thermal paper is fairly expensive. However, at $175 plus $40 for the cable, the thermal printer has a substantial price advantage over most printers. And, because it works by "burning" print into heat-sensitive paper, costly ribbon cartridges are not required.

IBM SOFTWARE FOR PC*jr*

CARTRIDGE (for 64K entry model):
Crossfire, *Mine Shaft*, *Mouser*, *ScubaVenture*, Cartridge BASIC

DISK (for 128K enhanced model):
Adventure, *Adventure in Serenia*, *Adventures in Math*, *Animation Creation*, *Arithmetic Games*, *Bumble Games*, *Bumble Plot*, *Casino Games*, *Dow Jones Reporter*, *EasyWriter*, *FileCommand*, *Home Budget*, jr, *HomeWord*, *Juggles' Butterfly*, *Logo*, *Monster Math*, *MultiPlan*, *Personal Communications Manager*, *Personal Editor*, *PFS: File*, *PFS: Report*, *Professional Editor*, *Strategy Games*, *Time Manager*, *Turtle Power*, *VisiCalc*, *Word Proof*.

FINAL IMPRESSIONS

Entry Model. Until more software is available, I feel that the PC*jr* entry model is overpriced in relation to its competition. For the same money, one can buy more complete systems (with a disk drive and a monitor) from other manufacturers and have access to a large and growing library of excellent software that would not be initially available to the owner of a basic PC*jr*. The software will come, of course, as most major publishers are developing packages for the new IBM machine—but its quality will be limited by the constraints of the cartridge format.

The seemingly high price for the entry model can be explained two ways. First, you are paying a premium for the ability to upgrade to a 128K computer that is compatible with the PC. This expanded PC*jr* should run most PC software that requires only 128K.

Second, when you buy an IBM product, you are paying a certain "surcharge" for the IBM name, which translates to stability and service. With the present chaotic state of the industry—Texas Instruments has dropped out of the home market, Osborne is in Chapter 11, and other manufacturers are shaky—stability is not to be sneezed at. It means you can be assured of service and product support over the long haul. Deciding how important this is to you should be part of your checklist when assessing the PC*jr*.

Enhanced Model. While the enhanced PC*jr* is a good machine, it is by no means outstanding. The cramped keyboard dilutes the clear advantages of compact size, 128K memory, and PC compatibility. Several other computers, while they are bulkier and have no PC compatibility, offer large, established libraries of software (including many of the programs offered for the PC*jr*), can be expanded with additional disk drives and other useful peripherals, and have full-sized keyboards suited for serious adult usage. Many of these expansion peripherals will probably be made for the PC*jr* by third-party manufacturers. But by the time you total the cost of, say, buying a new keyboard to replace the original, you might be better off buying a computer with a typewriter-style keyboard at the outset.

The PC*jr* seems best suited for a family in which the primary users will be younger children, with occasional adult usage for home management or light professional tasks. PC

Adrift in the Sea of Tax Forms?

PREPARING YOUR TAXES IS NO FUN. BUT A PERSONAL COMPUTER CAN MAKE THE TASK LESS TROUBLESOME—IF NOT IN TIME FOR THE UPCOMING DEADLINE, FOR NEXT YEAR.

BY LAWRENCE J. TELL

The devious minds at the Internal Revenue Service outdid themselves with Schedule G, otherwise known as "income averaging." Paying your taxes is bad enough. Yet here, on one page, is every trick possible to make filing your income tax return one of life's miseries. Some taxpayers have mastered Schedule G once, but few dare tempt its horrors again.

And that's a terrible shame. Because income averaging is one of the surest ways to cut your tax bill. Many taxpayers with rising income can save several hundred dollars by calculating their taxes using Schedule G instead of the easy-to-use tax tables. More than six million Americans income-average, but it's likely that a good many more of the 95 million taxpayers could take advantage of this legal "loophole." If only Schedule G weren't one forbidding series of calculations after another . . .

That gives you an idea, you say? You mean that personal computer in your living room, the one running through its umpteenth iteration of some space-age-cum-medieval adventure game, can slay the dreaded Schedule G faster than you can say "*Wizardry*?"

True enough. A personal computer can be a powerful tool at tax time. Not only will it run through Schedule G in no time flat, it can master the whole IRS alphabet soup. The right software can steer you through the income tax maze. It can help you spot new ways to save on taxes. Let's say you can't decide whether you and your spouse should use a joint return or file separately. A computer can tell you by printing out the numbers faster than you can sharpen a pencil.

With more and more households turning to microcomputers to handle everyday chores, software publishers have developed an overwhelming array of tax programs for nearly every brand of micro. The software comes in three varieties. *Tax preparation* programs are computerized versions just shy of the service you'd expect from a place like H & R Block. You give them the information and they fill out the tax forms. *Tax calculation* programs are simplified offshoots of full-service preparation software. They spit out the bottom line—how much tax you owe—and let you try out different ways to save money. But they don't take you through each line of the tax forms.

Unlike the first two types of programs, *tax planning* software can get a workout year round. These programs show you how different investment alternatives will increase or decrease your future tax bite. They let you plan important financial decisions with an eye to the tax consequences years in the future.

Since April 15 is drawing near, we'll concentrate on the preparation programs that help you fill out those menacing forms. If you've already begun the arduous process for this year, you'll see how these might eliminate some of next year's headaches. First comes the bad news: A tax program isn't a video game. You can't just sit down at the computer, insert a

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ILLUSTRATION BY CARTER GOODRICH


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disk, manipulate a joystick, and—presto—post a new high score in *Taxes*. Tax preparation is serious business. A good program can speed up much of the drudge work required to satisfy Uncle Sam. It can help you chart your course through a foreboding sea of lengthy forms. It can sometimes even spot ways to save on taxes you might not otherwise consider. But even the best ones aren't self-contained. Any tax program is going to require considerable "input" before it can work its magic.

BEFORE YOU COMPUTE

Before you boot that disk, gather your financial records from the past year. That includes the family checkbook, bank statements, receipts, and the like. If you've been keeping track of your finances with a home-budget program, so much the better. Now's the time to print out all those reports that categorize tax-related items, such as deductible business expenses and interest payments. A copy of last year's return should be handy, along with this year's blank tax forms. Pick up the free IRS booklet, *Publication 17*, which explains the various forms and schedules, line by line. Or invest in a popular paperback tax guide.

"A GOOD PROGRAM CAN SPEED UP MUCH OF THE DRUDGE WORK REQUIRED TO SATISFY UNCLE SAM."

With these low-tech chores out of the way, you can turn your software loose on this year's tax return. Have a blank formatted disk ready to receive the date you enter, because these tax programs constantly whir from program disk to data disk and back again—whether you're using one disk drive or two. Most programs start with a menu that first asks you to enter basic information about yourself (and your spouse, if it's a joint return): filing status, social security return, etc. Then you get into the number crunching through the forms and schedules. This is where the good tax-prep programs shine and the weak ones leave you as befuddled as ever in IRS never-never land.

WHAT TO LOOK FOR

Good programs have certain minimum features. Each time you enter an amount, it should be transferred automatically to all the proper lines on other forms. What's the use of a computer if you still must "write the amount from Form 1040, line 31"? The program should do it all for you. You should be able to vary the amounts on a given line to see how that will affect the taxes you owe.

Your program should also contain on disk all the different forms and schedules you'll need. Otherwise, you'll have to labor with pen and paper to fill out the form and then transfer the results to the program—hardly what you hoped to accomplish by computerizing your tax-filing chores. The program should have a tax-itemization feature—that is, a place to explain each entry with supporting details so that you'll be able to defend your deductions if you're ever audited.

Simple keystrokes should let you itemize each line on the return: how much of your medical expenses are for hospital bills, how much for doctors' visits, etc. And once each item is entered, it should be totaled and inserted on the proper line.

Some programs with all these features also seem the most foreboding. If you find them tough to use, welcome to the world of income-tax preparation. Satisfying the IRS isn't an easy job—with or without a computer. Just remember, a program that's too simple, that doesn't do the job, might be worse than none at all. No computer program can cure tax-a-phobia. So if you suffer from fear of filing, you might save time, money, and aggravation by consulting an accountant or paying a professional tax preparer.

One more caution. The folks at the IRS put out short forms called 1040A and 1040-EZ. Many taxpayers—especially wage earners without investment income or itemized deductions—can use one of these returns. No tax preparation is easier than that. So unless you're the type who's so hooked on computing you must run your entire household on floppies, stick to pencil, paper, and a hand-held calculator if you can file the shorter forms.

THE SOFTWARE

Now that you're ready to file electronically, you're probably wondering what to expect from your software. Each tax program comes with its own built-in traits, just like the human accountant who might prepare your return. We've listed many of these various tax programs in the accompanying chart, but those described below will give you a sample of the characteristics you may encounter while working with a tax program.

Preparation Programs

One of the least expensive and most complete preparation systems we tested is *The Tax Advantage* by Continental Software (for Apple II, Atari, Commodore 64, and IBM). It lets you move through the most frequently used tax schedules with ease. Hitting the "T" key gives you an immediate reading of your taxes, so you can monitor the effect that changes you make will have on the bottom line. A handy "option" feature lets you see at once just how much you'll save if, for example, you sock away an extra $500 in an Individual Retirement Account this year. On-screen "help" gives you quick explanations of most lines on the various forms at the push of a button.

The Tax Advantage also reads data from Continental's *Home Accountant* financial management program. So if you've been keeping the household budget on that program, you can save hours of data entry. Assuming, that is, you've set up your *Home Accountant* categories to match the tax program. If not, you'll be better off putting the numbers in by hand on this year's tax form and revising your *Home Accountant* for 1984.

At $69.95, *The Tax Advantage* may be a

A SURVEY OF THE SOFTWARE

Tax programs sprout like wildflowers in the spring, so it's impossible to keep up with all the latest releases. The chart below provides a good cross section of the three types of tax programs. (We've abbreviated them as "calc" for calculation programs, "plan" for planning software, and "prep" for preparation programs.) More details on some of the software listed here is discussed in the accompanying article. And, as with any software, make sure it's right for you *before* you buy. It's also good practice to ask for a demonstration to make sure the program performs as advertised.

NAME/Publisher	TYPE	PRICE	ANNUAL UPDATE	HARDWARE	SCHED/FORMS INCLUDED	OTHER FEATURES
Personal Tax Planner Aardvark/McGraw-Hill 1020 N. Broadway Suite 300 Milwaukee, WI 53202 (414) 225-7500	Plan	$99	$20 off price	IBM PC	None	Compares alternatives quickly
Tax Advantage Continental Software 11223 S. Hindry Ave. Los Angeles, CA 90045 (213) 410-3977	Prep	$69.95	50% off price	Apple II/II plus/IIe; Atari 400/800/1200XL; Commodore 64; IBM PC	A, B, C, D, E, G, W, SE, 4562	Reads from *Home Accountant*; telephone support w/$20 registration
Tax Aid II, III Northland Accounting 606 Second Ave. Two Harbors, MN 55616 (218) 834-3600	Calc	$24.95 (cassette), $29.95 (disk)	$10 (cassette), $12 (disk)	Commodore 64 (*Tax Aid III*); VIC-20 (16K, *Tax Aid II*)	A, B, G	Easy "what-if" comparisons
Tax Break Planner Proforma Software 2706 Harbor Blvd. Suite 200 Costa Mesa, CA 92626 (714) 641-3846	Calc, Plan, Prep	$180	$50	Apple II/II plus/IIe/III; IBM PC	A,D,G, 4972 for Apple; also B, C, D, E, F, G, R, RP, SE, W, 2106, 2119, 2210, 2440, 2441, 3468, 3903, 4137, 4255, 4562, 4684, 4797, 4972, 5695, 6251, 6252	Single-year only calc version: $130; Calif. state tax version avail.
Tax Byte Century Software P.O. Box 26516 Phoenix, AZ 85068 (602) 944-5533	Prep, Plan	$69.95	YES	Apple II/II plus/IIe	A, B, C, D, E, G, W, 4797, 6251, 6252	Does alternative minimum tax
TaxCalc TaxCalc Inc. 4210 W. Vickery Blvd. Fort Worth, TX 76107 (817) 738-3122	Calc	$125	$50	Apple II/II plus/IIe/III; CP/M; IBM PC; Kaypro; Osborne; TRS-80 Models II/III/4	None	Needs spreadsheet; Calif. state tax version costs $100
Tax Command Practical Programs P.O. Box 93104 Milwaukee, WI 53202 (414) 278-0829	Calc	$24.95	NO	Apple II/II plus/IIe; Atari 400/800/1200XL; Commodore 64; Osborne; VIC-20 (8K); Timex Sinclair 1000/1500; TI-99/4A; TRS-80 Color Computer	A, D, G	Other schedules avail. for systems with more than 48K
Tax Manager Micro Lab 2699 Skokie Valley Rd. Highland Park, IL 60035 (312) 433-7550	Prep	$180 (Apple), $250 (IBM)	YES	Apple II/II plus/IIe; IBM PC	A, B, C, D, E, F, G, R, RP, SE, W, 2106, 2119, 2210, 2441, 3468, 3903, 4625, 4726, 4797; 5695, 6251	On-screen "tax guide" suggests forms to use
Tax Optimizer Dynacomp 1427 Monroe Ave. Rochester, NY 14618 (716) 442-8960	Plan	$59.95	NO	Apple II/II plus/IIe/III; Atari 400/800; TRS-80 Models I/III/4; CP/M	None	Multi-year planning
Tax Preparer Howard Software Services 8008 Girard Ave. Suite 310 La Jolla, CA 92037 (619) 454-0121	Prep	$250 (Apple), $295 (IBM)	$65 (Apple), $75 (IBM)	Apple II/II plus/IIe/III; IBM PC	A, B, C, D, E, F, G, R, RP, SE, W, 2106, 2119, 2210, 2441, 3468, 4562, 4797, 5695, 6251	Automatic recalculation on all forms
Tax Saver Micromatics Programming Co. P.O. Box 158 Georgetown, CT 06829 (203) 324-3009	Prep	$150	40% off price	TRS-80 Models I/III	A, B, C, D, G, SE, W, 2441, 6251	On-screen tax helps; simple Q & A format
Tax Series Financier P.O. Box 670 Westboro, MA 01581 (617) 366-0950	Plan	$175	YES	IBM PC	None	Graphics function

bargain. But you don't get on disk all the schedules you might need. For example, many taxpayers can deduct business expenses on Form 2106 even if they don't itemize. And those using certain tax shelters in 1983 will need to tangle with the complicated alternative minimium tax (Form 6251). These forms can't be called up on *The Tax Advantage*. So if your tax situation is more complicated, you might use another full-service prep program, *Tax Preparer* by Howard Software Services (for Apple II and IBM PC).

Tax Preparer can be maddeningly slow. If you're using only one disk drive, you risk a broken wrist from inserting and reinserting your data and program disks. But it gets the job done. And it covers just about every tax form you'll ever need. Simple commands let you move from form to form with ease. An itemization feature lets you support each entry with specifics—no need to fumble through your checkbook more than once to recall just which charity that contribution went to—and tallies those items as you go. Entries on one form are automatically transferred to all the others. *Tax Preparer* even prints out supporting schedules and forms that can be filed just as they come off your printer. In addition, it will print directly on a preprinted 1040 return—the IRS won't accept a computer-generated version of a form you actually must sign [*see accompanying article for more details*]. If you want to make sure you've covered all the bases, *Tax Preparer* is probably the best prep program for you.

"EACH TAX PROGRAM COMES WITH ITS OWN BUILT-IN TRAITS, JUST LIKE THE HUMAN ACCOUNTANT WHO MIGHT PREPARE YOUR RETURN."

Tax Byte by Century Software (Apple II) includes some of the forms missing from *Tax Advantage*. But it isn't nearly as well documented, either on the screen or in the accompanying manual, and has some bothersome quirks. To make the program insert changes on all affected lines of the tax forms, you first must exit one screen and call up another part of the program. Since the function is not automatic and you have the option of not using this "auto math" utility, you take the risk of being exposed to a most embarrassing predicament: numbers that don't add up.

Tax Calculation

Many programs will calculate your taxes but won't actually prepare the forms. This software generally costs less than the full tax-prep programs and often runs on micros with smaller memory capacity. They're great for quick tax planning forays. If you've wondered whether to sell your stock now, at a loss, or to wait, hoping that it will go back up, these calc programs can tell you what the tax savings will be. However, documentation can be awfully skimpy, and on-screen tax help nonexistent. If the lines on a 1040 form make you dizzy, your eyes will probably glaze over when you glance at the monitor after booting one of these programs.

Some calc programs come with interesting gimmicks. Proforma Software's *Tax Break Planner* (for Apple II/II plus/IIe/III and IBM PC) gives you an "audit potential" score. It compares your deductions to nationwide averages in each category (medical, taxes, interest, contributions, casualty/theft). If your score is over 200, watch out! The program warns that the IRS may audit your return. On the other hand, if the program tells you that your $400 medical deduction is "low," you might want to recheck your records for items you've missed. The program also runs through a "tax optimization" routine to determine which tax calculation method gives you the lowest possible tax. These are neat tricks but may not be worth the program's $180 price—even though Proforma's promotional material features an elaborate demonstration of how much you'll save by writing off the cost of the software.

Tax Aid by Northland Accounting (for Commodore 64 and VIC-20) might be worth a try for little more than the cost of the latest game program. The program runs line-by-line through the basic 1040 form, asks you to enter each amount, then prints out the completed form. The program includes itemized deductions (Schedule A) and interest and dividend income (Schedule B). It's simple and fast, though hardly sophisticated. Another worthwhile feature: It will do the dreaded Schedule G income-averaging calculation for most taxpayers. Other programs of this type include *Tax Command* by Practical Programs (for nearly all popular micros) and the somewhat more expensive *TaxCalc* (for Apple, IBM, TRS-80, and CP/M computers), which only runs with a spreadsheet program like *VisiCalc*. If you already own a spreadsheet, you can devise your own tax calc "template," as these overlay programs are called, following the spreadsheet commands. Be sure to double-check the program before you send in your tax return.

Planning

Tax-planning programs allow you to run through numerous variants of complicated financial scenarios, spanning several tax years, and come up with the best tax strategy. For taxpayers with substantial incomes and room to maneuver, a tax planner can shave considerable sums off a tax bill.

Let's say you're expecting an annual five-percent raise in salary, your self-employed husband's business will be buying some expensive machinery next year, and your son needs braces on his teeth. Does it make more sense to pay the dental bill all at once, taking the deduction now? Or should you wait until the next tax year, when you'll be in a higher tax bracket? Or maybe you should split the payments into two tax years. And how will new accelerated-depreciation rules on your husband's machinery affect the tax on your joint return? Plug all these variables into a tax-planning program and get the answer.

The same approach can be used with all financial decisions. Thinking of buying real estate as an investment? Switching into tax-free

TAXING QUESTIONS

Taxes were confusing even in the precomputer days, and computer-aided tax preparation adds some new problems to ponder. Here are some straightforward answers to some often-asked questions about using tax software programs.

Q: Is it always faster and easier to prepare my taxes with my personal computer?

A: No. Taxpayers with fairly simple tax situations, such as one-wage-earner families without itemized deductions, would be better off using the IRS short forms, 1040A and 1040-EZ. But anyone who runs a business, receives income from numerous investments, or itemizes deductions can probably simplify the tax-preparation ritual with a good tax program.

Q: Can I send in tax forms prepared by my program and printed on my printer?

A: The IRS has very specific rules about computer-generated tax returns. The 1040 return and other forms that must be signed by the taxpayer must be preprinted. A computer printer can fill in the blanks, but the form itself must be printed beforehand to IRS specifications. Other schedules can be computer-printed if they follow certain IRS guidelines. Some programs meet this requirement, but it is best to check with a local IRS office for a copy of their specifications (ask for *Revenue Procedure 83-10*). Supporting documents can be printed in any format, so long as the name and social security number of the taxpayer(s) appear on each page.

Q: How do I know my program is giving me the correct numbers for my tax return?

A: Unfortunately, you don't. It's quite difficult to test a program for the myriad tax situations of individual users. A mistake could always creep in when you're working the exotic fringes of some tax form. If you think your tax status is unusual, it's safest to select a program that's been published—with updates—for several years. Any bugs in those programs are more likely to have been corrected. Finally, use common sense: If the computer reports that you owe the IRS $20,000, don't send in a check! And if the mistake is in *your* favor, don't expect you'll get away with it just because your computer program is responsible.

Q: What about state and local tax returns?

A: Some software packages include programs for state tax preparation at an additional cost. But only the most populous states are covered. Since state tax returns often require little more than line-by-line transfers from the federal forms, a state and local tax package is an added frill.

Q: Can I use this year's tax program for next year's tax return?

A: That depends. Some programs have built-in tax tables for future years and let you specify which year's return you're working on. But tax rates can change—remember the big tax cuts in 1981 and 1982—and render these tables useless. Other changes in the law can throw off parts of the program. For example, a 1982 program would give an inaccurately high medical deduction in 1983, exposing a taxpayer to possible penalties. Those who feel confident with both programming and the Internal Revenue Code might try modifying their own software to keep pace. But the safest approach is to buy annual software updates for your program, if they're available.

"FOR TAXPAYERS WITH SUBSTANTIAL INCOMES AND ROOM TO MANEUVER, A TAX PLANNER CAN SHAVE CONSIDERABLE SUMS OFF A TAX BILL."

bonds? The software asks you the pertinent questions, runs through the tax tables in its memory, and gives the tax impact of every scenario. Some tax-planning programs are specialized. Howard Software's *Real Estate Analyzer*, for example, helps calculate the tax consequences of different property investments. A good all-around tax planner, such as Financier's *Tax Series*, deals with simpler tax strategies.

BEWARE THE FLAT TAX

You don't need a fancy program to understand this simple fact: Tax laws change. And programs designed for 1983 taxes won't work in 1984 and beyond. There's even talk of fundamental tax reform to streamline the whole system, eliminate most deductions, and charge all taxpayers a single flat tax rate. Your $250 tax-preparation program won't be worth much in two years if the 1985 1040 form merely asks you to multiply your income by 0.25 and pay that amount to the IRS.

Remember this, too: A computer won't hold your hand during an IRS audit. Nor is the tax agent likely to be impressed when he asks, "Who told you to write off your Aunt Dotty's fur coat?" and you reply, "My software did."

Tax software, like any computer program, is simply a tool to help solve a problem. One software manual warns that the program "is not a substitute for thinking." Even the smartest, slickest tax program won't save you a penny unless you know how to use it. FC

Making Connections

LINKING A PRINTER OR MODEM TO YOUR COMPUTER CAN BE LIKE LEARNING TO SWIM—YOU GET THAT SINKING FEELING. THE RIGHT INTERFACE WILL HELP YOU FLOAT.

BY LARRY BIHLMEYER

IMAGINE TALKING TO THE SOVIET AMBASSADOR WITHOUT A TRANSLATOR—WITHOUT AN "INTERFACE."

So you bought yourself a new printer to go with your computer. You proudly carried the printer home, hooked it up to the computer, and awaited the comfort of hard copy—so tactile, so familiar. But as you struggled to type in the right words to make it react, nothing happened. Or, worse, the whole system locked up—crashed. The screen printed error messages while each component waited for the other to do something. And there you sat. Angry. Upset. And probably very embarrassed in front of family and friends.

That's the hard way to learn about interfaces—and about how you may need to spend even more money before your computer really becomes a useful tool.

This article should help you avoid that scene (or escape it if you are already there). Here's what you need to know about interfaces: What they are; which ones you need; how much they cost; and how they work.

WHAT'S AN INTERFACE?

Imagine for a moment that you are the U.S. ambassador to the United Nations. When you try to talk to the Soviet ambassador, neither of you can understand the other. But if you put a translator in between, then clear communication is possible (some of the time). The translator is an "interface."

Similarly, a computer interface is a device, or set of devices, that allows different computer equipment to be hooked together and to "talk" to each other. The interface begins where the computer ends, with a "port" that connects the computer to the outside world. Sometimes you'll need to add that port yourself, as well as a circuit board that carries information in from or out through the port.

The more ports that are built into your computer (or that can be added later), the greater flexibility you'll have. These ports are physical connectors, usually of the "female" type, that accept "male" connectors.

LIKE PLUGGING IN A LAMP

A computer port is to information as an electrical outlet is to electricity. As with an electrical outlet, you need the right kind of plug (or "connector") to attach your peripheral—be it printer, monitor, disk drive, modem, or whatever. You also need the right kind of voltage coming through; otherwise, your appliance might not work; or may even break. To prevent this, the best advice is: Try before you buy.

Often, you can buy a standard cable with the right connectors at both ends. The cable, of course, actually carries data from the computer to a peripheral, or vice versa. But sometimes you'll need special interfaces—little boxlike devices that go between your computer and, say, printer.

You don't need to know how the various pieces of the interface puzzle work in detail.

LARRY BIHLMEYER, *a freelance writer who lives in Pontiac, Michigan, has written for magazines such as* Boating, Family Handyman, Motor Boat, Sail, *and* Software Retailing. *He uses a Commodore 64 to write, keep a budget, and play with his four-year-old daughter.*

ILLUSTRATION BY ROBERT CONRAD

THE CONNECTIONS

3 STANDARD INTERFACES*

DISK DRIVE
Disk drives sold for a particular computer brand generally come with the proper cable and connecting device.

CASSETTE
The interface is usually a cable with two jacks at each end: one for saving a program to tape, and one for loading a program into the computer.

MONITOR
Most often, a five-pin connector hooks into the computer; cable with audio/video jacks hooks into the monitor.

PRINTER
The most common printer connection is the Centronics-type parallel interface, though RS232C serial interfaces are also used.

MODEM
Most external modems are connected with a standard RS232 serial cable, though sometimes slight wiring modifications are needed.

COMPUTER
A computer's ports, where cables are connected, are generally on the back of the unit. They consist of a metal "female" connector; or of a slot, through which a cable leads into the computer.

RS232C SERIAL INTERFACE
Used primarily to connect printers and modems, this interface is usually, but not always, a 25-pin connector. Each pin leads to a wire inside the cable, though no more than nine wires are used in most applications.

ROUND DIN CONNECTOR
Round DIN connectors sometimes plug into the computer's serial port (for printers), but are most often used as one end of a monitor cable. One-, five-, six- and eight-pin configurations are used; they are not interchangeable.

25PIN SERIAL PORT

6PIN DIN PORT

36PIN PARALLEL PORT

*The interface connections shown here are the most common, but some computers use different ones. Never buy any kind of peripheral without knowing what cable and connectors you'll need—and where to get them.

CENTRONICS PARALLEL INTERFACE
The most common parallel interface—and probably the most widely accepted standard in the industry—the 36-pin Centronics connector is used to hook up printers.

But you do need to know what kinds of interfaces are commonly used, what types of connectors exist, why software control is sometimes needed, and how to hook everything up.

THE RIGHT CONNECTION

NEVER BUY ANY PERIPHERAL WITHOUT KNOWING WHAT KIND OF CONNECTORS AND CABLES YOU'LL NEED—AND HOW TO GET THEM.

Interfaces are needed to attach the computer to monitors, printers, modems, cassettes or disk drives, and other peripherals. Each kind of peripheral has somewhat different requirements, which we will discuss. Some manufacturers build connection sockets into their computers; some don't. Peripherals may come with the interface you need; some may not. So, careful shopping is required. Never buy any kind of peripheral without knowing what kind of connectors and cables you'll need.

Four different types of cables and connectors, sometimes with slight variations for specific devices, are used to hook up computers and peripherals. [*See diagram.*] Let's look at these common connectors.

Standard DIN Connector. DIN connectors are round and usually have from one to eight pins, depending on what they're being used for. Common configurations include five, six, and eight pins, which are not interchangeable. With these and other connectors, the pins lead to wires inside the cable, which carry signals between the computer and peripherals.

Standard Serial RS-232C Connector. This connector is oblong-shaped and contains 25 pins. RS-232C connectors are used when the computer transmits and receives data "serially," one bit at a time.

In most applications, only some of the 25 pins are used—usually no more than nine. These connectors were originally designed for Teletype printers, but are now also used for modems and printers and other peripherals. Sometimes serial cables will need to be adapted to work properly with modems.

Standard Centronics Parallel Connector. Named after the original Centronics printer, which popularized the genre, this oblong, 36-pin parallel connector is the most common printer connector. It is also probably the most widely accepted standard in the industry.

Centronics-type parallel connectors send eight bits of data at once, and generally have cables no longer than 10 feet, due to signal-strength limitations.

IEEE-488 Connector. The IEEE-488 is rare, but it is used as a serial interface with Commodore computers. The advantage is that up to five devices—a disk drive, a printer, etc.—can be connected at once.

THE MISSING LINK—CABLES

Many hookup issues may be resolved easily, by noting which connectors are used at various points and then picking the right cables and connectors. For example, the connection port on the computer may be a DIN-type, while the connection port on the printer may be a 25-pin RS-232C type. Without the right kind of cable, you won't be able to hook the two together, let alone get the printer to work.

If you are buying a system from a full-price dealer, he or she should be able to provide you with the proper interfaces (connectors, cables, and circuit boards) and demonstrate all parts of your system working together. If you need a specialty cable, have your dealer or local electronics shop make it for you, unless you're an expert. This is a fairly straightforward matter, as long as you can provide specifications from your owners' manuals. Cables generally cost from $15 to $50.

Cables should be long enough to reach where you need them to go, with little slack. If they're too long, you risk power loss.

PRINTER INTERFACES

Depending on your computer brand or model, you may or may not have a printer interface port already built in. Shop carefully, and consider the price of the interface if you'll need to buy it separately. Atari requires that you buy an Atari 850 interface to use a printer other than an Atari printer with its computers. For TI-99/4A computers, you need a peripheral expansion box. To use a Centronics-type printer, you will need an additional printer card to fit inside the box, and a special cable, such as the TI CEN cable made by Tenex Computer Marketing Systems.

Or look at the Commodore 64 and VIC-20. If you use them with a Commodore-brand printer, no printer interface is needed; a simple cable with compatible connectors will suffice. But, if you want to use a non-Commodore printer, you'll need a separate printer interface, which is a little, box-like device.

In general, Centronics-type printers will be the easiest kind to connect, as long as you have a parallel port on your computer. The connect-

SAMPLE PRINTER INTERFACES

Product	Manufacturer	Computer
Atari 850 Module	Atari Inc. 1265 Borregas Ave. Sunnyvale, CA 94086; (408) 745-2000	Atari
Printer Interface	Data 20 Corporation 23011 Moulton Pkwy. Suite B10 Laguna Hills, CA 92653; (714) 770-2366	Commodore
Various models	Engineering Specialties 1501-B Pine St., P.O. Box 2233 Oxnard, CA 93030; (805) 486-0817	Various
MPP-1100 Parallel Printer Interface	Microbits Peripheral Products Inc. 205 W. Third St., Albany, OR 97321; (503) 967-9075	Atari
Centronics Parallel; RS-232 Interface	Memotech Corp. 99 Cabot St., Needham, MA 02194; (617) 449-6614	Timex
Smart ASCII Plus	Midwest Micro Inc. 311 W. 72nd St., Kansas City, MO 64114; (816) 333-7200	Commodore
MicroPal Cables	Tenex Computer Marketing Syst. Box 6578, South Bend, IN 46660; (800) 348-2778	TI-99/4A
Interpod	SJB Distributers 10520 Plano Rd., Suite 206 Dallas, TX 75238; (214) 494-3585	Commodore

ing cable is a standard piece of equipment. But if your computer outputs only through a serial port, as the TRS-80 Color Computer does, and if you want a Centronics-type printer, you'll need an interface such as the Botek CCP-1 to convert the computer's serial signal to a parallel signal your printer will recognize.

In some cases, a computer with serial output cannot be used directly by a serial printer, even though they both use RS-232C connections. Here, an interface is sometimes needed to convert voltage levels, control signal speed, and provide correct wiring and matching connectors.

These printer interfaces can vary in price from $70 to $200 or more, depending on your hardware and software needs. For instance, the Smart ASCII Plus, from Midwest Micro, is an interface for the Commodore 64 that allows you to print out the graphics characters; some other Commodore interfaces don't allow for this.

While lack of standardization in the industry can turn the printer connection into a circus act, there is a ray of hope. Alphacom, a printer manufacturer, is now selling cables designed to hook its printers to specific computer brands.

MONITOR INTERFACES

There are typically four types of monitor/TV interfaces. The first is just a convertor (called an RF modulator) to allow you to use your TV with a computer. RF modulators come with most home computers.

On most monochrome (one-color) monitors, the connecting cable has one-pin DIN connectors at each end.

If you plan to use a color monitor, then another type of interface may be needed. This is a special cable that allows you to separate the video signal from the audio signal. Connection at the monitor is usually by two one-pin plugs, one black and one red. At the computer, it's usually by a five- to eight-pin DIN connector. With this arrangement, you can route the sound to the proper monitor jack, or to a separate amplifier system if your monitor doesn't come with sound. The audio plug is compatible with most stereo amplifiers.

For some color monitors, one of two different interfaces may be needed. One is an interface card, which is added to your computer. An example is the Digital Video Multiplexer (DVM) made by Amdek Corporation. It allows Apple II computers to be used with high-resolution RGB (red-green-blue) monitors that use three separate color signals. And IBM PC owners must add a color-graphics card to take advantage of a color monitor.

The other color monitor interface is a cable, with two ends, that allows an optimum color signal. The physical connections look the same as they do on a cable for a monochrome monitor. The cable first splits the sound, and then splits the color signal into color and brightness. Quality Computer makes such a cable for the Commodore 1701 color monitor.

MODEM INTERFACES

A modem is a "box" that connects your computer to a telephone line—and to any computer that you can reach by telephone.

Both kinds of modem—acoustic couplers and direct-connect modems—usually use RS-232C serial connectors. This ordinarily simplifies hooking up a modem, but sometimes you will have to switch two or more of the connector's wires, and/or connect some of the pins to other wires. Novices should probably have their dealer or electronics shop switch the wires.

For those computers that accept internal modems—the Apple II line and IBM's PC and PC*jr*—you won't need to worry about the interface. You merely plug the modem card into the computer and connect your phone line directly to the card via its modular phone jack.

Finally, if you want to use both a printer and a modem at the same time, which many people do, keep this in mind when shopping. Since the modem will use the serial port, you should find a parallel printer.

CASSETTE AND DISK DRIVE INTERFACES

When first buying a computer, you may start out with a cassette tape data-storage system. In some cases, you'll have to buy the manufacturer's unit, which will include a built-in interface. The Atari Program Recorder and the Commodore Datassette are two such devices.

For computers that can be used with regular tape recorders, the connection is usually a cable with two jacks at each end. One jack is used to load programs from tape to computer, and the other to save programs from computer to tape. Radio Shack usually stocks these cables. (The cables for the TI-99/4A and the TRS-80 computers have one plug at the computer's end, and three at the recorder's end.)

Another situation can arise for disk-drive users. While hookups between the same brand of computer and disk drive usually require only a simple cable and a disk-controller card that comes with the disk drive, if you add a different brand or type of disk drive, you may well need a special interface. In some cases, the connections aren't possible or the interfaces don't exist, so be careful.

TRY BEFORE YOU BUY

When considering interfaces, it is best to find a peripheral that is designed to be hooked directly to your computer, and that comes with the proper cables. As the computer industry matures, this will become easier to do, but it isn't always possible, and it may be too expensive. Whatever the situation, see the peripheral you're buying actually work with your type of computer before you buy it. You could save yourself two months of trying to find the proper interface. FC

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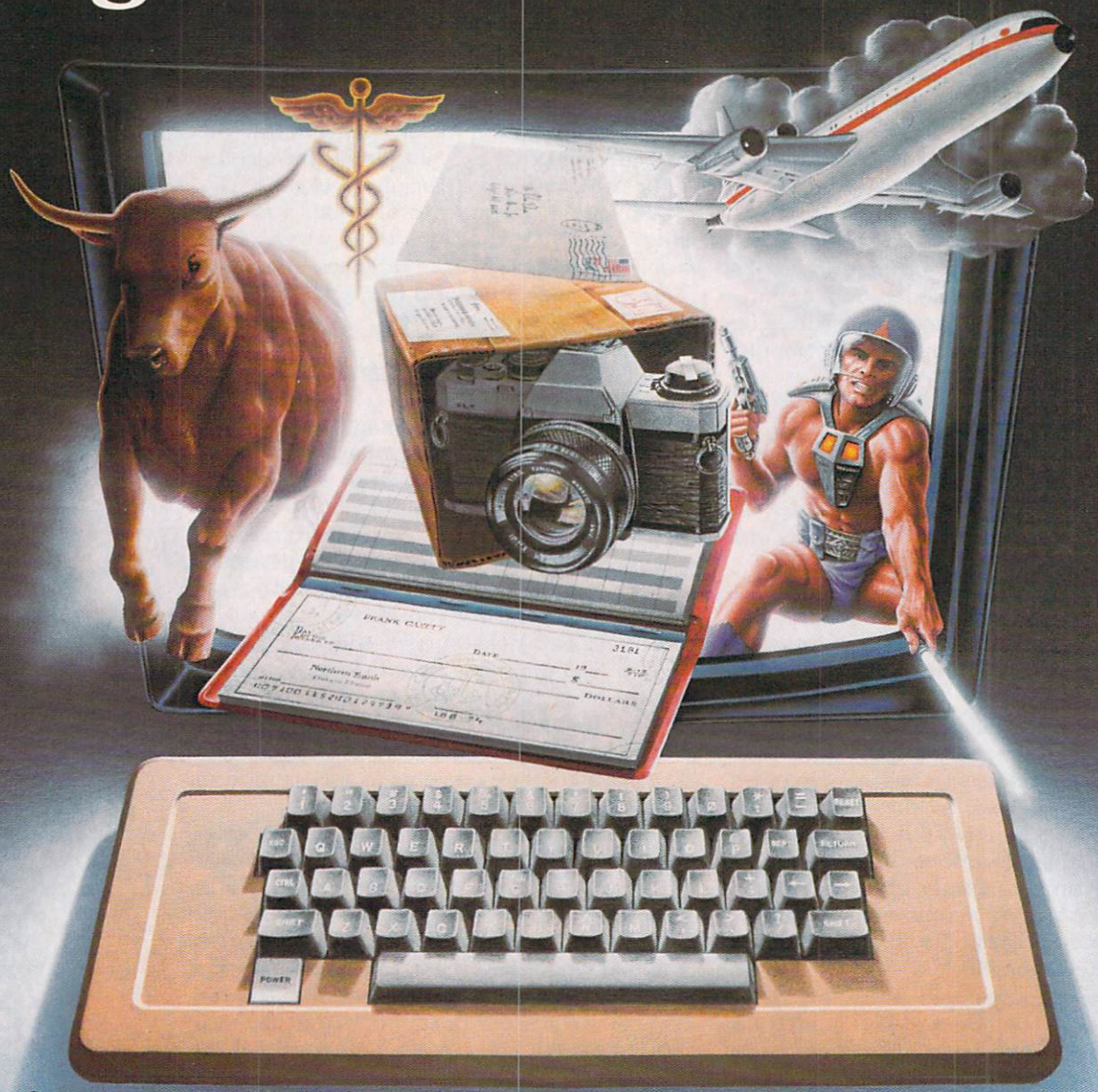

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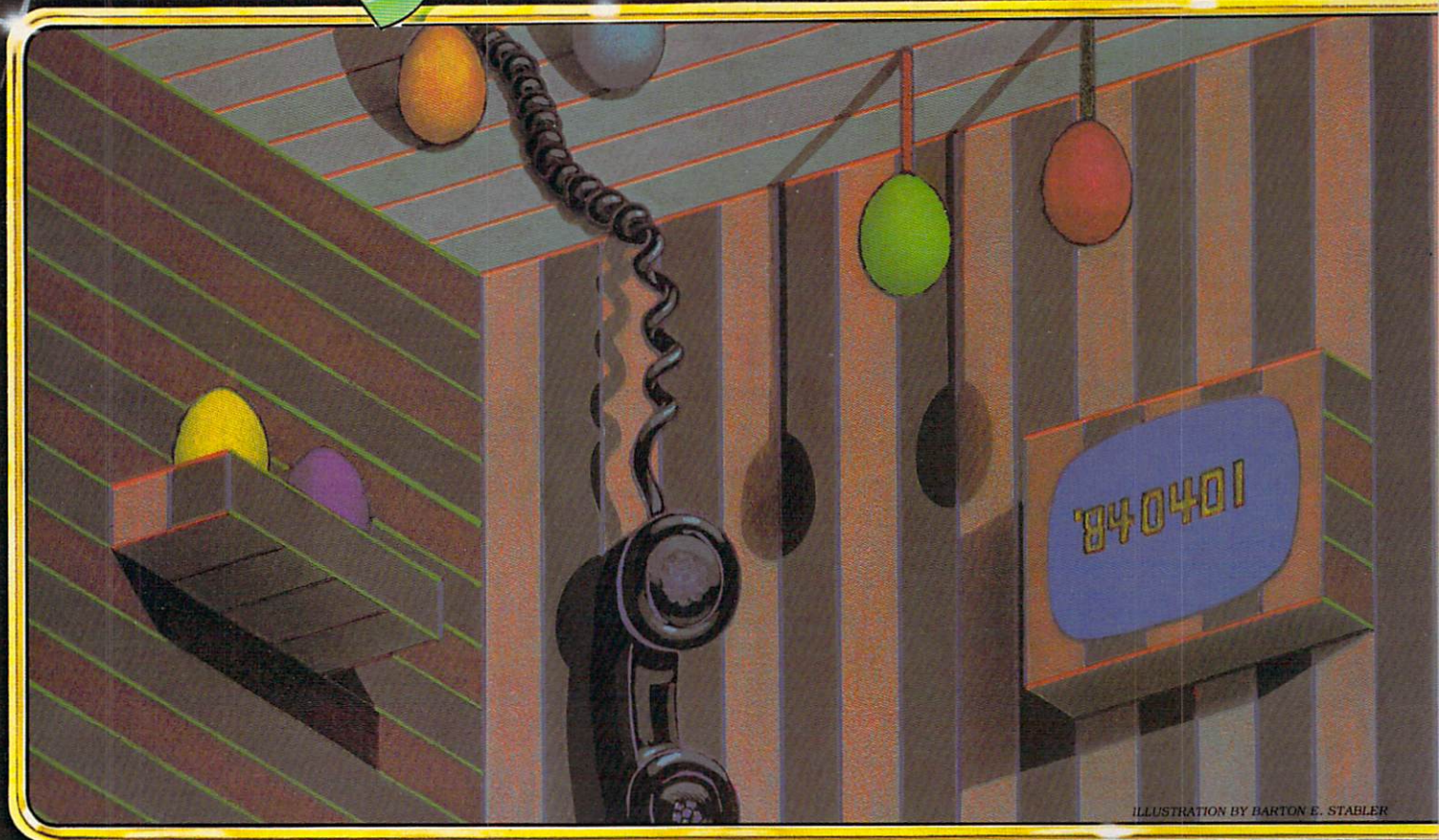


ILLUSTRATION BY BARTON E. STABLER

★ APRIL ★

BEGINNER PROGRAMS
Page 92

Discover an Easter egg under the kitchen sink; try a top-secret program to find out what it does.

PUZZLE
Page 98

You are lost on a strange planet with four minutes until your shuttle blasts off. Can you find your way back to your shuttle in time?

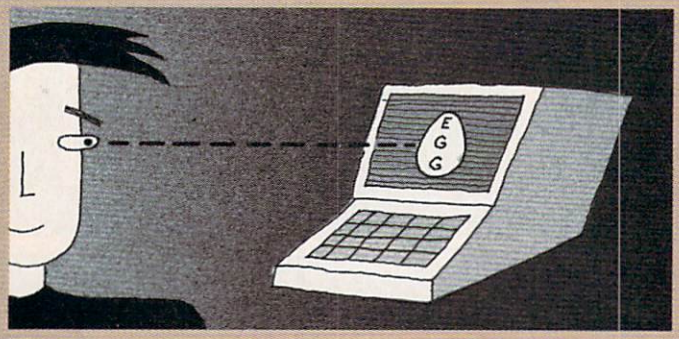
READER-WRITTEN PROGRAM
Page 108

Roll over, Beethoven! Now anyone can compose songs, and save them, too, with this program that turns your VIC-20 into a piano!

ILLUSTRATION BY JIM CHERRY III

EGG HUNT

BY JOEY LATIMER



Thanks to your computer, your child can be assured of the fun of an Easter *Egg Hunt*, regardless of the weather. All it takes is a little help from a parent:

Separately color seven hard-boiled eggs each of these colors: Blue, green, yellow, red, orange, white, and purple. Next, hide the eggs in the locations indicated in lines 1000–1060. (For example, the yellow egg should be hidden under the child's pillow.) Place a surprise, such as a chocolate egg, in the last location indicated in line 1070 (your bedroom). Then set your computer to all uppercase letters.

The program is now ready for your child to play. It will start with directions to look under the kitchen sink, where a blue egg should be found. Blue is the code word, which, when typed into the computer, will reveal the next location. (For younger children, you might wish to write the color with magic marker on the appropriately colored egg.)

It's easy to alter the program for various occasions (birthdays, rainy-day activities, etc.) by substituting different locations and code words in lines 1000–1070. When you make these changes, be sure to include the exact line number, the word DATA, the comma between location and code word, and the exact spacing, as in the original program.

Base Version (TRS-80 Model III)/*Egg Hunt*

```
220 CLS
230 PRINT "WELCOME TO THE EASTER"
240 PRINT "       EGG HUNT!"
250 PRINT
260 FOR R = 1 TO 8
270 READ PLACE$,CODE$
280 IF CODE$ = "END" THEN 570
290 PRINT "LOOK ..."
300 PRINT PLACE$
310 PRINT "FOR A COLORED"
320 PRINT "EASTER EGG."
330 PRINT
340 PRINT "TYPE THE COLOR OF"
350 PRINT "THE EGG, THEN"
360 PRINT "PRESS <ENTER>."
370 PRINT
380 PRINT "WHAT IS THE COLOR";
390 INPUT ANSWER$
400 IF ANSWER$ = CODE$ THEN 460
410 PRINT
420 PRINT "SORRY, WRONG COLOR!"
430 PRINT "PLEASE TRY AGAIN."
440 GOTO 380
450 CLS
460 FOR T = 1 TO 59
470 PRINT "COLOR ACCEPTED ";
480 NEXT T
490 PRINT
500 PRINT
510 PRINT "PRESS <ENTER>"
520 PRINT "TO CONTINUE."
530 R$ = INKEY$
540 IF R$ <> CHR$(13) THEN 530
550 CLS
560 NEXT R
570 PRINT "GREAT! YOU'VE"
580 PRINT "DONE IT!"
590 PRINT
600 PRINT "LOOK ..."
610 PRINT PLACE$
620 PRINT "TO FIND A SURPRISE!"
630 END
1000 DATA UNDER THE KITCHEN SINK,BLUE
1010 DATA IN THE REFRIGERATOR,GREEN
1020 DATA UNDER YOUR PILLOW,YELLOW
1030 DATA IN YOUR SOCKS DRAWER,RED
1040 DATA IN THE BATHROOM,ORANGE
1050 DATA IN YOUR CLOSET,WHITE
1060 DATA IN THE MAILBOX,PURPLE
1070 DATA IN YOUR PARENTS' ROOM,END
```

MODIFICATIONS FOR OTHER COMPUTERS

ADAM/*Egg Hunt*

Use the base version, with the following alterations: Change CLS to HOME in lines 220, 450, and 550. Change <ENTER> to <RETURN> in lines 360 and 510. Change 59 to 42 in line 460. Finally, change line 530 to read as follows:

```
530 GET R$
```

Apple/*Egg Hunt*

Use the ADAM version, except change 59 to 57 in line 460.

Atari/*Egg Hunt*

Use the base version, with the following alterations: Change CLS to PRINT CHR$(125) in lines 220, 450, and 550. Change <ENTER> to <RETURN> in lines 360 and 510. Change 59 to 16 in line 460. Add the following lines:

```
10 DIM PLACE$(30),CODE$(10),ANSWER$(10)
210 OPEN #1,4,0,"K:"
```

Finally, change lines 530 and 540 to read as follows:

```
530 GET #1,A
540 IF A<>155 THEN 530
```

Commodore 64/*Egg Hunt*

Use the base version, with the following alterations: Change CLS to PRINT CHR$(147) in lines 220, 450, and 550. Change <ENTER> to <RETURN> in lines 360 and 510. Change 59 to 60 in line 460. Finally, change line 530 to read as follows:

```
530 GET R$
```

IBM PC/*Egg Hunt*

Use the base version, except change 59 to 120 in line 460 and add line 200:

```
200 KEY OFF
```

IBM PC*jr*/*Egg Hunt*

Use the base version, except change 59 to 46 in line 460 and add line 200:

```
200 KEY OFF
```

TI-99/4A/*Egg Hunt*

Use the base version, with the following alterations: Change CLS to CALL CLEAR in lines 200, 450, and 550. Change 59 to 28 in line 460. Finally, change lines 470, 530, and 540 to read as follows:

```
470 PRINT "COLOR OK ";
530 CALL KEY(0,KEY,STATUS)
540 IF KEY<>13 THEN 530
```

ILLUSTRATIONS BY JOSHUA GOSFIELD

Timex Sinclair 1000 & 1500/*Egg Hunt*

Use the base version, with the following alterations: Omit lines 270 and 1000-1070. Change 64 to 15 in line 460. Add the following lines:

```
10 DIM P$(8,30)
20 DIM C$(8,10)
30 SLOW
40 LET P$(1) = "UNDER THE KITCHEN SINK"
50 LET C$(1) = "BLUE"
60 LET P$(2) = "IN THE REFRIGERATOR"
70 LET C$(2) = "GREEN"
80 LET P$(3) = "UNDER YOUR PILLOW"
90 LET C$(3) = "YELLOW"
100 LET P$(4) = "IN YOUR SOCKS DRAWER"
110 LET C$(4) = "RED"
120 LET P$(5) = "IN THE BATHROOM"
130 LET C$(5) = "ORANGE"
140 LET P$(6) = "IN YOUR CLOSET"
150 LET C$(6) = "WHITE"
160 LET P$(7) = "IN THE MAILBOX"
170 LET C$(7) = "PURPLE"
180 LET P$(8) = "IN YOUR PARENTS ROOM"
190 LET C$(8) = "END"
```

Finally, change lines 280, 300, 390, 400, 410, 530, 540, 570, 610, and 630 to read as follows:

```
280 IF C$(R,TO 3) = "END" THEN GOTO 570
300 PRINT P$(R)
390 INPUT A$
400 IF A$ = C$(R,TO LEN A$) THEN GOTO 460
410 CLS
530 LET R$ = INKEY$
540 IF R$ <> CHR$ 118 THEN GOTO 530
570 PRINT "GREAT. YOU HAVE"
610 PRINT P$(R)
630 STOP
```

Timex Sinclair 2068/*Egg Hunt*

Use the base version, with the following alterations: Replace PLACE$ by P$, CODE$ by C$, and ANSWER$ by A$ wherever they appear. Change 59 to 32 in line 460.

In lines 1000-1070, surround each data item by quotation marks. So, for example, you would change line 1000 to read

```
1000 DATA "UNDER THE KITCHEN SINK","BLUE"
```

Finally, change lines 280, 400, 530, 540, and 630 to read as follows:

```
280 IF C$(TO 3) = "END" THEN GOTO 570
400 IF A$ = C$ THEN GOTO 460
530 LET R$ = INKEY$
540 IF R$ <> CHR$(13) THEN GOTO 530
630 STOP
```

TRS-80 Color Computer/*Egg Hunt*

Use the base version, except change 59 to 32 in line 460.

TRS-80 Model 4/*Egg Hunt*

Use the base version, except change 59 to 120 in line 460.

VIC-20/*Egg Hunt*

Use the Commodore 64 version, except omit the semicolon at the end of line 380 and change 59 to 16, not 60, in line 460.

TOP SECRET

BY JOEY LATIMER

This program is so *Top Secret*, we can't say too much about it. We'd like to, understand, but it just isn't safe!

But, let us offer you a few bits of advice. Never, we repeat, *never*, reveal your code number to anyone! Don't run the program if anybody else is in the room. Since it's always better to be safe than sorry, shut the curtains before you begin! And shut the door, too, if you have a loud laugh!

ADAM/*Top Secret*

```
10 TEXT
30 HOME
40 PRINT "This is a top secret program!"
60 PRINT
70 PRINT "Press <RETURN> after"
80 PRINT "each reply."
90 PRINT
100 PRINT "What is your code name?";
110 INPUT n$
120 IF n$ = "" THEN 70
130 HOME
140 PRINT "Congratulations, "; n$; "!"
150 PRINT "your code has been accepted."
160 PRINT "Now, please type a four digit"
170 PRINT "code number, and"
180 PRINT "press <RETURN>."
200 INPUT "What is the number?"; n
220 IF n > 999 AND n < 10000 THEN 290
240 PRINT
250 PRINT "INVALID NUMBER! TRY AGAIN."
270 PRINT
280 GOTO 200
290 HOME
300 PRINT "Your name is: "; n$
310 PRINT
320 PRINT "Your number is: "; n
330 PRINT
340 PRINT "Is that right (Y/N)"
350 GET a$
370 IF a$ <> CHR$(89) AND a$ <> CHR$(121) THEN RUN
380 HOME
390 PRINT "O.K., ";n$;", press <c> to"
400 PRINT "begin a quick hardware check."
420 GET a$
430 IF a$ <> CHR$(67) AND a$ <> CHR$(99) THEN 420
440 HOME
450 FOR t = 1 TO (RND(1)*8)+5
460 PRINT "LOCATION #"; t; "= OK"
470 FOR d = 1 TO 600
480 NEXT d
490 NEXT t
500 PRINT "LOCATION #"; t; "= TROUBLE"
510 PRINT
520 PRINT "Press <RETURN> for help."
530 GET a$
```

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This is a complete word processor program which allows you to create and format professional looking documents. Features include: page numbering, margin control, full screen editing and footnotes. Tape — List $44.95. **Sale $34.95.** *Coupon $22.00. Disk — List $49.95. **Sale $39.00.** *Coupon $27.00.

TOTAL WORD PROCESSOR PLUS 5.2

This top quality word processor was specially designed for PROTECTO ENTERPRIZES. Features include line and paragraph insert and delete, right and left justification, multiple copies, and line spacing. Extra functions include mailmerge, embedded footnotes, extra user defined character sets, plus a complete label program. Tape: List $69.90. **Sale $49.00.** *Coupon Price $34.00. Disk: List $79.95. **Sale $59.00.** *Coupon Price $39.00.

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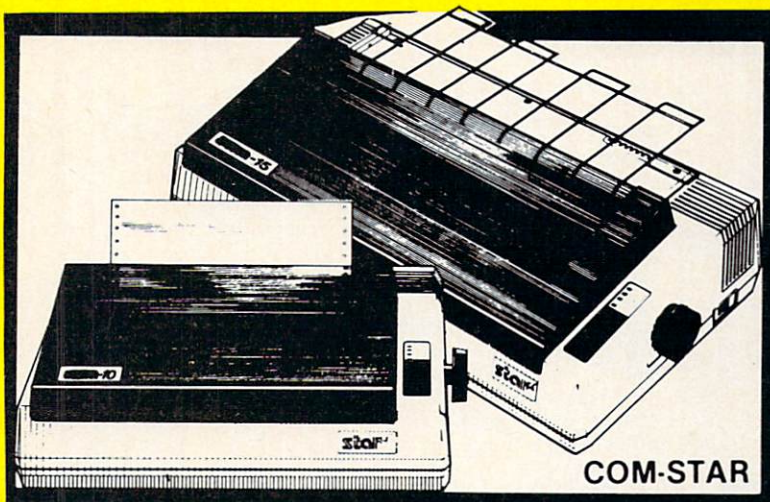

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```
540 IF a$ <> CHR$(13) THEN 430
550 HOME
560 PRINT n$; ", diagnostics show"
570 PRINT "that your computer has a"
580 FOR x = 1 TO 27
590 READ p
600 PRINT CHR$(p);
610 FOR d = 1 TO 400
620 NEXT d
630 NEXT x
640 PRINT
650 PRINT "Please wait 15 seconds for a"
660 PRINT "Complete diagnosis. TIME:"
690 FOR t = 15 TO 0 STEP -1
700 FOR d = 1 TO 600
710 NEXT d
720 VTAB 4
730 HTAB 27
760 PRINT t; "  "
770 NEXT t
780 GR
790 COLOR = 3
800 READ a,b,c
810 IF a = -1 THEN 840
820 HLIN a, b, AT c
830 GOTO 800
840 READ a, b, c,
850 IF a = -1 THEN 880
860 VLIN a, b, AT c
870 GOTO 840
880 GOTO 880
2000 DATA 83,69,86,69,82,69,32,73,78,84,69,82,78,65,76
2010 DATA 32,77,65,76,70,85,78,67,84,73,79,78
2020 DATA 4,9,3,4,9,9,11,15,3,11,15,9,17,21,3
2030 DATA 17,21,9,25,28,13,8,12,18,14,18,18,20,24,18
2040 DATA 26,30,29,8,12,23,14,18,29,20,24,29,-1,-1,-1
2050 DATA 3,13,4,3,13,9,3,13,11,3,9,15,3,13,17
2060 DATA 3,9,21,9,13,20,3,13,23,3,13,25,18,29,8
2070 DATA 18,29,14,18,29,18,18,29,20,18,29,24
2080 DATA 18,29,26,18,26,32,28,29,32,-1,-1,-1
```

Apple/*Top Secret*

```
10 TEXT
30 HOME
40 PRINT "THIS IS A TOP SECRET PROGRAM!"
60 PRINT
70 PRINT "PRESS <RETURN> AFTER EACH REPLY."
90 PRINT
100 PRINT "WHAT IS YOUR CODE NAME";
110 INPUT N$
120 IF N$ = "" THEN 100
130 HOME
140 PRINT "CONGRATULATIONS, ";N$;"!"
150 PRINT "YOUR CODE NAME IS ACCEPTED."
160 PRINT "NOW, PLEASE TYPE A FOUR DIGIT"
170 PRINT "CODE NUMBER, THEN PRESS <RETURN>."
190 PRINT
200 INPUT "WHAT IS THE NUMBER?";N
220 IF N > 999 AND N < 10000 THEN 290
240 PRINT
250 PRINT "INVALID NUMBER! TRY AGAIN."
270 PRINT
280 GOTO 200
290 HOME
300 PRINT "YOUR NAME IS: ";N$
310 PRINT
320 PRINT "YOUR NUMBER IS: ";N
330 PRINT
340 PRINT "IS THAT RIGHT? (Y/N)"
350 GET A$
370 IF A$ <> CHR$(89) THEN RUN
380 HOME
390 PRINT "O.K., ";N$;", PRESS <C> TO"
400 PRINT "BEGIN A QUICK HARDWARE CHECK."
420 GET A$
430 IF A$ <> CHR$(67) THEN 420
440 HOME
450 FOR T = 1 TO INT(RND(1) * 8) + 5
460 PRINT "LOCATION #";T;"= OK"
470 FOR D = 1 TO 600
480 NEXT D
490 NEXT T
500 PRINT "LOCATION #";T;"= TROUBLE"
510 PRINT
520 PRINT "PRESS <RETURN> FOR HELP."
530 GET A$
540 IF A$ <> CHR$(13) THEN 530
550 HOME
560 PRINT N$;", DIAGNOSTICS SHOW"
570 PRINT "THAT YOUR COMPUTER HAS A"
580 FOR X = 1 TO 27
590 READ P
600 PRINT CHR$(P);
610 FOR D = 1 TO 400
620 NEXT D
630 NEXT X
640 PRINT
650 PRINT "PLEASE WAIT 15 SECONDS FOR A"
660 PRINT "COMPLETE DIAGNOSIS. TIME:"
690 FOR T = 15 TO 0 STEP - 1
700 FOR D = 1 TO 600
710 NEXT D
720 VTAB 5
730 HTAB 27
760 PRINT T;" "
770 NEXT T
780 GR
790 COLOR= 3
800 READ A,B,C
810 IF A = - 1 THEN 840
820 HLIN A,B AT C
830 GOTO 800
840 READ A,B,C
850 IF A = - 1 THEN 880
860 VLIN A,B AT C
870 GOTO 840
880 GOTO 880
2000 DATA 83,69,86,69,82,69,32,73,78,84,69,82,78,65,76
2010 DATA 32,77,65,76,70,85,78,67,84,73,79,78,4,9,3,4
2020 DATA 9,9,11,15,3,11,15,9,17,21,3,17,21,9,25,28,13
2030 DATA 8,12,18,14,18,18,20,24,18,26,30,29,8,12,23
2040 DATA 14,18,29,20,24,29,-1,-1,-1,3,13,4,3,13,9,3
2050 DATA 13,11,3,9,15,3,13,17,3,9,21,9,13,20,3,13,23
2060 DATA 3,13,25,18,29,8,18,29,14,18,29,18,18,29,20
2070 DATA 18,29,24,18,29,26,18,26,32,29,29,32,-1,-1,-1
2080 DATA 19,10,14,21,10,14,27,5,18,30,5,-1,-1,-1
```

Atari/*Top Secret*

```
10 DIM P(29),N$(20),A$(5)
20 OPEN #1,4,0,"K:"
30 PRINT CHR$(125)
40 PRINT "THIS IS A TOP SECRET PROGRAM!"
60 PRINT
70 PRINT "PRESS <RETURN> AFTER EACH REPLY."
90 PRINT
100 PRINT "WHAT IS YOUR CODE NAME";
110 INPUT N$
120 IF N$="" THEN 100
130 PRINT CHR$(125)
140 PRINT "CONGRATULATIONS, ";N$;"!"
150 PRINT "YOUR CODE NAME IS ACCEPTED."
160 PRINT "NOW, TYPE IN A FOUR DIGIT"
170 PRINT "CODE NUMBER, THEN PRESS <RETURN>."
190 PRINT
200 PRINT "WHAT IS THE NUMBER";
210 INPUT N
220 IF N>999 AND N<10000 THEN 290
240 PRINT
250 PRINT "INVALID NUMBER! TRY AGAIN."
270 PRINT
```

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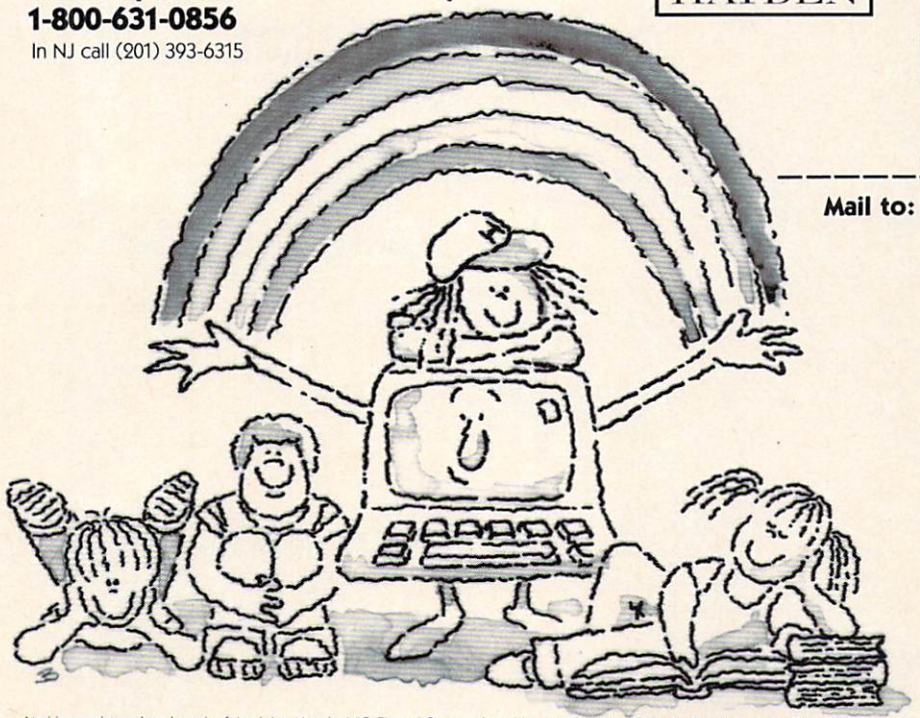

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```
280 GOTO 200
290 PRINT CHR$(125)
300 PRINT "YOUR NAME IS: ";N$
310 PRINT
320 PRINT "YOUR NUMBER IS: ";N
330 PRINT
340 PRINT "IS THAT RIGHT? (Y/N)"
350 GET #1,A
370 IF A<>89 THEN RUN
380 PRINT CHR$(125)
390 PRINT "O.K., ";N$;", PRESS <C> TO BEGIN"
400 PRINT "A QUICK HARDWARE CHECK.";
420 GET #1,A
430 IF A<>67 THEN 420
440 PRINT CHR$(125)
450 FOR T=1 TO INT(RND(1)*8)+5
460 PRINT "LOCATION #";T;"= O.K."
470 FOR D=1 TO 400
480 NEXT D
490 NEXT T
500 PRINT "LOCATION #";T;"= TROUBLE"
510 PRINT
520 PRINT "PRESS <RETURN> FOR HELP."
530 GET #1,A
540 IF A<>155 THEN 530
550 PRINT CHR$(125)
560 PRINT N$;", DIAGNOSTICS SHOW"
570 PRINT "THAT YOUR COMPUTER HAS A"
580 FOR X=1 TO 27
590 READ P
600 PRINT CHR$(P);
610 FOR D=1 TO 150
620 NEXT D
630 NEXT X
640 PRINT
650 PRINT "PLEASE WAIT 15 SECONDS FOR A"
660 PRINT "COMPLETE DIAGNOSIS. TIME:"
690 FOR T=15 TO 1 STEP -1
700 FOR D=1 TO 200
710 NEXT D
750 POSITION 33,5
760 PRINT T;" "
770 NEXT T
780 GRAPHICS 3+16
790 COLOR 2
800 READ A,B,C
810 IF A=-1 THEN 850
820 PLOT A,B
830 DRAWTO C,B
840 GOTO 800
850 READ A,B,C
860 IF A=-1 THEN 900
870 PLOT A,B
880 DRAWTO A,C
890 GOTO 850
900 GOTO 900
2000 DATA 83,69,86,69,82,69,32,73,78,84,69,82,78,65,76
2010 DATA 32,77,65,76,70,85,78,67,84,73,79,78
2020 DATA 3,1,8,10,1,15,17,1,22,24,1,30,3,5,8,10,5,15
2030 DATA 17,5,22,24,11,30,32,11,37,3,13,8,10,13,15,17
2040 DATA 13,22,32,13,37,3,17,7,32,17,37,10,22,15,17
2050 DATA 22,22,24,22,30,32,22,37,-1,-1,-1
2060 DATA 3,1,11,8,1,11,10,1,11,15,1,5,17,1,11,20,6,7
2070 DATA 21,8,9,22,1,5,22,10,11,27,1,11,32,1,11,3,13
2080 DATA 22,10,13,22,15,13,22,17,13,22,22,13,22
2090 DATA 24,13,22,32,13,17,37,17,22,-1,-1,-1
```

Commodore 64/*Top Secret*

```
30 PRINT CHR$(147)
40 PRINT "THIS IS A TOP SECRET PROGRAM!"
60 PRINT
70 PRINT "PRESS <RETURN> AFTER EACH REPLY."
90 PRINT
100 PRINT "WHAT IS YOUR CODE NAME";
110 INPUT N$
120 IF N$ = "" THEN 100
130 PRINT CHR$(147)
140 PRINT "CONGRATULATIONS, "N$"!"
150 PRINT "YOUR CODE NAME IS ACCEPTED."
160 PRINT "NOW, PLEASE TYPE A FOUR DIGIT"
170 PRINT "CODE NUMBER, THEN PRESS <RETURN>."
190 PRINT
200 INPUT "WHAT IS THE NUMBER";N
220 IF N>999 AND N<10000 THEN 290
240 PRINT
250 PRINT "INVALID NUMBER! TRY AGAIN."
270 PRINT
280 GOTO 200
290 PRINT CHR$(147)
300 PRINT "YOUR NAME IS: "N$
310 PRINT
320 PRINT "YOUR NUMBER IS: "N
330 PRINT
340 PRINT "IS THAT RIGHT? (Y/N)"
350 GET A$
360 IF A$ = "" THEN 350
370 IF A$ <> CHR$(89) THEN RUN
380 PRINT CHR$(147)
390 PRINT "O.K., "N$", PRESS <C> TO"
400 PRINT "BEGIN A QUICK HARDWARE CHECK."
420 GET A$
430 IF A$ <> CHR$(67) THEN 420
440 PRINT CHR$(147)
450 FOR T = 1 TO INT(RND(1)*8)+5
460 PRINT "LOCATION #"T"= O.K."
470 FOR D = 1 TO 600
480 NEXT D
490 NEXT T
500 PRINT "LOCATION #"T"=TROUBLE"
510 PRINT
520 PRINT "PRESS <RETURN> FOR HELP."
530 GET A$
540 IF A$ <> CHR$(13) THEN 530
550 PRINT CHR$(147)
560 PRINT N$", DIAGNOSTICS SHOW"
570 PRINT "THAT YOUR COMPUTER HAS A"
580 FOR X = 1 TO 27
590 READ P
600 PRINT CHR$(P);
610 FOR D = 1 TO 400
620 NEXT D
630 NEXT X
640 PRINT
650 PRINT "PLEASE WAIT 15 SECONDS"
660 PRINT "FOR A COMPLETE DIAGNOSIS. TIME:"
690 FOR T = 15 TO 1 STEP -1
700 FOR D = 1 TO 600
710 NEXT D
720 PRINT CHR$(19)
730 FOR X = 1 TO 4
740 PRINT
750 NEXT X
760 PRINT TAB(34);CHR$(20);CHR$(20);CHR$(20);T
770 NEXT T
780 PRINT CHR$(147)
790 READ A,B
800 IF A = -1 THEN 860
810 FOR Z = A TO B
820 POKE Z,160
830 POKE Z+54272,4
840 NEXT Z
850 GOTO 790
860 READ A,B
870 IF A = -1 THEN 930
880 FOR Z = A TO B STEP 40
890 POKE Z,160
900 POKE Z+54272,4
910 NEXT Z
920 GOTO 860
930 GOTO 930
2000 DATA 83,69,86,69,82,69,32,73,78,84,69,82,78,65
2010 DATA 76,32,77,65,76,70,85,78,67,84,73,79,78
2020 DATA 1067,1072,1074,1079,1081,1086,1088,1094
```

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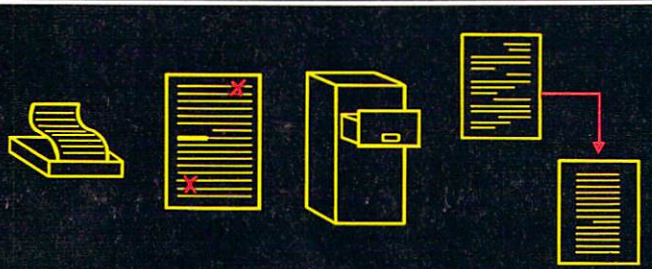

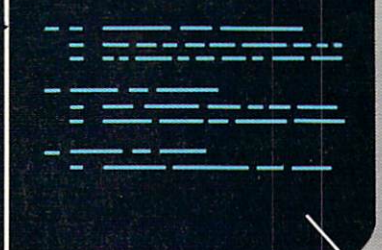

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```
2030 DATA 1227,1232,1234,1239,1241,1246,1488,1494
2040 DATA 1496,1501,1547,1552,1554,1559,1561,1566
2050 DATA 1576,1581,1707,1711,1736,1741,1954,1959
2060 DATA 1961,1966,1968,1974,1976,1981,-1,-1
2070 DATA 1067,1467,1547,1947,1072,1472,1074,1474
2080 DATA 1554,1954,1079,1239,1559,1959,1081,1481
2090 DATA 1561,1961,1284,1324,1365,1405,1086,1246
2100 DATA 1446,1486,1566,1926,1568,1968,1131,1451
2110 DATA 1096,1496,1576,1736,1741,1981,-1,-1
```

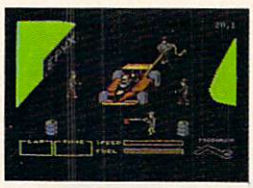
IBM PC with advanced BASIC and PC*jr* with cassette BASIC/*Top Secret*

```
30 CLS
40 PRINT "THIS IS A TOP SECRET PROGRAM!"
60 PRINT
70 PRINT "PRESS <ENTER> AFTER EACH REPLY."
90 PRINT
100 PRINT "WHAT IS YOUR CODE NAME";
110 INPUT N$
120 IF N$ = "" THEN 100
130 CLS
140 PRINT "CONGRATULATIONS, ";N$;"!"
150 PRINT "YOUR CODE NAME HAS BEEN ACCEPTED."
160 PRINT "NOW, PLEASE TYPE IN A FOUR DIGIT"
170 PRINT "CODE NUMBER, THEN PRESS <ENTER>."
190 PRINT
200 INPUT "WHAT IS THE NUMBER";N
220 IF N > 999 AND N < 10000 THEN 290
240 PRINT
250 PRINT "INVALID NUMBER! TRY AGAIN."
270 PRINT
280 GOTO 200
290 CLS
300 PRINT "YOUR NAME IS: ";N$
310 PRINT
320 PRINT "YOUR NUMBER IS: ";N
330 PRINT
340 PRINT "IS THAT RIGHT? (Y/N)"
350 A$ = INKEY$
360 IF A$ = "" THEN 350
370 IF A$ <> CHR$(89) AND A$ <> CHR$(121) THEN RUN
380 CLS
390 PRINT "O.K., ";N$;", PRESS <C> TO"
400 PRINT "BEGIN A QUICK HARDWARE CHECK."
420 A$ = INKEY$
430 IF A$ <> CHR$(67) AND A$ <> CHR$(99) THEN 420
440 CLS
450 FOR T=1 TO RND(8)+5
460 PRINT "LOCATION#";T;"= OK"
470 FOR D = 1 TO 600
480 NEXT D
490 NEXT T
500 PRINT "LOCATION#";T;"= TROUBLE"
510 PRINT
520 PRINT "PRESS <ENTER> FOR HELP."
530 A$ = INKEY$
540 IF A$ <> CHR$(13) THEN 530
550 CLS
560 PRINT N$;", DIAGNOSTICS SHOW"
570 PRINT "THAT YOUR COMPUTER HAS A"
580 FOR X = 1 TO 27
590 READ P
600 PRINT CHR$(P);
610 FOR D = 1 TO 400
620 NEXT D
630 NEXT X
640 PRINT
650 PRINT "PLEASE WAIT 15 SECONDS FOR A"
660 PRINT "COMPLETE DIAGNOSIS. TIME:"
690 FOR T = 15 TO 0 STEP -1
700 FOR D = 1 TO 400
710 NEXT D
750 LOCATE 5,27
760 PRINT T;"  "
770 NEXT T
780 SCREEN 1,0
790 CLS
800 COLOR 3,0
810 RESTORE 2020
820 READ X1,Y1
830 PSET (X1,Y1),2
840 READ X2,Y2
850 IF Y2 = -1 THEN 820 ELSE IF Y2 = -2 THEN 880
860 LINE - (X2,Y2),2
870 GOTO 840
880 CIRCLE (280,184),8,2
890 PAINT (319,199),1,2
900 RESTORE 2210
910 FOR I = 1 TO 12
920 READ PX,PY
930 PAINT (PX,PY),3,2
940 NEXT I
950 FOR I = 1 TO 5
960 READ LX1,LY1,LX2,LY2
970 LINE (LX1,LY1) - (LX2,LY2),1,BF
980 NEXT I
990 CIRCLE (280,56),48,3,,,8/5
1000 PAINT (280,56),0,3
1010 LINE (250,56) - (310,64),2,BF
1020 GOTO 1020
2000 DATA 83,69,86,69,82,69,32,73,78,84,69,82,78,65
2010 DATA 76,32,77,65,76,70,85,78,67,84,73,79,78
2020 DATA 40,8,16,8,8,24,8,88,24,88,24,56,32,56,32,88
2030 DATA 48,88,48,24,40,8,-1,-1,88,8,56,8,56,88,72,88
2040 DATA 72,56,88,56,96,40,96,24,88,8,-1,-1,136,8,104
2050 DATA 8,104,88,120,88,120,56,128,72,128,88,144,88
2060 DATA 144,72,136,56,144,40,144,24,136,8,-1,-1,184
2070 DATA 8,152,8,152,24,160,24,160,72,152,72,152,88
2080 DATA 184,88,184,72,176,72,176,24,184,24,184,8,-1
2090 DATA -1,208,8,192,8,192,88,232,88,232,72,208,72
2100 DATA 208,8,-1,-1,48,112,8,112,8,192,24,192,24,160
2110 DATA 48,160,48,144,24,144,24,128,48,128,48,112,-1
2120 DATA -1,88,112,64,112,56,128,56,176,64,192,88,192
2130 DATA 96,176,96,128,88,112,-1,-1,136,112,112,112
2140 DATA 104,128,104,176,112,192,136,192,144,176,144
2150 DATA 128,136,112,-1,-1,168,112,152,112,152
2160 DATA 192,192,192,192,176,168,176,168,112,-1,-1
2170 DATA 240,136,224,136,240,160,240,176,232,192,208
2180 DATA 192,200,176,200,168,216,168,200,144,200,128
2190 DATA 208,112,232,112,240,128,240,136,-1,-1,296
2200 DATA 112,264,112,272,168,288,168,296,112,-1,-2
2210 DATA 39,9,87,9,135,9,183,9,207,9,47,113,87,113,135
2220 DATA 113,167,113,231,113,295,113,280,184,24,24,32
2230 DATA 40,72,24,80,40,120,24,128,40,72,136,80,168
2240 DATA 120,136,128,168
```

TI-99/4A/*Top Secret*

```
10 RANDOMIZE
30 CALL CLEAR
40 PRINT "THIS IS A"
50 PRINT "TOP SECRET PROGRAM!"
60 PRINT
70 PRINT "PRESS <ENTER> AFTER"
80 PRINT "EACH REPLY."
90 PRINT
100 PRINT "WHAT IS YOUR CODE NAME?"
110 INPUT N$
120 IF N$="" THEN 100
130 CALL CLEAR
140 PRINT "ALRIGHT, ";N$;","
150 PRINT "YOUR CODE NAME IS ACCEPTED."
160 PRINT "NOW, TYPE A FOUR DIGIT CODE"
170 PRINT "NUMBER, THEN PRESS <ENTER>."
190 PRINT
200 INPUT "WHAT IS THE NUMBER?":N
220 IF N>999 THEN 230 ELSE 240
230 IF N<10000 THEN 290
240 PRINT
250 PRINT "INVALID NUMBER! TRY AGAIN."
270 PRINT
280 GOTO 200
```

PITSTOP.™
WHERE WINNING IS THE PITS.



You'll never make Grand Prix champion just driving in circles.

You've got to stop sometime. The question is when. Right now you're in the lead. But the faster you go, the more gas you consume. And the quicker your tires wear down.

If you do pull into the pits, though, you lose precious seconds. So it's up to you to make sure the pit crew is quick with those tires. And careful with that gas. Otherwise, poof! you're out of the race.

See your retailer for available computer formats.

So what'll it be, Mario? Think your tires will hold up for another lap? Or should you play it safe and go get some new ones?

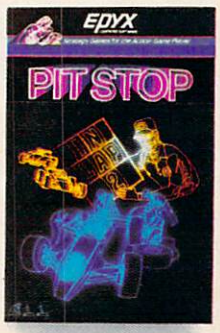
Think it over. Because Pitstop™ is the one and only road race game where winning is more than just driving. It's the pits.

Goggles not included.

One or two players; 6 racecourses, joystick control.

EPYX COMPUTER SOFTWARE

STRATEGY GAMES FOR THE ACTION-GAME PLAYER.



```
290 CALL CLEAR
300 PRINT "YOUR NAME IS: ";N$
310 PRINT
320 PRINT "YOUR NUMBER IS: ";N
330 PRINT
340 PRINT "IS THAT RIGHT? (Y/N)"
350 CALL KEY(0,A,ST)
360 IF ST=0 THEN 350
370 IF A<>89 THEN 30
380 CALL CLEAR
390 PRINT "O.K., ";N$;", PRESS <C> TO"
400 PRINT "BEGIN A QUICK"
410 PRINT "HARDWARE CHECK."
420 CALL KEY(0,A,ST)
430 IF A<>67 THEN 420
440 CALL CLEAR
450 FOR T=1 TO INT(8*RND)+5
460 PRINT "LOCATION#";T;"= O.K."
470 FOR D=1 TO 300
480 NEXT D
490 NEXT T
500 PRINT "LOCATION#";T;"= TROUBLE"
510 PRINT
520 PRINT "PRESS <ENTER> FOR HELP"
530 CALL KEY(0,KEY,STATUS)
540 IF KEY<>13 THEN 530
550 CALL CLEAR
560 PRINT N$;", DIAGNOSTICS SHOW"
570 PRINT "THAT YOUR COMPUTER HAS A"
580 FOR X=1 TO 27
590 READ P
600 PRINT CHR$(P);
610 FOR D=1 TO 200
620 NEXT D
630 NEXT X
640 PRINT
650 PRINT "PLEASE WAIT 15 SECONDS FOR A"
660 PRINT "COMPLETE DIAGNOSIS."
690 FOR D=1 TO 700
700 NEXT D
710 CALL CLEAR
720 FOR T=15 TO 1 STEP -1
730 PRINT "TIME:";T
740 FOR D=1 TO 200
750 NEXT D
760 CALL CLEAR
770 NEXT T
780 CALL CLEAR
790 CALL SCREEN(10)
800 REM  **BE SURE YOUR ALPHA LOCK KEY IS DEPRESSED!**
810 A$="FFFFFFFFFFFFFFFF"
820 CALL CHAR(128,A$)
830 READ A,B,R
840 IF A=-1 THEN 870
850 CALL HCHAR(A,B,128,R)
860 GOTO 830
870 READ A,B,R
880 IF A=-1 THEN 910
890 CALL VCHAR(A,B,128,R)
900 GOTO 870
910 GOTO 910
2000 DATA 83,69,86,69,82,69,32,73,78,84,69,82,78,65,76
2010 DATA 32,77,65,76,70,85,78,67,84,73,79,78,2,3,5,2
2020 DATA 9,5,2,15,5,2,21,5,6,3,5,6,9,5,6,15,5,8,16,1
2030 DATA 9,17,1,10,18,1,11,19,1,11,21,5,11,27,4,14,3
2040 DATA 5,14,9,5,14,15,5,14,27,4,18,3,4,18,27,4,23,9
2050 DATA 5,23,15,5,23,21,5,23,27,4,-1,-1,-1,2,3,10,2
2060 DATA 7,10,2,9,10,2,13,5,2,15,10,2,19,5,2,23,10,2
2070 DATA 27,10,14,3,10,14,9,10,14,13,10,14,15,10,14
2080 DATA 19,10,14,21,10,14,27,5,18,30,5,-1,-1,-1
```

TRS-80 Color Computer/*Top Secret*

```
30 CLS
40 PRINT "THIS IS A TOP SECRET PROGRAM!"
60 PRINT
70 PRINT "PRESS <ENTER> AFTER EACH REPLY."
90 PRINT
100 PRINT "WHAT IS YOUR CODE NAME";
110 INPUT N$
120 IF N$ = "" THEN 100
130 CLS
140 PRINT "CONGRATULATIONS, "N$"!"
150 PRINT "YOUR CODE NAME IS ACCEPTED."
160 PRINT "NOW, PLEASE TYPE A FOUR DIGIT"
170 PRINT "CODE NUMBER, THEN PRESS <ENTER>."
190 PRINT
200 INPUT "WHAT IS THE NUMBER";N
220 IF N>999 AND N<10000 THEN 290
240 PRINT
250 PRINT "INVALID NUMBER! TRY AGAIN."
270 PRINT
280 GOTO 200
290 CLS
300 PRINT "YOUR NAME IS: "N$
310 PRINT
320 PRINT "YOUR NUMBER IS: "N
330 PRINT
340 PRINT "IS THAT RIGHT? (Y/N)"
350 A$ = INKEY$
360 IF A$ = "" THEN 350
370 IF A$ = "N" THEN RUN
380 CLS
390 PRINT "O.K., "N$", PRESS <C> TO"
400 PRINT "BEGIN A QUICK HARDWARE CHECK."
420 A$ = INKEY$
430 IF A$<> CHR$(67) THEN 420
440 CLS
450 FOR T=1 TO RND(8)+5
460 PRINT "LOCATION #"T"= OK"
470 FOR D = 1 TO 600
480 NEXT D
490 NEXT T
500 PRINT "LOCATION #"T"= TROUBLE"
510 PRINT
520 PRINT "PRESS <ENTER> FOR HELP."
530 A$ = INKEY$
540 IF A$ <> CHR$(13) THEN 530
550 CLS
560 PRINT N$", DIAGNOSTICS SHOW"
570 PRINT "THAT YOUR COMPUTER HAS A"
580 FOR X = 1 TO 27
590 READ P
600 PRINT CHR$(P);
610 FOR D = 1 TO 400
620 NEXT D
630 NEXT X
640 PRINT
650 PRINT "PLEASE WAIT 15 SECONDS FOR A"
660 PRINT "COMPLETE DIAGNOSIS. TIME:"
690 FOR T = 15 TO 0 STEP -1
700 FOR D = 1 TO 400
710 NEXT D
760 PRINT@153,T
770 NEXT T
780 CLS(7)
790 READ A,B
800 IF A = -1 THEN 850
810 FOR Z = A TO B
820 PRINT@Z,CHR$(191);
830 NEXT Z
840 GOTO 790
850 READ A,B
860 IF A = -1 THEN 910
870 FOR Z = A TO B STEP 32
880 PRINT@Z,CHR$(255);
890 NEXT Z
900 GOTO 850
910 GOTO 910
2000 DATA 83,69,86,69,82,69,32,73,78,84,69,82,78
2010 DATA 65,76,32,77,65,76,70,85,78,67,84,73,79
2020 DATA 78,1,5,7,11,13,17,19,23,98,101,104,106
2030 DATA 109,113,143,143,176,176,209,209,211,215
2040 DATA 217,221,257,261,263,267,269,273,281,285
```

GIVE YOUR KIDS A LESSON THEY'LL NEVER FORGET.

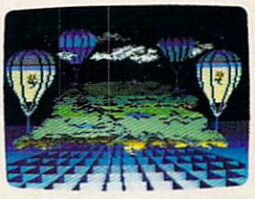
When kids have fun and learn at the same time, they're more likely to remember more of what they've learned. What's more, when they associate the two together — learning becomes an enjoyable activity. So they'll do more of it.

That's the basic principle behind the Learning Fun Series from EPYX.

FUN WITH MUSIC. PARENTS TAKE NOTE.

Fun with Music™ is designed to appeal to both you and your children. It comes with a songbook and has two modes of play. In the first mode, you can enter songs from the songbook — or compose your own. Then play the songs back, adding or removing notes and changing tempo or key. Your computer is like a musical instrument with memory, and you see every note of it displayed on your screen.

The second mode lets you play your song in a fun-filled action game. You control a drum major trying to touch the notes before a small but pesky poodle catches up to him and slows down the parade.



Either way, Fun with Music gives you and your whole family the perfect mix of learning and play.

FUN WITH ART. JUST PICTURE IT.

Creating art on the video screen is one of the newest forms of "high-tech" play for kids. And adults, for that matter. Plus there's nothing to clean up afterwards.

Fun with Art™ uses the computer and joystick to transform your TV screen into an artist's canvas with astonishing results. 128 colors, numerous brush strokes, all kinds of geometric shapes, and special fill-in and magnifying options are some of the 24 different modes and features available to create works of art never before possible.

Fun with Art brings out the artist in you, no matter what your age!

MORE LEARNING FUN ON THE WAY.

These two are the first of an extensive series of Learning Fun games we have planned. Look for these, as well as other EPYX titles, wherever computer software is sold.

EPYX™ COMPUTER SOFTWARE

LEARNING FUN SERIES.

```
2050 DATA 353,356,377,381,487,491,493,497,499
2060 DATA 503,505,509,-1,-1,33,193,37,197,39
2070 DATA 199,43,107,45,205,49,113,53,181,25
2080 DATA 185,289,481,295,455,299,459,301,461
2090 DATA 305,465,275,467,313,345,413,477,-1,-1
```

TRS-80 Model III/*Top Secret*

```
40 PRINT "THIS IS A TOP SECRET PROGRAM!"
60 PRINT
70 PRINT "PRESS <ENTER> AFTER EACH REPLY."
90 PRINT
100 PRINT "WHAT IS YOUR CODE NAME";
110 INPUT N$
120 IF N$ = "" THEN 100
130 CLS
140 PRINT "CONGRATULATIONS, "N$"!"
150 PRINT "YOUR CODE NAME IS ACCEPTED."
160 PRINT "NOW, PLEASE TYPE A FOUR DIGIT"
170 PRINT "CODE NUMBER, THEN PRESS <ENTER>."
190 PRINT
200 INPUT "WHAT IS THE NUMBER";N
220 IF N > 999 AND N < 10000 THEN 290
240 PRINT
250 PRINT "INVALID NUMBER! TRY AGAIN."
270 PRINT
280 GOTO 190
290 CLS
300 PRINT "YOUR NAME IS: "N$
310 PRINT
320 PRINT "YOUR NUMBER IS: "N
330 PRINT
340 PRINT "IS THAT RIGHT? (Y/N)"
350 A$ = INKEY$
360 IF A$ = "" THEN 350
370 IF A$ <> CHR$(89) AND A$ <> CHR$(121) THEN RUN
380 CLS
390 PRINT "O.K., "N$", PRESS <C> TO"
400 PRINT "BEGIN A QUICK HARDWARE CHECK."
420 A$ = INKEY$
430 IF A$ <> CHR$(67) AND A$ <> CHR$(99) THEN 420
440 CLS
450 FOR T = 1 TO RND(8)+5
460 PRINT "LOCATION#"T"= O.K."
470 FOR D = 1 TO 600
480 NEXT D
490 NEXT T
500 PRINT "LOCATION#"T"= TROUBLE"
510 PRINT
520 PRINT "PRESS <ENTER> FOR HELP."
530 A$ = INKEY$
540 IF A$ <> CHR$(13) THEN 530
550 CLS
560 PRINT N$", DIAGNOSTICS SHOW"
570 PRINT "THAT YOUR COMPUTER HAS A"
580 FOR X = 1 TO 27
590 READ P
600 PRINT CHR$(P);
610 FOR D = 1 TO 200
620 NEXT D
630 NEXT X
640 PRINT
650 PRINT "PLEASE WAIT 15 SECONDS FOR A"
660 PRINT "COMPLETE DIAGNOSIS.  TIME:"
690 FOR T = 15 TO 0 STEP -1
700 FOR D = 1 TO 400
710 NEXT D
760 PRINT @282,T
770 NEXT T
780 CLS
790 READ A,B
800 IF A = -1 THEN 850
810 FOR Z = A TO B
820 PRINT @Z,CHR$(191);
830 NEXT Z
840 GOTO 790
850 READ A,B
860 IF A = -1 THEN 910
870 FOR Z = A TO B STEP 64
880 PRINT @Z,CHR$(191);
890 NEXT Z
900 GOTO 850
910 GOTO 910
2000 DATA 83,69,86,69,82,69,32,73,78,84,69,82,78,65,76
2010 DATA 32,77,65,76,70,85,78,67,84,73,79,78
2020 DATA 69,78,80,89,91,100,102,112,197,206,208,217
2030 DATA 219,228,290,290,355,355,420,420,422,432,434
2040 DATA 443,581,590,592,601,603,612,626,635,709,714
2050 DATA 754,763,912,921,923,932,934,944,946,955,-1
2060 DATA -1,69,389,78,398,80,400,153,153,91,411
2070 DATA 164,164,171,363,114,370,645,901,592,848
2080 DATA 665,857,667,859,676,868,614,870
2090 DATA 690,690,827,891,-1,-1
```

TRS-80 Model 4/*Top Secret*

```
30 CLS
40 PRINT "THIS IS A TOP SECRET PROGRAM!"
60 PRINT
70 PRINT "PRESS <ENTER> AFTER EACH REPLY."
90 PRINT
100 PRINT "WHAT IS YOUR CODE NAME";
110 INPUT N$
120 IF N$ = "" THEN 100
130 CLS
140 PRINT "CONGRATULATIONS, "N$"!"
150 PRINT "YOUR CODE NAME IS ACCEPTED."
160 PRINT "NOW, PLEASE TYPE A FOUR DIGIT"
170 PRINT "CODE NUMBER, THEN PRESS <ENTER>."
190 PRINT
200 INPUT "WHAT IS THE NUMBER";N
220 IF N > 999 AND N < 10000 THEN 290
240 PRINT
250 PRINT "INVALID NUMBER! TRY AGAIN."
270 PRINT
280 GOTO 190
290 CLS
300 PRINT "YOUR NAME IS: "N$
310 PRINT
320 PRINT "YOUR NUMBER IS: "N
330 PRINT
340 PRINT "IS THAT RIGHT? (Y/N)"
350 A$ = INKEY$
360 IF A$ = "" THEN 350
370 IF A$ <> CHR$(89) AND A$ <> CHR$(121) THEN RUN
380 CLS
390 PRINT "O.K., "N$", PRESS <C> TO"
400 PRINT "BEGIN A QUICK HARDWARE CHECK."
420 A$ = INKEY$
430 IF A$ <> CHR$(67) AND A$ <> CHR$(99) THEN 420
440 CLS
450 FOR T = 1 TO RND(8)+5
460 PRINT "LOCATION#"T"= O.K."
470 FOR D = 1 TO 600
480 NEXT D
490 NEXT T
500 PRINT "LOCATION#"T"= TROUBLE"
510 PRINT
520 PRINT "PRESS <ENTER> FOR HELP."
530 A$ = INKEY$
540 IF A$ <> CHR$(13) THEN 530
550 CLS
560 PRINT N$", DIAGNOSTICS SHOW"
570 PRINT "THAT YOUR COMPUTER HAS A"
580 FOR X = 1 TO 27
590 READ P
600 PRINT CHR$(P);
610 FOR D = 1 TO 200
620 NEXT D
630 NEXT X
640 PRINT
650 PRINT "PLEASE WAIT 15 SECONDS"
```

```
660 PRINT "FOR A COMPLETE DIAGNOSIS.   TIME:"
690 FOR T = 15 TO 0 STEP -1
700 FOR D = 1 TO 400
710 NEXT D
760 PRINT @358,T
770 NEXT T
780 CLS
790 READ A,B
800 IF A = -1 THEN 850
810 FOR Z = A TO B
820 PRINT @Z,CHR$(191);
830 NEXT Z
840 GOTO 790
850 READ A,B
860 IF A = -1 THEN 910
870 FOR Z = A TO B STEP 80
880 PRINT @Z,CHR$(191);
890 NEXT Z
900 GOTO 850
910 GOTO 910
2000 DATA 83,69,86,69,82,69,32,73,78,84,69,82,78,65
2010 DATA 76,32,77,65,76,70,85,78,67,84,73,79,78
2020 DATA 91,98,101,105,108,113,411,418,421,425
2030 DATA 428,433,761,766,917,923,926,931,934,939
2040 DATA 1236,1241,1566,1571,1574,1579,1582,1587
2050 DATA 1590,1590,-1,-1,91,731,98,738,101,741
2060 DATA 106,426,108,748,113,433,432,752,117,757
2070 DATA 121,761,916,1556,925,1565,931,1571,933,1573
2080 DATA 939,1579,941,1581,950,1430,-1,-1
2090 DATA 828,828,992,1069,-1,-1
```

VIC-20/*Top Secret*

```
30 PRINT CHR$(147)
40 PRINT "THIS IS A"
50 PRINT "TOP SECRET PROGRAM!"
60 PRINT
70 PRINT "PRESS <RETURN> AFTER"
80 PRINT "EACH REPLY."
90 PRINT
100 PRINT "WHAT'S YOUR CODE NAME?"
110 INPUT N$
120 IF N$ = "" THEN 100
130 PRINT CHR$(147)
140 PRINT "ALRIGHT, ";N$;" YOUR"
150 PRINT "CODE NAME IS ACCEPTED."
160 PRINT "TYPE A FOUR DIGIT"
170 PRINT "CODE NUMBER, THEN"
180 PRINT "PRESS <RETURN>."
190 PRINT
200 PRINT "WHAT IS THE NUMBER?"
210 INPUT N
220 IF N>999 AND N<10000 THEN 290
240 PRINT
250 PRINT "INVALID NUMBER!"
260 PRINT "TRY AGAIN."
270 PRINT
280 GOTO 200
290 PRINT CHR$(147)
300 PRINT "YOUR NAME IS: "N$
310 PRINT
320 PRINT "YOUR NUMBER IS: "N
330 PRINT
340 PRINT "IS THAT RIGHT? (Y/N)"
350 GET A$
360 IF A$ = "" THEN 350
370 IF A$ <> CHR$(89) THEN RUN
380 PRINT CHR$(147)
390 PRINT N$", PRESS <C>"
400 PRINT "TO BEGIN A QUICK"
410 PRINT "HARDWARE CHECK."
420 GET A$
430 IF A$ <> CHR$(67) THEN 420
440 PRINT CHR$(147)
450 FOR T = 1 TO INT(RND(1)*8)+5
460 PRINT "LOCATION#"T"= O.K."
470 FOR D = 1 TO 600
480 NEXT D
490 NEXT T
500 PRINT "LOCATION#"T"= TROUBLE"
510 PRINT
520 PRINT "PUSH <RETURN> FOR HELP"
530 GET A$
540 IF A$ <> CHR$(13) THEN 530
550 PRINT CHR$(147)
560 PRINT N$", TESTS SHOW"
570 PRINT "THAT YOUR UNIT HAS A"
580 FOR X = 1 TO 27
590 READ P
600 PRINT CHR$(P);
610 FOR D=1 TO 400
620 NEXT D
630 NEXT X
640 PRINT
650 PRINT "WAIT 15 SECONDS FOR"
660 PRINT "A COMPLETE RUNDOWN."
670 PRINT
680 PRINT "TIME:"
690 FOR T = 15 TO 1 STEP -1
700 FOR D = 1 TO 800
710 NEXT D
720 PRINT CHR$(19)
730 FOR X = 1 TO 7
740 PRINT
750 NEXT X
760 PRINT TAB(8);CHR$(20);CHR$(20);CHR$(20);T
770 NEXT T
780 PRINT CHR$(147)
790 READ A,B
800 IF A = -1 THEN 860
810 FOR Z = A TO B
820 POKE Z,160
830 POKE Z+30720,4
840 NEXT Z
850 GOTO 790
860 READ A,B
870 IF A = -1 THEN 930
880 FOR Z = A TO B STEP 22
890 POKE Z,160
900 POKE Z+30720,4
910 NEXT Z
920 GOTO 860
930 GOTO 930
2000 DATA 83,69,86,69,82,69,32,73,78,84,69,82,78,65
2010 DATA 76,13,77,65,76,70,85,78,67,84,73,79,78,7703
2020 DATA 7705,7707,7709,7711,7713,7715,7717,7791,7793
2030 DATA 7795,7797,7799,7801,7822,7822,7891,7893,7895
2040 DATA 7897,7923,7925,7927,7929,7931,7933,7939,7941
2050 DATA 8011,8013,8027,8029,8147,8149,8151,8153,8155
2060 DATA 8157,8159,8161,-1,-1,7703,7879,7923,8143
2070 DATA 7705,7891,7707,7883,7927,8147,7709,7797,7929
2080 DATA 8149,7711,7887,7931,8151,7713,7801,7845,7889
2090 DATA 7933,8153,7716,7892,7935,8155,7719,7895,7939
2100 DATA 8027,8029,8161,-1,-1
```

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LOST IN SPACE

PUZZLE BY PETER FAVARO
PROGRAM BY JOE GELMAN

It is the year 2050 and space-shuttle travel has become quite commonplace on earth. Shuttle tickets can be purchased at most airport terminals for a moderate fee ($25,000 for a two-way excursion; $18,750 off-peak rates).

Northern Shuttle Carrier, Inc., has just begun its "Explorers Specials," featuring daylong charters to exotic moons and asteroids that have been scouted for safety but are otherwise unexplored and sometimes unpredictable.

Feeling the urge to get away, one day you purchase a ticket for Dormir, a space colony on the coldest side of Jupiter's second moon. An hour later, you find yourself aboard Northern's *Super Shuttle*, enjoying one of their in-flight holographs while whizzing along comfortably at about the speed of light. Your attention wanders from the orientation talks. "They're all the same anyway," you mutter to yourself: " 'Be careful not to separate from the group'; 'Be patient with irritable inhabitants'; 'Stay away from unfamiliar craters and rock formations.' "

Upon arrival, you immediately sense a burning dryness in your throat—stimulated, no doubt, by Dormir's temperature-controlled dome and your poorly adjusted new space suit. Your first order of business is to quench your thirst, and the sight of a refreshment stand off in the distance causes you to breathe an anticipatory sigh of relief.

Unfortunately, as was well explained during orientation, liquid intake upon arrival on Dormir causes drowsiness in humans due to metabolic and environmental factors. Drowsiness is putting it mildly! It isn't until seven and a half hours later that you open your eyes to the prodding of a snickering Dormirian, at which point several things become painfully evident.

First, you have been separated from the group and have no idea which crater your shuttle is docked on. Second, you notice that every crater, although clearly marked, consists of the same five letters but arranged in a different order. And third, all the Dormirians know where your crater is docked, but because of a ruling by their King Proto—a creature with a bizarre sense of humor—they can tell you only one letter in the name of the crater that you seek. "What good is that?" you wonder. You need to discover the key that will unravel the puzzle of the letter sequence.

DIRECTIONS

Set your computer to all uppercase letters before playing *Proto and the Dormirians*. When you run the program, you will be greeted by King Proto. To reach his subjects, type "N" (north), "S" (south), "W" (west), or "E" (east), using the illustration as a guide. You must speak to a minimum of three subjects before attempting to guess. But look at King Proto and his subjects carefully and think before you guess, because you can guess only once, since takeoff is in four minutes.

If you can't guess before the shuttle takes off or if you guess incorrectly, you will be stranded on this ridiculous rock for an entire week until the next shuttle arrives, when you'll have to guess from scratch again, since the shuttle docking location changes each week. However, you can get an additional clue after guessing incorrectly by typing "H" for help, to ensure that you will solve the puzzle in time for next week's takeoff.

The solution will appear in next month's issue.

PETER FAVARO, *Ph.D., is an educational and recreational video game design consultant and the author of several commercial software programs. He plans to "be doing all my space exploring in a homemade shuttle craft" by the year 2050.*

JOE GELMAN *plans to "be on the first ship out to Dormir" that year, but in the meantime is keeping busy as a freelance programmer. He is one of the founders of BASIC, an Atari users' group based in Brooklyn, New York.*

IBM PC*jr* w/Cartridge BASIC/*Proto and the Dormirians*

```
10 WL = 40:WIDTH WL:LOCATE ,,0
30 READ DR$,NL$,CR$,CLU$,SC$,NAM$
60 C = (INT(RND*5)+1)*5-4:ROOM = 1:MC = 0:IF C = LC TH
EN 60
70 TIME$ = "23:59:59":FOR I=1 TO 200:NEXT I
80 LC = C:CLS:PRINT:M$ = "I AM THE MASTER. THE PROTOTY
PE. "
90 M$ = M$+"ATTEND TO ME AND YOU WILL FIND WHAT YOU SE
EK.":GOSUB 3000
110 NR = ASC(MID$(CLU$,ROOM,1))-65:T = C+NR-1
120 IF MC > 0 THEN CLS
130 IF NR < 1 THEN 160
140 M$ = "I AM "+MID$(NAM$,ROOM*3-5,3)+",":GOSUB 3000
150 M$ = "AND THE LETTER I GIVE YOU IS *"+MID$(CR$,T,1
)+"*.":GOSUB 3000
160 PRINT:PRINT:M$ = "YOU CAN MOVE IN THESE DIRECTIONS
:":GOSUB 3000:PRINT:PRINT
170 M$ = " ":FOR X = ROOM*4-3 TO ROOM*4
180 IF MID$(DR$,X,1) <> "*" THEN M$ = M$+MID$(DR$,X,1)
+" "
190 NEXT X:GOSUB 3000:PRINT:PRINT
200 IF MC < 3 THEN M$ = "CHOOSE ONE:":GOSUB 3000:GOTO
220
210 M$ = "CHOOSE ONE, OR PRESS "+CHR$(34)+"G"+CHR$(34)
+" TO GUESS:":GOSUB 3000
220 G$ = INKEY$:IF G$ <> "" THEN 290
230 S = 59-VAL(RIGHT$(TIME$,2)):M = 3-VAL(MID$(TIME$,5
,1))
240 S$ = RIGHT$(STR$(S),2):IF S < 10 THEN S$ = "0"+RIG
HT$(S$,1)
250 IF TIME$ > "00:03:44" THEN SOUND 1000,2
260 IF TIME$ > "00:03:59" THEN 460
270 LOCATE 18
280 M$ = "<TIME TO DEPARTURE> "+STR$(M)+":"+S$:GOSUB 3
000:GOTO 220
290 IF G$ = "G" AND MC > 2 THEN 360
300 T = 0:FOR X = ROOM*4-3 TO ROOM*4
310 IF G$ = MID$(DR$,X,1) THEN ROOM = ASC(MID$(NL$,X,1
))-65:T = 1:MC = MC+1
320 NEXT X
330 IF T <> 0 THEN 110
340 PRINT:M$ = CHR$(7)+"YOU CAN'T GET THERE FROM HERE!
":GOSUB 3000
350 FOR X = 1 TO 1000:NEXT X:CLS:GOTO 110
360 CLS:M$ = "TYPE IN YOUR GUESS;":GOSUB 3000
370 M$ = "THEN PRESS <RETURN>.":GOSUB 3000:PRINT:PRINT
380 INPUT G$:IF G$ <> MID$(CR$,C,5) THEN 480
```

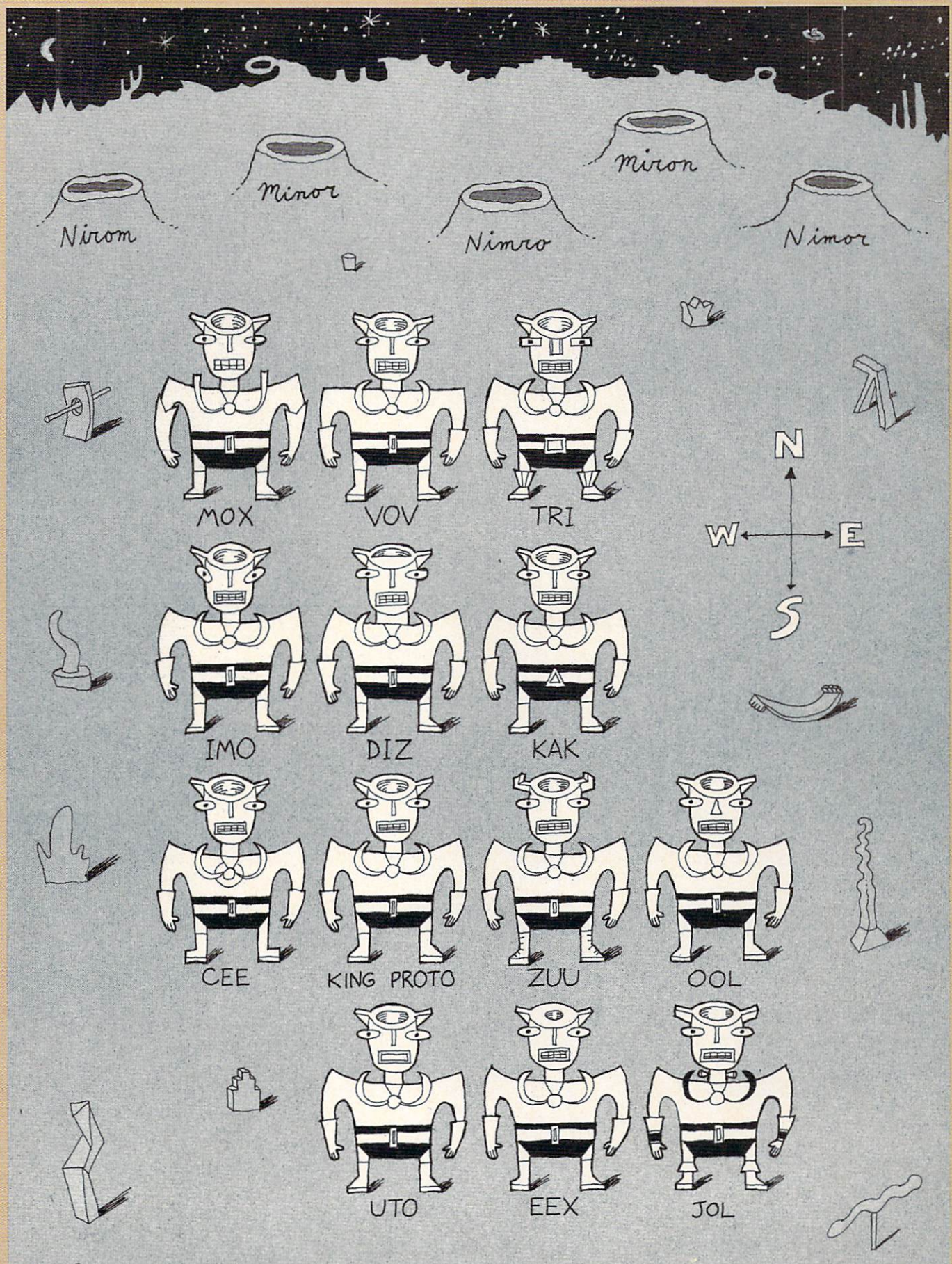

ILLUSTRATION BY JOSH GOSFIELD

```
390 CLS:M$ = "CONGRATULATIONS ... YOU MADE IT!":GOSUB
3000:PRINT
400 M$ = "ALL ABOARD!":GOSUB 3000:GOSUB 1000
420 PRINT:PRINT:M$ = "DO YOU WANT TO PLAY AGAIN?":GOSU
B 3000
430 A$ = INKEY$:IF A$ = "" THEN 430
440 IF A$ = "Y" THEN 60
450 END
460 CLS:M$ = "THE SHUTTLE HAS DEPARTED.":GOSUB 3000
470 M$ = "YOU'RE STUCK ON DORMIR UNTIL NEXT WEEK.":GOT
O 500
480 CLS:M$ = "NOPE! YOUR SHIP LEFT WITHOUT YOU.":GOSUB
 3000
490 PRINT:M$ = "YOU'LL HAVE TO WAIT UNTIL NEXT WEEK."
500 GOSUB 3000:GOSUB 1000
510 PRINT:PRINT "DO YOU WANT TO ...":PRINT " GET <H>EL
P;"
520 PRINT " <P>LAY AGAIN; OR ":PRINT " <Q>UIT?"
530 A$ = INKEY$:IF A$ = "" THEN 530
540 IF A$ = "Q" THEN CLS:END
550 IF A$ <> "H" THEN 60
560 PRINT:M$ = "":FOR X = 1 TO 48:M$ = M$+CHR$(ASC(MID
$(SC$,X,1))-1):NEXT X
570 M$ = M$+".":GOSUB 3000:FOR I = 1 TO 1000:NEXT I:GO
TO 60
1000 FOR S = 1 TO 200:SOUND RND*200+40,9
1010 FOR SD = 1 TO 4:NEXT SD:SOUND 37,0:COLOR 7,0,INT(
RND*16):NEXT S
1020 FOR S = 600 TO 1400 STEP 10:SOUND S,S/1000:NEXT S
:RETURN
3000 IF LEN(M$) < WL THEN PRINT TAB((WL-LEN(M$))/2+.6)
 M$:RETURN
3010 L = WL-1:FOR I = 2 TO WL:IF MID$(M$,I,1) = " " TH
EN L = I-1
3020 NEXT I:PRINT LEFT$(M$,L):M$ = RIGHT$(M$,LEN(M$)-L
-1):GOTO 3000
4000 DATA NSEW*SE**SEW*S*WNSE*NSEWNS*WN*E*NSEW*S*WN*E*
N*EWN**W
4010 DATA GLJIAFDAAGECAHADCIGADBHFEJAGFABAHMKBANAJBAMA
JANLKAAM
4020 DATA NIMRONIMORMINORMIRONNIROM,ADBEBCBCCBBBF
4030 DATA DPVOU!UIF!XBZT!FBDI!OBUJWF!EJGGFST!GSPN!UIF!
LJOH
4040 DATA MOXVOVTRIIMODIZKAKCEEZUUOOLUTOEEXJOL
```

Atari/*Proto and the Dormirians*

```
10 GRAPHICS 0:SETCOLOR 2,12,5:WL=40
20 DIM DR$(52),NL$(52),CR$(25),G$(10),CLU$(13),SC$(49)
,NAM$(36),SP$(40),M$(100),S$(2):OPEN #1,4,0,"K:":POKE
752,1
30 READ DR$,NL$,CR$,CLU$,SC$,NAM$
50 FOR X=1 TO 36:T=ASC(NAM$(X)):NAM$(X,X)=CHR$(T+128):
NEXT X:SP$=" ":SP$(40)=" ":SP$(2)=SP$
60 C=(INT(RND(0)*5)+1)*5-4:ROOM=1:MC=0:IF C=LC THEN 60
70 TC=256/60:TM=4:POKE 541,TM*60/TC:POKE 540,180:POKE
82,0
80 LC=C:PRINT CHR$(125);:M$="I AM THE MASTER. THE PROT
OTYPE. "
90 M$(LEN(M$)+1)="ATTEND TO ME AND YOU WILL FIND WHAT
YOU SEEK.":GOSUB 3000
110 NR=ASC(CLU$(ROOM))-65:T=C+NR-1
120 IF MC>0 THEN PRINT CHR$(125)
130 IF NR<1 THEN 160
140 M$="I AM ":M$(6)=NAM$(ROOM*3-5,ROOM*3-3):GOSUB 300
0
150 M$="AND THE LETTER I GIVE YOU IS *":M$(31)=CR$(T,T
):M$(32)="*":GOSUB 3000
160 PRINT :PRINT :M$="YOU CAN MOVE IN THESE DIRECTIONS
:":GOSUB 3000:PRINT :PRINT
170 M$=" ":FOR X=ROOM*4-3 TO ROOM*4
180 IF DR$(X,X)<>"*" THEN M$(LEN(M$)+1)=DR$(X,X):M$(LE
N(M$)+1)=" "
190 NEXT X:GOSUB 3000:PRINT :PRINT
200 IF MC<3 THEN M$="CHOOSE ONE:":GOSUB 3000:GOTO 220
210 M$="CHOOSE ONE, OR PRESS ":M$(22)=CHR$(34):M$(23)=
"G":M$(24)=CHR$(34):GOSUB 3000
220 K=PEEK(764):IF K<>255 THEN 290
230 TM=INT(PEEK(540)/60+PEEK(541)*TC):M=INT(TM/60):S=T
M-M*60
240 S$=STR$(S):IF S<10 THEN S$(2)=STR$(S):S$(1,1)="0"
250 IF TM<15 THEN GOSUB 1000
260 IF TM=0 THEN 460
280 POSITION 7,20:PRINT "<TIME TO DEPARTURE> ";M;":";S
$;:GOTO 220
290 GET #1,G:G$=CHR$(G):IF G$="G" AND MC>2 THEN 360
300 T=0:FOR X=ROOM*4-3 TO ROOM*4:IF G$=DR$(X,X) THEN R
OOM=ASC(NL$(X))-65:T=1:MC=MC+1
310 IF G$=DR$(X,X) THEN ROOM=ASC(NL$(X))-65:T=1:MC=MC+
1
320 NEXT X
330 IF T<>0 THEN 110
340 IF T=0 THEN PRINT :PRINT CHR$(253);:M$="YOU CAN'T
GET THERE FROM HERE!":GOSUB 3000
350 FOR X=1 TO 500:NEXT X:PRINT CHR$(125):GOTO 110
360 PRINT CHR$(125):M$="TYPE IN YOUR GUESS;":GOSUB 300
0
370 M$="THEN PRESS <RETURN>.":GOSUB 3000:PRINT :PRINT
380 INPUT G$:IF G$<>CR$(C,C+4) THEN 480
390 PRINT CHR$(125):M$="CONGRATULATIONS ... YOU MADE I
T!":GOSUB 3000
400 M$="ALL ABOARD!":GOSUB 3000
410 FOR S=15 TO 0 STEP -1:FOR D=1 TO 100:NEXT D:GOSUB
1000:NEXT S:GOSUB 2000
420 PRINT :PRINT :M$="DO YOU WANT TO PLAY AGAIN?":GOSU
B 3000
430 GET #1,G:IF G=89 THEN 60
450 END
460 PRINT CHR$(125):M$="THE SHUTTLE HAS DEPARTED.":GOS
UB 3000
470 M$="YOU'RE STUCK ON DORMIR UNTIL NEXT WEEK.":GOTO
500
480 PRINT CHR$(125):M$="NOPE! YOUR SHIP LEFT WITHOUT Y
OU.":GOSUB 3000
490 PRINT :M$="YOU'LL HAVE TO WAIT UNTIL NEXT WEEK."
500 GOSUB 3000:GOSUB 2000
510 PRINT :PRINT :PRINT "DO YOU WANT TO ...":PRINT " G
ET <H>ELP;"
520 PRINT " <P>LAY AGAIN; OR":PRINT " <Q>UIT?"
530 GET #1,G:IF G=81 THEN PRINT CHR$(125):END
550 IF G<>72 THEN 60
560 PRINT :FOR X=1 TO 48:M$(X)=CHR$(ASC(SC$(X))-1):NEX
T X
570 M$(50)=".":GOSUB 3000:FOR I=1 TO 1000:NEXT I:GOTO
60
1000 SOUND 0,170,8,15-S:SETCOLOR 4,PEEK(540),S:RETURN
2000 FOR X=200 TO 0 STEP -1.5:SOUND 0,X,10,10:NEXT X:R
ETURN
3000 IF LEN(M$)<WL THEN PRINT SP$(1,(WL-(LEN(M$)))/2);
M$:RETURN
3010 L=WL-1:FOR I=2 TO WL:IF M$(I,I)=" " THEN L=I-1
3020 NEXT I:PRINT M$(1,L):M$=M$(L+1):GOTO 3000
4000 DATA NSEW*SE**SEW*S*WNSE*NSEWNS*WN*E*NSEW*S*WN*E*
N*EWN**W
4010 DATA GLJIAFDAAGECAHADCIGADBHFEJAGFABAHMKBANAJBAMA
JANLKAAM
4020 DATA NIMRONIMORMINORMIRONNIROM,ADBEBCBCCBBBF
4030 DATA DPVOU!UIF!XBZT!FBDI!OBUJWF!EJGGFST!GSPN!UIF!
LJOH
4040 DATA MOXVOVTRIIMODIZKAKCEEZUUOOLUTOEEXJOL
```

Commodore 64/*Proto and the Dormirians*

```
10 WL=40
30 READ DR$,NL$,CR$,CLU$,SC$,NAM$
60 C=(INT(RND(0)*5)+1)*5-4:ROOM=1:MC=0:IF C=LC THEN 60
70 TI$="240000"
80 LC=C:PRINT CHR$(147):PRINT:M$="I AM THE MASTER. THE
 PROTOTYPE. "
90 M$=M$+"ATTEND TO ME AND YOU WILL FIND WHAT YOU SEEK
```

→

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Scholastic™ Wizware

Agent U.S.A., Bannercatch, Spelldiver designed and developed by Tom Snyder Productions, Inc. Available for Atari and Commodore 64 computers. Apple and IBM versions available soon.

```
.":GOSUB 3000
100 POKE 53280,14:FOR R=54272 TO 54296:POKE R,0:NEXT R
110 NR=ASC(MID$(CLU$,ROOM,1))-65:T=C+NR-1
120 IF MC >0 THEN PRINT CHR$(147)
130 IF NR<1 THEN 160
140 M$="I AM "+CHR$(18)+MID$(NAM$,ROOM*3-5,3)+CHR$(146
):GOSUB 3000
150 M$="AND THE LETTER I GIVE YOU IS *"+MID$(CR$,T,1)+
"*.":GOSUB 3000
160 PRINT:PRINT :M$="YOU CAN MOVE IN THESE DIRECTIONS:
":GOSUB 3000:PRINT:PRINT
170 M$=" ":FOR X=ROOM*4-3 TO ROOM*4
180 IF MID$(DR$,X,1)<>"*" THEN M$=M$+MID$(DR$,X,1)+" "
190 NEXT X:GOSUB 3000:PRINT:PRINT
200 IF MC<3 THEN M$="CHOOSE ONE:":GOSUB 3000:GOTO 220
210 M$="CHOOSE ONE, OR PRESS "+CHR$(34)+"G"+CHR$(34)+"
 TO GUESS:":GOSUB 3000
220 GET G$:IF G$ <>"" THEN 290
230 S=59-VAL(RIGHT$(TI$,2)):M=3-VAL(MID$(TI$,4,1))
240 S$=RIGHT$(STR$(S),2):IF S<10 THEN S$="0"+RIGHT$(S$
,1)
250 IF TI$ >"000344" THEN T=15:PER=100:L=30:H=21:W=17:
GOSUB 1000:POKE 54296,0
260 IF TI$ > "000359" THEN 460
270 PRINT CHR$(19):FOR I=1 TO 10:PRINT CHR$(17):NEXT I
280 M$="<TIME TO DEPARTURE> "+STR$(M)+":"+S$:GOSUB 300
0:GOTO 220
290 IF G$="G" AND MC>2 THEN 360
300 T = 0: FOR X = ROOM*4-3 TO ROOM *4
310 IF G$=MID$(DR$,X,1) THEN ROOM=ASC(MID$(NL$,X,1))-6
5:T =1:MC=MC+1
320 NEXT X
330 IF T<>0 THEN 110
340 M$="YOU CAN'T GET THERE FROM HERE!":GOSUB 3000
350 FOR X=1 TO 500:NEXT X:PRINT CHR$(147):GOTO 110
360 PRINT CHR$(147):M$="TYPE IN YOUR GUESS;":GOSUB 300
0
370 M$="THEN PRESS <RETURN>.":GOSUB 3000:PRINT:PRINT
380 INPUT G$:IF G$<>MID$(CR$,C,5) THEN 480
390 PRINT CHR$(147):M$="CONGRATULATIONS ... YOU MADE I
T!":GOSUB 3000:PRINT
400 M$="ALL ABOARD!":GOSUB 3000:GOSUB 2000
420 PRINT:PRINT:M$="DO YOU WANT TO PLAY AGAIN?":GOSUB
3000
430 GET A$:IF A$="" THEN 430
440 IF A$="Y" THEN 60
450 END
460 PRINT CHR$(147):M$="THE SHUTTLE HAS DEPARTED.":GOS
UB 3000
470 M$="YOU'RE STUCK ON DORMIR UNTIL NEXT WEEK.":GOTO
50
480 PRINT CHR$(147):M$="NOPE! YOUR SHIP LEFT WITHOUT Y
OU.":GOSUB 3000
490 PRINT:M$="YOU'LL HAVE TO WAIT UNTIL NEXT WEEK."
500 GOSUB 3000:PER=600:H=30:L=15:W=129:FOR T=15 TO 0 S
TEP -1:GOSUB 1000:NEXT T
510 PRINT:PRINT "DO YOU WANT TO ...":PRINT " GET <H>EL
P;"
520 PRINT " <P>LAY AGAIN OR;":PRINT " <Q>UIT"
530 GET A$:IF A$="" THEN 530
540 IF A$="Q" THEN PRINT CHR$(147):END
550 IF A$ <> "H" THEN 60
560 PRINT:M$="":FOR X=1 TO 48:M$=M$+CHR$(ASC(MID$(SC$,
X,1))-1):NEXT X
570 M$=M$+".":GOSUB 3000:FOR I=1 TO 1000:NEXT I:GOTO 6
0
1000 POKE 53280,INT(RND(0)*16):POKE 54278,240
1010 POKE 54296,T:POKE 54272,L
1020 POKE 54273,H:POKE 54276,W
1030 FOR F=1 TO PER:NEXT F
1040 RETURN
2000 POKE 54278,240:FOR T=1 TO 15
2010 POKE 54296,T:POKE 54272,81:POKE 54273,3:POKE 5427
6,129
2020 POKE 53280,INT(RND(0)*16):FOR D=0 TO 400:NEXT D:N
EXT T
2030 FOR I=1 TO 300:POKE 53280,INT(RND(0)*16):NEXT I:P
OKE 54296,0:RETURN
3000 IF LEN(M$) <WL THEN PRINT SPC((WL-LEN(M$))/2+.6);
M$:RETURN
3010 L=WL-1:FOR I=2 TO WL:IF MID$(M$,I,1)=" " THEN L=I
-1
3020 NEXT I:PRINT LEFT$(M$,L):M$=RIGHT$(M$,LEN(M$)-L-1
):GOTO 3000
4000 DATA NSEW*SE**SEW*S*WNSE*NSEWNS*WN*E*NSEW*S*WN*E*
N*EWN**W
4010 DATA GLJIAFDAAGECAHADCIGADBHFEJAGFABAHMKBANAJBAMA
JANLKAAM
4020 DATA NIMRONIMORMINORMIRONNIROM,ADBEBCBCCBBBF
4030 DATA DPVOU!UIF!XBZT!FBDI!OBUJWF!EJGGFST!GSPN!UIF!
LJOH
4040 DATA MOXVOVTRIIMODIZKAKCEEZUUOOLUTOEEXJOL
```

TI-99/4A w/TI Extended BASIC/*Proto and the Dormirians*

```
10 WL=28
30 READ DR$,NL$,CR$,CLU$,SC$,NAM$
60 C=(INT(6*RND)+1)*5-4 :: ROOM=1 :: MC=0 :: IF C=LC T
HEN 60
70 TM=240 :: VTAB=1
80 LC=C :: CALL CLEAR :: M$="I AM THE MASTER. THE PROT
OTYPE. "
90 M$=M$&"ATTEND TO ME AND YOU WILL FIND WHAT YOU SEEK
." :: GOSUB 3000
110 NR=ASC(SEG$(CLU$,ROOM,1))-65 :: T=C+NR-1
120 IF MC>0 THEN CALL CLEAR :: VTAB=1
130 IF NR<1 THEN 160
140 M$="I AM "&SEG$(NAM$,ROOM*3-5,3)&"," :: VTAB=1 ::
GOSUB 3000
150 M$="AND THE LETTER I GIVE YOU IS *"&SEG$(CR$,T,1)&
"*." :: VTAB=VTAB+1 :: GOSUB 3000
160 VTAB=VTAB+1 :: M$="YOU CAN MOVE IN THESE DIRECTION
S:" :: GOSUB 3000 :: VTAB=VTAB+1
170 M$=" " :: FOR X=ROOM*4-3 TO ROOM*4
180 IF SEG$(DR$,X,1)<>"*" THEN M$=M$&SEG$(DR$,X,1)&" "
190 NEXT X :: GOSUB 3000 :: VTAB=VTAB+2
200 IF MC<3 THEN M$="CHOOSE ONE:" :: GOSUB 3000 :: GOT
O 220
210 M$="CHOOSE ONE, OR PRESS "&CHR$(34)&"G"&CHR$(34)&"
 TO GUESS:" :: GOSUB 3000
220 CALL KEY(0,KEY,STATUS):: FOR DELAY=1 TO 10 :: NEXT
 DELAY :: IF STATUS<>0 THEN 290
230 TM=TM-0.29 :: M=INT(TM/60):: S=INT(TM-M*60):: S$=S
TR$(S)
240 IF S<10 THEN S$="0"&S$
250 IF TM<15 THEN I=11 :: CALL SOUND(-500,-7,I):: CALL
 SCREEN(INT(12*RND)+3):: TM=TM-0.1 :: I=I-1
260 IF TM<=0 THEN 460
280 M$="<TIME TO DEPARTURE> "&STR$(M)&":"&S$ :: DISPLA
Y AT(20,3):M$ :: GOTO 220
290 G$=CHR$(KEY):: IF G$="G" AND MC>2 THEN 360
300 T=0 :: FOR X=ROOM*4-3 TO ROOM*4
310 IF G$=SEG$(DR$,X,1)THEN ROOM=ASC(SEG$(NL$,X,1))-65
 :: T=1 :: MC=MC+1
320 NEXT X :: TM=TM-3.1
330 IF T<>0 THEN 110
340 VTAB=VTAB+2 :: M$="YOU CAN'T GET THERE FROM HERE!"
 :: GOSUB 3000
350 FOR DELAY=1 TO 1000 :: NEXT DELAY :: CALL CLEAR ::
 TM=TM-2.66 :: VTAB=1 :: GOTO 110
360 CALL CLEAR :: M$="TYPE IN YOUR GUESS;" :: VTAB=1 :
: GOSUB 3000
370 M$="THEN PRESS <ENTER>." :: GOSUB 3000 :: VTAB=VTA
B+2
380 INPUT G$ :: IF G$<>SEG$(CR$,C,5)THEN 480
390 CALL CLEAR :: M$="CONGRATULATIONS ... YOU MADE IT!
" :: VTAB=1 :: GOSUB 3000 :: VTAB=VTAB+1
400 M$="ALL ABOARD!" :: GOSUB 3000 :: GOSUB 1000
420 VTAB=VTAB+2 :: M$="DO YOU WANT TO PLAY AGAIN?" ::
GOSUB 3000
430 CALL KEY(0,KEY,STATUS):: IF STATUS=0 THEN 430
440 IF CHR$(KEY)="Y" THEN 60
450 END
```

An educational ad about educational software.

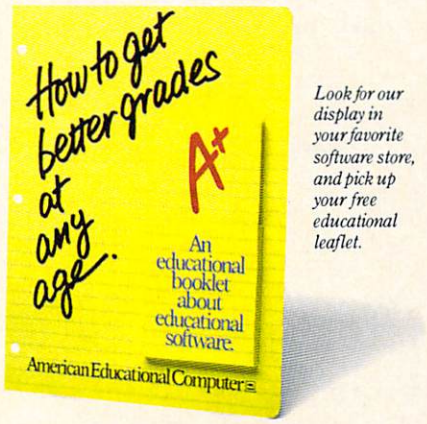
YOU studied all the computers and finally chose the one your family found most useful. One of the main reasons you wanted a computer in the first place is to help your children in school. Not just to teach them how to use a computer, but also to help them get good grades in basic school subjects like reading or geography.

That's why you should know about AEC, American Educational Computer – one of the country's most important developers and publishers of educational software.

You can help your child all the way through school and beyond.

AEC grew up on education.

The management of AEC started in educational publishing, with collectively over 100 years of experience in the field. AEC knows curriculum and how American education is practiced in the classroom. That's important because children should learn at home the same way they learn at school. Otherwise, you'll have a very confused child, and confusion is not the way to better grades or better learning.



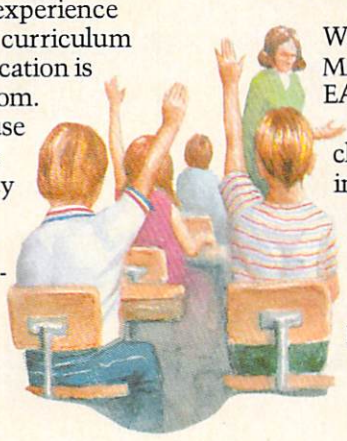
Look for our display in your favorite software store, and pick up your free educational leaflet.

AEC knows that good grades are important.

Any educational software could help school performance in some way. That's because the computer is such a patient teacher, giving instant feedback to questions and allowing children to learn at their own pace.

But AEC software has an important advantage. Our approach has been student tested under actual classroom conditions. So we know it keeps the child's interest while it teaches.

AEC gets parents involved in the learning process.



With either AEC's MATCHMAKER™ or EASYREADER™ Series, you can take your child through the grades in subjects such as Phonics, Word Attack Skills, Reading Comprehension, Spanish, World or US Geography, and Grammar. Our teacher tested system allows parents to enter material into a lively, interactive format. And because AEC's programs are grade-level oriented, you can help your child all the way through school.

AEC doesn't play games with education.

AEC programs do contain games, but only as rewards for learning achievement. For example, once your child successfully completes the objective in the Matchmaker Geography program, he or she can play an exciting, action-packed game.

Sure, the games are fun. But they're not the basis, and certainly not the primary focus, of any AEC software. Our focus is strictly on learning. And isn't that what you buy educational software for?

If you have more questions about educational software, contact your nearest AEC educational software center. And thanks for being a concerned parent.

A+

American Educational Computer

2450 Embarcadero Way, Palo Alto, CA 94303

```
460 CALL CLEAR :: M$="THE SHUTTLE HAS DEPARTED." :: VT
AB=1 :: GOSUB 3000
470 M$="YOU'RE STUCK ON DORMIR UNTIL NEXT WEEK." :: GO
TO 500
480 CALL CLEAR :: M$="NOPE! YOUR SHIP LEFT WITHOUT YOU
." :: VTAB=1 :: GOSUB 3000
490 VTAB=VTAB+1 :: M$="YOU'LL HAVE TO WAIT UNTIL NEXT
WEEK."
500 GOSUB 3000 :: GOSUB 1000
510 M$="DO YOU WANT TO ..." :: VTAB=VTAB+2 :: GOSUB 30
00 :: M$=" GET <H>ELP;" :: GOSUB 3000
520 M$=" <P>LAY AGAIN; OR" :: GOSUB 3000 :: M$="<Q>UIT
?" :: GOSUB 3000
530 CALL KEY(0,KEY,STATUS):: IF STATUS=0 THEN 530
540 IF CHR$(KEY)="Q" THEN CALL CLEAR :: END
550 IF CHR$(KEY)<>"H" THEN 60
560 VTAB=VTAB+1 :: M$="" :: FOR X=1 TO 48 :: M$=M$&CHR
$(ASC(SEG$(SC$,X,1))-1):: NEXT X
570 M$=M$&"." :: GOSUB 3000 :: FOR I=1 TO 1000 :: NEXT
 I :: GOTO 60
1000 TV=25 :: NV=1
1010 FOR TONE=200 TO 700 :: CALL SOUND(-500,TONE,TV,-6
,NV):: TV=TV-0.05 :: NV=NV+0.05 :: NEXT TONE
1020 RETURN
3000 IF LEN(M$)<WL THEN DISPLAY AT(VTAB,15-LEN(M$)/2):
M$ :: VTAB=VTAB+1 :: RETURN
3010 L=WL-1 :: FOR I=2 TO WL :: IF SEG$(M$,I,1)=" " TH
EN L=I-1
3020 NEXT I :: DISPLAY AT(VTAB,15-L/2):SEG$(M$,1,L)::
M$=SEG$(M$,L+1,LEN(M$)-L):: VTAB=VTAB+1 :: GOTO 3000
4000 DATA NSEW*SE**SEW*S*WNSE*NSEWNS*WN*E*NSEW*S*WN*E*
N*EWN**W
4010 DATA GLJIAFDAAGECAHADCIGADBHFEJAGFABAHMKBANAJBAMA
JANLKAAM
4020 DATA NIMRONIMORMINORMIRONNIROM,ADBEBCBCCBBBF
4030 DATA DPVOU!UIF!XBZT!FBDI!OBUJWF!EJGGFST!GSPN!UIF!
LJOH
4040 DATA MOXVOVTRIIMODIZKAKCEEZUUOOLUTOEEXJOL
```

Timex Sinclair 1000 w/16K RAM Pack & Timex Sinclair 1500/*Proto and the Dormirians*

Because the Timex Sinclair 1000 and 1500 do not allow READ and DATA statements nor more than one statement on a single numbered program line, the 1000/1500 version is much longer than the base version. If you would like a free translation of this program for the 1000 (with 16K RAM Pack) and 1500, send self-addressed, stamped envelope to Karen Cohen, "Timex Prototype," FAMILY COMPUTING, 730 Broadway, New York, NY 10003.

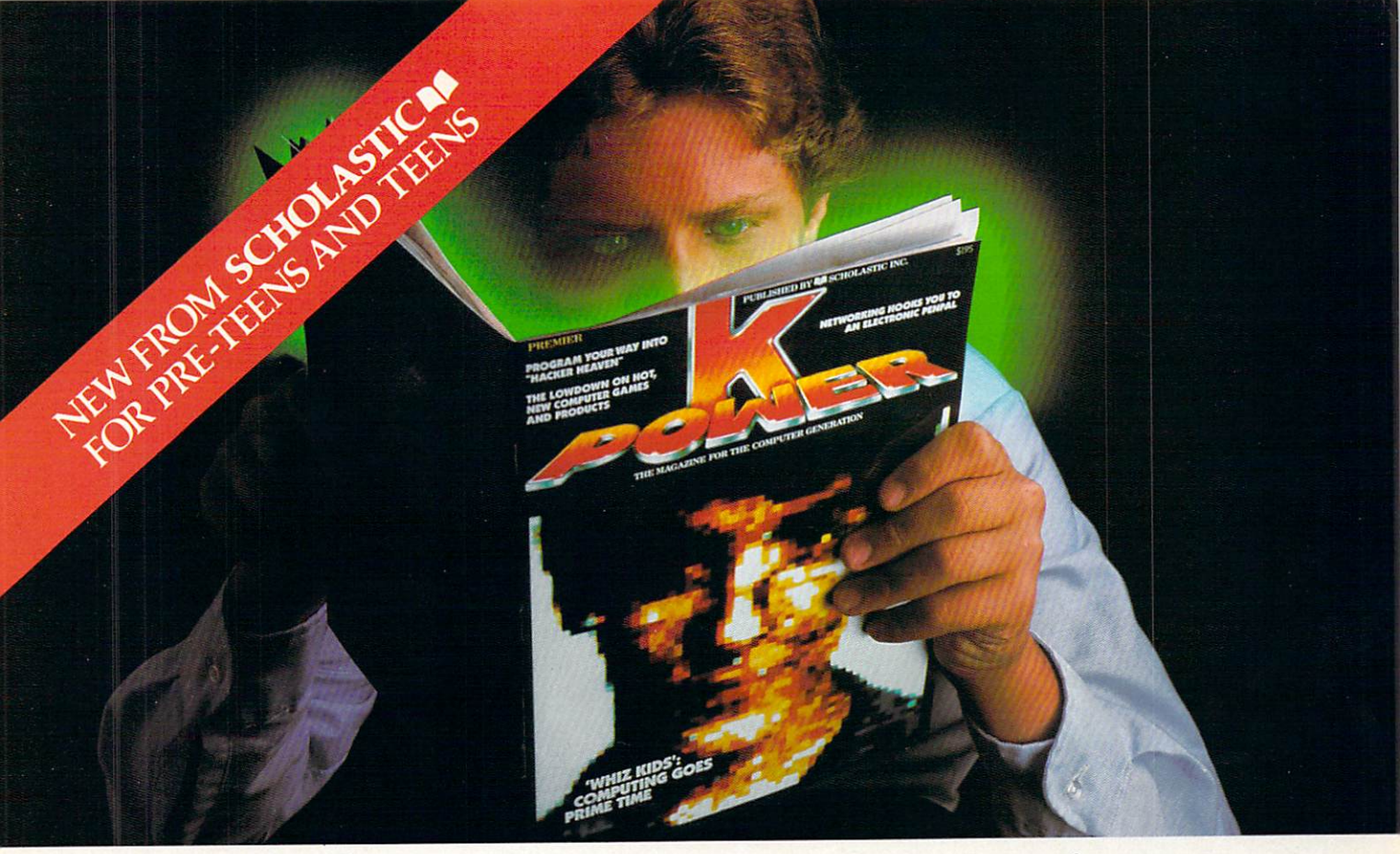
Timex Sinclair 2068/*Proto and the Dormirians*

```
10 LET LC=0
30 READ R$:READ L$:READ C$:READ U$:READ S$:READ N$
60 LET C=(INT (RND*5)+1)*5-4:LET ROOM=1:LET MC=0
70 LET TM=240:IF C=LC THEN GOTO 20
80 CLS:LET LC=C:LET M$="I AM THE MASTER. THE PROTOTYPE
."
90 LET M$=M$+"ATTEND TO ME AND YOU WILL FIND WHAT YOU
SEEK.":GOSUB 3000
110 LET NR=CODE(U$(ROOM))-65:LET T=C+NR-1
120 IF MC>0 THEN CLS
130 IF NR<1 THEN GOTO 160
140 LET M$="I AM "+N$(ROOM*3-5 TO ROOM*3-3)+",":GOSUB
3000
150 LET M$="AND THE LETTER I GIVE YOU IS *"+C$(T)+"*."
:GOSUB 3000
160 PRINT :PRINT :LET M$="YOU CAN MOVE IN THESE DIRECT
IONS:":GOSUB 3000:PRINT :PRINT
170 LET M$=" ":FOR X=ROOM*4-3 TO ROOM*4
180 IF R$(X)<>"*"  THEN LET M$=M$+R$(X)+" "
190 NEXT X:GOSUB 3000:PRINT :PRINT
200 IF MC<3 THEN LET M$="CHOOSE ONE:":GOSUB 3000:GOTO
220
210 LET M$="CHOOSE ONE, OR PRESS "+CHR$ 34+"G"+CHR$ 34
+" TO GUESS:":GOSUB 3000
220 LET K=CODE INKEY$:IF K<>0 THEN GOTO 290
230 LET TM=TM-1:LET T1=INT (TM/60)
240 LET T2=INT(TM-T1*60):LET T$=STR$ T2:IF T2<10 THEN
LET T$="0"+T$
250 IF TM<15 THEN FOR I=1 TO 8:BEEP .011,34:BORDER (I-
1):NEXT I:LET TM=TM-1
260 IF TM<1 THEN GOTO 460
280 PRINT AT 17,4;:LET M$="<TIME TO DEPARTURE>  "+STR$
 T1+":"+T$:GOSUB 3000:PAUSE 60:GOTO 220
290 LET G$=CHR$ K:IF G$="G" AND MC>2 THEN GOTO 360
300 LET T=0:FOR X=ROOM*4-3 TO ROOM*4
310 IF G$=R$(X) THEN LET ROOM=CODE L$(X)-65:LET T=1:LE
T MC=MC+1
320 NEXT X:LET TM=TM-.55
330 IF T<>0 THEN GOTO 110
340 PRINT :LET M$="YOU CAN'T GET THERE FROM HERE!":GOS
UB 3000
350 FOR X=1 TO 345:NEXT X:CLS:LET TM=TM-1.1:GOTO 110
360 CLS:LET M$="TYPE IN YOUR GUESS;":GOSUB 3000
370 LET M$="THEN PRESS <RETURN>.":GOSUB 3000:PRINT :PR
INT
380 INPUT G$:IF G$<>C$(C TO C+4) THEN GOTO 480
390 CLS:LET M$="CONGRATULATIONS ... YOU MADE IT.":GOSU
B 3000:PRINT
400 LET M$="ALL ABOARD.":GOSUB 3000:GOSUB 1000
420 PRINT :PRINT :LET M$="DO YOU WANT TO PLAY AGAIN?":
GOSUB 3000:PAUSE 0
430 LET A$=INKEY$
440 IF A$="Y" THEN GOTO 60
450 STOP
460 CLS:LET M$="THE SHUTTLE HAS DEPARTED.":GOSUB 3000:
470 LET M$="YOU ARE STUCK ON DORMIR UNTIL NEXT WEEK.":
GOTO 500
480 CLS:LET M$="NOPE! YOUR SHIP LEFT WITHOUT YOU.":GOS
UB 3000
490 PRINT:LET M$="YOU WILL HAVE TO WAIT UNTIL NEXT WEE
K."
500 GOSUB 3000:GOSUB 1000
510 PRINT :PRINT :PRINT "DO YOU WANT TO ...":PRINT " G
ET <H>ELP;"
520 PRINT " <P>LAY AGAIN; OR":PRINT " <Q>UIT?"
530 PAUSE 0:LET A$=INKEY$
540 IF A$="Q" THEN CLS:STOP
550 IF A$<>"H" THEN GOTO 60
560 PRINT :LET M$="":FOR X=1 TO 48:LET M$=M$+CHR$ (CO
DE (S$(X))-1):NEXT X
570 LET M$=M$+".":GOSUB 3000:FOR I=1 TO 345:NEXT I:GOT
O 60
1000 FOR X=1 TO 69:BEEP .01,33:NEXT X:SOUND 7,62;8,15
1010 FOR X=255 TO 0 STEP-1:SOUND 0,X:NEXT X:SOUND 8,0;
7,63:RETURN
3000 IF LEN M$<32 THEN PRINT TAB((32-LEN (M$))/2+.6);M
$:RETURN
3010 LET L=31:FOR I=2 TO 32:IF M$(I)=" " THEN LET L=I-
1
3020 NEXT I:PRINT TAB (32-L)/2;M$( TO L):LET M$=M$(L+2
 TO ):GOTO 3000
4000 DATA "NSEW*SE**SEW*S*WNSE*NSEWNS*WN*E*NSEW*S*WN*E
*N*EWN**W"
4010 DATA "GLJIAFDAAGECAHADCIGADBHFEJAGFABAHMKBANAJBAM
AJANLKAAM"
4020 DATA "NIMRONIMORMINORMIRONNIROM","ADBEBCBCCBBBF"
4030 DATA "DPVOU!UIF!XBZT!FBDI!OBUJWF!EJGGFST!GSPN!UIF
!LJOH"
4040 DATA "MOXVOVTRIIMODIZKAKCEEZUUOOLUTOEEXJOL"
```

VIC-20 w/8K RAM Cartridge/*Proto and the Dormirians*

```
10 POKE 36878,15:POKE 36879,24:WL=22
30 READ DR$,NL$,CR$,CLU$,SC$,NAM$
60 C=(INT(RND(0)*5)+1)*5-4:ROOM=1:MC=0:IF C=LC THEN 60
70 TI$="240000"
```

→



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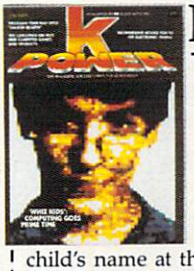

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```
80 LC=C:PRINT CHR$(147):PRINT:M$="I AM THE MASTER. THE
 PROTOTYPE. "
90 M$=M$+"ATTEND TO ME AND YOU WILL FIND WHAT YOU SEEK
.":GOSUB 3000
110 NR=ASC(MID$(CLU$,ROOM,1))-65:T=C+NR-1
120 IF MC >0 THEN PRINT CHR$(147)
130 IF NR<1 THEN 160
140 M$="I AM "+CHR$(18)+MID$(NAM$,ROOM*3-5,3)+CHR$(146
):GOSUB 3000
150 M$="AND THE LETTER I GIVE YOU IS *"+MID$(CR$,T,1)+
"*.":GOSUB 3000
160 PRINT:PRINT :M$="YOU CAN MOVE IN THESE DIRECTIONS:
":GOSUB 3000:PRINT:PRINT
170 M$=" ":FOR X=ROOM*4-3 TO ROOM*4
180 IF MID$(DR$,X,1)<>"*" THEN M$=M$+MID$(DR$,X,1)+" "
190 NEXT X:GOSUB 3000:PRINT:PRINT
200 IF MC<3 THEN M$="CHOOSE ONE:":GOSUB 3000:GOTO 220
210 M$="CHOOSE ONE, OR PRESS "+CHR$(34)+"G"+CHR$(34)+"
 TO GUESS:":GOSUB 3000
220 GET G$:IF G$<>"" THEN 290
230 S=59-VAL(RIGHT$(TI$,2)):M=3-VAL(MID$(TI$,4,1))
240 S$=RIGHT$(STR$(S),2):IF S<10 THEN S$="0"+RIGHT$(S$
,1)
250 IF TI$ >"000344" THEN FOR N=128 TO 255:POKE 36877,
N:POKE 36879,RND(0)*7+137:NEXT N
260 IF TI$ > "000359" THEN 460
270 PRINT CHR$(19):FOR I=1 TO 8:PRINT CHR$(17):NEXT I
280 M$="<TIME TO DEPARTURE> "+STR$(M)+":"+S$:GOSUB 300
0:GOTO 220
290 IF G$="G" AND MC>2 THEN 360
300 T = 0: FOR X = ROOM*4-3 TO ROOM *4
310 IF G$=MID$(DR$,X,1) THEN ROOM=ASC(MID$(NL$,X,1))-6
5:T=1:MC=MC+1
320 NEXT X
330 IF T<>0 THEN 110
340 M$="YOU CAN'T GET THERE FROM HERE!":GOSUB 3000
350 FOR X=1 TO 500:NEXT X:PRINT CHR$(147):GOTO 110
360 PRINT CHR$(147):M$="TYPE IN YOUR GUESS;":GOSUB 300
0
370 M$="THEN PRESS <RETURN>.":GOSUB 3000:PRINT:PRINT
380 INPUT G$:IF G$<>MID$(CR$,C,5) THEN 480
390 PRINT CHR$(147):M$="CONGRATULATIONS ... YOU MADE I
T!":GOSUB 3000:PRINT
400 M$="ALL ABOARD!":GOSUB 3000:GOSUB 1000
420 PRINT:PRINT:M$="DO YOU WANT TO PLAY AGAIN?":GOSUB
3000
430 GET A$:IF A$="" THEN 430
440 IF A$="Y" THEN 60
450 END
460 PRINT CHR$(147):M$="THE SHUTTLE HAS DEPARTED.":GOS
UB 3000
470 M$="YOU'RE STUCK ON DORMIR UNTIL NEXT WEEK.":GOTO
500
480 PRINT CHR$(147):M$="NOPE! YOUR SHIP LEFT WITHOUT Y
OU.":GOSUB 3000
490 PRINT:M$="YOU'LL HAVE TO WAIT UNTIL NEXT WEEK."
500 GOSUB 3000 :GOSUB 1000
510 PRINT:PRINT "DO YOU WANT TO ...":PRINT " GET <H>EL
P;"
520 PRINT " <P>LAY AGAIN OR;":PRINT " <Q>UIT"
530 GET A$:IF A$="" THEN 530
540 IF A$="Q" THEN PRINT CHR$(147):END
550 IF A$ <> "H" THEN 60
560 PRINT:M$="":FOR X=1 TO 48:M$=M$+CHR$(ASC(MID$(SC$,
X,1))-1):NEXT X
570 M$=M$+".":GOSUB 3000:FOR I=1 TO 1000:NEXT I:GOTO 6
0
1000 NS = 128:T = 140: FOR X=1 TO 1000:POKE 36877,NS:P
OKE 36875,T
1010 NS=NS+.1:T=T+.1:NEXT X
1020 POKE 36877,0:POKE 36875,0:RETURN
3000 IF LEN(M$) < WL THEN PRINT SPC((WL-LEN(M$))/2+.6)
;M$:RETURN
3010 L=WL-1:FOR I=2 TO WL:IF MID$(M$,I,1)=" " THEN L=I
-1
3020 NEXT I:PRINT LEFT$(M$,L):M$=RIGHT$(M$,LEN(M$)-L-1
):GOTO 3000
4000 DATA NSEW*SE**SEW*S*WNSE*NSEWNS*WN*E*NSEW*S*WN*E*
N*EWN**W
4010 DATA GLJIAFDAAGECAHADCIGADBHFEJAGFABAHMKBANAJBAMA
JANLKAAM
4020 DATA NIMRONIMORMINORMIRONNIROM,ADBEBCBCCBBBF
4030 DATA DPVOU!UIF!XBZT!FBDI!OBUJWF!EJGGFST!GSPN!UIF!
LJOH
4040 DATA MOXVOVTRIIMODIZKAKCEEZUUOOLUTOEEXJOL
```

MODIFICATIONS FOR OTHER COMPUTERS

Apple/*Proto and the Dormirians*

Use the base version, with the following alterations: Replace RND in line 60 with RND(1). Change CLS to HOME in lines 80, 120, 360, 390, 460, 480, and 540. Omit lines 1010 and 1020. Finally, change lines 10, 70, 220-270, 290, 320, 350, 430, 530, and 1000 to read as follows:

```
10 WL = 40
70 TM = 241
220 K = PEEK(-16384):IF K > 127 THEN 290
230 TM = TM-.12:M = INT(TM/60):T2% = TM-M*60
240 S$ = STR$(T2%):IF T2% < 10 THEN S$ = "0"+S$
250 IF TM < 15 THEN FOR I = 1 TO 8:PRINT CHR$(7);:NEXT
 I:TM = TM-1
260 IF TM < 0 THEN 460
270 VTAB 20
290 G$ = CHR$(K-128):POKE(-16368),0:IF G$ = "G" THEN 3
60
320 NEXT X:TM = TM-.55
350 FOR X = 1 TO 500:NEXT X:HOME:TM = TM-1.1:GOTO 110
430 GET A$:IF A$ = "" THEN 430
530 GET A$:IF A$ = "" THEN 530
1000 FOR X = 0 TO 3:FOR A = 1 TO 200:J = PEEK(-16336):
NEXT A:NEXT X:RETURN
```

IBM PC/*Proto and the Dormirians*

Use the base version, except change lines 10, 70, 350, and 1010 to read as follows:

```
10 WL = 80:WIDTH WL:LOCATE ,,0
70 TIME$ = "23:59:59":FOR I = 1 TO 350:NEXT I
350 FOR X = 1 TO 1400:NEXT X:CLS:GOTO 110
1010 FOR SD = 1 TO 5:NEXT SD:SOUND 37,0:COLOR 7,0,INT(
RND*16):NEXT S
```

TRS-80 Color Computer/*Proto and the Dormirians*

Use the base version, with the following alterations: Change RND to RND(0) in line 60. Change <RETURN> to <ENTER> in line 370. Omit lines 1010 and 1020. Finally, change lines 10, 70, 160, 190, 230, 250-270, 340, 350, 1000, and 3020 to read as follows:

```
10 WL = 32
70 TIMER = 65480
160 PRINT:M$ = "YOU CAN MOVE IN THESE DIRECTIONS:":GOS
UB 3000:PRINT
190 NEXT X:GOSUB 3000:PRINT
230 S = 240-INT(TIMER/58):M = INT(S/60):S = S-M*60
250 IF TIMER > 13050 THEN SOUND 190,1:SOUND 210,1
260 IF TIMER > 13862 THEN 460
270 PRINT @352,""
340 PRINT:SOUND 200,3:M$ = "YOU CAN'T GET THERE FROM H
ERE!":GOSUB 3000
350 FOR X = 1 TO 400:NEXT X:CLS:GOTO 110
1000 FOR A = 50 TO 250 STEP 3:SOUND A,1:NEXT A:RETURN
3020 NEXT I:PRINT TAB((WL-L)/2)LEFT$(M$,L):M$ = RIGHT$
(M$,LEN(M$)-L-1):GOTO 3000
```

programmer s

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TRS-80 Model III/*Proto and the Dormirians*

Use the base version, with the following alterations: Change RND to RND(0) in line 60. Change <RETURN> to <ENTER> in line 370. Omit lines 1010 and 1020. Finally, change lines 10, 70, 230, 250-270, 340, 350, 500, and 1000 to read as follows:

```
10 CLEAR 1000:WL = 64
70 POKE 16919,0:POKE 16920,0
230 IF PEEK(16919) > 0 THEN S = 60-PEEK(16919):M = 3-P
EEK(16920) ELSE M = 4-PEEK(16920)
250 IF PEEK(16920) = 3 AND PEEK(16919) > 44 THEN PRINT
 "PREPARE FOR LAUNCH!"
260 IF PEEK(16920) > 3 THEN GOSUB 1000:GOTO 460
270 PRINT @768,"";
340 PRINT:M$ = "YOU CAN'T GET THERE FROM HERE!":GOSUB
3000
350 FOR X = 1 TO 500:NEXT X:CLS:GOTO 110
500 GOSUB 3000
1000 FOR D = 1 TO 50:PRINT @283,"BLAST OFF!":PRINT @28
3,STRING$(15,32):NEXT D:RETURN
```

TRS-80 Model 4/*Proto and the Dormirians*

Use the base version, with the following alterations: Change RND to RND(0) in line 60. Change <RETURN> to <ENTER> in line 370. Omit lines 1010 and 1020. Finally, change lines 10, 70, 250-270, 340, 350, 500, and 1000 to read as follows:

```
10 CLEAR 1000:PRINT CHR$(15):WL = 80
70 SYSTEM "TIME 23:59:58"
250 IF TIME$ > "00:03:44" THEN PRINT @1630,"PREPARE FO
R LAUNCH!"
260 IF TIME$ > "00:03:59" THEN GOSUB 1000:GOTO 460
270 PRINT @1600,"";
340 PRINT:M$ = "YOU CAN'T GET THERE FROM HERE!":GOSUB
3000
350 FOR X = 1 TO 500:NEXT X:CLS:GOTO 110
500 GOSUB 3000
1000 FOR D = 1 TO 50:PRINT @355,"BLAST OFF!":PRINT @35
5,STRING$(15,32):NEXT D:RETURN
```

SOLUTION TO LAST MONTH'S PUZZLE:

The correct sequence through Calthrop Manor is Location #1, #5, #8, #12, #14, #17, #20, #26, #23, #22.

ATTENTION PUZZLE FANS!

Do you have an original idea for FAMILY COMPUTING*'s monthly puzzle? We will pay $150 for every fully developed puzzle program we publish. Send a complete explanation of your puzzle along with a disk or tape containing two copies of your program (try not to exceed 100 lines) and a listing (preferably a printout) to Puzzle,* FAMILY COMPUTING*, 730 Broadway, New York, NY 10003. Include your name, age, address, day and night phone numbers, computer model, and the level of BASIC and memory required. If you want your disk or tape returned, enclose a stamped, self-addressed mailer.* FAMILY COMPUTING *cannot assume responsibility for the loss of or damage to any unsolicited materials.*

COMPOSE YOURSELF! Now Any VIC-20 Owner Can Write Original Music

BY JAMES MILLER

PHOTOGRAPH BY DENNIS LAMAN

The author, composing piano tunes on his VIC-20.

As a child, I spent a great deal of time avoiding the wishes of my parents. Among the more mundane tasks of youth (brushing your teeth, hanging up your clothes), my mother encouraged me to learn the piano. My resistance to her urgings won out eventually, although she made a monumental effort. "You'll be sorry later," my mother warned. She was right. Parents very often are. . .

To my parents' everlasting chagrin, I learned to play the drums, not the piano. My first drumsticks were arrows from an archery set, and I played endlessly on tabletops and door frames until there were tiny dents in anything wooden about the house. Oddly, instead of discouraging the racket, my parents let the noise continue.

Arrows turned into bona fide drumsticks, tinkering turned into formal drum lessons, high-school ensembles became jazz bands, and kitchen jam sessions turned into one-night stands with rock bands. While I never got the formal piano training my mother would have wished, she had secretly won a victory of another sort. I came to love the piano and the keyboard, and I was hooked on music. And, when I finally discovered computing about a year ago, I selected a VIC-20 partly because it was capable of making music.

JAMES MILLER *is a former newspaper editor, teacher, and cofounder of a recording studio. He lives in Lima, Ohio, where he writes freelance articles and educational programs on his VIC-20.*

HOW THE PROGRAM WORKS

My program, *Player Piano*, reproduces a single octave of a standard piano keyboard, from C to C, including sharps and flats. Using it, a person can →

ONE TOUGH SPELLER.

Time was, Billy would do almost anything to duck his spelling homework.

But since Dad brought home *Spellicopter*™ by DesignWare,™ Billy has become a spelling ace. As well as an ace chopper pilot.

Each week, in addition to the words already in the game, Billy types new spelling words and new sentences into the game. Then he takes command of his chopper and flies a mission through crowded skies and mountainous terrain to recover the words, letter by letter. And always in the right order.

So by the time Billy gets back to the base, he's one proud pilot. And one tough speller.

DESIGNWARE MAKES LEARNING COME ALIVE.

All DesignWare spelling programs combine computer game fun with sound educational principles to help improve your youngster's spelling skills. That's why *Spellicopter,* for example, is consistently on the nation's best seller lists. You'll also want to keep an eye out for new math and science games.

All DesignWare programs run on these computers with disk drive: Apple,® Atari,® Commodore 64,™ IBM PC and IBM PC Jr. See your local software retailer or call DesignWare at (800) 572-7767 (in California 415-546-1866) for our free software catalog. You'll be delighted with the way your kids will learn with DesignWare.

DesignWare™

LEARNING COMES ALIVE.

compose and save songs on tape while learning the arrangement of piano keys, the sounds of the various notes, and their letter names.

Touching the keys QWERTYUI will play the musical notes CDEFGABC, respectively. Number keys 23567 play C#, D#, F#, G#, and A#. When you touch one of these keys, the letter name of the sound you hear will appear in its correct location on the screen, on a picture of the piano keyboard.

When you run the program, you will hear the VIC's middle, or "alto" voice. You may change voices by using the function keys. "F1" will raise the voice an octave to "soprano," while "F3" will lower the voice back to "alto." Your own songs can easily be composed and replayed in both voice ranges built into the program. To hear the sample tune, "London Bridge," press the "P" key.

VIC-20/*Player Piano*

```
10 V=36878:S=36875:CL=646:POKE 649,1:POKE V+1,27:Z$="0
00000":GOSUB 1000
20 GET A$:IF A$="" THEN 20
30 POKE V,15
40 IF A$="Q" THEN POKE S,225:POKE 8011,3
50 IF A$="2" THEN POKE S,227:POKE 7858,3:POKE 7859,35
60 IF A$="W" THEN POKE S,228:POKE 8014,4
70 IF A$="3" THEN POKE S,229:POKE 7861,4:POKE 7862,35
80 IF A$="E" THEN POKE S,231:POKE 8017,5
90 IF A$="R" THEN POKE S,232:POKE 8020,6
100 IF A$="5" THEN POKE S,233:POKE 7867,6:POKE 7868,35
110 IF A$="T" THEN POKE S,235:POKE 8023,7
120 IF A$="6" THEN POKE S,236:POKE 7870,7:POKE 7871,35
130 IF A$="Y" THEN POKE S,237:POKE 8026,1
140 IF A$="7" THEN POKE S,238:POKE 7873,1:POKE 7874,35
150 IF A$="U" THEN POKE S,239:POKE 8029,2
160 IF A$="I" THEN POKE S,240:POKE 8031,3
170 IF A$="P" THEN 420
180 IF A$="Z" THEN POKE S,0
190 IF A$=CHR$(133) THEN POKE S,0:S=36876
200 IF A$=CHR$(134) THEN POKE S,0:S=36875
210 IF A$=CHR$(136) THEN PL=1:RE=0:C=0:POKE V+1,31:GOT
O 300
220 IF A$<>CHR$(135) THEN 250
230 A$=CHR$(133-(S=36875)):RE=1:PL=0:C=0:NT$="":DR$=""
240 POKE V+1,26:GOTO 370
250 IF A$=CHR$(211) AND LEN(NT$)> 1 THEN 450
260 IF A$=CHR$(204) THEN 490
270 IF A$="*" THEN RUN
280 IF PL=0 THEN 320
290 IF TI<D THEN 40
300 C=C+1:IF C>LEN(NT$) THEN PL=0:POKE S,0:POKE V+1,27
:GOTO 20
310 A$=MID$(NT$,C,1):D=ASC(MID$(DR$,C,1)):TI$=Z$:GOTO
30
320 IF PEEK(197)<>64 THEN 30
330 IF C*2>FRE(0)-8 AND RE=1 THEN POKE V,0:GOSUB 2000:
A$=CHR$(136):GOSUB 1000:GOTO 210
340 IF PEEK(197)=64 THEN POKE S,0
350 IF RE=0 THEN 20
360 C=C+1:D=INT(TI/2):IF D>255 THEN D=255
370 NT$=NT$+A$:DR$=DR$+CHR$(D):TI$=Z$:IF C=254 THEN GO
SUB 1000:GOTO 210
380 IF PEEK(197)=64 THEN 380
390 D=INT(TI/2):IF D>255 THEN D=255
400 NT$=NT$+"Z":DR$=DR$+CHR$(D):TI$=Z$
410 GOTO 20
420 RESTORE:POKE V,15:FOR X=1 TO 32:READ A:POKE S,A
430 FOR T=1 TO 150:NEXT T
440 NEXT X:POKE V,0:POKE S,0:GOTO 20
450 PRINT CHR$(147);"WHAT'S THE NAME":PRINT "OF YOUR S
ONG?":INPUT T$
460 OPEN 1,1,2,T$:L=LEN(NT$):PRINT#1,L
470 FOR X=1 TO L:PRINT#1,ASC(MID$(NT$,X,1)):PRINT#1,AS
C(MID$(DR$,X,1)):NEXT X
480 CLOSE 1:GOTO 10
490 PRINT CHR$(147):PRINT "WHAT SONG WOULD YOU":PRINT
"LIKE ME TO PLAY?":INPUT T$
500 OPEN 1,1,0,T$:INPUT#1,L:NT$="":DR$="":FOR X=1 TO L
:INPUT#1,T:NT$=NT$+CHR$(T)
510 INPUT#1,T:DR$=DR$+CHR$(T):NEXT X:CLOSE 1:GOTO 10
1000 POKE S,0:POKE S+1,0:PRINT CHR$(147):T$=CHR$(122)+
CHR$(122)+CHR$(122)
1010 POKE CL,0:PRINT T$;:POKE CL,2:PRINT "VIC-PLAYER P
IANO";:POKE CL,0:PRINT T$;
1020 FOR X=1 TO 22:PRINT CHR$(184);:NEXT X
1030 POKE CL,6:PRINT "      C MAJOR SCALE"
1040 POKE CL,0:FOR X=1 TO 22:PRINT CHR$(185);:NEXT X
1050 RV$=CHR$(18)+"  ":NR$=CHR$(146)+" ":BR$=CHR$(180)
1060 FOR J=1 TO 6
1070 PRINT NR$;" ";RV$;NR$;RV$;NR$;" ";BR$;
1080 PRINT NR$;RV$;NR$;RV$;NR$;RV$;NR$;BR$;NR$;
1090 NEXT J
1100 FOR X=1 TO 5
1110 PRINT "   ";BR$;"  ";BR$;"  ";BR$;"  ";BR$;"  ";B
R$;"  ";BR$;" ";BR$;" ";
1120 NEXT X
1130 FOR X=1 TO 22:PRINT CHR$(184);:NEXT X
1140 RV$=CHR$(18):NR$=CHR$(146)
1150 POKE CL,4:PRINT RV$;" 23 567 ";NR$;:POKE CL,0:PRI
NT "=SHARPS"
1160 POKE CL,6:PRINT RV$;"QWERTYUI";NR$;:POKE CL,0:PRI
NT "=NATURAL NOTES";
1170 PRINT "*=";:POKE CL,2:PRINT "CLEAR  ";:POKE CL,0:
PRINT "P=SAMPLE TUNE";
1180 PRINT "F1=";RV$;:POKE CL,2:PRINT "SOPRANO";NR$;:P
OKE CL,0
1190 PRINT "     F3=";:POKE CL,5:PRINT "ALTO";:POKE CL
,0
1200 PRINT "F5=";:POKE CL,6:PRINT RV$;"RECORD";NR$;
1210 POKE CL,0:PRINT "  F7=";:POKE CL,4:PRINT "PLAYBAC
K";:POKE CL,0
1220 PRINT "SFT/S=SAVE SFT/L=LOAD";
1230 RETURN
2000 PRINT CHR$(147);"MUSIC MEMORY FULL!":PRINT "PRESS
 <RETURN> TO PLAY":INPUT A$:RETURN
3000 DATA 235,237,235,232,231,232,235,0
3010 DATA 228,231,232,0,231,232,235
3020 DATA 0,235,237,235,232,231,232,235,0
3030 DATA 228,228,235,235,231,225,225,225
```

TIPS TO THE TYPIST

1. When you type program lines into your computer, be sure to copy them *exactly* as written. Numbers, punctuation marks, and spaces are very important!

2. Remember to press RETURN or ENTER *after* every completed program line.

3. Run the program when you finish typing it in by typing RUN and pressing the RETURN or ENTER key. If the computer gives you an error message, don't panic. Mistakes can be fixed. List the program by typing the word LIST and pressing the RETURN or ENTER key and double-check each line. A foolproof way to correct a mistake is to type in the entire line again (including its line number). When you list the program again, you should find the new line in place of the old.

4. If you need more help, read the programming guide written for your computer. It will answer questions that can't possibly be covered here.

5. When all else fails . . . turn off the computer and relax.

WHAT'S IN STORE

NEW HARDWARE ANNOUNCEMENTS*

TRS-80 MODEL 2000/SMITH-CORONA DOT-MATRIX PRINTERS/ ECHO SPEECH SYNTHESIZER/MAGELLAN LIGHT PEN/ TRS-80 COLOR COMPUTER MULTI-PAK INTERFACE

COMPUTERS

TRS-80 Model 2000 Personal Computer

MANUFACTURER: Tandy Corp., 1800 One Tandy Center, Fort Worth, TX 76102; (817) 390-3885
PRICE: $2,750 (basic system)

Tandy/Radio Shack has jumped on the IBM-compatible bandwagon with its TRS-80 Model 2000. Its MS-DOS operating system, used by the IBM PC and a growing number of business computers, will run many business programs on the market. These include *dBase II*, a data-base management program; *Multiplan*, a spreadsheet program; *Home Accountant Plus*, a finance program from Continental Software; *Microsoft Windows*, a multifaceted productivity program; *PFS: File* and *PFS: Report*; and *Ovation*, an integrated spreadsheet, graphics, and word-processing package. Tandy says the TRS-80 2000's high-powered Intel 80186 16-bit microprocessor runs programs three times faster than other MS-DOS–based computers.

However, the TRS-80 2000 will not run programs or read files from other TRS-80 computers. This is a switch in marketing strategy for Tandy, whose products in the past have been generally compatible with much of the software developed for previous models.

The Model 2000 base system has 128K RAM memory and can be expanded to 768K; by comparison, the IBM PC's base system offers 64K memory, expandable to 768K. Also standard in the 2000 are two disk drives, and serial and parallel ports. A monochrome monitor ($249), color monitor ($799), and hard-disk storage system are optional.

**These products have been announced by manufacturers, but are not necessarily in the stores yet. Some products may still be under development, and others may be in test markets only. Call or write the manufacturer for expected date of delivery.*

INTERFACES

TRS-80 Color Computer Multi-Pak Interface

MANUFACTURER: Tandy Corp., 1800 One Tandy Center, Fort Worth, TX 76102; (817) 390-3885
PRICE: $180

If you like to switch between one cartridge and another on your TRS-80 Color Computer, you can do so more quickly with the Multi-Pak Interface. After inserting the interface into the Color Computer's cartridge slot, up to four Program Pak cartridges may be plugged in and selected with the flip of a switch.

PRINTERS

Smith-Corona Dot-Matrix Printers

MANUFACTURER: Smith-Corona, 65 Locust Ave., New Canaan, CT 06840; (203) 972-1471
PRICE: $395 (D-100); $595 (D-200); $795 (D-300)

Smith-Corona, the typewriter manufacturer that also makes the TP-II Plus letter-quality computer printer, is now branching out into the dot-matrix market. All three of its new models print in six different pitches (type size); offer emphasized or elongated print, proportional spacing, italics, superscripts (X^2) and subscripts (H_20), and true descenders (the tail on a "y" or a "g"); and can print in six foreign languages. They also offer both friction- and tractor-feed mechanisms, allowing use of either single sheets or perforated roll paper, respectively.

Where these printers differ is in printing speed, column width, and the size of their buffer memories. (Buffers store data in the printer so that the computer's memory is freed for your use.) Model D-100 prints 100 characters per second (cps) on a maximum 80-character line, and has a 132-character buffer. The D-100 has a parallel interface port, with a serial port as an option.

Model D-200 prints 120 cps on an 80-character line with a 2K-memory buffer, and comes with both parallel and serial ports. The D-300 prints 140 cps at a maximum 132-character line. It also has a 2K buffer, and offers both parallel and serial ports.

Tell your parents you're studying.

Introducing Wizware.™ Now you can have a blast on your computer and your parents won't mind.

Tell them you're catching up on your spelling or geography. You will be.

But here's what you'll *really* be doing! Chasing the Fuzzbomb around the country. Matching your wits against Max the Robot. Searching for secret messages deep beneath the sea. Or writing your own mystery.

Agent U.S.A.™
The Fuzzbomb is turning the U.S. into a nation of Fuzzbodies. As the top agent for an elite intelligence organization, only you can stop him. You crisscross the country by train in hot pursuit. But be careful! One wrong move and you'll become just another Fuzzbody. Geography was never this much fun!

Spelldiver.™
Deep beneath the sea lie giant words covered by a strange seaweed called lettermoss. You face sharp-toothed sharks and pesky flipper-nippers as you dive to the bottom and remove the lettermoss. The quicker you guess the words, the quicker you're safe.

Bannercatch.™
In a field bigger than the biggest football field, you and a friend take on chief robot Max and his robot raiders. Steal their flag before they steal yours and you win. But your strategy better be good!

Story Tree.™
Amaze your friends with a twist-a-plot story that you can write yourself. See how many twists and turns you can put into it.

So make your parents happy. Tell them you're studying. Just don't tell them how much fun you're having.

Look for Scholastic Wizware at your local computer store. *Or contact Scholastic Inc., 730 Broadway, New York, NY 10003, 212-505-3000.*

Scholastic™ Wizware

Agent U.S.A., Spelldiver, Bannercatch designed and developed by Tom Snyder Productions, Inc. Story Tree designed and developed by George Brackett. • Agent U.S.A., Spelldiver, Bannercatch available for Atari 800/1200/XL. Commodore, Apple, IBM versions available soon. • Story Tree available for Apple.

WHAT'S IN STORE
NEW HARDWARE

MISCELLANEOUS

ECHO Speech Synthesizers

MANUFACTURER: Street Electronics Corp., 1140 Mark Ave., Carpinteria, CA 93013; (805) 684-4593
PRICE: $150 (ECHO II); $200 (ECHO GP and ECHO PC)

The ECHO line of speech synthesizers offers voice/speech capability for most microcomputers, thus allowing your computer to "talk." Street's ECHO GP is the general-purpose model for connection to virtually all micros, though special interfaces are needed for hookup to a Commodore 64 or VIC-20. The ECHO PC is designed for the IBM PC, while the ECHO II works only with 48K Apples and compatible computers.

All ECHO speech synthesizers have four different voice modes, ranging from a robotic machine voice to a "natural" female voice with a 700-word vocabulary. This software is available on disk for $29.95, except for the GP model.

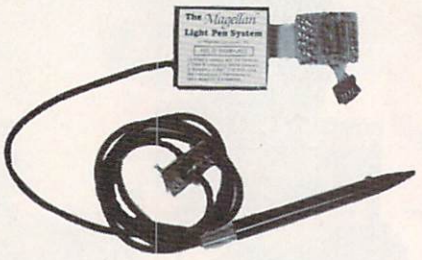
Both the GP and PC models are stand-alone, self-contained units with their own microprocessors, built-in speakers, text-to-speech firmware (built-in software), a serial interface, and a tutorial manual. Cables are supplied.

The ECHO II, for Apple IIs and compatibles, is a small circuit board that plugs into the back of an Apple. Its speaker can be secured inside the Apple computer's housing, or mounted externally. This package includes a disk with demonstration programs.

Magellan Light Pen System

MANUFACTURER: Magellan Computer, Inc., 4371 E. 82nd St., Suite D, Indianapolis, IN 46250; (317) 842-9138
PRICE: $190

For Apple II computers with 64K and a disk drive, Magellan introduces a high-resolution light pen. It has a push button that enables control over drawing without having to use



the keyboard. The light pen connects to the Apple's game port.

To use the light pen, you need software. Two packages, *Quick Draw* and *Amper-Pen*, are included with the pen. *Quick Draw* is a complete graphics-creation program; *Amper-Pen* allows you to incorporate light-pen operation into programs written in Applesoft BASIC.

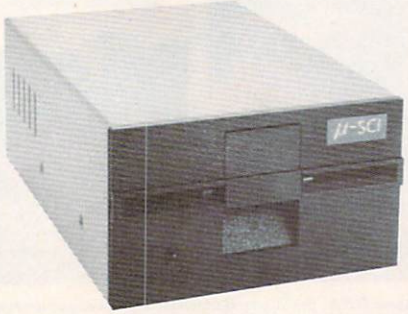
Micro-Sci Disk Drives (Apple)

MANUFACTURER: Micro-Sci, 2158 S. Hathaway St., Santa Ana, CA 92705; (714) 662-2801
PRICE: $345 (A2), $445 w/controller; $529 (A70), $629 w/controller; $569 (A82), $669 w/controller

Micro-Sci has announced several new disk drives for the Apple II plus and IIe computers. The new drives offer more storage and faster access to stored information than Apple disk drives, for less money. Micro-Sci's A2 model stores the same amount of data as an Apple drive (143K), but accesses the information three times faster under modified DOS, according to Micro-Sci.

The equally fast A70 model has a 286K storage capacity and offers 70 tracks for storage, twice as many as the Apple's. Model A82 has 80 tracks, with a storage capacity of 327K; it can boot and read most 35-track disks. Included with the A82 are utility programs to enable DOS 3.3, CP/M 2.23, CP/M 2.20B, and Pascal 1.1 usage.

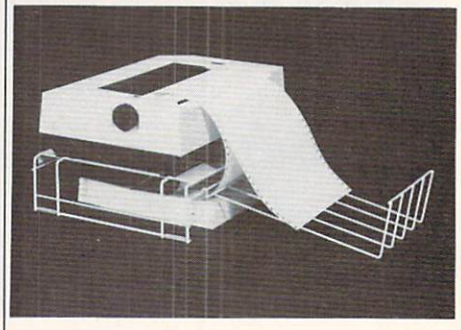
All Micro-Sci's disk drives plug into the Apple Disk II or Micro-Sci controller cards.



Paper Tamer (PT 80/900)

MANUFACTURER: Micromate Accessories, 5801 Duluth St., Suite 105, Minneapolis, MN 55422; (612) 544-5327
PRICE: $35 plus $2 shipping and handling

The Paper Tamer elevates your printer and stores up to 900 pages (depending on the grade of paper you use) under the printer. It allows the paper to move freely up and into the roller, and then into the paper catcher, which folds the paper neatly. Most 80-column dot-matrix printers can be used with this all-metal, light-beige device. You can order it directly from the company (enclose $2 for shipping).



SJT400 Random Access Player

MANUFACTURER: RCA, 30 Rockefeller Plaza, New York, NY 10020; (212) 930-4000
PRICE: $499

Videodisk players haven't sold nearly as well as analysts first expected, but the long-awaited connection with computer technology may change that. RCA's newly announced Random Access Player videodisk system comes with built-in microcomputers that allow it to accept "interactive" disks. These involve the viewer in game-like situations; and on "how-to" and educational disks, allow quick access to any of a disk's contents.

RCA is producing three interactive disks, while CBS Publishing, Walt Disney Home Video, and Paramount Pictures are expected to develop other programs. RCA also plans to market stereo music disks, which will allow the user to pick and choose selections in any order. Information is displayed on the TV screen to assist the viewer/listener in the process of programming "video concerts."

Jeff and Marilyn Mitchell "designed" their new program themselves. CodeWriter wrote all the computer code. The Mitchells' dream is thriving on fulfilling other people's wishes. Their new home business needs very special information fast: Which fantasies are still open? What's our next completion date? Can we get a list of all fantasies needing out of state travel?

They got it all—with no computer hassle.

And you can too, with CodeWriter. No programming. No. 'computerese'. At home or at the office, you create your own programs to handle any information you want—at your fingertips; Payables, receivables, inventory, credit cards, tax details, club or church records—always organized your way.

You work with CodeWriter in plain English. Simply 'draw' any screen layout, add any calculations you'd like done—or help messages you need—and you're done. CodeWriter writes all the BASIC code.

In minutes you've got YOUR OWN PROGRAM on YOUR OWN DISK. You don't need CodeWriter again until you want a new program.

You can begin with **Home FileWriter™** and expand to more complete business systems with full report and menu design features.

You can get CodeWriter for the Commodore 64®, Atari®, Apple®, IBM PC®, Commodore Business Machine®, Victor 9000®, and Kay Pro II®, computers. Prices range from $69 to $249.

You think this much power can't come this easy? There are thousands of CodeWriter systems in use all over the world—80% are first time computer owners. CodeWriter writes solutions the first time you try!

"This is our first business, our first computer, and our first program—and we really did it ourselves!"

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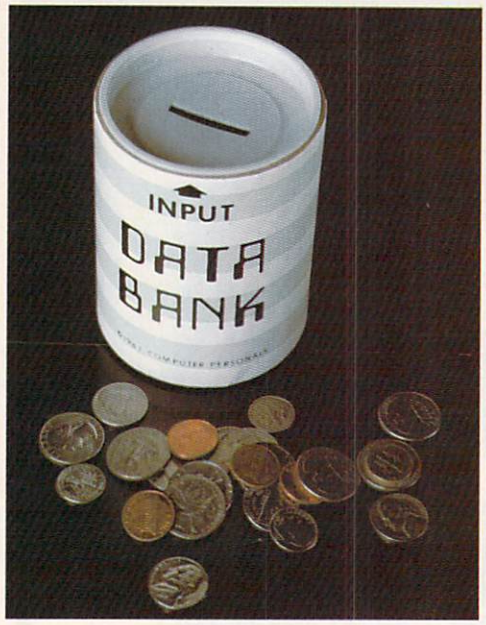
WHAT'S IN STORE



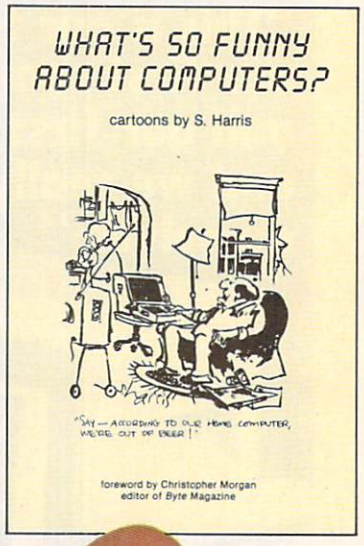
CURTIS WASHINGTON

INPUT ADDS UP

Nickels, dimes, and quarters won't buy you a peripheral, but they can help. Input your loose change into this cylindrical Data Bank and start saving for that computer, disk drive, monitor, printer, or software you've been eyeing. Data Banks are available for $2.50 from Computer Personals, P.O. Box 376, Southampton, PA 18966; (215) 947-6175.

HIGH-TECH HUMOR

You can't laugh off the computer age, but you can certainly laugh with it. Computer buffs and hackers, and even those bewildered by it all, will see themselves reflected in Sidney Harris' *What's So Funny About Computers?*, a book of computer cartoons. Harris' book is available for $6.95 at bookstores or through The Computer Museum Store, One Iron Way, Marlboro, MA 01752; (617) 467-7658.



CURTIS WASHINGTON

MONITORING TIME

There'll be no more losing track of time while seated at the monitor—thanks to these mini micro clocks. These timely, quartz digital clocks show the hour, minute, month, and date. Priced at $9.95, they're available from California Ltd. Enterprises, 23 Sweet Rain, Irvine, CA 92714; (714) 786-0346.

CURTIS WASHINGTON

DON'T BUG ME MUG
Here's a coffee mug that tells everyone you're on break. Pour a hot beverage into the mug, and the "Programmer On Duty" message is replaced by "Programmer Off Duty." You'll stay "off duty" until the mug's contents cool. Programmer mugs are available for $8.95 plus $2 shipping and handling through Sweet Gum, Inc., 15490 N.W. 7th Ave., Suite 204, Miami, FL 33169; (800) 237-9338.

IN CASE THERE'S A CHANGE IN THE WEATHER
These disks will warn you when your data's in danger. Exposed to high temperatures or excessive humidity, the Intelligent Disks' environment-sensitive tabs change color. A box of 10 single-sided double-density disks retails for $52.50 and is available from computer stores or the manufacturer: Omni Resources, Inc., 50 Howe Ave., Milbury, MA 01527; (800) 343-7620.

KICK UP DUST
Practice preventive maintenance, and keep your computer as good as new. The Dust-Off II System is a complete cleaning and maintenance kit that will cut down computer service and repair bills by blowing away dust, removing dirt, eliminating static charges, and cleaning hard-to-reach places. The kit is available for $42.50 and can be purchased at retail stores or through the manufacturer: Falcon, 1065 Bristol Rd., Mountainside, NJ 07092; (201) 233-5000.

WHAT'S IN STORE
SOFTWARE GUIDE
QUICK TAKES ON SOFTWARE—NEW AND NOTEWORTHY

Welcome to FAMILY COMPUTING's Software Guide, the most comprehensive listing available of two dozen of the newest, most noteworthy and/or best programs on the market. Our reviewers include families from all over the country who have judged the software according to the following criteria: long-term benefits and applications, adaptability, and advantages of using a computer for a given task. Programs have been evaluated and rated for their performance in each of the categories listed below. Detailed reviews of some programs follow the chart.

Here's a rundown of the ratings categories and what they mean: **O** = Overall performance, and refers to the software's performance given the limitations and capacities of the particular computer for which it is intended; **D** = Documentation, or the instructions and literature that accompany a program; **EH** = Error-handling, the software's capacity to accommodate errors made by the user—an especially important consideration with software for younger users; **GQ** = Graphics quality, also evaluated in light of each particular brand's graphics capabilities; **EU** = Ease of use after the initial learning period, which varies from computer to computer; **V** = Value for money, or how the software measures up to its price.

HOME BUSINESS AND HOME MANAGEMENT

Title Manufacturer Price	Brief description	Hardware/ Equipment required	Backup policy	Ratings O	D	EH	GQ	EU	V
THE BUDGETER Timex Computer Corp. P.O. Box 2655 Waterbury, CT 06725 (800) 248-4639 $15.95 © 1982 $24.95 (2068 cassette) $34.95 (2068 cartridge)	Track monthly actual versus budgeted expenditures in 18 categories. Requires considerable time and effort to make the most of this program. —ROBERTS	TS 1000, 16K (cassette). Also available for TS 1500, 16K (cassette); TS 2068, 16K (cassette or cartridge).	Defective materials replaced free.	★★★	★★★	★★★	★★	D	★★★
DATADEX The Software Guild 2935 Whipple Rd. Union City, CA 94587 (800) 341-4000 $150 © 1983	File, store, and retrieve mailing lists, health records, etc. with information management system that allows you to configure your own screen for display of data. —WILSON	Apple II/II plus/IIe, 48K (disk).	Defective disks replaced free; $10 fee for backup or if user-damaged.	★★	★★	★	★★★	D	★★
FAMILY ROOTS Quinsept, Inc. P.O. Box 216 Lexington, MA 02173 (617) 862-0404 $185 © 1982	Trace family lineage, keep files on birth, death, marriage, occupation of family members with comprehensive tool for creating and maintaining cross-indexed genealogical records.† —WILSON	Apple II/II plus/IIe/III w/ emulator, 48K (disk). Also available for IBM PC, 128K (disk); PC*jr*, 128K (disk).	Defective disks replaced free w/in 90 days; $7 per disk thereafter; user makes backup.	★★★	★★★★	★★	n/a	A	★★★
OMNIWRITER & OMNISPELL HesWare 150 N. Hill Dr. Brisbane, CA 94005 (800) 624-2442 $69.95 © 1983	Type newsletters, term papers, simple or sophisticated writing tasks with this high-quality word processor, complete with such valuable features as an automatic spelling checker.† —AKER	Commodore 64 (disk). Versions planned for IBM PC*jr*, 48K (disk) and ADAM, 48K (cassette).	Defective materials replaced free w/in six months; $5 fee if user-damaged or for backup.	★★★	★★★	★★	n/a	A	★★★
SPELL WIZARD Datasoft 19808 Nordhoff Pl. Chatsworth, CA 91311 (818) 701-5161 $49.95 © 1983	Check and correct spelling in word-processed documents. Spelling checker contains over 33,000 words, with room for 1,000 user-defined ones. —VAN DE CARR	Atari 400/800/1200XL, 32K (disk).	$30 replacement fee for user-damaged disks; backup copy available for $5 per disk.	★★★	★★★★	★★	n/a	E	★★★★
TEXT WIZARD Datasoft 19808 Nordhoff Pl. Chatsworth, CA 91311 (818) 701-5161 $49.95 © 1981	Process schoolwork, correspondence, any form of writing with easy-to-learn word processor, featuring consistent command structure, easy delete and move procedures.† —VAN DE CARR	Atari 400/800, 32K (disk). Compatible w/three printers: Epson MX-80, Centronics 737, and Atari 825.	$30 replacement fee for user-damaged disks; backup copy available for $5.	★★★★	★★★★	★★★	n/a	A	★★★★

RATINGS KEY **O** Overall performance: **D** Documentation: **EH** Error-handling: **GQ** Graphics quality: **EU** Ease of use: **V** Value for money: ★ Poor: ★★ Average: ★★★ Good: ★★★★ Excellent: n/a Not applicable: E Easy: A Average: D Difficult: † Longer review follows chart

READER'S DIGEST INTRODUCES PLAY-AND-LEARN SOFTWARE FOR A VERY TOUGH AUDIENCE.

In the eyes of any red-blooded, American four-five-or-six-year-old, computer software is nothing more than a new toy. And when it comes to a new toy, kids have never been known to fool around. It's either good or bad, fun or boring, worth playing with or not, right from the start.

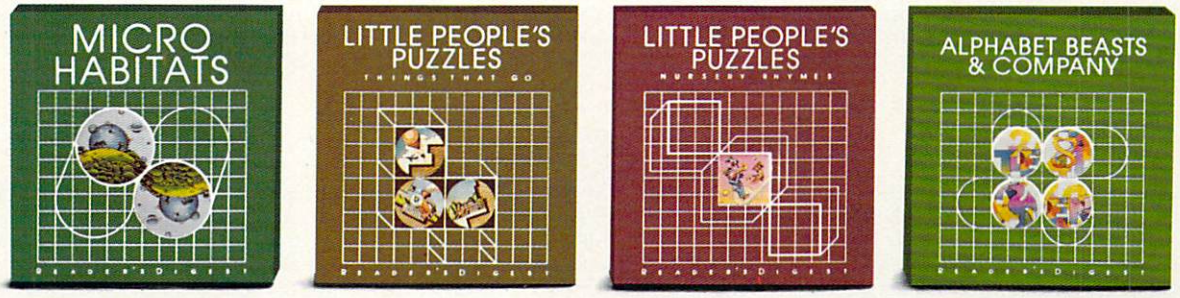
Nothing in between and no bones about it.

So when we created our early learning series, we did it without any illusions. And, judging from the kids who've tried our games so far, there's not a dull learning tool in the group.

Each game is fun. And worth playing over and over. So our programs continually reinforce early learning skills along with basic computer commands. And unlike some other early learning programs, Reader's Digest Software™ games are designed so that even non-readers can follow the fun.

Whether it's Little People's Puzzles™ for pleasure, Micro Habitats,™ the creative construction set, or kooky, unspooky Alphabet Beasts and Company,™ there's a lot of color, animation, sound and even music to turn our toughest customers into a captive audience. Look for it now at your software store or call Customer Service at 800/431-8800. (In NY, AK, HI: 914/241-5727.)

SOFTWARE GOOD ENOUGH TO GO OUT AND BUY A COMPUTER FOR.



Little People's Puzzles, Alphabet Beasts and Company, and Micro Habitats are available for Apple® II, II Plus, IIe: 48K and disk drive, and Commodore™ 64 Machine and disk drive. Color monitor is required for Little People's Puzzles, preferred for Alphabet Beasts and Company. Color monitor and joystick preferred for Micro Habitats. Alphabet Beasts and Company, and Micro Habitats available for IBM® PC and PCjr in spring, 1984. Warranty information available upon request by writing to: Reader's Digest Services, Inc., Microcomputer Software Division, Pleasantville, New York 10570.

READER'S DIGEST

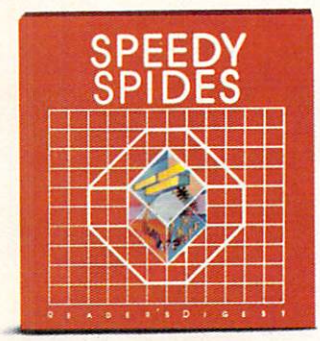
SOFTWARE GUIDE

EDUCATION/FUN-LEARNING

Title Manufacturer Price	Brief description	Hardware/ Equipment required	Backup policy	Ratings O	D	EH	GQ	EU	V
BOTTICELLI Krell Software Corp. 1320 Stony Brook Rd. Stony Brook, NY 11790 (516) 751-5139 $34.95 © 1983	Kids ages 10+ use computer to quiz opponents in simulation artificial-intelligence program that forces players to think about similarities and differences. —MORRIS	Apple II plus/IIe, 48K (disk). Also available for Commodore 64 (disk).	Defective disks replaced free w/in 30 days; $10 fee for backup or if user-damaged.	★ ★	★	★ ★	n/a	A	★ ★
HIGHRISE Micro Learn 2699 Skokie Valley Rd. Highland Park, IL 60035 (312) 433-7550 $30 © 1983	Kids ages 10+ build towers by balancing assorted-shaped blocks on platform, paying attention to relative shape and volume. —DELSON	Apple II/II plus/IIe/III w/emulator, 48K (disk). Also available for Atari 400/800/1200XL, 32K (disk); Commodore 64 (disk).	Defective disks replaced free; $5 fee if user-damaged.	★ ★ ★	★ ★	★	★ ★	E	★ ★ ★
MATH MAZE DesignWare 185 Berry St. Bldg. 3, Suite 158 San Francisco, CA 94107 (415) 546-1866 $39.95 © 1983	Kids ages 6–11 travel through mazes, practicing basic addition, subtraction, multiplication, and division skills. Use one of 40 mazes of varying difficulty levels, or create your own.† —MORRIS	Apple II/II plus/IIe/III w/emulator, 48K (disk). Also available for Atari 400/800/1200XL, 48K (disk); Commodore 64 (disk); IBM PC 64K (disk, color card required). Version planned for PC*jr*.	Defective disks replaced free w/in 90 days; backup copy available for $12.	★ ★ ★ ★	★ ★ ★	★ ★ ★	★ ★	A	★ ★ ★ ★
MUSIC CONSTRUCTION SET Electronic Arts 2755 Campus Dr. San Mateo, CA 94403 (415) 571-7171 $40 © 1983	Kids and adults (music knowledge preferred) practice fundamentals of music notation and composition in versatile, sophisticated, entertaining music-making package.† —MORRIS	Apple II/II plus/IIe, 48K (disk). Also available for Atari 400/800/1200XL, 48K (disk); Commodore 64 (disk). Mockingboard sound-effects generator recommended for Apple.	Defective disks replaced free w/in 90 days; $7.50 fee thereafter.	★ ★ ★	★	★ ★ ★	★ ★ ★	A	★ ★ ★ ★
SHIPS AHOY Unicorn Software Co. 1775 E. Tropicana Ave., #8 Las Vegas, NV 89109 (702) 798-2727 $39.95 © 1983	Kids ages 5–10 practice numbers in series of simple activities with clever music. Package includes primitive graphics program. —CHADWICK	Atari 400/800/1200XL, 48K (disk). Also for Apple II/II plus/IIe, 48K (disk); Commodore 64 (disk); IBM PC, 64K (disk, color card required).	Defective disks replaced free w/in 30 days; $5 fee thereafter or if user-damaged.	★ ★	★ ★ ★	★ ★ ★	★ ★	E	★ ★
SONGWRITER Scarborough Systems 25 N. Broadway Tarrytown, NY 10591 (914) 332-4545 $39.95 © 1983	Musicians and nonmusicians ages 5+ play with notes, creating melodies and compositions and learning music basics in simple music-making package that simulates player piano.† —MORRIS	Apple II/II plus/IIe/III w/emulator, 48K (disk). Also available for Atari 800/1200XL, 48K (disk); Commodore 64 (disk); IBM PC, 64K (disk).	Defective or user-damaged disks replaced free w/in 30 days; $6 fee thereafter.	★ ★ ★ ★	★ ★ ★	★ ★ ★ ★	★ ★ ★	A	★ ★ ★ ★
SPELLAGRAPH DesignWare 185 Berry St. Bldg. 3, Suite 158 San Francisco, CA 94107 (415) 546-1866 $39.95 © 1983	Seven- to 14-year-olds practice spelling in games that employ the rebus (picture puzzle). Word lists can be revised and expanded.† —MORRIS	Apple II/II plus/IIe/III w/emulator, 48K (disk). Also available for Atari 400/800/1200XL, 48K (disk); Commodore 64 (disk); IBM PC, 64K (disk, color card required). Version planned for PC*jr*.	Defective disks replaced free w/in 90 days; backup copy available for $12.	★ ★ ★	★ ★ ★	★ ★ ★ ★	★ ★ ★	A	★ ★ ★
SPELLAKAZAM DesignWare 185 Berry St. Bldg. 3, Suite 158 San Francisco, CA 94107 (415) 546-1866 $39.95 © 1983	Kids ages 7–14 practice vocabulary by scampering through maze, picking up letters to spell words, racking up points for speed and accuracy. Use preprogrammed list of words or create your own.† —MORRIS	Apple II/II plus/IIe/III w/emulator, 48K (disk). Also available for Atari 400/800/1200XL, 48K (disk); Commodore 64 (disk); IBM PC, 64K (disk, color card required). Version planned for PC*jr*.	Defective disks replaced free w/in 90 days; backup copy available for $12.	★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★	A	★ ★
TEN LITTLE ROBOTS Unicorn Software Co. 1775 E. Tropicana Ave., #8 Las Vegas, NV 89109 (702) 798-2727 $39.95 © 1983	Kids 2–7 (with help from adults) practice number and letter recognition in a series of activities that includes unsophisticated graphics program. —CHADWICK	Atari 400/800/1200XL, 48K (disk). Also available for Apple II/II plus/IIe, 48K (disk); Commodore 64 (disk); IBM PC, 64K (disk, color card required).	Defective disks replaced free w/in 30 days; $5 fee thereafter or if user-damaged.	★ ★	★ ★ ★	★ ★ ★	★ ★	E	★ ★

RATINGS KEY **O** Overall performance: **D** Documentation: **EH** Error handling: **GQ** Graphics quality: **EU** Ease of use: **V** Value for money: ★ Poor: ★★ Average: ★★★ Good: ★★★★ Excellent: n/a Not applicable: E Easy: A Average: D Difficult: † Longer review follows chart

INTRODUCING QUIZZES, CONTESTS AND SPIDERS.



Maybe computer quizzes haven't made it to your list of all-time game favorites yet. But Speedy Spides™ is different.

First, it gets a couple of swinging spiders in on the act. And second, two kids can pounce on words, or zero in on numbers, together. In direct competition! If neither player speeds a spide to the correct answer, the program supplies it. You can play Speedy Spides alone, too, but the thrill of the contest makes it even better. There are nine fact files on the disk—plus a big bonus editor that lets you enter up to 26 new quizzes into play. On almost any subject. So any-brainy-body in the family can play.

Reader's Digest Software™ created Speedy Spides to help take the bugaboos out of learning. And to give everybody at home a chance to play a fact-and-fun filled game together. Look for it at your software store or call Customer Service at 800/431-8800. (In NY, AK, HI: 914/241-5727.)

Warranty information available upon request by writing to: Reader's Digest Services, Inc., Microcomputer Software Division, Pleasantville, N.Y. 10570.

Speedy Spides runs on Apple®II, II Plus, IIe: 48K and disk drive and Commodore 64™ and disk drive. Use of paddles optional.

SOFTWARE GOOD ENOUGH TO GO OUT AND BUY A COMPUTER FOR.

R E A D E R ' S D I G E S T

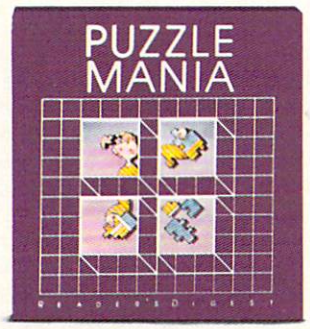
GAMES

Title Manufacturer Hardware	Brief description	Hardware/ Equipment required	Backup policy	Ratings O	D	EH	GQ	EU	V
BEACH-HEAD Access Software 925 E. 900 S. Salt Lake City, UT 84105 (801) 532-1134 $34.95 © 1983	Maneuver ships through treacherous waters, sink vessels, and destroy opponent's stronghold in strategy shoot-'em-up that demands calm decision-making and accurate aim from players over 13, younger with adult help.† —DELSON	Commodore 64 (disk or cassette).	Defective material replaced free; $7.50 fee if user-damaged.	★★★	★★★	★★	★★★	A	★★★
BILESTOAD Datamost, Inc. 8943 Fullbright Ave. Chatsworth, CA 91311 (213) 709-1202 $39.95 © 1983	As a robot-like warrior, challenge computerized or human opponent warrior to exciting,if occasionally bloody,hand-to-hand combat on islands littered with magic symbols.† —DELSON	Apple II plus/IIe, 48K (disk). Also available for Commodore 64 (disk). Apple II plus requires joystick.	Defective disks replaced free.	★★★	★★★	★★★	★★★	A	★★★
COMBAT LEADER Strategic Simulations, Inc. 883 Stierlin Rd. Bldg. A-200 Mountain View, CA 94043 (415) 964-1353 $39.95 © 1983	As platoon commander of tanks and armored personnel carriers, fight the enemy in terrain that has been preprogrammed or that you create yourself. Sophisticated war game requires time and patience. Good for ages 12+, younger with adult help.† —DELSON	Atari 400/800/ 1200XL, 48K (disk or cassette). Also available for Commodore 64 (disk or cassette).	Defective material replaced free w/ in 10 days; backup copy available for $10.	★★★★	★★★	★★★	★★★	D	★★★★
JUMP JET Avant-Garde Creations, Inc. 1907 Garden Ave. Eugene, OR 97403 (503) 345-3043 $29.95 © 1983	Pilot a heavily armed, powerful jet over enemy attack ships, obliterate ground forces, and liberate loyal island territory in exciting action game, good for ages 12+.† —DELSON	Apple II/II plus/IIe, 48K (disk). Joystick optional.	Defective disks replaced free w/in 30 days; $5 fee if user-damaged.	★★★	★★	★★★	★★	E	★★★
JUMPMAN Epyx 1043 Kiel Ct. Sunnyvale, CA 94089 (408) 735-1600 approx. $40 © 1982	Jump and leap your way through 30 separate screens, defusing bombs and avoiding assorted perils to save Jupiter headquarters in one of the best ladder games to date, great for ages 8+. —DELSON	Commodore 64 (disk). Also available for Apple II/II plus/IIe, 48K (disk); Atari 400/800/1200XL, 48K (disk), 32K (cassette). Joystick required.	Defective material replaced free w/ in 30 days; $5 fee thereafter or if user-damaged.	★★★★	★★	★★	★★★	A	★★★
THE LAST GLADIATOR Electronic Arts 2755 Campus Dr. San Mateo, CA 94403 (415) 571-7171 $35 © 1983	As gladiator or gladiatrix, choose your weapon and take on everything from octopuses to snakes and 'droids in this clever action game with varying degrees of difficulty, good for ages 10+. Game is flawed by one objectionable characterization (see my games column, p. 26). —DELSON	Apple II/II plus/IIe, 48K (disk).	Defective disks replaced free w/in 90 days; $7.50 fee thereafter.	★★★	★	★★	★★	D	★★
M*A*S*H Texas Instruments P.O. Box 53 Lubbock, TX 79408 (800) 842-2737 $29.95 © 1983	Fly helicopters to rescue wounded combatants, operate to remove small shell fragments. Flexible system allows for rescue only, surgery only, or combination of both. Best suited for ages 8+. —DELSON	TI-99/4A, 16K (cartridge).	Defective materials replaced free w/in 90 days; $13 fee thereafter.	★★	★★★	★★	★★	E	★★
SPELUNKER Micro GraphicImage 12640 E. Northwest Hwy. Suite 410 Dallas, TX 75228 (214) 270-6638 $39.95 © 1983	Travel into the depths of a cave in search of hidden treasure, outwitting monsters, navigating along an obstacle-laden path in entertaining ladder-type game with rich variety of screens, for ages 10+. —DELSON	Atari 400/800/1200XL, 48K (disk). Joystick required.	Defective disks replaced free w/in 30 days; $5 fee if user-damaged.	★★★	★★	★★	★★★	D	★★★
THE STANDING STONES Electronic Arts 2755 Campus Dr. San Mateo, CA 94403 (415) 571-7171 $35 © 1983	Set forth on solitary quest in search of the Grail. Take on foes such as footpads and panes of glass in humorous, if simplistic, version of classic *Wizardry* series.† —DELSON	Apple II/II plus/IIe, 48K (disk).	Defective disks replaced free w/in 90 days; $7.50 fee thereafter.	★★	★★★	★★	★★	A	★★

RATINGS KEY **O** Overall performance: **D** Documentation: **EH** Error handling: **GQ** Graphics quality: **EU** Ease of use: **V** Value for money: ★ Poor: ★★ Average: ★★★ Good: ★★★★ Excellent: n/a Not applicable: E Easy: A Average: D Difficult: † Longer review follows chart

INTRODUCING PUZZLE MANIA. 7 GREAT PUZZLES CREATED BY US.

THE OTHERS BY PUZZLE MANIACS.



Puzzle Mania™ is a challenging jigsaw program for puzzle lovers.

Puzzle Mania is also an inspired jigsaw program for puzzle creators.

Because in addition to the seven great puzzles on the disk, you can create your own pictures on the screen, paint them in sixteen different colors and let the program turn them into puzzles to save on a separate disk.

Each Puzzle Mania puzzle (including your own creations) can be played on six levels of difficulty. There's help when you need it. And all turns are tallied. So you can turn the puzzle play into competitive play. If you have to part with a puzzle before it's finished, there's a stop-and-save feature built into the program, too.

Reader's Digest Software™ created Puzzle Mania for kids and their friends and their parents and their grandparents and everybody else who likes fun and games. Look for it at your software store or call Customer Service at 800/431-8800. (In NY, AK, HI: 914/241-5727.)

SOFTWARE GOOD ENOUGH TO GO OUT AND BUY A COMPUTER FOR.

R E A D E R ' S D I G E S T

Warranty information available upon request by writing to: Reader's Digest Services, Inc., Microcomputer Software Division, Pleasantville, N.Y. 10570. Puzzle Mania runs on Apple® II, II Plus, IIe: 48K and disk drive, Commodore™ 64 Machine and disk drive. Color monitor required. IBM® PCjr version available late spring. Puzzle Mania and Reader's Digest Software are trademarks of The Reader's Digest Association, Inc. Apple is a registered trademark of Apple Computer, Inc. Commodore is a trademark of Commodore Electronics Limited. IBM is a registered trademark of International Business Machines, Inc.

WHAT'S IN STORE SOFTWARE REVIEWS

On the following pages, you'll find in-depth reviews of some of the programs listed in the Software Guide. Refer back to the Guide on page 118 for information such as backup policies and addresses of software manufacturers.

HOME BUSINESS & HOME MANAGEMENT

Family Roots

HARDWARE REQUIREMENTS: Apple II/II plus/IIe/III w/emulator. Also available for IBM PC, 128K (disk); IBM PC*jr*, 128K (disk).
MANUFACTURER: Quinsept, Inc.
PRICE: $185

Perhaps it's a function of growing older, but recently I've become more and more interested in knowing about my family's origins. And though I've quizzed my parents, I haven't been able to figure out how to best organize and record all the information I've accumulated. Creating and maintaining a set of records that mushrooms with each generation traced is an overwhelming task.

In many ways, *Family Roots* typifies the capacity of the computer to reduce the tediousness of some tasks. The program allows you to create, edit, and index records for individual family members, or search through records of individuals married in a certain month, or those with a common last name, for instance. You can generate four different kinds of genealogy charts on the basis of your stored data. Enter new information and the program automatically readjusts corresponding records. For instance, when I added my record to the files, it automatically designated me as a child in my mother's files. I felt as if I were being well taken care of. To top it off, the manual is a model of orderly, complete documentation.

You may have reservations about the cost of this program, as I did. Let me assure you, I've found it to be worth every penny. —DAVID WILSON

OmniWriter

HARDWARE REQUIREMENTS: Commodore 64 (disk). Versions planned for ADAM, 48K (cassette) and IBM PC*jr*, 48K (disk).
MANUFACTURER: HesWare
PRICE: $69.95

OmniWriter has a lot going for it. It's simple enough for a beginner and sophisticated enough for an experienced user.

If your writing is limited to the yearly family newsletter, you can print out "Dear Aunt Gloria" on the first letter and easily change it to "Dear Uncle Bob" the second time through. If your use tends more towards term papers, you can save time by typing WSH on rough drafts and have the computer automatically replace each occurrence of those letters with "William Shakespeare's Hamlet" for the final copy. If a few typos escape your notice, put your text through the automatic spelling checker to weed them out.

One of *OmniWriter*'s special features is something called "automatic formatting." Many word processors split words at the end of each line, though they're not printed out that way. With *OmniWriter*, they're automatically adjusted on screen as well. I also appreciated the placement of faint dots to mark typed blank spaces. (They're often hard to keep track of.)

OmniWriter is troublesome when it comes to dealing with your disk drive. You can't simply erase a file or rename it. Instead, you have to issue cryptic disk commands. If you use it enough, you'll accustom yourself to these seemingly mysterious procedures. Then you'll find that it's a lot of word-processing power for the money. —SHARON AKER

Text Wizard

HARDWARE REQUIREMENTS: Atari 400/800, 32K (disk); compatible w/ three printers: Epson MX-80, Centronics 737 and Atari 825.

Many word processors boast a long list of features, only a small percentage of which the average user would need—for example, options to delete letters, words, sentences, or paragraphs, where a simple "delete-text" option would be sufficient. *Text Wizard* contains all the features I feel are necessary for most applications, such as memo, letter, and term-paper writing. And it doesn't have all the fat that makes for harder-to-use, and more expensive programs.

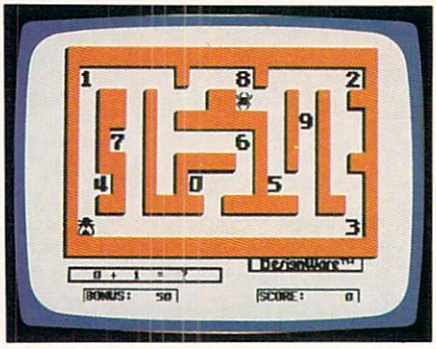
It took me about 15 minutes to learn how to use *Text Wizard*. Although it doesn't have on-screen menus (list of options), it does come with a reference card that clearly explains all the commands, and a manual that is clear and concise. Once you get used to the system, which is consistent and sensible, you'll find yourself moving easily through text, editing, erasing, and adding words. To move a block of text, for example, you simply move the cursor to the beginning of the words you wish to move, hold the START key and press the "M" key. After that, you move the cursor to the end of the words, hold down the SELECT key and press the "M" key. Then to place the text in a new location, hold down the OPTION key and press the "M" key again. The process of duplicating text follows the same procedures, except that you hit the "D" key instead of the "M" key.

In addition, the package includes underlining, and double-column printing. These enhance *Text Wizard*'s usefulness as a lean and easy way to process correspondence, simple newsletters, and term papers. —DEAN VAN DE CARR

EDUCATION/ FUN LEARNING

Math Maze

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk). Also available for Atari 400/800/1200XL, 48K (disk); Commodore 64 (disk); IBM PC, 64K (disk); IBM PC requires color card. Version planned for PC*jr*.
MANUFACTURER: DesignWare
PRICE: $39.95



You're a fly on the outside of a web-like maze littered with the numbers 0–9. The problem 9 × 8 = ? appears at the bottom of the screen, and you have to buzz about the web picking up the digits that fit the equation. The more time you take, the fewer points you'll earn.

This is just one of 40 mazes created to challenge kids up to about the fifth-grade level, or 11 years old, in one of the four different basic math skills. Degrees of difficulty range from relatively easy to downright di-

SWIG©

SOFTWARE WRITERS INTERNATIONAL GUILD

THE LARGEST PAID MEMBERSHIP PROGRAMMERS GUILD - OVER 5,000 MEMBERS WORLDWIDE!!

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(1) $10,000 PROGRAMMING CONTEST (Members only)

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(11) AGENT (**SWIG** can represent you in sales to software publishers)

(12) 24 HOUR - 7 DAY BULLETIN BOARD SYSTEM (BBS) ACCESSIBLE BY COMPUTER FREE

(13) AND MORE!!!!

MEMBERSHIP APPLICATION FOR SOFTWARE WRITERS INTERNATIONAL GUILD

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

PHONE # ( ) _____

- CLASSIFICATION:

  ☐ NOVICE ☐ BEGINNER TO ADVANCED

  ☐ ADVANCED WITH ON THE JOB EXPERIENCE ☐ RESEARCH/SCIENTIST

- WHAT EQUIPMENT DO YOU HAVE EXPERIENCE WITH &/OR ACCESS TO &/OR PLAN TO BUY?

  ☐ MAINFRAME ☐ MINI ☐ MICRO ☐ DESIGN/R&D

  BRAND NAME(S): ☐ IBM ☐ XEROX ☐ APPLE ☐ TI

  ☐ COMMODORE ☐ RADIO SHACK ☐ ATARI ☐ OSBORNE

  ☐ TIMEX/SINCLAIR ☐ NORTH STAR ☐ HEWLETT PACKARD

  ☐ OTHER _____

- AREAS OF INTEREST:

  ☐ DATA PROCESSING ☐ BUSINESS APPLICATIONS ☐ GRAPHICS

  ☐ LEGAL ☐ VOICE ☐ MEDICAL ☐ APPLIANCE (HOME) CONTROL

  ☐ ROBOTICS ☐ GAMES ☐ MUSIC ☐ R&D ☐ OTHER _____

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abolical, and special options allow you to alter or create new mazes or even make the maze walls invisible. All these variations make for a flexible method for getting kids to practice arithmetic. It's useful for the highly skilled player looking for new challenges, as well as the very young child who may need lots of easy mazes in order to get started.

Everything about *Math Maze* seems to have been carefully considered. The multiplication problems, for instance, are presented in progressive degrees of difficulty, the way they are at school. It's easy to select which maze and which skills to practice. And it's always possible to hit ESC to get out of a maze or series of problems that have been mastered or chosen in error. These are all desirable characteristics in a game intended for younger children. They came in handy for me, too. This is honestly the first time that I couldn't think of a useful feature that hadn't been included already! —TONY MORRIS

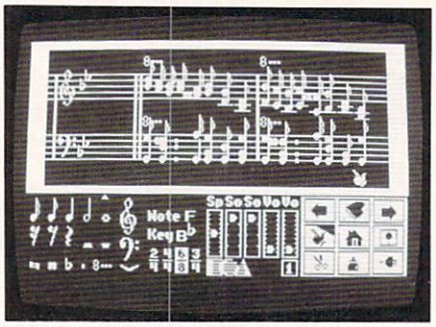
Music Construction Set

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk). Also available for Atari 400/800/1200XL, 48K (disk); Commodore 64 (disk); Mockingboard highly recommended for Apple.
MANUFACTURER: Electronic Arts
PRICE: $40

With a screen display that looks like the dashboard of a James Bond car, the *Music Construction Set* fairly begs you to experiment with musical sounds. The disk includes a variety of compositions that you can load and play simply for the fun of listening. The instruction manual's always urging you to experiment and try your own ideas—take an existing song and change the key, change notes, or rearrange the measures.

It's tempting to call *MCS* an instrument rather than "software." A brief tutorial leads you through some of the basic procedures for entering notes; changing what you've written; altering time-signatures, sound quality, or volume; changing keys, building chords, and so on. Using standard musical notation, and the pointing finger controlled through the joystick or keyboard, you can plunk down a "C" here, an "E" there, add some unusual chords, try different tempos, and more.

With all its potential, it's difficult to understand why *MCS*' documentation is so insufficient. The program really deserves a detailed tutorial, which would guide the complete novice through all its clever nooks and crannies. Instead, you get a 13-page manual that tells you to study an accompanying reference card "to learn how to use the on-screen hand to build and play music"! I'm not a computer expert, but I'm not a rank beginner either. Still, it took me a full hour before I could figure out how to get things going. After many hours of alternating fun and frustration, I'm still not confident I know how to fully tap the power of *MCS*.

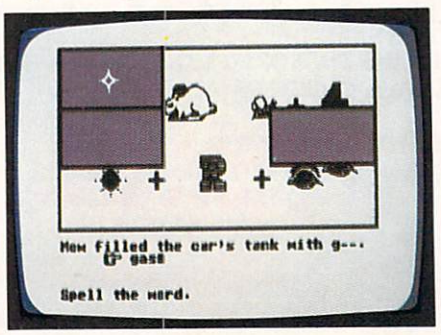


Without the desired documentation, the program's still a good value, provided you're willing to use trial and error and you have a fairly high tolerance level for frustration.
—TONY MORRIS

Spellagraph and Spellakazam

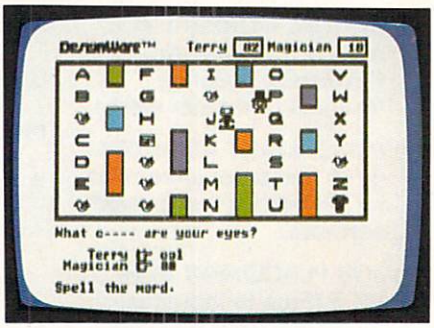
HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk). Also available for Atari 400/800/1200XL, 48K (disk); Commodore 64 (disk); IBM PC, 64K (disk).
MANUFACTURER: DesignWare
PRICE: $39.95 each

These two programs are twins. They're vocabulary- and spelling-practice programs that use the same lists of words and teach the same skills. Is one game better than the other? A lot probably depends on the tastes of the user, but I think that most young players will find *Spellagraph* more interesting and motivating than *Spellakazam*.



Spellagraph uses something called a rebus to motivate seven- to 14-year-old children to learn to spell. These puzzles combine pictures with words to represent a phrase. You know: an eye followed by the letter "H", then an ear and a letter "U" to represent "I hear you." At the start of each game, the computer hides a rebus behind a screenful of squares. The rebus is revealed square by square as you correctly spell the missing word in sentences such as THE CAT R —— AFTER THE MOUSE.

This simple idea is enhanced by an intricate scoring system. You may earn a point for each word spelled correctly, but every time you make an incorrect guess about the phrase



represented by the rebus, you'll be penalized a point. This encourages kids to develop a strategy for solving puzzles. Higher skill levels raise the challenge by covering the rebus with a greater number of smaller squares.

In *Spellakazam*, kids spell the mystery word by scurrying through a maze, picking up the correct letters and putting them into a hat at a far end of the maze. The game requires speed in order for the player to outmove a magician racing toward the hat. The faster the word is spelled, the more points gained.

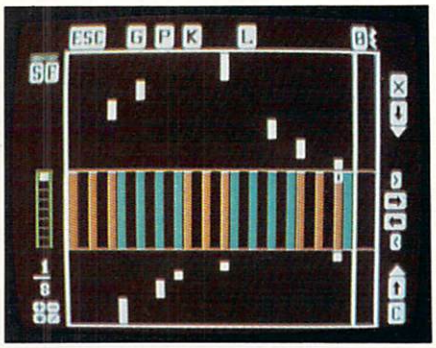
Both games draw from a list (limited, in my opinion) of 400 words and allow you to create your own lists to teach such things as place names or foreign languages vocabulary. Other strong features include easy-to-use on-screen instructions for getting about the programs, and easy access to the ESC key to exit games, a blessing when it comes to satisfying younger, impatient or easily frustrated spellers.

Younger kids may find *Spellakazam*, with its cute graphics and clever visual rewards, more entertaining. *Spellagraph*, with its emphasis on strategy and planning and its greater variety of skill levels, will capture the imagination of older children. —TONY MORRIS

SongWriter

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk). Also available for Atari 800/1200XL, 48K (disk); Commodore 64 (disk); IBM PC, 64K (disk).
MANUFACTURER: Scarborough Systems.
PRICE: $39.95

Occasionally a piece of software comes along that is in a class by itself. *SongWriter* is one of these. Exemplifying fun-learning at its best, it fosters joy in exploring musical sounds, excitement in trying musical ideas, and confidence in your musical creativity and originality.



A "Quick Start" chapter at the beginning of the manual allows you to sit down and start making music right away. Your notes make holes in an imaginary piano roll that scrolls up the screen, just like a player piano. Long notes make long holes; short notes make short holes. Low notes make holes at the left of the screen, high notes toward the right. This may seem odd if you're used to standard musical notation, but it turns out to be one of the great strengths of the program. Since it doesn't rely on standard notation, it can be used by anybody, regardless of musical experience. The connections between the visuals and the sounds they represent invite creativity and experimentation.

SongWriter's presented as a tool for you to use as you wish, rather than as a method someone else has decided you should use to learn music. In addition to learning the basics of writing, editing, saving, and playing back songs, you will explore different time signatures, tempos, scales, and keys. A set of fun-learning activities rounds out each chapter's presentation of a new concept. The manual even includes a glossary of musical terms and a list of possible error messages.

Drawbacks are minor in comparison to this program's advantages. *SongWriter* plays only one note at a time. And the five-year-olds for whom the software is supposedly accessible will find it difficult going on their own. Still, these faults do not detract significantly from an otherwise first-rate piece of software.

—TONY MORRIS

GAMES

Beach-Head

HARDWARE REQUIREMENTS: Commodore 64 (disk or cassette).
MANUFACTURER: Access Software
PRICE: $34.95

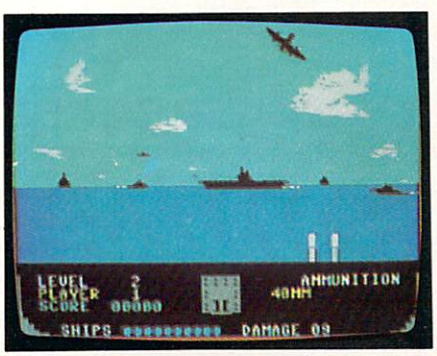
Here's a strategy/shoot-'em-up game that does for armed combat what *Microsoft Decathlon* did for sports. In order to win the game you must beat the computer in five "events": 1) Maneuvering your ships through a mine field while being shot at by torpedoes (this first event is optional but helps your chances later in the game); 2) shooting down attacking enemy aircraft; 3) sinking enemy ships in a naval artillery duel; 4) navigating your tanks (which have been put ashore by your surviving ships) through enemy-controlled territory; 5) destroying the enemy stronghold.

Beach-Head requires calm decision-making and accurate shooting and steering abilities. Its animated graphics add to the excitement.

Each different challenge you face requires extensive practice, but fortunately, the game is set up so that you can work on areas in which you're having trouble. Just run the demo program and start play at whatever point you wish.

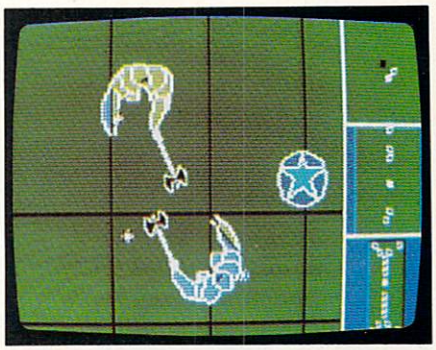
While not an easy game to master, it can be played immediately—an especially popular feature among those who hate reading the rules. A few rounds will give you a sense of where you need practice. The game is suitable for players older than 10, although those younger than 13 may require adult assistance.

—JAMES DELSON



Bilestoad

HARDWARE REQUIREMENTS: Apple II plus/IIe, 48K (disk). Also available for Commodore 64 (disk).
MANUFACTURER: Datamost, Inc.
PRICE: $39.95



Though by no means the last word on the subject, this is the most accurate and absorbing simulation of hand-to-hand combat ever put on computer disk. In player-vs.-player or player-vs.-computer encounters, you maneuver your robot warrior by keyboard or paddle control, causing it to run forward, turn clockwise or counterclockwise, swing its ax or shield right or left. As the lower-ranked player, the "Forsher," your goal is to find and step on a "Zonenstrall," which scores high points and ends the round. As the higher-ranked player, the "Yayger," you hunt down and kill your opponent while trying to find the Zonenstrall.

The 39 different islands on which combat takes place are littered with magical disks. "Springers" teleport players from one place on the island to another; "Loyfers" are antigravity speeders that enable players to travel at accelerated rates of speed; and any robot stepping onto a "Mondstrall" will instantly disintegrate and end the round.

You should map each island you go to, since the locations of magic disks on the islands are the same from game to game. Knowing where to go to find the Zonenstrall (or where your prey is heading if you're the hunter/killer) gives you an immense advantage. But this is all gravy. The real object of the game is to perfect control over your robot so you can become an expert warrior.

This was, by far, the most popular game I saw play tested in the past few months. One warning only: The graphic depiction of blood, dismemberment, and death (the robots bleed when struck by axes) could be objectionable to some players.

—JAMES DELSON

WHAT'S IN STORE
SOFTWARE REVIEWS

Combat Leader

HARDWARE REQUIREMENTS: Atari 400/800/1200XL, 48K (disk or cassette). Also available for Commodore 64 (disk or cassette).
MANUFACTURER: Strategic Simulations, Inc.
PRICE: $39.95

As combat leader, you're in command of between four and 27 vehicles (tanks and armored personnel carriers) on hilly, forested, rock-strewn terrain. Issue orders to individual units in a platoon or to all of them together to move, fire at sited targets, take cover, disgorge infantry (in the case of the personnel carriers), and then control infantry as well.

Combat Leader's primary challenge is that the computer, which thinks, issues orders, and moves much faster than you, is working in real time. It's all taking place as you watch, so you can't dawdle. Your only ally is the pause control, which allows you to replan failing strategies or replot the direction of your units on paper before returning to the game and issuing orders.

If you're smart, you'll go directly from learning the play mechanics, in the novice and intermediate scenarios, to setting up your own game, in the optional building scenario. Here, you can set the terrain to favorable conditions. Then you can choose your units' strength and the enemies' as well, setting firepower, armor density, speed, and the number of units both sides shall have. This way, you have a fair chance to play the game long enough to master the mechanics of fire and movement.

Only those patient enough to take time and practice will enjoy the game fully. If you have the right stuff, you'll find this the most realistic simulation of small-unit warfare ever created, sure to keep ages 12 and up (as young as 10 with adult assistance) on their toes.

—JAMES DELSON

Jump Jet

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk).
MANUFACTURER: Avant-Garde Creations, Inc.
PRICE: $29.95

As the pilot of a heavily armed "jump jet," you can hover over land and water, refuel in midair, or land on an aircraft carrier's deck to rearm and refuel and, if necessary, get extra speed from cutting in its afterburners. Starting from the flight deck of your aircraft carrier, you must travel east where the Loyal Island territory has been taken over by the Outsiders, who claim it as their own.

Speed to the defense of your accompanying fleet and the eventual destruction of the enemy. Sink attack ships and submarines, then "splash" your enemies' insidious kamikaze fighter planes. If your carrier hasn't been sunk, you can replenish your supplies and go on to obliterate the enemy's ground forces on your colony, accepting the Outsider General's surrender.

Inspired by the Falkland Islands War, and particularly by the superb performance under fire of England's *Harrier Jump Jet*, this game obliges you to fight an enemy whose combined forces vastly outnumber your own. As soon as the game begins, your fleet comes under fire from the enemy, so think and act fast—without your aircraft carrier as a fuel and munitions base, you're lost.

More suitable to beginning players than advanced ones, *Jump Jet* was immediately enjoyable for all novice gamers from ages eight and up. With fewer technical complexities to master, unlike *Defender*, *Repton*, and the like, each player made progress or gained confidence in early games. And unlike many arcade games that don't have a clear-cut goal in sight, *Jump Jet* offers the chance to actually finish at some point, rather than end up with the usual frustrations and stresses of succumbing to the machine's program in the end.

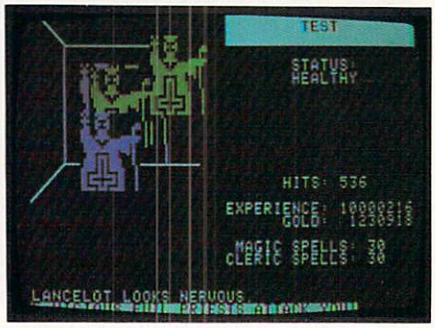
—JAMES DELSON

The Standing Stones

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk).
MANUFACTURER: Electronic Arts
PRICE: $35

Attention maze-adventure fans! This item combines the magic of several popular role-playing and text-adventure games on the market, and then adds some new tricks. It's not as time consuming or compelling as *Wizardry*, and lacks the "live action" of Epyx's *Apshai* series. But thanks to innovations such as enemies that grow in strength and an option allowing you to become invisible, *The Standing Stones* could be your cup of role-playing adventure tea.

In your quest for the Holy Grail, you're equipped with mage and priest spells, similar to those in *Wizardry*. PASSWALL allows you to go through a solid wall, while the destructive DISPELL and DATSPELL (this game does have a sense of humor) are just two examples of the verbal barrages you'll use to smite the foe.



Wizardry and *Apshai* players often complain of the necessity of exiting the maze in order to heal wounds. Electronic Arts added the innovative idea of an Oasis, at which players stop to recover and rest up.

Unfortunately, only one character at a time ventures into the maze on the game's quest for the Holy Grail. It's a solo game that lacks the depth of enjoyment and player interaction that multiplayer games such as *Wizardry* and *Zork* offer. Also, once you've created a character, it's very difficult to keep it alive unless you adhere strictly to the suggestions offered in the rules: Get a few experience points and leave the maze. But when Electronic Arts printed up the map to the first level in their instruction manual, they neglected to put in the exit sign!!! Be sure to note that there's a one-way door at the top of the map. That's the exit. Although the game is especially fun for novices, many play testers who had experience with other games in the field found it overly repetitive (the same monsters over and over again, the same types of traps, etc.)

I can't say you won't enjoy *Standing Stones*, but it's got the look and feel of a game which owes more than a little to *Wizardry*, and why settle for a copy when you can play the original?

—JAMES DELSON

WHAT'S IN STORE
BOOK REVIEWS

30 Games for the Timex/Sinclair Computer
Bill L. Behrendt
Micro Text Publications, 1983
84 pp., softcover, $4.95

I used to use my Timex Sinclairs mostly for business purposes. I don't consider myself much of a games player, and most game programs obtained from books require long and laborious typing, a process for which I don't have (or won't take) the time. Then along came *30 Games*.

All of the games in *30 Games* are written for 2K, the amount of memory that comes with the Timex Sinclair 1000. With the longest program extending for only 80 lines, each can be entered quickly and easily. User notes and documentation accompany each listing, clearly explaining various features of the programs and substitutions players may choose to make. Another of the book's positive features is an appendix that explains, for the more curious or advanced Timex users, the special codes used in creating graphics on the machine.

One particularly entertaining game is not really a game at all. It's a graphics puppet show, featuring a boy and a girl puppet that you can name and give up to 10 speaking lines each. With a few changes in the program, provided in the accompanying notes, the number of lines can be changed, as can the names of your puppets. I used this program at a birthday celebration for my three-year-old grandnephew, and it was the hit of the party. I even know of an educational director of a mental-health institution who modified the program for use in his slow-learners group. My Timex is no longer used only for business. —JAMES ROBERTS

First Look Books: #1—Sizes, Shapes and Flavors; #2—Beeps, Whirs and Blinking Lights; #3—Menus, Loops and Mice
J.M. Johnston
Dell/Banbury (#1); Dell/Standish (#2, #3), 1983
softcover, $2.95 each

This series of brief books provides the finest description I've encountered of what computers are, what they do, and how they work. Written specifically for kids ages eight to 12, they can also be recommended, without hesitation, to older kids and adults.

Book #1 guides readers gently through an introduction to the computer's potential. Book #2 features a glimpse of the specific parts of computers, their functions, and how they operate. Also included is a discussion of software, programming, and various programming languages. Book #3 completes the software lesson and goes on to describe such potentially complicated computer uses as information management and the remote control of appliances and other sophisticated devices.

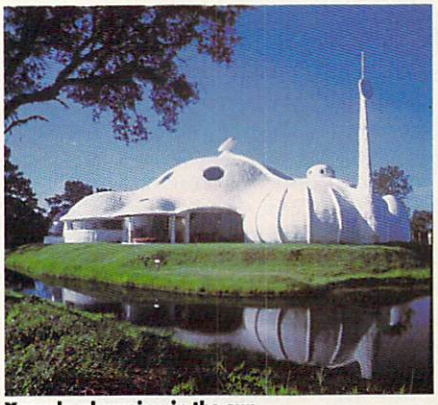
Lean and laced with warmth, these books are written with good humor and a style that is well-balanced, with not a speck of condescension or pretension. The illustrations scattered throughout are delightful, too. Take my advice: Before giving these books to your own or your friends' kids, read them yourself. Chances are, if you're like me, you'll learn a lot. —DAVID WILSON

The Naked Computer
Jack Rochester and John Gantz
William Morrow & Company, 1983
325 pp., hardcover, $15.95

Did you know the youngest computer-user was a five-month-old baby? Or that the Japanese are perfecting a robotic dog for the blind? Do you know the words to songs in the "top secret" IBM songbook? These are just a few of the delightful tidbits to be found in *The Naked Computer*. A cross between the *Guinness Book of World Records* and Peter McWilliams' *The Personal Computer Book*, the whimsical work is so much fun, it's dangerous. Because of it, I've missed my subway stop, buttered my coffee, and ignored my children's pleas for dinner.

The authors mix history, trivia, legend, and scandal in a complete computer almanac. They relate tales of young and restless computer geniuses and great computer capers, and tumultuous histories of monoliths such as AT&T and IBM. Irreverent and insightful, this book belongs on the coffee and bedside tables of anybody who keeps tabs on the state of computers, society, or both. How these guys amassed such a wealth of eclectic information is still beyond me. —ROBIN RASKIN

Xanadu: The Computerized Home of Tomorrow and How It Can Be Yours Today
Roy Mason, with Lane Jennings and Robert Evans
Acropolis Books, 1983
260 pp., hardcover, $18.95



Xanadu gleaming in the sun.

"In Xanadu did Kubla Khan a stately pleasure-dome decree."

The dreamlike nirvana envisioned by Samuel Coleridge in his 1797 poem "Kubla Khan" differs substantially from Roy Mason's vision. In his book *Xanadu*, nirvana consists of a dome home made of polyethylene.

Billed as a totally computerized living environment, Xanadu is a marvelous example of "architronics"—architecture and electronics working hand in hand to take the drudgery out of housework. Among other things, it features a centralized temperature control, and fire and theft security. An electronic hearth combines telecommunications terminals with mood enhancements.

Filled with fanciful (occasionally farfetched) scenes depicting a day in the life of the average family 10 or 20 years from now, the book also provides an index of the materials currently available so you can start building your very own Xanadu.

The 20th century is almost over and I suppose we've got to start thinking about incorporating new electronic technologies into our lives. Somehow, I'd hoped it wouldn't look as sterile and isolated as it does here. Nonetheless, if you're interested in domestic architecture, urban studies, or future technologies, you'll find this book offers some new and interesting twists to the notion of "home sweet home." —ROBIN RASKIN

PHOTOGRAPH BY GRADY ALLRED

THE PRIMER

The Primer will appear in every issue of FAMILY COMPUTING. You might look to it for "Everything You Always Wanted to Know About Computers but Were Afraid to Ask." New information will be presented periodically, and existing sections will continually be adapted and updated. Whatever the format, the Primer is a handy reference guide to shopping for, setting up, and using a computer.

The only way to learn to use a computer is to use one. But before you start, it's well worth asking, "What can I do with a computer?" And, "How does a computer work?"

The illustration of a computer system on the opposite page shows various pieces of equipment, referred to as hardware. To work effectively, this hardware needs step-by-step instructions, or programs. These programs are often called software. What you can do with a computer depends on the software you use.

The many uses of home computers can be broken down into several broad categories.

WHAT A COMPUTER DOES

Game Playing. Several types of games are available—arcade-style action, fantasy, adventure. Some take minutes to master; others months. Many games can be played by more than one person at a time.

Education. Whether you are learning math, French, history, or typing, these programs allow you to learn at your own pace. Programs range from question-and-answer drills to loose creative exercises. Some test logical skills, by putting you in a real-life problem-solving situation; others teach you to program by letting you draw pictures.

Paper work. When it comes to handling reams of information, the computer can't be beat. It functions as an endless supply of paper, file cabinets, and a calculator rolled into one. With an electronic spreadsheet, you can change one figure in a budget and the rest will automatically change. The ability to ask "what if?" and see immediate results has obvious time-saving benefits.

The computer is equally adept at setting up a filing system, and allows you to cross-reference data in any number of ways for easy recall.

With a word-processing program, the computer can speed up and simplify the writing process, by allowing you to change or rearrange words and paragraphs without retyping.

Information access. You can hook your home computer, via the telephone, to much larger computers at "information service" companies. This allows you to "call up" stock quotations, airline schedules, newspaper and magazine bibliographies, encyclopedias, and even games.

Also, by using the telephone lines you can hook your computer to other home computers around the country, and leave or receive messages. This practice is known as electronic mail. Several computers linked together are called a network.

Programming. It's possible to enjoy practical benefits from your computer without ever buying a commercial program—you can write your own. And, in some cases, you can adapt commercial programs to better suit your particular needs.

HOW A COMPUTER WORKS

The computer is an information-handling machine. It stores, compares, changes, and manipulates information of almost any kind at tremendously high speeds.

The computer's operating method can be boiled down to four simple steps. (1) INPUT: Instructions and information, in the form of a program and data, are entered into the computer. (2) PROCESSING: The computer executes the steps of the program. (3) OUTPUT: The results of the computer's work are made visible and available to the user. (4) STORAGE: Results can be stored and saved.

Most home computers do not come ready-made in one piece, but must be assembled from various components. Following are the components needed for each of the four operating steps, and how they work.

Input. There are four basic ways of getting a program and/or other information into a home computer.

KEYBOARD. The keyboard looks and behaves much like that of a typewriter. Some keyboards have special keys for certain computer functions, and some have a numeric keypad, much like a calculator. But on any unit, every keystroke you type goes directly into the computer's memory. That information will stay there until you delete it or turn the computer off. (You can also store, or save, that information for future use.)

CASSETTE TAPE RECORDER. You can copy a program stored on a cassette tape directly into the computer's memory. Regular tape recorders and cassettes can be used with most home computers, although you will need a special cable to connect the two. Once connected, you merely type a simple command to transfer the program from tape to computer.

DISK DRIVE. The transfer method is much the same with a disk drive, except that the program is stored on a floppy disk, which looks much like a 45 rpm record.

The disk drive enters programs much more quickly and with less chance of error than the cassette recorder. But the cassette recorder is significantly cheaper.

CARTRIDGE. A cartridge, which plugs into a slot built into some computers, also stores programs. Putting a cartridge into a computer actually adds memory to the computer—and that memory contains a program.

Processing. All input goes to the Central Processing Unit (CPU), located underneath the keyboard. The CPU is a maze of tiny electronic circuits, but it functions as a giant.

The CPU controls the flow of information into, out of, and inside the computer. The computer's memory, where information is stored, is located in the CPU. The CPU also interprets a program, performs each of its steps, and then sends the results to the user.

Output. The visible result of a CPU's work is called output. Output is made available on the screen of a

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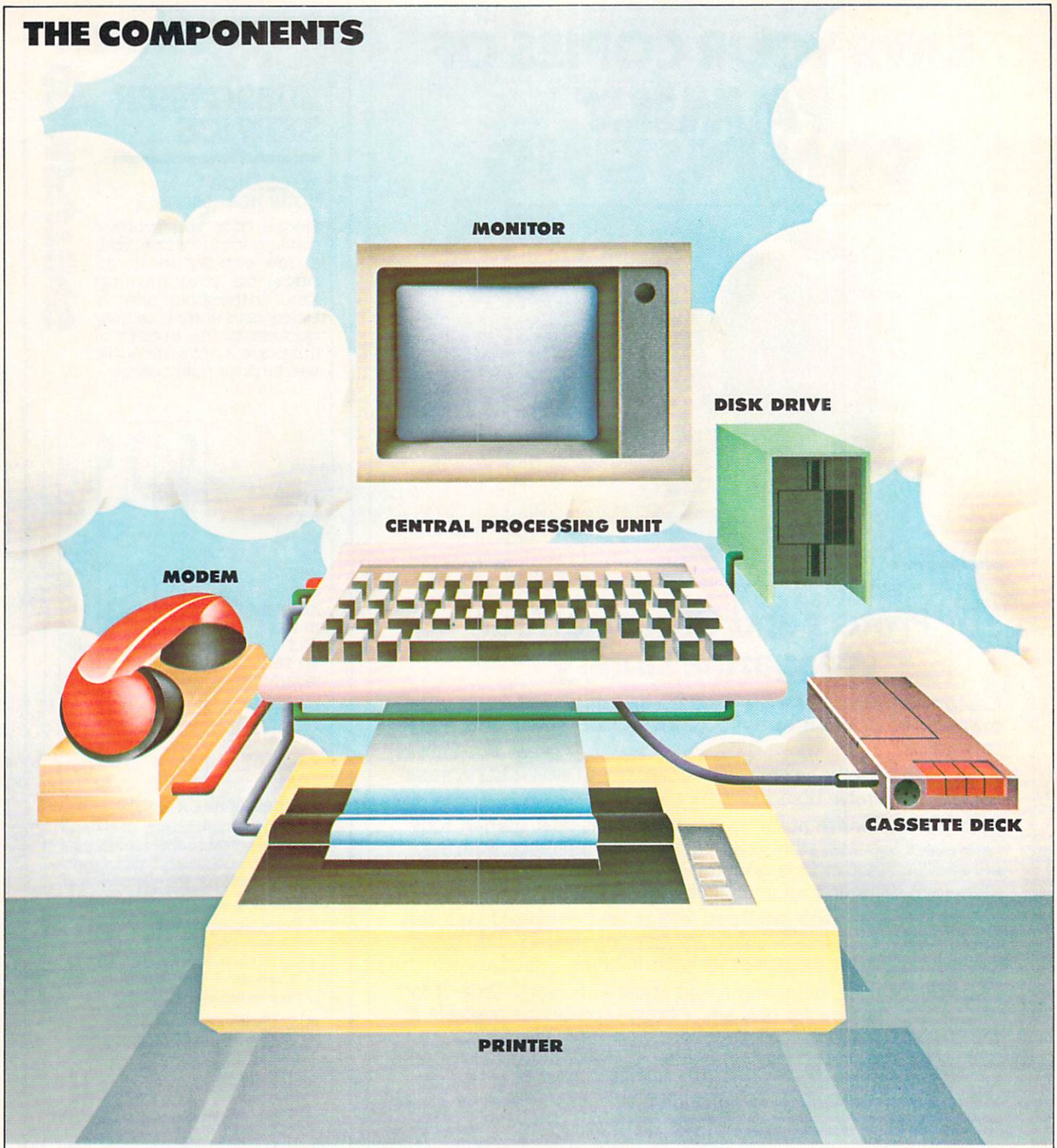

TV or monitor, or from a printer.

Computers can be hooked to TVs or monitors, and to printers. In all cases special cables are required. In general, the monitor's screen display is sharper than the TV's.

Storage. When the computer is turned on, it will store and remember all information it receives. But when it is turned off, this information will vanish—unless you instruct the computer to save it.

You can store information on a blank tape or disk. Either way, you can record the results of the computer's work, just as you would record a speech. Then, any time you want to run that program again, you can transfer it into the computer's memory, and see it on the display screen.

You cannot store new information on a cartridge.

Peripherals. Peripherals are optional pieces of equipment that can be added to your computer, but are not crucial to the computer's operation. A printer, in fact, is considered a peripheral. One of the most popular peripherals is a modem.

MODEM. If you want to link your computer to an information service or other computers, you will need a modem. A modem holds a telephone receiver and transmits and receives data through phone lines.

Remember that the computer is a tool. As with all tools and machines, there is no need to know everything about how a computer works. All you need to know is how to use it for your own purposes.

ILLUSTRATIONS BY RICHARD TIMPERIO

THE PRIMER
THE WORDS

The Words is a glossary of commonly used computer terms. Some are well-known English words, such as *read* and *write*, that have been incorporated into computer language and given different meanings. (Note: All italicized words in the definitions are defined in full elsewhere in the glossary.) Other terms that refer to a computer's inner workings are not often used in common speech, but are important because they are used in manufacturers' specifications and ads. Don't be awed by them. Remember the delight with which Americans took to the new NASA language over 20 years ago, when John Glenn first orbited the globe.

Access
To retrieve information from a storage place in the computer system. Access time is the amount of time it takes to obtain the information.

Address
A specific location in the computer's *memory* where a piece of information is stored. Each address is identified by a number.

Applications software
Programs that instruct the computer to perform one task or a group of related tasks, such as keeping track of a household budget, or the accounting and inventory of a business.

BASIC
Beginner's All-purpose Symbolic Instruction Code. A popular, easy-to-learn *programming language* widely used with *microcomputers*.

Baud
Bits per second. A unit of measurement that describes the rate at which *data* are transmitted from one device to another, such as computer to *printer*, computer to computer, or computer to *terminal*.

Binary code
A number system using only two digits, "0" and "1." Any number or letter can be expressed as a combination of these digits. Computers use the system by translating each *character* of information into a string of binary numbers.

Bit
The smallest unit of information a computer uses. A bit is either the digit "0" or "1." An "eight bit" processor manipulates *data* in clusters of eight bits.

Board
Printed circuit board. A flat, thin rectangular component of a computer that includes one or more layers of printed circuitry and to which *chips* and other electronic parts are attached. As an add-on to an existing computer, sometimes called a card.

Boot
Derived from "bootstrap." To start or restart a computer system by *reading* instructions from a storage device into the computer's *memory*.

Bug
An error in the logic of a computer *program* that prevents it from running properly. Bugs can cause a program to "freeze up," that is, to repeat the same operation endlessly. Finding and correcting the error is called debugging.

Bus
A device that connects components of a computer so that *data* can flow between them. There are several conventional buses that allow components made by different manufacturers to be used in the same computer.

Byte
One byte contains eight *bits*, enough to stand for one *character* of English, or one number. Thus, it generally takes more than one byte to make up a word. "Cat," for instance, requires three bytes.

CAI
Computer Assisted Instruction. A term applied to a wide range of instructional *software*, including drill-and-practice, simulation, and educational games.

Cartridge
A device that stores a prerecorded *program*. A cartridge is inserted into a special slot built into the computer. Also known as a solid state cartridge or *ROM* module.

Cassette tape recorder
Computer cassette recorders are usually the same as those used for audio recordings, but often need a special cable to connect them to the computer. They house and run magnetic tapes that either hold a prerecorded *program* or store *data* from the computer.

Character
A letter, number, or symbol.

Chip
A small (about the size of a child's fingernail) component that contains a large amount of electronic circuitry. Chips are the building blocks of a computer and perform various functions, such as doing arithmetic, serving as the computer's *memory*, or controlling other chips.

Command
An instruction that tells the computer to do something, such as to run a *program*.

Compatibility
The ability of different devices, such as a computer and a *printer*, to work together; or the ability of a particular *program* to run on a given computer. In short, the ability of anything in a computer system to work with anything else.

CP/M
Control Program for Microprocessors. A widely used *operating system* for microcomputers.

CPU
Central Processing Unit. The "heart" of a *microprocessor*, with components that control the interpretation and execution of instructions.

CRT
Cathode Ray Tube. A TV or TV-like *monitor* used to display information and pictures. Also called a computer screen.

Cursor
A symbol, usually a small square, that indicates where the next *character* will appear on the CRT screen.

Data
Information put into or taken out of a computer.

Data bank
A central location for storing vast amounts of information accessible by computer.

Data-base manager
A *program* that allows the user to enter, organize, sort, and retrieve information.

Disk
A magnetic device for storing information and *programs* accessible by a computer. A disk can be either a rigid platter (hard disk) or a sheet of flexible plastic (floppy diskette). Disks have tracks, much like grooves on LP records, where *data* is stored.

Disk drive
A device that *reads* information from a *disk* and copies it into the computer's *memory* so that it can be used by the computer, and that *writes* information from the computer's *memory* onto a *disk* so that it can be stored.

Documentation
The written instructions that explain how to use computer *hardware* or *software*. Also refers to all instructions and remarks, used to describe procedures when programming.

DOS
Disk Operating System. See *operating system*.

Downtime
Time when a computer is not working.

Electronic mail
The transmission of messages, documents, or other information from one computer user to another. This can be done over telephone lines using devices called *modems*.

Emulator
A *hardware/software* device designed to translate *programs* written for one particular computer so that they will run on another computer.

Firmware
Programs or *data* stored in *ROM*—either built-in by the manufacturer, or added with a cartridge—that cannot be changed by the user.

Flow chart
A diagram on paper that shows all the logical steps necessary to write a *program*.

Format
To prepare a *disk* so that it can receive and store information. Until you perform this task, the *disk* will not be able

THE PRIMER
THE WORDS

to store any information. The word "initialize" is often used to mean the same thing as format.

Function key
A special key on the computer's *keyboard* that has been or can be designated to perform a specific task.

Graphics
Pictorial displays on the *CRT*, such as charts, graphs, and symbols. Contrasted with *text*.

Graphics tablet
A kind of electronic drawing board. With a graphics tablet and a special pen, whatever you draw will appear simultaneously on the *CRT*.

Hard copy
Information printed by the computer onto paper.

Hardware
The physical, nonchanging parts of a computer system. Contrasted with *software*, or *programs*, which can change.

High-level language
A *programming language* that resembles an ordinary spoken language (e.g., English). *BASIC* is a high-level language.

Input
Programs or *data* entered into the computer.

Interface
An electronic connector between the computer and its *peripherals*.

K
Abbreviation for kilo, or 1,000. When used to describe the amount of *memory*, or storage space, a computer has, it often signifies 1,024. A computer with 16K *bytes* of *memory*, for example, can store 16,384 *characters* of information.

Keyboard
Designed much like that of a standard typewriter, the keyboard is used to enter information into the computer.

Load
To enter a *program* from an external storage device into the computer.

Information services
Broad-based *data bases* that offer a variety of services, ranging from airline reservation information to stock market quotations. You need a *modem* to link up with such a service.

LOGO
A *programming language* that allows the user to draw pictures on the screen. LOGO is particularly good for teaching young children how to *program*.

Loop
A statement in a *program* that instructs the computer to repeat a certain task.

Machine language
A binary code consisting of "0s" and "1s," which is the only language a computer understands. *Programs* written in any other language, such as *BASIC*, are translated into machine language for processing.

Membrane
A type of computer *keyboard* with a flat, smooth surface.

Memory
The place in a computer where *data* and *programs* are stored.

Menu
A list on a *CRT* of the operational options of a computer *program*; a list of programs stored on a tape or *disk*.

Microcomputer
A small computer designed primarily for home or small business use. The micro can do today what many room-sized mainframe computers did 20 years ago.

Microprocessor
A tiny processor on a single *chip*. The "brains" of all *microcomputers*, it is also found in many consumer and industrial products.

Modem
A contraction of Modulator/Demodulator. A device that makes it possible to transmit and receive computer *data* over telephone lines.

Monitor
A device for visually displaying a computer *program* or the results of that program on a screen. See *CRT*.

Network
A system of linking computers so that users can share resources and exchange information.

Operating system
A *program* that controls the operation of a computer system, such as controlling signals to the *disk drive* or *printer*. When a computer system is turned on, the operating system is the first program executed. All subsequent programs are loaded and supervised by the operating system.

Output
Computer-generated information that is transferred to a *monitor*, *disk*, tape, or *printer*.

PASCAL
A *programming language* that can be used on many *microcomputers*. While it is considered more difficult to learn than *BASIC*, it can generate *programs* that run faster and use less *memory*.

Peripherals
Hardware accessories for a computer, such as a *disk drive*, *printer*, or *modem*.

Pixel
Stands for "picture element." A single dot of light on a TV screen or computer monitor. These tiny elements are used to create electronic pictures, or *graphics*.

Plotter
A machine, attached to a computer, that prints lines or graphs on paper.

Printer
A machine that transfers information stored in the computer onto paper. Two of the most commonly used printers are: dot matrix—a printer that forms *text* or *graphics* using a group of individual points (dots); and letter quality—a printer that prints fully formed characters (like a typewriter), using a type element called a "daisy wheel."

Program
A set of step-by-step instructions that tells a computer how to solve a given problem. Also, to prepare such a set of instructions.

Programming language
A language, with clearly defined rules, that can be used to express a computer *program*.

RAM
Random Access Memory. An area in the computer where information is stored. When called into this area, information can be *read*, changed, or edited. However, it will be lost when the computer's power is turned off, unless you first *save* the information.

Read
The process of copying information from a storage device (such as floppy *disk* or tape) into the computer's *memory*. Reading only copies; it does not erase the *data* from where it is stored.

Resolution
The sharpness of a picture on a *CRT*, usually described as "high" or "low." The higher the resolution, the sharper the picture. Resolution is expressed by the number of *pixels* in the display. For example, 560x720 is much sharper than 275x400.

ROM
Read Only Memory. Permanent *memory* built into a computer by a manufacturer. The information stored here gives the computer operating instructions when it is first turned on. The user cannot change this memory, but "only read" it.

Save
To store information from *memory* on tape or *disk* so that it can be used again.

Software
Computer *programs*. Also, tapes and *disks*.

Stringy floppy
A computer storage device that holds a magnetic tape, called a wafer. The enclosed wafer tape is thinner, narrower, and faster than conventional cassette tapes.

Terminal
A computer user's workstation. Also refers to the computer screen where information is displayed.

Text
Words, letters, and numbers that appear on a *CRT*. Contrasted with *graphics*, which are lines, shapes, and symbols.

Winchester
A type of hard disk that is sealed in an air-tight, dust-free container. See *disk*.

Word processor
A *program* that allows the user to write, edit, or rewrite *text*. The *text* can be saved on a storage device and printed out. A word processor allows the user to make changes in the same *text* without retyping the whole page.

Write
The opposite of *read*. To transfer information from the computer's *memory* to a storage device such as a floppy *disk*. Write-protect is a procedure for preventing a disk from being written to.

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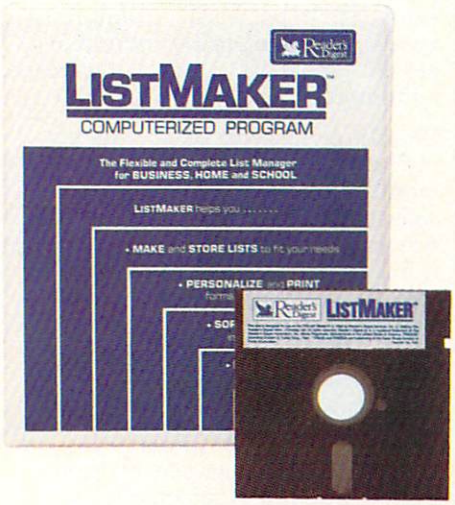

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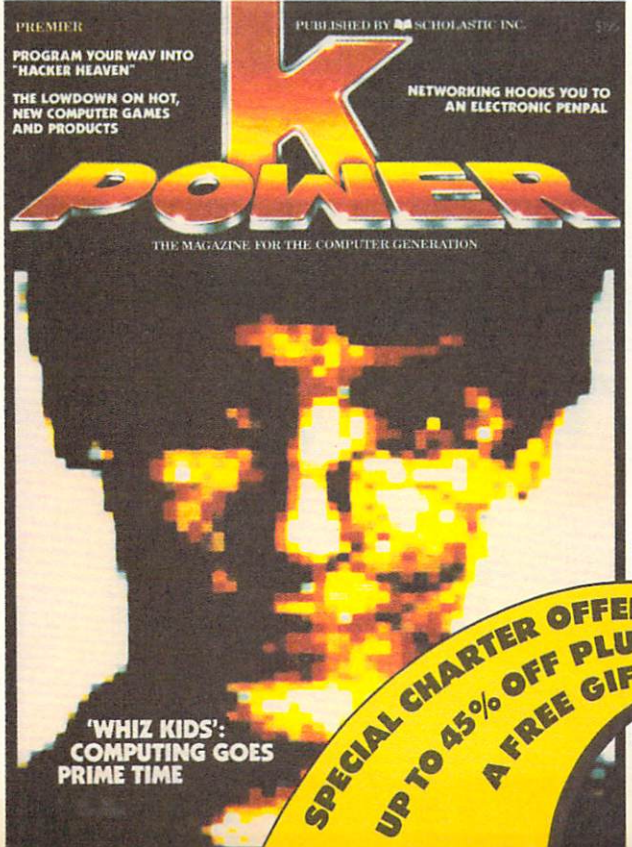

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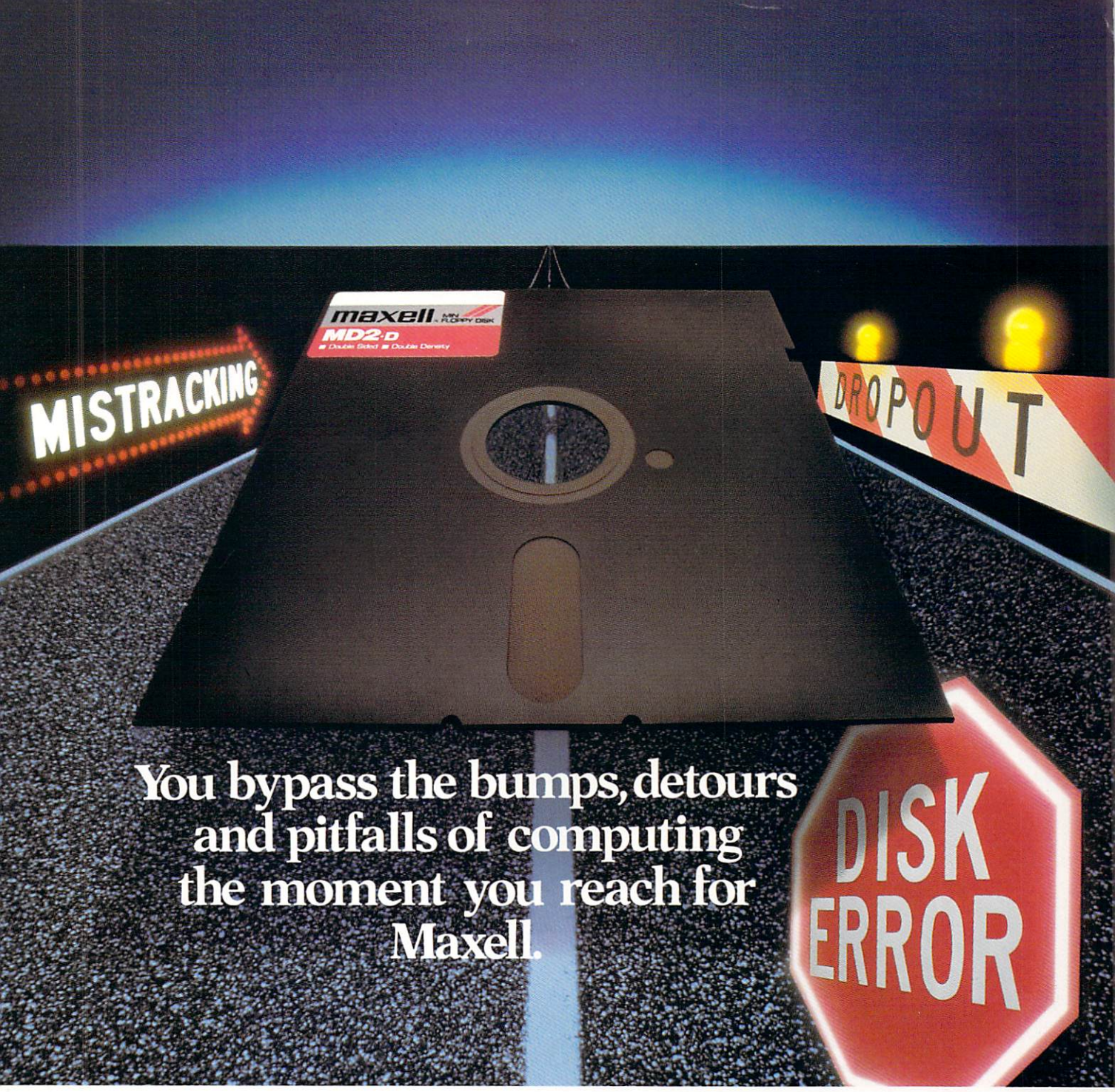

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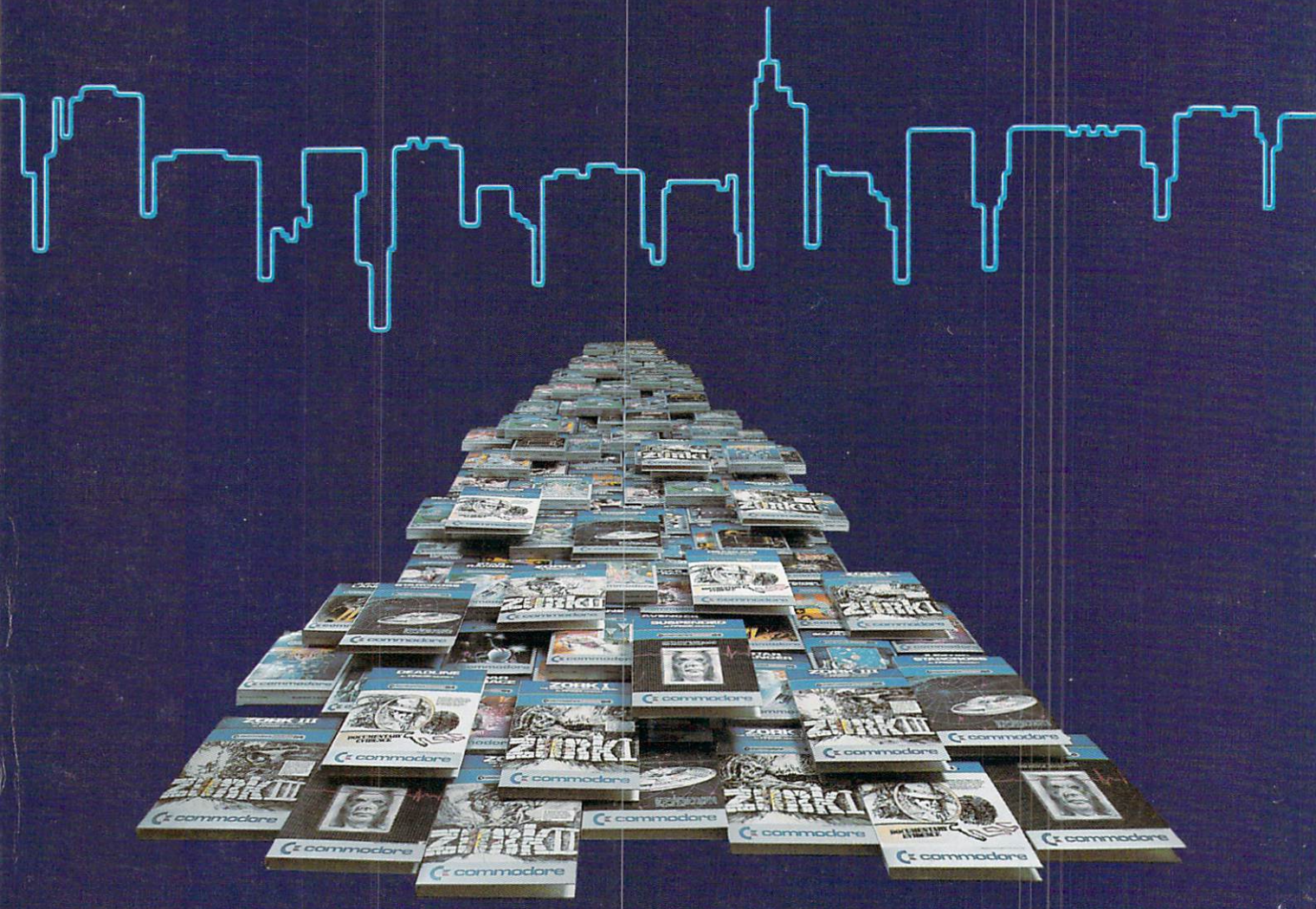

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