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APRIL 1986
VOLUME 4
NUMBER 4

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CIRCLE READER SERVICE 20

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APRIL
1986

FAMILY COMPUTING

VOLUME 4
NUMBER 4

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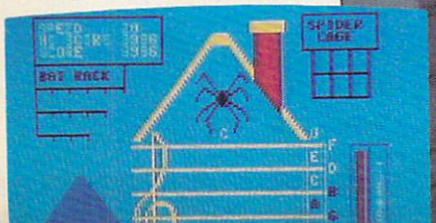

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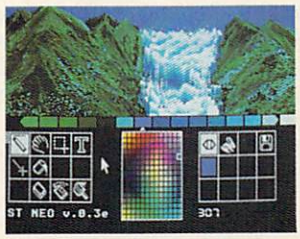

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Standard ROM	192K	192K	64K	64K	16K
Number of Keys	95	89	95	59	63
Mouse	Yes	Yes	No	Yes	Optional
Screen Resolution (Non-Interlaced Mode) Color Monochrome	 640x200 640x400	 640x200*** 640x200***	 640x200 720x350**	 None 512x342	 560x192 560x192
Color Output	Yes	Yes	Optional	None	Yes
Number of Colors	512	4096	16	None	16
Disk Drive	3.5"	3.5"	5.25"	3.5"	5.25"
Built-in Hard Disk (DMA) Port	Yes	No	Yes	No	No
Midi Interface	Yes	No	No	No	No
# of Sound Voices	3	4	1	4	1

Atari 520ST with 512K RAM, $799.

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CIRCLE READER SERVICE 2

EDITOR'S NOTE

"I used to be a hacker. Now I want to be a user." That's what a man named Richard (I wish I remembered his last name) from New Jersey said to me during this winter's Consumer Electronics Show in Las Vegas, Nevada.

To me, Richard is not just a user. He's a star. And I can't even tell you his last name or where in New Jersey he's from.

After Richard made his statement to me at the end of a panel I chaired on computing in the home, everyone laughed. But Richard's words are a lot more than cute. He embodies exactly what's happened in the world of computing, especially in the world of home computing.

When the first computers came into the home, it was the hackers who embraced them. In fact it was these early computers that created the hackers. These were people who took their machines apart, people who played them like a musician plays an instrument. They were most like jazz musicians at that: improvising and seeing how far they could go. Their goal was to see how much *they* could make the computer *do*.

That's not what being a *user* is all about. Being a user means instead seeing how much your *computer* can do for *you*.

As I hope all of you know, that's who FAMILY COMPUTING is for: users. That's why so much of each issue is devoted to helping you find the products, hardware, software, and accessories that will help you make the best use of your computer. That's why so many articles are devoted to applications: to extending your knowledge and your expertise on how to use your computer.

In this issue, our cover story on souping up your computer (page 29) is a don't-miss for all users. So is our last installment, the sixth, of Henry Beechhold's "Hands On" series (page 38). And of course, there's more. But you will find your own favorites as you look through the contents page and go through the magazine itself.

I want to make sure there's room to get back to talking about the Consumer Electronics Show. Though we devote very little space to trade shows and products shown there—products that may or may not come to market—this particular show does deserve a little more attention.

The mood was good. While fewer computers and computer-related products were on display than in the past, there was a feeling of stability. Christmas sales figures were in and they were better than anyone had dared to anticipate. Several companies are showing steady profits, and we look forward to their continued growth and to many new players entering the field.

We all know people don't move backwards. We're not going to stop using machines to help us do our work. We're going to use more computers and we're going to use computers more. And we at FAMILY COMPUTING are going to keep trying to help you use your computers better.

Claudia Cohl

CLAUDIA COHL
EDITOR-IN-CHIEF

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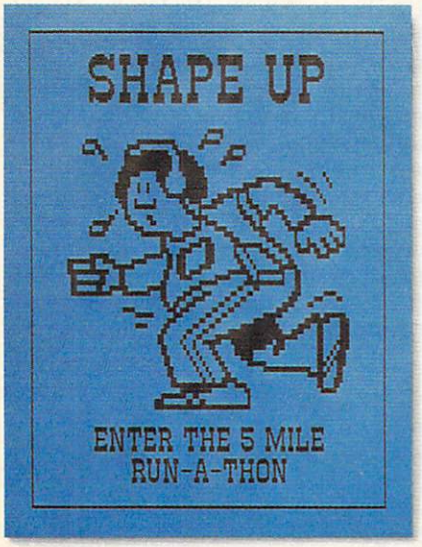

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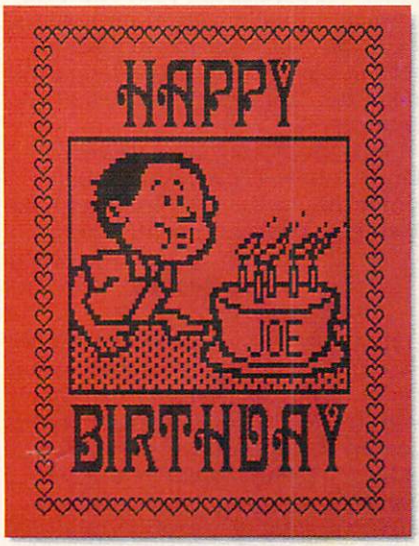

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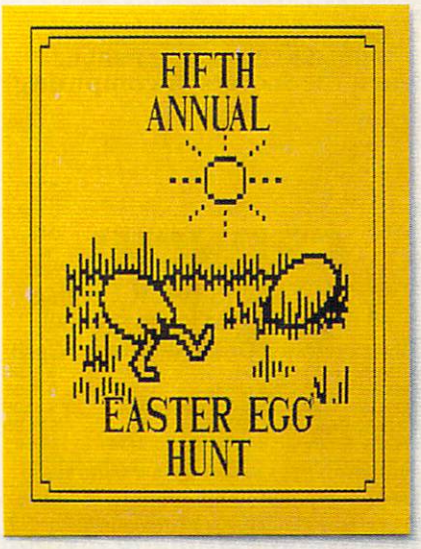

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LETTERS

GETTING STARTED

I am currently researching the market for my first computer investment. One of my primary criteria is versatility of software and peripherals. Is there any comprehensive resource that publishes descriptions of these items as well as what machines they are compatible with? Of course, I have been reading FAMILY COMPUTING's Software Guide and Reviews and this has given me a sound start. Can you refer me to a beginner's guide to facilitate understanding of the "anatomy" of personal computers?

I enjoy your magazine tremendously. I have learned more about computing in the three issues I have read than I have in my lifetime.

NICHOLAS MAMMI
Medford, New York

EDITOR'S NOTE: *You're starting out on the right foot, and there are a number of resources that will help you. Reading* FAMILY COMPUTING *will keep you up-to-date, and you might want to research some of our back issues for information on choosing systems, software, and peripherals. In particular, see "Making Connections" and The Primer in the April 1984* FAMILY COMPUTING. *(To order, write to* FAMILY COMPUTING, *Back Issues, 730 Broadway, New York, NY 10003). Also, try the catalog series published and updated annually by Haba/Arrays, Inc., which lists and describes the software available for Apple, Commodore, and IBM computers ($20–$25). For computer care, a good book is Henry Beechhold's* The Plain English Repair and Maintenance Guide for Home Computers *(Simon & Schuster, 1984/85, $14.95).*

NEVER TOO LATE TO LEARN

After having received and read, from cover to cover, more than ten issues of FAMILY COMPUTING, my eyes are open to the fact that anyone planning to purchase a computer and peripherals should be sure there is ample supporting software available for future use.

I wonder how much different computing would have been for me had I been introduced to your fine magazine several months before the bug really bit me. I know it would have saved me from much frustration, expense, and disappointment because of the limited choice of usable software I now have. I should have known better, since I have over seventy years of learning and fact-finding. *Never too late to learn!*

HARRY F. MORRIS
Toledo, Ohio

MASTERING BASIC

I am a new subscriber to your magazine and am very interested in BASIC programs for my Compaq Portable. My daughter and I are working together to master the language and really enjoy learning BASIC by analyzing and entering programs.

Because we learn as we go, I must protest the format of *Home Information Manager* in the January 1986 edition of FAMILY COMPUTING. I have been very careful to teach my daughter to use documentation, remarks, and structure, but *Home Information* contains none of the above. Furthermore, there are at least 140 GOSUB statements in a 340-line program!

PATRICK M. McNULTY
Glen Ellyn, Illinois

EDITOR'S NOTE: *It's* GOTO *statements, not* GOSUBS, *that structured programmers avoid. In BASIC, some* GOTOS *are unavoidable, but we're careful to avoid so-called "spaghetti code:"* GOTOS *that cross each other.*

GOSUBS *are necessary when a function is performed again and again throughout a program. Imagine how long* Home Information Manager *would have been if every one of the* GOSUBS *had been replaced by several program lines!*

You may find it easier to understand the program if you determine what task each subroutine performs and then mentally substitute the appropriate function wherever you see a GOSUB *in the main program.*

Because many readers learn programming by studying FAMILY COMPUTING's *programs, all our programs are very carefully crafted to be clear, easy to understand, efficient, and models of good programming practice. We'd like to include full remarks and documentation with each program, but often we sacrifice them to allow more space for additional translations, or even an additional program.*

CORRECTION

In the December 1985 issue of FAMILY COMPUTING, we published an incorrect price in our Home/Money Management column for MECA's *Andrew Tobias' Managing Your Money 2.0* (128K Apple II with two disk drives, 128K IBM PC/PC*jr*). The correct price is $199.95.

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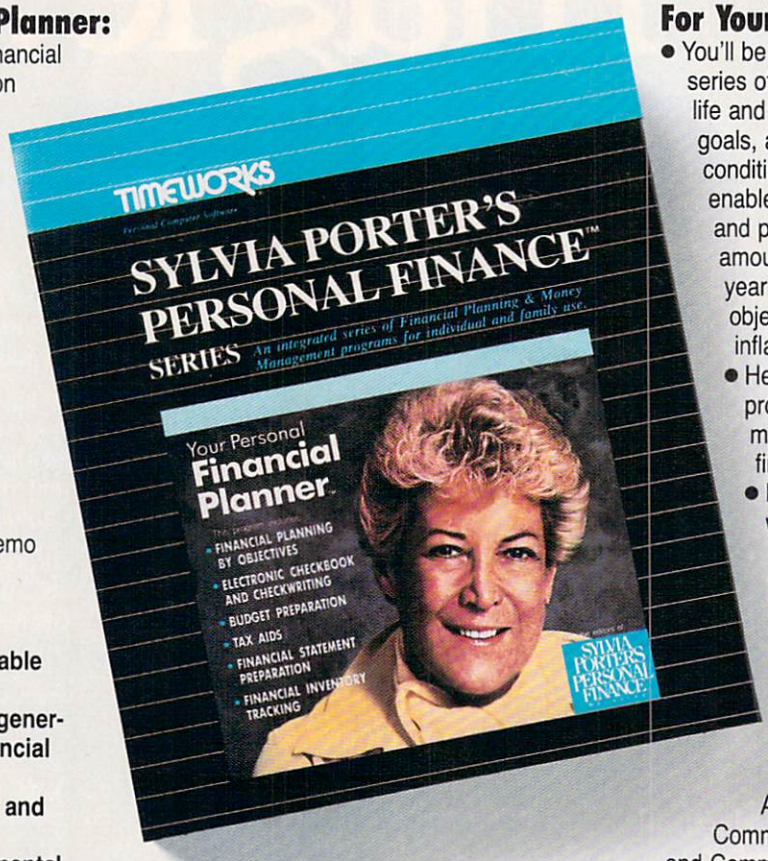

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BEHIND THE SCREENS

PEOPLE, NEWS, AND TRENDS

EDITED BY CHARLOTTE PIERCE

Take a "Disk Drive"

Looking for a new car? Finding it confusing to wade through the tangled maze of options, tax and licenses, down payments, and interest? Help is here—if you are a computer owner. Now you can "disk drive" a 1986 Chevrolet without setting foot in the showroom.

Chevrolet has recently released a program that allows you to figure out at home the cost of a new Chevrolet car or truck with all the options. *ChevyTech* is available on disk for Apple IIe, C 64, and IBM PC computers, according to Thomas A. Staudt, Chevrolet's general marketing manager. (To receive a disk, send $3 for postage and handling to Chevrolet, 30007 Van Dyke Ave., Warren, MI 48090.)

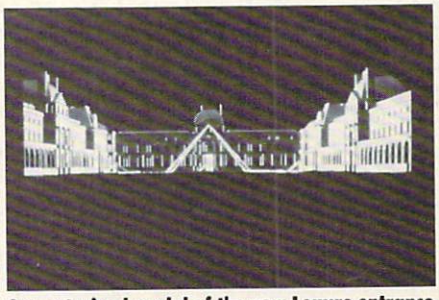
"*ChevyTech* reaches people who are especially interested in a new car or truck and provides them with useful information," such as a model's standard and optional equipment and prices, said Staudt. *ChevyTech* also keeps a running total of the price, so if it's over or under your budget you can simply add or delete options and the program will recompute the cost.

Once you're happy with the model, options, and price, the program's finance calculator can help you select various monthly payments, depending on interest rates, payment periods, down payments and trade-in allowances. And for a bit of added fun, there's a short game, Depreciation Derby, that lets you race against the clock to get your 12 used cars to the dealer for trade-in.

Ed Lechtzin, assistant director of public relations for Chevrolet, told FAMILY COMPUTING that the program was originally developed for the Apple IIe and tested in California's Silicon Valley. "That's where we found the highest concentration of Apple owners," he explained. Including the IBM and Commodore versions, more than 6,000 copies have been sent out for "disk drives."

Concrete Dreams

By 1989, visitors to the Louvre museum in Paris will see four huge pyramids of glass in the courtyard. The pyramids, forming a new entrance to the Louvre and designed by New York architect I.M. Pei, will be transparent so that the museum facade can still be seen. Visitors will enter through the central pyramid and descend by escalator to the lower level, where they may enter any of the Louvre's three wings. From below, portions of the facade will still be visible through the "skylights."



Computerized model of the new Louvre entrance.

After Pei designed the new Louvre entrance, he wanted to simulate the effect the structure would have on its environment. He invited Computervision to create a model of the project using one of their computer-aided design (CAD) systems.

Architects like Pei are using computer-aided design to represent structures in 3-D color, including shadows, from any angle. They can even show the wind patterns that a new building would create, and monitor the interior acoustics. The computerized model can then be manipulated to achieve the best overall effect and to eliminate design flaws from the pedestrian's point of view.

According to Patrick Purcell, an associate professor of computer graphics at MIT's School of Architecture and Planning, the most advanced CAD technique, computational video, animates the structural models created on computers. The video perspective shifts as you proceed, creating the realistic sensation of driving down Main Street, say, or of climbing the steps of City Hall. The computerized viewpoint can also approach the fantastic as you whirl around the outside of a thirty-story office building or peer down through transparent floors at a speeding subway below.

Architects with computers are not just building castles in the air. These new techniques lend precision and flexibility to the architects' models so they can fully analyze the potential effects of a structure.

—KAREN KANE

An Apple a Day

Barbara Johnson says that computers changed her life.

Ten years ago, doctors had labeled her a "burnt-out psychotic" who would never work anywhere but in a sheltered workshop, and then for only two hours a day.

Then she began attending Fellowship Inc., a New Haven, Connecticut-based nonprofit group that works with the emotionally disturbed. Johnson, who owns a Tandy CoCo and an Apple IIe, suggested last year that Fellowship start its own computer center. Fellowship's center opened in spring 1984 equipped with an Apple IIe, and subsequent grants from private agencies added three more Apple IIes to the center. Johnson was the only one at Fellowship who knew how to use Apple computers.

"Suddenly, I was the computer expert, and I began teaching classes on the Apples," Johnson says. "That made me feel a lot better about myself. Now, I no longer see myself as a 'patient.' I don't need to be. I can be an equal, the one who teaches, the leader."

Outpatient Barbara Johnson: "With computers, I can't fail."

Today, Johnson, who has multiple sclerosis, works part-time for Fellowship Inc. as a computer lab assistant. She also has written several brochures and beginner's manuals for the agency. "I'm ready to forget what the doctors said. I know darn well that my abilities are a lot more than that," she says.

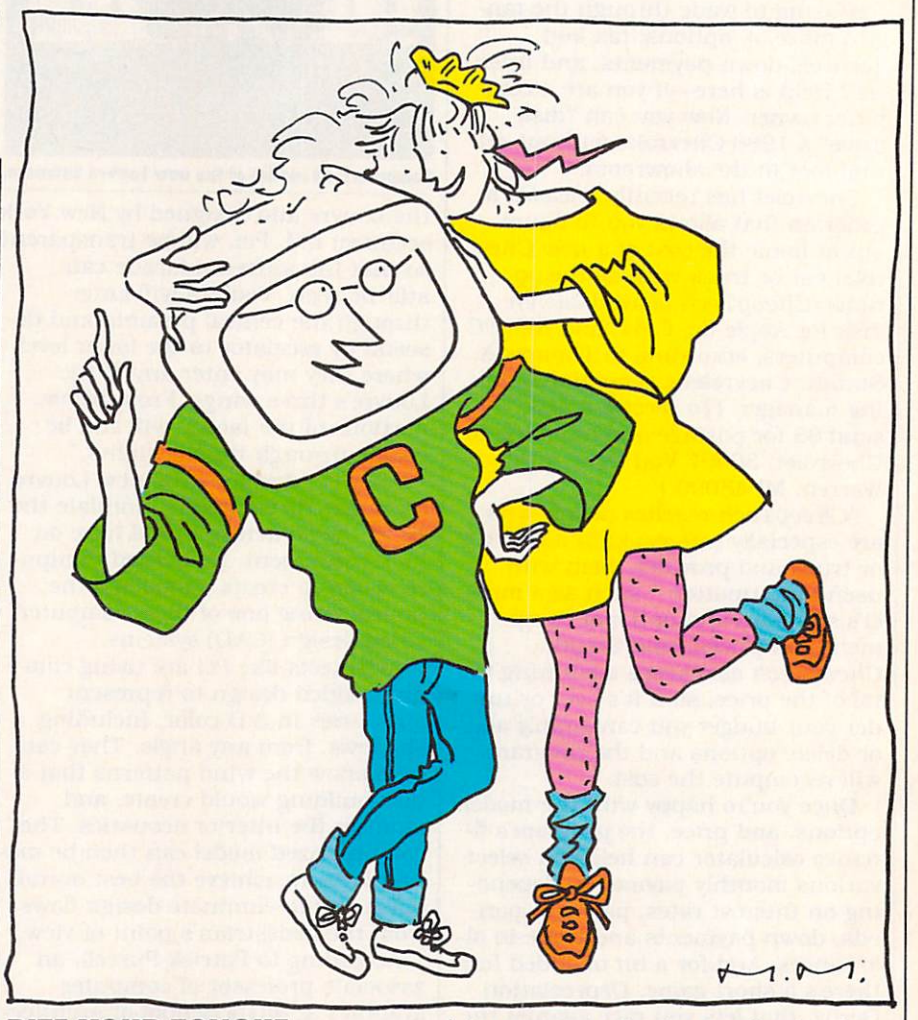
Fellowship's computer center now has a Macintosh, an IBM PC, five Apples, several printers, and a variety of educational and recreational software. In the future, Fellowship Inc. hopes to expand some of its computer programs to include neighborhood children.

—ELIZABETH OAKES

HOME-SCHOOL CONNECTION

HELPING TEENS AND TECHNOLOGY TICK
A Teacher (And Mother of Four) Discusses Issues Surrounding Young Teens And Computers

BY UTE ELISABETH VAN NUYS



Can computers influence the way teenagers learn? Do they really help teens boost reading, writing, and math skills? Can they improve social skills? Does having a computer at home affect classroom performance? Are there programs that are particularly well-suited to the needs and interests of poor readers, abysmal spellers, or reluctant learners?

Last summer, I was bombarded with questions such as these from parents who had signed up their teenage sons and daughters for a six-week computer programming class at a junior high school in Rohnert Park, California. Unfortunately, I wasn't prepared to give those parents many answers. At the time, I didn't have the experience—or the intention—of teaching computer classes to sixty 12- to 15-year-olds.

I did have experience for the job described in the classifieds of the local newspaper: "Teacher needed for computer programming class. Grades K–2. Must have experience in working with this age group and have strong background in computing."

But when the Rohnert Park-Cotati school district offered me the job, they told me about an error in the description. The students were not in grades K–2. They were seventh-, eighth-, and ninth-graders. Teenagers. "Do you still want the job?" they asked.

I took a deep breath. "Of course I want the job."

Much to my surprise—and relief—teaching those teenagers was a pleasure (as well as an enlightening experience) for me both as a teacher and a parent. I discovered many things, worth sharing with other parents, about the meshing of two intricate souls: a teenager's and a computer's.

UTE ELISABETH VAN NUYS *is a freelance author from Rohnert Park, California, and frequently writes on the subject of computers.*

BITE YOUR TONGUE

Most students signed up for my classes in the first place because their parents insisted. Still, the teens admitted the programming class was taking away some of the pressure at home. Many parents, even if they don't use a computer themselves, want their kids to be part of the "computer generation." As a result, they often try to force their youngsters to take more of an interest in the computer at home. The kids resist; not because of the computer, but because of the pressure. Students said they liked working on their own and "not being bugged all the time" by their parents. That's understandable, because it is difficult—if not impossible—for parents and young teenagers to develop teacher/student roles in the home. An outside class can accomplish better results, without putting family relationships on the line.

BRING TECHNOLOGY HOME

That's not to say that having a computer at home hampers a teen's interest in technology. Far from it. Young teens may like having a computer at home, but they don't want it forced on them by their parents. It's very easy to spot which kids have a computer at home, even if it belongs to a parent. Generally, their interest and motivation are much higher, and they show a deeper interest in all aspects of the class. Their interest in software is higher, too, because teens with their own

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CIRCLE READER SERVICE 46

CLASS PETS: SOFTWARE THAT EARNED THE GRADES

Teenagers vary. They come in all shapes, sizes, and levels of maturity. Although the software packages I initially chose for my programming class were recommended for 12- to 15-year-olds, actual usage convinced me that most were too difficult for beginners. So I brought in other software to offer a wider range—all the way from programs designed for early childhood to programs geared to adults. Somewhere in that range, each student found his or her match.

Surprise! *Kids on Keys* (Spinnaker Software Corp.), a typing program, was a favorite among students without prior computing experience. I included it almost as an afterthought, since I already had *MasterType* (Scarborough System) and several other typing programs. I thought *Kids on Keys* would be too babyish. Was I wrong! It was always in demand, and the kids thought it really helped their typing skills.

Grolier Electronic Publishing Inc.'s *Treasure Hunter* and *The Secrets of Science Island* also were unexpected runaway hits, as was the *Microzine* series (Scholastic Software). The *Microzine* programs turned out to be a hook that caught even the poorest readers. Kids who were extremely poor readers spent hours and hours working their way through twist-a-plot stories. The worst readers somehow gravitated toward each other and sat, three or four around one computer, painstakingly helping each other decipher the words. Other favorites were *Alice in Wonderland* (Spinnaker Software), *Operation Frog* and *Math Man* (both by Scholastic Software), *Stickybear Town Builder* (Weekly Reader Family Software) and *Felony* (CBS Software).

I did notice some sex-linked responses to software. Only boys played *Agent USA* (Scholastic Software) or *Zork* (Infocom). Only girls used *Gertrude's Puzzles* or *Moptown Hotel* (both by The Learning Company). In general, boys preferred *Fahrenheit 451* (CBS Software) and *Robot Odyssey* (The Learning Company). Girls preferred *Coast to Coast* (CBS Software) and *In Search of The Most Amazing Thing* (Spinnaker Software).

One of the biggest surprises for me was the discrepancy between reviewer reaction to some programs and the reaction of the kids who were using the software. Some educational programs that have garnered award after award were absolute duds in the classroom. Not all of them, but enough to raise questions. Other programs, less attractive to reviewers, were great hits. Perhaps the discrepancy is the same as that between great literature and books on the bestseller lists.

computers know that if they find a really intriguing software package, they can buy it to use at home. Not surprisingly, in my class the most avid programmers were the teens with a computer in their homes.

HAIL THE TYPIST

Teens with computers at home also are more likely to have better keyboard skills. Students who have taken a typing class are an exception. For the majority of my class, two-finger keyboard-pecking was the first, and biggest, obstacle to easy use. Hunting around for a particular letter was a real bother, particularly in the beginning. They did get better with practice, and then began to wish they knew how to type. To help, a parent can point out that typing is usually an elective at junior high schools. That's all I said to my class, and a number of students signed up for typing the next semester.

DE-GAP THE GENDER GAP

Just as typing isn't limited to girls these days, computing isn't just for boys. That's not a secret, but it needs to be reinforced. There is absolutely no difference between the way boys and girls take to computers. Individual differences, yes, but no observable sex-linked distinctions. In my class, enthusiasm, rate of learning, and ability to program a computer were equal between both sexes. Parents are showing that they encourage their daughters, as well as their sons, to take an interest in computers. Almost half the students I taught last summer were girls. That was very different from the scenario of a couple of years ago, when computer classes usually contained a disproportionate number of boys.

PROGRAM SOCIAL SKILLS

Another interesting observation I made was that computer skills can affect social status. A teenager in my class became popular at school once he or she was perceived as a good programmer, troubleshooter, or whiz at a particular educational game. Once these students were known to be competent, they were valued and sought out. Several shy youngsters became positively expansive under all this attention. That ran counter to many parents' images of the programmer as a loner. Young programmers who like computers are not more likely to lose out on social interaction than other classmates. Far from encouraging isolation, computers can foster interaction, cooperation, and mutual respect. In my class, kids taught other kids easily and accepted advice and correction from each other.

BE HARD ON SOFTWARE

Good software turns kids on, while boring software turns up on the shelf. Indeed, science, math, reading, spelling, and history can create enthusiastic responses when they deliver the academic content. One boy in my class, after working with *Treasure Hunter* (Grolier Electronic Publishing Inc.), said, "I wish my history classes were as interesting as this stuff. I'd memorize the book!" Several kids got excited about subjects such as weather, astronomy, and biology. Thanks to the geography games, every student learned the locations and names of the 50 states and their principal cities.

Parents shouldn't duplicate the software their children use in school because the kids will burn out. What parents can do is find other software that complements their children's curriculum. Often, teachers can give parents the best advice on appropriate software choices. A good program is a real learning tool discovery, and can motivate even the slowest students to learn at their own pace. Software can make or break a teen's experience with computers. FC

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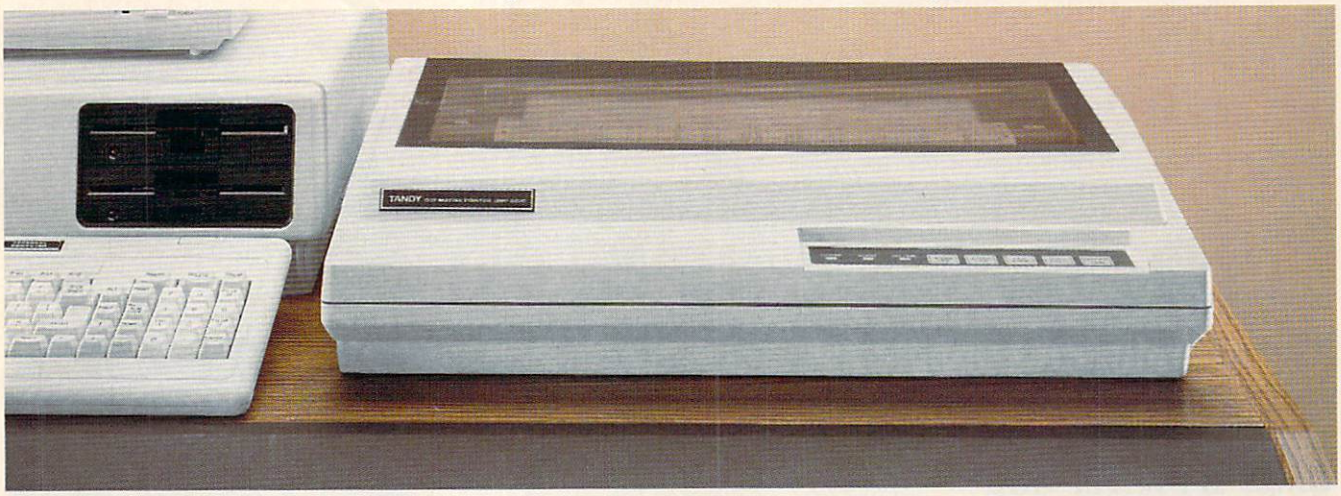

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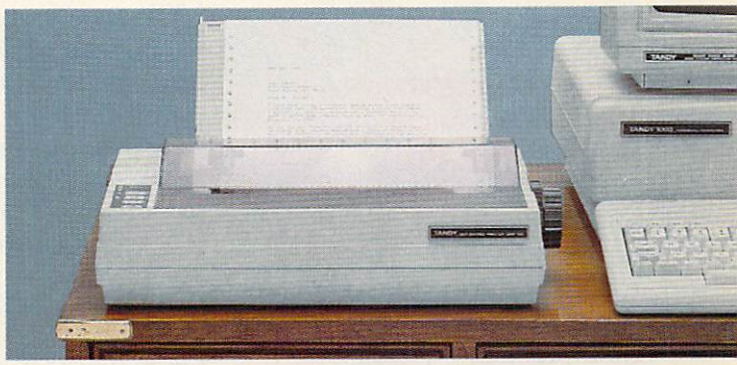

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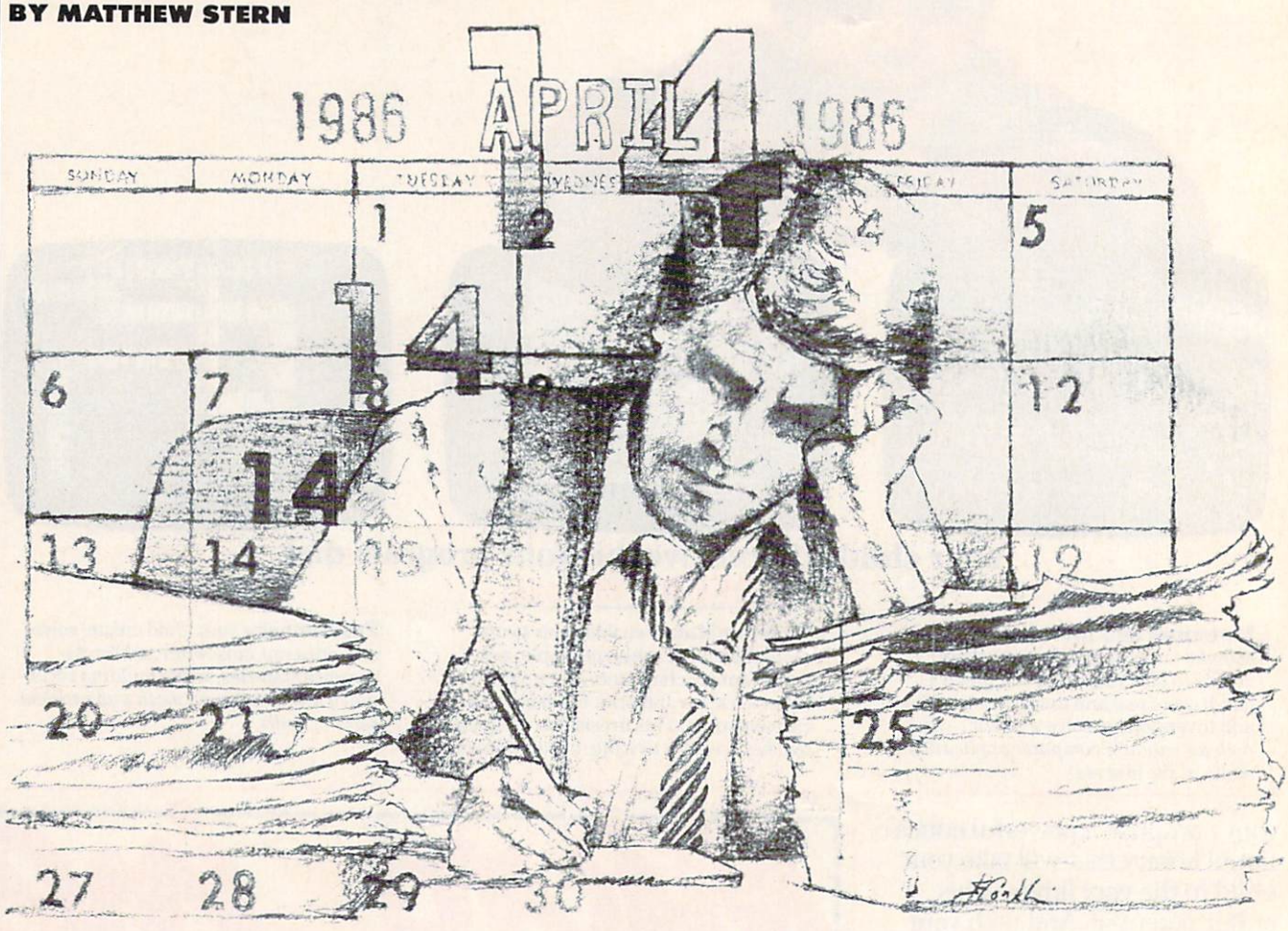
CIRCLE READER SERVICE 38

HOME/MONEY MANAGEMENT

LAST-MINUTE TAX TIPS

BY MATTHEW STERN



So you haven't done your taxes yet, huh? Don't worry. April 14 doesn't have to be a nightmare of adding-machine tapes. Your computer can take some of the burden out of preparing your return, especially if you itemize.

A tax-preparation program is the best way to prepare your return. The February 1986 issue of FAMILY COMPUTING described a number of such programs. Some of them are easy to use, like *Swiftax* (Timeworks). Just type in the information from your receipts and statements, and you can prepare your return in minutes.

But what do you do when it's April 14, you don't have a prep program, and you haven't organized the receipts you've stuffed in your shoe box all year? Your computer can still help prepare your taxes and save you money. Here are some tips:

MATTHEW STERN *wrote the Home/Money Management column in the December 1985 issue of* FAMILY COMPUTING.

ORGANIZE YOUR RECEIPTS WITH A DATA BASE

Part of the struggle in preparing taxes is organizing the receipts you've accumulated all year. You have to sort out your doctor and dental bills, contributions, and business expense receipts. A data-base program can make this task easier. It lets you organize your figures into the proper categories. (*See "Get Organized for Good with Data-base Software" in the March issue.*)

Create this simple file with the following fields: (A field type is included, in case your data base has this capability.)

FIELD NAME	FIELD TYPE
1. CATEGORY	TEXT
2. DATE	DATE
3. PAID TO	TEXT
4. AMOUNT	CURRENCY OR NUMERIC

Once you create the file, start entering receipts into your data base. Make sure you are consistent in the categories you enter. After you have entered all receipts, use the data base's sort and report features to print the records in each category. If the program doesn't sum them for you, you may add your receipts by hand or use a spreadsheet.

If your data base is part of an integrated system, like *1-2-3* (Lotus, for IBM PC and compatibles) or *Vizastar* (Solid State Software, for Commodore 64/128), or *AppleWorks* (Apple, for IIe/IIc), you can transfer your totals directly to a spreadsheet for calculations.

CALCULATE YOUR TAXES ON A SPREADSHEET

A certified public accountant once told me that simple mathematical mistakes cost money for thousands of taxpayers every year. A spreadsheet can calculate your taxes more accurately and organize your figures.

A spreadsheet is useful for small calculations. Unlike a calculator, on

ILLUSTRATION BY KEVIN CONKLIN

a spreadsheet you can organize your figures, move them around, and change figures without recalculating from scratch. You can use it for adding your itemized deductions, such as charitable contributions. If you made a number of contributions during the year, enter them in a column, let's say from cells C1 to C20. (Leave a few cells empty, in case you need to make more entries.) Then, if you make a mistake in entering an amount or found one last receipt stuffed in your wallet, all you have to do is type in the amount and use the spreadsheet's recalculation command. You will find these features very useful for more complex calculations, such as income averaging, capital gains, and business income.

You can even prepare your entire tax return on a spreadsheet. The rows can be set up to correspond to the line numbers in your tax form (e.g., enter wages, salaries, etc. in row 7 to represent line 7 on the 1040). Separate sections of your spreadsheet can be set aside for different forms and calculations. For example, add up your interest income in column B for Schedule B (Interest and Dividend Income) and transfer the total to another column that lists the figures for your main 1040 form.

If you are preparing a 1040EZ, 1040A, or a 1040 with a few forms (like itemized deductions and interest), you can put together a spreadsheet in a short time. If you have a more complex return with income averaging, capital gains, investment credits, etc., it may require additional time and preparation. Some books to help you include Charles Rubin's *AppleWorks: Boosting Your Business with Integrated Software* (Microsoft Press, 1985; $16.95) and *Jazz*, by David Bolocan (TAB Books, 1985; $17.45). There are also many other books for most popular spreadsheets and integrated packages like *Lotus 1-2-3* and *Symphony*, that are available at your local bookstore or computer dealer. If you can't find a book about your particular spreadsheet, you can use the models in one of the other books and change the instructions to fit your needs.

ON-LINE TAX HELP

Not only can a computer help you do the actual preparation of your tax return, it can even give you tax information and money-saving tips. Both The Source and CompuServe include answers to commonly asked questions, and the option of reading IRS publications on-line or ordering them electronically.

On The Source, tax assistance is obtained by typing TAX at the command level or by selecting it from the Business menu. The Source's tax service also includes the latest IRS rulings, a special section on tax deductions for computer use, tax news, and an index to tax items on file in various areas of The Source.

CompuServe's tax assistance is selected by typing GO IRS at the command level or by selecting the Personal Finance/Insurance section of the finance menu. Along with the IRS information and forms, CompuServe also contains tax tips, a keyword search for tax information, and a bulletin board for giving feedback to, or asking questions of, the IRS.

A MICROCHIP TAX SHELTER

If you rush to prepare your taxes at the last minute, you may overlook some money-saving deductions. Some of them can be right under your fingertips.

If you purchased software to prepare your return, it may be included under Miscellaneous Deductions on Schedule A as a tax-preparation expense. You can also deduct on-line charges when you use a service like The Source or CompuServe for tax research or assistance. Make sure that you have receipts to substantiate your deductions.

If you use your computer to work at home, you can claim the following expenses on a Schedule C (Business Income or Loss), if you used it for your own business; or Form 2106 (Employee Business Expenses), if you used it as an employee of a company:

- Computer software used for business;
- Computer supplies, paper, floppy disks, etc.;
- Computer equipment, peripherals, and hardware;
- Depreciation on computers and peripherals.

If you use your computer part of the time for business and the rest for personal use, you may deduct only the portion you used for business. (Don't try to write off your Gamestar *Star League Baseball* as an entertainment expense.)

If you use your computer at home for business purposes less than 50 percent of the time, it is considered "listed property" and subject to certain limitations. For more information, check IRS Publication 534, *Depreciation*, which is available from IRS offices or from CompuServe and The Source.

Of course, you must have receipts for all expenses you claim on your return. Make sure that you keep your receipts organized and on file after you finish your return, in case you need to prove your expenses.

PREPARE NOW FOR NEXT APRIL 15

You can save yourself money and trouble next tax season by preparing *now*. Because of new IRS regulations, you will have to keep even more accurate records of your expenses, especially if you use your computer at home for business. This makes it all the more important to start keeping better records.

You will need a "diary" of your personal and business computer use so you can validate your deductions. The IRS suggests that you keep a running log of your computer use. Jot down on a note pad *when* you use your computer, *what* programs you run, and *why* you used them.

Your computer can make record-keeping very easy. Your log can be saved on a data base for easy sorting and retrieval. A checkbook program, like *Quicken* (Intuit), or an integrated home-financial program, like *Andrew Tobias' Managing Your Money* (MECA), lets you keep current, accurate records of your income and expenses. You can use this information to develop tax-reducing strategies, like budgeting contributions to an Individual Retirement Account. Be sure that you enter your records as you go along, so you don't have a mountain of work to do at the end of the year.

While a computer can't do all of your tax work for you, it can make preparing your return easier and possibly save you money, even if it is at the last minute. FC

COMPANIES

CompuServe, (800) 848-8199; Intuit, Inc., (415) 322-0573; Lotus, (617) 492-7171; MECA (Micro Education Corporation of America), (800) 631-MECA; Monogram, (213) 215-0529; Solid State Software, (415) 341-5606; The Source, (800) 336-3366; Timeworks, Inc., (800) 323-9755.

For the phone number of the Internal Revenue Service office in your area, consult your local directory.

GAMES

11 HINTS FOR WINNING WAR GAMES USING STRATEGY AND TACTICS

BY JAMES DELSON

From the first day prehistoric people hunted their supper-to-be with any semblance of preparation, the twin ideas of strategy and tactics came into being. Strategy is the overall plan for any sustained action or campaign, while tactics are the execution of the plan's components.

Winning most computer war games calls for both strategic and tactical arrangements. In these simulations of historical (and sometimes imaginary) wars and battles, you're given resources such as an "order of battle" for the units that participate, and a map of the terrain where the action is fought. By including elements as detailed as the commanders' idiosyncrasies, programs try for the feel and tensions of real battles.

To fully enjoy strategy and tactics games, you like to put up a good show against your opponents. Admittedly, everyone isn't looking to spend hundreds of hours fighting old battles. There are, however, several war games which need little strategic planning. (*See software listing.*) For those who seek victory in war games of greater complexity, I offer these strategic and tactical guidelines.

The new wave, the state of the art in game software, will be the subject of games critic JAMES DELSON*'s column next month in* FAMILY COMPUTING.

GENERAL ADVICE FOR COMPUTER GENERALS

1. Do outside reading on the actual battles. Since most games are based on famous battles or campaigns, they often come with notes about the history, and play tips on how to conduct your army. A trip to the library will enhance your playing edge, especially against human opponents. The computer already "knows" this background material and will probably begin play with the actual strategy of the side it is simulating.

2. Take time to plan before you play. Going into battle without any idea of your goals or how to complete them is folly. Look over the battlefield, formulate a concrete plan, then follow it through.

3. Adopt a realistic attitude toward your actions. Although you're only playing a game, most programs have been designed to reward compassion to your army and the enemy. Wars of attrition are not intelligent; unlike many arcade games, you don't win by watching the casualties pile up. My approach is both determined and thoughtful. I don't hesitate to hit the enemy hard if needed, but I never attack when I can reach a goal with little or no violence.

4. Play for position. In chess, the one who controls the board usually wins. It's the same with war games, in which seizing key points on the map is crucial to victory. You'll recognize these strategic locations often, because the side that occupies them gets points at the game's end.

5. Make tactical preparations within the aim of your strategy. Separate your total plan into component goals. Proceed only when you have a good idea of how to take a hill, for example, or cross a bridge under enemy fire.

6. Remain flexible and cool. If your plans aren't working, adapt them. Don't throw them out at the first sign of trouble.

TIPS FOR THE ATTACK

7. Marshal your forces. Don't attack until all your assaulting troops are in proper position. Also, make ready your reserves to secure and exploit your advances.

8. Never waste your forces. This means avoiding costly attrition engagements whenever possible, or sending soldiers on suicide missions just to see what happens. These may not be real people, but you should act as though they were if you're serious about gaming. →

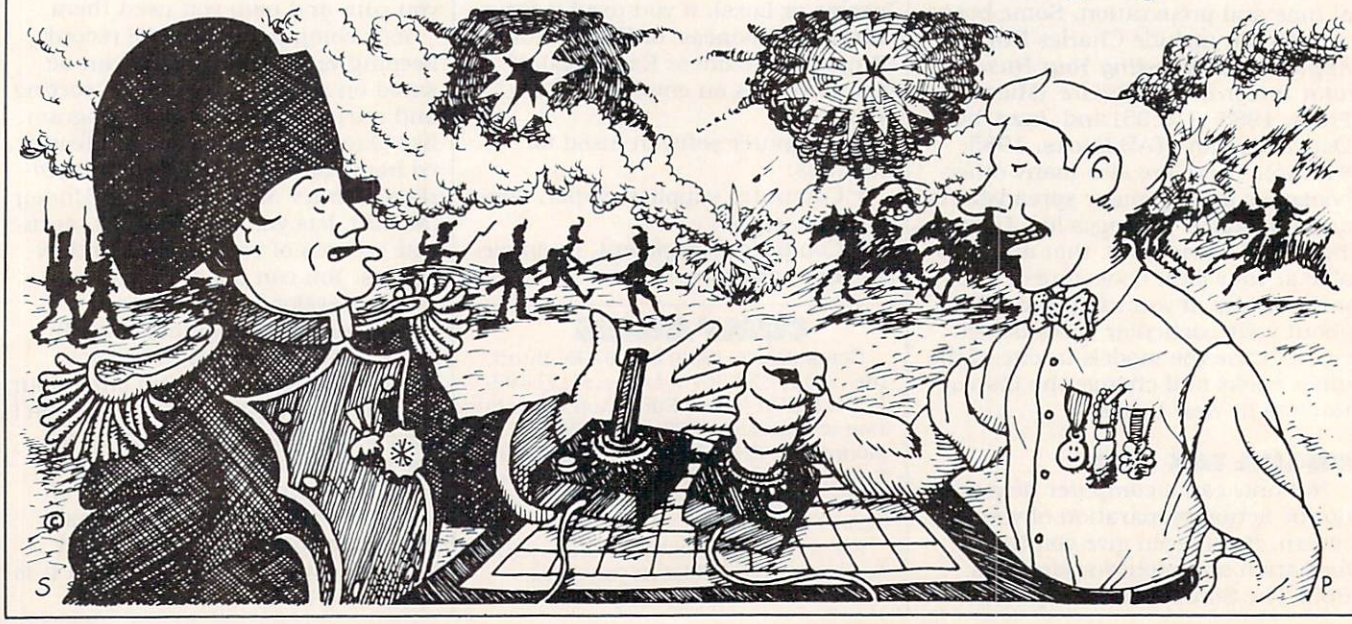


ILLUSTRATION BY STEVE PARTON

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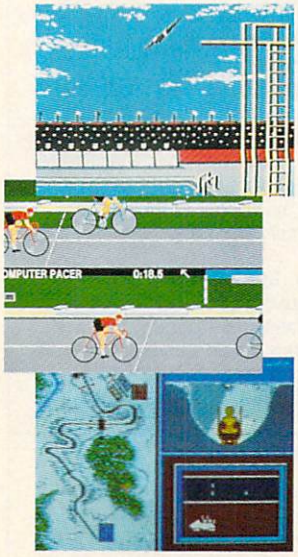

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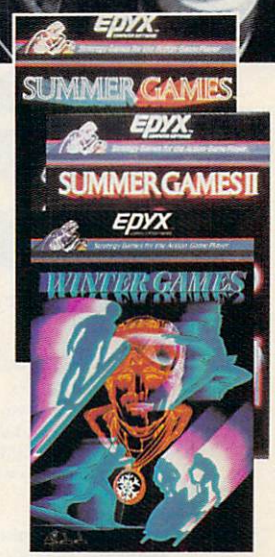

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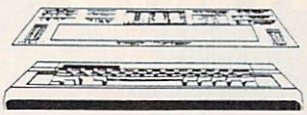

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GAMES

9. Use the combat results table to your advantage. Most game play systems favor either attacker or defender, depending on the odds. Learn which odds are best for you because attacking with poor odds is suicidal.

SETTING UP YOUR DEFENSES

10. Secure a defensive perimeter with strong points. Choose your ground, then place your strength where it'll be favored in combat (hills, towns, and forests). Use the ground to improve your chances in action while denying the best positions to your opponent.

11. Always look behind you. Prepare fall-back positions in case your offensive plans fail. Plan retreat routes to avoid having advance units cut off. Protect your supply lines to keep your army running smoothly.

The only way to learn strategy and tactics games is to play them repeatedly. If you are attentive and learn from your mistakes, you might come to like the realistic and thought-provoking details of this genre.

SOFTWARE FOR STRATEGY AND TACTICS

LEAST STRATEGIC PLANNING

Turn on the computer and play. You may not win immediately, but you'll have fun while you learn.

Decision in the Desert (MIC)—World War II North African campaign. 64K Apple, Atari*, C 64/128, IBM PC/PC*jr*. $40.

Field of Fire (SSI)—A variety of World War II tactical actions. Atari, C 64/128. $40.

Legionnaire (AH)—Julius Caesar's Gallic campaigns. Apple, Atari, C 64/128. $30–$40.

Panzer Grenadier (SSI)—World War II Russian campaign. Apple, Atari, C 64/128. $40.

MODERATE STRATEGIC PLANNING

After you've picked up the basics, move on to these excellent games, which I rate intermediate to advanced.

The Ancient Art of War (BRO)—A war-game construction set. IBM PC/PC*jr*, Macintosh. $45.

The Battle of Antietam (SSI)—Civil War battle. Apple, Atari, C 64/128. $50.

The Battle of Chickamauga (GDW)—Civil War battle. Atari. $35.

Knights of the Desert (SSI)—World War II North African campaign. Apple, Atari, C 64/128, IBM PC/PC*jr*. $40.

MOST STRATEGIC PLANNING

These programs require some experience and take the longest to play, but they're the most rewarding.

Carriers at War (SSG)—World War II Pacific naval campaign. 64K Apple, C 64/128. $50.

Fighter Command (SSI)—World War II Battle of Britain aerial game. Apple, C 64/128. $60.

Gulf Strike (AH)—Modern Middle East war-game simulation. Atari. $30.

Operation Market Garden (SSI)—World War II airborne fighting. Apple, Atari, C 64/128, IBM PC/PC*jr*. $50.

Paris in Danger (AH)—Napoleon's final campaign. Atari. $35.

MORE THAN COMBAT

It's possible to win here without firing a shot—if you're playing human opponents. Even against the computer, these games offer the increased challenge of political, diplomatic, financial, and other nonmilitary solutions to your problems.

Balance of Power (MIN)—Modern-day nuclear brinkmanship between the United States and the Soviet Union. Macintosh. $50.

Colonial Conquest (SSI)—Western colonization in the late Victorian era. Atari, C 64/128. $40.

Incunabula (AH)—An imaginary game of classic civilization-building. IBM PC/PC*jr*. $30.

A WAR GAMER'S BIBLIOGRAPHY

To further appreciate the precepts of strategy and tactics, here are a few classic books you can find at a local library or bookstore. (While specific editions are noted, other editions or translations might also be available.)

The Art of War; Henri Jomini (translated by Capt. G.H. Mendell and Lt. W.P. Craighill); 1971; Greenwood Press, Westport, Connecticut.

The Art of War; Sun Tzu (translated, with an introduction by Samuel B. Griffith); 1963; Oxford University Press, New York, New York.

On War; Carl von Clauswitz (edited and translated by Michael Howard and Peter Paret); 1982; Penguin, New York, New York.

Strategy; B. Liddell Hart; 1974; New American Library, New York, New York.

Historical atlases and books on wars, battles, campaigns, and generals will also help you research your games.

**Each "Atari" refers to the 800/XL/XE series.*

KEY TO PUBLISHERS' ABBREVIATIONS

AH—Avalon Hill; (301) 254-5300.
BRO—Broderbund; (415) 479-1170.
GDW—Game Designer's Workshop; (309) 452-3632.
MIC—MicroProse; (301) 667-1151.
MIN—Mindscape; (312) 480-7667.
SSG—Strategic Studies Group, distributed by Electronic Arts; (415) 571-7171.
SSI—Strategic Simulations Inc.; (415) 964-1353. FC

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CIRCLE READER SERVICE 19

TELECOMPUTING

COMPUTER AS INTERACTIVE TV
Viewtron's New National Network

BY NICK SULLIVAN

"The Bill Cosby Show" had a Nielsen rating of 33.1 during Christmas week last year. Even though the show was a rerun, one out of three of the nation's 85.9 million TV households was tuned to the latest master of laughs.

The size of this rating is impressive, especially since people now have VCRs, cable TV, and computers to keep them away from network TV. Since I got the news while watching a *computer*, this rating started me thinking. I realized that one in three households in the United States was certainly not watching the same computer program I was. Fewer than one in three households in the United States even has a computer, and fewer than that have modems.

Will this change? Yes, when buying, connecting, and using modems is made easier, and when the "programming" on computer networks improves, and the cost of watching that programming decreases. All of this is happening now.

CHANGE THE CHANNEL

The computer channel I was watching is called Viewtron. It is, of course, more properly called an information service, or electronic network, which you access by dialing a phone number with your computer and modem. (Available for Apple II series, Commodore 64/128, IBM PC and compatibles, and Macintosh with *MacTerminal* software.) Yet, Viewtron feels closer to TV than any other existing computer network. This may be good or bad, depending on your point of view. My point is that TV is how most Americans receive most of their information and entertainment.

You can watch Viewtron in color on a Commodore 64/128. Special software for Commodore comes with the Starter Kit ($9.95; includes password and ID; to order, call [800] 543-5500) and receives graphic displays sent from Viewtron. They are "painted" on the screen, section by section. True, you don't see actual TV-like images, but you do see color with a hint of graphic design, which is a marked change from the monochromatic presentation of other computer networks. The only drawback is that "painting" graphics is slower than spewing out straight text.

You can also order starter kits for Apple and IBM, but you won't get color. Software from Viewtron can be legally copied and given to friends. They can then call Viewtron Customer Service for their own passwords and IDs.

Viewtron's combination of reds, blues, and yellows and large-type 40-column screen display is a relief to eyes that have squinted to read small scrolling text. You're not meant to *read* Viewtron so much as to *watch* it—or use it as you do a push-button bank terminal.

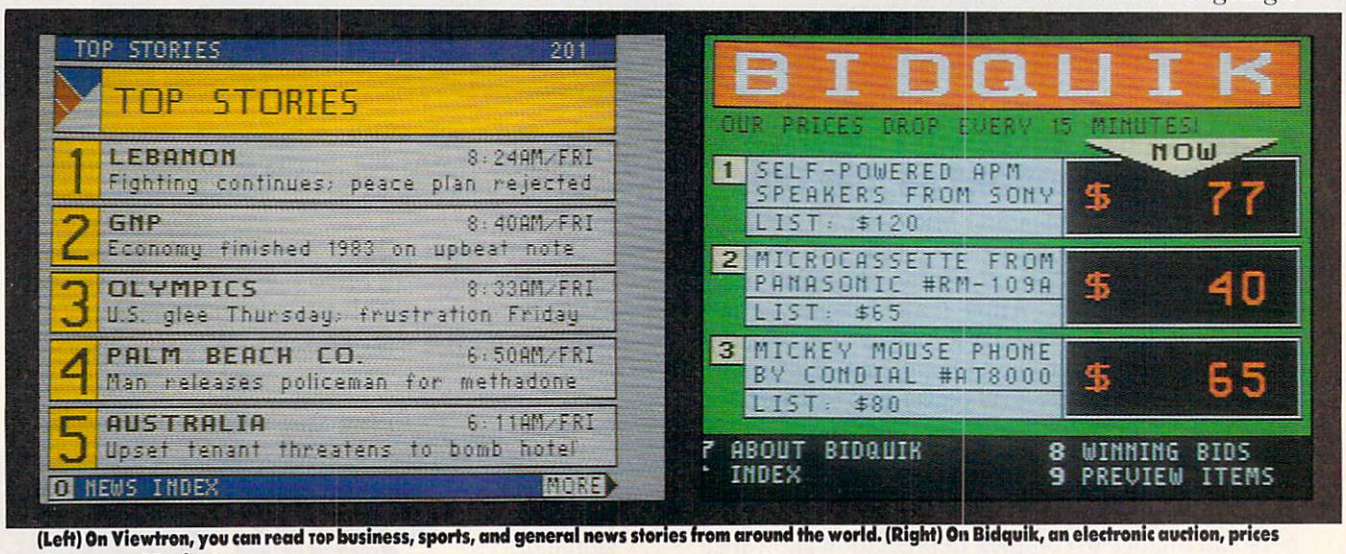
Moving from one section of the network to another—"changing channels"—is simple. When you see a blinking cursor on the top line of your screen you type a "keyword" that whisks you to your destination. I typed NIELSENS to find out about the Cosby show.

If you have any trouble signing on or using the system, the digest-like documentation that comes with your Starter Kit is a handy reference guide. And Viewtron's human-help-by-phone ([800] 843-9876), which I used to overcome several minor sign-on problems, is as helpful as the industry offers.

PERSONAL MAGAZINE

Other keywords, which you can use in various combinations to home in on your quarry, include: WEATHER CANADA, MOVIE JEDI (for a review of *Return of the Jedi*), JCP (to order from the J.C. Penney's catalog), or YANKEES (for the latest on the baseball soap opera in pinstripes). Type SOAPS for summaries of ongoing TV

Nick Sullivan is senior editor of FAMILY COMPUTING.



(Left) On Viewtron, you can read top business, sports, and general news stories from around the world. (Right) On Bidquik, an electronic auction, prices *drop* every 15 minutes.

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Viewtron's navigation is more advanced than other on-line services. Plain English keywords take you right to the meat of things. Often you can "zero in" by hitting one button. Viewtron charges no subscription fee, no monthly minimum. Pay only 9 cents a minute weekday nights (after 6 p.m.) and weekends; 22 cents a minute weekdays.* Access Viewtron on any of the major communications networks at no extra charge. (A local call for most people.)

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**Please add $2.50 postage and handling for Starter Kit. Plus $3.50 shipping for modems.

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You can set up a PERSONAL MAGAZINE of features you want to see regularly by choosing keywords and linking them together. For instance, you could set up a sequence of GOLD COINS, INDEX OPTIONS, BASEBALL, BUSINESS TOP (top 10 stories), WASHINGTON (for daily government stories), and SISKEL PICKS (to read the latest rants and raves from the *Chicago Tribune* movie critic).

NEWS, SPORTS, WEATHER

Viewtron is particularly strong on news, sports, money-market, and weather information. In many ways, it's a video newspaper. This can be explained by its heritage. Viewtron is published by Viewdata, a wholly-owned subsidiary of Knight-Ridder Newspapers. Knight-Ridder is a Fortune 500 company that publishes 28 newspapers in the United States. Viewtron's pedigree explains some of the service's directness—reporters don't beat around the bush. And, in true newspaper tradition, Viewtron offers HOROSCOPES.

As to why it has a video component, Viewtron was originally a TV videotext service in south Florida. Consumers there received Viewtron over their TVs by buying a $600 "black box" and paying a monthly fee. After two years of testing, evaluation, and reformulation, Knight-Ridder probably realized that more people own or will own computers than black boxes. Viewtron became a national computer network on October 1, 1985.

BANKING AND SHOPPING

Besides publishing video information, Viewtron offers home-banking and home-shopping services. Currently, four banks—two in Florida, one in Pennsylvania, and one in North Carolina—let customers pay bills on Viewtron and transfer funds among bank accounts. In the future, Viewtron expects to add more banks to its roster.

Viewtron shoppers can order catalogs from a variety of retailers, and in many cases even order goods online. (*See the November 1985 Telecomputing, which lists other shopping services.*) An on-going electronic auction called BIDQUIK offers discount prices on brand-name goods, mostly electronic; the prices drop every 15 minutes, and you can buy at any time with a credit card.

A more important feature of Viewtron for many potential shoppers is its annual auto and monthly product ratings from *Consumer Reports*. Type CR CELICA, for instance, and you'll read how *Consumer Reports* rates that car. CR COMPUTERS gives you hardware and software ratings.

Travellers can make airline and car-rental reservations on Viewtron. Want a spontaneous getaway? Type LAST and you'll read about last-minute travel specials. Type TRAVEL NEWS SCOTLAND for the latest on tourism there.

Viewtron also allows you to send electronic mail to other Viewtron users, visit Special Interest Groups (SIGs), and converse with other Viewtron users on an open channel called "CB" (modeled after the well-known CompuServe CB). However, those services are not strong selling points, at least for now. The system is new, has far fewer users than CompuServe or The Source, and thus has less appeal as a network of people. Viewtron looks better if you consider it as a network of information and services. Put all of Viewtron's services together, and it begins to look like a real household utility. It's more informative than network TV, and more useful than newsy cable TV because you can pick your topics. Who knows when you'll want to look at FOOTBALL ODDS? In addition, the interactive nature of Viewtron allows you to order goods, make reservations, pay bills, etc. Viewtron doesn't come close to TV as an entertainment medium, but it does have other teasers, such as Grolier's *Academic American Encyclopedia* and *Peterson's College Data Base* to search for schools.

Like cable TV, you pay to use Viewtron—22 cents a minute from 7 a.m. to 6 p.m., and 9 cents a minute from 6 p.m. to 7 a.m. This nighttime rate of $5.40 an hour is reasonable, and is the same whether you use a 300- or 1200-baud modem. There is no initial sign-up fee, and no monthly minimum charge.

Say you set up a Viewtron PERSONAL MAGAZINE with your favorite newspaper sections, and read it on your computer/TV 5 minutes a day. You'd pay about $15 a month. If the information was valuable to you, and if retrieving it through Viewtron fit your lifestyle better than through other sources, it would be worth it. You might be confused about which medium you were using, but you'd be getting a lot of utility out of one . . . CompuTube? FC

NEW NETWORKS: G E AND QUANTUM

Commodore, a company that managed some of the largest and most active Special Interest Groups (SIGs) on CompuServe, has moved them to a new network catering specifically to Commodore 64 and 128 users. **QuantumLink**, a network funded by venture capital, allows you to view color graphics, which are provided on special software you receive at sign-up. You can preview new software, play games with a friend across the country, shop, and join SIGs. QuantumLink has a flat fee of $9.95 a month—no matter how much you use the system—for both 300 and 1200 baud. However, when playing games, chatting in the Auditorium, or using some of the other special services, you pay an additional 6 cents a minute. (Quantum Computer Services, Inc.; 8620 Westwood Center Drive; Vienna, VA 22180; [800] 392-8200; or [703] 448-8700.)

General Electric, the big consumer electronics company, has introduced a computer network called **GEnie**. GEnie has all the standard services—LiveWire CB Simulator, Round Table Special Interest Groups, GE Mail, Classic Games, etc. The initial sign-up fee is $18; connect time is $5 an hour nights and weekends, and $35 an hour during the day (for both 300 and 1200 baud).

To sample GEnie, hook up your modem and call (800) 838-6369. When you're connected, press HHH and RETURN. At the U#= prompt enter 5JM11999,GENIE and press RETURN. You'll get five free minutes on the system. Unfortunately, this demo doesn't give a very good feel for what lurks behind the lamp. To find out more, write or call GE Consumer Services, Department 02B, 401 N. Washington St., Rockville, MD 20850; (800) 638-9636.

ELECTRONIC EDITION

The Family Computing Forum (GO FAMFORUM) and the Computer Club Forum (GO CLUB) on CompuServe are run with modems supplied by Hayes Microcomputer Products, Inc.

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CIRCLE READER SERVICE 45

COMPUTING CLINIC

COMMODORE PLUS 4 AND 128 • PANASONIC SR. PARTNER • APPLE II PLUS SOFTWARE COMPATIBILITY • APPLESOFT BASIC ON THE ADAM

Will Commodore 64 BASIC programs run on the Commodore Plus 4? Will Plus 4 programs run on the C 128?

D. WESTON
Westminster, Maryland

Most BASIC programs for the C 64 will not run on the Plus 4. The two machines and their BASICs differ too much. On the C 64, most graphics and sound effects are achieved with PEEKs, POKEs and machine language subroutines specific to the C 64. That's because BASIC 2.0 has no commands for graphics and sound. On the Plus 4, BASIC 4.5 is a superior language with many more ready-made commands. However, the C 128's BASIC 7.0 is very similar to BASIC 4.5.

Tri Micro, a software company (14072 Stratton Way, Santa Ana, CA 92705; [714] 832-6707), has a monthly newsletter answering questions on the Plus 4. Commodore markets Plus 4 programs directly. Write to Commodore Direct Marketing, 1200 Wilson Drive, West Chester, PA 19380. —L.W.

I saw a Panasonic Sr. Partner the other day. It is perfect for my use. Do you think it's a good computer? Also, does it run 85–90 percent of IBM PC software?

C. JAMES PEARSON
Estes Park, California

The Panasonic Sr. Partner, an IBM compatible, is a fine computer that runs most IBM software. Putting a figure on exactly how much is impossible. It will run the standard business programs, such as *WordStar* and *Lotus 1-2-3*. But certainly check with the company to ensure that specific packages you have in mind will run.

When the transportable "Partner" was first introduced in mid '84, many dealers thought it would be a big hit, especially with its built-in thermal printer (it prints out from the top of the monitor!). However, it never sold well, perhaps because most users want a fast dot-matrix printer or a good letter-quality printer; or perhaps because "transportable" computers aren't as popular as they once were. At any rate, the computer works, so if it's perfect for you, it's a match. —N.S.

In the information I received with my Coleco Adam, it stated "compatible with Applesoft BASIC." Does this mean that with a disk drive I'll be able to run software created for Apple computers?

ANTHONY SEAMAN
Mt. Juliet, Tennessee

No. Since most computers use different disk-operating systems (DOS's), you can't just plug a disk made for one computer into another computer's disk drive and expect it to work. The main exceptions to this rule are with IBM-compatible computers, which are designed to run disks created for the IBM PC (*see cover story in last month's issue*); and with the Franklin 2000 series, which is designed to run Apple disks.

Some Applesoft BASIC programs, especially those that don't use graphics, will run on your Adam with little or no modification if you type them in. Notice that in our Programming section, some months the same program will run on both Apple and Adam computers. Other months, the programs differ for the two machines. —N.S.

Is there any way to cross over and use Apple software on an IBM PC*jr*?

KAREN KERSCHEN
Andale, Kansas

No. However, it *is* possible to use some Apple II plus software on an IBM PC or Tandy 1000. You need to install the Trackstar Apple II plus emulation board ($375) in the PC or Tandy 1000. The board is made by Diamond Computer Systems, (415) 941-1221.

Commodore 64 owners who wish to use Apple II plus software may do so with the Spartan expansion device ($599) from Mimic Systems, (800) MOD-ULAR.

However, Apple II plus software does not represent the latest in Apple software. Unless you know of specific "must have" programs, you can probably find equally good software for any of the above systems. —N.S.

Questions are answered by LOUIS WALLACE, *contributing editor, and* NICK SULLIVAN, *senior editor.*

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CIRCLE READER SERVICE 9

A SIGHT FOR SORE EYES

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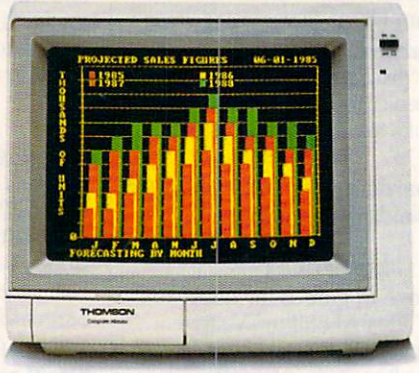

Model CM 31311SL 12" diagonal, .31mm dot pitch RGBI color monitor with text switch and non-glare tinted screen.

THOMSON

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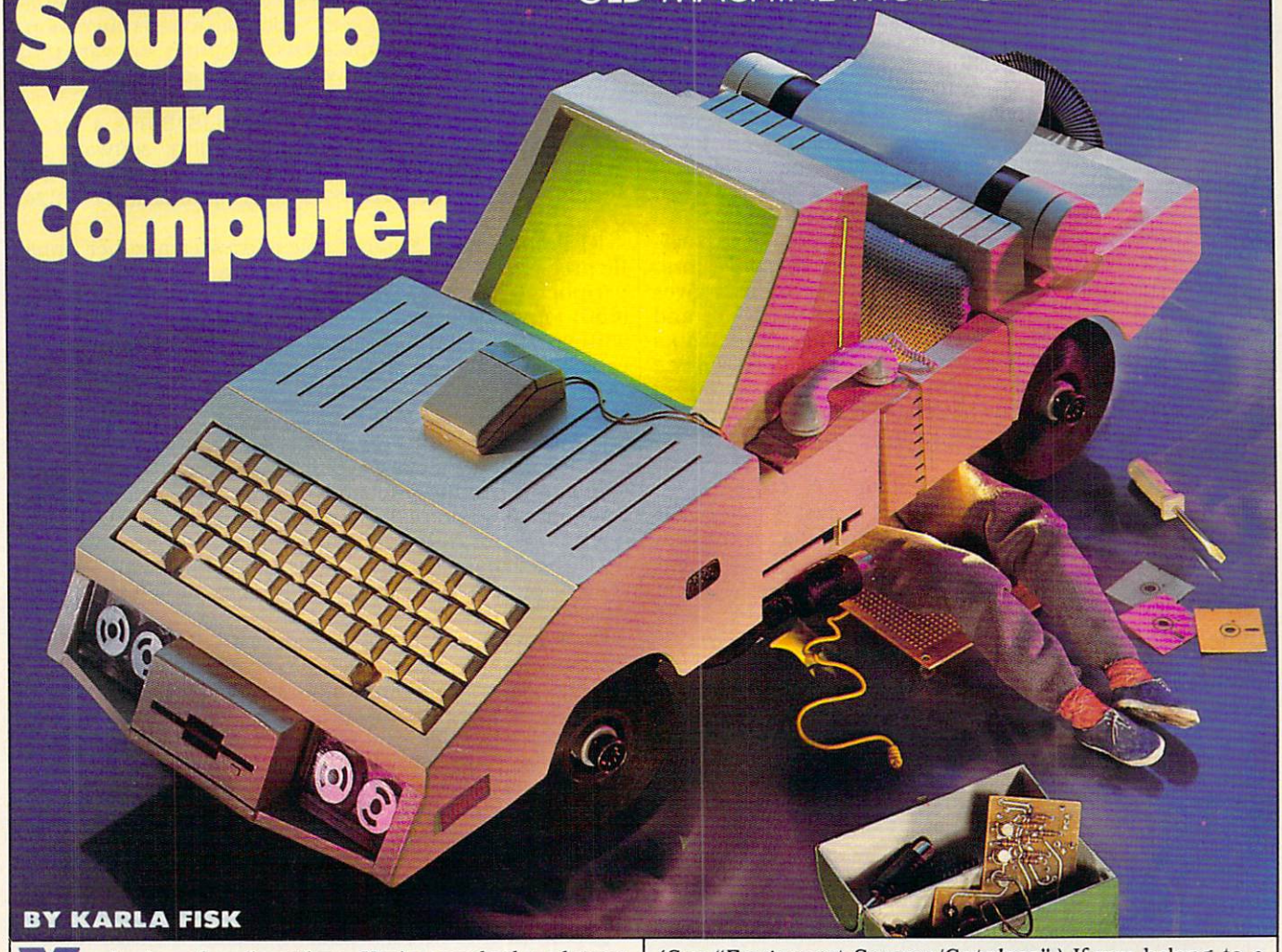
CIRCLE READER SERVICE 49

How To Soup Up Your Computer

A DIRECTORY OF MEMORY, VIDEO, AND PRINT ENHANCEMENTS TO GIVE YOUR OLD MACHINE MORE GET-UP-AND-GO



BY KARLA FISK

You're bored and restless. You've reached a plateau with your computer. You used to think your computer was beautiful. Now all the new computers—with more memory and better graphics—look better than yours. You've got the seven-year (or two-year) computer itch. But how do you abandon your dear old friend? You've invested thousands of hours learning how to make the machine work for you. You know all its special quirks.

Why not soup up the old jalopy? Add some memory, a video "enhancer," or maybe a printer interface with a built-in buffer. Give your computer a clock/calendar so you never have to type in the time and date. That's not a big deal, but it is a nice touch. Besides the common peripherals (such as disk drives, monitors, modems, and printers) and the uncommon peripherals (such as music and speech synthesizers and home-control units) there are circuit boards, chips, cartridges, and interfaces that will improve your computer's "ride." That's what we're talking about here.

How do you find those add-ons? The best way to start is to get a catalog from your computer's manufacturer or from a third-party manufacturer or distributor specializing in equipment for your computer's brand and model. (*See "Equipment Sources/Catalogs".*) If you belong to a local users' group, ask for suggestions. Finally, if you have a modem, sign on to one of the electronic bulletin boards that specializes in your computer.

Except for the Apple IIe and IBM PC, most computers weren't designed to be expanded beyond a certain point. So you'll have to do a little sleuthing to find your products and you may have to get your hands dirty once you find them. You know, unscrew the computer's casing and slide in a chip or board. (*Refer to the six-part "Hands On" series that began in October 1985 and continues through this issue.*) In many cases, such action will void the manufacturer's warranty, so wait 90 days or until it's up before fiddling!

Don't assume that all software will take advantage of the new power! For instance, adding more memory is only useful if there is software designed to take advantage of it. At the very least, you usually need RAM-disk software. Find out beforehand whether the software you have or want will take advantage of the new memory or video enhancements or whether the add-ons will be largely wasted.

For the most popular computers owned by our readers, we've listed a few of the products available in four categories: memory, print, video, and miscellaneous. (Not all

KARLA FISK *is a contributing editor at* FAMILY COMPUTING.

PHOTOGRAPH BY WALTER WICK DIMENSIONAL ILLUSTRATION BY JOAN STEINER

categories are mentioned for all computers). For the computers no longer in production (TI-99/4A, Timex Sinclair, Coleco Adam, and IBM PC*jr*), we've listed sources of product information.

APPLE IIc

Unlike the Apple II, II plus, and IIe, the 128K Apple IIc is a relatively closed system without internal expansion slots. Printer, modem, joystick/mouse, and video ports are lined up across the back, giving most owners enough room to move. But with the new UniDisk 3.5 ($499) from Apple, which stores 800K, there's likely to be an avalanche of new high-powered software, and users are going to want more memory to run it. As a result, there are a lot of memory expanders around, which means that the system that wasn't meant to be opened is being unscrewed by users hungry for more power. Also, because the IIc has a serial printer port, and many popular printers have parallel interfaces, there are a few serial-to-parallel convertors.

Memory: Applied Engineering's Z-RAM not only gives the 128K IIc 256K ($329) or 512K ($389) of RAM (and comes with RAM-disk software and *Super AppleWorks Desktop Expander* to help you use it), it also provides a Z-80 microprocessor and CP/M 4.0 operating system so you can use the huge body of CP/M software with your IIc. You install the equipment yourself by unscrewing the IIc casing.

Checkmate Technology's MultiRam CX Card ($330, 256K; $430, 512K) also features a socket for a 16-bit microprocessor ($119) that can be added later when more software is available. Again, you do it yourself. VIP Technologies is developing a spreadsheet, and Haba/Arrays is working on BASIC-16 and PASCAL-16. The 16-bit Apple (the Apple IIc has an 8-bit microprocessor) will process numbers much faster than the current IIc.

Video: Video-7's Screen Enhancer ($70) plugs into the back of the IIc and gives it 16-shade gray-scale definition on a monochrome monitor. This gives you more depth and shadows when running color software, but does nothing when running monochrome software.

GLOSSARY OF TERMS

Buffer—A temporary storage space where data is held; sometimes part of the computer's memory, often part of a separate device such as a printer interface. With a 64K print buffer, you can send about 30 double-spaced pages of text to your printer while using your computer for other tasks.

Clock/calendar—A device that stamps the time and date on all files as they are saved, and runs even when your computer is turned off. Also can be used with software to display time and date whenever you boot up a program.

Expansion card—A thin rectangular computer component, with layers of printed circuitry, that can act as a modem, parallel or serial interface, mouse, joystick controller, etc. The card plugs into the open slots of some computers.

Expansion slot—A place "under the hood" of some computers that accepts circuit boards to add memory, interfaces, etc.

Interface—Any connection (such as a cable or a circuit board) between your computer and a peripheral. The most common types are Centronics parallel and RS-232C serial. (*See the "Hands On" article in February's issue.*)

Megabyte—A measurement of computer memory, equal to 1,000K RAM, or about 588 double-spaced typewritten pages.

RAM disk—A portion of your computer's memory set aside as an internal disk drive. (To create this "compartment," you need RAM-disk software.) For instance, in a 256K computer, you might turn 128K into a RAM disk. Programs loaded into RAM disks generally run much faster than they do on disk drives because the data can be accessed more quickly.

Screen dump—The ability to print anything on your computer screen without saving it to disk first. Some printer interfaces have this ability built in, and include a small push button for printing a screen. This is a valuable feature when using graphics programs or games.

Video-7's Color Enhancer ($130) allows you to connect an RGB monitor to your IIc. You also get a free copy of Broderbund's *Dazzle Draw* to create pictures, graphs, and charts in 16 colors.

Print: Orange Micro has an economical solution—the HotLink ($69)—and a deluxe solution—the Grappler C ($119)—to connect parallel printers to the IIc. The HotLink, powered by your IIc, does a complete serial-to-parallel conversion; the Grappler C does the same conversion, but also comes with *GrapplerDisk* graphics software that gives you over 30 different ways to manipulate and print graphics.

Practical Peripherals' Switchport IIc ($109) is a serial-to-parallel convertor that includes utility software for printing out graphics. The Switchport 232 ($109) is a serial-to-parallel convertor for any standard RS-232C port.

IQ Technologies' Smart Cable addresses another Apple IIc problem: it has a five-pin serial connector when many peripherals have 25-pin connectors. The Smart Cable ($50) joins the five-pin IIc to serial printers or modems with 25-pin interfaces. All you do is flick a switch and the cable "pin outs" adjust accordingly.

APPLE IIe

The Apple IIe, with its eight slots, is made for expansion. This is fortunate since the bare-bones Apple IIe has only a 40-column display and no serial or parallel interfaces. Thus, the first step is to add one of the many 80-column cards and a printer and/or modem interface. Beyond that, the major expansion activity now (as with the IIc) centers on memory expansion to keep up with the new Unidisk 3.5 disk drive.

Memory: You can upgrade the 64K IIe to 128K with the extended 80-column cards (*see* **Video**) on the market, but you can add even more memory atop that if you wish. Apple makes the Apple II Memory Expansion Card ($299, 256K), which can be expanded to one megabyte. It comes with RAM-disk capability.

Applied Engineering's RamWorks II ($219) adds 256K RAM (expandable to 3M) to your IIe, and expands the *AppleWorks* "desktop" to 187K. Apple IIe RAM-disk software and CP/M RAM-disk software are included. Options that can be added later include: RGB display ($129) and a *VisiCalc* IIe Expander ($29).

Quadram's Multicore adds memory in increments ($279, 64K; $329, 128K; $399, 256K), and you get a parallel and serial printer interface, an RS-232C serial modem interface, a clock/calendar, and RAM-disk software. You can use Multicore with Apple II, II plus, or IIe.

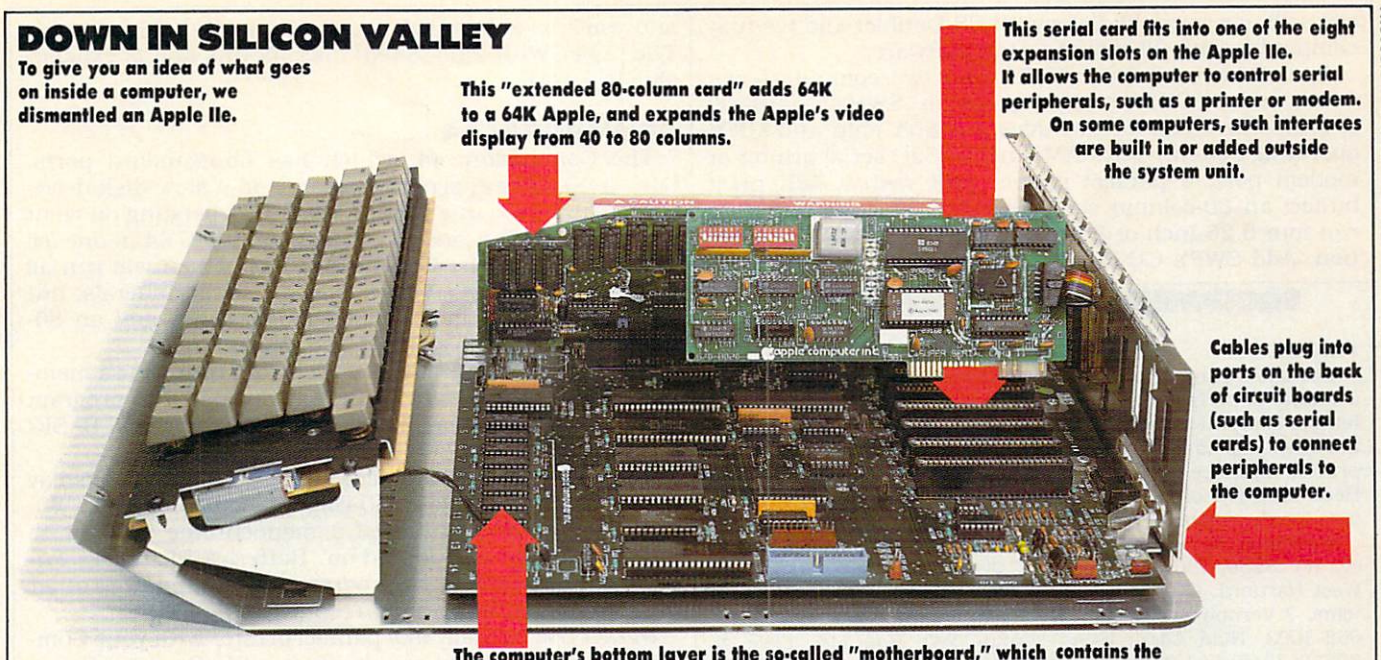
Checkmate Technology's MultiRam IIe Card ($160, 64K; $210, 256K; $270, 512K; $330, 768K) allows you to add a 16-bit microprocessor later for $190 (as on the IIc). Apricorn's Extend-It ($70), a 64K memory expander, attaches to your 80-column card.

Video: Since much new IIe business software requires 128K, it makes sense to get an extended 80-column card—one that ups the memory from 64K to 128K and expands the 40-column text display to 80 columns. Apple's Extended 80-Column Card ($139) is an option. Quadram's eRAM 80 ($135) does the same job and works with all software. Quadram makes an extended 80-column/RGB card ($229) that includes a clock/calendar. ALS's ADD/RAM 80/64 ($99) and ADD/RAM 80/256 ($199) give 80-column displays, and add 64K and 256K to the IIe.

Video-7's Screen Enhancer ($130) gives you 16 distinct shades of gray when running color software on a monochrome monitor. It also provides an 80-column text display and 64K extra memory. Video-7's Color Enhancer ($180) is an RGB interface that connects all IBM-compatible RGB monitors. Included is an enhanced version of

DOWN IN SILICON VALLEY

To give you an idea of what goes on inside a computer, we dismantled an Apple IIe.



PHOTOGRAPH BY PHILIP H. SEYMOUR

Broderbund's *Dazzle Draw*.

Print: Team your Apple II plus/IIe with Apple's ImageWriter II color printer by using Street Electronics' AlphaBits II ($120). This serial interface card has over 60 built-in color graphics and text-printing commands accessible through a pull-down menu. AlphaBits II works with other serial printers as well, and has an optional 16K or 64K buffer.

Orange Micro's Serial Grappler+ ($119) has over 30 graphics- and text-printing commands, and lets you print black-and-white or color graphics and text. A 16K or 64K buffer is optional. Grappler+ works on the Apple II/II plus/IIe. The ImageBuffer ($99) is a 64K buffer that fits inside the ImageWriter II printer.

A "smart" printer interface with lots of valuable extras is Street Electronics' BusinessCard ($220, serial; $250, parallel). Besides built-in commands on a pull-down menu for text and graphics printing, it has an RS-232C modem interface and a clock/calendar. A 16K or 64K buffer is optional.

Texprint's Print It! ($134–$199) is a parallel or serial interface that includes a small push button to print anything on the screen at any time.

Miscellaneous: Make your Apple run three times as fast with Titan Technologies' Accelerator IIe ($319). The extra speed is especially handy for calculating spreadsheets or sorting on a data base. Accelerator works with the Apple II, II plus, and IIe.

Keep your IIe from overheating with the Kensington Microware System Saver ($90). This classic Apple fan with a surge protector has plugs for the system unit, printer, and monitor, so you can start up the system by flicking one switch. The Apple IIe Enhancement Kit (Apple, $70), several chips that dealers install, lets the IIe run all the software designed specifically for the IIc, with pull-down menus, etc.

APPLE/MACINTOSH

Like the Apple IIc, the Macintosh has no internal expansion slots and no standard serial printer ports. The 128K Mac (no longer manufactured) and sometimes even the 512K Mac can operate slowly. Fortunately, solutions to these problems have arrived. (The new and more expensive Macintosh Plus, announced as we went to press, also solves many of these problems.)

Memory: Apple dealers can turn your 128K Mac into a "Fat Mac" with 512K of internal memory ($449). MacMemory Inc.'s The Max comes in three different versions (installed) for different needs: from 128K to 512K ($249); from 128K to 1.5M ($795); and from 512K to 1.5M ($645). The Max (expandable to 1.5M) comes with *MaxRAM*, RAM-disk software.

Print: Hook up your Mac to an Epson RX or FX printer with SMT's Image Driver ($99), an "intelligent" serial card. It fits right inside the printer. Juki's LetterPrint kit ($95) includes software and a cable that allows connection of the Juki 6100 and 6300 letter-quality printers to the Mac. NEC's *Colormate* software ($125), designed to be used with the NEC Pinwriter color printer, will allow you to print out in color from the Macintosh.

ATARI XL/XE

In the past, to connect a modem or printer to an Atari you needed the Atari 850 interface. Now, so many printers and modems come with special Atari cables, that's rarely necessary. Keep in mind that while you can expand the Atari's screen display and increase its memory, precious little commercial software takes advantage of these enhancements. So you're on your own.

Memory: ICD's RAMBO XL ($50) boosts the 800XL or 1200XL to 256K.

Add 256K internal memory to your XL with Newell Industries 256KXL ($100) and upgrade your XL to 130XE compatability (just like the RAMBO XL). Newell Industries' RAM-disk software MY-DOS is included with the memory expansion.

Video: Newell Industries' Omniview XL/XE ($60) expands the Atari's video display to 80 columns, and comes with the *Omniwriter 80* word processor.

Print: The Atari 850 Interface ($99) gives the XL/XE line a standard serial and parallel port to connect a wide variety of printers and modems. ICD's P:R:Connection ($80) does the same, but takes up much less room on your desktop. Digital Devices' U-Print Model A ($90) is a parallel printer interface with a 16K buffer (expandable to 64K).

Miscellaneous: Turn your 1050 drive (134K storage) into an 180K disk drive with ICD's US Doubler ($70). You

can still use your old disks with US Doubler and it's fully compatible with all existing Atari software.

Transform your Atari XL/XE into two computers—an Atari and a CP/M computer—with SWP's ATR8000 ($400). The ATR8000 includes a Z-80A chip and CP/M operating system; 64K RAM; an RS-232C serial printer or modem port; a parallel printer port with a 48K print buffer; an 80-column screen display; and the ability to run four 5.25-inch or 8-inch disk drives in any combination. Add SWP's CO-POWER-88 ($350) to the ATR8000, and you'll be able to run much of the MS-DOS software. The CO-POWER-Plus ($495) does all this and is expandable to 1024K.

EQUIPMENT SOURCES/CATALOGS

ADAM

You can expand Adam's video display to 80 characters and add a variety of peripherals, including a tractor-feed mechanism for fanfold computer paper, an RS-232 serial port to hook up external modems and a wide line of printers, and a Commodore printer interface so you can use the Okimate 10 color printer. Here are a few of the main sources of information about products for the Adam:

Adamland, Wyoming Adam User's Group, 795 Garfield, Lander, WY 8250; (307) 332-9250. Coleco, 999 Quaker Lane S., West Hartford, CT 06110; (800) 842-1225. Eve Electronic Systems, 2 Vernon St., Suite 404, Framingham, MA 01701; (617) 653-3003. Niad Adam Users' Group, P.O. Box 114, Lisle, IL 60532; (312) 961-3529. The *Adam Resource Directory* is a 76-page book with listings of Adam users' groups and retailers ($13.95; P.O. Box 90, Seelyville, IN 47878).

Sections 6 and 7 of the FAMILY COMPUTING Forum on CompuServe (GO FAMFORUM) are devoted to Adam users. You can be sure you'll find out about new products there. A file in Data Library 6 (DL6), called BBS, lists bulletin boards around the country that cater to Adam owners. John Mesiavech is the Adam administrator.

IBM PC*jr*

The IBM PC*jr* isn't as easily expandable as the IBM PC, but you can pump the memory up to 640K and add a second disk drive and print buffers. The PC*jr* has only one internal slot (for a modem); other expansion units are attached externally on the side. And, while IBM doesn't make a second disk drive for the PC*jr*, third-party manufacturers do.

Besides IBM, the main companies that provide expansion products for the PC*jr* are Quadram, IQ Technologies, Racore, and Tecmar. (*Refer to the manufacturers' box for telephone numbers.*) The IBM Novice SIG on CompuServe is a good repository of PC*jr* product information and expertise.

TI-99/4A

Triton carries all TI and third-party hardware and software for the 99/4A, and publishes catalogs twice a year. Call (800) 227-6900 for a free catalog. Unisource Electronics (Lubbock, Texas; [806] 745-8834) is also a large TI dealer.

The 99/4A National Assistance Group has 35,000-plus members worldwide and offers more than 1,500 TI hardware and software accessories. A one-year membership, which includes a newsletter and catalog, costs $10. (National Headquarters, P.O. Box 290812, Ft. Lauderdale, FL 33329; (305) 583-0467. Call Monday and Tuesday, 6:30 p.m.–9 p.m., EST, and Monday through Thursday 10 a.m.–1 p.m., EST.)

TIMEX SINCLAIR

The following companies sell software/hardware for the Timex 1000/1500/2068 and Sinclair QL (call or write for a catalog):

Curry Computer, Glendale, Arizona; (602) 978-2902. RMG Enterprises, Oregon City, Oregon; (503) 655-7484. Sunset Electronics, San Francisco, California; (415) 665-6161. T/S Connection, Cincinnati, Ohio; (513) 271-5575. Variety Sales, New Haven, Connecticut; (203) 387-8512. WMJ Data Systems, Hauppage, New York; (516) 543-5252. Zebra Systems Inc., Woodhaven, New York; (718) 296-2385.

The Computer Club Forum on CompuServe (GO CLUB), managed by FAMILY COMPUTING, has an active group of Timex Sinclair users, and is a great source of product information. Here, also, you can get phone numbers of local Timex bulletin boards. A file in Data Library 4 (DL4) called VENDOR.CAT lists companies that carry Timex Sinclair and Sinclair QL products. The system operator is Pat Spera.

COMMODORE 64

The Commodore 64, which has nonstandard ports, 64K, a 40-column screen display, and a slow disk drive, can be improved in a variety of ways. Depending on what you're looking for, one way to soup up the C 64 in one fell swoop is to buy the Commodore 128, which will run all your existing C 64 software and use all peripherals, but give you more memory, a faster disk drive, and an 80-column screen display (in C 128 mode).

Memory: Get even more power from your C 64's memory with Cardco S'More ($70). You can use it to program in BASIC (61K instead of 38K) and use additional BASIC commands.

Video: Batteries Included's B.I.-80 Column Display ($170) transforms your 40-column screen into an 80-column display. You'll need a monochrome monitor to take advantage of this add-on. Batteries Included's *PaperClip* word-processing program and a handful of other programs work with this screen expansion.

Print: Use virtually any parallel printer with your Commodore and print hi-res graphics with Orange Micro's Grappler CD ($119).

Cardco's parallel printer interface, the G-Wiz ($70), connects Commodore computers to virtually any Centronics parallel printer.

Miscellaneous: Epyx's Fast Load Cartridge ($40) speeds up the operation of the Commodore 1541 disk drive considerably, and also includes handy DOS utilities.

Make your C 64 act just like an Apple II plus with Mimic Systems' Spartan ($599). It allows you to use all Apple II plus (and most Apple IIe) software and hardware. For C 64/128 and Plus 4, Aprotek's Aprospand-64 ($30) adds four extra cartridge slots and a reset switch so you can reboot without turning your computer off and on again.

IBM PC

Ever since IBM came out with an "open" computer that users could customize according to their needs, third-party manufacturers have been finding new and exotic ways to fill up the valuable expansion-slot "real estate." To use the IBM PC with a monitor, you need to add a monochrome or color video adapter. Because many users have filled up the IBM's five expansion slots by adding video adapters, memory beyond 256K, and printer interfaces, "multifunction" cards that are crammed with features but take up only one slot are the cards of choice. Many include printer interfaces, so we've bypassed that category. We concentrated on the most popular and best-supported of these multifunction cards. Lately, new graphic adapters and memory expanders beyond 640K have been the two hot areas.

Some of these cards also work on IBM PC-compatible computers. However, since most compatibles include video adapters, allow you to expand to 640K on the motherboard, and include printer and modem interfaces, multifunction cards are rarely necessary.

Memory: Quadram's Silver Quadboard ($695) has 384K RAM (which brings a 256K PC up to 640K), a parallel port, a serial port, a game port, an optional second serial port, and a clock/calendar. *QuadMaster III* and *Polywindows Desk Plus* software are included. AST's Six Pak Plus allows you to add memory in increments ($395, 64K; $695, 256K; etc.) and also gives you a serial port, a parallel port, and a clock/calendar.

Video (Monochrome): The Hercules Graphics Card ($499) displays 720 x 348-pixel high-resolution graphics and text, and also includes a parallel printer port.

Video-7's MonoGraphics Adapter ($250) is the same as a Hercules card, except the Video-7 M6A is a shorter card (good for IBM PC/XT) without a parallel port.

Video (Color): The IBM Color/Graphics Board ($244) lets you display 16-color graphics on a RGB color monitor with your PC. The Hercules Color Card ($245) gives you 16-color graphics on an RGB monitor and adds a parallel port.

Paradise Systems' Modular Graphics Card ($395) is four graphics boards in one. It produces standard color graphics and enhanced color graphics (both RGB and composite), drives a monochrome monitor, and displays 16-shade monochrome graphics.

The IBM Enhanced Graphics Adapter (EGA), $524, gives you hi-res 16-color graphics at a maximum resolution of 640 x 350 pixels. The adapter also acts as an IBM Color/Graphics Board. You can see all 16 colors at a resolution of 640 x 200, but you can only display four colors at once at the top resolution. To get the resolution you expect, you need to buy a Memory Expansion Card ($199, 64K) that increases the EGA's RAM to 128K.

The Video-7 Enhanced Graphics Adapter (VEGA), $599, is really four video graphics cards in one. It comes in both long-slot and short-slot versions, runs all four standard video modes—IBM EGA, IBM Color Graphics Adapter, IBM Monochrome Display Adapter, and the Hercules Graphics Card—and comes with 256K RAM.

Quadram's QuadEGA+ ($595) does the same thing and comes in a short-card version ($595), useful for the PC/XT and PC compatibles. For truly stellar color graphics, AT&T's Video Display Adapter with Digital Enhancement (VDA/D), $695, works with the IBM Color Display monitor to display up to 1,008 colors at once. According to AT&T, the VDA/D produces "realistic, life-like photographic images" without any changes in the monitor.

Miscellaneous: Diamond Computer Systems' Trackstar ($375), an internal circuit board, allows the IBM PC to run any software that runs on the Apple II plus. Orange Micro's ImageMate ($129) fits inside Apple's ImageWriter II color printer, and allows it to work with an IBM PC. ImageMate includes a 64K print buffer.

TANDY

The Tandy 1000, with expansion slots, is probably the most naturally expandable of the Tandy computers. However, the old Tandy Models III/4 and Color Computer have been on the market so long, there are plenty of gadgets to bring out the best in those machines. (Note that Tandy now calls most of its computers "Tandy," even some in the old TRS-80 line.)

MANUFACTURERS

Advanced Logic Systems (ALS), (408) 730-0307; Alpha Products, (718) 296-5916; Apple Computer, Inc., (408) 996-1010; Applied Engineering, (214) 241-6060; Apricorn, (619) 271-4880; Aprotek, (805) 482-3504; AST Research, Inc., (714) 863-1333; AT&T, (201) 898-6000; Atari, (408) 745-2000; Batteries Included, Inc., (416) 881-9941; Botek, (313) 739-2910; Cardco, Inc., (316) 267-6525; Checkmate Technology, Inc., (800) 325-7347, (602) 263-0638; Coleco, (203) 725-6000; Colorware Inc., (718) 647-2864; Commodore, (215) 436-4200; Diamond Computer Systems, (415) 941-1221; Digital Devices, (404) 872-4430; Epyx, (408) 745-0700; Green Mountain Micro, (802) 485-6112; Haba/Arrays, (818) 901-8828; Hercules Computer Technology, (415) 540-6000; IBM, (305) 998-6048; ICD, Inc., (815) 968-2228; IQ Technologies, (206) 451-0232; Juki (415) 964-4176; Kensington Microware, (212) 475-5200; MacMemory, Inc., (415) 964-4176; Mimic Systems, Inc., (800) MOD-ULAR, (800) 663-8527; NEC, (617) 264-8635; Newell Industries, (214) 442-6612; Orange Micro, (714) 779-2772; Paradise Systems, Inc., (800) 527-7977, (800) 822-2020; PBJ, (201) 523-8663; Practical Peripherals, (818) 991-8200; Quadram Corp., (404) 923-6666; Racore Corporation, (408) 438-7255; SMT—Systems Manufacturing Technology, Inc., (619) 744-3590; Spectrum Projects, (718) 441-2807; Street Electronics Corp., (805) 684-4593; SWP Microcomputer Products, (817) 924-7759; Tandy Corporation, (817) 338-2335; Tecmar Inc., (216) 349-0600; Texprint, (800) 255-1510; Thirdware Computer Products, (305) 592-7522; Titan Technologies, (313) 662-8542; Video-7 Inc., (408) 943-0101.

TANDY 1000

Note: The short- and medium-length circuit boards made for the IBM PC work on this PC compatible, but the longer ones will not fit inside the smaller 1000.

Memory: Tandy's 256K Memory Expansion Board ($240) expands the memory of your 128K Tandy 1000 to 256K. Tandy's Memory PLUS Expansion Board ($320) expands the 128K 1000 to 640K of memory. Tandy's 512K Expansion Board ($200) expands memory from 384K to 512K. The Tandy 128K RAM Upgrade Kit ($130) can be added to either expansion board.

Print: Tandy's RS-232C Option Card ($100) allows connection of serial peripherals.

Miscellaneous: Tandy's Digi-Mouse Controller/Calendar Board ($100) is a perpetual clock/calendar that includes a controller for Tandy's Digi-Mouse ($100). Run Apple II plus software on your regular Tandy 1000 disk drives with Diamond Computer Systems' Trackstar Apple II plus Emulation Board ($375).

TANDY MODELS III/4

Memory: Tandy's Model 4 64K RAM Upgrade Kit ($70) gives the Model 4 128K RAM. Transform your Model III into a Model 4—with more memory and better resolution—with Tandy's Model 4 Upgrade Kit ($400).

Video: Tandy's High-Resolution Graphics expansion board ($219) increases the resolution of your Model III (48K) or Model 4 (64K) monochrome screen up to 640 x 240 pixels.

Print: Tandy's Printer Controller ($250) has a 64K print buffer and a built-in Z-80 microprocessor that gives you special print functions on the Model 4. Tandy's internal RS-232 board ($250) for the Tandy Models III/4 allows you to connect serial peripherals (printers or modems).

Miscellaneous: Alpha Products' Newclock-80 ($60) is a clock/calendar for the Tandy III and 4 computers. Aerocomp's Model I Double Density Board ($99) increases the storage capacity of your Model I disk drives 80 percent.

TANDY COLOR COMPUTER

Memory: Spectrum Projects' 64K–128K Upgrade ($149) upgrades your 64K CoCo to 128K.

Video: Hook your CoCo (designed for a TV) to a color monitor and get a clear, crisp picture with Spectrum's Video Plus ($24, CoCo I; $29, CoCo II monochrome; $39, CoCo II color).

Create beautiful high-res graphics in color with Colorware's *CoCo Max* ($70). *CoCo Max* has pull-down menus that you control with a mouse, joystick, or Koala-Pad. Don't limit yourself to uppercase letters on your CoCo. You can use lowercase letters, too, with Green Mountain Micro's LowerKit III ($129). Get 80-column displays (from the 32-column display CoCo) and lowercase letters with Word-Pak II ($149). You'll need a monochrome monitor to take advantage of this add-on.

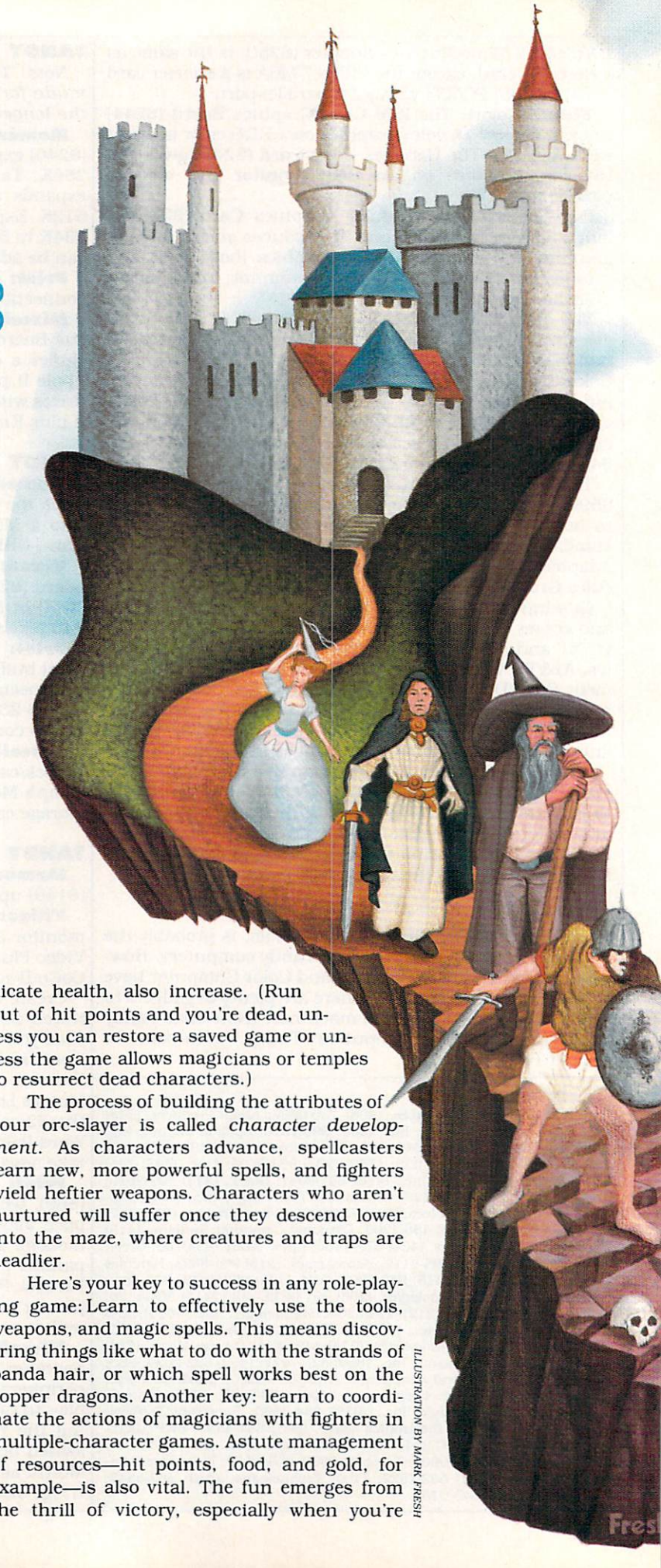
Print: Spectrum Projects' PBH CoCo Serial Interface ($69), which connects to the CoCo's nonstandard serial port, allows you to connect a standard serial printer or modem. The Botek Interface ($55) allows you to connect parallel printers to the serial CoCo. With PBJ's PC-Pak Parallel Port and Clock ($132), you can use a parallel printer and get the current date and time on-screen, as well.

Miscellaneous: Spectrum Projects' Triple RS-232 Switcher ($29) allows you to connect three different serial peripherals—a printer, a plotter, and a modem, for example—to your CoCo and select any one without disconnecting the rest. Spectrum's Switcher ($69) allows you to switch between a cartridge and your disk drive. Tandy's Multi-Pak Interface ($99) gives you four selectable cartridge slots. FC

FROM TOWERS TO DUNGEONS:

THE UNIVERSE OF FANTASY ROLE-PLAYING SOFTWARE

BY SHAY ADDAMS



Once the worlds of fantasy fiction could be visited only by reading novels like J.R.R. Tolkien's *Lord of the Rings*. Now the gates have been flung open by fantasy role-playing games, which invite you to venture into equally fantastic realms for some firsthand dragon-slaying.

Fantasy games are like adventure games in the sense that you visit an imaginary world to achieve a long-range goal. The playing experience, however, is entirely different. One distinguishing feature of fantasy is that the player assumes the role of a character, one whose capabilities are determined by specific attributes. Strength, dexterity, intelligence, and luck are among the most common. Fantasy games stress combat and magic, in contrast to the logical puzzle-solving found in adventures.

A STAR IS BORN

Fantasy programs generate characters by randomly assigning values to the attributes. You usually get to choose your persona's name and class (e.g., warrior, thief, sorcerer, etc.). In the ensuing combat, attributes of strength and dexterity determine your character's effectiveness. Attributes like intelligence govern your chance of success when negotiating with merchants or casting magic spells. Depending on the game, you press keys or move a joystick or mouse to decide whether your character will swing a sword or cast a spell when you're attacked by a gang of deranged dwarfs. The software rolls its internal dice to decide each battle, then announces the results.

Victory nets your character gold and experience points. Gold will buy you more weapons and armor, for instance. Earn enough experience points, and some of your character's attributes will be boosted. Hit points, which indicate health, also increase. (Run out of hit points and you're dead, unless you can restore a saved game or unless the game allows magicians or temples to resurrect dead characters.)

The process of building the attributes of your orc-slayer is called *character development*. As characters advance, spellcasters learn new, more powerful spells, and fighters wield heftier weapons. Characters who aren't nurtured will suffer once they descend lower into the maze, where creatures and traps are deadlier.

Here's your key to success in any role-playing game: Learn to effectively use the tools, weapons, and magic spells. This means discovering things like what to do with the strands of panda hair, or which spell works best on the copper dragons. Another key: learn to coordinate the actions of magicians with fighters in multiple-character games. Astute management of resources—hit points, food, and gold, for example—is also vital. The fun emerges from the thrill of victory, especially when you're

ILLUSTRATION BY MARK FRESH

down to your last hit point. A sense of discovery awaits the intrepid dungeon-delver.

VARIATIONS ON THE THEME

In some games, only one character takes the field. In others, you organize parties of up to eight. While epic struggles lasting for hundreds of hours are common, a few are fast plays. You'll find treacherous dungeons and mazes that require intense mapping.

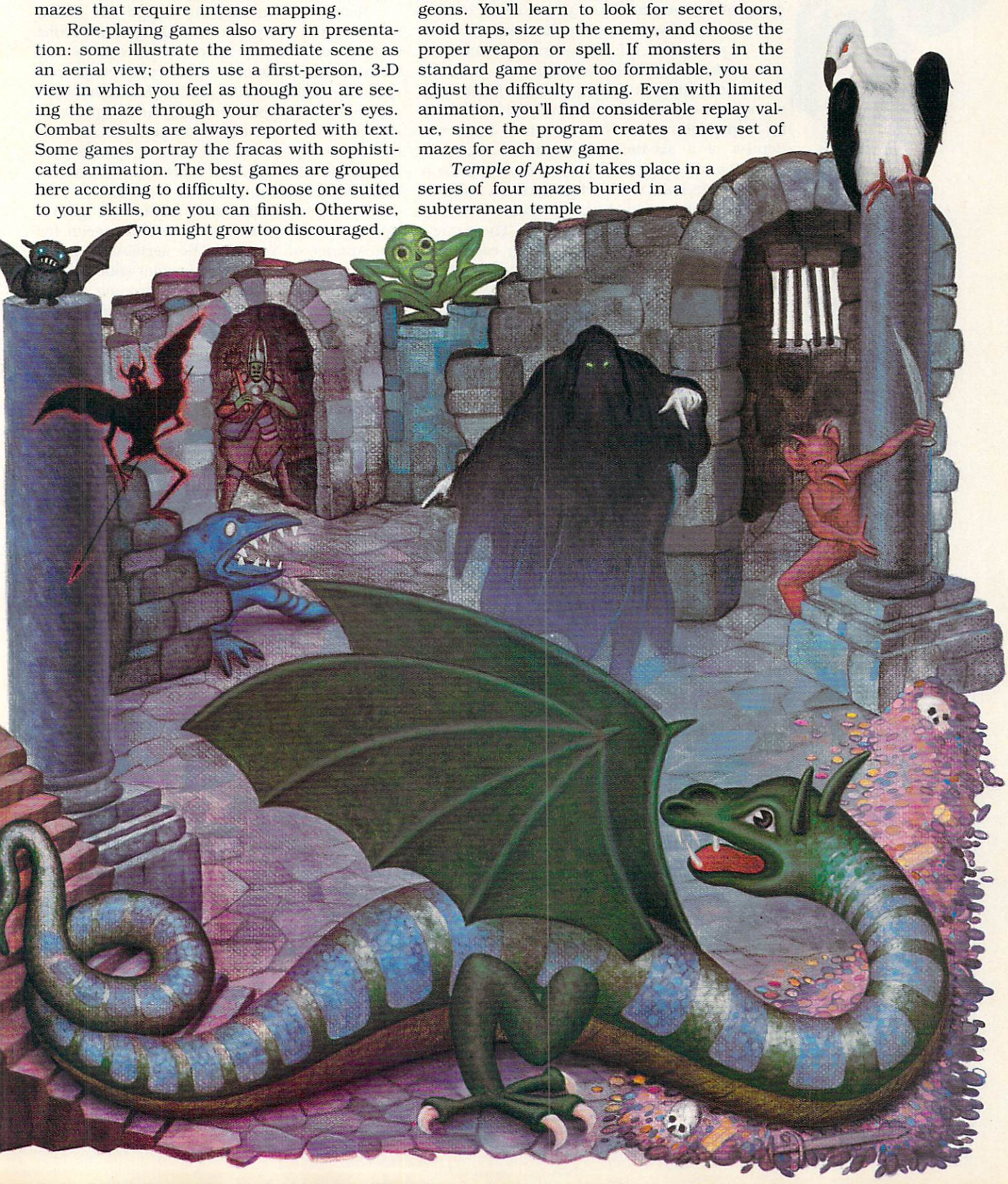
Role-playing games also vary in presentation: some illustrate the immediate scene as an aerial view; others use a first-person, 3-D view in which you feel as though you are seeing the maze through your character's eyes. Combat results are always reported with text. Some games portray the fracas with sophisticated animation. The best games are grouped here according to difficulty. Choose one suited to your skills, one you can finish. Otherwise, you might grow too discouraged.

FANTASY FOR FIRST-TIMERS

One of the pioneer role-playing computer games is still the best introduction to the genre. *Beneath Apple Manor* lets you decide which attributes will increase each time your character earns more experience points. This forces you to pay close attention to character development as you strive to retrieve a magic golden apple from the labyrinth's many dungeons. You'll learn to look for secret doors, avoid traps, size up the enemy, and choose the proper weapon or spell. If monsters in the standard game prove too formidable, you can adjust the difficulty rating. Even with limited animation, you'll find considerable replay value, since the program creates a new set of mazes for each new game.

Temple of Apshai takes place in a series of four mazes buried in a subterranean temple

SHAY ADDAMS *edits "Quest Busters," a newsletter for devoted fantasy and adventure fans. He explored adventure games in the June 1985 issue of* FAMILY COMPUTING.



YOU'RE THE HERO WHEN YOU PLAY A CHARACTER IN THESE GAMES OF GRAPHIC IMAGINATION

built by the insect-worshipping cult of Apshai. You become the hero if you can end an ancient curse on the land by wiping out Ant-man and other fiends who haunt the temple. The game's presentation resembles *Beneath Apple Manor*, but with sharper graphics and better sound effects. Despite their vast dimensions, each of the four mazes is easily mapped. It may take weeks, but *Apshai*'s quest is within the grasp of any novice. When you're done, there's more: *Upper Reaches of Apshai* and *Curse of Ra*, sequels that offer four mazes each, are now packaged with the original.

A solid introductory game for Macintosh monster-mashers, *Pyramid of Peril* involves an expedition to recover an idol from the depths of a six-tiered pyramid. Crisp, 3-D graphics show the maze from a first-person perspective: walls shift before your eyes. Fighting is equally crisp, but you won't find any magic spells in your bag of tricks. The game's handiest feature is auto-mapping; each new room or hall you enter is added to a map that fills its own window.

John Travolta might have been the inspiration for *Telengard*, a game in which your only goal is staying alive. It's not easy to traverse a 50-level dungeon, wielding swords and using sorcery against fearsome giants and "undead" zombies. The mazes—which encompass a staggering two million locations—are full of teleportals that frequently zap you off to a distant part of the labyrinth. Too bad the game lacks the animation and snappy graphics of more recent titles. *Telengard*'s focus on the basics makes it a practical learning vehicle that determined novices can have much fun with, even if they never finish it.

ARE YOU EXPERIENCED?

The games in this category take up to 50 hours to complete.

In *Questron*, you are charged with saving the Empire from an evil sorcerer named Mantor. You play entirely with a joystick; highlight on a list the commands you want, like "fight" or "use magic," then press a button. Both presentation styles are on display. A bird's-eye view reveals the landscape while your single character roams its vast fields and plains. High-resolution graphics illustrate the 3-D mazes. Instead of fighting for gold, hit the local casinos and try to double your money at cards or dice in this rich game odyssey.

Receive a commission to find the fabled sword in the Fortress of the Dragon in *Sword of Kadash*. You see an overhead view of the maze and a profile of your character while you dash through its 200 rooms. *Kadash* offers only one magic spell, leaving you to fight with swords, axes, and other weapons. It also includes some jumping and dodging arcade-style challenges like those in *Lode Runner*, so reflexes are important.

A classic mainframe computer game, *Rogue* sends you into a 26-level dungeon for the Amulet of Yendor. The aerial-view maze format never varies, but the color-coded spells have different effects in each new game. Sometimes the blue potion cures you, sometimes it kills. That makes it tough, so tough I've never heard of anyone successfully completing this compelling, well-animated quest.

Moebius transports you to the mystic Orient to serve as a disciple of the martial arts and Zen master Windwalker. Your task is to track down and destroy Kaimen, a renegade disciple who made off with the Windwalker's mystic orb. In addition to its exotic magic, *Moebius* is distinguished by superbly animated sword and karate duels, reminiscent of those in *Karateka*. Auto-mapping simplifies the mission, but the combat scenes demand more keyboard dexterity than called for by most role-playing games.

Phantasie is set on the island of Gelnor, where your party of up to six questers must find the Nine Rings of Power and destroy the Dark Lord. A split-screen display shows on the right an overhead view of the countryside or a maze; your party and minimally animated enemies appear on the left. The 10 single-level dungeons are auto-mapped on-screen as you progress, a feature that makes this a fine first game in the multiple-character category.

You'll travel through 11 towns, where all-text menus let you learn more of the 54 spells or buy out the local armory. Besides monster-whomping, depth is added to the scenario by your interaction with nonplayer characters for information and items needed to solve several logical problems. *Phantasie* exhibits a droll sense of humor—it even lets you recruit orcs and other monsters as party members!

THE KILLERS

Now you're really up to your ears in orcs, for these heavyweights of fantasy are good for 50 to 100 hours—maybe more—of full-time role-playing.

A legend among legends, the *Wizardry* se-

ROLES BEYOND THE FANTASY GENRE

Is slaying dragons not your style? Try one of the new breed of role-playing games: scenarios set in environs not so fantastic.

Expedition Amazon replaces wizards and warriors with a four-member team composed of specialists, such as field assistants and medics. The goal? Find a lost civilization in Peru, where you'll dig for artifacts and gold.

A treasure hunt with an historical theme, *Seven Cities of Gold* sends you sailing from Spain to discover the Americas (and continents of your own imagination, too). It's a single-character game with auto-mapping and sharp animation.

Science-fiction fans launch a flight to the stars in *Sundog*, in which players trade exotic goods between planets and solar systems. The object here is to find settlers scattered through space and transport them to a new colony. *Sundog* is controlled by joystick alone, and features a colorful icons-and-windows interface.

For a more complex but less visual science-fiction scenario, check out *Universe II*. You become an interstellar spy who must perform secret missions while earning a living by mining, trading, and space piracy. An intricate and elaborate game, it even offers a dedicated on-line bulletin board for tips.

If you'd prefer to drive a souped-up, well-armed hot rod while fighting outlaw bikers and other road hogs, *AutoDuel* is the perfect vehicle. After custom-building and arming your car, you'll hit the road to carry out courier missions in 16 sites across a mythical America.

ries currently consists of three games (the fourth, *Return of Werdna*, is coming soon). They are all distinguished by intense combat encounters and a remarkable variety of magic spells. You don't get animated combat, although the walls of the 3-D mazes appear to move as you trod their halls.

In the first *Wizardry* game, *Proving Grounds of the Mad Overlord*, you fight your way down 10 mazes to reach the lair of Werdna (a diabolical wizard) and retrieve a stolen amulet. *Knight of Diamonds* is a sequel with no character generator, which requires you to use a cast of warriors and wizards developed in the first game. Same with *Legacy of Llylgamyn*, which offers colorful graphics as you explore more mazes in search of a mystic orb. All three games call for highly polished mapping and managerial skills.

Another cornerstone of fantasy role-playing mythology, the *Ultima* series, was written by Richard Garriott, aka Lord British. Like *Questron* (which he also designed), the *Ultima* games switch between overhead views of the countryside and first-person views of the mazes. You'll also enter cities, castles, and towns, whose layouts scroll across the screen.

Ultima II leads you to seek and slay the scourge of the land, an evil enchantress named Minax. The hard part is figuring out how to use *Ultima II*'s time doors to travel between the five different time periods. *Ultima III* gives your four characters the goal of vanquishing Exodus, the spawn of Minax.

In *Ultima IV*, the last game in the series, you head a band of eight characters in a most unusual quest—not to seek and slay a wizard, but to seek and become an Avatar. You'll get there by developing virtues like honesty and compassion, while you build the standard attributes by defeating hordes of orcs. All four *Ultima* packages feature the finest sound tracks and animation of any role-playing game. They simplify maze-mapping by introducing magic gems that let you see the entire layout and copy it all immediately, instead of tediously, step-by-step.

The latest seek-and-slay scenario, *The Bard's Tale*, introduces a new class of character—the bard—who casts spells by playing songs. He and five other characters must defeat Mangar, who dwells within a five-mazed tower. First, you'll have to fight your way through 11 other mazes in different parts of town (instead of stacked atop each other, as in most games). With lush graphics and insidious 3-D mazes, *The Bard's Tale* is an enthralling implementation of classic dungeons-and-dragons-style gaming. It even accepts characters you developed earlier in *Wizardry* or *Ultima III*.

MAKE YOUR FANTASIES COME TRUE

After you've become a skilled fantasy role-player, you may feel motivated to design your own game. The action-oriented *Mail Order Monsters* permits you to generate monsters who can buy weapons, then slug it out in joystick-controlled combat scenes. To invent an entire fantasy world and people it with your own creatures and features, try the more complex *Adventure Construction Set*. It includes three games you can enjoy while designing your own for friends to play.

No matter which of these quests you seek to fulfill, remember: It's not whether you win or lose that counts, but how you role-play the game.

A DIRECTORY OF SOFTWARE

Minimum memory requirements are 48K for Apple, 48K for Atari, 128K for IBM PC/PCjr, and 128K for Macintosh, unless otherwise noted. Games listed for the IBM PC/PCjr will usually run on IBM PC compatibles, such as the Tandy 1000 computer. "Atari" alone refers to the 800/XL/XE series; "Atari ST" means the 520ST machine.

Title/Price/Publisher	Computers	Characters, View & Interface
Adventure Construction Set ($40–$50) Electronic Arts	Amiga, Apple, C 64/128.	Four characters. Overhead view. Keyboard, joystick, or mouse.
AutoDuel ($50) Origin Systems, distributed by Electronic Arts	64K Apple.	One character. Overhead view. Keyboard and joystick.
The Bard's Tale ($40–$45) Electronic Arts	Apple, C 64/128.	Six characters. 3-D view. Keyboard.
Beneath Apple Manor ($30) Quality Software	Apple, 32K Atari, IBM PC/PCjr.	One character. Overhead view. Keyboard.
Expedition Amazon ($35) Penguin Software	Apple, C 64/128.	Four characters. Overhead view. Keyboard.
Knight of Diamonds ($35) Sir-Tech Software	Apple.	Uses *Wizardry* characters. 3-D view. Keyboard.
Legacy of Llylgamyn ($40) Sir-Tech Software	Apple.	Uses *Wizardry* characters. 3-D view. Keyboard.
Mail Order Monsters ($33) Electronic Arts	C 64/128.	One changeable character. Overhead view. Joystick, keyboard.
Moebius ($50–$60) Origin Systems, distributed by Electronic Arts	Apple, C 64/128.	One character. Overhead view. Keyboard.
Phantasie ($40) Strategic Simulations	Apple, C 64/128.	Six characters. Overhead view. Keyboard.
Pyramid of Peril ($35) Aegis Development	Macintosh.	One character. 3-D view. Mouse.
Questron ($40–$50) Strategic Simulations	Apple, 40K Atari, C 64/128.	One character. Overhead and 3-D views. Joystick.
Rogue ($40) Epyx	IBM PC/PCjr, Macintosh.	One character. Overhead view. Keyboard (IBM), mouse (Mac).
Seven Cities of Gold ($33–$40) Electronic Arts	Amiga, Apple, Atari, C 64/128, IBM PC/PCjr.	One character. Overhead and 3-D views. Keyboard, joystick, or mouse.
Sundog ($35–$40) Accolade	64K Apple, Atari ST.	One character. Overhead view. Joystick.
Sword of Kadash ($35–$40) Penguin Software	Apple, C 64/128, Macintosh.	One character. Overhead view. Keyboard, joystick.
Telengard ($28) Avalon Hill	Apple, Atari, C 64/128, IBM PC/PCjr.	One character. Overhead view. Keyboard.
Temple of Apshai Trilogy ($30) Epyx	Apple, Atari, C 64/128, IBM PC/PCjr, Macintosh.	One character. Overhead view. Keyboard.
Ultima II ($60) Sierra On-Line	Apple, Atari, C 64/128, IBM PC/PCjr, Macintosh.	One character. Overhead and 3-D views. Keyboard.
Ultima III ($50–$60) Origin Systems, distributed by Electronic Arts	Apple, Atari, C 64/128, IBM PC/PCjr, Macintosh.	Four characters. Overhead and 3-D views. Keyboard.
Ultima IV ($60) Origin Systems, distributed by Electronic Arts	Apple, C 64/128.	Eight characters. Overhead and 3-D views. Keyboard.
Universe II ($70) OmniTrend	128K Apple, Atari ST, IBM PC/PCjr, 512K Macintosh.	One character. Overhead view. Keyboard or mouse.
Wizardry ($50–$60) Sir-Tech Software	Apple, IBM PC/PCjr, Macintosh.	Six characters. 3-D view. Keyboard.

COMPANY CONTACTS: Accolade, (408) 446-5757; Aegis Development, (213) 306-0735; Avalon Hill, (301) 254-5300; Electronic Arts, (415) 571-7171; Epyx, (408) 745-0700; OmniTrend, (203) 658-6917; Origin Systems, (603) 644-3360; Penguin Software, (312) 232-1984; Quality Software, (818) 709-1721; Sierra On-Line (209) 683-6858; Sir-Tech Software, (315) 393-6633; and Strategic Simulations, (415) 964-1353.

HANDS ON SOOTHE YOUR TROUBLED COMPUTER

BY HENRY F. BEECHHOLD

Part Six of a Six-Part Series

A light broke in upon my brain. . .
—Lord Byron
The Prisoner of Chillon

Don't assume that trouble is bound to strike (at least any time soon). Computers and associated equipment tend to be reliable, barring the thousand natural shocks such things are heir to. However, when something *does* go wrong, it's still not the end of the world. What's broken can be mended, and if you've followed this series, you should, by now, have absorbed at least one maxim: with a little information, the right tools, and (most important) the right attitude, you may be able to do the job all by yourself. In this final installment of "Hands On," we're going to pull together everything we've learned and try to do some troubleshooting.

SIMPLE TROUBLESHOOTING

Electronic systems can, and do, act a little spooky sometimes, and this does not necessarily mean that something must be wrong. As you become more familiar with your system—its design triumphs and flaws—you'll be able to better recognize and distinguish the fine shades of difference that separate 1. intermittent spookiness; 2. fundamental design flaws making their presence known (Oh, well, if your system didn't have faults, it wouldn't be so lovable); and 3. real correctable misbehavior.

In general, when a system begins acting flaky, or worse, fails, the first thing an experienced troubleshooter does is to go through a mechanical procedure designed to rectify troubles of types 1. and 2. The procedure goes as follows: turn off the system and all components; wiggle the cables and connectors and push them in firmly; wait a minute, then turn the components of the system on again in the right order and reboot.

Often, that's all the system needs: a little attention. If that approach fails, the next step is to consider the character and circumstances of the problem and to try to localize it. The idea is to isolate a range of possible causes for your difficulty, then examine your computer so you can eliminate the simplest possibilities first. For example, many computer system problems can be traced to broken cables and connectors. The obvious principle is to check them before digging any deeper. Look for frayed, bent, twisted, or otherwise mangled wires. The points at which cables are joined to plugs need particular attention. Cables running in through the back panel and connecting directly to the motherboard or to other circuit cards may have worked loose or been broken. Connector pins may be bent or broken off entirely. Likewise, the edge connectors on internal circuit cards may be loose—press them down firmly. Remember that dirt, anywhere in the system, may cause troubles ranging from flaky behavior to a complete shutdown. Review the December 1985 installment ("Hands On: Clean your Computer and Look Around Inside"), and eliminate all dust kittens and oxide buildups.

While you're at it, note any diagnostic messages the system may have given you, and look them up in the manual. Some systems (IBM PCs, for example) run a set of diagnostic routines automatically on power-up, or incorporate "self-test" routines that can be run on command. Likewise, most stand-alone peripherals (printers, for example), incorporate built-in diagnostics of some kind. Check the peripheral's manual to see how to run these.

When you think you've located an (apparently) malfunctioning component, try substituting another to see if it's really the thing at fault. In any computer system, it's relatively easy to substitute disk drives, cassette recorders, or other peripherals (printers, plotters, and modems). In many systems, it's just as easy to "swap out" keyboards, monitors, and circuit boards, such as disk controller cards, memory boards, or printer interfaces.

DIGGING DEEPER—PRINCIPLES, CAUTIONS, AND SUGGESTIONS

The prime law of troubleshooting is not to overstep the bounds of your competence. Let's say your video monitor is acting strangely and you know the problem's not in the video cable; what do you do next? Answer: Take the monitor to the repair shop, of course! Remember that the monitor is basically a TV set, and that the inside of a TV—powered up or even unplugged for a time—can bite! Moral: Don't mess with the monitor.

Likewise, but for a different reason, don't meddle with disk drives other than to carefully swab the heads with rubbing alcohol from time to time. When a drive gets sick, chances are it's out of alignment—and aligning a drive requires test equipment and special software that only a professional repair person would find it cost-effective to own. In some cases, it may be better simply to replace a sick disk drive. The cost of buying a new one is about the same as repairing your old one.

It's a good idea to buy the technical service manuals for your computer and peripherals. The manuals usually describe various problems you're likely to encounter and include "recipes" for solving them. Specific components will usually be mentioned with reference to schematic diagrams and parts layouts. Spend some time studying these diagrams and layouts before doing anything else, and try to familiarize yourself with the flow of power and signals (*see below*). Remember, everything in your computer is at the mercy of electrical power to run things and electrical signals to compute.

Remember also that while it's easiest to troubleshoot a live circuit, in doing so you must exercise utmost caution. The electrical power therein is not lethal (except in the power supply and the video monitor), but carelessness can damage the circuit.

HENRY F. BEECHHOLD, *professor of English and chairman of the Interdisciplinary Linguistics Program at Trenton State College, is a computer tinkerer and do-it-yourselfer par excellence. He is the author of* The Plain English Repair and Maintenance Guide for Home Computers, *and* The Plain English Maintenance and Repair Guide for IBM Personal Computers *(both published by Simon & Schuster, 1984/85).*

PAST TOPICS COVERED IN "HANDS ON"

October 1985: "Getting Started as a Computer Tinkerer." Assembling an electronic toolkit.

December 1985: "Clean Your Computer and Look Around Inside." Basic maintenance tips to keep your computer running smoothly.

January 1986: "From CPU to Supersystem—Do-It-Yourself Enhancements." Installing equipment to boost your computer's performance.

February 1986: "Patterns of Data Communication." How your computer talks to its peripherals; troubleshooting RS-232 interface problems; making special cables.

March 1986: "Build a Home-Brewed Logic Probe." How to read a schematic and build an important addition to your troubleshooting toolkit.

TROUBLESHOOTING THE BOARD

In order to make sense of what's going on in your (presumably deranged) computer, you must distinguish between problems associated purely with lighting up the components, so to speak, and those associated with timing and computation. If you turn on the computer and absolutely nothing happens, very likely the power circuitry is at fault. For example, the Tandy Color Computer Technical Reference Manual (p. 44) suggests that if your CoCo is "dead," the first thing to do is to "check the power-supply voltage levels." By referring to the schematic, it's fairly easy to use the multimeter to check whether the CoCo's power supply is functioning without getting into high-voltage areas. If the supply isn't working, your problem is there, and you should probably take the CoCo in to have a qualified technician do further servicing. If the supply is working normally, however, your problem lies "downstream." Tracing the lines on the schematic that lead away from the power supply will take you to other components that may be at fault. Continue to track the voltage and to check each component as the manual dictates until you find the break, which may be in a particular chip.

TESTING CHIPS

Following the procedures outlined in the manual will eventually lead you to the major integrated circuit (IC) chips, such as the CPU. Each of these chips represents anywhere from a few to literally thousands of individual components in a single package, and each requires power to function. Consider the 6809, the microprocessor (CPU) for Tandy's Color Computer. According to the manual and schematic, this chip needs +5 VDC on pin 7 to function. No juice, no action. Your multimeter, set for DC volts, should measure between +4.8 and +5.25 VDC with the red probe touching pin 7 and the black probe touching pin 1—the ground. A no-show here means that the chip is either dead or getting no power. Stepping the red meter probe through the circuit, away from pin 7 and toward the power supply, should give you an idea of the more likely scenario, because if you discover that power is not being delivered elsewhere, there's a strong possibility that the CPU will prove to be sound but that power is being cut off further upstream. Of course, the CPU could also be bad, but you won't know that until you get the power flowing again.

LOGIC PROBLEMS

If power seems to be flowing normally, the logic circuitry is probably at fault. It's time to put aside the multimeter, unholster the logic probe, and test various locations for the presence of proper logic. Taking the CoCo's 6809 CPU as an example once again, the manual tells us to touch the probe tip sequentially to pins 2, 3, 4, 37, and 40. According to the manual, these pins should all register high (logical 1), that is, they should turn on the logic probe's red LED. Pin 39, which is grounded, should give a logical low (zero) and turn on the green LED. The manual also supplies logical arrangements for various other chips. Depending on the kind of trouble you have, it may be appropriate to test these, too.

WHAT TO DO?

As noted before about the major components of the system, the royal road to problem solving is via substitution. This rule works with minor components, as well. When you find the chip that seems to be at fault, turn off the power and replace the chip with a new one of the same variety. In fact, if you have ample chips on hand (*see "Sources"*), you can even "brute force" a solution by substituting everything in sight. Just walk your substitutes through from the memory chips back to the CPU. In all likelihood, you'll stumble on the problem. It ain't elegant, but it often works.

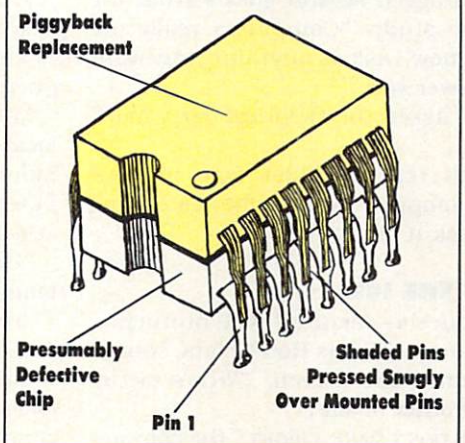
For example, the CoCo technical manual suggests that, if "you have a screen full of garbage," you should try substituting (in order) the RAM chips, the RAM controller, the CPU, the PIA (Peripheral Interface Adapter), and the ROM chip. And that's the advice they give *technicians*! Who says electronics is complicated?

It's a particularly good idea to keep a few spare memory chips of the type used in your computer. Many computers use either 64K or 256K RAMs with numbers like 4164 and 41256. A variety of computer "doofiness" will result from one or more bad memory chips. As noted above, a typical indication that memory has gone bad is the appearance of "garbage" on the screen. Garbage can also be caused by a faulty clock, CPU, memory controller, PIA, monitor ROM, or character generator.

If the chip you want to substitute is socketed, it's easy to replace. With the power off, simply unseat the chip and press a new one in place. A simpler way to substitute memory chips (and the only practical way, since they're usually soldered into the board) is to turn off the power and press a new chip on top of the suspicious one (*see illustration*). This is called "piggybacking" (big surprise).

If you've located a bad chip that happens to be soldered into the board, piggybacking may be your best solution. Getting an old chip out of a circuit board is a nasty little job that can result in a butchered board and (at the very least) dyspepsia. As a general rule, if you're quite sure you've found the components that need replacing but can't replace them easily yourself, it's time to seek a qualified repair person. Armed with the approximate knowledge of what's wrong, you can arrange the quickest and cheapest professional fix. After all, you've done the diagnostics yourself, haven't you?

PIGGYBACK SUBSTITUTION



SOURCES

Electronic parts, supplies:

Digi-Key Corp., 701 Brooks Ave. S., Box 677, Thief River Falls, MN 56701; (800) 344-4539.

Jameco Electronics, 1355 Shoreway Road, Belmont, CA 94002; (415) 592-8097.

JDR Microdevices, 1224 S. Bascom Ave., San Jose, CA 95128; (408) 995-5430.

Radio Shack (stores nationwide)

Electronic Kits, Literature, etc.:

Heathkit/Zenith Educational Systems, Hilltop Road, St. Joseph, MI 49085; (616) 982-3200.

CONCLUSION

Electronics can be a fascinating and rewarding hobby. The skills you've gleaned and the tools you've assembled in this series have prepared you to begin tinkering with confidence—and that means more than just computer maintenance and repair. Want to build a robot? A computer? There are kits out there with all the parts and documentation you'll need. Putting one together will teach you more about "hands on" electronics than any article or book. If you're interested, here are some sources for electronic kits and parts and further reading material that can help guide you on your way. Above all, have fun! FC

ILLUSTRATION BY NICK JANSCHIGG

April Fools! I'd Like You to Meet My Computer

HERE'S A WAY TO INTRODUCE YOUR FRIENDS TO THE EXCITING WORLD OF COMPUTING—AND HAVE A LITTLE PARTY FUN AT THE SAME TIME

BY LORENE HANLEY DUQUIN

The Duquin family's Apple IIe is the life of the party.

Our party was already in full swing when my husband, Dick, asked, "Who wants to see how the computer works?"

No one answered.

"But I've got a new party program," he insisted as he dragged several guests from the kitchen to the study. "Computers really are sophisticated now. Ask it anything you want and it will answer you."

"Anything?" asked the skeptical Jerry Marinaccio.

"Sure," Dick replied. "Just type in your name so the computer knows who it's talking to, and then ask it anything."

BREAKING THE ICE

Two of our guests—identical twin brothers—decided to go first. "This is Ron Golata," one of them typed onto the screen. "Who's better looking, my brother or me?"

"TWO WRONGS DON'T MAKE A RIGHT," the computer replied, and the guests standing around roared.

Suddenly, the study was filled with people who wanted to ask the computer a question. Grace Marie wanted to know if she did the right thing when she quit her job. Steve wanted to know if his bowling team would win in the league. Gary wanted to know if his new tenants would be nicer than the old ones. Mari wanted the computer to guess how old she was. But we let John Pisarski, whose wife Paula was expecting a baby, go next.

"When will the baby be born?" John typed onto the screen. "ASK THE MILKMAN," the computer replied.

Then Lori DuVall, who also is expecting, asked, "What kind of baby will I have?"

"ONE THAT EATS, SLEEPS, AND CRIES," the computer answered.

Mike DuVall, the pitcher and manager of a local softball team, wanted to know how many more years he'd be able to pitch. And the computer told him, "YOU'VE BEEN PITCHING TOO LONG ALREADY."

"How many more years can I manage the team?" Mike asked.

"YOU CAN MANAGE AS LONG AS YOU WANT. NO ONE ELSE WANTS THE JOB!" the computer exclaimed.

For more than an hour, the computer traded jokes and funny insults with our guests. The computer seemed to have a personality of its own. It could summon guests: "I DON'T WANT TO TALK TO TIM KENDALL. I WANT TO TALK TO HIS WIFE, NANCY." It knew all about the people at the party: "STEVE WEARS FUNNY SHIRTS. MARI'S FAVORITE WORD IS "EH." PAULA WILL GO HOME SOON BECAUSE SHE HAS TO WORK TOMORROW. JUDY MAKES GREAT SHRIMP DIP." And when the computer couldn't come up with an answer right away, the word "THINKING" would appear on its screen.

PHOTOGRAPH BY LORENE HANLEY DUQUIN

LORENE HANLEY DUQUIN'S *last article, "The Back-to-School Game," appeared in the August 1985* FAMILY COMPUTING.

Finally, people began to ask how the computer knew so much. Then someone noticed that Bob DuVall and Rich Bleyle were missing. They searched the house, and couldn't find them. "Maybe they're sending messages over the phone lines!" Grace Marie suggested.

Sure enough. The two were a few blocks away at Rich's house. Our computer was connected to theirs with modems. When someone typed in a question, Bob and Rich sent the answers back to us.

After 90 minutes, they gave their final message: "HAPPY APRIL FOOLS' DAY!"

It was a perfect practical joke, but it could work at any kind of party—not just an April Fools' Day celebration. Imagine the fun you could have at a children's birthday party, a baby or wedding shower, a men's stag party, a teenage get-together, or a family reunion. Or, how about telling your friends or relatives you have a fortune-telling computer that knows the past and the present and makes funny predictions about the future?

You'll need two computers that can be connected with telephone modems. Because the modems we used were direct-connect, they were installed inside the computer and connected directly to the telephone wall outlet, so there was no indication from looking at the phone that the modem was in use. If you have an acoustic-coupler modem and have to place the telephone receiver into a cradle on the modem, you may want to find a way of hiding the modem from your guests.

WHAT IT TAKES

The night before the party, we tested the modems to make sure everything was working properly. It was a good thing we did, because there were some minor problems and a few important decisions that had to be made. For example . . . .

Who would initiate the call to connect the computers?

With some modems, the computer will place the call to the other computer when you type in the telephone number. But with our modem, we had to dial the phone. We figured it would be less obvious if we initiated the call rather than having the phone ring if Bob and Rich called us. We decided to have Dick make the call before he invited our guests into the study. When the connection was made, he would leave the computer on, but turn off the monitor, so it would appear as though the computer were off.

What would be the ground rules for sending and receiving messages?

During our tests the night before, we found that in the excitement of sending and receiving messages, we often were typing at the same time and our words would become intertwined on the screen and produce garbage. To prevent that, we needed a system for knowing when the other person was finished with his message. We decided that when the message was over, the sender would hit the RETURN key twice. That would signal the receiver that he could begin typing a response.

How would Bob and Rich know who was typing, so they could respond appropriately?

We decided that we would instruct our guests that they had to type in their name before they sent each message. If someone forgot, and things got confusing, Bob and Rich would type in a funny line such as "WHO'S PLAYING WITH MY KEYS?" or "YOUR MESSAGE DOES NOT COMPUTE BECAUSE YOU HAVE NOT IDENTIFIED YOURSELF PROPERLY."

IT WAS A PERFECT PRACTICAL JOKE, BUT IT COULD WORK AT ANY KIND OF PARTY—NOT JUST AT AN APRIL FOOLS' DAY CELEBRATION.

How would we explain typing errors and misspellings?

Bob and Rich were not good typists or spellers, but neither were our guests. No one paid any attention to errors. In fact, when one person made several mistakes in typing her message, one of our other guests told her, "Don't worry about it. The computer will know what you mean. It can't spell, either."

How long would the joke last?

We hoped that we could pull the wool over our guests' eyes for at least 30 minutes, but the joke went on for an hour and a half. Later, Bob and Rich suggested that it would have been better if we had sent their wives over to help them think and respond. Linda and Mary were both in on the joke from the beginning, but had decided it would be more fun to stay at the party.

What would happen if someone wanted to use the phone?

We discovered that when someone picked up the phone and tried to talk, garbage words, symbols, and letters would appear on the screen. No one ever picked up the phone at the party. But later, we realized that our phone had been tied up for over 90 minutes and many of our guests had small children at home with babysitters. Luckily, there were no emergencies and no one tried to reach us. As a precaution, however, if you have a call forwarding feature on your phone, you might want to direct any incoming calls to a neighbor's house. Or tell your guests when you invite them that you've been having phone trouble, and give them an alternate number that their sitter can call in case of emergency.

Would anyone be mad because we tricked them?

We didn't think so, but it was a chance we decided to take. Afterwards, everyone laughed about it—especially when they saw the transcript of the entire conversation on a disk that Rich had saved, complete with spelling errors and typos. Suddenly, the mystery and the fear of computers were gone. And everyone agreed that it was a great way to meet a computer for the very first time. FC

BUYER'S GUIDE TO MONITORS

QUESTIONS AND ANSWERS TO HELP YOU FOCUS BETTER

BY PHIL WISWELL

A monitor, or video display, is one of the most important components of any computer system. It is your window into the computer. But not all computer "windows" are alike: some are clear, some are cloudy, some are in-between; some are color, some have audio speakers, and some even have built-in TV receivers.

Choosing one monitor that satisfies all of your needs may be difficult, but it's not impossible. To start, forget about the features and concentrate on clarity of text and graphics. You'll find technical specifications for 28 popular monitors—a sampling from all the major manufacturers—in the chart. By reading through the question-and-answer section below, you'll be able to decipher those specifications and judge the monitors for yourself. Remember, when talking monitors, beauty is in the eye of the beholder. So don't buy one sight unseen.

Q *Why can't I just use a TV with my computer?*

A With many computers you can, and with some, such as the Tandy Color Computer and Atari 600XL, you have to. A TV is good mostly for displaying entertainment and educational software. A 40-column display is generally the maximum that can be viewed with any clarity on a TV, though the Amiga computer can display 60 characters on a TV.

Q *What's the difference between a composite color monitor and a TV?*

A A composite color monitor is basically a color TV set without a tuner. It is usually better for computer displays than a TV is because it does not pick up any interference. Also, a TV's video bandwidth, which measures the frequency of video signals, is much lower than a monitor's (see video bandwidth later in article).

Composite color monitors, like TVs, generally cannot legibly display more than 40 columns of text or numbers. For this reason they are not suited for extensive word processing or for spreadsheets. The exception to this rule is the Apple ColorMonitor IIe/IIc, which includes new circuitry that allows it to run 80-column software, such as *AppleWorks*.

Q *What's the difference between a composite color monitor and a monochrome monitor?*

A A monochrome monitor can legibly display 80 columns of text. This is because its graphics resolution—a measure of the number of dots (or pixels) on the screen—is much higher than that of most composite color monitors. Thus, each letter or number can be made up of more dots. Of course, monochrome monitors display only one color—generally amber or green—on a black background. (Apple Macintosh and Tandy Model 4 display black on white and white on black, respectively.)

Q *What's the difference between a composite color monitor and an RGB color monitor?*

A RGB monitors display brighter, sharper colors, and can also display 80 columns of text. Thus, you can use RGB monitors for serious word processing, as well as for generating graphics and playing games.

Whereas composite monitors take a blended signal as input from a computer, RGB monitors accept three signals: one for red, one for green, and one for blue. This split-signal capability means the images don't bleed much. However, you can pay twice as much for an RGB monitor.

In addition, on older computers—such as Apple II, Commodore 64, Atari 800, and IBM PC—RGB monitors require an interface, which can cost up to $200. On newer computers—like Atari 520ST, Amiga, Leading Edge Model D, Tandy 1000, IBM PC*jr*, Commodore 128, and many IBM PC compatibles—these interfaces are built into the units.

Q *Can you use a color monitor in monochrome mode to make text more readable?*

A Yes. Since text on a composite monitor is made up of colors that can look fuzzy, some color monitors come with something called a **text switch**, which toggles between color and monochrome displays. (Often the monochrome display is easier on the eyes.) The Apple ColorMonitor has such a switch. Thomson color monitors let you toggle between color, monochrome green, and monochrome amber. This is useful for switching between graphics and text/data applications.

However, while the text/data might look slightly better in monochrome, don't be misled into thinking you're getting the resolution of a monochrome monitor. You aren't.

Q *Are all RGB monitors alike?*

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Finally, people began to ask how the computer knew so much. Then someone noticed that Bob DuVall and Rich Bleyle were missing. They searched the house, and couldn't find them. "Maybe they're sending messages over the phone lines!" Grace Marie suggested.

Sure enough. The two were a few blocks away at Rich's house. Our computer was connected to theirs with modems. When someone typed in a question, Bob and Rich sent the answers back to us.

After 90 minutes, they gave their final message: "HAPPY APRIL FOOLS' DAY!"

It was a perfect practical joke, but it could work at any kind of party—not just an April Fools' Day celebration. Imagine the fun you could have at a children's birthday party, a baby or wedding shower, a men's stag party, a teenage get-together, or a family reunion. Or, how about telling your friends or relatives you have a fortune-telling computer that knows the past and the present and makes funny predictions about the future?

You'll need two computers that can be connected with telephone modems. Because the modems we used were direct-connect, they were installed inside the computer and connected directly to the telephone wall outlet, so there was no indication from looking at the phone that the modem was in use. If you have an acoustic-coupler modem and have to place the telephone receiver into a cradle on the modem, you may want to find a way of hiding the modem from your guests.

WHAT IT TAKES

The night before the party, we tested the modems to make sure everything was working properly. It was a good thing we did, because there were some minor problems and a few important decisions that had to be made. For example . . . .

Who would initiate the call to connect the computers?

With some modems, the computer will place the call to the other computer when you type in the telephone number. But with our modem, we had to dial the phone. We figured it would be less obvious if we initiated the call rather than having the phone ring if Bob and Rich called us. We decided to have Dick make the call before he invited our guests into the study. When the connection was made, he would leave the computer on, but turn off the monitor, so it would appear as though the computer were off.

What would be the ground rules for sending and receiving messages?

During our tests the night before, we found that in the excitement of sending and receiving messages, we often were typing at the same time and our words would become intertwined on the screen and produce garbage. To prevent that, we needed a system for knowing when the other person was finished with his message. We decided that when the message was over, the sender would hit the RETURN key twice. That would signal the receiver that he could begin typing a response.

How would Bob and Rich know who was typing, so they could respond appropriately?

We decided that we would instruct our guests that they had to type in their name before they sent each message. If someone forgot, and things got confusing, Bob and Rich would type in a funny line such as "WHO'S PLAYING WITH MY KEYS?" or "YOUR MESSAGE DOES NOT COMPUTE BECAUSE YOU HAVE NOT IDENTIFIED YOURSELF PROPERLY."

How would we explain typing errors and misspellings?

Bob and Rich were not good typists or spellers, but neither were our guests. No one paid any attention to errors. In fact, when one person made several mistakes in typing her message, one of our other guests told her, "Don't worry about it. The computer will know what you mean. It can't spell, either."

How long would the joke last?

We hoped that we could pull the wool over our guests' eyes for at least 30 minutes, but the joke went on for an hour and a half. Later, Bob and Rich suggested that it would have been better if we had sent their wives over to help them think and respond. Linda and Mary were both in on the joke from the beginning, but had decided it would be more fun to stay at the party.

What would happen if someone wanted to use the phone?

We discovered that when someone picked up the phone and tried to talk, garbage words, symbols, and letters would appear on the screen. No one ever picked up the phone at the party. But later, we realized that our phone had been tied up for over 90 minutes and many of our guests had small children at home with babysitters. Luckily, there were no emergencies and no one tried to reach us. As a precaution, however, if you have a call forwarding feature on your phone, you might want to direct any incoming calls to a neighbor's house. Or tell your guests when you invite them that you've been having phone trouble, and give them an alternate number that their sitter can call in case of emergency.

Would anyone be mad because we tricked them?

We didn't think so, but it was a chance we decided to take. Afterwards, everyone laughed about it—especially when they saw the transcript of the entire conversation on a disk that Rich had saved, complete with spelling errors and typos. Suddenly, the mystery and the fear of computers were gone. And everyone agreed that it was a great way to meet a computer for the very first time.

IT WAS A PERFECT PRACTICAL JOKE, BUT IT COULD WORK AT ANY KIND OF PARTY—NOT JUST AT AN APRIL FOOLS' DAY CELEBRATION.

BUYER'S GUIDE TO MONITORS

QUESTIONS AND ANSWERS TO HELP YOU FOCUS BETTER

BY PHIL WISWELL

A monitor, or video display, is one of the most important components of any computer system. It is your window into the computer. But not all computer "windows" are alike: some are clear, some are cloudy, some are in-between; some are color, some have audio speakers, and some even have built-in TV receivers.

Choosing one monitor that satisfies all of your needs may be difficult, but it's not impossible. To start, forget about the features and concentrate on clarity of text and graphics. You'll find technical specifications for 28 popular monitors—a sampling from all the major manufacturers—in the chart. By reading through the question-and-answer section below, you'll be able to decipher those specifications and judge the monitors for yourself. Remember, when talking monitors, beauty is in the eye of the beholder. So don't buy one sight unseen.

Q *Why can't I just use a TV with my computer?*

A With many computers you can, and with some, such as the Tandy Color Computer and Atari 600XL, you have to. A TV is good mostly for displaying entertainment and educational software. A 40-column display is generally the maximum that can be viewed with any clarity on a TV, though the Amiga computer can display 60 characters on a TV.

Q *What's the difference between a composite color monitor and a TV?*

A A composite color monitor is basically a color TV set without a tuner. It is usually better for computer displays than a TV is because it does not pick up any interference. Also, a TV's video bandwidth, which measures the frequency of video signals, is much lower than a monitor's (see video bandwidth later in article).

Composite color monitors, like TVs, generally cannot legibly display more than 40 columns of text or numbers. For this reason they are not suited for extensive word processing or for spreadsheets. The exception to this rule is the Apple ColorMonitor IIe/IIc, which includes new circuitry that allows it to run 80-column software, such as *AppleWorks*.

Q *What's the difference between a composite color monitor and a monochrome monitor?*

A A monochrome monitor can legibly display 80 columns of text. This is because its graphics resolution—a measure of the number of dots (or pixels) on the screen—is much higher than that of most composite color monitors. Thus, each letter or number can be made up of more dots. Of course, monochrome monitors display only one color—generally amber or green—on a black background. (Apple Macintosh and Tandy Model 4 display black on white and white on black, respectively.)

Q *What's the difference between a composite color monitor and an RGB color monitor?*

A RGB monitors display brighter, sharper colors, and can also display 80 columns of text. Thus, you can use RGB monitors for serious word processing, as well as for generating graphics and playing games.

Whereas composite monitors take a blended signal as input from a computer, RGB monitors accept three signals: one for red, one for green, and one for blue. This split-signal capability means the images don't bleed much. However, you can pay twice as much for an RGB monitor.

In addition, on older computers—such as Apple II, Commodore 64, Atari 800, and IBM PC—RGB monitors require an interface, which can cost up to $200. On newer computers—like Atari 520ST, Amiga, Leading Edge Model D, Tandy 1000, IBM PC*jr*, Commodore 128, and many IBM PC compatibles—these interfaces are built into the units.

Q *Can you use a color monitor in monochrome mode to make text more readable?*

A Yes. Since text on a composite monitor is made up of colors that can look fuzzy, some color monitors come with something called a **text switch**, which toggles between color and monochrome displays. (Often the monochrome display is easier on the eyes.) The Apple ColorMonitor has such a switch. Thomson color monitors let you toggle between color, monochrome green, and monochrome amber. This is useful for switching between graphics and text/data applications.

However, while the text/data might look slightly better in monochrome, don't be misled into thinking you're getting the resolution of a monochrome monitor. You aren't.

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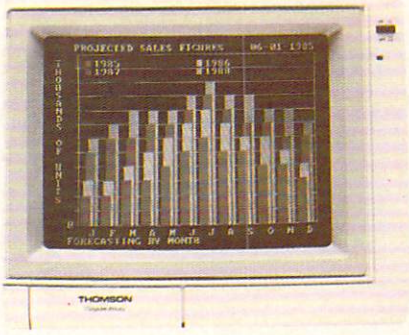
Amdek 310A



Thomson CM36512 VI

Apple ColorMonitor IIc

monitor and a second TV, or a TV that can be used occasionally as a computer monitor, a combination TV/monitor makes sense. Many new TVs on the market today include computer monitors.

Q *What factors contribute to a monitor's clarity?*

A The three main factors are graphics resolution, video bandwidth, and dot pitch.

Graphics resolution is a measure of the number of pixels (or dots) that can be displayed on the screen: 640 × 200 means 640 pixels across the screen, and 200 down. The higher the resolution, the better the resulting image. (Some manufacturers measure resolution in "lines at center." The number of lines is roughly equivalent to the horizontal pixel measurement.) Note from the chart that resolution affects the amount of text that can be displayed. Color monitors with relatively low resolution cannot display 80 columns.

Video bandwidth is a measure of the amount of information packed into a video signal. The higher the bandwidth (in megahertz), the better the picture.

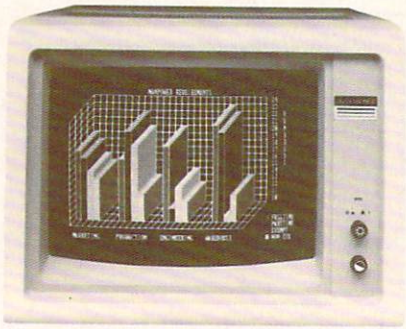
Dot pitch is simply a measurement (in millimeters) of how closely together the dots are placed on the screen to form a character or image. The closer you get to a dot pitch of zero, the better the display.

GUIDE TO POPULAR MONITORS

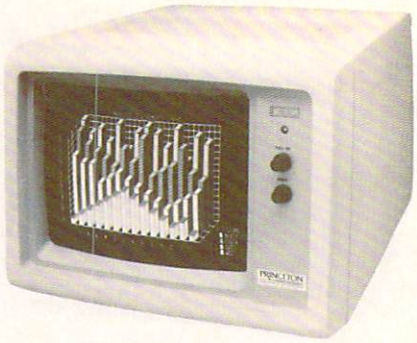
MONITOR	LIST PRICE	TOP RESOLUTION (pixels)	TOP VIDEO BANDWIDTH (mhz)	DOT PITCH* (mm)	TEXT DISPLAY (characters x lines)	DIAG. SIZE	SCREEN COLOR (monochrome)	SPEAKER?
MONOCHROME								
Apple Monitor II	$129	900 lines	18	NA	80x24	12"	Green	N
NEC JB-1205MA	$179	800x230	18	NA	80x25	12"	Amber	N
RCA VP4012	$199	1000 lines	25	NA	132x25	12"	Both	Y
Sakata SA-1000	$159	900x800	18	NA	80x25	12"	Amber	N
Sanyo DM2112N	$ 99	600 lines	15	NA	80x25	12"	Green	N
Tandy VM-2	$149	640x200	15	NA	80x25	12"	Green	N
Taxan 115	$180	1000 lines	20	NA	80x25	12"	Green	N
Thomson VM 3102 VG	$179	1000 lines	35	NA	80x25	12"	Green	Y
MONOCHROME (IBM)								
Amdek 310A	$230	960x800	18	NA	80x25	12"	Amber	N
Princeton MAX-12	$249	720x350	23	NA	80x25	12"	Amber	N
COMPOSITE COLOR							TEXT SWITCH	
Apple ColorMonitor IIe/IIc	$379	640x200	8	0.52	80x24	13"	Y	N
Commodore 1702	$219	320x200	4	0.51	40x25	13"	N	Y
NEC JC1225MA	$299	640x200	20	0.63	40x25	12"	N	Y
Sakata SC-100	$299	300x280	3.8	0.65	40x25	13"	Y	Y
Taxan 220	$350	500x200	6	0.67	60x25	14"	Y	Y
Thomson CM36632 V	$299	300x260	12	0.63	40x25	14"	Y	Y
RGB/COMPOSITE								
Amiga A1080	$495	640x400	10	0.39	80x25	13"	N	Y
Commodore 1902	$299	640x200	15	0.42	80x25	13"	N	Y
Sakata SC-150	$519	640x200	15	0.42	80x25	13"	Y	Y
Thomson CM36512 VI	$449	560x246	14	0.48	80x25	14"	Y	Y
Zenith ZVM-1330	$649	640x240	20	0.43	80x25	13"	N	N
RGB								
Amdek Color 600	$599	640x240	18	0.43	80x25	13"	Y	N
IBM Color Display	$680	640x200	14	0.43	80x25	13"	N	N
Princeton HX-12	$695	640x200	15	0.31	80x25	12"	Y	N
Quadram Quadchrome II	$499	640x240	18	0.43	80x25	14"	Y	N
Tandy CM-2	$459	640x200	15	0.42	80x25	13"	Y	N
RGB/TV								
Sears Color TV/Monitor	$350	480 lines	7	0.50	80x25	13"	Y	Y
Sony KV 1311CRZ	$599	640x200	10	0.37	80x25	13"	N	Y

*Does not apply to monochrome monitors.

IBM Color Display



Quadram Quadchrome II



Princeton HX-12

Q *How does the size of a monitor's screen affect display?*

A On smaller screens, dots are closer together, thus the display appears sharper. The relatively small screen size is one of several reasons why the Apple Macintosh's display has such a sharp look. Most screens measure 12 or 13 inches diagonally, although nine-inch screens are perfectly readable, depending on how close you like to sit to the screen, and the condition of your eyes!

Q *What's better, amber or green monochrome monitors?*

A Amber- and green-screen monitors are functionally identical except for the color. Which type you *perceive* as better is a matter of personal preference. See if you can find a store that will let you sit down in front of each type for a good half hour.

Q *Do all monitors have audio speakers?*

A No. If your computer doesn't have its own speaker, you can produce sound through your monitor if it has a speaker. (The Atari XL/XE and C 64/128 don't have speakers and thus require a TV or monitor with a speaker; the IBM PC*jr* needs a TV or monitor to play three-voice sound.) Usually this requires an RCA-type phone jack. A few monitors come with earphone jacks, but you're the only person who knows whether or not you'd use it enough for that feature to matter.

COMPUTER	BUILT-IN RGB[1]	MAX. COLOR RESOLUTION	BUILT-IN SPEAKER	SOUND OUTPUT[3]
Apple IIe 128K	N	560x192	Y	N
Apple IIc	N	560x192	Y	Y
Atari XE/XL	N	320x192	N	Y
Commodore Amiga	Y	640x400	N	Y
Commodore 64	N	320x200	N	Y
Commodore 128	Y	640x200	N	Y
IBM PC	N	640x200[2]	Y	Y
IBM PC*jr*	Y	640x200	Y	Y
Leading Edge D	Y	640x200[2]	Y	N
Tandy 1000	Y	640x200[2]	Y	Y

[1]RGB interfaces can cost up to $200. See "How to Soup Up Your Computer" in this issue.
[2]Standard resolution with IBM Color/Graphics Monitor Adapter or equivalent. Can be higher with other circuit boards.
[3]Can send sound to external speaker.

MATCH YOUR COMPUTER TO THE RIGHT COLOR MONITOR

Q *Can I plug a monitor into any computer?*

A For the most part, yes. However, computers have different requirements. On the Tandy Color Computer, you can only use a monitor with a special interface. (*See "How to Soup Up Your Computer" in this issue.*) You can plug most monitors into Commodore 64/128, Atari XL/XE (except the 600XL), or Apple IIe/IIc computers and just turn them on. For the new Atari ST and Commodore Amiga, we recommend using the monitors made for those computers. On the AT&T 6300, you have to use the AT&T monitor.

The IBM PC requires a special circuit board, called a display adapter, that works with a particular kind of monitor. For a monochrome monitor, you need a monochrome adapter; for a color monitor, you need a color display adapter. (Most IBM PC compatibles include these adapters.) Since different combinations of adapters and monitors produce widely varying displays of color, intensity, brightness, and contrast, it's best to buy the adapter and monitor together.

Q *If I can find the world's best monitor, will it necessarily work with my computer?*

A It might work with your computer, but much of its power might be wasted. For instance, a monitor with 640 × 400 resolution is too good for an Atari 800. If you're going to be doing text/data work, you want a monitor with resolution at least as high as your computer's. A monitor with a good built-in speaker will be wasted with an Apple II, which can play through its own "beeper" but can't send sound to a speaker.

Also, as noted before, if the monitor requires an expensive RGB interface, the price might be prohibitive.

Q *What kind of monitor should I buy?*

A Everyone's needs are different. But basically, if you're going to engage primarily in text and data processing, get a monochrome monitor. If you're mainly going to use games or educational software, get a color monitor. If you plan to do equal amounts of both, an RGB monitor or combination RGB/TV model makes sense. For computers without RGB interfaces, an Apple ColorMonitor is a good bet. FC

MANUFACTURERS

Amdek Corp., (312) 364-1180; Apple Computer, (800) 538-9696; Atari Corp., (408) 745-2000; Commodore Inc., (215) 431-9100; IBM, (305) 272-2662; Leading Edge, (617) 828-8150; NEC, (312) 228-5900; Princeton Graphics, (609) 683-1660; Quadram Corp., (404) 925-7643; RCA, (717) 295-6887; Sakata Corp., (800) 323-6647; Sanyo Corp., (213) 537-5830; Sears, (312) 875-2500; Sony, (201) 930-1000; Tandy Corp., (817) 338-2335; Taxan Corp., (818) 810-1291; Thomson, (213) 821-2995; Zenith, (312) 391-8860.

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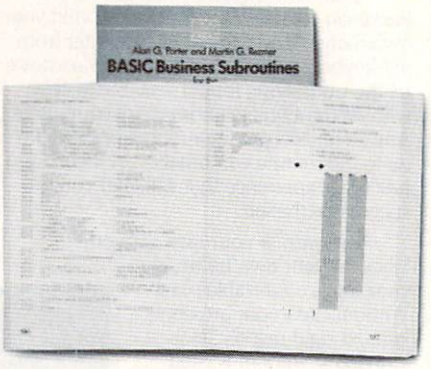

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ANOTHER LOOK AT SOME *FAMILY* FUN

Let's take another look at three programs that appear in this issue of *Family Computing*.

In rural America, time was when Saturday night meant gathering in a large barn and dancing to an "orchestra" made up of such instruments as guitars, banjos, fiddles, and washboards.

One of the favorites from that earlier time was Turkey in the Straw. Joey Latimer wrote TURKEY, which is a program that allows you to play a computer-style rendition of that old folk classic. Be careful, don't play it too loud or your neighbors will be knocking on your barn door.

At one time or another, all of us have come across bugs in software. Little accidental codes that give the program fits when we least expect it. Wouldn't it be great to create a bug on purpose? BUGS, by John B. Jainschigg, is a masterpiece of Apple animation that puts a bug on your screen. This frisky critter will move stead fastly around your screen completely terrorizing the faint of heart.

MIRROR DRAW, another visual treat from Joey Latimer, lets you draw symmetrical, Rorschach-like figures on your screen. You may use either a joystick with this program, or the U (up left), I (up), O (up right), J (left), R (right), M (down left), "," (down) and "." (down right) keys. Press either the joy stick button or spacebar to change colors. Press the C key to clear the screen.

The data strip on the near right contains all three programs in the Apple format. Read in the strip and run the program of your choice. To exit the program press CONTROL-RESET.

The data strip on the far right contains the programs TURKEY and MIRROR in IBM format. Read in the strip and enter BASICA to run either program. Exit any time by pressing CONTROL-BREAK.

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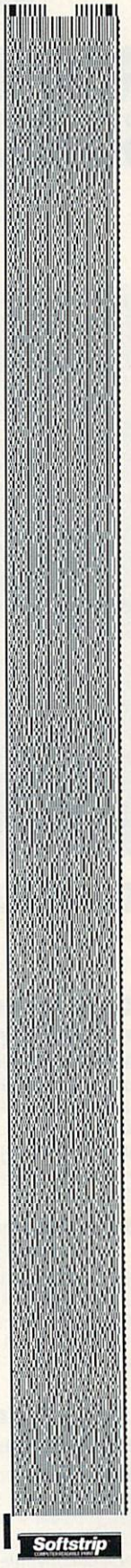
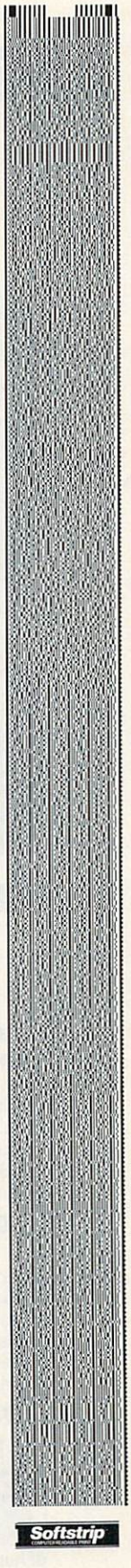


IBM



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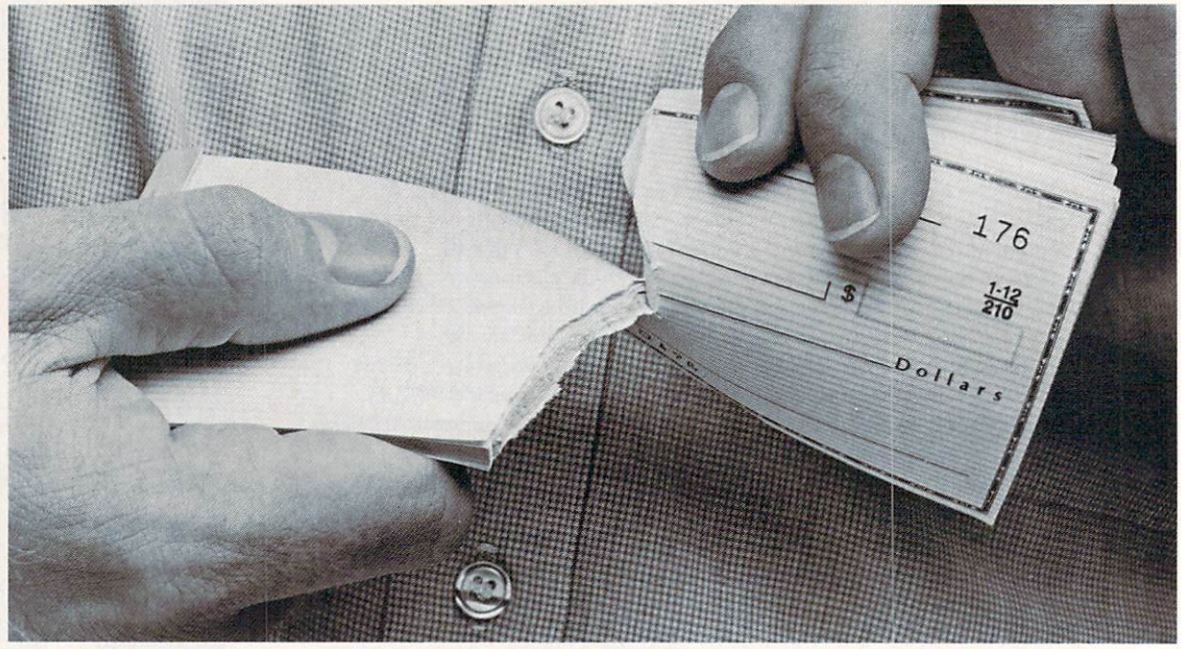

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CIRCLE READER SERVICE 7

the Programmer

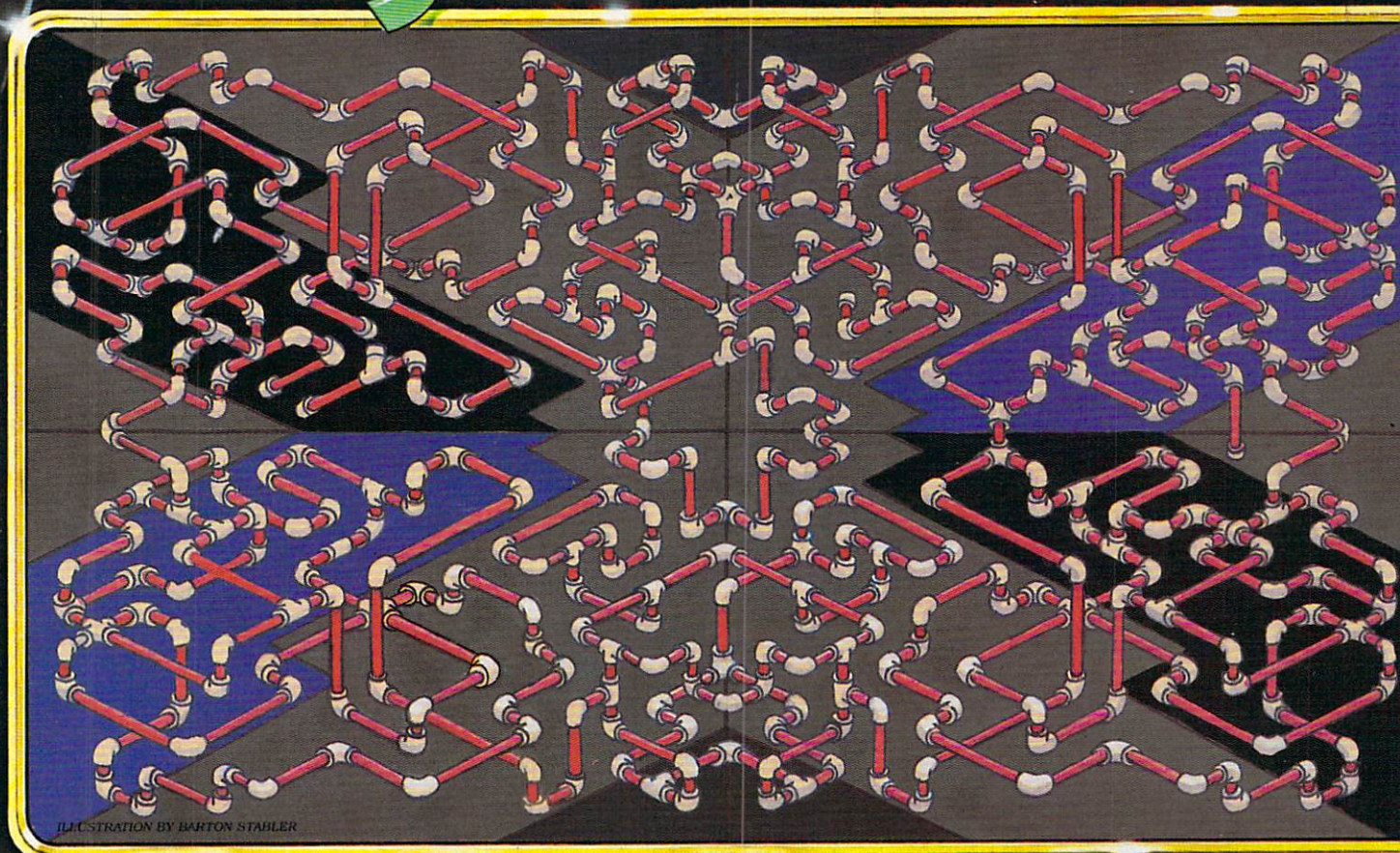


ILLUSTRATION BY BARTON STABLER

★ A P R I L ★

TIPS TO THE TYPIST
Page 62

PROGRAMMING P.S.
Page 62

MORE PROGRAMS IN K-POWER
Page 69

PUZZLE
Page 50

Luke's lost in a labyrinth of water pipes. Can you keep the new plumber from getting fired?

CREATIVITY PROGRAM
Page 58

Type in *Mirror Draw*, and create tapestries of color and form.

GAME PROGRAM
Page 64

Fox and Geese, an intriguing two-player game from the Middle Ages is presented here for IBM PC and compatibles.

ILLUSTRATION BY JIM CHERRY III

SUBTERRANEAN PLUMBER'S BLUES
Will Luke Start a Leak?

PUZZLE BY SARAH KORTUM AND PETER FAVARO
PROGRAM BY STEVEN C.M. CHEN

If you like this month's puzzle, watch for Steven Chen's related Maze Creator *program in the May issue. It'll generate thousands of different mazes on-screen or on paper.*

The first week in April was unusually cold, even for Grindel, a quiet northern town by the sea. One freezing afternoon two old-timers dangled their feet in the deep end of the indoor pool at the Veterans' Club. One septuagenarian brushed his hand across two days' growth of wiry, spindle-like bristles, thrust his hands deep into the pockets of his terry-cloth robe, and reminisced to his cohort, "Hasn't been quite this chilly since '28."

"Nope, near's I can recall. Wasn't that the year Miller's dog froze solid outside Town Hall?"

"Nope. That was '29. Was pretty cold back then, too."

"Yup."

"Think that new plumber's got enough gumption to work that auxiliary system?"

The two looked at each other and had a good strong laugh.

The auxiliary plumbing system was an ancient labyrinth of pipes, levers, valves, and other contraptions that lay beneath the dusty streets of Grindel. Because the townspeople strongly resisted any newfangled gizmos of modern technology, the auxiliary system was manual, and shunted extra water from the water source in the center of town to the outlying establishments that needed it most.

Each morning at dawn, the town plumber, Matt Pratt ("the water rat"), would accommodate the town proprietors by descending into the dark and damp underground maze of tunnels. He would snake his way alongside the old rusty pipes, turning on a valve here and there and knowing—almost magically—which valves to open to release water in the direction of the proper establishments. At sundown, Matt would disappear one more time to turn the valves off until the next morning. Despite his peculiar love of underground travel, everyone felt sad when they heard that Matt Pratt was retiring after many long years of dedicated service.

LUKE'S DILEMMA

Minutes into his first day on the job, Luke Watermane, the new plumber, found himself in deep water (figuratively speaking, that is). He discovered that without the guidance of the old plumber, he was quickly lost in the dark and twisting subterranean passageways. To make matters worse, his glasses fogged up from the moisture, rendering them useless immediately.

Anxious to exit from the slimy surroundings, Luke began to open every valve in sight, figuring that that way he was bound to satisfy those establishments really in need of extra water. Suddenly, he remembered a critical instruction handed down to him by Matt Pratt before the old plumber retired: "Do not open more than *five* valves at a time or the system will break down and the tunnels will flood." Luke quickly shut the valve he was in the process of opening—his sixth!

Luke then settled down at a clammy intersection and scratched his head, trying to remember *which* establishments Matt said needed auxiliary water. Once he had that solved, all he had to do was select the five valves that would shunt water in the direction of all of those places. Luke thought hard; he didn't want to emerge blinking into the sunlight on his first day on the job, only to be greeted by a group of angry proprietors shouting, "Luke Watermane, YOU'RE FIRED!"

HOW TO PLAY

Type each line of the program into your computer exactly as shown, carefully making the appropriate modifications (if needed). *(See "Tips to the Typist," page 62, for help with typing in programs.)* Then SAVE the program to disk or cassette.

When you RUN the program, you'll see Grindel's complete network of underground pipes. There's a pipe running under every street in town. A plus sign ("+") marks the water source (at the intersection of Main Street and Water Street). Those intersections where the flow of water is controlled by valves are marked O if the valve at that intersection is open or C if it's closed. E's mark the locations of the establishments shown on the map, some of which need water from the auxiliary system. Finally, a blinking asterisk marks Luke's position.

Your job is to move Luke through the water system using the I, J, K, and L keys (I moves him "up" or north, K moves him south, J moves him west, and L moves him east). When he reaches a valve, you can press O to open it or C to close it. (Careful: remember the rule about having more than five valves open at once!) When you think the right combination of valves have been opened, press S (for surface) to exit from the underground labyrinth. And at any time you can press Q to quit.

You can better help Luke if you understand three things about the way water flows through the pipes:

1. Water can flow out from the water source in any direction for any distance until it reaches an obstruction: either a closed valve or an establishment.

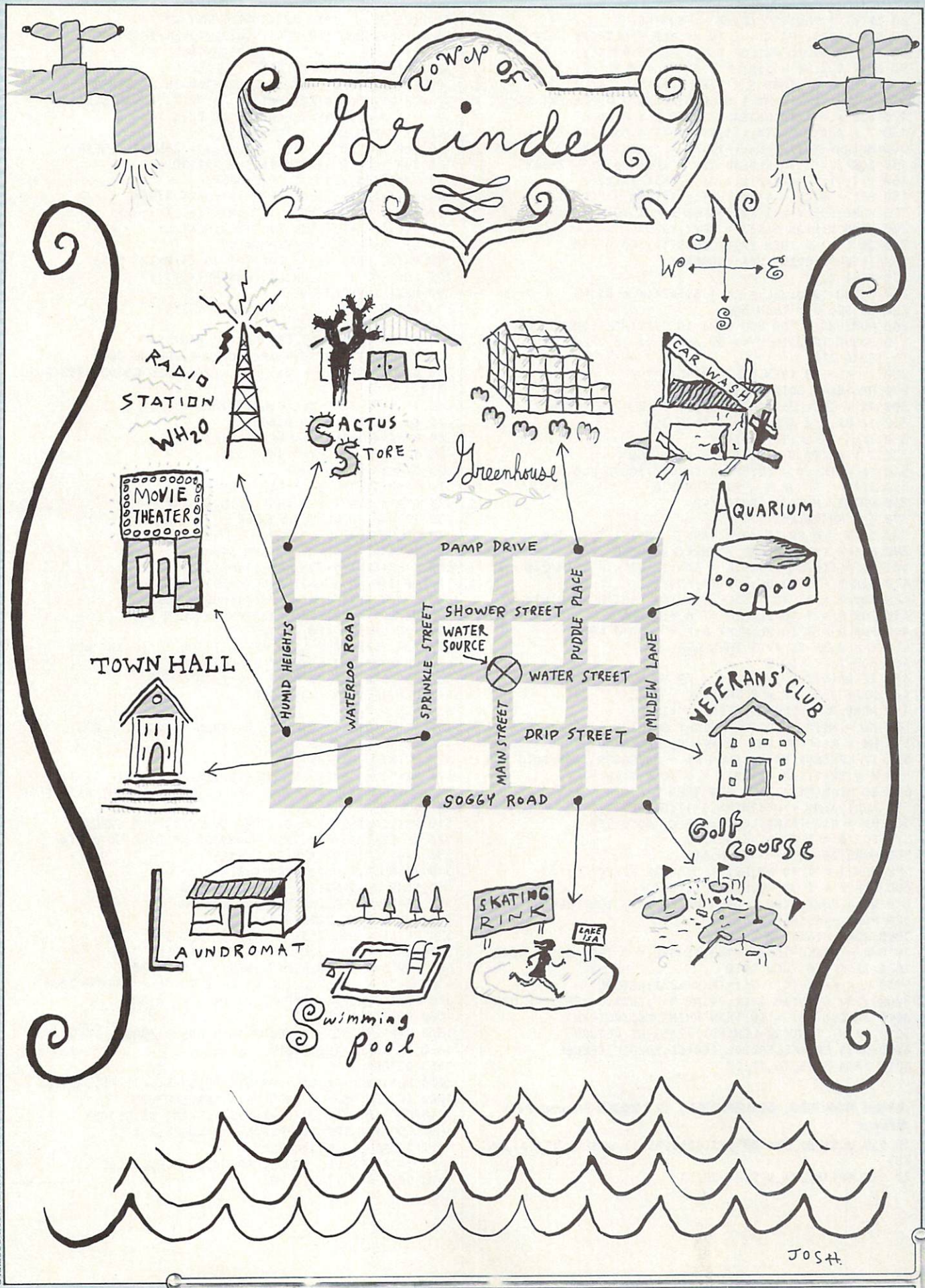
2. Important: Water cannot pass *through* an establishment to the pipes beyond it. Every establishment shown on the map (*opposite*), marked by an E on your screen, represents a *water*, not a *human*, roadblock. That is, following the same underground route, you can move Luke underneath an establishment and go on.

3. It's not necessary to create one long, continuous water flow. Water can flow out in many different directions from the water source in the center of town.

The solution to the puzzle is on page 62.

Apple II series/*Plumber's Blues*

```
20 AX = 7:DL = 1000:DM = 65:SW = 40
30 SP$ = CHR$(32):MX = AX*5+3
40 DIM MP(MX,23),V(5,2),Z$(3)
50 Z$(0) = "BLINKING":Z$(1) = "SOAKING"
```



ILLUSTRATIONS BY JOSH GOSFIELD

```
60 Z$(2) = "QUIT?":Z$(3) = "SURFACE?"
70 BL$ = SP$:FOR X = 2 TO MX:BL$ = BL$+SP$:NEXT X
80 FOR X = 1 TO MX:FOR Y = 1 TO 23:MP(X,Y) = 0
90 NEXT Y,X:VC = 5:RY = 2:FOR Y = 2 TO 22:S = AX
100 IF Y = RY THEN S = 1:RY = RY+5
110 FOR X = 2 TO MX-1 STEP S:MP(X,Y) = 32:NEXT X,Y
120 FOR Y = 1 TO 5:READ T$:FOR X = 1 TO 6
130 T = ASC(MID$(T$,X)):T = T-(T = 66)*34
140 MP(AX*(X-1)+2,5*(Y-1)+2) = T:NEXT X,Y
150 FOR Z = 1 TO 5:READ T:Y = INT(T/6):X = T-6*Y
160 V(Z,1) = X*AX+2:V(Z,2) = Y*5+2:NEXT Z
180 SEL = 0:CX = 4*AX+2:CY = 17:PM$ = "C"
190 HOME:FOR Y = 1 TO 23:FOR X = 1 TO MX
200 VTAB Y:HTAB 1+X:T = MP(X,Y)
210 IF T <> 0 THEN PRINT CHR$(T);:GOTO 230
220 INVERSE:PRINT SP$;:NORMAL
230 NEXT X,Y
240 GOSUB 1000:SEL = (K = 81)*2+(K = 83)*3
250 IF SEL = 0 THEN 300
260 HOME:N$ = "DO YOU WANT TO "+Z$(SEL):GOSUB 3000
270 GOSUB 1000:IF K <> 89 AND K <> 78 THEN PRINT CHR$(
7);:GOTO 270
280 IF K = 78 THEN SEL = 0:GOTO 190
290 ON SEL-1 GOTO 620,450
300 DX = (K = 76)-(K = 74):DY = (K = 75)-(K = 73)
310 IF DX = 0 AND DY = 0 THEN 350
320 TX = CX+DX:TY = CY+DY
330 T = MP(TX,TY):IF T = 0 THEN 360
340 CX = TX:CY = TY:PM$ = CHR$(T):GOTO 240
350 IF K = 67 OR K = 79 THEN 370
360 PRINT CHR$(7);:GOTO 240
370 T = MP(CX,CY)
380 IF T = K OR (T <> 67 AND T <> 79) THEN 360
390 MP(CX,CY) = K:PM$ = CHR$(K):GOSUB 2000
400 VC = VC+(K = 79)-(K = 67):IF VC < 6 THEN 240
410 FOR D = 1 TO DL:NEXT D:INVERSE
420 FOR Y = 23 TO 1 STEP -1:VTAB Y:HTAB 2:PRINT BL$
430 FOR D = 1 TO DL/3:NEXT D,Y:NORMAL
440 FOR D = 1 TO DL:NEXT D:F = 1:GOTO 490
450 F = 0:IF VC <> 5 THEN 490
460 FOR Z = 1 TO 5
470 IF MP(V(Z,1),V(Z,2)) = 79 THEN VC = VC-1
480 NEXT Z:IF VC = 0 THEN VC = -1
490 HOME:M$ = "LUKE EMERGES "+Z$(F)
500 M$ = M$+" INTO THE BRIGHT SUNLIGHT AND IS GREETED"
510 M$ = M$+" BY THE TOWNFOLK, WHO SHOUT,"
520 IF LEN(M$) <= SW THEN N$ = M$:GOSUB 3000:GOTO 570
530 B = SW+1:C = 1:FOR A = B TO 2 STEP -1
540 IF MID$(M$,A,1) = SP$ THEN C = 0:B = A:A = 2
550 NEXT A:N$ = LEFT$(M$,B-1):GOSUB 3000
560 M$ = RIGHT$(M$,LEN(M$)-B+C):GOTO 520
570 FOR D = 1 TO DL*3:NEXT D
580 HOME:IF VC = -1 THEN 610
590 FOR I = 1 TO DM:PRINT "YOU'RE FIRED! ";
600 FOR D = 1 TO 10:NEXT D,I:GOTO 620
610 N$ = "WHY, YOU CLEVER WATER RAT, YOU!":GOSUB 3000
620 POKE -16368,0:END
1000 POKE -16368,0
1010 K = PEEK(-16384)-128:IF SEL = 0 THEN GOSUB 2000
1020 IF K < 0 THEN 1010
1030 K = K-32*(K > 96)*(K < 123):RETURN
2000 VTAB CY:HTAB 1+CX:PRINT "*";CHR$(8);PM$;:RETURN
3000 IF LEN(N$) = SW THEN PRINT N$;:RETURN
3010 PRINT TAB((SW-LEN(N$))/2+1);N$:RETURN
4000 DATA EBBCEE,EBCBOE,CCO+OC,EOEOCE,CEECEE
4010 DATA 3,13,16,17,19
```

Atari 400/800, 600/800XL, & 130XE/*Plumber's Blues*

```
10 DIM BL$(38),M$(100),N$(40),PM$(1),SP$(1),T$(30),Z$(
28)
20 DIM MP(38,23),V(5,2),ZP(5)
30 POKE 752,1:POKE 82,0:SP$=CHR$(32)
40 ZP(1)=1:ZP(2)=9:ZP(3)=16:ZP(4)=21:ZP(5)=29
50 Z$(1)="BLINKING":Z$(9)="SOAKING"
60 Z$(16)="QUIT?":Z$(21)="SURFACE?"
70 BL$=CHR$(160):BL$(38)=CHR$(160):BL$(2)=BL$
80 FOR X=1 TO 38:FOR Y=1 TO 23:MP(X,Y)=160:NEXT Y
90 NEXT X:VC=5:RY=2:FOR Y=2 TO 22:S=7
100 IF Y=RY THEN S=1:RY=RY+5
110 FOR X=2 TO 37 STEP S:MP(X,Y)=32:NEXT X:NEXT Y
120 FOR Y=1 TO 5:READ T$:FOR X=1 TO 6
130 T=ASC(T$(X,X)):T=T-(T=66)*34
140 MP(7*(X-1)+2,5*(Y-1)+2)=T:NEXT X:NEXT Y
150 FOR L=1 TO 5:READ T:Y=INT(T/6):X=T-6*Y
160 V(L,1)=X*7+2:V(L,2)=Y*5+2:NEXT L
170 SEL=0:CX=30:CY=17:PM$="C"
180 PRINT CHR$(125);:FOR Y=1 TO 23:PRINT SP$;
190 FOR X=1 TO 38:PRINT CHR$(MP(X,Y));
200 NEXT X:PRINT :NEXT Y
210 GOSUB 1000:SEL=(K=47)*3+(K=62)*4
220 IF SEL=0 THEN 280
230 PRINT CHR$(125):N$="DO YOU WANT TO "
240 N$(16)=Z$(ZP(SEL),ZP(SEL+1)-1):GOSUB 3000
250 GOSUB 1000:IF K<>43 AND K<>35 THEN GOSUB 4000:GOTO
 250
260 IF K=35 THEN SEL=0:GOTO 180
270 ON SEL-2 GOTO 620,440
280 DX=(K=0)-(K=1):DY=(K=5)-(K=13)
290 IF DX=0 AND DY=0 THEN 330
300 TX=CX+DX:TY=CY+DY
310 T=MP(TX,TY):IF T=160 THEN 340
320 CX=TX:CY=TY:PM$=CHR$(T):GOTO 210
330 IF K=8 OR K=18 THEN 350
340 GOSUB 4000:GOTO 210
350 IF K<>8 AND K<>18 THEN 340
360 K=67*(K=18)+79*(K=8):T=MP(CX,CY)
370 IF T=K OR (T<>67 AND T<>79) THEN 340
380 MP(CX,CY)=K:PM$=CHR$(K):GOSUB 2000
390 VC=VC+(K=79)-(K=67):IF VC<6 THEN 210
400 FOR D=1 TO 600:NEXT D
410 FOR Y=22 TO 0 STEP -1:POSITION 1,Y:PRINT BL$;
420 FOR D=1 TO 150:NEXT D:NEXT Y
430 FOR D=1 TO 600:NEXT D:F=1:GOTO 480
440 F=1:IF VC<>5 THEN 480
450 FOR L=1 TO 5
460 IF MP(V(L,1),V(L,2))=79 THEN VC=VC-1
470 NEXT L:IF VC=0 THEN VC=-1
480 PRINT CHR$(125);
490 M$="LUKE EMERGES ":M$(14)=Z$(ZP(F),ZP(F+1)-1)
500 M$(LEN(M$)+1)=" INTO THE BRIGHT SUNLIGHT AND IS GR
EETED"
510 M$(LEN(M$)+1)=" BY THE TOWNFOLK, WHO SHOUT,"
520 IF LEN(M$)<=40 THEN N$=M$:GOSUB 3000:GOTO 570
530 B=41:C=1:FOR A=B TO 2 STEP -1
540 IF M$(A,A)=SP$ THEN C=0:B=A:A=2
550 NEXT A:N$=M$(1,B-1):GOSUB 3000
560 M$=M$(B+1-C,LEN(M$)):GOTO 520
570 FOR D=1 TO 1800:NEXT D
580 PRINT CHR$(125);:IF VC=-1 THEN 610
590 FOR I=1 TO 62:PRINT "YOU'RE FIRED! ";
600 FOR D=1 TO 10:NEXT D:NEXT I:GOTO 620
610 N$="WHY, YOU CLEVER WATER RAT, YOU!":GOSUB 3000
620 POKE 764,255:POKE 82,2:POKE 752,0:END
1000 POKE 764,255
1010 K=PEEK(764):IF SEL=0 THEN GOSUB 2000
1020 IF K=255 THEN 1010
1030 RETURN
2000 POSITION CX,CY-1:PRINT "*";CHR$(30);PM$;:RETURN
3000 IF LEN(N$)=40 THEN PRINT N$;:RETURN
3010 POKE 85,INT(20-LEN(N$)/2):PRINT N$:RETURN
4000 SOUND 0,100,10,10:FOR D=1 TO 25:NEXT D
4010 SOUND 0,0,0,0:RETURN
5000 DATA EBBCEE,EBCBOE,CCO+OC,EOEOCE,CEECEE
5010 DATA 3,13,16,17,19
```

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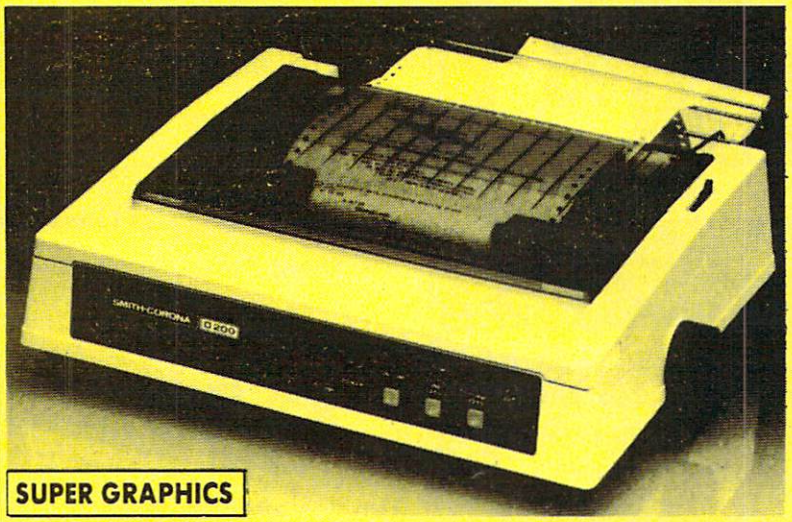

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CIRCLE READER SERVICE 36

Commodore 64 & 128 (C 64 mode)/*Plumber's Blues*

```
10 DIM MP(38,23),V(5,2),Z$(3):POKE 650,128
20 SP$=CHR$(32):Z$(0)="BLINKING":Z$(1)="SOAKING"
30 Z$(2)="QUIT?":Z$(3)="SURFACE?":BL$=CHR$(166)
40 FOR X=2 TO 38:BL$=BL$+CHR$(166):NEXT X
50 S=54272:FOR X=0 TO 24:POKE S+X,0:NEXT X
60 POKE S+5,9:POKE S+6,0:POKE S+1,100:POKE S+24,15
70 FOR X=1 TO 38:FOR Y=1 TO 23:MP(X,Y)=166:NEXT Y,X
80 VC=5:RY=2:FOR Y=2 TO 22:W=7
90 IF Y=RY THEN W=1:RY=RY+5
100 FOR X=2 TO 37 STEP W:MP(X,Y)=32:NEXT X,Y
110 FOR Y=1 TO 5:READ T$:FOR X=1 TO 6
120 T=ASC(MID$(T$,X)):T=T+(T=66)*34
130 MP(7*(X-1)+2,5*(Y-1)+2)=T:NEXT X,Y
140 FOR L=1 TO 5:READ T:Y=INT(T/6):X=T-6*Y
150 V(L,1)=X*7+2:V(L,2)=Y*5+2:NEXT L
160 SEL=0:CX=30:CY=17:PM$="C":PRINT CHR$(5)
170 PRINT CHR$(147)
180 FOR Y=1 TO 23:PRINT SP$;:FOR X=1 TO 38
190 PRINT CHR$(MP(X,Y));:NEXT X:PRINT:NEXT Y
200 GOSUB 1000:SEL=ABS((K=81)*2+(K=83)*3)
210 IF SEL=0 THEN 280
220 PRINT CHR$(147)
230 N$="DO YOU WANT TO "+Z$(SEL):GOSUB 3000
240 GOSUB 1000
250 IF K<>78 AND K<>89 THEN GOSUB 4000:GOTO 240
260 IF K=78 THEN SEL=0:GOTO 170
270 ON SEL-1 GOTO 590,420
280 DX=(K=74)-(K=76):DY=(K=73)-(K=75)
290 IF DX=0 AND DY=0 THEN 330
300 TX=CX+DX:TY=CY+DY
310 T=MP(TX,TY):IF T=166 THEN 340
320 CX=TX:CY=TY:PM$=CHR$(T):GOTO 200
330 IF K=67 OR K=79 THEN 350
340 GOSUB 4000:GOTO 200
350 T=MP(CX,CY):IF T=K OR (T<>67 AND T<>79) THEN 340
360 MP(CX,CY)=K:PM$=CHR$(K):GOSUB 2000
370 VC=VC-(K=79)+(K=67):IF VC<6 THEN 200
380 FOR D=1 TO 1000:NEXT D:X=1
390 FOR Y=22 TO 0 STEP -1:POKE 214,Y:PRINT
400 PRINT SP$;BL$;:FOR D=1 TO 350:NEXT D,Y
410 FOR D=1 TO 1000:NEXT D:F=1:GOTO 460
420 F=0:IF VC<>5 THEN 460
430 FOR L=1 TO 5
440 IF MP(V(L,1),V(L,2))=79 THEN VC=VC-1
450 NEXT L:IF VC=0 THEN VC=-1
460 PRINT CHR$(147);:M$="LUKE EMERGES "+Z$(F)
470 M$=M$+" INTO THE BRIGHT SUNLIGHT AND IS GREETED"
480 M$=M$+" BY THE TOWNFOLK, WHO SHOUT,"
490 IF LEN(M$)<=40 THEN N$=M$:GOSUB 3000:GOTO 540
500 B=41:C=1:FOR A=B TO 2 STEP -1
510 IF MID$(M$,A,1)=SP$ THEN C=0:B=A:A=2
520 NEXT A:N$=LEFT$(M$,B-1):GOSUB 3000
530 M$=RIGHT$(M$,LEN(M$)-B+C):GOTO 490
540 FOR D=1 TO 3000:NEXT D
550 PRINT CHR$(147);:IF VC=-1 THEN 580
560 FOR I=1 TO 65:PRINT "YOU'RE FIRED! ";
570 FOR D=1 TO 15:NEXT D,I:GOTO 590
580 N$="WHY, YOU CLEVER WATER RAT, YOU!":GOSUB 3000
590 POKE S+24,0:END
1000 GET K$:IF SEL=0 THEN GOSUB 2000
1010 IF K$="" THEN 1000
1020 K=ASC(K$):RETURN
2000 POKE 214,CY-1:PRINT
2010 PRINT TAB(CX);"*";CHR$(157);PM$;:RETURN
3000 IF LEN(N$)=40 THEN PRINT N$;:RETURN
3010 PRINT SPC(20-LEN(N$)/2);N$:RETURN
4000 POKE S+4,17:FOR D=1 TO 100:NEXT D
4010 POKE S+4,16:RETURN
5000 DATA EBBCEE,EBCB0E,CC0+0C,E0E0CE,CEECEE
5010 DATA 3,13,16,17,19
```

IBM PC & compatibles (80-column version)/*Plumber's Blues*

This program has been tested and found to work on the following computers and hardware configurations, using the BASICs shown: IBM PC w/Color/Graphics Monitor Adapter or Monochrome/Printer Card. w/Disk BASIC D2.00 or Advanced BASIC A2.00. IBM PCjr w/128K RAM, w/Cartridge BASIC J1.00. Tandy 1000 w/GW-BASIC version 00.05.00 or 01.01.00. IBM PCjr owners with 64K RAM should use the 40-column version.

```
10 DEF SEG=0:SCREEN 0,0:KEY OFF
20 LM=13:AX=10:AY=5:DL=1200:DM=110:SD=25:SW=80
30 BK=219:WIDTH SW:LOCATE,,0:BA$=CHR$(29)
40 SP$=CHR$(32):MX=AX*5+3:MY=AY*4+3
50 DIM MP(MX,MY),V(5,2),Z$(3)
60 Z$(0)="BLINKING":Z$(1)="SOAKING"
70 Z$(2)="QUIT?":Z$(3)="SURFACE?"
80 BL$=STRING$(MX,BK)
90 FOR X=1 TO MX:FOR Y=1 TO MY:MP(X,Y)=BK:NEXT Y,X
100 VC=5:RY=2:FOR Y=2 TO MY-1
110 IF Y=RY THEN S=1:RY=RY+AY ELSE S=AX
120 FOR X=2 TO MX-1 STEP S:MP(X,Y)=32:NEXT X,Y
130 FOR Y=1 TO 5:READ T$:FOR X=1 TO 6
140 T=ASC(MID$(T$,X)):T=T+(T=66)*34
150 MP(AX*(X-1)+2,AY*(Y-1)+2)=T:NEXT X,Y
160 FOR L=1 TO 5:READ T:Y=INT(T/6):X=T-6*Y
170 V(L,1)=X*AX+2:V(L,2)=Y*AY+2:NEXT L
180 SEL=0:CX=4*AX+2:CY=3*AY+2:PM$="C"
190 CLS:FOR Y=1 TO MY:PRINT TAB(LM+1);:FOR X=1 TO MX
200 PRINT CHR$(MP(X,Y));:NEXT X:PRINT:NEXT Y
210 GOSUB 1000:SEL=ABS((K=81)*2+(K=83)*3)
220 IF SEL=0 THEN 270
230 CLS:N$="DO YOU WANT TO "+Z$(SEL):GOSUB 3000
240 GOSUB 1000:IF K<>78 AND K<>89 THEN SOUND 500,2:GOT
O 240
250 IF K=78 THEN SEL=0:GOTO 190
260 ON SEL-1 GOTO 580,410
270 DX=(K=74)-(K=76):DY=(K=73)-(K=75)
280 IF DX=0 AND DY=0 THEN 320
290 TX=CX+DX:TY=CY+DY
300 T=MP(TX,TY):IF T=BK THEN 330
310 CX=TX:CY=TY:PM$=CHR$(T):GOTO 210
320 IF K=67 OR K=79 THEN 340
330 SOUND 500,2:GOTO 210
340 T=MP(CX,CY):IF T=K OR (T<>67 AND T<>79) THEN 330
350 MP(CX,CY)=K:PM$=CHR$(K):GOSUB 2000
360 VC=VC-(K=79)+(K=67):IF VC<6 THEN 210
370 FOR D=1 TO DL:NEXT D:X=LM+1
380 FOR Y=MY TO 1 STEP -1:GOSUB 4000:PRINT BL$;
390 FOR D=1 TO DL/3:NEXT D,Y
400 FOR D=1 TO DL:NEXT D:F=1:GOTO 450
410 F=0:IF VC<>5 THEN 450
420 FOR L=1 TO 5
430 IF MP(V(L,1),V(L,2))=79 THEN VC=VC-1
440 NEXT L:IF VC=0 THEN VC=-1
450 CLS:M$="LUKE EMERGES "+Z$(F)
460 M$=M$+" INTO THE BRIGHT SUNLIGHT AND IS GREETED"
470 M$=M$+" BY THE TOWNFOLK, WHO SHOUT,"
480 IF LEN(M$)<=SW THEN N$=M$:GOSUB 3000:GOTO 530
490 B=SW+1:C=1:FOR A=B TO 2 STEP -1
500 IF MID$(M$,A,1)=SP$ THEN C=0:B=A:A=2
510 NEXT A:N$=LEFT$(M$,B-1):GOSUB 3000
520 M$=RIGHT$(M$,LEN(M$)-B+C):GOTO 480
530 FOR D=1 TO DL*3:NEXT D
540 CLS:IF VC=-1 THEN 570
550 FOR I=1 TO DM:PRINT "YOU'RE FIRED! ";
560 FOR D=1 TO SD:NEXT D,I:GOTO 580
570 N$="WHY, YOU CLEVER WATER RAT, YOU!":GOSUB 3000
580 POKE 1050,PEEK(1052):END
1000 K$=INKEY$:IF SEL=0 THEN GOSUB 2000
1010 IF K$="" THEN 1000 ELSE K=ASC(K$)
1020 K=K-32*(K>96)*(K<123):RETURN
2000 Y=CY:X=LM+CX:GOSUB 4000
2010 PRINT "*";BA$;PM$;:RETURN
3000 IF LEN(N$)=SW THEN PRINT N$;:RETURN
3010 PRINT TAB((SW-LEN(N$))/2);N$:RETURN
4000 LOCATE Y,X:RETURN
5000 DATA EBBCEE,EBCB0E,CC0+0C,E0E0CE,CEECEE
5010 DATA 3,13,16,17,19
```

MODIFICATIONS FOR OTHER COMPUTERS

Adam/*Plumber's Blues*

Use the Apple version with the following alterations. Change lines 20, 620, and 1000–1020 to read as follows:

```
20 ax = 5:dl = 1500:dm = 50:sw = 31
620 CALL 28000:POKE 16953,95:END
1000 CALL 28000
1010 k = PEEK(64885):IF sel = 0 THEN GOSUB 2000
1020 IF k < 1 THEN 1010
```

Also, add lines 10, 170, and 5000:

```
10 LOMEM: 29000:POKE 16953,0
170 FOR x=28000 TO 28005:READ t:POKE x,t:NEXT x
5000 DATA 62,0,50,117,253,201
```

Note: The program begins by turning off the cursor; it turns it back on again when you "Q"uit. If you exit from the program abnormally (e.g., if you have a syntax error or press CONTROL-C), you can turn the cursor back on by typing `POKE 16953,95` and pressing RETURN.

IBM PC & compatibles (40-column version)/*Plumber's Blues*

This program has been tested and found to work on the following computers and hardware configurations, using the BASICs shown: IBM PC w/Color/Graphics Monitor Adapter, w/Disk BASIC D2.00 or Advanced BASIC A2.00. IBM PCjr w/Cartridge BASIC J1.00. Tandy 1000 w/GW-BASIC version 00.05.00 or 01.01.00.

Use the IBM PC 80-column version, except change line 20 to read as follows:

```
20 LM=1:AX=7:AY=5:DL=1200:DM=44:SD=25:SW=40
```

Macintosh w/Microsoft BASIC 2.0/*Plumber's Blues*

Use the IBM PC 80-column version, except change lines 10–30, 370, 550, 560, and 580 to read as follows:

```
10 CALL TEXTFONT(4):CALL TEXTSIZE(9):CALL TEXTFACE(64)
:CALL TEXTMODE(2)
20 LM=15:AX=8:AY=5:SW=74:DL=2700:DM=110:SD=30
30 BK=218:BA$=CHR$(8)
370 CALL TEXTMODE(0):FOR D=1 TO DL:NEXT D:X=LM+1
550 FOR I=1 TO 22:FOR J=1 TO 5:PRINT "YOU'RE FIRED! ";
560 FOR D=1 TO SD:NEXT D,J:PRINT:NEXT I:GOTO 580
580 END
```

Tandy Color Computer/*Plumber's Blues*

Use the IBM PC 80-column version, except change lines 10–30, 80, 240, 330, 580, and 4000 to read as follows:

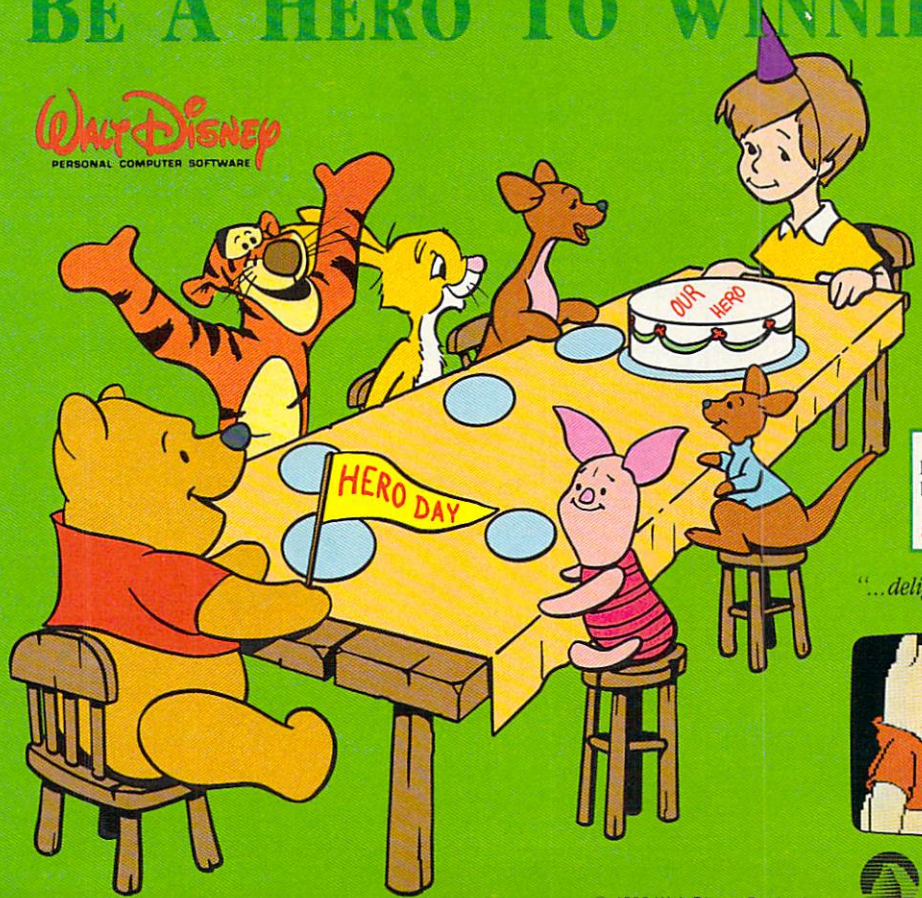
```
10 CLEAR 500
20 LM=1:AX=5:AY=3:DL=800:DM=31:SD=20:SW=32
30 BK=175:BA$=CHR$(8)
80 BL$=CHR$(BK):FOR X=2 TO MX:BL$=BL$+CHR$(BK):NEXT X
240 GOSUB 1000:IF K<>78 AND K<>89 THEN SOUND 100,2:GOT
O 240
330 SOUND 100,2:GOTO 210
580 END
4000 PRINT@SW*(Y-1)+X,"";:RETURN
```

Tandy Models III & 4 (Model III mode)/*Plumber's Blues*

Use the IBM PC 80-column version, except change lines 10–30, 240, 330, 580, and 4000 to read as follows:

```
10 CLEAR 500
20 LM=12:AX=7:AY=3:DL=600:DM=64:SD=10:SW=64
30 BK=191:BA$=CHR$(24)
240 GOSUB 1000:IF K<>78 AND K<>89 THEN 240
330 GOTO 210
580 END
4000 PRINT@SW*(Y-1)+X,"";:RETURN
```


BE A HERO TO WINNIE THE POOH



Last night the blustery wind came up and mixed up everything in the Hundred Acre Wood. If you can find the lost articles, like Pooh's honey pot and Eeyore's tail, and return them to their rightful owners, the characters in the Hundred Acre Wood will give a Hero Party in your honor!

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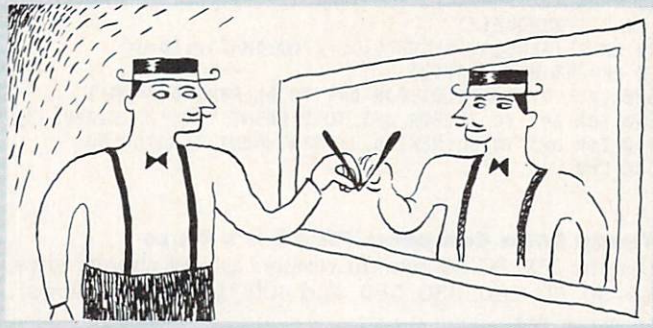
CIRCLE READER SERVICE 40

MIRROR DRAW

BY JOEY LATIMER AND JOHN JAINSCHIGG



Have you ever been inside a house of mirrors and seen the weird effects that come from multiple reflections? *Mirror Draw* isn't exactly a "house of mirrors," but it comes pretty close to creating the same kind of kaleidoscopic images. By letting you draw on the screen and mirroring your design both vertically and horizontally, *Mirror Draw* lets you create beautifully symmetrical tapestries of color and form.

Type it in and SAVE it on disk or cassette. If you have a joystick, plug it into port 1 of your computer. Then type RUN. Make sure your computer is set for all capital letters. You'll be able to draw using the joystick (the mouse on the Macintosh) or by pressing the U (up left), I (up), O (up right), J (left), L (right), M (down left), "," (down), and "." (down right) keys. (Note: the Macintosh version doesn't use the keyboard and the Model III version uses keyboard only.) Press the joystick button or space bar to change the drawing color (the TI version lets you change color only with the space bar). The Model III version of *Mirror Draw* uses graphic characters instead of colors. The Mac version uses monochrome graphics. Pressing the space bar or single-clicking the mouse button on the Mac will change the figure currently being used to draw. Press the C key (double-click the mouse button) to clear the screen. Have fun!

Adam/*Mirror Draw*

```
9 REM --FIRST COLOR AND STARTING POSITION--
10 c = 6:x = 11:y = 11
19 REM --CLEAR SCREEN AND SET GRAPHICS MODE--
20 HOME:GR
29 REM --PRINT INSTRUCTIONS--
30 VTAB 21
40 PRINT "------------------------------";
50 PRINT TAB(4);"Fire buttons change color."
60 PRINT TAB(2);"Any keypad key clears screen.";
69 REM --SET DRAWING COLOR--
70 COLOR= c
79 REM --PLOT 4 POINTS BASED ON X,Y--
80 PLOT x,y
90 PLOT 39-x,y
100 PLOT x,39-y
110 PLOT 39-x,39-y
119 REM --IF KEYPAD KEY PRESSED, START AGAIN--
120 IF PDL(11) <> 0 THEN 10
129 REM --READ CONTROLLER STICK--
130 d = PDL(5)
139 REM --COMPUTE NEW X,Y BASED ON STICK VALUE--
140 IF d = 4 OR d = 6 OR d = 12 THEN y = y+1
150 IF d = 1 OR d = 3 OR d = 9 THEN y = y-1
160 IF d = 2 OR d = 3 OR d = 6 THEN x = x+1
170 IF d = 8 OR d = 9 OR d = 12 THEN x = x-1
179 REM --KEEP X,Y ON SCREEN--
180 IF x > 39 THEN x = 0
190 IF x < 0 THEN x = 39
200 IF y > 39 THEN y = 0
210 IF y < 0 THEN y = 39
219 REM --IF NO COLOR CHANGE, GO BACK--
220 IF PDL(7) = 0 AND PDL(9) = 0 THEN 80
229 REM --CHANGE COLOR--
230 c = c+1
240 IF c = 15 THEN c = 1
250 GOTO 70
```

Apple II series/*Mirror Draw*

```
9 REM --FIRST COLOR AND STARTING POSITION--
10 C = 6:X = 11:Y = 11
19 REM --CLEAR SCREEN AND SET GRAPHICS MODE--
20 HOME:GR
29 REM --PRINT INSTRUCTIONS--
30 VTAB 22
40 PRINT "----------------------------------------";
50 PRINT " <FIRE> OR <SPACE BAR> CHANGES COLOR;"
60 PRINT TAB(11);"<C> CLEARS SCREEN.";
69 REM --SET DRAWING COLOR--
70 COLOR= C
79 REM --PLOT 4 POINTS BASED ON X,Y--
80 PLOT X,Y
90 PLOT 39-X,Y
100 PLOT X,39-Y
110 PLOT 39-X,39-Y
119 REM --GET KEYPRESS--
120 K = PEEK(-16384)
130 POKE -16368,0
139 REM --IF "C" KEY PRESSED, START AGAIN--
140 IF K = 195 THEN 10
149 REM --COMPUTE NEW X,Y BASED ON STICK AND KEYS--
150 IF PDL(1) > 192 OR K = 205 OR K = 172 OR K = 174 T
HEN Y = Y+1
160 IF PDL(1) < 64 OR K = 213 OR K = 201 OR K = 207 TH
EN Y = Y-1
170 IF PDL(0) > 192 OR K = 207 OR K = 204 OR K = 174 T
HEN X = X+1
180 IF PDL(0) < 64 OR K = 213 OR K = 202 OR K = 205 TH
EN X = X-1
189 REM --KEEP X,Y ON SCREEN--
190 IF X > 39 THEN X = 0
200 IF X < 0 THEN X = 39
210 IF Y > 39 THEN Y = 0
220 IF Y < 0 THEN Y = 39
229 REM --IF NO COLOR CHANGE, GO BACK--
230 IF PEEK(-16286) < 128 AND K <> 160 THEN 80
239 REM --CHANGE COLOR--
240 C = C+1
250 IF C > 15 THEN C = 1
260 GOTO 70
```

Atari 400, 800, 600/800XL, & 130XE/*Mirror Draw*

```
9 REM --SET LEFT BORDER OF TEXT WINDOW TO ZERO--
10 POKE 82,0
19 REM --FIRST COLOR AND STARTING POSITION--
20 C=1:X=11:Y=6
29 REM --SET GRAPHICS MODE; TURN OFF CURSOR--
30 GRAPHICS 3:POKE 752,1
39 REM --PRINT INSTRUCTIONS--
40 PRINT "----------------------------------------";
50 PRINT " FIRE BUTTON OR <SPACE> CHANGES COLOR."
60 PRINT "          <C> CLEARS SCREEN.";
69 REM --SET DRAWING COLOR--
70 COLOR C
79 REM --PLOT 4 POINTS BASED ON X,Y--
80 PLOT X,Y
90 PLOT 39-X,Y
100 PLOT X,19-Y
110 PLOT 39-X,19-Y
119 REM --GET KEYPRESS--
```

```
120 K=PEEK(764)
129 REM --CLEAR "LAST KEY PRESSED" LOCATION--
130 POKE 764,255
139 REM --IF "C" KEY PRESSED, START AGAIN--
140 IF K=18 THEN 20
149 REM --READ JOYSTICK--
150 D=STICK(0)
159 REM --COMPUTE NEW X,Y BASED ON STICK AND KEYS--
160 IF D=9 OR D=13 OR D=5 OR K=32 OR K=34 OR K=37 THEN
 Y=Y+1
170 IF D=10 OR D=14 OR D=6 OR K=11 OR K=13 OR K=8 THEN
 Y=Y-1
180 IF D=6 OR D=7 OR D=5 OR K=8 OR K=0 OR K=34 THEN X=
X+1
190 IF D=9 OR D=10 OR D=11 OR K=11 OR K=1 OR K=37 THEN
 X=X-1
199 REM --KEEP X,Y ON SCREEN--
200 IF X>39 THEN X=0
210 IF X<0 THEN X=39
220 IF Y>19 THEN Y=0
230 IF Y<0 THEN Y=19
239 REM --IF NO COLOR CHANGE, GO BACK--
240 IF STRIG(0) AND K<>33 THEN 80
249 REM --CHANGE COLOR--
250 C=C+1
260 IF C>3 THEN C=1
270 GOTO 70
```

Commodore 64 & 128 (C 64 mode)/*Mirror Draw*

```
9 REM --FIRST COLOR AND STARTING POSITION--
10 C=6:X=11:Y=6
19 REM --SET SCREEN TO BLACK AND CLEAR IT--
20 POKE 53281,0:PRINT CHR$(147);
29 REM --SET CURSOR ON 22ND SCREEN LINE--
30 POKE 214,21:PRINT
39 REM --PRINT INSTRUCTIONS--
40 PRINT "----------------------------------------";
50 PRINT " FIRE BUTTON OR <SPACE> CHANGES COLOR."
60 PRINT TAB(11);"<C> CLEARS SCREEN.";
69 REM --PLOT 4 POINTS BASED ON X,Y--
70 POKE Y*40+X+55296,C
80 POKE Y*40+X+1024,160
90 POKE Y*40+(39-X)+55296,C
100 POKE Y*40+(39-X)+1024,160
110 POKE (21-Y)*40+X+55296,C
120 POKE (21-Y)*40+X+1024,160
130 POKE (21-Y)*40+(39-X)+55296,C
140 POKE (21-Y)*40+(39-X)+1024,160
149 REM --GET KEYPRESS--
150 GET K$
159 REM --IF "C" KEY PRESSED, START AGAIN--
160 IF K$="C" THEN 10
169 REM --READ JOYSTICK--
170 D=PEEK(56321) AND 15
179 REM --COMPUTE NEW X,Y BASED ON STICK AND KEYS--
180 IF D=9 OR D=13 OR D=5 OR K$="M" OR K$="," OR K$="."
" THEN Y=Y+1
190 IF D=10 OR D=14 OR D=6 OR K$="U" OR K$="I" OR K$="
O" THEN Y=Y-1
200 IF D=6 OR D=7 OR D=5 OR K$="O" OR K$="L" OR K$="."
 THEN X=X+1
210 IF D=10 OR D=11 OR D=9 OR K$="U" OR K$="J" OR K$="
M" THEN X=X-1
219 REM --KEEP X,Y ON SCREEN--
220 IF X>39 THEN X=0
230 IF X<0 THEN X=39
240 IF Y>21 THEN Y=0
250 IF Y<0 THEN Y=21
259 REM --IF NO COLOR CHANGE, GO BACK--
260 IF (PEEK(56321) AND 16)<>0 AND K$<>" " THEN 70
269 REM --CHANGE COLOR--
270 C=C+1
280 IF C>15 THEN C=1
290 GOTO 70
```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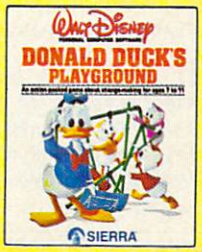

SIERRA
CIRCLE READER SERVICE 39

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IBM PC & compatibles/*Mirror Draw*

This program has been tested and found to work on the following computers and hardware configurations, using the BASICs shown: IBM PC w/Color/Graphics Monitor Adapter, w/Disk BASIC D2.00 or Advanced BASIC A2.00; IBM PCjr w/Cartridge BASIC J1.00.

```
9 REM --SET UP SCREEN; PREPARE TO READ STICK--
10 WIDTH 40:KEY OFF:SCREEN 0,1:STRIG ON:CLS
20 PRINT TAB(7);"Is a joystick plugged in";:INPUT JS$
29 REM --JS IS -1 (TRUE) IF JOYSTICK PLUGGED IN--
30 JS=LEFT$(JS$,1)="Y" OR LEFT$(JS$,1)="y"
39 REM --FIRST COLOR AND STARTING POSITION--
40 C=6:X=11:Y=6
50 CLS
59 REM --SET CURSOR POSITION AND TEXT COLOR--
60 LOCATE 22,1,0:COLOR 7
69 REM --PRINT A LINE OF DASHES--
70 PRINT STRING$(40,45);
79 REM --PRINT INSTRUCTIONS--
80 PRINT "  FIRE BUTTON OR <SPACE> CHANGES COLOR."
90 PRINT TAB(11);"<C> CLEARS SCREEN.";
99 REM --SET DRAWING COLOR--
100 COLOR C
109 REM --PRINT 4 COLORED BLOCKS BASED ON X,Y--
110 LOCATE Y,X:PRINT CHR$(219);
120 LOCATE Y,41-X:PRINT CHR$(219);
130 LOCATE 22-Y,X:PRINT CHR$(219);
140 LOCATE 22-Y,41-X:PRINT CHR$(219);
149 REM --GET KEYPRESS--
150 K$=INKEY$
159 REM --IF "C" KEY PRESSED, START AGAIN--
160 IF K$="C" THEN 40
169 REM --COMPUTE NEW X,Y BASED ON STICK AND/OR KEYS--
170 IF (STICK(1)>80 AND JS) OR K$="M" OR K$="," OR K$=
"." THEN Y=Y+1
180 IF (STICK(1)<20 AND JS) OR K$="U" OR K$="I" OR K$=
"O" THEN Y=Y-1
190 IF (STICK(0)>80 AND JS) OR K$="O" OR K$="L" OR K$=
"." THEN X=X+1
200 IF (STICK(0)<20 AND JS) OR K$="U" OR K$="J" OR K$=
"M" THEN X=X-1
209 REM --KEEP X,Y ON SCREEN--
210 IF X>40 THEN X=1
220 IF X<1 THEN X=40
230 IF Y>21 THEN Y=1
240 IF Y<1 THEN Y=21
249 REM --IF NO COLOR CHANGE, GO BACK--
250 IF NOT (STRIG(1) AND JS) AND K$<>" " THEN 100
259 REM --CHANGE COLOR--
260 C=C+1
270 IF C>15 THEN C=1
280 GOTO 100
```

Macintosh w/Microsoft BASIC 2.0 or 2.1/*Mirror Draw*

```
  BEGIN:
  REM --SET INITIAL BRUSH SIZE--
    F=0
    CLS
    LOCATE 14,1
  REM --PRINT A LINE OF DASHES--
    PRINT STRING$(70,45)
  REM --PRINT INSTRUCTIONS--
    PRINT TAB(8);"Single-click to change brush. Double
-click to clear screen.";
  DRAW:
  REM --READ MOUSE BUTTON--
    MS=MOUSE(0)
  REM --IF DOUBLE-CLICK, START AGAIN--
    IF MS=2 THEN BEGIN
  REM --READ CURSOR POSITION--
    X=MOUSE(1):Y=MOUSE(2)
  REM --IF CURSOR OUT OF BOUNDS, GO BACK--
    IF X<10 OR X>480 OR Y<10 OR Y>200 THEN DRAW
  REM --DRAW BRUSH SHAPE AT 4 POINTS BASED ON X,Y--
    PSET(X,Y):GOSUB BRUSH
    PSET(480-X,Y):GOSUB BRUSH
    PSET(480-X,200-Y):GOSUB BRUSH
    PSET(X,200-Y):GOSUB BRUSH
  REM --IF NO BRUSH CHANGE (SINGLE-CLICK), GO BACK--
    IF MS=0 THEN DRAW
  REM --CHANGE BRUSH SIZE--
    F=F+1
    IF F=5 THEN F=0
    GOTO DRAW
  BRUSH:
    LINE STEP(-F,-F)-STEP(F,F),,BF:RETURN
```

Tandy Color Computer/*Mirror Draw*

```
9 REM --FIRST COLOR AND STARTING POSITION--
10 C=7:X=11:Y=4
20 CLS
29 REM --PRINT INSTRUCTIONS--
30 PRINT@416,"--------------------------------";
40 PRINT "  FIRE OR SPACE CHANGES COLOR."
50 PRINT TAB(6);"<C> CLEARS SCREEN.";
59 REM --SET COLOR OF DRAWING CHARACTER--
60 C$=CHR$(127+C*16)
69 REM --PRINT 4 COLORED BLOCKS BASED ON X,Y--
70 PRINT@Y*32+X,C$;
80 PRINT@Y*32+(31-X),C$;
90 PRINT@(12-Y)*32+X,C$;
100 PRINT@(12-Y)*32+(31-X),C$;
109 REM --GET KEYPRESS--
110 K$=INKEY$
119 REM --IF "C" KEY PRESSED, START AGAIN--
120 IF K$="C" THEN 10
129 REM --COMPUTE NEW X,Y BASED ON STICK AND KEYS--
130 IF JOYSTK(1)>48 OR K$="M" OR K$="," OR K$="." THEN
 Y=Y+1
140 IF JOYSTK(1)<16 OR K$="U" OR K$="I" OR K$="O" THEN
 Y=Y-1
150 IF JOYSTK(0)>48 OR K$="O" OR K$="L" OR K$="." THEN
 X=X+1
160 IF JOYSTK(0)<16 OR K$="U" OR K$="J" OR K$="M" THEN
 X=X-1
169 REM --KEEP X,Y ON SCREEN--
170 IF X>31 THEN X=0
180 IF X<0 THEN X=31
190 IF Y>12 THEN Y=0
200 IF Y<0 THEN Y=12
209 REM --IF NO COLOR CHANGE, GO BACK--
210 IF PEEK(65280)<>254 AND PEEK(65280)<>126 AND K$<>"
 " THEN 70
219 REM --CHANGE COLOR--
220 C=C+1
230 IF C=6 THEN C=7
240 IF C>8 THEN C=2
250 GOTO 60
```

Tandy Models III & 4 (Model III mode)/*Mirror Draw*

```
9 REM --CLEAR STRING SPACE--
10 CLEAR 500
19 REM --FIRST CHARACTER AND STARTING POSITION--
20 C=1:X=11:Y=4
30 CLS
39 REM --PRINT A LINE OF DASHES--
40 PRINT@832,STRING$(64,45);
49 REM --PRINT INSTRUCTIONS--
50 PRINT TAB(9);"PRESS <SPACE BAR> TO CHANGE DRAWING C
HARACTER."
60 PRINT TAB(18);"PRESS <C> TO CLEAR SCREEN.";
69 REM --SET DRAWING CHARACTER--
70 C$=CHR$(192-C)
79 REM --PRINT 4 CHARACTERS BASED ON X,Y--
80 PRINT@64*Y+X,C$;
90 PRINT@64*Y+(63-X),C$;
100 PRINT@64*(12-Y)+X,C$;
110 PRINT@64*(12-Y)+(63-X),C$;
119 REM --GET KEYPRESS--
```

```
120 K$=INKEY$
129 REM --IF "C" KEY PRESSED, START AGAIN--
130 IF K$="C" THEN 20
139 REM --COMPUTE NEW X,Y BASED ON KEYS--
140 IF K$="M" OR K$="," OR K$="." THEN Y=Y+1
150 IF K$="U" OR K$="I" OR K$="O" THEN Y=Y-1
160 IF K$="O" OR K$="L" OR K$="." THEN X=X+1
170 IF K$="U" OR K$="J" OR K$="M" THEN X=X-1
179 REM --KEEP X,Y ON SCREEN--
180 IF X>63 THEN X=0
190 IF X<0 THEN X=63
200 IF Y>12 THEN Y=0
210 IF Y<0 THEN Y=12
219 REM --IF NO CHARACTER CHANGE, GO BACK--
220 IF K$<>" " THEN 80
229 REM --CHANGE CHARACTER--
230 C=C+1
240 IF C>63 THEN C=1
250 GOTO 70
```

TI-99/4A/*Mirror Draw*

```
9 REM --DEFINE 7 CHARACTERS W/DIFFERENT COLORS--
10 FOR I=9 TO 15
20 CALL CHAR((I+3)*8,"FFFFFFFFFFFFFFFF")
30 CALL COLOR(I,I-3,1)
40 NEXT I
49 REM --FIRST COLOR AND STARTING POSITION--
50 C=0
60 X=5
70 Y=5
80 CALL CLEAR
89 REM --PRINT INSTRUCTIONS--
90 PRINT "---------------------------";
100 PRINT "<SPACE BAR> CHANGES COLOR."
110 PRINT TAB(5);"<C> CLEARS SCREEN.";
119 REM --PRINT BLOCKS AT 4 PLACES BASED ON X,Y--
120 CALL HCHAR(Y,X,96+C*8)
130 CALL HCHAR(Y,33-X,96+C*8)
140 CALL HCHAR(22-Y,33-X,96+C*8)
150 CALL HCHAR(22-Y,X,96+C*8)
159 REM --GET KEYPRESS--
160 CALL KEY(3,K,S)
169 REM --IF "C" KEY WAS PRESSED, START AGAIN--
170 IF K=67 THEN 50
179 REM --READ JOYSTICK--
180 CALL JOYST(1,DX,DY)
189 REM --COMPUTE NEW X,Y BASED ON STICK AND KEYS--
190 X=X-DX/4+(K=85)+(K=74)+(K=77)-(K=79)-(K=76)-(K=46)
200 Y=Y-DY/4+(K=85)+(K=73)+(K=79)-(K=77)-(K=44)-(K=46)
209 REM --KEEP X,Y ON SCREEN--
210 IF X>0 THEN 230
220 X=32
230 IF X<33 THEN 250
240 X=1
250 IF Y>0 THEN 270
260 Y=21
270 IF Y<22 THEN 290
280 Y=1
289 REM --IF NO COLOR CHANGE, GO BACK--
290 IF K<>32 THEN 120
299 REM --CHANGE COLOR--
300 C=C+1
310 IF C<7 THEN 120
320 C=0
330 GOTO 120
```

VIC-20/*Mirror Draw*

```
9 REM --FIRST COLOR AND STARTING POSITION--
10 C=1:X=4:Y=4
19 REM --SET SCREEN TO BLACK AND CLEAR IT--
20 POKE 36879,11:PRINT CHR$(147);
29 REM --SET CURSOR ON 20TH SCREEN LINE--
```


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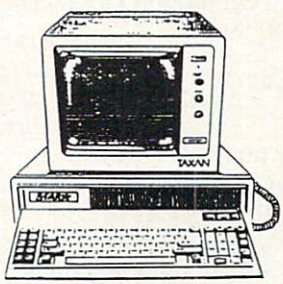

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CIRCLE READER SERVICE 32

```
30 POKE 214,19:PRINT
39 REM --PRINT INSTRUCTIONS--
40 PRINT "----------------------";
50 PRINT " <SPACE>/FIRE CHANGES"
60 PRINT "  COLOR; <C> CLEARS.";
69 REM --PLOT 4 POINTS BASED ON X,Y--
70 POKE Y*22+X+38400,C
80 POKE Y*22+X+7680,160
90 POKE Y*22+(21-X)+38400,C
100 POKE Y*22+(21-X)+7680,160
110 POKE (19-Y)*22+X+38400,C
120 POKE (19-Y)*22+X+7680,160
130 POKE (19-Y)*22+(21-X)+38400,C
140 POKE (19-Y)*22+(21-X)+7680,160
149 REM --GET KEYPRESS--
150 GET K$
159 REM --IF "C" KEY PRESSED, START AGAIN--
160 IF K$="C" THEN 10
169 REM --PREPARE FOR JOYSTICK INPUT--
170 POKE 37154,127
179 REM --READ JOYSTICK LOCATION AND COMPUTE VALUE--
180 D=(PEEK(37137) AND 28)/4+(PEEK(37152) AND 128)/16
189 REM --RESET TO NORMAL AFTER READING JOYSTICK--
190 POKE 37154,255
199 REM --COMPUTE NEW X,Y BASED ON STICK AND KEYS--
200 IF D=9 OR D=13 OR D=5 OR K$="M" OR K$="," OR K$="."
" THEN Y=Y+1
210 IF D=10 OR D=14 OR D=6 OR K$="U" OR K$="I" OR K$="
O" THEN Y=Y-1
220 IF D=6 OR D=7 OR D=5 OR K$="O" OR K$="L" OR K$="."
 THEN X=X+1
230 IF D=10 OR D=11 OR D=9 OR K$="U" OR K$="J" OR K$="
M" THEN X=X-1
239 REM --KEEP X,Y ON SCREEN--
240 IF X>21 THEN X=0
250 IF X<0 THEN X=21
260 IF Y>19 THEN Y=0
270 IF Y<0 THEN Y=19
279 REM --IF NO COLOR CHANGE, GO BACK--
280 IF K$<>" " AND (PEEK(37137) AND 32) THEN 70
289 REM --CHANGE COLOR--
290 C=C+1
300 IF C>7 THEN C=1
310 GOTO 70
```

PROGRAMMING P.S.

Corrections to previous months' programs

Explosion Machine *(February 1986, page 68)*

IBM PC*jr* & compatibles: Due to a difference between Tandy's GW-BASIC and IBM's BASIC, this program will not run on the Tandy 1000 unless you change line 1010 to read as follows:

```
1010 S=INT(RND*3)+4:D=INT(RND*5)+2:NOISE S,I,D
```

Multimath *(March 1986, page 60)*

Commodore 64 & 128 (C 64 mode): A printer's error introduced two splotches into line 590 that resemble a quotation mark. Here's that line again:

```
590 PRINT:PRINT:PRINT TAB(4);"DO YOU WANT TO ..."
```

SOLUTION TO *PLUMBER'S BLUES*

There are only four establishments in need of extra water: the greenhouse, the aquarium, the laundromat, and the Veterans' Club (to fill the indoor swimming pool mentioned in the introduction). The outdoor ice-skating rink is on a natural lake and thus does not need extra water; the outdoor public swimming pool is not in use in freezing weather; and the car wash is out of business.

All values should remain closed, except for those at the following five intersections: Puddle Place and Water Street; Milldew Lane and Water Street; Damp Drive and Main Street; Waterloo Road and Water Street; and Waterloo Road and Drip Street.

TIPS TO THE TYPIST

Typing in FAMILY COMPUTING's programs is a great way to become familiar with your computer and get some free software "to boot." But it's frustrating to type in a long program only to find it doesn't work as it should. When this happens, simple typing errors are most often the cause. So to help you gain greatest value from the time you spend computing with us, we've put together some tips on how to avoid typing errors—and what to do if a program doesn't run right. Read them carefully and you'll be up and running in no time!

SOME GENERAL RULES

1. Do read instructions and program headings carefully. Make sure your computer has enough memory, the right version of BASIC, and the appropriate peripherals (joysticks, printers, disk drives, etc.) for a program.

2. Don't let fatigue and boredom contribute to inaccuracy. If you're new to programming, try typing in shorter programs first. Type in a longer program in easy stages, SAVEing each installment as you go.

3. Until you are fairly familiar with BASIC, **do** assume that every word, number, letter, space, and punctuation mark in a program listing must be copied accurately if the program is to function as intended.

4. Do watch out for potential trouble spots. About 90 percent of all typing errors occur in DATA statements: long lines filled with numbers or incomprehensible secret codes. If possible, have someone else read DATA to you as you type, and help you proofread it if you have trouble later on. Proofreading from a printout is best.

5. Do be aware that program listings printed in FAMILY COMPUTING sometimes differ from what you will see on your computer's screen or in printouts you produce at home. Our program listings are printed 54 characters wide. Thus, a single BASIC program "line" (sometimes called a "logical line") may appear as several lines in our listing. If you are typing along and reach the right margin of the printed listing, don't press RETURN or ENTER until you've checked to see if the program "line" you're typing really ends there. The way to tell is to check if the line following begins with a multiple of 10 that follows in sequence from the previous logical line. REM statements are the exception and typing them in is optional.

Several computers (ADAM, Apple, Atari, and TI) format BASIC programs according to unique rules of their own. Don't let this throw you—just type in the listing exactly as printed in the magazine and your computer is guaranteed to accept it, even though it may end up looking a little different on your screen.

6. One foolproof way to correct an error in a BASIC program line is to type the line in again from the beginning, and press RETURN or ENTER to set it in place of the old one in your computer's memory.

WHICH PROGRAMS WILL RUN ON MY COMPUTER?
Unless a program heading indicates otherwise, programs will run on any version of the computer specified, with the following exceptions:

- Apple programs run under Applesoft (*not* Integer) BASIC on the Apple II (with language card), II plus, IIe, and IIc.
- IBM compatibility of BASIC programs is determined by both the hardware and the version of BASIC used. Our programs for IBM PC & compatibles are composed on IBM PC & PC*jr*s, and tested under most versions of BASIC available for these machines. They are then tested on a variety of IBM-compatible machines under the versions of BASIC supplied with them. Each "IBM PC & compatibles" program listing is supplemented by a rundown of the machines and versions of BASIC under which the program is guaranteed to work. Most programs will probably run on many other PC Compatibles and under other versions of BASIC.
- TI programs not marked "w/TI Extended BASIC" should be run under standard (console) TI BASIC.

DEBUGGING HINTS

Sometimes even the most careful typist makes a mistake. Don't expect your program to run right off the bat. If you have problems, remain patient and follow these general instructions for a probable quick fix.

1. Write down any error messages you receive.

2. If necessary, look these up in your manual, and check the indicated lines for simple mistakes. Also check related lines (see No. 4, below), such as the DATA statements corresponding to a READ routine. Correct all the problems you can find, and SAVE a corrected copy of the program before typing RUN again. If you're lucky, all systems will be GO; if not . . . .

3. LIST the program in screen-size chunks (check your manual for instructions on how to LIST parts of a program). Even better, if you have a printer, get a printout. Compare what you've typed in—letter by letter—to the published program. Make sure that you haven't typed the numeral 0 (which is slashed in our listings) for the letter O (which isn't), swapped a small letter "l" for the numeral one, dropped or mixed up some punctuation, switched uppercase text for lowercase, or vice versa (particularly in DATA statements or within quotes), or miscounted the characters (and/or spaces) between a pair of quotes. Get someone to help you if possible.

4. Check your DATA statements—then check them again. Mistakes in DATA statements are the single most common cause of program failures. Bad data can cause a program to malfunction at any point, which can be misleading. If you can't find your error in the lines the computer specifies, check your DATA statements line by line, letter by letter, comma by comma. Then have someone else check it for you.

5. If all else fails, turn off your computer and relax. Then try again the next day—exhausted proofreaders are careless proofreaders.

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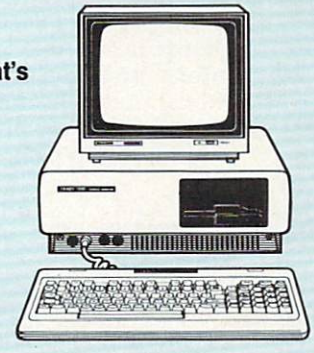

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FOX AND GEESE

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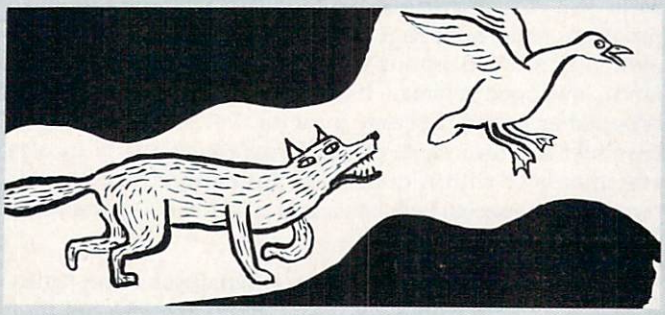


Fox and Geese is an intriguing two-player game of skill and wit that has been popular for centuries. Last month, we featured *Fox and Geese* for Apple II series computers. This month, we offer a version for the IBM PC and compatibles.

For your convenience, the instructions for playing *Fox and Geese* that originally appeared in our March issue are reprinted below.

HOW TO PLAY

Play begins with 17 geese and one fox poised for combat on a cross-shaped board (*see illustration*). The object of the game—for the geese—is to surround the fox so he can't move. The fox, on the other hand, must try to gobble up so many geese that capture is impossible.

Because he's grievously outnumbered, the fox traditionally moves first. He may move to an unoccupied square in one of eight directions: up, down, left, right, or along a diagonal—one square at a time. Similarly, a goose may move one square per turn up, left, right, or diagonally (a total of five directions), but may not move down the board.

If the fox maneuvers to a square adjacent to a goose, he may jump over the goose and remove it from the board, *if* (as in checkers) the square beyond is unoccupied. If another goose is resting in the square he wishes to jump to, the fox is blocked. The fox is under no obligation to jump simply because an opportunity presents itself. Double (and triple, etc.) jumps are also permitted, though not obligatory. The fox must declare a multiple jump before moving.

PLAYING ON THE COMPUTER

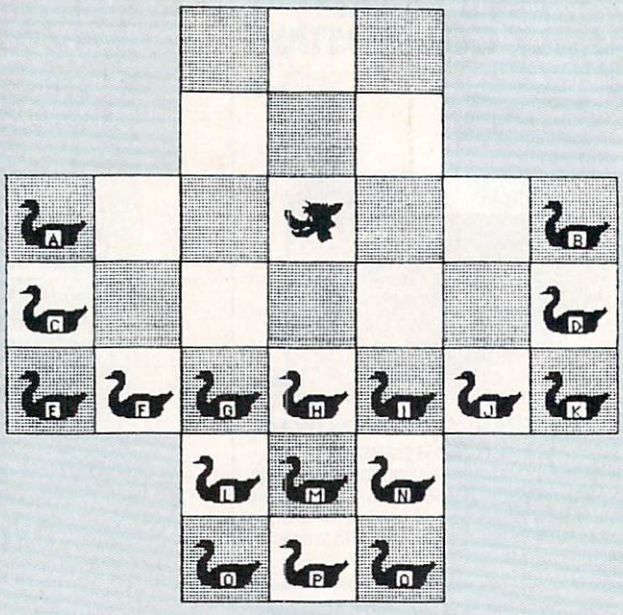
The computerized version of Fox and Geese is easy to play. The computer will tell you whose turn it is to move, and will permit only legal moves. The fox, as tradition dictates, moves first. The computer will display a set of arrows on the right side of the screen that show the directions the fox may move. Blocked directions will be labeled, though opportunities for jumping will be shown only as arrows. The fox player may move or initiate a jump by pressing the number key (1 through 8) corresponding to the direction desired.

Jumps will be made (and "jumped" pieces removed from the board) automatically—just indicate the direction. Multiple jumps, however, as stated earlier, must be declared before the first jump. Just press the D key before indicating a direction, and the computer will permit the fox to jump until he can't (or chooses not to) jump any further. After each jump in a declared series, if the computer finds another jump is possible, it will ask the fox player if he or she wishes to continue jumping.

When it's the geese's turn, the geese player first will be asked to indicate which goose he or she wants to move. Geese are labeled with letters A through Q. When the player presses the appropriate letter key, the goose he or she has selected will begin to flash, and a set of numbered arrows will be displayed on the right side of the screen that indicate moves the piece can make. Again, blocked directions will be labeled. To move, simply press the number key (1 through 5) corresponding to the direction desired.

If the player selects a goose but hasn't moved it yet, and decides to move another, the selection may be withdrawn by pressing the 6 key (for "redo"). Thereafter, another goose may be selected and moved.

After each turn, the computer scans the board to determine if the game is over. The fox wins if fewer than six geese remain (a minimum of six geese are required to trap the fox); if it's the flock's turn, but no goose can move; or if all geese are *above* the fox (since geese can't move downward, trapping a sane fox in this situation is impossible). The geese win if (and only if) it's the fox's turn and he can't move.



IBM PC & compatibles/*Fox and Geese*

This program has been tested and found to work on the following computers and hardware configurations, using the BASICs shown: IBM PC w/Color/Graphics Monitor Adapter, w/Advanced BASIC A2.00 (BASICA); IBM PCjr w/Cartridge BASIC J1.00; Tandy 1000 w/GW-BASIC 2.02 version 00.05.00 or 01.01.00.

```
10 KEY OFF:SCREEN 1,0:COLOR 0,1:LOCATE ,,0
20 DIM B$(7,7),AR$(8),GS(72),FX(72),SQ1(98),SQ2(98)
30 DIM BK(72),AL(8),G(17,4)
40 BK$=STRING$(39,32):GS$="":FX$="":FF=0
50 DEF FN DX(DR)=(DR=4 OR DR=5 OR DR=6)-(DR=1 OR DR=2
OR DR=8)
```

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```
60 DEF FN DY(DR)=(DR=2 OR DR=3 OR DR=4)-(DR=6 OR DR=7
OR DR=8)
70 DEF FN LGL(DX,DY)=(DY>2 AND DY<6 AND (DX=1 OR DX=2
OR DX=6 OR DX=7)) OR (DY>0 AND DY<8 AND DX>2 AND DX<6)
80 DEF FN THERE(DX,DY)=(B$(DX,DY)<>"")
90 DEF FN DARK(DX,DY)=(DX MOD 2=0 AND DY MOD 2=0) OR (
DX MOD 2=1 AND DY MOD 2=1)
100 DEF FN DIRS(DL)=8+3*(DL=-1)
110 DEF FN X(DX)=-23+32*DX
120 DEF FN Y(DX)=-19+24*DX
130 DEF FN CB(DR)=X+FN DX(DR)
140 DEF FN RB(DR)=Y+FN DY(DR)
150 DEF FN CB2(DR)=X+2*FN DX(DR)
160 DEF FN RB2(DR)=Y+2*FN DY(DR)
170 DEF FN UC$(D$)=CHR$(ASC(D$)+32*(ASC(D$)>96))
180 FOR I=1 TO 17:READ G(I,3),G(I,4):NEXT I
190 FOR I=1 TO 3:READ T$:GS$=GS$+T$:NEXT I
200 FOR I=1 TO 6:READ T$:FX$=FX$+T$:NEXT I
210 FOR I=1 TO 8:READ AR$(I):NEXT I
220 READ MS$:MS$="MF03T114L4"+MS$+"GD"+MS$+"G2P16"
230 CLS
240 FOR Y=80 TO 103
250 FOR X=112 TO 142 STEP 2
260 PSET(X+Y MOD 2,Y),2
270 NEXT X
280 FOR X=184 TO 214 STEP 3
290 PSET(X+2*(Y MOD 2),Y),1
300 PSET(X+Y MOD 2,Y),3
310 NEXT X:NEXT Y
320 GET(112,80)-(143,103),SQ1
330 GET(184,80)-(215,103),SQ2
340 GET(1,1)-(28,20),BK
350 LOCATE 12,20:PRINT "and"
360 PUT(114,82),BK,PSET
370 DRAW LEFT$(FX$,164)
380 PAINT (130,93):PAINT (119,92):PAINT (123,98)
390 DRAW RIGHT$(FX$,38)
400 GET(114,82)-(141,101),FX
410 PUT(186,82),BK,PSET
420 DRAW GS$
430 PAINT (200,96)
440 GET(186,82)-(213,101),GS
450 PLAY MS$
460 FOR I=1 TO 7:FOR J=1 TO 7
470 B$(I,J)="":NEXT J:NEXT I
480 FOR I=1 TO 17
490 G(I,1)=G(I,3):G(I,2)=G(I,4)
500 B$(G(I,1),G(I,2))=CHR$(I+96)
510 NEXT I
520 FCOL=4:FROW=3:B$(FCOL,FROW)="FOX":GS=17:DC=0
530 CLS
539 REM --DRAW GAME BOARD, FOX, AND GEESE--
540 FOR I=1 TO 7:FOR J=1 TO 7
550 IF NOT FN LGL(J,I) THEN 580
560 PX=FN X(J)-2:PY=FN Y(I)-2
570 IF FN DARK(J,I) THEN PUT(PX,PY),SQ2,PSET ELSE PUT(
PX,PY),SQ1,PSET
580 NEXT J:NEXT I
590 PUT(FN X(FCOL),FN Y(FROW)),FX,PSET
600 FOR I=1 TO 17
610 PUT(FN X(G(I,1)),FN Y(G(I,2))),GS,PSET
620 LOCATE 3*G(I,2),4*G(I,1):PRINT B$(G(I,1),G(I,2))
630 NEXT I
639 REM --FOX'S TURN--
640 PL=0:X=FCOL:Y=FROW
650 PX=FN X(X):PY=FN Y(Y)
660 GOSUB 8000
670 IF NL=0 THEN 1860
680 IF DC=0 THEN 800
690 IF NJ>0 THEN 740
700 DC=0
710 LOCATE 23,1:PRINT BK$;
720 LOCATE 23,1:PRINT "No more jumps.":BEEP:BEEP
730 GOSUB 5000:GOTO 1330
740 LOCATE 23,1:PRINT BK$;
750 LOCATE 23,1:PRINT "Will you jump again?":BEEP:BEEP
760 K$=INKEY$:IF K$="" GOTO 760
770 IF K$="Y" OR K$="y" THEN 800
780 IF K$<>"N" AND K$<>"n" THEN 760
790 DC=0:GOTO 1310
800 IF FF THEN FF=0 ELSE GOSUB 9000
809 REM --GET DIRECTION OF FOX'S MOVE--
810 LOCATE 23,1:PRINT BK$;
820 LOCATE 23,1:PRINT "Fox's direction?";:BEEP
830 PUT(PX,PY),BK,PSET
840 GOSUB 7000:IF K$<>"" THEN 880
850 PUT(PX,PY),FX,PSET
860 GOSUB 7000
870 IF K$="" THEN 830
880 K$=FN UC$(K$)
890 PUT(PX,PY),FX,PSET
900 PRINT K$;
910 IF K$<>"D" THEN MV=VAL(K$):GOTO 960
919 REM --PROCESS MULTIPLE JUMP DECLARATION--
920 IF DC<>0 OR NJ=0 THEN 810 ELSE DC=1
930 LOCATE 23,1:PRINT BK$;
940 LOCATE 23,1:PRINT "Multiple jump declared.":BEEP:B
EEP
950 GOSUB 5000:GOTO 810
960 IF AL(MV)<>0 THEN 990
969 REM --PROCESS ILLEGAL MOVE--
970 LOCATE 23,1:PRINT "Sorry ... that move is blocked.
":BEEP:BEEP
980 GOSUB 5000:GOTO 810
990 IF AL(MV)=-2 OR DC=0 THEN 1140
1000 IF DC=1 THEN 1080
1010 LOCATE 23,1:PRINT BK$;
1020 LOCATE 23,1:PRINT "Sorry ... having declared, you
"
1030 PRINT "can only jump.";:BEEP:BEEP
1040 FF=-1
1050 GOSUB 5000
1060 LOCATE 24,1:PRINT BK$;
1070 GOTO 740
1080 LOCATE 23,1:PRINT "That's not a jump!"
1090 PRINT "You forfeit your declaration.";:BEEP:BEEP
1100 DC=0
1110 GOSUB 5000
1120 LOCATE 23,1:PRINT BK$;
1130 LOCATE 24,1:PRINT BK$;
1139 REM --MOVE THE FOX--
1140 IF FN DARK(X,Y) THEN PUT(PX-2,PY-2),SQ2,PSET ELSE
 PUT(PX-2,PY-2),SQ1,PSET
1150 B$(X,Y)=""
1160 X=FN CB(MV):Y=FN RB(MV)
1170 PX=FN X(X):PY=FN Y(Y)
1180 IF NOT FN THERE(X,Y) THEN 1240
1190 GS=GS-1
1200 QP=ASC(B$(X,Y))-96:G(QP,1)=0:B$(X,Y)=""
1210 IF FN DARK(X,Y) THEN PUT(PX-2,PY-2),SQ2,PSET ELSE
 PUT(PX-2,PY-2),SQ1,PSET
1220 X=FN CB(MV):Y=FN RB(MV)
1230 PX=FN X(X):PY=FN Y(Y)
1240 PUT(PX,PY),BK,PSET
1250 PUT(PX,PY),FX,PSET
1260 B$(X,Y)="FOX"
1270 FCOL=X:FROW=Y
1280 IF GS<6 THEN 1890
1290 GOSUB 4000
1300 IF NB=0 THEN 1920
1310 GOSUB 3000
1320 IF DC<>0 THEN DC=DC+1:GOTO 660
1329 REM --GEESE'S TURN--
1330 PL=-1
1340 GOSUB 6000
1350 IF NL=0 THEN 1950
1360 LOCATE 23,1:PRINT BK$;
1369 REM --DETERMINE WHICH GOOSE PLAYER WANTS TO MOVE-
-
1370 LOCATE 23,1:PRINT "Which goose do you want to mov
e?";:BEEP
1380 K$=INKEY$:IF K$="" THEN 1380
1390 K$=FN UC$(K$)
1400 IF K$<"A" OR K$>"Q" THEN 1380
1410 PRINT K$
1420 GP=ASC(K$)-64
```

GAME PROGRAM

```
1430 IF G(GP,1)<>0 THEN 1470
1440 LOCATE 23,1:PRINT BK$;
1450 LOCATE 23,1:PRINT "Sorry ... that goose is cooked
!":BEEP:BEEP
1460 GOSUB 5000:GOTO 1360
1470 X=G(GP,1):Y=G(GP,2)
1480 GOSUB 8000
1490 IF NL<>0 THEN 1530
1500 LOCATE 23,1:PRINT BK$;
1510 LOCATE 23,1:PRINT "Sorry ... that goose is trappe
d.":BEEP:BEEP
1520 GOSUB 5000:GOTO 1360
1530 GOSUB 9000
1540 LOCATE 23,1:PRINT BK$;
1549 REM --GET DIRECTION OF GOOSE'S MOVE--
1550 LOCATE 23,1:PRINT "Goose's direction?";:BEEP
1560 K$="":PX=FN X(X):PY=FN Y(Y)
1570 PUT(PX,PY),BK,PSET
1580 GOSUB 7000:IF K$<>"" THEN 1620
1590 PUT(PX,PY),GS,PSET
1600 LOCATE Y*3,X*4:PRINT B$(X,Y)
1610 GOSUB 7000
1620 IF K$="" THEN 1570
1630 PUT(PX,PY),GS,PSET
1640 LOCATE Y*3,X*4:PRINT B$(X,Y)
1650 K$=FN UC$(K$)
1660 MV=VAL(K$)
1670 IF MV=6 THEN GOSUB 3000:GOTO 1360
1680 IF AL(MV)<>0 THEN 1730
1689 REM --PROCESS ILLEGAL MOVE--
1690 LOCATE 23,1:PRINT BK$;
1700 LOCATE 23,1:PRINT "Sorry ... that move is blocked
.":BEEP:BEEP
1710 GOSUB 5000
1720 GOTO 1540
1729 REM --MOVE THE GOOSE--
1730 OG$=B$(X,Y):B$(X,Y)=""
1740 IF FN DARK(X,Y) THEN PUT(PX-2,PY-2),SQ2,PSET ELSE
 PUT(PX-2,PY-2),SQ1,PSET
1750 X=FN CB(MV):Y=FN RB(MV)
1760 PX=FN X(X):PY=FN Y(Y)
1770 PUT(PX,PY),GS,PSET
1780 LOCATE Y*3,X*4:PRINT OG$
1790 B$(X,Y)=OG$
1800 G(GP,1)=X:G(GP,2)=Y
1810 GOSUB 3000:GOSUB 4000
1820 IF NB=0 THEN 1920
1830 GOSUB 6000
1840 IF NL=0 THEN 1950
1850 GOTO 640
1859 REM --CONCLUSION OF GAME--
1860 LOCATE 23,1:PRINT BK$;
1870 LOCATE 23,1:PRINT "The fox is trapped! The geese
have won!";
1880 GOTO 1980
1890 LOCATE 23,1:PRINT BK$;
1900 LOCATE 23,2:PRINT "Too few geese remain to trap t
he fox!"
1910 GOTO 1970
1920 LOCATE 23,1:PRINT BK$;
1930 LOCATE 23,6:PRINT "All geese are above the fox!"
1940 GOTO 1970
1950 LOCATE 23,1:PRINT BK$;
1960 LOCATE 23,10:PRINT "No goose can move!"
1970 LOCATE 24,11:PRINT "The fox has won!";
1980 PLAY MS$
1990 LOCATE 23,1:PRINT BK$;
2000 LOCATE 24,1:PRINT BK$;
2010 LOCATE 23,4:INPUT "Would you like to play again";
PA$
2020 IF LEFT$(PA$,1)="Y" OR LEFT$(PA$,1)="y" THEN 460
2030 IF LEFT$(PA$,1)<>"N" AND LEFT$(PA$,1)<>"n" THEN 1
990
2040 CLS:END
3000 FOR I=3 TO 19
3010 LOCATE I,31:PRINT LEFT$(BK$,9);
3020 NEXT I:RETURN
4000 NB=0
```


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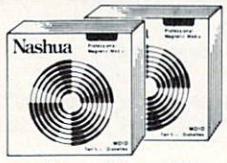

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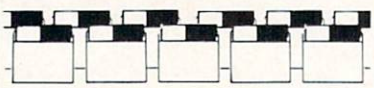

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```
4010 FOR I=1 TO 17
4020 IF G(I,2)>=FROW THEN NB=NB+1:I=17
4030 NEXT I:RETURN
5000 FOR DE=1 TO 1000:NEXT DE:RETURN
6000 TF=-1
6010 LOCATE 23,1:PRINT BL$
6020 LOCATE 23,1:PRINT "Please wait ... scanning board
."
6030 FOR I=1 TO 17
6040 IF G(I,1)<>0 THEN X=G(I,1):Y=G(I,2):GOSUB 8000:IF
 NL<>0 THEN I=17
6050 NEXT I:TF=0:RETURN
7000 FOR DE=1 TO 10
7010 K$=INKEY$:V=VAL(K$)
7020 IF (V>0 AND V<=FN DIRS(PL)-PL) OR ((K$="D" OR K$=
"d") AND NOT PL) THEN DE=10:GOTO 7040
7030 K$=""
7040 NEXT DE:RETURN
8000 NL=0:NJ=0:IF NOT TF THEN LM=FN DIRS(PL) ELSE LM=5
8010 FOR J=1 TO LM:AL(J)=0
8020 IF NOT FN LGL(FN CB(J),FN RB(J)) THEN 8070
8030 AL(J)=NOT FN THERE(FN CB(J),FN RB(J)):IF TF THEN
8060
8040 IF AL(J) OR PL OR NOT FN LGL(FN CB2(J),FN RB2(J))
 THEN 8060
8050 AL(J)=2*(FN THERE(FN CB(J),FN RB(J)) AND NOT FN T
HERE(FN CB2(J),FN RB2(J)))
8060 IF AL(J) THEN NL=NL+1:IF AL(J)=-2 THEN NJ=NJ+1
8070 NEXT J:RETURN
9000 LM=FN DIRS(PL)
9010 FOR I=1 TO LM
9020 LOCATE I*2+2,31
9030 PRINT USING "#:";I
9040 IF AL(I)=0 THEN LOCATE I*2+2,33:PRINT "Blocked":G
OTO 9060
9050 DRAW AR$(I)
9060 NEXT I
9070 IF PL THEN LOCATE 14,31:PRINT "6:Redo"
9080 RETURN
```

```
10000 DATA 1,3,7,3,1,4,7,4,1,5,7,5,2,5,3,5,4
10010 DATA 5,5,5,6,5,3,6,4,6,5,6,3,7,4,7,5,7
10020 DATA "C3BM189,86E1R1E2R2F2D3G1D1G3F1E1R1"
10030 DATA "E1R1E1R1E1R3F1R3F1R3U1L1E1G1F1G1D1"
10040 DATA "G2D3L19H1L1U1H1U2E1U1E5U1L5"
10050 DATA "BM116,91R1E1F1R1F2R3E1U2L2U1H1U1H1"
10060 DATA "E2R2E1R2F1E1F3R2E1R2D1G3F3G1L1G1L1D"
10070 DATA "2F1D3L5E1H2L4G2L5U1F1E1U1F1E1R2U1R2"
10080 DATA "U2L4D1H1G1H1L1G1U1H1L1U2"
10090 DATA "BM127,87C0D5R1U3"
10100 DATA "BM115,89C2F1R1U2L1D1C3"
10110 DATA "BM276,27H3D7E3H2D3E1L8U1R5"
10120 DATA "BM271,39R5D5H4R3G8R1E7D1L3G5"
10130 DATA "BM271,54G3R7H3G2R3H1D8L1U5"
10140 DATA "BM267,76U5R5G4U3F8U1H7R1D3F5"
10150 DATA "BM267,91E3D7H3E2D3H1R8U1L5"
10160 DATA "BM267,106D5R5H4D3E8D1G7R1U3E5"
10170 DATA "BM272,128E3L7F3E2L3F1U8R1D5"
10180 DATA "BM271,144R5U5G4R3H8R1F7U1L3H5"
10190 DATA "G.A8BBA8G8A8B8"
```

COMPUTERS WE COVER

We regularly present two or more programs in each issue for the Apple II series; Atari 400/800, 600/800XL, & 130XE; Commodore 64 and 128 (in C 64 mode); IBM PC and compatibles; Macintosh; and Tandy Models III/4 and Color Computer. However, occasionally we have to omit versions when a program requires capabilities that some of these computers lack. For example, we usually won't run a Tandy Model III or 4 version of a program featuring sound and/or color graphics. And many Microtones programs can only run on computers that have three voices, which eliminates the Apple II series; IBM PC and compatibles (except the PC*jr* with Cartridge BASIC and the Tandy 1000); and Tandy Models III, 4, and Color Computer.

In addition, we publish at least one program each issue for the Adam, TI-99/4A, and VIC-20. In the future, we also hope to cover the Atari 520ST and the Amiga. This month, these programs can be found here in The Programmer and in Microtones (in the K-POWER section of FAMILY COMPUTING).

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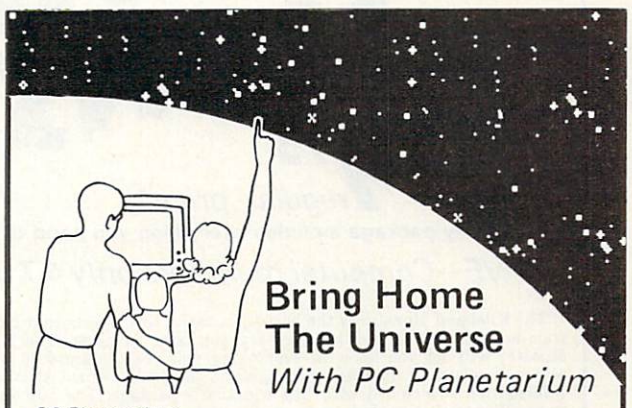

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About the Author: *Marilyn Davis (Ph.D., UCSD, Radio Astronomy) is also the author of the widely acclaimed BASIC Primer, published by IBM.*

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CIRCLE READER SERVICE 21

WHAT IS THIS GIRL DOING?

THE			GIRL				IS	
TH	AX	PAS	GG3	ER2	LL	PAS	IH	SS
29	15	04	34	52	45	04	12	55

			FEEDING					
PAS	FF	IY	PA3	DD2	IH	NG	PAS	BB1
04	40	19	02	33	12	44	04	28

		BREAD				TO	
RR1	EH	EH	PA1	DD1	PAS	TT2	UW2
14	07	07	00	21	04	13	31

	A			DUCK		
PAS	EY	PAS	DD2	AA	KK2	PAS
04	20	04	33	24	41	04

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This Month!!

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MICROTONES, page 73
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CONTEST, page 75

K-POWER®
FOR THE COMPUTER GENERATION

Edited by Anne Krueger

MUSIC PROGRAM! Check Out Page 73 Turkey in the Straw

The Official Special Ks' Guide to

Hacker Snacks

The "right" snack is to the hacker what the "in" shoe is to the jock. Since we want only the best for our readers, we've spent many a fun-filled afternoon here at K-POWER *sampling various tried-and-true hacker foods, some of which are the most convenient forms of sustenance ever devised by humanity. We discovered which foods are best to throw when you've just lost the third man in a row during your record-breaking game of* Rescue Raiders*; which are the best to throw at opponents for tactical advantage during land auctions in* M.U.L.E.*; and many other interesting tidbits. Herewith, our impressions of various munchies and beverages.*

—SPECIAL Ks

CHIPS

Like a fine wine, they need to have the right bouquet, texture, color, and taste.

Doritos (nacho-cheese-flavored corn chips)—"Pretty good—a 7½ out of 10," Alex remarks. "Too corny," says Damon.

Lay's Sour Cream and Onion Potato Chips—"Blech," Alex postulates. "Too sour, too creamy, too oniony," Damon says.

O'Gradys Au-Gratin—This cheddar-cheese-flavored potato chip is one of the best on the market. The aroma alone is enough to excite a true hacker's taste buds. The chips are thick, ridged, aesthetically colored (although artificially), and crunchy. David comments, "Any person who doesn't have orange cheesy powder on his or her hands is clearly not a *real* hacker."

Wise Potato Chips—"No ridges for easy gripping, and they crumble under the slightest stress. Not recommended," opines David.

MISCELLANEOUS MUNCHABLES

Other edibles to stimulate a hacker's discriminating palate.

Archway Apple-Filled Oatmeal Cookies—"Intriguingly chewy and surprisingly good for a quasi-natural substance. They taste best while watching your strategy fall to pieces in *Ancient Art of War*," muses David.

Chee-tos Cheese-Flavored Snacks—"Possibly the most bizarre-looking snacks known to humanity. They have too many ingredients, but they're addictive," Alex admits between munches. "Too cheesy," says Damon.

Entenmann's Chocolate Chip Cookies—"Five stars, thumbs up, 10 out of 10, A+—what more can we say?" Alex and David spout.

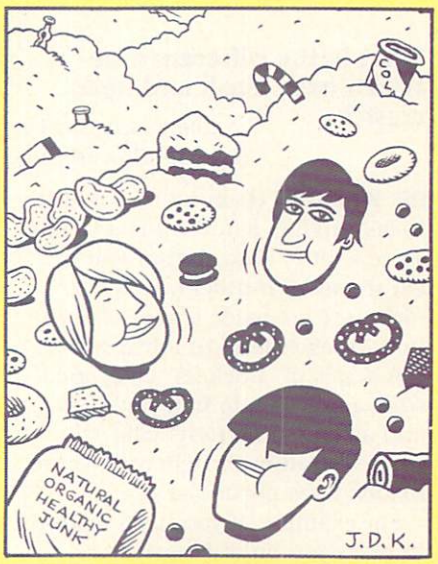
Fruit Roll-Ups—"Probably the most profound usage of this fantastically annoying product would be as upholstery for the interior of your car," Alex declares.

Hostess Powdered Donuts—"Their relatively good taste is offset by the fact that when you're finished eating them, you and the computer are covered in a fine white mist," Alex gripes. "Too powdery," says Damon.

Magic Mommy Brownies—"Dry, crumbly, not enough ingredients, and people make fun of you for eating something with a name like 'Magic Mommy,' " Alex contends. "Too brown . . . too magic," says you-know-who.

Quinlan Tiny Thin Pretzels—"Okay taste, but they're best for throwing in the air and catching in your mouth while the disk is accessing," David observes. "Too tiny, too thin," Damon says.

Ring Ding Jrs.—"Self-contained classics. They also make a pleasant thud when hurled against a wall in frustration," David notes.



WARNING: The Special Ks have determined that snacking at the computer can be dangerous to its health.

BEVERAGES

Of course, the dedicated hacker needs something to wash it all down.

Colas—"Great for rotting teeth and corroding keyboards; the standard hacker drink," verbalizes Alex.

Iced tea—"Great for tropical computing," David theorizes.

Orange juice—"Sweet and tangy, the only health drink a hacker should be caught with," cries David. "Too orange," Damon says.

Egg nog—"I like it!" Damon says cheerfully, lightheartedly, jauntily, and (during December) seasonally!

ILLUSTRATION BY J.D. KING

DOCTOR KURSOR'S KLINIC

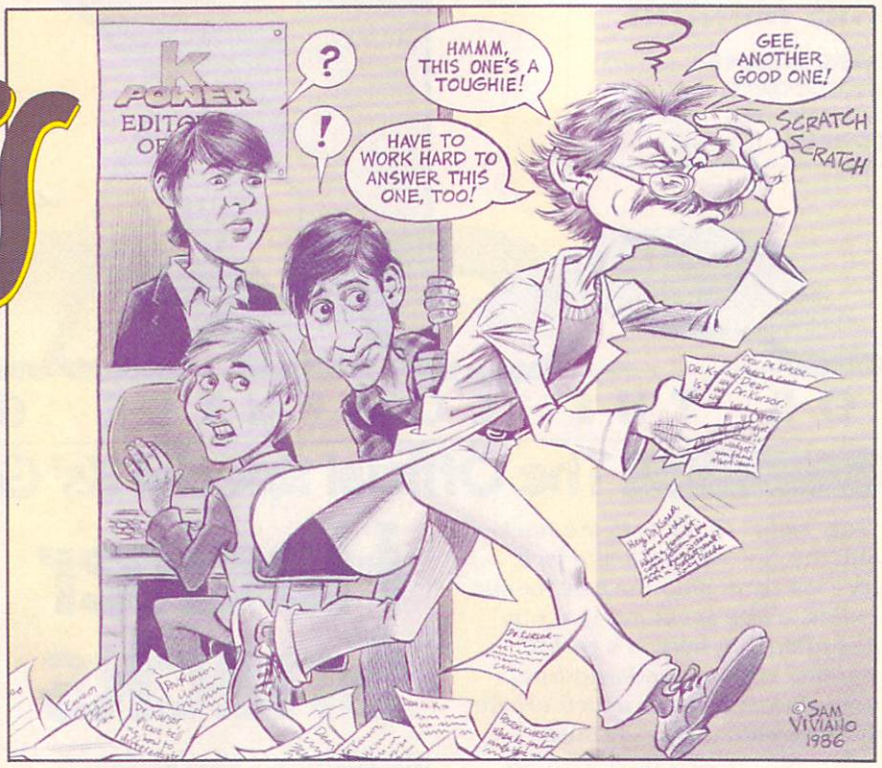


ILLUSTRATION BY SAM VIVIANO

STUMP DR. KURSOR CONTEST WINNERS

Dr. Kursor's been wandering around the K-POWER offices in a daze, scratching his head and mumbling to himself, ever since we asked you last November for your toughest technical questions. Here are two of the hardest, along with Dr. K's answers. Their authors each won $25.

How many "K" do military computers have?

AARON COOK, *13, Ephrata, Washington*

DR. KURSOR: The military uses computers of all sizes, from tiny microchips to huge supercomputers. The largest computers are probably so top secret that not even *I* know about them. I can tell you about the Naval Research Laboratory's gargantuan system, though. It's a CRAY X-MP with 16 million bytes (16,000K) of RAM and eight *gigabytes* (that's eight *billion* bytes or eight million K) of disk storage. And they plan on more than doubling the total memory of the system this year!

This system is so big that it needs its own computers! It has three front-end VAX 11/785 computers from Digital Equipment Corp. to act as traffic cops. Each one has eight megabytes of RAM, and together they have access to 4.2 gigabytes of disk storage. Then there's a processor used exclusively for input/output with eight megabytes of RAM. Besides all this, there are 40 VAXs scattered around the lab that can communicate with the CRAY.

The biggest computers I know of are the Control Data CYBER 205s. These monsters can take 1.6 terabytes of RAM (that's 1.6 *trillion* bytes!) And you can hook up 112 hard-disk drives to a 205, each holding 60 megabytes, for a total of 6.7 gigabytes of disk storage. If you want to talk speed, there's a computer that's even faster than the CYBER. The Amdahl 1400 goes at 1.4 giga-FLOPs (billion floating-point operations per second), leaving my old Atari 800 (about 50,000 FLOPs) eating its dust.

What is the difference between hash clash and head crash?

ROBBY DEBLAEY, *13, Rapids City, Illinois*

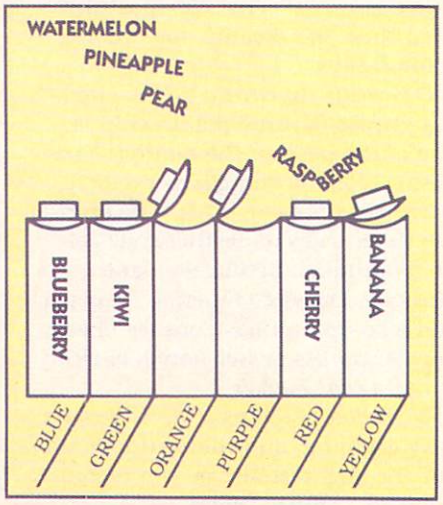
DR. KURSOR: "Hashing" (no relation to last night's leftovers) is a way to store a lot of data so that you can get to any of it quickly without having to set aside a special location for each item in advance.

A series of "buckets" (*see opposite*) are set up to hold the data, and a "hash function" tells you where to put each item and where to look for a particular one.

For example, if you need to store information on different fruits, each bucket can stand for a different color. So "cherry" would go in the "red" bucket, and you'd look for "banana" in the "yellow" bucket.

But suppose you then had to store "raspberry." Your hash function would tell you to put it in the "red" bucket . . . but you already have "cherry" there! That's what you call a "hash clash." (There are several ways to solve the problem.)

"Head crash" has to do with the way a hard-disk drive works. The read–write head normally floats just above the surface of the disk. But sometimes the head may "crash" into (touch) the disk surface (when the power suddenly goes off, for example). That's a "head crash" . . . and it's a good way to lose all or part of the data on your disk.



Need an answer to a hi-tech question?

Send your questions to Dr. Kursor's Klinic, c/o K-POWER, 730 Broadway, New York, NY 10003.

STRATEGY

TIPS, TRICKS, AND HINTS

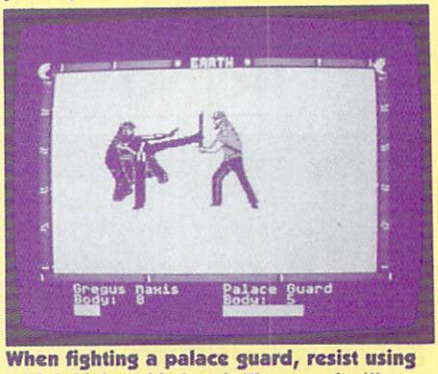
Moebius: The Orb of Celestial Harmony

Origin Systems. Role-playing adventure. Your mission: Traverse the four planes (Earth, Water, Air, and Fire) in search of the evil warlord who stole the Orb of Celestial Harmony. Before you can kill the warlord and recover the Orb, you'll face an army of rebel guards and evil assassins, whom you must defeat or bypass using sword, fist, shuriken (a Japanese throwing weapon), and magic (hints and game for Apple).

Fighting palace guards and assassins: If you wait for them to make the first move, guards and assassins use the same strategy. They attack you with a flurry of blows, then retreat, rest, and attack again. As one approaches, use a low kick or sword blow to knock him back. Repeat this until you have finished him off. If your opponent gets in close and starts attacking, hold down the space bar (parry) if you have a repeating keyboard, or hit it repeatedly if you don't. Wait for him to retreat, and then attack when he comes at you again. Note: Although head blows do more damage, your opponent will usually block them and be able to strike you. We have also found that bare-handed combat is the most effective, unless your sword is blessed.

Fighting evil monks: As soon as you see a monk, put your sword away. (In areas of heavy vegetation where visibility is limited, you should "L"isten often and make sure you hear no sinister chanting. If you do, be prepared.) If you fight a monk in a shrine, keep him at bay by continuously hurling fireballs. Then slowly approach him, making sure you're not in direct line of fire. If one of your fireballs hits the mark, pounce on the monk while he's still stunned. High and middle kicks work well when fighting a monk, but be certain you start the kick while he's still approaching. Since parrying isn't very effective against monks, you'd be better off punching when he's close.

Moebius the Windwalker will watch you set out on your quest for the Orb. He will grant you three resurrections during your journey.



When fighting a palace guard, resist using a high kick to his head. The guard will likely block it and then attack you.

You can use "M"agic to "E"xamine your stock of components. Be sure you have panda hair to cast the spirit spell.

We need a few good hints! Help K-POWER readers be all that they can be by sending us hints for your favorite games. We have all the *Zork* and *Ultima III* hints we can handle, but we'll gladly publish and pay $10 for hints we've not heard of. Send them to Hint Hotline, c/o K-POWER, 730 Broadway, New York, NY 10003. Hints will not be considered for publication unless accompanied by full name (no aliases, please), address, telephone number, and date of birth. Stumped gamers can send in their questions to the same address.

After walking through a door, shut it. That way, if a guard stuns you, he'll be confined to a limited area, since guards can't open doors.

A guard can only steal from you once. Unless you kill that guard, no other guard can steal from you, either. So if one steals from you but you haven't lost much, it's usually not worth going after him.

The best places to take soil samples are either near a good water supply or near the entrance to a shrine. If you take one near a shrine, you'll easily be able to meet a good monk there without having to fight the guards blocking your way.

The spirit spell is one of the most useful. It lets you go anywhere on the map you want to without having to fight. Plus, you can always go to a cistern and your mind will be restored, enabling you to keep the spell going that much longer.

When on the planes of Earth and Water, make sure you get as many spell components as possible. Take time to get panda hair, since you'll need it often to cast the spirit spell.

Take advantage of a blessed sword and cut down all the vegetation you can so, in case you lose the blessing, you will be able to travel on land more easily.

On the plane of Air, go into spirit form and, when night falls, wait for the demon to appear. Follow him around until he assumes minstrel form and then "S"top the spell. "C"ommunicate with him and get the charm (make sure you have the amulet on). You can do the same thing with the condor: when night falls, follow him to his nest and get his feathers. (Remember, you'll have to be in solid form to get them, however.) —CHRIS VAN KIRK, *17, New York, New York;* SPECIAL KS

Q and A

In *Mask of the Sun* (Broderbund) how do you get by the room filled with green gas? —RALPH T. PAGANO, *40, Greeley, Colorado*

Go immediately southwest.

In your August 1985 issue, you said that to get through the screening door in *Hitchhiker's Guide to the Galaxy* (Infocom), you had to remove the common sense particle from your brain. How do I do this? —AHMAD JASSEM AL NUSIF, *Dahia, Kuwait*

When using the Improbability Drive, you may find yourself in the middle of a neuron group in your own brain. Wander around for a

while and you'll find a common sense particle. Get this, and you'll have successfully removed it from your brain.

In *Planetfall* (Infocom), how do you get the key from the crevice? Where is the kitchen access card? —JAY SCOTT MATTHIESEN, *16, Broken Bow, Oklahoma*

To get the key, hold the metal bar near it. The kitchen access card is located in one of the offices. (Open the desk drawers to find it.)

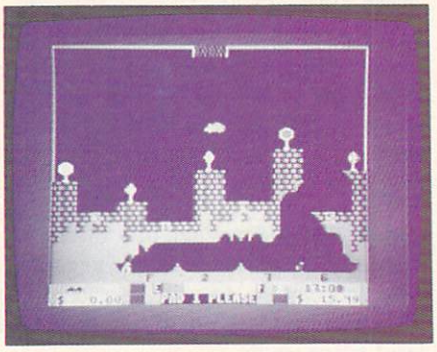
In *Savage Island* (Adventure International), how do I get the objects out of the lake in the volcano? —DEREB BATTING, *13, East Liverpool, Ohio*

Take the palm log into the lake. In the lake: Hold your breath, drop the log, swim down and north, then get the knife. Swim up and hold your breath again, then swim down and east. Get the block, and you've got all the objects on the lake bottom.

H I N T H O T L I N E

SPACE TAXI, Muse Software (C 64 version *only*). Arcade/skill. Your mission: Carry passengers to and from the bizarre hot spots of a 23rd-century metropolis.

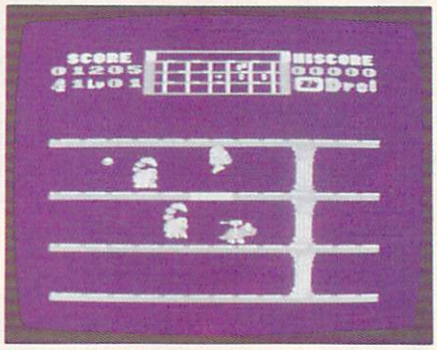
If you'd like to repeat the screen you're on, turn off the disk drive before it starts to access the next screen. In addition to getting practice on a specific board, you now can complete a 24-hour shift



and reach the mystery screen. You can do this by remaining on the same screen until the clock reads 24:00, then turning the disk drive on and completing the level.—SCOTT PHILLIPS, *Grand Rapids, Michigan*

DROL, Broderbund (Apple, Atari, Commodore). Arcade/skill. Your mission: Traverse multilevel mazes and find a kidnapped family.

Second screen: Go immediately right and down a level, then go right again until you find the boy. Then go down to the bottom level



and move left. The lizard should be there about the time you reach midscreen. Note: Sometimes the lizard is up on top and the boy is on the bottom.

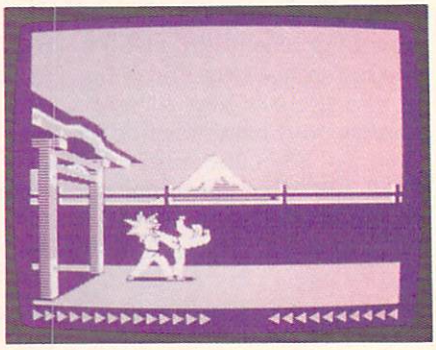
Third screen: Go left to the first trap door and then down. While going right, move up and down, firing continuously. This should knock down any flying weapons in your way. When you try to reach the bottom level, test each trapdoor by opening it a little, then backing up. Then you can see which trap doors are guarded by the man-eating plants, without them killing you. —BRANDON P. REIF, *14, Saginaw, Michigan*

SKYFOX, Electronic Arts (Apple). Arcade/skill. Your mission: Use the supermodern jet fighter Skyfox to stop an invasion and protect your bases.

When fighting a mothership guarded by tanks, shoot all the tanks but one, then shoot the mothership. Otherwise, if you destroy all the tanks, a new wave of them will be launched.—BRANDON P. REIF, *14, Saginaw, Michigan*

KARATEKA, Broderbund (Apple). Your mission: Using your skill in martial arts, defeat the evil warlord Akuma and his guards to rescue your bride-to-be.

For an interesting effect, try loading the disk on the reverse side. Normal controls can be used.—CHRISTIAN HANLON, *12, Goffstown, New Hampshire*



BY JOEY LATIMER

One piece of Americana that's being lost to progress is the barn dance. For people in rural areas, Saturday night used to be the time for gathering in a large barn and dancing to an "orchestra" made up of such instruments as guitars, banjos, fiddles, and washboards.

One of the songs that comes to mind when I think of good ol' barn-dancing is *Turkey in the Straw*. While it's generally thought of as a fiddle tune, the song can be played by another instrument. And, if you're reading this, you probably have that instrument right in your home. That's right, it's your computer!

If you don't have anything else to do this Saturday night, make sure the animals are settled in for the evening, and then type *Turkey in the Straw* into your computer. Don't turn the volume up too loud, though, or you'll have all the neighbors knockin' on your barn door!

ADAM/*TURKEY IN THE STRAW*

```
10 LOMEM: 29000
20 DIM f(92),s(92),d(92)
30 FOR i = 28000 TO 28005:READ a:POKE i,a:NEXT i
40 FOR i = 1 TO 92:READ f(i),s(i),d(i):NEXT i
50 HOME:VTAB 10:HTAB 3:PRINT "-*- Turkey in the Straw
-*-"
60 FOR i = 1 TO 92
70 POKE 28006,f(i):CALL 28000
80 POKE 28006,s(i):CALL 28000
90 POKE 28006,144:CALL 28000
100 FOR d = 1 TO d(i)*100:NEXT d
110 POKE 28006,159:CALL 28000
120 NEXT i:GOTO 60
1000 DATA 58,102,109,211,255,201
1010 DATA 143,3,1,138,3,1,133,3,1,138,3,1
1020 DATA 133,3,1,143,2,1,133,3,1,135,4,1
1030 DATA 133,5,1,128,5,1,135,4,1,143,3,1
1040 DATA 135,4,1,133,5,1,135,4,2,133,3,1
1050 DATA 143,2,1,138,2,2,138,2,2,138,2,1
1060 DATA 143,2,1,133,3,1,143,2,1,138,2,2
1070 DATA 143,2,2,143,2,2,138,2,1,143,2,1
1080 DATA 133,3,1,138,3,1,133,3,1,143,2,1
1090 DATA 133,3,1,135,4,1,133,5,1,128,5,1
1100 DATA 135,4,1,143,3,1,135,4,1,133,5,1
1110 DATA 135,4,2,133,3,1,143,2,1,138,2,1
1120 DATA 131,2,2,143,1,1,131,2,1,138,2,1
1130 DATA 133,3,1,143,2,1,138,2,2,143,2,2
1140 DATA 133,3,4,138,2,1,131,2,2,138,2,1
1150 DATA 131,2,2,131,2,2,138,2,1,131,2,2
1160 DATA 138,2,1,131,2,4,136,2,1,143,1,2
1170 DATA 136,2,1,143,1,2,143,1,2,136,2,1
1180 DATA 143,1,2,136,2,1,143,1,2,143,1,1
1190 DATA 141,1,1,139,1,2,139,1,2,131,2,2
1200 DATA 131,2,2,138,2,2,138,2,2,143,2,2
1210 DATA 133,3,1,143,2,1,138,2,1,131,2,2
1220 DATA 143,1,1,131,2,1,138,2,1,133,3,1
1230 DATA 143,2,1,138,2,2,143,2,2,133,3,2
```

APPLE II SERIES/*TURKEY IN THE STRAW*

```
10 DIM P(98),D(98)
20 HOME:VTAB (10):HTAB (4)
30 PRINT "--*-- TURKEY IN THE STRAW --*--"
40 FOR I = 0 TO 36:READ A:POKE 768+I,A:NEXT I
50 FOR I = 1 TO 98:READ P(I),D(I):NEXT I
60 FOR I = 1 TO 98:POKE 6,20*D(I):POKE 8,P(I)
70 CALL 768:NEXT I:GOTO 60
1000 DATA 165,8,201,2,176,2,169,2,74,133,10,164,8
1010 DATA 240,8,173,48,192,234,234,136,208,251,56
1020 DATA 165,7,229,10,133,7,176,235,198,6,208,231,96
2000 DATA 151,1,135,1,127,1,135,1,127,1,113,1
2010 DATA 127,1,170,1,202,1,191,1,170,1,151,1
2020 DATA 170,1,202,1,170,2,127,1,113,1,101,1
2030 DATA 0,1,101,1,0,1,101,1,113,1,127,1,113,1
2040 DATA 101,2,113,2,113,2,101,1,113,1,127,1
2050 DATA 135,1,127,1,113,1,127,1,170,1,202,1
2060 DATA 191,1,170,1,151,1,170,1,202,1,170,2
2070 DATA 127,1,113,1,101,1,85,1,0,1,75,1,85,1
2080 DATA 101,1,127,1,113,1,101,2,113,2,127,2
2090 DATA 0,2,101,1,85,2,101,1,85,2,85,2,101,1
2100 DATA 85,2,101,1,85,4,95,1,75,2,95,1,75,2,75,2
2110 DATA 95,1,75,2,95,1,75,2,75,1,67,1,63,2,63,2
2120 DATA 85,2,85,2,101,2,101,2,113,2,127,1,113,1
2130 DATA 101,1,85,1,0,1,75,1,85,1,101,1,127,1
2140 DATA 113,1,101,2,113,2,127,2,0,8
```

ATARI 400, 800, 600/800 XL, & 130XE/ *TURKEY IN THE STRAW*

```
10 DIM P(97),D(97)
20 FOR I=1 TO 97:READ P,D
30 P(I)=P:D(I)=D:NEXT I
40 PRINT CHR$(125):POSITION 4,10:POKE 752,1
50 PRINT "--*-- TURKEY IN THE STRAW --*--"
60 FOR I=1 TO 97:SOUND 0,P(I),10,8
70 FOR DE=1 TO D(I)*40:NEXT DE
80 SOUND 0,0,0,0:NEXT I:GOTO 60
1000 DATA 144,1,128,1,121,1,128,1,121,1,108,1
1010 DATA 121,1,162,1,193,1,182,1,162,1,144,1
1020 DATA 162,1,193,1,162,2,121,1,108,1,96,1
1030 DATA 0,1,96,1,0,1,96,1,108,1,121,1,108,1
1040 DATA 96,2,108,2,108,2,96,1,108,1,121,1
1050 DATA 128,1,121,1,108,1,121,1,162,1,193,1
1060 DATA 182,1,162,1,144,1,162,1,193,1,162,2
1070 DATA 121,1,108,1,96,1,81,1,0,1,72,1,81,1
1080 DATA 96,1,121,1,108,1,96,2,108,2,121,2
1090 DATA 0,2,96,1,81,2,96,1,81,2,81,2,96,1,81,2
1100 DATA 96,1,81,4,91,1,72,2,91,1,72,2,72,2
1110 DATA 91,1,72,2,91,1,72,2,72,1,64,1,60,2,60,2
1120 DATA 81,2,81,2,96,2,96,2,108,2,121,1,108,1
1130 DATA 96,1,81,1,0,1,72,1,81,1,96,1,121,1
1140 DATA 108,1,96,2,108,2,121,2
```

COMMODORE 64 & 128 (C 64 MODE)/ *TURKEY IN THE STRAW*

```
10 DIM H(98),L(98),D(98)
20 S=54272:POKE 53281,10:POKE 53280,2
30 PRINT CHR$(147);CHR$(144):POKE 214,10:PRINT
40 PRINT TAB(4)"--*-- TURKEY IN THE STRAW --*--"
50 FOR I=0 TO 24:POKE S+I,0:NEXT I
60 POKE S+24,15:POKE S+5,68:POKE S+6,132
70 FOR I=1 TO 98:READ H(I),L(I),D(I):NEXT I
80 FOR I=1 TO 98:POKE S+4,33
90 POKE S,L(I):POKE S+1,H(I)
100 FOR D=1 TO 75*D(I):NEXT D
110 POKE S+4,32:NEXT I:GOTO 80
1000 DATA 14,24,1,15,210,1,16,195,1,15,210,1,16
1010 DATA 195,1,18,209,1,16,195,1,12,143,1,10,143
1020 DATA 1,11,48,1,12,143,1,14,24,1,12,143,1,10
1030 DATA 143,1,12,143,2,16,195,1,18,209,1,21,31
1040 DATA 1,0,0,1,21,31,1,0,0,1,21,31,1,18,209,1,16
1050 DATA 195,1,18,209,1,21,31,2,18,209,2,18,209
1060 DATA 2,21,31,1,18,209,1,16,195,1,15,210,1,16
1070 DATA 195,1,18,209,1,16,195,1,12,143,1,10,143
1080 DATA 1,11,48,1,12,143,1,14,24,1,12,143,1,10
1090 DATA 143,1,12,143,2,16,195,1,18,209,1,21,31
1100 DATA 1,25,30,1,0,0,1,28,49,1,25,30,1,21,31,1
1110 DATA 16,195,1,18,209,1,21,31,2,18,209,2,16
1120 DATA 195,2,0,0,2,21,31,1,25,30,2,21,31,1,25
1130 DATA 30,2,25,30,2,21,31,1,25,30,2,21,31,1,25
1140 DATA 30,4,22,96,1,28,49,2,22,96,1,28,49,2,28
1150 DATA 49,2,22,96,1,28,49,2,22,96,1,28,49,2,28
1160 DATA 49,1,31,165,1,33,135,2,33,135,2,25,30,2
1170 DATA 25,30,2,21,31,2,21,31,2,18,209,2,16,195
1180 DATA 1,18,209,1,21,31,1,25,30,1,0,0,1,28,49
1190 DATA 1,25,30,1,21,31,1,16,195,1,18,209,1,21
1200 DATA 31,2,18,209,2,16,195,3,0,0,3
```

IBM PC & COMPATIBLES/*TURKEY IN THE STRAW*

This program has been tested and found to work on the following computers and hardware configurations, using the BASICs shown: IBM PC w/Color/Graphics Monitor Adapter or Monochrome/Printer Card, w/Disk BASIC D2.00 or Advanced BASIC A2.00. IBM PCjr w/Cartridge BASIC J1.00, Tandy 1000 w/GW BASIC 2.02 version 00.05.00 or 01.01.00.

```
10 DIM P(98),D(98)
20 CLS:WIDTH 40:LOCATE 10,4,0
30 PRINT "--*-- TURKEY IN THE STRAW --*--"
40 FOR I=1 TO 98:READ P(I),D(I):NEXT I
50 FOR I=1 TO 98:SOUND P(I),D(I)*2
60 NEXT I:GOTO 50
1000 DATA 220,1,247,1,262,1,248,1,262,1,294,1
1010 DATA 262,1,196,1,165,1,175,1,196,1,220,1
1020 DATA 196,1,165,1,196,2,262,1,294,1,330,1,30000
1030 DATA 1,330,1,30000,1,330,1,294,1,262,1,294,1
1040 DATA 330,2,294,2,294,2,330,1,294,1,262,1
1050 DATA 247,1,262,1,294,1,262,1,196,1,165,1
1060 DATA 175,1,196,1,220,1,196,1,165,1,196,2,262
1070 DATA 1,294,1,330,1,392,1,30000,1,440,1,392,1
1080 DATA 330,1,262,1,294,1,330,2,294,2,262,2,30000
1090 DATA 2,330,1,392,2,330,1,392,2,392,2,330,1,392,2
1100 DATA 330,1,392,4,349,1,440,2,349,1,440,2,440,2
1110 DATA 349,1,440,2,349,1,440,2,440,1,494,1,523,2
1120 DATA 523,2,392,2,392,2,330,2,330,2,294,2,262,1
1130 DATA 294,1,330,1,392,1,30000,1,440,1,392,1,330,1
1140 DATA 262,1,294,1,330,2,294,2,262,2,30000,4
```

TANDY COLOR COMPUTER/ *TURKEY IN THE STRAW*

```
10 DIM T(92),D(92)
20 FOR I=1 TO 92:READ T(I),D(I):NEXT I
30 CLS
40 PRINT@227,"*--TURKEY IN THE STRAW--*"
50 FOR I=1 TO 92
60 SOUND T(I),D(I)*2
70 NEXT I:GOTO 50
1000 DATA 159,1,170,1,176,1,170,1,176,1,185,1
1010 DATA 176,1,147,1,125,1,133,1,147,1,159,1
1020 DATA 147,1,125,1,147,2,176,1,185,1,193,2
1030 DATA 193,2,193,1,185,1,176,1,185,1,193,2
1040 DATA 185,2,185,2,193,1,185,1,176,1,170,1
1050 DATA 176,1,185,1,176,1,147,1,125,1,133,1
1060 DATA 147,1,159,1,147,1,125,1,147,2,176,1
1070 DATA 185,1,193,1,204,2,210,1,204,1,193,1
1080 DATA 176,1,185,1,193,2,185,2,176,4,193,1
1090 DATA 204,2,193,1,204,2,204,2,193,1,204,2
1100 DATA 193,1,204,4,197,1,210,2,197,1,210,2
1110 DATA 210,2,197,1,210,2,197,1,210,2,210,1
1120 DATA 216,1,218,2,218,2,204,2,204,2,193,2
1130 DATA 193,2,185,2,176,1,185,1,193,1,204,2
1140 DATA 210,1,204,1,193,1,176,1,185,1,193,2
1150 DATA 185,2,176,2
```

M I C R O N O T E S

The BASIC languages that come with Apple II and Coleco Adam computers don't include the easy-to-use sound commands built into the BASICs of other machines. To pick up the slack, third-party companies have stepped in with extended, add-on BASICs that give programmers new control over sound generation!

For the Apple, the folks at Roger Wagner Publishing (10761 Woodside Ave., Suite E, Santee, CA 92071; [619] 562-3670) have released *The Wizard's Toolbox, Assorted New Commands for Applesoft*, $40, as part of the *Toolbox* series of software. *The Wizard's Toolbox* gives you tone and sound-effect commands, as well as new Applesoft options, such as turtle graphics, shape viewer, and print. Also available from Roger Wagner Publishing is *Assembly Lines: The Book*, $20, which explains how to put together 6502 assembly-language routines for generating music on an Apple II—all in easy-to-understand language.

Apple users who enjoy computer music but don't like to type programs will enjoy *The Magic Piano Music Learning System*, $50, from EduSoft (P.O. Box 2560, Berkeley, CA 94702; [800] EDU-SOFT). The Magic Piano section turns your computer keys into piano keys, without requiring extra hardware. You can compose your own songs and see them instantly scored and printed. Also included in the package: a rhythm game, a melody game, and a 64-page music workbook.

For Adam computers, there's a $29.95 add-on BASIC called *Auto Aid* from Futurevision (P.O. Box 34-FC, N. Billerica, MA 08162; [617] 663-8591) that will give you easy access to the sound registers through simple commands. Call or write for a free catalog explaining the features of *Auto Aid* and other Futurevision music products for the Adam.

COMPUCOPIA

SHORT PROGRAMS BY JOHN JAINSCHIGG

Usually, it's not a good thing to find bugs in a program. Well, you'll have your hands full "debugging" this little nightmare! Type it in, and E-e-e-e-k!

APPLE II SERIES/*BUGS*

```
10 FOR I = 0 TO 168:READ A:POKE 768+I,A:NEXT I
20 POKE 232,0:POKE 233,3:HGR2:SCALE= 1
30 B = INT(RND(1)*4):ROT= 16*B
40 ST = 24+143*(B = 0)+228*(B = 3)
50 EN = 279*(B = 1)+191*(B = 2)
60 LB = 4+8*(B = 2 OR B = 3)
70 UB = 267-88*(B = 1)+8*(B = 2)-80*(B = 3)
80 V = INT(RND(1)*(UB-LB))+LB
90 FOR I = ST TO EN STEP 5*SGN(EN-ST)
100 P = 1+(I/2 = INT(I/2))
110 IF B = 1 OR B = 3 THEN X = I:Y = V:GOTO 130
120 X = V:Y = I
130 HCOLOR= 3:DRAW P AT X,Y
140 FOR D = 1 TO 30+200*(RND(1) > 0.85):NEXT D
150 HCOLOR= 0:DRAW P AT X,Y
160 SN = PEEK(-16336):SN = PEEK(-16336):NEXT I
170 FOR D = 1 TO INT(RND(1)*500)+500:NEXT D:GOTO 30
1000 DATA 2,0,6,0,90,0
1010 DATA 118,14,118,45,32,12,12,252,147,146
1020 DATA 58,23,45,109,41,40,22,255,63,63,63
1030 DATA 231,36,28,188,146,82,73
1040 DATA 41,45,77,30,63,63,63,255
1050 DATA 59,78,109,41,45,21,63,63,63,63,110,9,45,109
1060 DATA 21,223,63,255,27,110,9,45,109,9,254
1070 DATA 27,63,255,27,23,77,9,45,109,9,254,219
1080 DATA 255,219,187,77,73,73,73,113,118,6,0
1090 DATA 118,14,118,45,32,12,12,252,147,146,58
1100 DATA 23,45,109,33,100,180,146,27,63,63,63,231
1110 DATA 28,183,173,77,45,109,73,17,255,59,63,63
1120 DATA 63,78,45,109,41,62,63,63,63,191,13,45
1130 DATA 109,9,254,27,63,255,187,77,41,45,77,49,223
1140 DATA 59,63,223,51,77,41,45,77,9,174,31,216,219
1150 DATA 255,219,246,246,6,0
```

ATARI 400, 800, 600/800 XL, & 130XE/*BUGS*

```
9 REM --PRESS <SYSTEM RESET> TO STOP PROGRAM--
10 DIM UD$(24)
20 POKE 106,PEEK(106)-4:GRAPHICS 0:POKE 756,PEEK(106)
30 SETCOLOR 1,0,0:SETCOLOR 2,0,15:POKE 752,1:PRINT
40 READ UD$:B=PEEK(106)*256+264
50 FOR I=0 TO 47:READ A:POKE B+I,A
60 V=A:A=0:FOR Q=1 TO 8:A=A*2
70 IF V/2<>INT(V/2) THEN A=A+1
80 V=INT(V/2):NEXT Q
90 POKE B+I+48,A:NEXT I
100 FOR I=0 TO 95:POKE B+191-I,PEEK(B+I):NEXT I
110 BG=INT(RND(0)*2):H=INT(RND(0)*38)
120 ST=-4+27*(BG=0):EN=-4+27*(BG=1):CP=1+12*(BG=1)
130 FOR I=ST TO EN STEP SGN(EN-ST)
140 C=CP+6*(I/2=INT(I/2))
150 IF BG=1 AND I>-1 THEN POSITION H,I:PRINT "  ";
160 FOR Z=1 TO 3
170 IF I+Z>-1 AND I+Z<24 THEN POSITION H,I+Z:PRINT UD$
(C+2*Z-2,C+2*Z-1);
180 NEXT Z
190 IF BG=0 AND I<20 THEN POSITION H,I+4:PRINT "  ";
200 FOR D=1 TO 5:NEXT D
210 IF RND(0)>0.8 THEN GOSUB 1000
220 NEXT I:GOSUB 1000:GOTO 110
1000 FOR D=1 TO INT(RND(0)*200)+200:NEXT D:RETURN
2000 DATA ADBECFJGKHLIMPNQORVSWTXU
3000 DATA 8,8,4,34,34,17,17,19
3010 DATA 15,3,207,51,63,35,35,35
3020 DATA 35,67,65,128,0,0,0,0
3030 DATA 16,16,32,64,64,128,134,200
3040 DATA 246,200,240,192,224,208,200,196
3050 DATA 196,196,132,4,2,2,1,0
```

K-POWER OPINION POLL

ILLUSTRATION BY J.D. KING

It's that time of year—time for you to tell the editors of K-POWER how we're doing. Really lay it on the line. We'll read every comment and take your recommendations seriously. Plus, we'll randomly pick three contest responses and send those people $15 each for entering our Opinion Poll. So what are you waiting for?! Please mail your comments to Opinion Poll Contest, K-POWER, 730 Broadway, New York, NY 10003, before April 25. Thanks for helping us make K-POWER the best it can be.

Name_____ Birthdate _____

Address_____

City_____ State_____ Zip_____

Telephone (___)_____

Computers(s) I own (brand and model) _____

Rate the following sections of K-POWER on a scale of 1–5: 5-love it, 4-pretty good, 3-good, 2-could live without it, 1-please don't bore me with this anymore.

Software Scoop _____ News about kids _____

News about designers _____ Logon (letters from readers) _____

Dr. Kursor's Klinic _____ Microtones (music programs) _____

Micronotes (news about computer music products/events)_____

Strategy_____ Hint Hotline _____

Compucopia (short programs) _____ Contest _____

What I like best and least about K-POWER and why _____

What other stuff I'd like to see in K-POWER and why _____

Other comments _____

WHAT'S IN STORE
NEW HARDWARE/MARKET UPDATE

COMPUTERS

Quadram Datavue
MANUFACTURER: Quadram, One Quad Way, Norcross, GA 30093; (404) 923-6666
PRICE: $1,695 (256K); $1,995 (768K); $2,195 (1.3M)

Quadram's Datavue portable computer is a battery-operated, 12-pound computer with 256K that can be expanded to 1.3 megabytes of memory. With an 80-character × 25-line screen display and a built-in 5.25-inch disk drive, it can run IBM PC software. The screen displays graphics, can be tilted for viewing comfort, and can be fine-tuned. A second disk drive can plug into the back, and an internal modem can fit inside the case. A parallel and a serial port allow connection of many printers and external modems.

PRINTERS

Okimate 20 (Amiga, Apple IIe/IIc, IBM PC/PC*jr*)
MANUFACTURER: Okidata, 532 Fellowship Road, Mt. Laurel, NJ 08054; (609) 235-2600
PRICE: $268

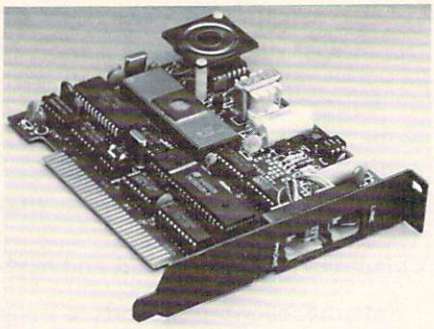
The Okimate 20 color printer, already available for the IBM PC/PC*jr* and the Apple IIe/IIc, is now ready for the Amiga. A Plug 'n Print kit includes an interface module and data cable for quick installation. The Amiga includes the Okimate 20 on its printer menu, so users can transfer full-color screen images to the Okimate 20 without using outside software.

It's only fitting that the Amiga have a customized color printer, since the computer is capable of displaying 4,096 colors. And the Okimate 20 can print them all, according to Okidata.

In straight word-processing mode, the Okimate 20 prints 80 characters per second; in near-letter-quality mode it prints at 40 cps. Users can choose from wide print, boldface, condensed (for 132-column printing), and italics. The Okimate 20 has both friction-feed (for single sheets) and pin-feed (for computer paper) mechanisms.

MODEMS

Signalman Expressi (IBM PC and compatibles)
MANUFACTURER: Anchor Automation, 6913 Valjean St., Van Nuys, CA 91406; (818) 997-7758
PRICE: $299



The auto-answer, auto-dial Signalman Expressi is a 300/1200-baud modem on a circuit board, that fits inside the IBM PC, PC XT, and PC AT, as well as inside many compatibles. The modem's small size allows it to fit into short expansion slots. The modem is Hayes compatible, which means it will work with a wide variety of communications software. However, the modem does come with its own software, *Lync* (from Norton Lambert), which allows file transfer and automatic log-on to other computer systems. A speaker on the modem lets you follow the progress of calls. The product has a five-year warranty.

MISCELLANEOUS

Transet 1000
MANUFACTURER: Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348; (404) 449-8791
PRICE: $399 with 128K; $549 with 512K

If you've got a thriving little business going out of your house, but only one overburdened computer to run it, the Transet 1000 might help. The Transet 1000 is a multifunction buffering device that can do several things at once, leaving your computer free for other tasks. For instance, the Transet 1000 can print out a long file from your word-processing program while accepting another long file via the telephone lines—while you play *Flight Simulator* or fiddle with *Lotus 1-2-3*. Moreover, even after the computer is turned off, the Transet 1000 can receive and store messages sent to you by modem.

How can it do this? Because the Transet 1000 is really a computer unto itself, with a 68008 microprocessor, and 128K or 512K of memory. It connects to any computer with a standard RS-232C serial port, though utility software is available for the Apple IIc, Macintosh, and IBM PC. It has two serial ports and one parallel or serial port of its own. A modem is required for communications tasks.

MARKET UPDATE

Tandy has introduced a 3.5-inch disk drive for its Model 100 and 200 portable computers. The drive weighs 1.75 pounds, and costs $200. The newer Tandy Model 600 has a built-in 3.5-inch drive. Since little software in 3.5-inch disk format runs on the Tandy portables, these drives should be considered primarily as storage devices. FC

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. More detailed reviews follow the chart. Unless otherwise noted, all programs are in disk format. Minimum memory requirements are 48K for Apple II series, 48K for Atari, 128K for IBM PC/PC*jr* or compatibles, and 128K for Macintosh.

Here's a rundown of the rating categories and what they mean: **O** = Overall performance, given the limitations and capacities of the particular computer for which the software 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. **PS** = Play system, in the games reviews, the quality of the game design and the game's playability. **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 & PRODUCTIVITY

Title Publisher Price	Brief description	Hardware/ Equipment required	Backup policy	Ratings O	D	EH	GQ	EU	V
FANTAVISION Broderbund Software 17 Paul Drive San Rafael, CA 94903 (415) 479-1170 $50 ©1985	A rarity—powerful software that's also easy to use. You can create artistically complex animation in minutes because the program does the hard work. A tool that's fun.† —FRANK	64K Apple. Joystick, KoalaPad, or mouse. Color monitor recommended.	90-day warranty. $7.50 thereafter. User can make one backup.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★ ★ ★
PRINCE Baudville 1001 Medical Park Drive S.E. Grand Rapids, MI 49506 (616) 957-3036 $70 ©1985	Print color pictures using a regular dot-matrix printer? Yes—with *Prince*, a utility that includes the software and ribbons you need. It also makes transfers for clothing. —FRANK	64K Apple. C.Itoh 8510, Epson MX-80/ RX-80/FX-80, Imagewriter, Imagewriter II, or NEC 8023.	90-day warranty. $7.50 thereafter or for backup.	★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★	A	★ ★ ★
SLIDE SHOW MAGICIAN 1.3 Magnum Software 21115 Devonshire St. Chatsworth, CA 91311 (818) 700-0510 $60 ©1984, 1985	String together *MacPaint* pictures in any sequence, adding visual magic with the cinematic "Special Effects" editor. Great for animated displays, video greeting cards, and more. —AKER	Macintosh.	$10 for replacement disk.	★ ★ ★	★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★ ★
SYLVIA PORTER'S YOUR PERSONAL FINANCIAL PLANNER Timeworks, Inc. 444 Lake Cook Road Deerfield, IL 60015 (312) 948-9200 $60–$130 ©1984	Write checks, maintain your budget, track cash and credit expenditures, and project your financial needs. Helps do taxes. Refreshingly complete; did more than we expected.† —SUMMERS	Reviewed on C 64. Also for Apple, C 128, IBM PC/PC*jr*.	90-day warranty.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	N/A	A	★ ★ ★
VP-PLANNER Paperback Software 2612 Eighth St. Berkeley, CA 94710 (415) 644-2116 $100 ©1985	A powerful spreadsheet program at a reasonable price. This *Lotus 1-2-3* work-alike can read files from that package. Will take you from beginning to advanced use.† —SUMMERS	256K IBM PC/PC*jr* and compatibles. Graphics adapter card recommended.	90-day warranty. $5 thereafter. $10 for non-copy-protected backup.	★ ★ ★ ★	★ ★ ★	★ ★ ★ ★	★ ★ ★	A	★ ★ ★ ★

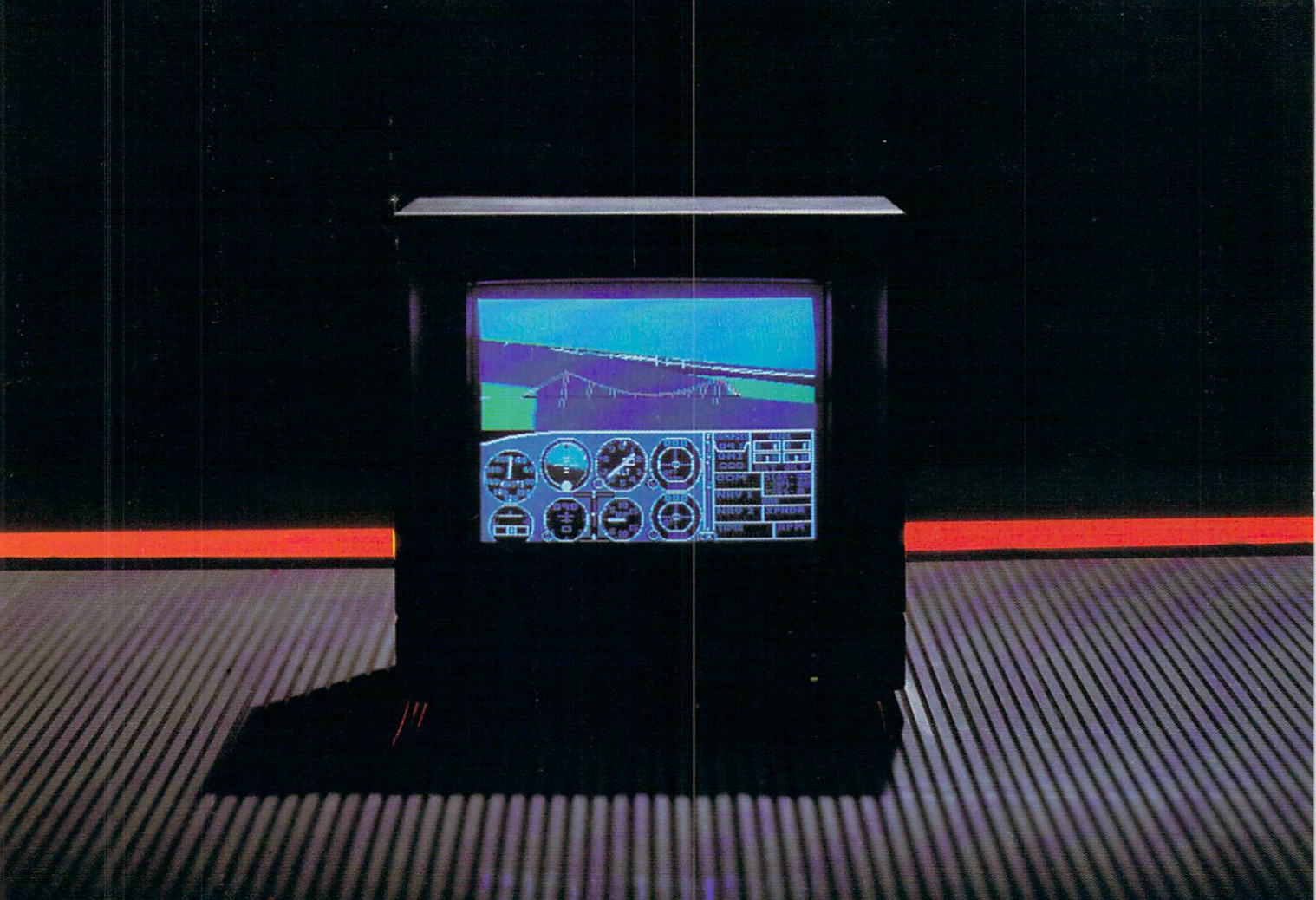
RATINGS KEY **O** Overall performance: **D** Documentation: **EH** Error-handling: **GQ** Graphics quality: **EU** Ease of use: **V** Value for money: ★ Poor: ★★ Average: ★★★ Good: ★★★★ Excellent: N/A Not applicable: E Easy: A Average: D Difficult: † Longer review follows chart

WHAT'S IN STORE
SOFTWARE GUIDE

EDUCATION/FUN LEARNING

Title Publisher Price	Brief description	Hardware/ Equipment required	Backup policy	Ratings O	D	EH	GQ	EU	V
FIX IT Random House Software 201 E. 50th St. New York, NY 10022 (800) 638-6460 $30–$40 ©1985	Aims to teach logic and problem-solving but falls short. You combine parts of "machines" so they work correctly. 200 puzzles for all ages, but gets tiresome. —MORRIS	Reviewed on Apple. Also for C 64/128. Optional joystick, mouse, and color monitor.	90-day warranty. $5 thereafter up to one year. $12 for backup.	★ ★	★ ★	★ ★	★ ★ ★	@	★ ★
GARFIELD DOUBLE DARES Random House Software (*See above for address and phone*) $40 ©1985	Reminds me of the word game Boggle: the object is to make words from scrambled letters. Challenging for ages 6–12, but rather dry, even with Garfield of comic-strip fame. —FRANK	64K Apple.	90-day warranty. $5 thereafter up to one year. $12 for backup.	★ ★	★ ★ ★	★ ★ ★	★ ★ ★	A	★ ★
HOMEWORK HELPER: MATH WORD PROBLEMS Spinnaker Software One Kendall Square Cambridge, MA 02139 (617) 494-1200 $33–$50 ©1985	Helps make math problems as problem-free as possible. You know the kind: If a car travels north at 50 mph with a 10 mph head wind, how long will it take to travel 150 miles? A good adjunct to school learning for grades 7–12. —SUMMERS	Reviewed on IBM PC/PC*jr*. Also for Apple, Atari 520ST, C 64/128. Color graphics card required for IBM PC.	30-day warranty. $5 thereafter.	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★ ★	A	★ ★ ★
HOMEWORK HELPER: WRITING Spinnaker Software (*See above for address and phone*) $33–$50 ©1985	An interactive word processor for students in grades 7–12. Asks the right questions to help with book reports and various essays.† —SUMMERS	Reviewed on C 64/128. Also for Apple, Atari 520ST, IBM PC/PC*jr*. Printer optional. Color graphics card required for IBM PC.	30-day warranty. $5 thereafter.	★ ★ ★ ★	★ ★ ★	★ ★ ★	N/A	E	★ ★ ★ ★
LEARNING TO WRITE: UPPERCASE LETTERS Right On Programs 1737 Veteran's Highway Central Islip, NY 11722 (516) 348-1577 $35 ©1986	Youngsters learn letter shapes and each stroke needed to write them. The learning is reinforced by colorful graphics that are animated when the child completes each letter. There's a separate package for lowercase letters. —BUMGARNER ELTGROTH	Reviewed on Apple. Also for C 64/128. Color monitor optional.	Unlimited warranty (includes user-damaged disks).	★ ★ ★	★ ★	★ ★ ★ ★	★ ★ ★ ★	E	★ ★ ★
THE NOTABLE PHANTOM Designware 185 Berry St. San Francisco, CA 94107 (415) 546-1866 $50 ©1984	By using a computer keyboard to simulate a piano's, all ages can explore the names, positions, and sounds of musical notes. Its goals are modest, but it works well.† —MORGENSTERN	Reviewed on C 64/128. Also for 64K Apple, IBM card required for IBM PC.	90-day warranty. $12 thereafter or for backup.	★ ★ ★	★ ★ ★ ★	★ ★ ★	★ ★ ★	E	★ ★ ★
PAINT WITH WORDS MECC 3490 Lexington Ave. N. St. Paul, MN 55112 (612) 481-3500 $30 ©1984	Explains the concepts of various words by producing pictures on-screen. As children use this program more, they have more fun learning. Highly motivating.† —BUMGARNER ELTGROTH	64K Apple. Joystick or mouse optional.	Unlimited warranty (includes user-damaged disks).	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★	★ ★ ★	E	★ ★ ★ ★
PICTURE PERFECT Mindplay 82 Montvale Ave. Stoneham, MA 02180 (617) 438-5454 $40 ©1984	Here's a decent beginner's program for drawing on-screen and then printing out. Also contains a library of pictures to enhance or begin compositions. For ages 4+. —BUMGARNER ELTGROTH	Reviewed on Apple. Also for IBM PC/PC*jr*. Joystick or mouse.	90-day warranty. $10 thereafter up to one year. $7.50 for backup within 90 days.	★ ★	★ ★ ★	★ ★ ★ ★	★ ★ ★	A	★ ★
SCIENCE TOOLKIT: MASTER MODULE Broderbund Software 17 Paul Drive San Rafael, CA 94903 (415) 479-1170 $60 ©1985	Investigate the hows and whys of light and temperature with the probes and program provided. With more than 20 intriguing experiments, this package is appropriate for the curious, especially ages 10–15.† —MORRIS	64K Apple. Apple II plus requires 9-pin joystick-port adapter.	90-day warranty. $7.50 (disk), $22.50 (interface), or $17.50 (probes) 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; @ Easy to difficult, depending on puzzle; † Longer review follows chart



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Apple and Atari versions will be released soon. Each disk covers a geographical region of the country in detail, and is very reasonably priced.

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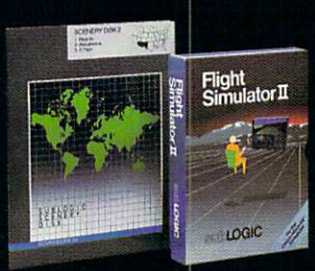

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GAMES REVIEWS BY JAMES DELSON

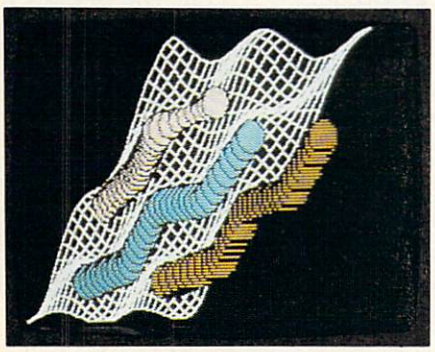
Title Publisher Price	Brief description	Hardware/ Equipment required	Backup policy	Ratings O	D	PS	GQ	EU	V
APBA MAJOR LEAGUE PLAYERS BASEBALL Random House Software 201 E. 50th St. New York, NY 10022 (800) 638-6460 $90 ©1985	Using exhaustively detailed stats for every current major leaguer, manage teams through games, series, or seasons. State-of-the-art strategy, but weak graphics. Good for both adults and kids ages 10+.	IBM PC/PC*jr*. Apple version planned.	90-day warranty. $5 thereafter. $22 for master disk backup. $12 for data disk backup.	★★★	★★★	★★★	★	E	★★
ACROJET MicroProse Software 120 Lakefront Drive Hunt Valley, MD 21030 (301) 667-1151 $35 ©1985	Negotiate a series of aerobatic race courses with this sporty, stunt-flying simulator. Some features: 1–4 players and 10 different races. For ages 12+ (8+ with adult supervison).	C 64/128. Also for Apple, Atari, IBM PC/ PC*jr*. Joystick(s).	90-day warranty. $10 thereafter.	★★★	★★★★	★★★	★★★	D	★★★
BALANCE OF POWER Mindscape, Inc. 3444 Dundee Road Northbrook, IL 60062 (312) 480-7667 $50 ©1985	A geopolitical strategy game of nuclear brinkmanship. You are the United States or the Soviet Union as you try to gain political points without "pushing the button." For ages 12+.†	Macintosh.	90-day warranty. $10 thereafter.	★★★★	★★★★	★★★	★★	D	★★★★
THE BARD'S TALE Electronic Arts 2755 Campus Drive San Mateo, CA 94403 (415) 571-7171 $40–$45 ©1985	Are you experienced enough to attempt the ultimate challenge in a 16-level dungeon? That's your goal in this *Wizardry*-like role-playing adventure. Great, long-playing fun for ages 12+.†	Reviewed on Apple. Also for C 64/128.	90-day warranty. $7.50 thereafter or for backup.	★★★★	★★★	★★★	★★	A	★★★★
FIGHT NIGHT Accolade, Inc. 20863 Stevens Creek Blvd. Cupertino, CA 95014 (408) 446-5757 $30–$35 ©1985	Here's the first boxing construction kit. Build your own boxer from "spare parts." The control system is limited, but the action is exciting. Lots of arcade fun for ages 8+.	Reviewed on C 64/128. Also for Apple. Joystick optional.	90-day warranty. $6 thereafter. $10 for backup.	★★★	★★★	★★	★★	E	★★★
HEART OF AFRICA Electronic Arts (*See above for address and phone*) $33 ©1985	Quest through the Africa of the 1890s in search of a hidden tomb. This exceptionally enjoyable role-playing adventure is flawed by its use of stereotypes.†	C 64/128. Joystick.	90-day warranty. $7.50 thereafter or for backup.	★	★★★★	★★★★	★★★	A	★
THE LITTLE COMPUTER PEOPLE RESEARCH PROJECT Activision 2350 Bayshore Frontage Road Mountain View, CA 94039 (415) 960-0410 $25–$35 ©1985	An "entertainment" that explores the home life of your computer's "inhabitant." He sets up house, eats, plays the piano, dances, feeds his dog, and is your "friend." Not a game, but a form of kinetic art for ages 4+.	Reviewed on C 64/128. Also for Apple.	6-month warranty. $7 thereafter.	★★★	★★★	★★★	★★★	E	★★★
MINDWHEEL Synapse, a division of Broderbund Software 17 Paul Drive San Rafael, CA 94903 (415) 479-1170 $40–$45 ©1984	With constant feedback for impatient gamers, this text-only adventure is easier to get into than most. 60 pages of documentation help players with an entertaining science-fiction story. Fun for ages 12+.	Reviewed on IBM PC/ PC*jr*. Also for Apple, Atari with two disk drives, C 64/128.	90-day warranty. $7.50 thereafter.	★★★	★★★★	★★★	N/A	E	★★★
PSION CHESS Psion Inc. 40 Lindeman Drive Trumbull, CT 06611 (203) 371-4371 $60 ©1984, 1985	Incredible 3-D graphics enhance this excellent chess software. Includes 28 play levels, 50 classic games to study, and can be played in six foreign languages. For ages 10+.†	Reviewed on Macintosh. Also for 256K IBM PC/PC*jr*.	30-day warranty. $10 thereaffer or for backup. IBM user makes backup.	★★★★	★★	★★★★	★★★	E	★★★
SPY VS SPY II: THE ISLAND CAPER First Star Software 18 E. 41st St. New York, NY 10017 (212) 532-4666 $30 ©1985	You compete to find secret missile parts and escape with them to a waiting submarine. Set traps for each other and avoid the quicksand. Uses varying levels. A treat for ages 8+.	Reviewed on C 64/128. Also for Atari.	90-day warranty. $7 if user-damaged or for backup.	★★★	★★★	★★★★	★★★	A	★★★

RATINGS KEY **O** Overall performance; **D** Documentation; **PS** Play system; **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

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 77 for information such as backup policies and addresses of software publishers.

HOME BUSINESS & PRODUCTIVITY



Fantavision

HARDWARE REQUIREMENTS: 64K Apple.
PUBLISHER: Broderbund Software
PRICE: $50

You won't believe how easy it is to create artistically complex animation with *Fantavision*. Through this unique programming achievement, your series of single, still pictures are seamlessly sewn together into an animated "movie."

Here's how it works: With the *Fantavision* drawing tools, create the rear view of a car, for example, and place it on the bottom center of the screen. Then, using simple commands, copy the car into the next frame, shrink its size, and move it further up the screen to present the image of a car that's further away. *Fantavision* then constructs a sequence between the two still frames, calculating as many as 64 intermediary positions, so that the car appears to be driving away from you. This technique of "tweening" makes objects appear to flow.

All the animated figures in *Fantavision* are created by using a mouse, joystick, or KoalaPad. I found making basic shapes easy, especially with commands to copy, change size, flip, and rotate figures. Intricate figure design was more difficult. For background scenery, you can insert any standard high-resolution picture file.

The manual is comprehensive and well-written with a clear, step-by-step tutorial. There is much to learn to fully use this software's potential, and it took me several days to get up to speed. But, as with a powerful word processor, you need not know all the commands before you begin.

Fantavision's fantastic potential is illustrated by the demo disk on the flip side. It's incredible. Among dozens of animations, there's a sequence of a cell dividing (including the separation of the chromosomes) and then returning to its resting state.

On top of all this, you can format a special disk so that the movies saved on it will be self-running. That way you can produce animated greeting cards to send to people who have an Apple, but not *Fantavision*. If I could buy only one piece of software that would be useful for my whole family (aside from a word processor), this might be the one.

—CATHY FRANK

Sylvia Porter's Your Personal Financial Planner

HARDWARE REQUIREMENTS: Apple, C 64, C 128, IBM PC/PC*jr*.
PUBLISHER: Timeworks, Inc.
PRICE: $60–$130

It was during tax time one year, after we'd gone through a bushel of old receipts trying to find our deductible expenses, that my husband and I decided to buy a personal computer. We needed budgeting help, too, and monthly bill-paying was an all-day chore. We knew there had to be a better way.

Here's one better way: *Sylvia Porter's Your Personal Financial Planner* (*Planner*, for short), a refreshingly complete home-accounting package. It helps us track cash expenditures and up to five checking and ten credit card accounts, while assigning transactions to any of 140 budget accounts. A single transaction can be split up to six ways for budgeting so that we can accurately monitor sales tax, work-related expenses, and other categories.

Planner stores information about our regular monthly checks, like the phone bill and the mortgage. When paying each month's bills, we change any dollar amounts that are different from last month's, add any bills unique to the current month, then let the printer do the work.

Of course, we need to separately enter checks written at local stores, as well as cash and credit purchases, to keep our budget information current. *Planner*'s report feature will generate a list of all our deductible expenses at tax time, a balance sheet, an income and expense statement, and more.

There looms the bugaboo of all home-finance software—if you don't enter all the information, it won't help you by itself. Still, *Planner* more than met our expectations. This is software that's good enough to buy a computer for.

—TAN A. SUMMERS

VP-Planner

HARDWARE REQUIREMENTS: 256K IBM PC/PC*jr* and compatibles.
PUBLISHER: Paperback Software
PRICE: $100

One good spreadsheet program can do the work of a half dozen other packages. The same spreadsheet can balance the family budget, calculate income taxes, do accounting, maintain a data base, and graph statistics. *VP-Planner* will help with this and more, yet it costs only $100, much less than most programs as powerful. It's a *Lotus 1-2-3* workalike, and can read or create files intended for either *1-2-3* or *dBase II* and *III*.

At first glance, *VP-Planner* looks like an ordinary spreadsheet. The setup is rows and columns, and you choose commands from a menu or enter them directly. Like *Lotus 1-2-3*, *VP-Planner* lets you turn frequently used strings of commands into "macros" you invoke with a single keystroke. There are built-in calendar functions and functions for performing common calculations like sums and averages. You can turn numeric data into pie charts, or bar, line, and X-Y graphs.

Beneath the surface, however, are a surprising number of solid extras. One is the Autokey mode, which makes it easy to create macros by recording each keystroke as you work. *VP-Planner*'s most impressive feature is its ability to create "multidimensional" spreadsheets. Ordinary spreadsheets have two dimensions for categories: one horizontal and one vertical. Horizontal labels could indicate months of the year and vertical labels your individual budget categories. If you want to compare this year's spending with last year's, however, you need a third dimension—a stack of work sheets. For an occasional spreadsheet user like myself, doing this with conventional

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CIRCLE READER SERVICE 42

WHAT'S IN STORE
SOFTWARE REVIEWS

software can be a nightmare. *VP-Planner*, however, makes it easy to work in up to five dimensions.

A complex product such as this is unlike the simpler software intended solely for home use; this takes longer to learn. But the manual provides over 200 pages of tutorials that thoroughly train you.

If you've been wanting to explore powerful spreadsheets, here's your chance. You can get your feet wet without sinking your pocketbook. When you're ready for more, dive right in without having to buy a second spreadsheet.

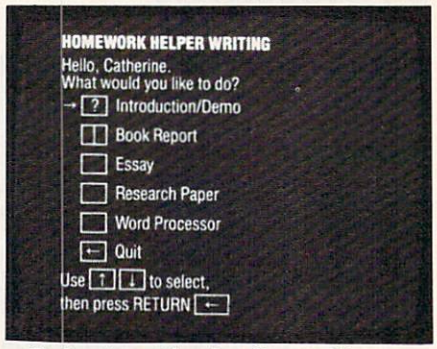
—TAN A. SUMMERS

EDUCATION/FUN LEARNING

Homework Helper: Writing

HARDWARE REQUIREMENTS: Apple, Atari 520 ST, C 64/128, IBM PC/PC*jr*.
PUBLISHER: Spinnaker Software
PRICE: $33–$40
PUBLISHER'S SUGGESTED GRADES: 7–12

Here's software that helps students with essays and book reports, not only by being a word processor, but by acting like a knowledgeable friend, one who asks good questions that get ideas flowing. This is the kind of help that teachers and parents can't complain about. As one of two titles in Spinnaker's new *Homework Helper* series, *Writing* offers interactive aid that still makes students work through problems on their own.



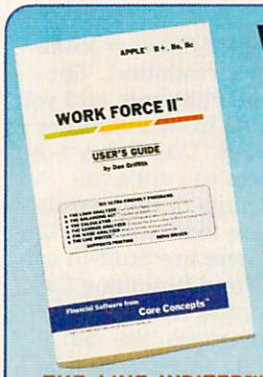
To begin with, the Create Ideas segment asks what type of book is being reviewed, or if the essay is descriptive, narrative, persuasive, or expository. We gave the program a run for its money by using the biographical book-report format on *The Hobbit*, by J.R.R. Tolkien. We laughed when the program asked us what Bilbo Baggins' major contributions were, but we had to admit that the questions the program asked would surely elicit a well-organized report if it were a real biography. When we weren't certain what a question meant, pressing a function key would rephrase the question.

Writing includes a surprisingly good word processor. You can move or delete blocks of text, perform a find-and-replace, and handle disk-formatting and file procedures. On-screen windows allow you to display your responses to the questions as you write an outline or your essay.

There's a built-in spelling checker, too. With only a 500-word dictionary, you'll still need to proofread carefully, but they're 500 of the most frequently misspelled words.

This software is proof that educational software need not be hidden under a game format to help children enjoy learning. With a word processor so simple they'll want to write all their papers on it, and a clever question-and-answer tutorial routine to help them learn good writing habits, *Homework Helper: Writing* should be a winner at home and at school.

—TAN A. SUMMERS



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CIRCLE READER SERVICE 15

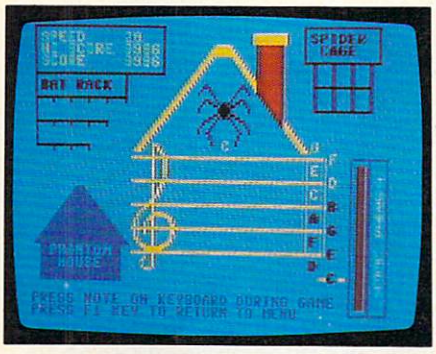
The Notable Phantom

HARDWARE REQUIREMENTS: 64K Apple C 64/128, IBM PC/PCjr.
PUBLISHER: Designware
PRICE: $50
PUBLISHER'S SUGGESTED AGES: 5+

Every so often, a reviewer receives a piece of software at precisely the right time. That's the way it was with *The Notable Phantom*. It arrived at our house just two days before my nine-year-old son's first piano lesson. I'm pleased to report that he enjoyed the program, and even learned something from it—when he could get me away from the keyboard, that is.

Unlike heavy-duty music programs that challenge you to create complex compositions, this package has a more modest goal: to teach the names, sounds, and positions of notes on a musical staff and piano keyboard. The key to accomplishing this task is in the keys: that is, on a durable keyboard overlay with an octave and a half of piano-style keys. Liberace might be disappointed with the keyboard action, but for hunt-and-peck pianists, it works nicely.

The basic component is *The Notable Phantom* note-recognition game, which stars ghosts, spiders, and phantoms who live in a haunted



house built around a G clef staff. The creepy creatures offer three difficulty levels: a note and its sound, the note name only, or the sound only. Levels can be mixed in a single game, and game speed can be varied—useful controls for software aimed at a broad age range.

Remember, the goals here are modest. The program doesn't deal with sharps or flats, and it shows all notes as whole notes. But for those of us who still mumble "Every Good Boy Does Fine" to remember the lines of the treble staff, there's plenty to learn.

Play your piano/computer keyboard while using the Creative Play section, and the program will record the notes you press. It can be frustrating, however, since there is no way to edit your songs. Still, this part of the package is really just an extra attraction. The main event is the note-learning game, and on that basis it's easy to recommend *The Notable Phantom*.

—STEVE MORGENSTERN

Paint With Words

HARDWARE REQUIREMENTS: 64K Apple.
PUBLISHER: MECC
PRICE: $30
PUBLISHER'S SUGGESTED AGES: 4–8

Have you ever wished you could explain a word's concept to a child by instantly producing a picture? On a simple level, *Paint With Words*—one of five programs in MECC's new Early Learning Series—does just that. Using the keyboard, joystick, or a mouse, children pick words from a subject-related list and place them on the screen. Pressing a button or key results in the word being replaced by a graphic image.

Children have 12 lists to choose from (with eight words each) and 12 associated backgrounds. Parents may select different words for the

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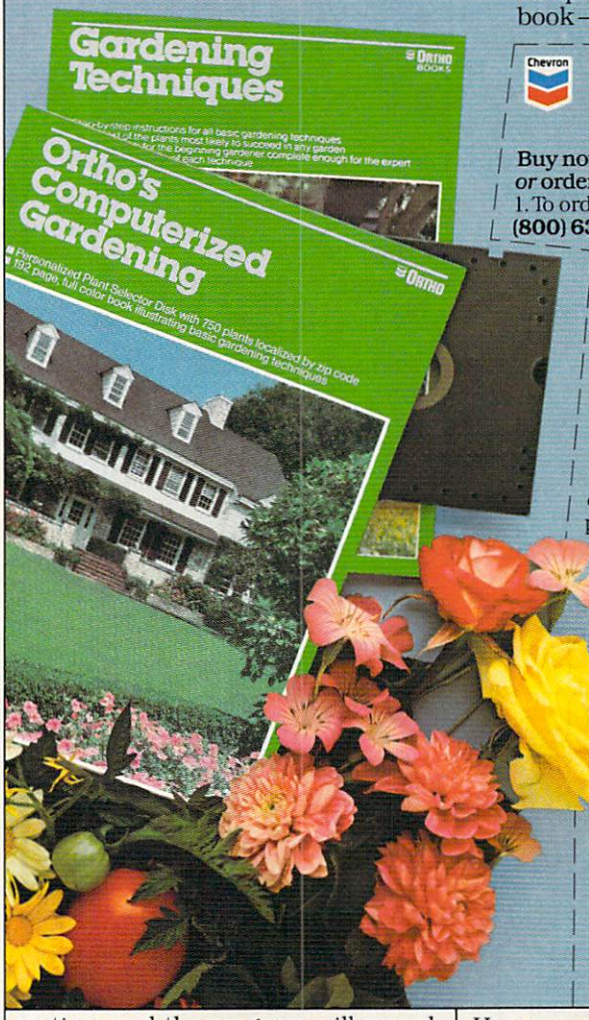

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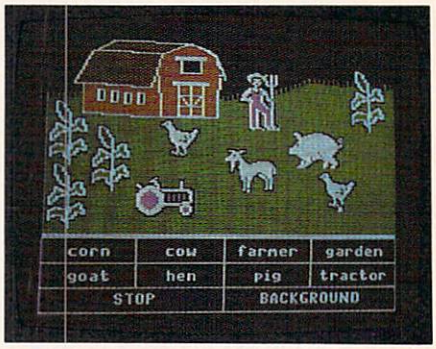


Some teachers might be leery of this program at first, since it teaches children to memorize whole words rather than sound them out. However, used in conjunction with a strong phonics program, *Paint With Words* can be highly motivating for beginning readers by giving them a way to build a vocabulary of sight words.

When the children began using *Paint With Words*, they wanted me to sit beside them and read each word at the bottom of the screen. The "farm" list, consisting of corn, cow, farmer, garden, goat, hen, pig, and tractor, was very popular. After choosing the proper background for that list, my testers placed each word where they wanted it on-screen to make a logical, balanced picture.

Once the children discovered the freedom of figuring out the words themselves and of changing their minds about the words' locations, they were far more creative in mixing backgrounds. The zoo animals were moved to the street, and then to the lake. The ball was placed on top of the slide, the snowman had chimney smoke coming out of his pipe, and the mailbox was stuck on the roof of the car. Silliness abounded, children laughed, and several new words were painlessly learned.

This is a good program for children who know the basic letter sounds and are beginning to decode words from those sounds. MECC has long prepared excellent software for educators; this is a strong addition to its home software line.

—MARLENE BUMGARNER ELTGROTH

Science Toolkit: Master Module
HARDWARE REQUIREMENTS: 64K Apple.
PUBLISHER: Broderbund Software
PRICE: $60
PUBLISHER'S SUGGESTED AGES: 10–15

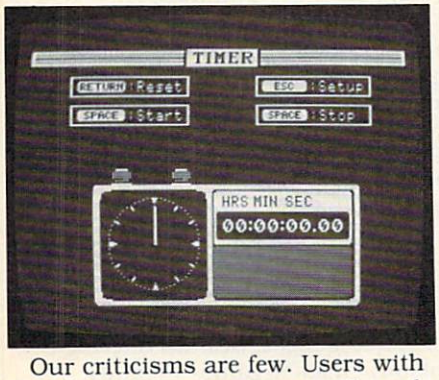
CIRCLE READER SERVICE 4

Why do we feel less comfortable on a humid day than on a dry one? How do elephants and rabbits keep cool? Is an ice cube hot? Why does light decrease as you move away from its source? What is the best angle for a ski-jump ramp in order to get the longest jump?

Those are just a few of the questions to explore with *Science Toolkit*. In each of more than 20 documented experiments, you read background information on a classic problem concerning light or temperature, then gather materials that range from a jar of water and cotton balls, to plaster of paris and food coloring. Lucid, step-by-step instructions lead you through the actual experiments.

Along with the temperature and light probes, this software converts your computer into a thermometer, light meter, or timer so you can collect data. Create a strip chart to plot data collected over several hours, then save the chart for later examination or to compare to other data collected in a different way or on a different day.

Science Toolkit is most appropriate for budding scientists 10 to 15 years old. The experiments are relatively simple, but concern important phenomena and are fascinating. The manual is superb, going beyond the experiments with anecdotes and little-known facts about each phenomenon under study. As the *Master Module* in Broderbund's new series, this package contains the basic interface needed for future modules.



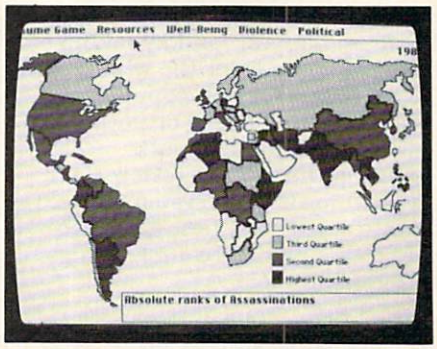
Our criticisms are few. Users with old Apple II plus machines will need a nine-pin joystick port adapter that's not included. More substantively, *Science Toolkit* doesn't fully exploit the power of the computer. It provides a readout for the temperature and light probes, keeps time, and creates a strip chart for continuous recording of data. While these functions are far from trivial, they do not tax a microcomputer's capabilities. Still, the total package of hardware, software, and documentation is powerful and worth your investment of time and money.

—TONY MORRIS

GAMES

Balance of Power

HARDWARE REQUIREMENTS: Macintosh.
PUBLISHER: Mindscape
PRICE: $50
CRITIC'S SUGGESTED AGES: 12+



Although technically a war game, *Balance of Power* is really about "nuclear brinkmanship," avoiding a nuclear war while coming as close to it as possible. As the United States or the Soviet Union, one to two gamers can use money, troops, covert action, or outright threats to gain political points without actually "pushing the button."

You cannot impose your own vision of how the world should be with this game, since it emphasizes working within current political constraints. To pile up points, you may send economic or military aid to friendly (and not-so-friendly) nations, dispatch troops to troubled areas, or aid insurgents via cash, advice, political assassinations, or outright coups. But, while you may try any type of strategy, your opponent (human or computer) may also question you about any acts considered aggressive.

Those confrontations are the heart of the game, where your point score climbs or the game abruptly ends. Diplomatic notes are exchanged at first, but if neither side backs down, tension quickly escalates through several stages—the last being nuclear war.

It takes a long time to learn how far you can push the computer player before it launches a nuclear attack. Extensive playing (both human vs. human and solo) is suggested be-

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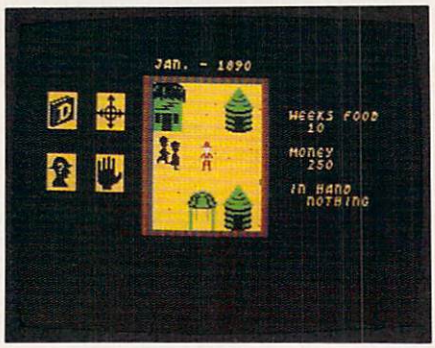
fore you may feel comfortable with the tough, yet excellent play system.

The vast amount of information crammed into the *Balance of Power* package is an education in itself. It's a brilliant piece of work, one which will set standards for political simulations to come.

Heart of Africa

HARDWARE REQUIREMENTS: C 64/128.
PUBLISHER: Electronic Arts
PRICE: $33
CRITIC'S SUGGESTED AGES: 12+

Heart of Africa is easy to learn and is an exceptionally enjoyable role-playing adventure. You begin play as an ordinary person living in the 1890s. An eccentric millionaire chooses you as the heir to his immense fortune, but only if you can locate a tomb hidden in Africa.



Sound simple? Well, not quite, since you start with a mere $250 and have only five years of "game time" to complete your task. Accompanied by colorful graphics and enchanting music, you walk, canoe, ride, swim, or voyage by boat across the length and breadth of the African continent.

Your first act is to equip yourself with the necessities of travel in the Victorian era: medicine, pistol, whip, rope, and, above all, gifts for the people you will encounter on your quest. As you make your way through Africa, you seek out friendly (and not-so-friendly) peoples. By bribing them with those gifts, you can replenish your supplies and gain vital hints about the tomb's location. These hints are often useful, but sometimes misleading.

The game's realistic elements are impressive. With on-screen maps that are geographically accurate, you're given a good introduction to the various regions of Africa. Your journey ranges from the banks of the Nile to the rain forests of what was once called "The Congo" and "Darkest Africa."

However, certain other anachronisms disturbed me. When I began playing the game, I couldn't help noticing that the African characters looked and acted as if they had stepped out of a fourth-rate 1930s *Tarzan* movie.

Admittedly, the game takes place at the turn of the century, a period hardly noted for Western acceptance of darker-skinned races. But, in my mind, by using clichéd images to represent Africans, by referring to them as "natives," and by taking a superior attitude for the white "hero" over the black populace (whether intentionally or not), a bad taste was left in my mouth.

And yet, if I were to review *Heart of Africa* for its play system alone, I'd have to say it's the best game I've played this year. Of course, things aren't that simple.

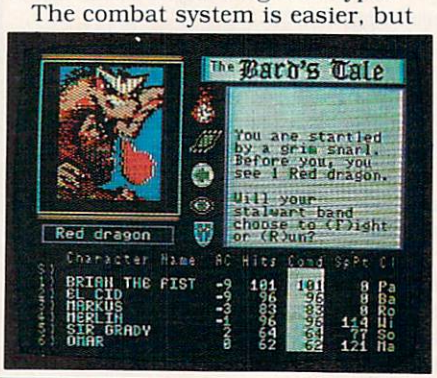
The Bard's Tale

HARDWARE REQUIREMENTS: Apple, C 64/128.
PUBLISHER: Electronic Arts
PRICE: $40–$45
CRITIC'S SUGGESTED AGES: 12+

Straight out of the *Wizardry* and *Ultima* schools of role-playing adventures, *The Bard's Tale* offers character generation, mapping, equipping, and many other similar elements. There are enough new twists here, however, to create a true variant on the two older series, even though *The Bard's Tale* is not a great groundbreaker.

One major addition is a new character, the Bard, who uses songs to cast spells and lends a certain charm to the proceedings. And, there are now four different types of magicians, including a "super wizard" who can combine all the spells of the three lesser magician types.

The combat system is easier, but

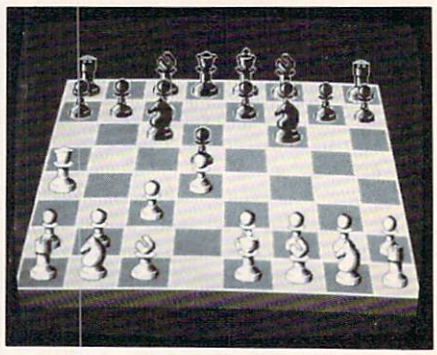


still as thrilling as its predecessors. The character generation feature has a great new option; players can not only create new heroes, they can also transfer favorites from the *Wizardry* trilogy, *Ultima II*, or *Ultima III*. This gives experienced adventurers the opportunity to avoid the early phase of simply keeping their characters alive while learning the play system.

This game is a winner—the best traditional role-playing adventure since *Ultima IV*. It will keep players busy for months while they grow strong enough to take on the challenging finale—a 16-level dungeon!

Psion Chess

HARDWARE REQUIREMENTS: 256K IBM PC/PC*jr*, Macintosh.
PUBLISHER: Psion Inc.
PRICE: $60
CRITIC'S SUGGESTED AGES: 10+



After *Sargon III*, I thought it would be ages before I encountered another chess program as excellent. But I'm pleased to report that *Psion Chess* is of comparable gaming quality, and even has better graphics.

Everyone from bare beginners to masters can enjoy this great program's 28 levels of play (including a handicap option and varying time for the computer to plan its moves). Play features range from the ability to take back moves and change sides against the computer, to a hint feature that offers differing advice, depending on how long the machine has to "think." This program is international and can be played in any of six languages, besides offering 50 historic master games to study.

The incredible 3-D graphics (which can be exchanged for a flat, overhead view) are the finest chess images to date. Added to the natural feel of pointing and choosing with the mouse, *Psion Chess* gives players the "feel" of playing with real pieces. A must for Macintosh gamers.

—REVIEWS BY JAMES DELSON

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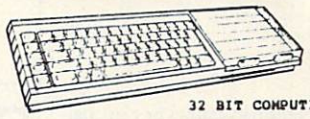

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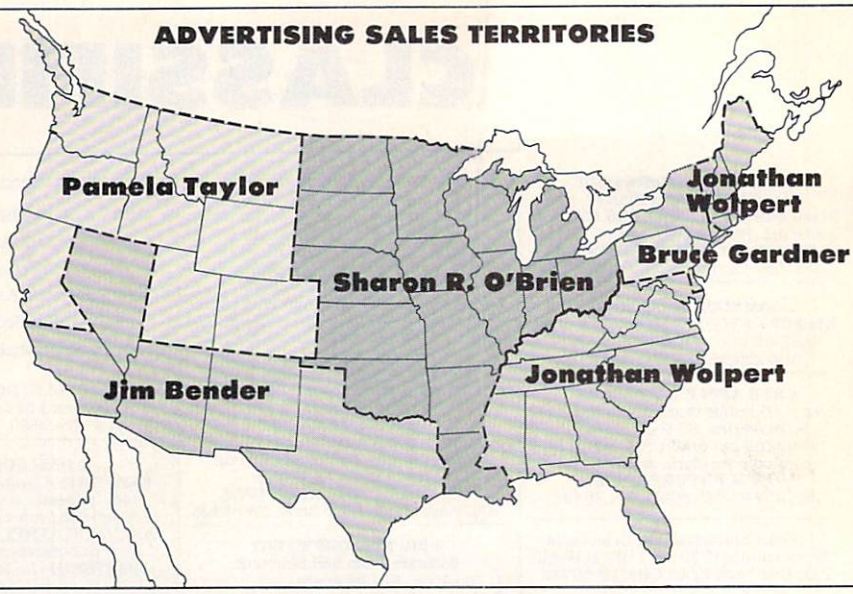

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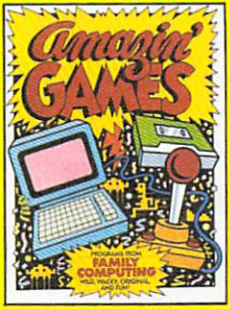

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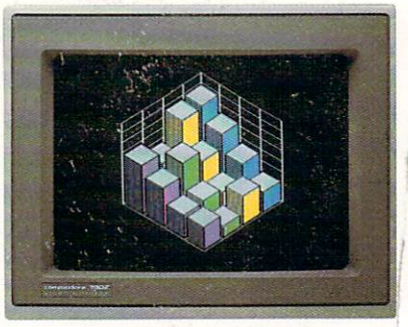

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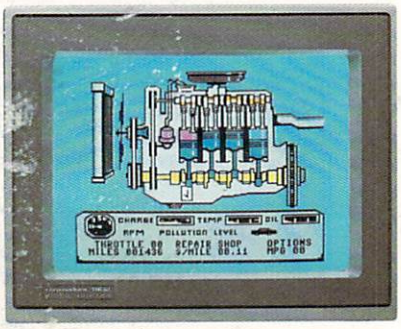

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