EDUCATION ISSUE

FOR APPLE II USERS

II COMPUTING

U.S.A. $2.95 CANADA $3.50 AUGUST / SEPTEMBER 1986

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Apple V.P. Yocam on Computer Ed

What Parents Should Know About Kids and Computers

Electronic Orrery

Apple II and the LaserWriter!

Reviews:
- *Sensible Grammar*
- *Touch Window*
- *Laser 128*
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  Fingertips
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5 Type-In Programs
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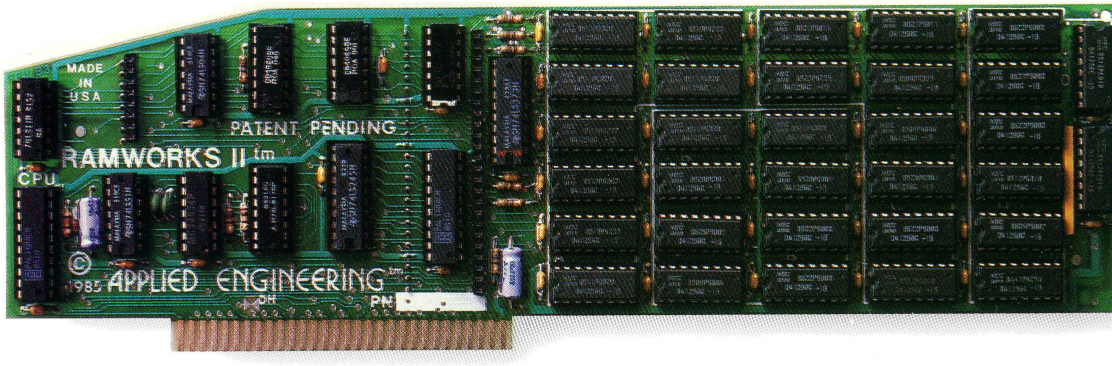

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While RamWorks II is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks II does. Naturally, you'd expect RamWorks II to expand the available desktop, after all Applied Engineering was a year ahead of everyone else *including Apple* in offering more than 55K in AppleWorks and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Just look at all the AppleWorks enhancements that even Apple's own card does not provide and *only* RamWorks II does. With a 256K or larger RamWorks II, all of AppleWorks will automatically load itself into RAM dramatically increasing speed by eliminating all the time required to access the program disk drive. Now switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

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Highest Memory Expansion.

Applied Engineering has always offered the largest memory for the IIe and RamWorks II continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 meg is about 500 pages of text)...but if you do ever need more, RamWorks II has the widest selection of expander cards available. Additional 512K, 2 MEG, or multiple 16 MEG cards just snap directly onto RamWorks II by plugging into the industry's only low profile (no slot 1 interference) fully decoded memory expansion connector. You can also choose non-volatile, power independent expanders allowing permanent storage for over 20 years.

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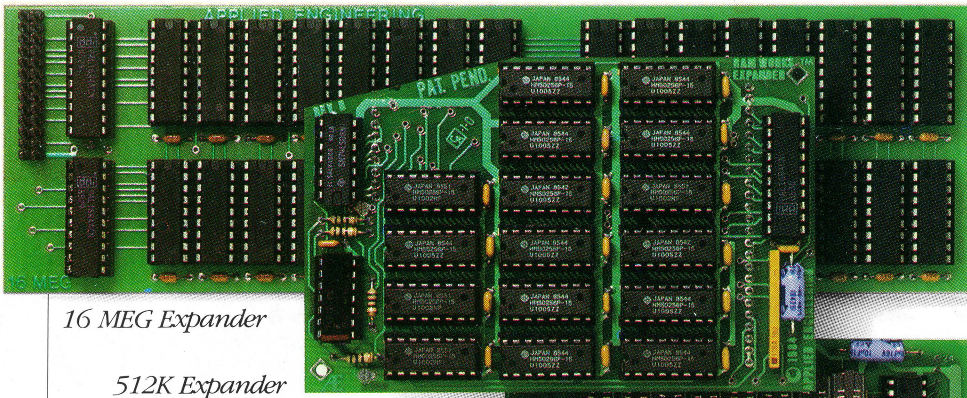
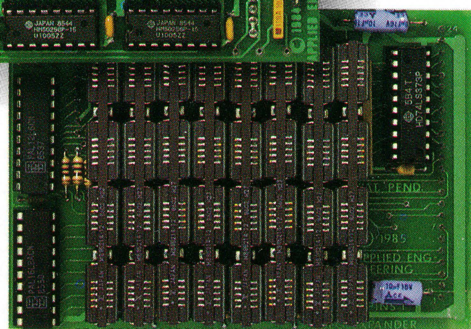


16 MEG Expander

512K Expander



2 Meg Expander

compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks II RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and remember you can order the RGB option with your RamWorks II or add it on at a later date.

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RamWorks II has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 meg of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 yet maintains full 8 bit compatibility.

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Steve Wozniak, creator of the Apple Computer said "I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks." A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks II is king of the hill."

Apple experts everywhere are impressed by RamWorks II's expandability, versatility, ease of use, and the sheer power and speed that it adds to any IIe. With a RamWorks II in your Apple, you'll make IBM PC's and AT's look like slowpokes.

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RamWorks II. The industry standard for memory expansion of the Apple IIe.

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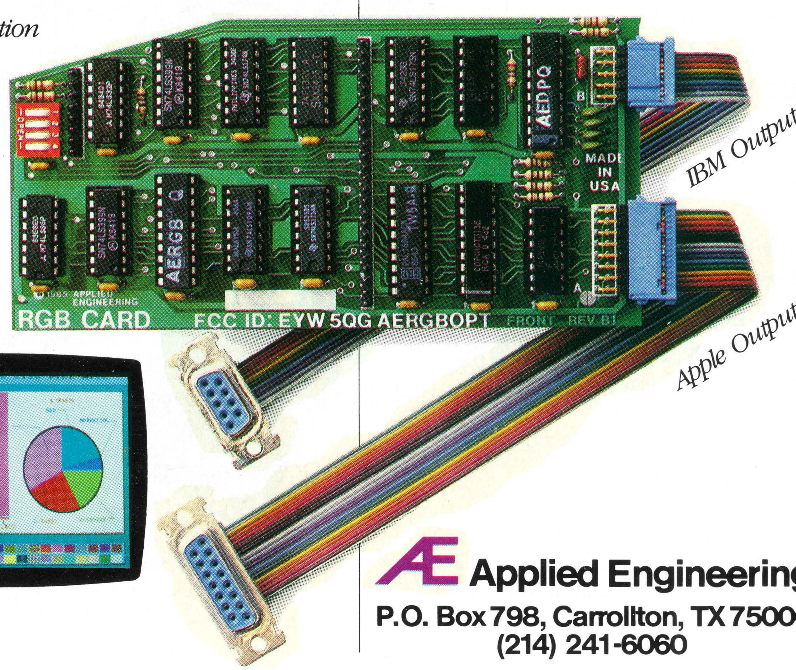
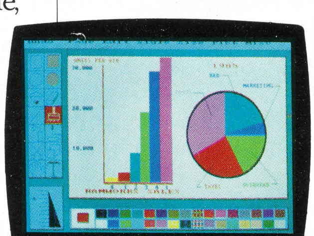


IBM Output

Apple Output



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What the Experts are Saying About RamWorks II!®

"In an informal competition called '640K vs. 640K' AppleWorks running on a RamWorks equipped Apple IIe outperformed Symphony running on an IBM PC."

—*InfoWorld*

"AppleWorks wiped out Symphony... The competition was set up partly to show off another of Wozniak's favorite things, the RamWorks II memory expansion board from Applied Engineering . . ."

—*San Jose Business Journal*

"There are huge differences among the AppleWorks modifying programs sold with the cards. Without doubt, RamWorks II is the most powerful."

—*inCider*

"Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks. . . I like the product so much that I am buying one for my own system."

—*A+ Magazine*

"RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars... For my money, Applied Engineering's RamWorks II is king of the hill."

—*inCider*

As you can see, it's easy to tell who sets the pace in Apple memory expansion. In fact, if you read the competition's ads, you'll notice that many even claim to be as good as RamWorks. Some say they're "RamWorks compatible". At least they agree on one thing. RamWorks is the one they have to measure up to. But the truth is there aren't any substitutes for RamWorks.

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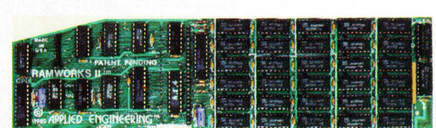

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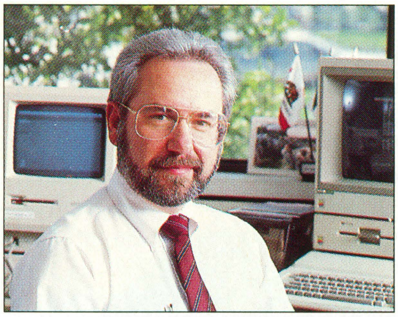

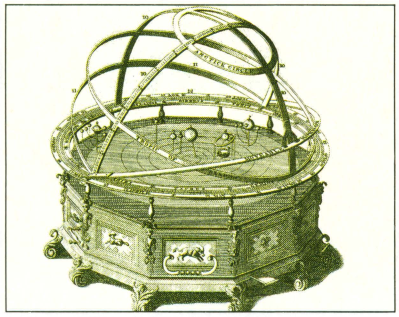

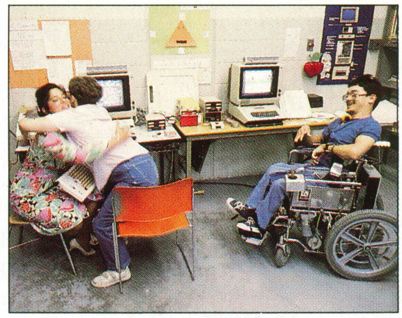

Features

Columns

Software Library

***About the Cover:* Tia Dodge, photographer; Ryan Taggart, Kira Onodera, children pictured; "Math in a Nutshell," Learning Technologies, on monitor.**

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Departments

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EDITORIAL

The Apple II: Catalyst and Equalizer

In May of this year The Carnegie Forum on Education and the Economy in Washington D.C. released the report, "A Nation Prepared: Teachers for the 21st Century." It made some startling, nearly revolutionary recommendations about the overhaul of American education. Teacher training would become a function of graduate school, salaries would skyrocket, responsibilities would shift *and* technology would become a major player. The Report envisions computers complementing the learning process: they will aid teachers and inspire students. We endorse the efforts of the Forum.

On a regular basis, we've been offering you progressive ways to educate and learn with your Apple. We'll continue that. From a recent subscriber survey we've learned that many ***II Computing*** readers are parents and teachers. Let us know what *you'd* like to see.

We've devoted this issue to education and the innovative role computers are taking already. Of course, technology alone can't do all the work needed. It can, however, serve as a creative and powerful catalyst, and perhaps equalizer.

Del Yocam, executive v.p. of Apple Computer, says in our interview with him—and it's hard to disagree—that business along with everyone else has a responsibility to see that improved education reaches all strata of society. Del's enthusiasm is infectious. We came away feeling as he does: that the microcomputer is an extraordinary tool, that we


A. Marshall

want to let everyone know it and that we want change to come quickly.

Exciting changes are well on their way in special education classes around the country. Author Neill Rosenfeld informs us of some wonderful advances, particularly in the area of speech synthesis and word processing, in "New Vistas for Disabled: Computers Lead the Way."

And, we're looking forward to the exciting advances with Apple's new "Super" II, the soon-to-be-born member of the II family. Look for a faster, 16-bit machine. We hear your old software will run on the new II and upgrades should be available. Expect to see more and more use of speech synthesizers and sophisticated graphics.

We'll be sure to share all the good news soon . . . //

Anita Malnig

ANITA MALNIG, EDITOR

INTO THE LIGHT

I emerge from the dark corners of my study following final exams and I find a new Apple magazine, ***II Computing***. I love it! I just picked up the April/May issue from my local computer store.

I am very interested in Dr. Foster's column, and I enjoyed most of the articles, features and columns. Keep up the good work.

Ed Lewis
Tempe, AZ

Editor's note: Tales From the Crypt will return next issue.

SHUTTLE STRIPPER

I took your April/May issue to my Cauzin dealer and tried out the Softstrip reader on the "Shuttle Tracker" program.

It worked great, right out of the package. Unlike my "expert" typing there was no "SYNTAX ERROR" or "BREAK IN LINE XXX." Now if only you and other magazines would show a continuing interest in publishing Softstrips, then I would probably buy one.

Thanks for making the offer available.

George A. Calder
Livonia, MI

ACE IN THE HOLE

I am a moderately late arrival to Apple-compatible computing with a Franklin Ace 1000, and I seem to be missing something. Reading through the April/May issue, most of the articles do not specify which model of the computer will be compatible with the software. That information would allow us "non-experts" to know just what goes with what.

I have been told that certain Apple-compatible software, specifically programs from Spinnaker, won't work on the Franklin Ace 1000. Is this the case? Do you know of any other software that falls into this category? Without purchasing the product, taking it home only to find that it won't work, then hassling with unenlightened sales clerks to return the merchandise, how can one find out if the purchased products work on my machine?

John F. Marthens
Whittier, CA

The editors reply:
Every ***II Computing*** review begins by listing the hardware and software requirements—how much memory, which computer, what operating system. It's not possible to list *all* the brands of computer a program works with; since most Apple-compatibles are designed to work like a particular Apple model, we list the requirements in terms of Apples. The Franklin Ace 1000 was designed to function like an Apple II+, so programs that run on the II+ should also run on your Franklin.

All BASIC programs in our Software Library are written in Applesoft, and should work on all Apple-compatible computers with Applesoft unless otherwise noted.

We asked Spinnaker Software about Franklin compatibility. They've tested their software with the IIe-compatible Franklin Ace 2000, but even *they* weren't sure whether it will run on the 1000.

II COMPUTING SURVEY RESULTS

Last January we did a survey to find out something about our readers—who you are and what you want to see in ***II Computing***. Now that we have the results, we thought you might like to know something about yourselves.

Your average age is 37, and most of you have a college degree. A quarter of you are female, and most are either parents, teachers or students. Almost everyone has an Apple at home—and some also use an Apple at school or work.

You know your way around a computer—two-thirds of you are interested in programming, and half are competent in BASIC or some other computer language. A few of you spend as much as 100 hours each week at the keyboard, but for most it's about 10 hours—time you spend word processing, programming, playing games, using databases and educational programs; you also use spreadsheets, telecommunications, graphics and music programs.

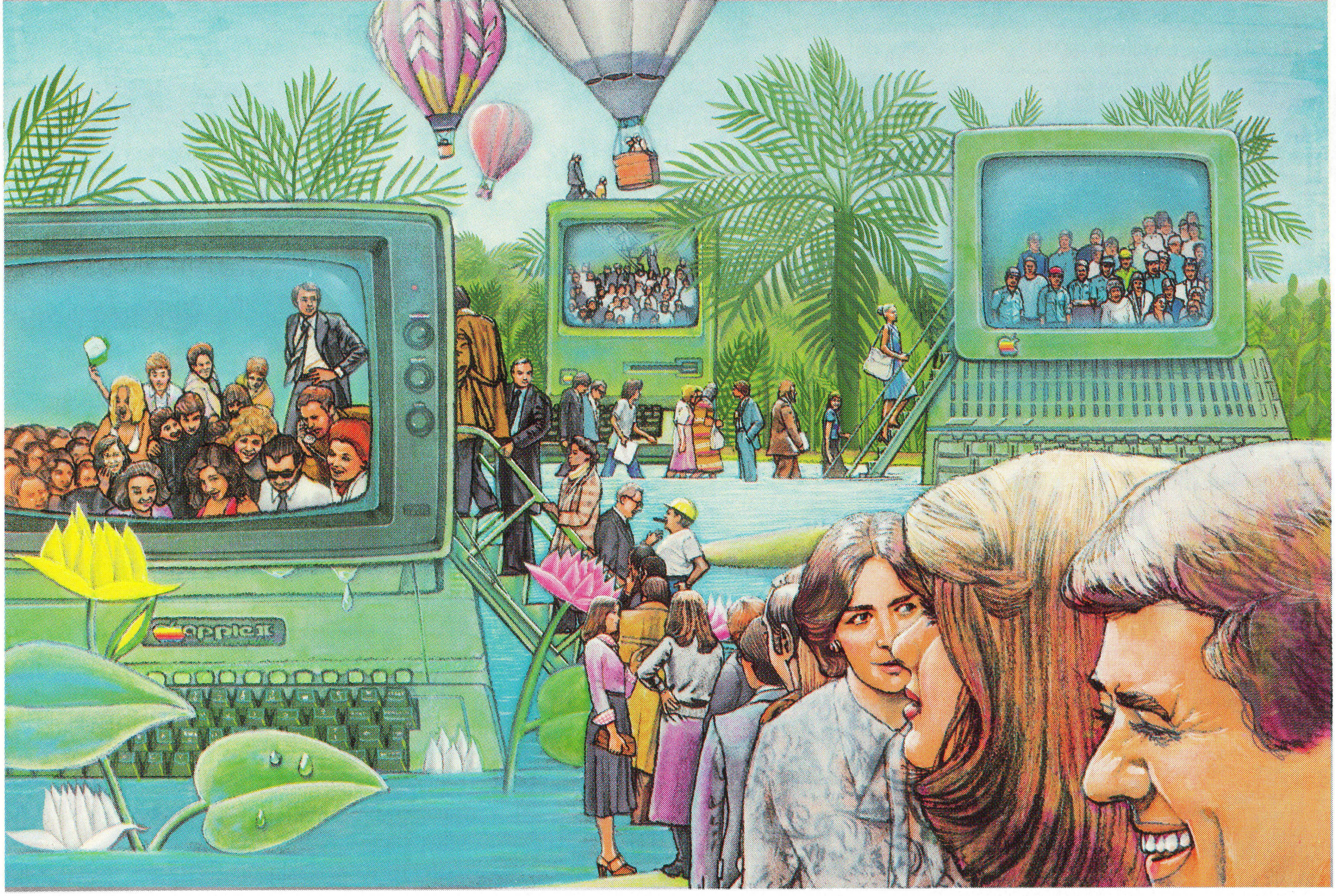
Nearly all of you read other computer magazines, and you often use the product reviews to decide what to buy, even though you doubt the objectivity of the reviews. You buy about six new pieces of software each year—an average of one every other month.

What do you like about computer magazines? General computing information, product news and reviews, programming techniques and type-in programs. What *don't* you like? Long technical articles, non-computer articles and—here it is again—type-in programs.

What do you want to see in ***II Computing***? Information on available products. Utility programs. Graphics. Programming tutorials. Articles about how others use the Apple II—but not just articles about celebrities who own Apples.

That's a pretty tall order to fill—and over the last year we've tried hard to meet it. Are we publishing the kind of articles and programs you want? Let us know!

—The Editors



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Learning with Tiggers and Heffalumps

by MARGOT COMSTOCK

Possibly the best book for learning the eastern philosophy of Taoism is *Winnie the Pooh.* That's what Benjamin Hoff thought, and he wrote *The Tao of Pooh* to prove it. In his work, Hoff uses the characters and stories of A. A. Milne extensively to illustrate Taoism. Not only does it work, but it's delightful and fun to read and learn.

SOMETIMES LEARNING IS HARD TO BEAR

People used to claim that education was why they bought a home computer. If that were true, the market for educational software should have been fantastic—but until 1983, that market was dead. Educational software was dull, boring, gray. Since then, it has improved, but it's never matched the pizzazz and professionalism of game software.

Happily, many computer games are inherently educational—and they're brighter, better-made and a lot more fun than most "educational" software available.

Games rarely teach the basics of specific subjects, and they seldom follow a course outline. Rather, games tend to hone the mind, stretch the thinking processes and raise ethical questions. Guilty of these achievements are the better text and graphics adventure games, and the best of the fantasy role-playing games.

An *adventure,* in this context, is a game that requires the player to use verbal commands to solve the game's puzzles. The best adventures offer an overall problem to be solved, such as rescuing a kidnapped person or solving a murder mystery, with other puzzles that help lead to the overall solution.

Solving the puzzles requires logic and innovative thinking. Adventures can help kids widen their problem-solving vision for real life, developing the potential to think outside the square, to see solutions others may miss. They learn to look to all possible resources for solutions, that things that appear useless may not be and that seemingly hopeless situations sometimes can be solved if you can just figure out the right approach to them.

Fantasy role-playing, on the other hand, uses minimal (frequently one letter) commands to move through a fantasy world usually beset by monsters that must be overcome to win. Players battle using weapons and magic, good and evil are generally clear cut and the overall mission is heroic; fantasy games take on the aura of morality plays.

In adventure games, the player essentially plays himself, solving the game's problems. In fantasy role-playing games, the player controls one or more characters who have specific characteristics and abilities that change and grow throughout play. Often the player can choose actions he knows will advance characters' growth. Much of the game is in developing strong, intelligent, capable characters who can overcome the ultimate evil and win the game.

Margot Comstock, former editor of Softalk, *lives on a bluff by the beach, where her days are spent writing, consulting on software, and playing with Apples.*

> "Games hone the mind, stretch thinking processes and raise ethical questions."

THE CASE OF THE WISE OLD OWL

Most adventure games, like many fantasy games, assume a simple good versus evil ethic, but one or two go further. The game Zork III (Infocom), for example, depends on the player acting with

continued on next page

heroic trust and benevolence. He must prefer to avoid violence, yet be courageous enough to defend himself—and fight with unblemished fairness.

Another outstanding adventure is Suspended (Infocom). In this game, the player, as a disabled leader on a space station, must depend on six robots to carry out his commands. Innovative thinking, thoughtful use of resources (especially the robots, each of which has specific useful characteristics),

> **"Deadline, Suspect and The Witness are excellent for developing deductive thinking."**

well-planned logistics and skillful timing are required to diagnose the damage to the space station and abort the well-meaning but destructive intrusion of the planetary government.

The mysteries Deadline, Suspect and The Witness (Infocom) are excellent for developing deductive thinking. All are murder mysteries set in confined areas where someone is a murderer. The player must solve the mystery by observing the characters, searching for clues, asking questions, confronting the appropriate people with evidence and so on. There's a great deal to be said for learning to ask the right questions. Many people never do learn how.

MAKING FRIENDS AMONG THE HEFFALUMPS

In a sense, an adventure game is inherently educational. This is not the case with fantasy role-playing games, but two of the most popular are excellent learning tools.

Wizardry (Sir-Tech) has been one of the most popular computer games since its release in 1981. A Dungeons & Dragons-type fantasy, Wizardry involves developing parties of up to six characters to explore a multilevel, monster-ridden dungeon and rescue the world from an evil wizard.

That may not sound very educational. But Wizardry has a quality no similar game has achieved: the way its characters are created (with much left up to the player) and develop, combined with their capacity for cooperation and their individual fragility, gives most players a strong sense of reality about the characters. Characters begin relatively weak, unskilled and inexperienced. As the player takes the characters on forays into the dungeon, they gain experience and from time to time advance a level. Advancing a level is announced only in the gathering place outside the dungeon and is treated as an exciting achievement; the character gains strength in some character qualities and sometimes loses a bit in other qualities.

Players come to care about the individual characters they create as if they were real people. Their characters must share and cooperate, using the talents of each to best advantage; they must care for the injured and retrieve the bodies of the dead, who may be revived with good fortune. For many people, developing their characters quickly becomes more important than the "fun" of battle. For those young people who can extrapolate the teamwork and concern they feel for their Wizardry characters into real life, this is a very educational program.

Not all Wizardry-type games have this advantage. The Bard's Tale (Electronic Arts), for instance, is a fun dungeon game, but it lacks these special character-caring qualities. At least part of the reason is that, in The Bard's Tale, a dead character can always be revived, so nothing is at stake; and losing the entire party ends the game—there's no searching and retrieving fallen friends.

TURNING EEYORE INTO SPECTACULAR BID

Ultima IV (Electronic Arts) is superb and gives the player plenty to think about: it's an unabashed morality play, dealing with morals straightforwardly and well. If they're not your morals, well, you won't want it for your kids. But unless you're a total pacifist or a mobster, you'll probably appreciate its lessons.

In Ultima IV the goal is to become an avatar, a perfect person; only an avatar can overcome the villain who is enslaving the good of the world. An avatar must prove himself to have courage, valor, honor, honesty, compassion, spirituality, humility and unselfish generosity. If the character doesn't exhibit these qualities throughout the game, he cannot win; if he acts against them, he loses what he has gained and must prove himself again. What's more valuable, the player must figure out how to exhibit these qualities within the game, so he must think about them and learn what they represent. You cannot play Ultima IV without examining these character traits in some depth.

PARENTAL GUIDANCE SUGGESTED

There are other games that are worthwhile educationally. One game that takes geography seriously in a fun way is Where in the World Is Carmen Sandiego? (Broderbund). This spy adventure comes with a current almanac, and players need to look up geographical information in order to understand clues and solve the mystery. Carmen

continued on page 14

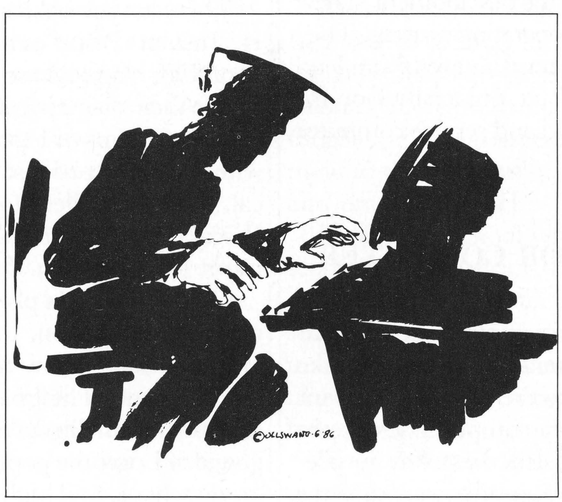
Computer Science on Campus

by GEORGE BEEKMAN and MICHAEL JOHNSON

No question about it: computer science is hot. More than 1200 colleges and universities in North America offer undergraduate programs, and students at many of those institutions are literally begging to get into those programs. What will all of these budding young computer scientists learn about in school? Is computer science a good career path for you or your kids? If so, what's the best way to prepare for it?

WHAT IS IT?

Computer science has only been around for a couple of decades. Young academic fields, like young kids, tend to move too fast to tie down. And since computer science is built around a technology that moves faster than a hyperactive preschooler, it's especially hard to put in a neat little package. That's as it should be. If an academic discipline like computer science is too carefully defined, it may not be able to grow and develop.



Paul Ollswang

Still, the lack of a well-defined core is a concern among computer scientists and industry leaders. The two major computer-science professional organizations, the Association for Computing Machinery (ACM) and the Institute of Electrical and Electronics Engineers (IEEE) Computer Society, have been working separately and together in recent years to establish a more solid identity for computer science. In 1985, the Computer Science Accreditation Board, a joint product of these two organizations, identified several core areas of computer science that could be used in evaluating academic computer-science departments. These are:

- Computer theory: This is primarily a mathematical approach to computational problems such as the processing of character strings and the translation of computer programming languages into the machine's native language.
- Algorithms: An algorithm is a step-by-step process for solving a problem; it's the logical understructure of a computer program.
- Data structures: A data structure is, as the name implies, a logical structure built out of data, or information. (The BASIC array is a simple data structure.)
- Programming concepts and languages: The design and writing of computer programs is what most people think of as computer science, because it's what most introductory computer science courses teach. It's just one piece of the pie.
- Computer elements and architecture: This is the area that concentrates on computer hardware and how it works.

continued on next page

George Beekman is the author of several books on microcomputers, including The Apple Home Companion *(Datamost). Michael Johnson is Secretary/Treasurer of the Small and Personal Computing Systems Special Interest Group of ACM. Both teach in the Computer Science Department at Oregon State University.*

What computer science isn't: It's not electrical engineering, though electrical engineers design computers. It's not mathematics, though mathematicians make important contributions to hardware and software design. And it isn't business administration, though data processing and management information systems (MIS) are critical parts of every major business school curriculum today.

WHAT DO COMPUTER SCIENTISTS DO?

Computer science prepares students for careers in research, design and education. Rather than just write programs, a computer scientist is more likely to ask questions about the process of programming—questions such as "What constitutes good programming practices?" and "How might we design a language that enforces these practices?"

"Computer science is built around a technology that moves faster than a hyperactive preschooler."

Computer scientists lead the development of new compilers, interpreters and operating systems. They are software engineers, systems analysts and lead programmers. They work at universities or for companies that design, build and service computer hardware and software.

GETTING READY FOR COMPUTER SCIENCE

Suppose you're a sophomore in a high school that offers several computer-science courses. You take one of those courses, and you're in love. You want nothing more than to study computer science in a big name college. What's the best way to prepare? Take as many computer-science courses as you can, right?

Not necessarily. One recent study has shown that taking computer-science classes in high school does not improve a student's performance in college computer-science programs. There are several reasons for this surprising finding: many high school "computer-science" courses are nothing more than introductory BASIC programming courses that teach outmoded programming techniques; many high school computer science classes are taught by math or science teachers who have no training in computer science; and many students who take computer science do so at the expense of other classes that might have better prepared them for college.

It's not a bad idea to take computer-science courses in high school if you're considering a computer-science career; it's a good way to get a peek at the field. But current research suggests that the best predictor of success in collegiate computer science is mathematical ability. Computer science grew out of mathematics, and math is still a fundamental. High school students preparing for college computer-science programs should take all the higher math courses they can, including courses from nearby colleges, if possible.

If you're determined to get some background in computer science in high school, you may have to strike out on your own. Alfred Bork, a well-respected computer educator, has called BASIC "the junk food of programming languages." This may be an extreme statement, but BASIC is not a part of standard university computer-science curricula.

The most common language used in beginning and intermediate college courses is Pascal. This language was designed to teach—and enforce—good programming practices and has features that make it an excellent language for coding the algorithms that students learn in their coursework.

There are several Pascal compilers for the Apple II. Instant Pascal and Kyan Pascal run under ProDOS; Apple Pascal and UCSD Pascal run under their own operating systems, and there are several versions of Pascal that run on an Apple II with a CP/M card installed, including Turbo Pascal. All are excellent for learning the language; if Pascal is not taught in your high school, try learning it on your own.

Other languages play important roles in undergraduate education, too. C, Modula-2 and Ada are similar in many ways to Pascal. LISP is a different kind of language used mostly in the study of artificial intelligence. (LISP is the parent language of Logo, the popular language used in many grade schools and high schools.) A background in Pascal will make learning these other languages easier when the time comes.

The above languages are all "higher level" languages that hide many of the messy details of computation from the programmer. Assembly language rips off the cloak of secrecy and reveals the inner workings of the beast. It's not crucial to understand assembly language before college, but it's interesting and educational. The MECC Assembler, published by the Minnesota Educational Computing Consortium, is an excellent software package for learning the basics of machine language. The MECC Assembler includes a graphic simulation of the Apple II central processing unit (CPU) that shows exactly what happens when the computer executes an assembly-language program. There are also many good books on assembly language for the Apple II.

PICKING THE RIGHT COLLEGE

The big three institutions of higher learning for computer science are Carnegie-Mellon University, Massachusetts Institute of Technology and Stanford University. These institutions have a long (for computer science) history of leadership in the discipline. They have outstanding faculties in computer science and related areas of mathematics and engineering.

Not everyone is able to — or wants to — go to one of the big three. Other colleges offer some or many of the same advantages, as well as some of their own. How do you pick the right school?

The Computer Science Accreditation Board (CSAB) has established computer-science accreditation criteria for curriculum, computing resources, students and institutional support. CSAB accreditation means the school is strong in these four important areas. But don't eliminate a program just because it lacks accreditation. The CSAB is new and has only reviewed a few programs. The superstar institutions may not even request accreditation because they may feel they don't need to have additional evidence of their excellence. Many small but excellent programs will not qualify. If a school is not accredited, for whatever reason, you can conduct your own evaluation considering the CSAB criteria. These are:

- Curriculum: About 40 to 60 percent of required courses should be in the core areas listed earlier.

- Faculty: There should be a minimum of five faculty members devoting full time in computer science, and 25 percent of their time should be devoted to scholarly activity other than teaching.

- Students: High student quality should be maintained, including the expectation that students entering the program can enter a calculus course their first semester.

- Computing resources: At least two of the following hardware environments must be present: microcomputer, minicomputer and mainframe computer, with sufficient access to allow time for classwork and individual projects.

- Institutional support: A strong library should contain up-to-date textbooks and the journals and transactions published by ACM and IEEE.

You can compare the first four of the above areas with what you find in the college catalog. A visit to the campus (highly recommended) will reveal the condition of the library.

Another key factor is access to computing equipment — the best equipment is worth nothing if you can't use it. An institution that limits access to students by providing a dollar or resource limit for each course should lose points in your evaluation. Many colleges provide open access to computing resources for their students, but access may still be a problem at those schools if there isn't enough equipment to meet student needs.

Upper-division students at your school should ideally have access to a computer with Unix. The Unix operating system has become important in computer science as a development environment and as a networking medium with the computer world; it's almost a higher education standard.

"BASIC is 'the junk food of programming languages.'"

There are other factors worth considering, too. Institutions located in areas of high computing-industry density (e.g., Silicon Valley, Boston area, Austin) increase contact with industry, which usually feeds ideas, interesting problems and equipment to the program and receives products, ideas, and employees back.

Look for a school with strong departments or schools of engineering, business and mathematics, and a good working relation between the computer-science department and these departments. Don't undervalue the liberal arts school, either; communications skills, both written and oral, are important parts of any education.

Small colleges usually lack some of the requirements for accreditation, but may still have excellent programs. Small colleges often have better student access to computers even though they lack the wide range of equipment found at larger schools. The faculties are smaller, but their emphasis is on education, not research. More individualized instruction and personal attention by the faculty is usually a feature of these institutions.

Finally, a few suggestions on what not to do. Avoid:

- Selecting a college solely because it uses your brand of computer.
- Colleges whose computer-science curriculum is

continued on next page

EDUCATION

mostly or totally programming. They aren't teaching real computer science.
- Colleges that still use punched cards as their main form of computer input. (Unless, of course, you really want to study history.)

These guidelines are designed to help you find a good school for studying computer science. If you've got skill, intelligence, drive and a desire to help design future generations of computer hardware and software, then computer science may just be for you.//

REFERENCES:

- College catalogs, which you can find at public, college and university libraries as well as high school libraries or advising/counseling offices. Also, write to prospective colleges and their computer science departments.
- Peterson's Guide to Graduate Programs in Engineering & Applied Sciences, Peterson's Guides, Princeton, NJ, (609) 924-5338.
- Graduate Assistantship Directory in the Computer Sciences, ACM (see address below), 1-800-526-0359, ext. 75.
- DPMA Model Curriculum for Undergraduate Computer Information Systems Education, Data Processing Management Association, 505 Busse Highway, Park Ridge, IL 60068, (312) 693-5070.
- IEEE Computer Society, 1730 Massachusetts Avenue, N.W., Washington, DC 20036, (202) 371-0101.
- Association for Computing Machinery, 11 W. 42nd Street, New York, NY 10036, (212) 869-7440.

SOTTO VOCE

LEARNING WITH TIGGERS . . .
continued from page 10

Sandiego is a mix, however: a successful commercial program, the package really is educational software without the stigma. However, Carmen Sandiego shares a trait with most educational software that the best games escape: adults, beware. You might well enjoy this game once through—but after that 45-minute stint, you'll leave it to youngsters.

Not so with the Zorks and Ultimas and Wizardrys. Kids often learn an extra lesson with these: how to compete with parents for playing time.

Well, kids, here's a tip: get your folks a copy of *The Tao of Pooh*. That'll keep them away from the computer for a while. And they might learn something too.//

PRODUCT INFORMATION

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by Benjamin Hoff
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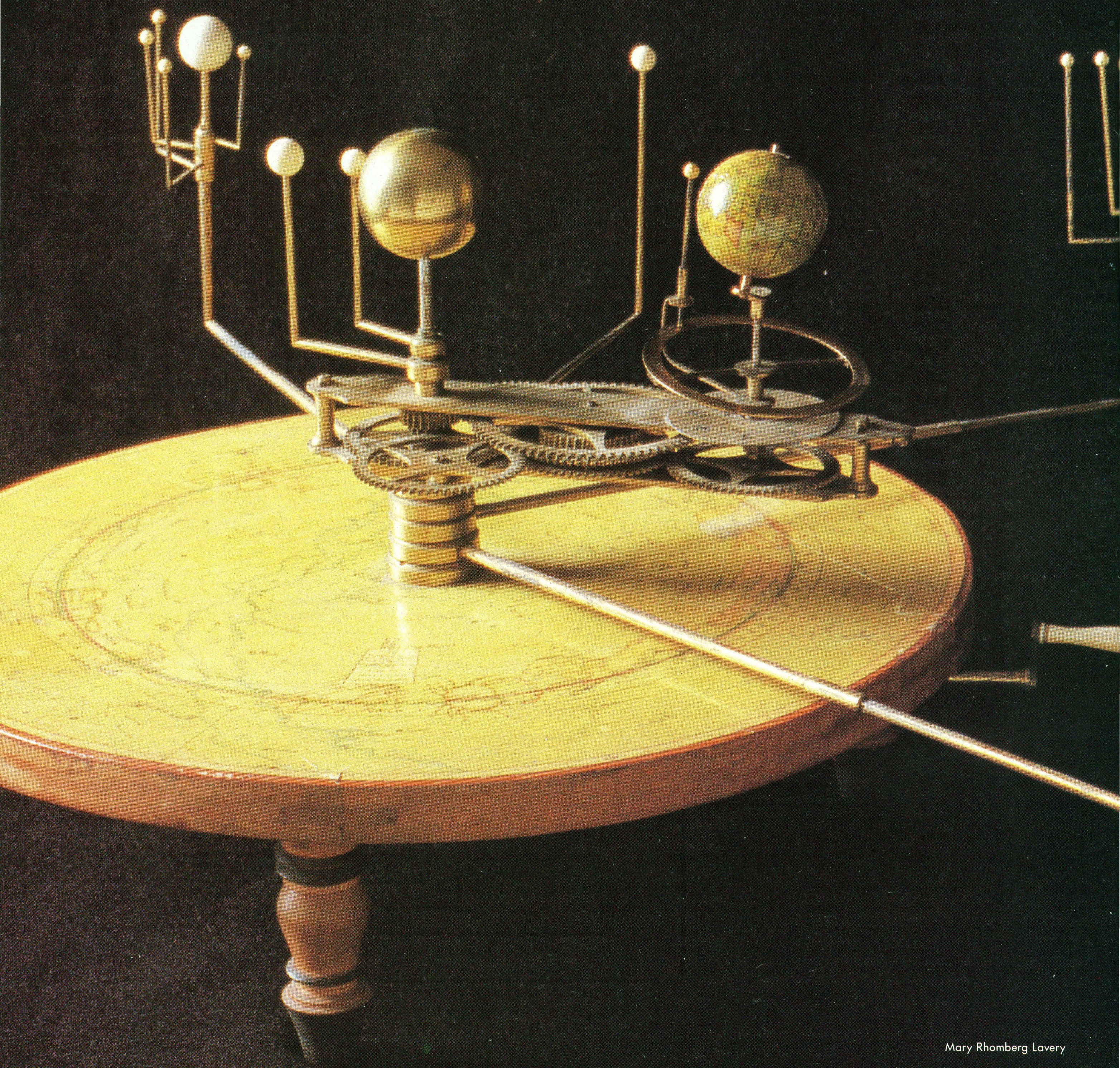
$39.95
CIRCLE **246** ON READER SERVICE CARD

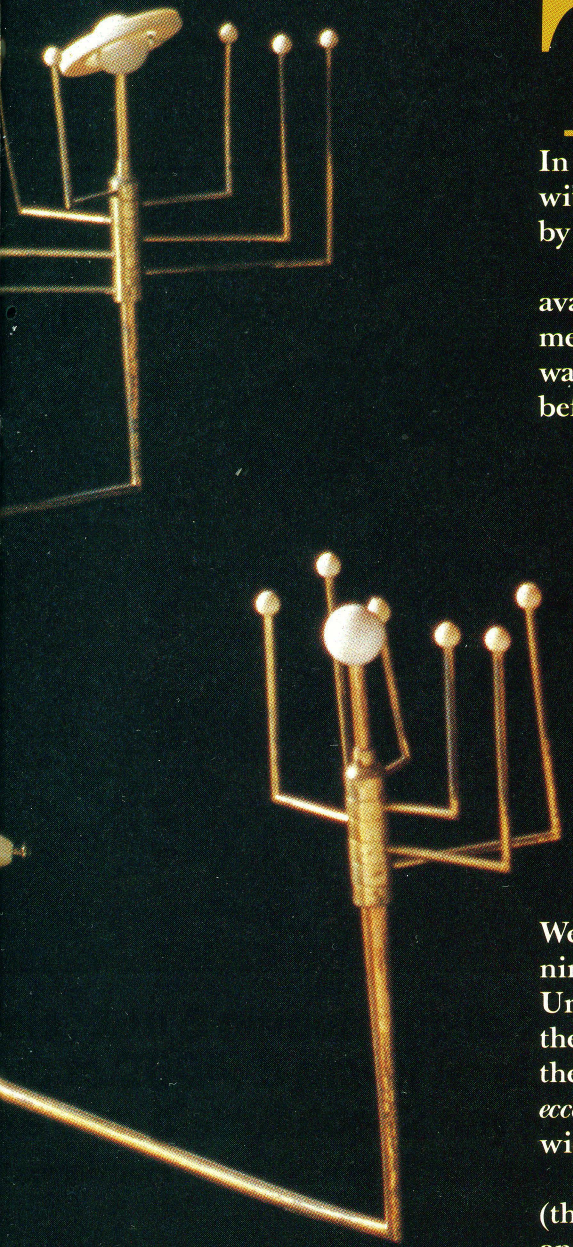
AN ELECTRONIC ORRERY

by DONALD TATTERSFIELD



Mary Rhomberg Lavery

An orrery is a working model of the solar system. Traditionally it is a mechanical device in which each planet is represented by a ball supported at the top of a vertical wire, with a large central ball representing the Sun. The wires are connected to a central mechanism by long rods. When the orrery is operated, the motion of the balls represents the movement of the planets around the Sun.



The name arises from Charles Boyle, the fourth Earl of Orrery (1676-1731), for whom the first one was made in 1712. Since then, some beautiful models have been made, many of which can be seen at science museums. In these orreries the planets are usually represented by ivory balls, with a brass ball for the Sun; the planets are set in motion either by turning a handle or by a spring-driven clockwork mechanism.

An orrery, of course, is based on the astronomical knowledge available at the time it is constructed, and on the limits of the mechanical devices themselves. For example, the planet Uranus was not discovered until 1781, so you will not find an orrery made before that date that includes the planets Uranus, Neptune or Pluto. The outer planets span much greater distances than the inner planets, so many mechanical orreries distort the relative distances of the planets. And even though Johannes Kepler discovered in the early 17th century that the planets move in elliptical orbits, almost all mechanical orreries show circular orbits—mostly because an elliptical orbit is difficult for a mechanical model to portray.

Fortunately, a computerized orrery presents no such difficulties. The orbits can be precisely plotted on your Apple's screen—and you can see as many or as few planets as you like.

THE SOLAR SYSTEM BY APPLE

We are all familiar with the fact that the solar system contains nine planets—Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto, listed in order of their distance from the Sun—that move in their individual orbits. Each orbit has the shape of an ellipse, but each ellipse is of a different size and *eccentricity E*. Eccentricity simply means that the ratio of the orbit's width B to its length A is different for each planet.

The formula connecting these numbers is $B^2 = A^2(1-E^2)$. If E (the eccentricity) is zero, the orbit is circular, since the length and width are equal. If E is larger than zero, then the width is

continued on next page

smaller in relation to the length, and the orbit is an oval. All the orbits have the Sun as a common focus.

The Earth's orbit is along a plane that astronomers call the ecliptic, and the planes of all the other planets are inclined at different angles to the ecliptic. However, they do not vary much; the planets generally move along in their orbits near the ecliptic. The time taken for any planet to complete its orbit around the Sun is known as its period; the larger the orbit, the larger the period. The values that define the shape, size, inclination and period of each planet's orbit are known as the orbit's parameters.

In the ORRERY program in this month's Software Library, those parameters for each planet are embodied in the DATA statements in lines 1330 through 1590; each of the nine sets consists of seven items, and they are worth looking at by themselves. The first item in each group, variable P, is the orbital period in years, ranging from 0.24 (about 12 weeks) for Mercury to 246 years for Pluto. The second item is the eccentricity, CY; while the orbit of Venus is almost circular, those of Mercury and Pluto are much more oval. The fourth item in each group, AM, is half the length of the orbit (counting that of Earth as one). We see that the range of Mercury (0.387) to Pluto (39.3) is quite large; this necessitates the scaling shown in lines 780 and 890. Using scaling, the orbit of the chosen outer planet occupies the full screen, the others being scaled correctly at the same time.

The inclination, in degrees, of each orbital plane to the ecliptic is given as the sixth item, U. Because of the difference in inclinations, a true representation of the solar system would need to be three-dimensional. To bring the display back to two dimensions, the positions of the planets have been projected onto the ecliptic plane, in lines 630-680.

The central action of the program takes place in the subroutine running from lines 1000 to 1080. This routine converts your starting date to a Julian date to assist in the computation of days elapsed since December 31, 1975. The calendar date is displayed by the subroutine at lines 1090-1320, where DT$ is the date; it is, in effect, the reverse process of the Julian date routine. Subroutine 970-980 ensures that the relevant angles fall within the range 0 to 360 degrees, while lines 640 to 670 simply ensure that the longitude LR of a planet is placed in the correct quadrant.

The Bettmann Archives

"An orrery is a working model of the solar system."

RUNNING THE PROGRAM

To use ORRERY, type it in from the Software Library on page 38 and check it with Typo II, or select it from the Action Disk menu. When it runs, you'll first choose which planets you wish to display by specifying an inner planet (the one nearest the Sun) and an outer planet. You can start the solar system at any date within a reasonable time either before or after 1975, and the planets will be displayed in their correct relative positions.

Next you're given the option of choosing the time span in days over which you wish the display to continue, and the interval in days between successive positions of the planets. Pluto, for example, completes a revolution around the Sun in about 246 years, or roughly 90,000 days; to get a reasonable display, you should select about 2000 days between positions plotted. The planets will move forward in their orbits until the chosen time span is exhausted. As the program plots the path of each of the planets, you will see the calendar date at the bottom of the screen.

The positions of the planets have been projected onto the ecliptic plane; the display thus represents a view of the solar system as seen from a point on the same side of the ecliptic plane as the Pole Star.

As you display the planets, you may notice some things you did not expect. The inner planets are much more closely spaced than the outer planets; you will find that if you choose to display too many planets the ones nearest the Sun may overwrite, giving the appearance of a small filled circle near the position of the Sun. You'll also notice a large gap between the orbits of Mars and Jupiter: the asteroid belt. And you may see the orbit of Pluto coming just inside of that of Neptune, making Pluto the eighth planet instead of the ninth. Don't worry—Pluto's orbit is very different from those of the other planets, particularly in eccentricity and inclination. It occasionally swings closer to the Sun than Neptune, and is so at present.

FORWARD INTO THE PAST

Finally, if you would like to see the solar system run backwards, add an extra line:

```
915 IF DJ<0 AND -V>DY THEN 950
```

and make sure you enter a negative value for the chosen time interval DJ at line 370.//

Donald Tattersfield is the author of Halley's Comet *(Basil Blackwell Publishers),* Orbits for Amateurs *and other writings on astronomy and astronautics. He is a member of the British Astronomy Association and a Fellow of the Royal Astronomy Society.*

Apple II and

the LaserWriter

by SCOTT ANTHONY

Now you can explore the world of super-high-quality computer printing with your Apple II! Using the Apple LaserWriter *you can create printing that's near typeset quality, incredibly sharp custom designs, and dazzling graphics effects—just by connecting it to your trusty Apple II, II+, IIe or IIc.*

continued on next page

If you think that's impossible, it's no surprise. Whether by accident or design, Apple, its dealers and almost all reviewers have only discussed using the LaserWriter with a Macintosh, and the manual included with the LaserWriter is written entirely for the Macintosh owner. But with a simple serial connection and a word processor and terminal program for your Apple II, you can tap directly into the LaserWriter's power.

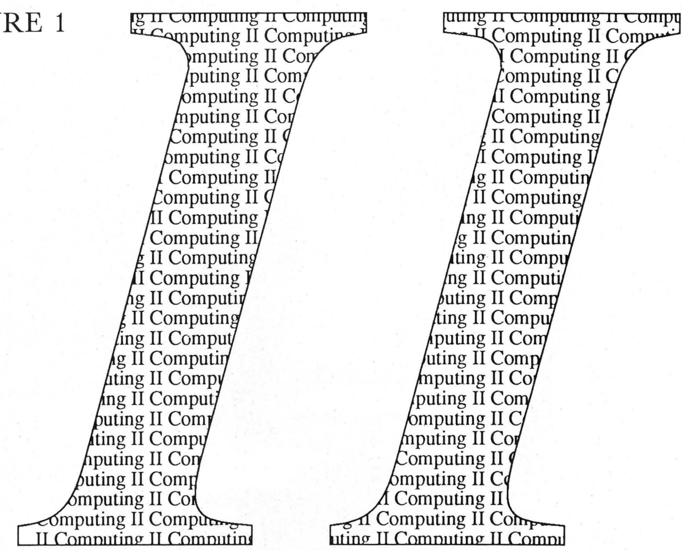
Apple calls the LaserWriter a printer, but it's really a powerful graphics computer that creates its display on paper instead of a monitor. The LaserWriter has a 12 MHz 68000 microprocessor and enough memory to store a complete page as a 300-dots-per-inch picture—more than eight million dots per page. It also has program space and 512K of ROM, which contains the built-in PostScript language and the LaserWriter's built-in fonts.

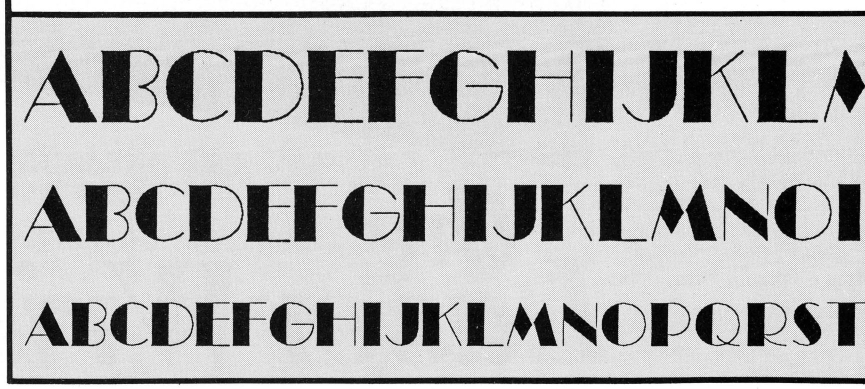
PostScript is the key to the LaserWriter's power. To study this programming language, forget the LaserWriter manual; the books you need were written by Adobe Systems, the developers of PostScript. They're the *PostScript Language Tutorial and Cookbook* and the *PostScript Language Reference Manual*, both published by Addison-Wesley.

PostScript programs are ordinary ASCII text, "printed" through the serial port to the LaserWriter. You can do that using BASIC, Forth or Pascal, but I use Apple Writer IIe; this program makes it simple to direct output to the serial port, and Apple Writer's Word Processing Language can easily load and send sequences of PostScript programs to the LaserWriter.

To illustrate the power that the PostScript language gives a LaserWriter user, I wrote the short program that produced the image in Figure 1. Here's the entire program:

FIGURE 1






```
200 200 moveto
/Times-BoldItalic findfont
400 scalefont setfont
   (II) true charpath clip
   (II) true charpath stroke
/Times-Roman findfont 10
scalefont setfont
200 540 moveto
/ypos 540 def
/cr {/ypos ypos 10 sub def
   200 ypos moveto}def
25{
   20 {(II Computing )show}
repeat cr
   20 {(Computing II )show}
repeat cr
   }repeat
showpage
```

With only 14 short lines of code, I produced a sophisticated graphic image that would have been much more difficult to create without the LaserWriter and PostScript.

Electronics writer Don Lancaster has been using Apple Writer with his LaserWriter for a long time; his company, Synergetics, offers a series of LaserWriter utilities in the form of AppleWriter files. Using Applesoft and machine language, I've written an Apple II-LaserWriter **Screen Dump** that prints hi-res, double hi-res and quad hi-res pictures at almost any size, orientation or position on an 8-1/2-by-11-inch page, with a near-typeset-quality label.

The LaserWriter is expensive: nearly $6000. It could possibly be

continued on page 82

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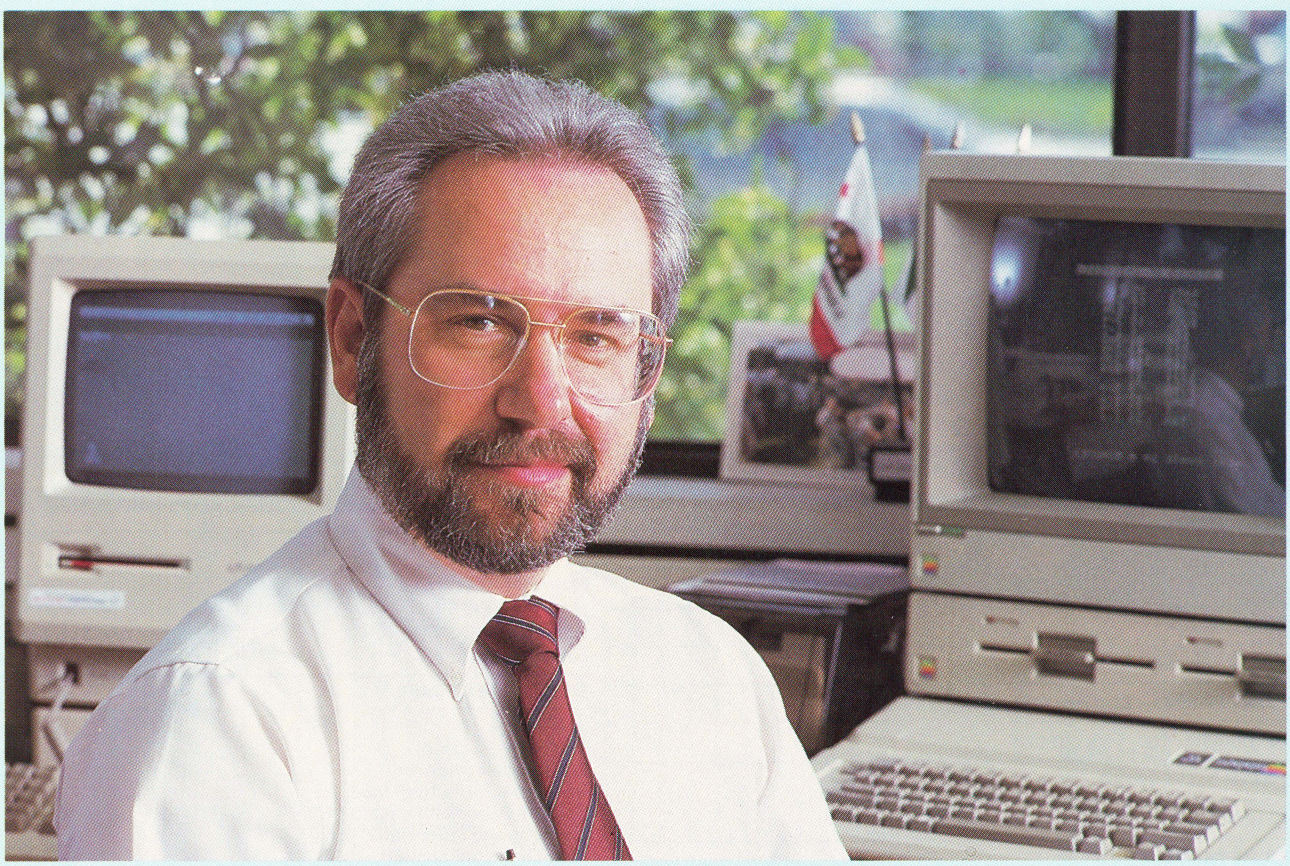


Tia Dodge

From a ground floor, corner office at Apple Computer's world headquarters in Cupertino, California, Delbert Yocam directs the development, manufacturing, management, quality and distribution of all Apple products. Executive vice president and group executive of product operations, Yocam defies the traditional corporate image implied by his title, for he is an outspoken visionary on the subject of computers in education.

He believes, quite simply, that the microcomputer is the first tool since text to really facilitate the learning process. With Apple's technology as his tool, he is trying to solve problems that distress the educational community, such as declining SAT scores, and bring about a revolution in American education. On May 19, 1986, II Computing *discussed Apple's role in education with Mr. Yocam.*

Del Yocam on Computer Ed:

First Important Tool Since Text

interviewed by ANITA MALNIG and MICHAEL CIRAOLO

II Computing: *Where did your interest in education come from?*

Del Yocam: I married a teacher. Janet taught for 11 years in elementary, so I've always been interested in education. I taught for seven years at night, courses like introduction to business, merchandising, marketing. As my kids started through the educational process I was like any other concerned parent. Then as I got involved with Apple I saw the viable benefit of the computer. To me there's not enough discussion or awareness about it.

II C: *Do you see massive changes coming in education? What resistance will they encounter?*

DY: I don't think there is an overnight answer to 200 years of educating American students. And I think that there won't be anything as dramatic as suddenly everyone learning in their homes, and no longer going to a schoolhouse. Just putting computers into schools isn't sufficient. It was initially, because it was just the awareness of what could happen with microcomputing that was exciting. Now, there has to be a realization of what can happen with a classroom of Apple computers. This triggered us to begin to explore with Apple's Classrooms of Tomorrow (ACOT) concept [see sidebar]. At first we thought that you could have a particular curriculum that was based on software, en masse. Well, that was the wrong direction! What we found—and thank God we have these classrooms—is that that is not the case at all. The instructor wasn't necessarily using specific software packages designed for the sixth grade. He had templates that he was able to adapt to what his own lesson plans had to accomplish.

II C: *Can you give us some specifics about the Classrooms of Tomorrow?*

DY: You think of everyone in classrooms looking toward the teacher. Here they had the students all around the sides, facing the windows and the walls. The teacher could download one assignment to everyone, the beginnings of a network. We're excited about having a lab, a real live setting, where we can utilize the latest technologies, before we offer it to the marketplace.

In this case, I came home knowing that that setting would be a perfect spot to try out our Appletalk Network for education. What we want to do is offer each one of the ACOT sites the new technology: compact disks, optical disk storage, new curriculum software.

Also, when we come out with a classroom management package, it will probably be the first. It will allow an individual teacher to do all the things he needs to do, with lesson plans, grading, and the stuff that he needs to turn in to his principal and administration.

II C: *When you say curriculum software, what type of software do you mean? Drill and practice, something based on a textbook?*

DY: That's where we've evolved: incorporating the software with the text. Where I think we're at now is a horizontal application, let's just say for math in grades three through six; something that allows individual

continued on next page

teachers to adapt various texts to what they need to accomplish, depending on the grade level. There needs to be a lot of flexibility built in. So you need the basics. For example, AppleWorks is used a lot in education, because of the integration. Basically it is a horizontal application: spreadsheet, database, word processor. So there are a lot of people who are looking at building templates or applications on top of an AppleWorks program. Ultimately I think you'll find that there'll be several answers that will surface.

II C: *Quantifiable results of computer use in classrooms is a real concern among many educators and parents: if the computers don't lead to immediate higher test scores, they're not going to be accepted. There was an article in* InfoWorld *by a teacher from New York who said she thought that Apple computers were inadequate because they could not measure performance. What's your opinion?*

DY: I think it's a real pressure that teachers are under. You've got one end of the spectrum that says accountability has got to happen, and that's being mandated by the states. The other end of the spectrum says that not everything that's going to be done over the next 10 to 25 years is going to be quantifiable. In fact, the more intuitive software, the type of applications that really get in and cause something to happen within the student, won't necessarily be quantifiable at all.

It's such a dichotomy; that's why we have a full-court press on classroom management, something that allows all of those things to take place, whether it's grading or assessing the students. Ultimately you want to link the classroom to the principal's office, to the administration office, where information can flow up and down. And I think that as we put more AI and expert systems into all of our applications that will allow more and more intuitive-type things, there's going to be a need for both. I never accept the criticism about Apple software, because I know we have a leadership there. I think now, some of our great software for education is going to come through individuals. And it may well come through teachers and groups.

II C: *It's easy to change things in Classrooms of Tomorrow. What about poor schools? In your "Bits And Bytes" speech in Dallas [November 1985], you said Apple has a commitment not to disenfranchise lower socioeconomic groups. Does this mean a commitment to public education?*

DY: Yes. I think that's where it's still at in the United States.

II C: *How can public schools give computers a high priority when people are concerned about overcrowded schools, where there's not enough money for books?*

DY: By trying to work with state governments and looking at new ways of funding. The voucher system has had a lot of press. Where a $600 voucher could be used by an individual district or school it would help the poor districts that don't have ways of earning or funding personal computer purchases.

II C: *If parents could apply this voucher money to private education, what might then happen to public education?*

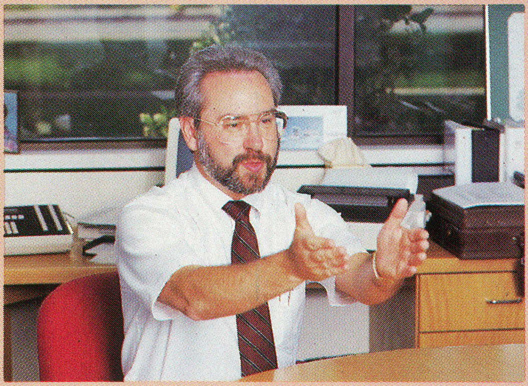
DY: I think you can't say that public would go to private because I don't think that's the case. I think the concept of neighborhood schools is still a very valid one for parents and children, and that's pretty well ingrained into our society. But what the vouchering system would do is give some alternatives, especially in those lower socioeconomic areas.

An awful lot of the purchases now are coming from educational foundation groups set up by individuals in the different school districts. So, when you get to an inner city situation, it has to be a really focused attempt. And it's not necessarily going to come from the parents alone. It's going to have to come from legislation from the states as well.

At the same time, you've got to hit it from both directions. So, it's up to us, the private sector, a manufacturing company, to lead from technology's standpoint. You're going to need the business sector, the parents, the public sector and the legislature working together. And there's got to be more leadership from the governmental side of it, in the individual states. Let's forget about federal; where you see it is in a state like Texas.

IIC: *As an industry leader, what role does Apple take with state government?*

Del Yocam on the New Apple



Yocam offered this glimpse of the new Apple II, the 16-bit "Super II" Apple computer that's scheduled for release this fall:

"In our new, evolutionary II that everybody's been reading about, we've tried to incorporate those things that specifically teachers wanted: better sound, better graphics, more speed, all of that stuff.

"So 'Apple II Forever' means that we want to have a product line that's going to live forever . . . one design center that's Apple II, with multiple products. Open and expandable and always a future generation product. We've tried to incorporate in the hardware those things that are required to have great software. You can't have one without the other. Remember, hardware's the engine that software runs on.

"You'll certainly see more Mac-like applications on the Apple II line, but it is not a Macintosh. Macintosh is 68XXX driven and the Apple II is 65XXX driven, so you've got two different levels of technology."

DY: First of all, we're a very vocal group. We speak at any place we're invited, and we invite ourselves sometimes to make sure that certain messages get across. But wherever we're asked from a governmental standpoint, we will certainly give our advice. I've made it an open invitation to every place that I speak: Let us know what help or assistance or education is needed; we'd be happy to help. It depends upon the attitude in the states, whoever is the superintendent of education.

II C: *With the Classrooms of Tomorrow, you seem to be advocating one child/one computer. It comes up often in educational circles that two kids to a computer really fosters a lot of sharing and good socialization. How do you feel about that?*

DY: I feel good about that. In fact, in Eugene, many times they have two students at one computer. And one would sit there while they were using it, just so the other one could share. For example, in the Black Middle School in Houston I think the ratio is one to four. I think whatever saturation ratio feels right to the individual district, that's when they understand that, hey, my God, we are able to see increased performance. For example, in Eugene, they got a random sampling of skills. It wasn't just the high end, but all spectrums of the skill level. They obviously measured their students at the beginning, and they're going to measure them at the end of the year. It's going to be interesting to see if it was just the upper skill students or the lower skill students that have benefited the most. I don't know what's right yet. It's too early.

II C: *Well, we're still in an experimental stage, but are teachers going to be able to experiment the way they probably should? What's the danger of their getting locked in?*

DY: The district has to foster it. In Houston, the teachers come in and take courses, that's one direction. Then there are districts that don't have many personal computers and look at it as another instructional aid. There are districts that buy 1,000 or 2,000 Apple II computers every year, and they have a regular program of incorporation of the project at one grade level, and another and another. They are working independently with third-party developers to make sure that they get the kind of software they want. It's education of parents, of teachers, of administrators, of governmental people, that has to take place.

II C: *How does the rate of illiteracy fit into all this? Forget about computer literacy; there is rampant illiteracy out there.*

DY: Let me give you a personal example, to show what a microcomputer can do. I had a daughter five years ago who's been brought up on a personal computer. She has read, fluently, for the last year and a half. Not all of that came from a personal computer, we used flash cards and such. But my God, look at the potential this girl is going to have. She's going into kindergarten next year, and she's already reading at a second or third grade level. She is on a personal computer every day. And she uses a lot of Scholastic-type programs; Houston has a set of programs that are very well done for that age, developed for students of English as a Second Language. Elizabeth devoured them early on.

Can you make the correlation that if every child had that exposure, with a dedicated person working with them, a teacher, that that could happen? I don't care what the socioeconomic situation is. I believe it can. We've got to break the code some way so that we can get everyone working together. And that's why it's going to take private and public sectors. You have to constantly get people excited about it to do something about it.

II C: *You're really asking for two revolutions. You're asking for something that brings technology to people, but you're also asking for that one teacher for every student.*

continued on next page

Apple's Classrooms of Tomorrow (ACOT)

One child—one computer. A futuristic notion? A good idea, or not?

Apple Computer is in the process of finding out. Through its educational sales force, Apple solicited proposals from schools around the country on what their concept of a Classroom of Tomorrow would be. Six classes in Eugene, Oregon; Blue Earth, Minnesota; Cupertino, California; Columbus, Ohio; and Nashville and Memphis, Tennessee, received the grants: enough Apple IIe computers for an entire class plus IIc's for each child in those classes to use at home. Houston, Texas, wrote a proposal for a School of the Future and received 210 computers which are being used in the Black Middle School at a ratio of one computer to six students.

"Apple is in this to gain knowledge," stresses Catherine Herrick, ACOT project coordinator. "At this point, it's really an R&D project."

While each school operates independently, the thread running through them all is computer as tool, computer integrated innovatively within a total curriculum.

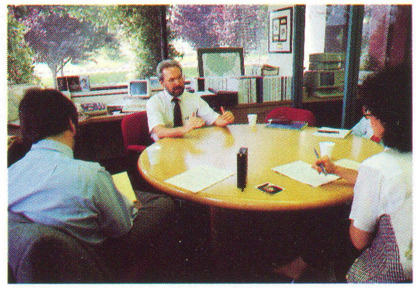
The Memphis class had all their computers installed by October 1985. At that point, 19 of the 29 fifth graders tested at below grade level. In May 1986, only three were below and not by much.

Conclusions? It's too soon to tell, but one thing is clear: the enthusiasm of students and teachers in the Classrooms of Tomorrow.

DY: The teachers were so concerned that personal computers would take their place. It's just the reverse. It creates more jobs. What happens to teachers is they get away from this download, this lecturer, to where they become a facilitator. And you can work with more students individually. So their jobs get more rewarding. To me it is going to require more people, and it will help to elevate the level of competency, and knowledge, and self-fulfillment of educators.

II C: *What do you think of IBM's Writing to Read package? [The Writing to Read program requires a bulk purchase of 10 PCjr's and that a child spend one hour a day on the PCjr. It uses phonetic spelling: a child writes words as she hears them. Spelling skills are taught separately.]*

DY: There may be some districts that want to have the whole package. We think of IBM as being very centralized, mainframe oriented,



and wanting to link, so that in effect the personal computer is a terminal. We think of a more distributed data processing type of environment; there are individual units that become connected, and the real value is in the connectivity. So we're coming at it from the individual side, more than from a centralized point of view.

II C: *With computer use do we run the risk of lowering certain other skills, like handwriting? If kids start word processing at a very early age, is that skill going to fall by the wayside?*

DY: I think it's just the reverse, because they see the print. They can get on the computer and do things at an earlier age that they don't have their motor skill coordination. I watched Elizabeth as she would see a sentence constantly on the screen. Her natural thing was she wanted to start to write that herself. When she couldn't, she just kept practicing and practicing. Do you know how my wife solved the problem? Went out and bought her stencils. And that's the way she learned to print—stencils—and she could maneuver these stencils so fast, and write the sentences, and then she started writing letters.

II C: *So there's a combination of tools there?*

DY: Yes! Yes! And she reads books, she devours books. She's read *Alice in Wonderland, The Wizard of Oz*, all of these. I think the combination of these different tools plus her mother, who was working with her, is what's going to give her such a jump on life. But you can use that concept in any family. You don't have to be executive director of Apple Computer. If you want to have a personal computer and you believe that it is a tool. . .And so those are the kinds of messages that you see us have in print and in commercials. There is real value!

I visited the ACOT site in Eugene, and the biggest thing about that day was that I came away knowing we're on the right track. Lunch time came, and the computer room immediately filled up. The children would bring their friends back into the classroom, or kids that didn't have the advantage of being in the sixth grade class would come in. The room was overloaded with kids who couldn't wait to get on an Apple II. I knew—I know we're doing the right thing. I just want it to go faster.//

Anita Malnig is editor of **II Computing.** *Michael Ciraolo is special projects editor for Antic Publishing, Inc.*

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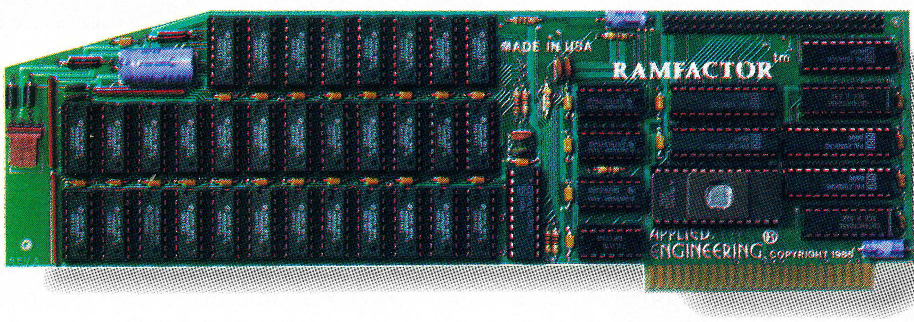

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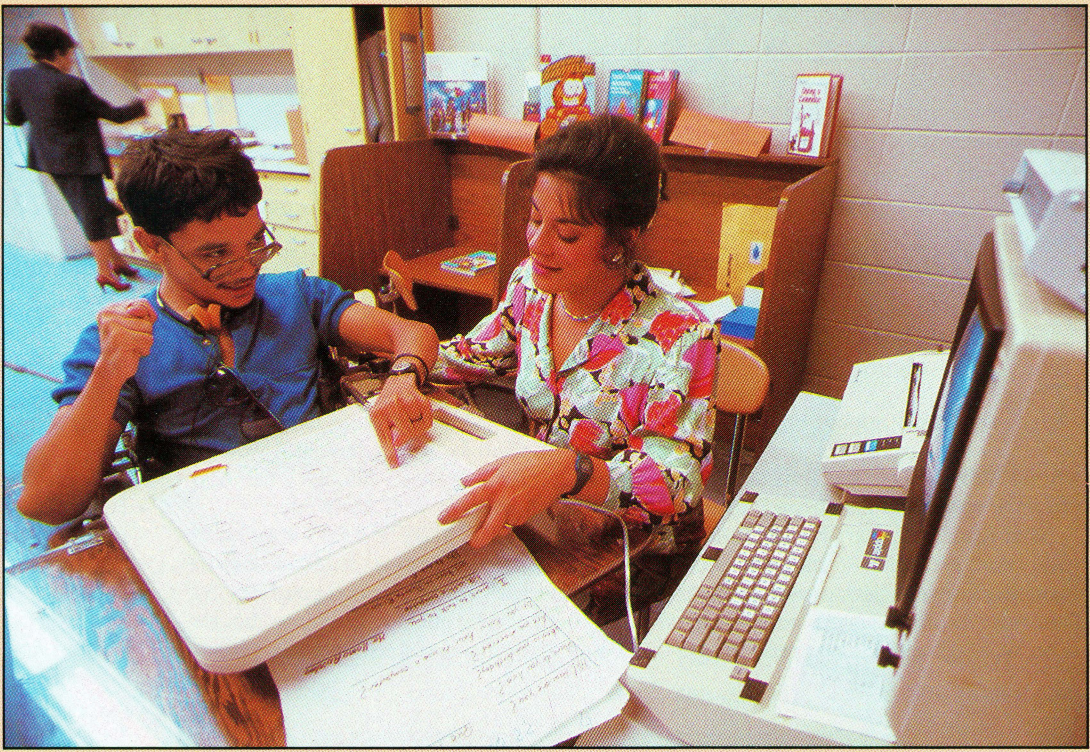
Anselmo Aviles operates his "power pad." A former graphics tablet, it's been turned into a talking communication system that uses "Touch and Write" software developed by Boston's Children's Hospital. Madalaine Pugliese is pictured with him.



New Vistas for Disabled

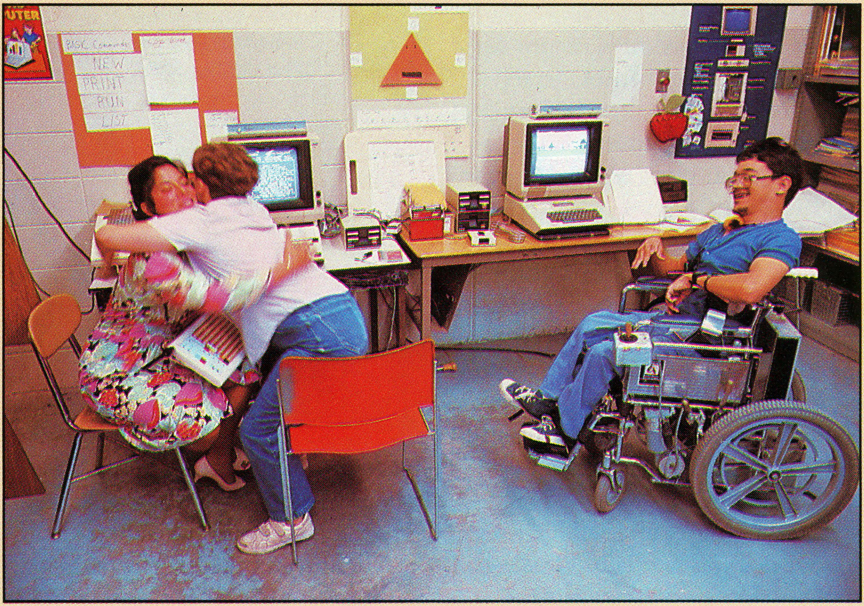
Computers Lead the Way

by NEILL S. ROSENFELD

PHOTOGRAPHY by JOHN PAWLICK

In Boston, Massachusetts, a student with cerebral palsy gleefully rolls his wheelchair into the gym. With his computer he directs a robot turtle to cavort as he can't, circling a tower of blocks and then knocking them over. Geometry has become three dimensional—and fun.

Denise Guiggio shows Ms. Pugliese her appreciation. Anselmo Aviles looks on.



In Fort Worth, Texas, a retarded woman with an IQ of 19—her body frozen into an arch—no longer vegetates in bed, as she has for 42 years. With a voice-activated computer keyed to her few intelligible words, she turns on and off videotapes, a pad that vibrates under her and a radio tuned to country music. For the first time, she is not totally dependent on others to guess her needs and meet them.

And on Staten Island in New York City, youngsters at a high school for troubled students are murdering their principal. Writing mysteries on a computer, particularly with school personalities as victims or perpetrators, sustains the interest of kids with limited attention spans while unlocking creativity and providing time to learn writing skills, their teacher found. One reason there's more time and interest in writing is because the students aren't always recopying papers because of poor penmanship or typing.

"Computers have revolutionized special education," says Jan Eisenbarth of the Council for Exceptional Children, an international organization that provides information on learning disabilities (800-345-TECH; in Virginia (703) 620-3660). "They give teachers the freedom to spend more time with students who need one-to-one help."

For the student, she says, "the computer is much more tolerant and patient than a teacher; if a child is slow or makes a mistake, the computer keeps questioning until the student understands, and it won't get frustrated. When a student solves a problem, the computer pops up the next one, while a book won't turn its next page over.

"Second, it's a tool for word or data processing that allows learning disabled children to feel just as proud of their work as other children. And third, it lets physically handicapped children control their environment, such as by dialing the phone. So it's a life-supporting tool that makes them more independent," she says.

Alan Brightman, Apple Computer's special education director, says there are 4.5 million learning disabled children in America—more than 20 percent of the school-age populace—with problems ranging from stuttering to retardation. Most use computers for the same reasons as other kids: for communication

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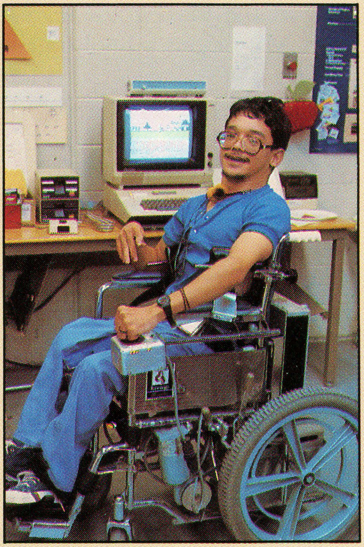


Anselmo Aviles

"Can you image a child speaking for only a few hours a day—and then not with his family? I wake up at night thinking about this."

and learning.

"But consider what it means for a nonverbal kid to be able to tell a joke through a voice synthesizer. If you are blind and in a regular classroom, you can print out a story in both Braille and type, so your friends can read it. Think of the impact things like that have on someone's self-worth, to be like other people," Brightman says.

"It gets really dramatic with people who can't move from the nose down. With a puff straw (which activates the computer by blowing) or an eyebrow switch, they can do anything," he says. "It may take a long time to spell out words by raising a brow to tell the cursor to stop on a letter displayed at the bottom of the monitor, but if that's your only way to communicate, it's a glory."

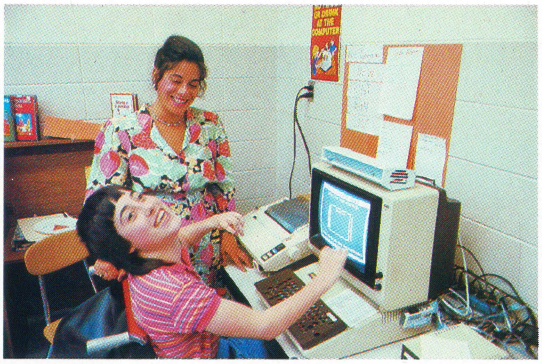
Better communication was a goal that Budd and Dolores Hagen set for their profoundly deaf 13-year-old son, Marc, in 1981. He was then reading at the third-grade level.

With Minnesota school officials able to offer little more than a suggestion that a computer might help, they decided they had to become their own experts. They discovered that word processing could strengthen Marc's language skills, which, like those of many deaf people, were marred by abbreviations and poor grammar, spelling and structure.

In September 1986, his skills computer honed, Marc becomes a high school senior. Last year was his first in a regular English class, and he earned A's and B's as he churned out 2,000 words a week of fiction and poetry.

Meanwhile, the Hagens have built a national reputation publishing *Closing the Gap*, a bimonthly magazine that describes hardware and software for the disabled ($21, P.O. Box 68, Henderson, MN 56044).

"Teaching now should be substantially different," Mrs. Hagen says, "but the education system is having great difficulty implementing this technology, partly because teachers are expected to learn about it in their preparation time. You can't expect a teacher to have half an hour a day [for studying] and work magic."



Mindy Cheever uses her Apple II with a Votrax speech synthesizer. Madalaine Pugliese stands by her.

Availability of computers remains a problem at a time of federal and local budget cuts. "The average in the U.S. now is 67 kids to one computer. With special education, that has to be gotten down to 1 to 1," she says.

No one is more aware of that than Madalaine Pugliese, head of Boston's special education technical resource center, which serves the 12,000 disabled children in the 55,000-student system. The city pays her salary and funds a basic hardware and software lending library, but she had to raise another $100,000 from private sources to fuel her operation.

"It's a drop in the bucket," she laments. "We have eight kids sharing one system to speak or write with. And students can't take these devices home. Can you imagine a child being able to speak for only a few hours a day—and then not with his parents or brothers or sisters? I wake up in the night thinking of this."

Cost is a major consideration. Hardware can range from under $10 for simple switches she builds at home to $4,000 for Digital's luxury Dectalk voice synthesizer with eight voices, including child, grandmother and French and Spanish accents. A $100 voice synthesizer can do the job, but sounds less natural and leaves a girl with a man's voice. And then there's the computer, typically $1,000.

Pugliese, like other experts questioned, favors Apple IIs because their open architecture allows for easy adaptation. And there is a host of specialized software available. Magic Slate (Sunburst Communications), for one, with its 20-column mode works well with low-vision students, and Boston's Children's Hospital has developed several programs for nonverbal users that Pugliese uses often.

Boston fraternal groups have donated equipment for the personal use of handicapped kids, and recently the Massachusetts Medicaid system was ordered to cover computer-driven devices that physicians prescribe, Ms. Pugliese says.

Meanwhile, special education hardware and software is proliferating. Optical scanners read printed books aloud for blind students. Plastic grids guide the fingers of youngsters with poor muscle control onto the right keys. Touch-sensitive screens do away with keyboards altogether. One program allows functions that require multiple, simultaneous keystrokes to be hit sequentially.

"Materials for special education must be very carefully constructed. You can't make any assumptions," says Teri Perl of The Learning Company, a respected software firm in Menlo Park, California.

David Rubin of the American Institutes for Research, a nonprofit corporation in Palo Alto, Cal., is developing software to help children make the jump from phoenetic reading to gulping in words at a glance.

"They'll sound out every syllable and have little idea what they've read," he says. "It's taken all their cognitive capacity to do that phonetic decoding. A normal reader discovers you don't have to sound words out but can recognize them. The word 'dog' is tall in the front and hangs down at the back and is a short word.

Denise Guiggio operates her Vois 130, lying it on Ms. Pugliese's lap. This is a dedicated speech synthesizer Denise carries around with her the way some kids carry "ghetto blasters."

Using cues like that you can decode a word fast."

His program, being tested in Cupertino, drills kids on easily confused letters; "b" is a rotated "p," for example. To recognize words by their shapes, children match stylized patterns; "bat," looking like two office towers flanking a shorter building, would be mixed with similar shapes.

Since the ideas are to recognize letters or words without stopping to think and to keep the child's interest, Rubin speeds the tasks as proficiency increases. And he makes it fun: with every right answer, a pile of gold appears and, at the end, creatures appear to pile up the booty.

"There's no way to do this without a computer," Rubin says. "A teacher would go crazy with flash cards and couldn't even change them fast enough."

Computers are just starting to be used with the retarded. Carrie Brown of the Association for Retarded Citizens of the United States in Arlington, Texas, is pioneering with Shirley Jennings, a profoundly retarded 42-year-old patient at a state hospital.

Shirley quickly recognized that by saying one of her few easily intelligible words, she could get a voice-activated Apple to switch on a videotape of fairy tales. "She immediately understood she did it and yelled at everyone to look," Dr. Brown says. "Her entire face, her being, reacted dramatically. We all stood around and cried."

Shirley learned to use different words to activate a vibrating pad, a radio and a videotape of her family. Shirley switches devices on and off just for the pleasure of exercising control. Recently, Dr. Brown hooked up an electric train to her computer. "All the other ladies come in in their wheelchairs. Shirley says 'choo choo' and they all laugh to see it run around. It's become a big social thing for these people to be involved with," she says.

On Staten Island, 52 Apple computers are a key educational tool at Concord High School, an "alternative" school for 270 youngsters who couldn't make it in a regular school. Most are several years below grade level, many have learning disabilities, and a good number have the poor spelling and penmanship that turn writing by hand into frustration.

"I was having difficulty motivating these kids last year, so I took a creative writing approach," says teacher Michael Blyth. "The word processor has a real appeal for kids. And they can concentrate on how something is said rather than on what it looks like. Now they love to write."

Brad Bozzo, a sophomore who was hard at work on a murder mystery, said of both Blyth's teaching and the computer, "They make me think."//

Neill S. Rosenfeld is a New York City freelance writer.

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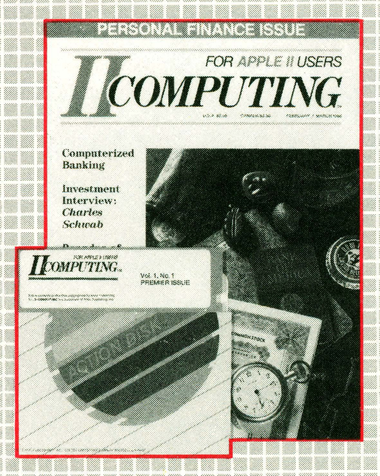

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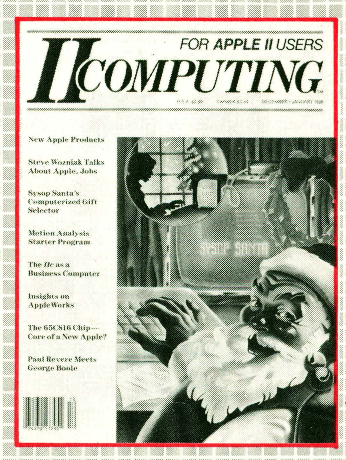

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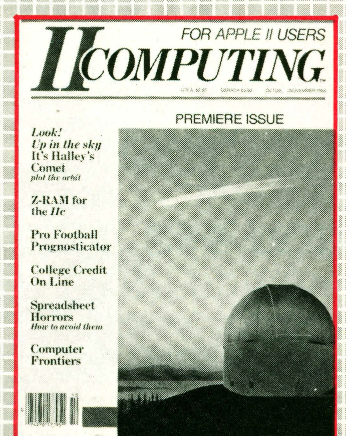

SOFTWARE LIBRARY

II Computing*'s type-in listing section includes every full-length program from this issue. Since they're included all together, it's easy to remove and save them in a binder if you wish. All programs work with both DOS 3.3 and ProDOS unless otherwise noted.*

NOTE: *If you have the Action Disk version of* ***II Computing****, you can use all these programs immediately. Just boot the disk and, when the menu appears, move the inverse bar to highlight the program title and press RETURN. To restart the menu, quit the program and type RUN STARTUP.*

The Action Disk also contains a program for converting to DOS 3.3. Boot the Action Disk and, at the menu, press ESC. At the] prompt type BRUN CONVERT, then follow the screen instructions. Your destination disk must already be formatted for DOS 3.3. To set direction of transfer, press R; to start the conversion, press T.

Softstrip From Cauzin Systems

These Cauzin Softstrips contain programs from this issue's Software Library. You can read each Softstrip directly into your Apple II, II+, IIe or IIc with a Cauzin Softstrip Reader, available from many computer stores for $199. The Softstrip Reader can also read the strips in books and other magazines.

If you don't own a Softstrip reader, call Cauzin Systems at 1-800-533-7323 (in Connecticut, (203) 573-0150) for the address of the nearest store with an Apple and a Softstrip Reader. Then bring this issue of ***II Computing*** and a formatted DOS 3.3 or ProDOS disk to the store for a demonstration. The dealer will transfer the files from Softstrip to disk free of charge, and you'll see how easy getting software out of a magazine can be.//

This Softstrip contains Tracy and Lori Hershey's CASTLE GAME (see page 68).//

1C 2C 3C 4C

TYPO II (TYPE YOUR PROGRAM ONCE)

TYPO.II is the automatic proofreading program for ***II Computing***'s Software Library. It generates a two-letter code for each line in a BASIC program. It also produces a total checksum for the entire program. When you use TYPO.II, it should give you the same letter codes and checksum that appear in the Typo II Table for that program. If it doesn't, you've mistyped a line.

To use TYPO.II, type in the program on this page and then SAVE it as TYPO.II.MAKER. Then type RUN TYPO.II.MAKER. This creates a text file called TYPO.II, which is the actual proofreading program.

Now, for each BASIC program you want to use from the Software Library:

1. Type in the BASIC program. Be sure to include all REM and DATA statements, and all spaces within quotes. When the program is complete, SAVE it on disk. Then LIST the program to make sure it's still in memory.
2. Type EXEC TYPO.II and press RETURN. A list of two-letter codes and the total checksum will be printed on the screen. (You can send this information to your printer by typing PR#1 before you type EXEC TYPO.II.) Compare the codes and checksum to those printed in the program's Typo II Table, listed with it in the Software Library.
3. If a two-letter code does not match the code in the Typo II Table, correct the BASIC program line. If the total checksum does not match, make sure that every line is in the program. Then type EXEC TYPO.II and check the codes and checksum again. Repeat the process until all the codes and the checksum match.

Then SAVE the corrected type-in program to disk. It's now free of typing errors and ready to run!//

```
10 D$ =  CHR$ (4)
20  PRINT D$;"OPEN TYPO.II": PRINT
    D$;"WRITE TYPO.II"
30  LIST 63000,63150
40  PRINT "RUN 63040": PRINT D$;
    "CLOSE"
50  NEW
63000  REM * TYPO II, VERSION 1.
    1
63010  REM * BY GERRY VILLAREAL
    AND FRANK HAYES
63020  REM * (C) 1985, 1986 ANTI
    C PUBLISHING INC.
63030  REM * II COMPUTING
63040  TEXT : HOME : PRINT  SPC(
    11);"CODE", SPC( 5)"LINE NO.
    ": POKE 34,1
63042  DEF  FN PK(X) =  PEEK (X)
     + 256 *  PEEK (X + 1)
63050 CH = 0:S =  FN PK(103)
63060 S1 = S + 3:N =  FN PK(S):L
    INE =  FN PK(S + 2): IF LINE
     = 63000 THEN 63140
63070 LV = 0: FOR A = 1 TO 255
63080 C =  PEEK (S1 + A): IF C =
     0 THEN 63100
63090 LV = LV + C * A: NEXT A
63100 CODE = LV -  INT (LV / 676
    ) * 676
63110 HCODE =  INT (CODE / 26):L
    CODE = CODE - HCODE * 26
63120  PRINT  SPC( 12); CHR$ (HC
    ODE + 65); CHR$ (LCODE + 65)
    ; SPC( 8);LINE
63130 CH = CH + LV + LINE:S = N:
     GOTO 63060
63140  PRINT  SPC( 7);"TOTAL CHE
    CKSUM = ";CH: POKE 34,0
63150  DEL 63000,63150
```

AN ELECTRONIC ORRERY

Article on page 16

```
10  REM  * ORRERY
20  REM  * BY DONALD TATTERSFIEL
    D
30  REM  * (C) 1986 ANTIC PUBLIS
    HING, INC.
40  REM  * II COMPUTING  VOL.1
    NO.6
45  ONERR  GOTO 960
50  DATA  2,0,6,0,8,0,5,0,29,45,
    21,63,63,46,45,53,59,63,0
70  FOR I = 768 TO 768 + 18: READ
    S: POKE I,S: NEXT I
80  POKE 233,3: POKE 232,0: REM
     SHAPE TABLE ADDRESS
90  TEXT : HOME : FOR I = 2 TO 4
    : VTAB I: PRINT "*";: HTAB 3
    9: PRINT "*": NEXT
100  VTAB 1: FOR I = 1 TO 39: PRINT
    "*";: NEXT : VTAB 3: HTAB 17
    : PRINT "ORRERY": VTAB 5: FOR
    I = 1 TO 39: PRINT "*";: NEXT
    : POKE 34,5: PRINT
110  VTAB 7: HTAB 9: PRINT "MOTI
    ON OF THE PLANETS"
120  DIM P(9),CY(9),W(9),AM(9),O
    (9)
130  DIM U(9),PE(9),LP(9),UN(9),
    ZR(9)
140  DIM DR(9),SR(9),SD(9),CD(9)

150  DIM PR(9),PS(9),LR(9),LD(9)

160  DIM RD(9),X(9),Y(9),R(9),N(
    9)
170 P$ = "MERCURYVENUS  EARTH M
    ARS   JUPITERSATURN URANUS N
    EPTUNEPLUTO  "
180  FOR Q = 1 TO 9
190  READ P(Q),CY(Q),W(Q),AM(Q),
    O(Q),U(Q),PE(Q)
200  NEXT Q
210  PRINT
220  PRINT "*MERCURY =1 ....PLUT
    O =9*"
230  PRINT
240  INPUT "SELECT INNER PLANET"
    ;IP
250  PRINT
260  INPUT "OUTER PLANET";OP
270  PRINT
280 PI = 3.14159265
290 CC = 180 / PI
300  DEF  FN A(Z) =  ATN (Z /  SQR
    ( - Z * Z + 1))
310  PRINT "*INPUT STARTING TIME
    FOR ORRERY*"
320  PRINT
330  INPUT "YEAR, MONTH, DAY?";Y
    ,M,J
340  PRINT
350  INPUT "HOW MANY DAYS DO YOU
    WISH TO COVER?";DY
360  PRINT
370  INPUT "CHOSEN TIME INTERVAL
    (DAYS)?";DJ
380  PRINT
390  HOME : HGR :DT$ = ""
400 K = 0: POKE  - 16368,0
410  SCALE= 1: ROT= 0
420  REM **LOOP POINT*****
430  GOSUB 990
440 DA = (I - 2442412) + (D - 0.
    5)
450  GOSUB 1080
460  FOR Q = IP TO OP
470 N(Q) = (360 / 365.25) * (DA /
    (P(Q)))
480 A = N(Q)
490  GOSUB 970
500 N(Q) = A
510  NEXT Q
520  FOR Q = IP TO OP
530 LP(Q) = N(Q) + (360 * CY(Q) /
    PI) *  SIN ((N(Q) + PE(Q) -
    W(Q)) / CC) + PE(Q)
540 A = LP(Q)
550  GOSUB 970
555 K =  PEEK ( - 16384): IF K >
    127 THEN  POKE  - 16368,0: GOTO
    960
560 LP(Q) = A
570 UN(Q) = LP(Q) - W(Q)
580 ZR(Q) = AM(Q) * (1 - CY(Q) *
    CY(Q)) / (1 + CY(Q) *  COS (
    UN(Q) / CC))
590 DR(Q) = (LP(Q) - O(Q)) / CC:
    SR(Q) = U(Q) / CC
600 SD(Q) =  SIN (DR(Q)):CD(Q) =
     COS (DR(Q))
610 PR(Q) =  FN A( SIN (DR(Q)) *
     SIN (SR(Q)))
620 PS(Q) = PR(Q) * CC
630 LR(Q) =  ATN ( TAN (DR(Q)) *
     COS (SR(Q))) + O(Q) / CC
640  IF  SGN (SD(Q)) = 1 AND  SGN
    (CD(Q)) = 1 THEN LR(Q) = LR(
    Q)
650  IF  SGN (SD(Q)) = 1 AND  SGN
    (CD(Q)) =  - 1 THEN LR(Q) =
    LR(Q) + PI
660  IF  SGN (SD(Q)) =  - 1 AND
     SGN (CD(Q)) =  - 1 THEN LR(
    Q) = LR(Q) + PI
670  IF  SGN (SD(Q)) =  - 1 AND
     SGN (CD(Q)) = 1 THEN LR(Q) =
    LR(Q) + 2 * PI
680 LD(Q) = LR(Q) * CC
690 RD(Q) = ZR(Q) *  COS (PR(Q))

700  NEXT Q
710  HCOLOR= 3
720  HPLOT 140,80
730  HPLOT 145,80 TO 279,80
740 COLOUR = 7
750  FOR Q = IP TO OP
760  IF COLOUR = 3 THEN COLOUR =
    7: GOTO 780
770 COLOUR = 3
```

```
780 R = 60 / AM(OP)
790 R(Q) = R * RD(Q)
800 X(Q) = R(Q)*  COS (LR(Q))
810 Y(Q) = R(Q)*  SIN (LR(Q))
820 X1 = X(Q) + 140:Y1 = 80 - Y(
   Q)
830  REM IF K * DJ < P(Q) * 365
   THEN  HCOLOR= COLOUR: DRAW 1
    AT X1,Y1: GOTO 860
835  REM  DRAW 1 AT X1,Y1
840  HCOLOR= COLOUR
850 FIRST(Q) = FIRST(Q) + 1
855  XDRAW 2 AT X1,Y1: IF FIRST(
   Q) > 1 THEN  XDRAW 2 AT LX(Q
   ),LY(Q)
856  IF DJ < 7 AND FIRST < 1 THEN
    XDRAW 1 AT LX(Q),LY(Q)
860 LX(Q) = X1:LY(Q) = Y1
880  NEXT Q
890 K = K + 1
900 J = J + DJ
910 V = K * DJ
920  IF V > DY THEN 960
930  VTAB 22
940  PRINT  TAB( 1); MID$ (P$,7 *
   IP - 6,7);" TO "; MID$ (P$,7
    * OP - 6,7); TAB( 28);DT$
950  GOTO 420
960  TEXT : HOME : PRINT " RUN A
   GAIN? (Y OR N)  ";: GET K$: IF
   K$ = "Y" THEN  RUN
965  END
970 A = A -  INT (A / 360) * 360
980  RETURN
990  REM ****JULIAN DATE***
1000  IF M > 2 THEN 1040
1010 I = 365 * Y +  INT ((Y - 1)
    / 4) -  INT ((Y - 1) / 100)
    +  INT ((Y - 1) / 400) + 17
   21059
1020 D = 31 * (M - 1) + J + 0.5
1030  GOTO 1060
1040 I = 365 * Y +  INT (Y / 4) -
    INT (Y / 100) +  INT (Y / 4
   00) + 1721059
1050 D = 31 * (M - 1) -  INT ((M
    - 1) * 0.4 + 2.7) + J + 0.5

1060 I = I +  INT (D):D = D -  INT
    (D)
1070  RETURN
1080  REM **CALENDAR DATE**
1090 JD =  INT (I + D) + 0.5
1100 II =  INT (JD + 0.5)
1110 FF = JD -  INT (JD)
1120  IF II < 2299160 THEN 1160
1130 AA =  INT ((II - 1867216.25
    ) / 36524.25)
1140 BB = II + 1 + AA -  INT (AA
    / 4)
1150  GOTO 1170
1160 AA = 1
1170 CD = BB + 1524
1180 DZ =  INT ((CD - 122.1) / 3
    65.25)
1190 EE =  INT (365.25 * DZ)
1200 GG =  INT ((CD - EE) / 30.6
    001)
1210 DD = CD - EE + FF -  INT (3
    0.6001 * GG) - 0.5
1220  IF GG < 13.5 THEN 1250
1230 MM = GG - 13
1240  GOTO 1260
1250 MM = GG - 1
1260  IF MM < 2.5 THEN 1290
1270 YY = DZ - 4716
1280  GOTO 1300
1290 YY = DZ - 4715
1300 DT$ =  STR$ (YY) + " " +  STR$
    (MM) + " " +  STR$ (DD)
1310  IF  LEN (DT$) < 10 THEN DT
    $ = DT$ + " "
1320  RETURN
1330  DATA  0.24085,0.205629,77.
    06645
1340  DATA  0.387099,48.03493,7.
    00427
1350  DATA  320.66305
1360  DATA  0.62521,0.006785,131
    .21928
1370  DATA  0.723332,76.45475,3.
    39438
1380  DATA  310.974453
1390  DATA  1.00004,0.016720,102
    .51044
1400  DATA  1.00000,0,0
1410  DATA  99.53431
1420  DATA  1.88089,0.093382,335
    .59881
1430  DATA  1.523691,49.36466,1.
    84983
1440  DATA  249.62919
1450  DATA  11.86224,0.04860,13.
    91992
1460  DATA  5.202804,100.19608,1
    .30450
1470  DATA   355.21414
1480  DATA  29.45771,0.055630,92
    .55833
1490  DATA  9.53844,113.43842,2.
    48933
1500  DATA   104.17278
1510  DATA  84.01247,0.047250,17
    0.25472
1520  DATA  19.181854,73.87283,0
    .77316
1530  DATA  205.78286
1540  DATA  164.79558,0.008586,4
    4.40592
1550  DATA  30.057960,131.50506,
    1.77236
1560  DATA  249.91462
1570  DATA  246.378,0.246115,224
    .2580
1580  DATA  39.29976,101.9986,17
    .14451
1590  DATA  202.3345
4970 A = A -  INT (A / 360) * 36
    0
```

TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
DD	10	OX	555	GV	1070
BR	20	VO	560	WI	1080
UP	30	DL	570	LA	1090

continued on next page

FS	40	KB	580	LE	1100
RQ	45	RE	590	HE	1110
JB	50	QD	600	CZ	1120
IP	70	WZ	610	EW	1130
AD	80	QJ	620	LN	1140
PZ	90	WF	630	HS	1150
UM	100	EM	640	NB	1160
UV	110	MB	650	LQ	1170
WE	120	SV	660	QW	1180
QO	130	HO	670	HR	1190
DO	140	NZ	680	AE	1200
PD	150	JH	690	TF	1210
LC	160	LG	700	YR	1220
TS	170	JO	710	CT	1230
PA	180	FD	720	HR	1240
BR	190	UA	730	NB	1250
LG	200	HU	740	WX	1260
HE	210	WG	750	VC	1270
HQ	220	LR	760	GW	1280
HE	230	GO	770	US	1290
WS	240	NI	780	WH	1300
HE	250	SO	790	MT	1310
PA	260	LH	800	GV	1320
HE	270	LT	810	QP	1330
UQ	280	NN	820	MJ	1340
JR	290	XK	830	AQ	1350
KW	300	RA	835	KZ	1360

NT	310	KM	840	UP	1370
HE	320	UT	850	BA	1380
YC	330	QI	855	RR	1390
HE	340	DU	856	KK	1400
GJ	350	CG	860	GE	1410
HE	360	LG	880	BU	1420
KT	370	PT	890	ZY	1430
HE	380	KI	900	FM	1440
KY	390	LF	910	NR	1450
RO	400	CO	920	YY	1460
WZ	410	PW	930	KY	1470
XQ	420	FG	940	RD	1480
ZD	430	XT	950	OX	1490
AE	440	ZR	960	YV	1500
HY	450	EY	965	KN	1510
WG	460	LN	970	VO	1520
SW	470	GV	980	JZ	1530
GS	480	WA	990	ZD	1540
YX	490	IS	1000	OS	1550
YT	500	RA	1010	DF	1560
LG	510	FF	1020	EM	1570
WG	520	HL	1030	TR	1580
ZD	530	YI	1040	ES	1590
ZA	540	MI	1050	LN	4970
YX	550	MF	1060		

Total checksum = 3570560

CASTLE GAME

Article on page 68

```
10  REM  * AREA FORMULA CASTLE B
    UILDER
20  REM  * BY TRACY AND LORI HER
    SHEY
30  REM  * (C) 1986 ANTIC PUBLIS
    HING, INC.
40  REM  * II COMPUTING  VOL.1 N
    O. 6
50  LOMEM: 24576: GOSUB 9500: GOSUB
    9600: TEXT
100  HGR : HCOLOR= 3: REM  BUILD
     CASTLE
110  FOR I = 1 TO 12: READ X1,Y1
    ,X2,Y2: HPLOT X1,Y1 TO X2,Y1
    : HPLOT  TO X2,Y2: HPLOT  TO
    X1,Y2: HPLOT  TO X1,Y1: NEXT
    I
120  FOR I = 1 TO 4: READ X1,Y1,
    X2,Y2,X3,X4: HPLOT X1,Y2 TO
    X2,Y1: HPLOT  TO X3,Y1: HPLOT
     TO X4,Y2: HPLOT  TO X1,Y2: NEXT
    I
130  FOR I = 1 TO 2: READ X1,Y1,
    X2,Y2,Y3,Y4: HPLOT X1,Y2 TO
    X2,Y1: HPLOT  TO X2,Y3: HPLOT
     TO X1,Y4: HPLOT  TO X1,Y2: NEXT
    I
140  FOR P = 1 TO 4: READ X1,Y1,
    X2,Y2,X3,X4: HPLOT X1,Y2 TO
    X2,Y1: HPLOT  TO X4,Y1: HPLOT
     TO X3,Y2: HPLOT  TO X1,Y2: NEXT
    P
150  HPLOT 83,20 TO 83,0: HPLOT
     TO 100,5: HPLOT  TO 83,10
160  FOR I = 1 TO 2: READ X1,Y1,
    X2,Y2: HPLOT X1,Y1 TO X2,Y2:
     HPLOT  TO X1,Y2: HPLOT  TO
    X1,Y1: NEXT I
170  FOR P = 1 TO 7: READ X,Y,XC
    ,YC,E,J: HPLOT X,Y TO X,Y: FOR
    I = 0 TO E STEP J:X = 12 *  COS
    (I) + XC:Y =  - 12 *  SIN (I
    ) + YC: HPLOT  TO X,Y: NEXT
    I: NEXT P
180  DATA 10,75,155,150,78,120,9
    3,150,15,30,35,65,130,30,150
    ,65,21,12,29,20
190  DATA 140,20,160,30,120,20,1
    40,30,136,12,144,20,5,20,25,
    30,25,20,45,30
200  DATA 83,45,115,75,50,45,83,
    75,10,65,15,75,35,40,125,65,
    130,75,150,155
210  DATA 93,140,103,150,145,155
    ,10,140,20,150,68,78,20,40,3
    0,35,60,55,135
220  DATA 35,145,40,55,60,36,12,
    41,20,45,49,5,12,0,20,14,8,1
    20,12,115,20,129
230  DATA 124,151,12,156,20,160,
    165,83,20,115,45,83,20,50,45
    ,55,95,44,95,6.6
240  DATA .2,78,60,66,60,6.6,.2,
    111,60,99,60,6.6,.2,135,95,1
```

```
    24,95,6.6,.2,33,130,44
250  DATA 130,3.15,.05,112,130,1
    24,130,3.15,.05,74,97,85,97,
    3.15,.05
700 RR = 0:PA = 0
800  READ L
810  GOSUB 9000
820  PRINT : PRINT : PRINT : PRINT
    : PRINT
830  ON L GOSUB 1000,1500,2000,2
    500,3000,3500,4000,4500
840  GOTO 800
1000  REM  RECTANGLES
1010  READ C,X1,Y1,X2,Y2,AS$: HCOLOR=
    3
1020  HPLOT X1,Y1 TO X2,Y1: HPLOT
    TO X2,Y2: HPLOT  TO X1,Y2: HPLOT
    TO X1,Y1
1050  GOSUB 8000
1060  IF AN$ = AS$ THEN 1090
1070  GOSUB 8100
1080  GOTO 1050
1090  REM  COLOR A RECTANGLE
1100  READ X1,Y1,X2,Y2: HCOLOR=
    C
1110  HPLOT X1,Y1 TO X2,Y1:Y1 =
    Y1 + 1
1130  IF Y1 = Y2 THEN 1150
1140  GOTO 1110
1150  RETURN
1500  REM  SQUARES
1510  READ C,X1,Y1,X2,Y2,AS$: HCOLOR=
    3: HPLOT X1,Y1 TO X2,Y1: HPLOT
    TO X2,Y2: HPLOT  TO X1,Y2: HPLOT
    TO X1,Y1
1530  GOSUB 8000
1550  IF AN$ = AS$ THEN 1580
1560  GOSUB 8100
1570  GOTO 1530
1580  REM  COLOR A SQUARE
1590  READ X1,Y1,X2,Y2: HCOLOR=
    C
1600  HPLOT X1,Y1 TO X2,Y1:Y1 =
    Y1 + 1
1620  IF Y1 = Y2 THEN 1650
1630  GOTO 1600
1650  RETURN
2000  REM  TRIANGLES
2010  READ C,X1,Y1,X2,Y2,AS$: HCOLOR=
    3: HPLOT X1,Y1 TO X2,Y2: HPLOT
    TO X1,Y2: HPLOT  TO X1,Y1
2040  GOSUB 8000
2050  IF AN$ = AS$ THEN 2080
2060  GOSUB 8100
2070  GOTO 2040
2080  REM  COLOR A TRIANGLE
2090  READ X1,Y1,X2,Y2:X3 = X2: HCOLOR=
    C
2100  HPLOT X1,Y1 TO X2,Y2:X2 =
    X2 + 1
2130  IF X2 = X3 + 33 THEN 2160
2140  GOTO 2100
2160  RETURN
2500  REM  TRAPEZOIDS
2510  READ C,X1,Y1,X2,Y2,X3,X4,A
    S$: HCOLOR= 3: HPLOT X1,Y2 TO
    X2,Y1: HPLOT  TO X3,Y1: HPLOT
    TO X4,Y2: HPLOT  TO X1,Y2
2530  GOSUB 8000
2540  IF AN$ = AS$ THEN 2570
2550  GOSUB 8100
2560  GOTO 2530
2570  REM  COLOR A TRAPEZOID
2580  READ X1,Y1,X2,Y2,X3,X4: HCOLOR=
    C
2600  HPLOT X1,Y2 TO X2,Y1:X1 =
    X1 + 1:X2 = X2 + 1
2620  IF X2 = X3 THEN 2640
2630  GOTO 2600
2640  HPLOT X3,Y1 TO X1,Y2
2650 X1 = X1 + 1
2660  IF X1 = X4 THEN 2680
2670  GOTO 2640
2680  RETURN
3000  REM  PARALLELOGRAMS
3010  READ C,X1,Y1,X2,Y2,Y3,Y4,A
    S$: HCOLOR= 3:PA = PA + 1: HPLOT
    X1,Y2 TO X2,Y1: HPLOT  TO X2
    ,Y3: HPLOT  TO X1,Y4: HPLOT
    TO X1,Y2
3030  GOSUB 8000
3040  IF AN$ = AS$ THEN 3070
3050  GOSUB 8100
3060  GOTO 3030
3070  REM  COLOR A PARALLELOGRAM

3080  HCOLOR= C: IF PA = 1 OR PA
    = 5 THEN 3100
3090  GOTO 3150
3100  READ X1,Y1,X2,Y2,Y3,Y4
3110  HPLOT X1,Y2 TO X2,Y1:Y2 =
    Y2 + 1:Y1 = Y1 + 1
3130  IF Y2 = Y4 THEN 3200
3140  GOTO 3110
3150  READ X1,Y1,X2,Y2,X3,X4
3160  HPLOT X2,Y1 TO X1,Y2:X1 =
    X1 + 1:X2 = X2 + 1
3180  IF X2 = X3 THEN 3200
3190  GOTO 3160
3200  RETURN
3500  REM  CIRCLES
3510  READ C,X,Y,XC,YC,E,J,AS$: HCOLOR=
3: HPLOT X,Y TO X,Y: FOR I = 0 TO
    E STEP J:X = 12 *  COS (I) +
    XC:Y =  - 12 *  SIN (I) + YC
    : HPLOT  TO X,Y: NEXT I
3560  GOSUB 8000
3580  IF AN$ = AS$ THEN 3610
3590  GOSUB 8100
3600  GOTO 3560
3610  REM  COLOR A CIRCLE
3620  READ X,Y,XC,YC,E,J: HCOLOR=
    C: FOR I = 0 TO E STEP J:X =
    12 *  COS (I) + XC:Y =  - 12
    *  SIN (I) + YC: HPLOT XC,Y
    C TO X,Y: NEXT I
3670  RETURN
4000  REM  FLAG
4010  READ X1,Y1,X2,Y2,AS$: HCOLOR=
    3: HPLOT X1,Y2 TO X1,Y1: HPLOT
    TO X2,Y2: HPLOT  TO X1,Y2
4040  GOSUB 8000
4050  IF AN$ = AS$ THEN 4080
4060  GOSUB 8100
4070  GOTO 4040
4080  REM  COLOR FLAG
4090  HCOLOR= 2: READ X1,Y1,X2,Y
    2,Y3
4110  HPLOT X1,Y1 TO X2,Y3:Y1 =
    Y1 + 1
4130  IF Y1 = Y2 THEN 4160
```

continued on next page

```
4140  GOTO 4110
4160  RETURN
4500  PRINT : PRINT : PRINT : PRINT
   : PRINT "YOU MISSED "RR" QUE
   STIONS,"
4510  IF RR = 0 THEN 4540
4520  PRINT "WHY DON'T YOU TRY A
   GAIN?"
4530  GOTO 4550
4540  PRINT "THAT IS VERY GOOD!"

4550  END
8000  PRINT  CHR$ (7)
8005  IF  NOT FL THEN 8050
8010  PRINT "1- W * L";: HTAB 11
   : PRINT "4- PI * R^2";: HTAB
   27: PRINT "7- 1/2 * H * B";
8020  PRINT "2- S^2 ";: HTAB 11:
    PRINT "5- 1/2*H*(B+T)";: HTAB
   27: PRINT "8- HELP": PRINT "
   3- B * H";: HTAB 11: PRINT "
   6- 1/2*PI*R^2"
8030  INPUT "FORMULA OF SHAPE ON
    THE RIGHT? ";AN$
8035  IF  VAL (AN$) = 8 THEN  POKE
    - 16303,0: GOSUB 9500: HOME
   : TEXT : POKE  - 16304,0: GOTO
   8010
8040  RETURN
8050  PRINT "1 RECTANGLE";: HTAB
   17: PRINT "4 CIRCLE";: HTAB
   30: PRINT "7 TRIANGLE"
8060  PRINT "2 SQUARE";: HTAB 17
   : PRINT "5 TRAPEZOID";: HTAB
   30: PRINT "8 HELP"
8070  PRINT "3 PARALLELOGRAM";: HTAB
   17: PRINT "6 SEMI-CIRCLE": INPUT
   "WHAT IS THE SHAPE ON THE RI
   GHT? ";AN$
8075  IF  VAL (AN$) = 8 THEN  POKE
    - 16303,0: GOSUB 9500: HOME
   : TEXT : POKE  - 16304,0: GOTO
   8050
8080  RETURN
8100  PRINT : PRINT : PRINT "SOR
   RY, THAT IS NOT CORRECT!": FOR
   H = 1 TO 1500: NEXT H
8110 RR = RR + 1: RETURN
8500  DATA 1,6,200,135,240,150,1
   ,10,75,155,150,6
8510  DATA 5,224,130,212,130,6.6
   ,.2,4,55,95,44,95,6.6,.05,4
8520  DATA 7,200,130,210,150,240
   ,250,5,93,140,103,150,145,15
   5,1
8530  DATA 5,200,130,240,150,1,7
   8,120,93,150,6
8540  DATA 7,200,130,212,130,3.1
   5,.05,6,112,130,124,130,3.15
   ,.05,4
8550  DATA 7,200,120,220,150,240
   ,260,5,10,140,20,150,68,78,6

8560  DATA 5,224,130,212,130,6.6
   ,.2,4,135,95,124,95,6.6,.05,
   6
8570  DATA 7,211,130,223,130,3.1
   5,.05,6,33,130,44,130,3.15,.
   05,1
8580  DATA 2,200,125,220,150,1,1
   5,30,35,65,5
8590  DATA 3,200,130,210,150,110
   ,130,3,20,40,30,35,60,55,2
8600  DATA 3,200,130,205,135,2,2
   1,12,29,20,1
8610  DATA 1,200,125,205,150,1,5
   ,20,25,31,5
8620  DATA 3,200,130,210,150,110
   ,130,3,5,12,0,20,9,14,4
8630  DATA 5,200,130,220,150,240
   ,260,5,9,65,14,75,36,41,1
8640  DATA 1,200,130,245,150,1,2
   5,20,45,31,5
8650  DATA 3,200,130,220,150,120
   ,140,3,36,12,41,20,50,45,2
8670  DATA 5,210,130,230,150,2,5
   0,45,83,75,3
8680  DATA 1,200,130,240,150,7,8
   3,20,50,45,2
8690  DATA 5,200,130,220,150,2,8
   3,45,115,75,6
8700  DATA 6,224,130,212,130,6.6
   ,.2,4,76,60,66,60,6.6,.05,1
8710  DATA 2,200,120,210,150,1,1
   30,30,150,65,1
8720  DATA 1,200,125,205,145,1,1
   20,20,140,31,5
8730  DATA 3,200,130,220,150,120
   ,140,3,120,12,115,20,125,128
   ,4
8740  DATA 5,220,150,200,130,260
   ,240,5,124,65,129,75,151,156
   ,1
8750  DATA 1,200,135,245,145,1,1
   40,20,160,31,3
8760  DATA 1,200,125,220,150,7,8
   3,20,83,45,5
8770  DATA 3,200,130,220,150,120
   ,140,3,136,35,145,40,55,60,2

8780  DATA 3,200,140,210,150,2,1
   36,12,144,20,5
8790  DATA 3,200,130,210,150,110
   ,130,3,152,12,157,20,165,160
   ,6
8800  DATA 6,224,130,212,130,6.6
   ,.2,4,111,60,99,60,6.6,.05,6

8810  DATA 7,200,130,212,130,3.1
   5,.05,6,74,97,84,97,3.15,.05
   ,7
8820  DATA 205,130,230,150,7,83,
   0,100,11,5,8
9000  HCOLOR= 0
9010 Y = 100:Y2 = 170:X = 180:X2
    = 260
9020  HPLOT X,Y TO X2,Y
9030 Y = Y + 1
9040  IF Y = Y2 THEN 9060
9050  GOTO 9020
9060  RETURN
9500  TEXT : HOME : FOR I = 2 TO
   4: VTAB I: PRINT "*";: HTAB
   39: PRINT "*": NEXT I
9510  VTAB 1: FOR I = 1 TO 39: PRINT
   "*";: NEXT : VTAB 3: HTAB 15
   : PRINT "CASTLE GAME": VTAB
   5: FOR I = 1 TO 39: PRINT "*
   ";: NEXT : POKE 34,5: PRINT

9520  VTAB 7: INVERSE : HTAB 5: PRINT
```

```
     "FORMULAS";: HTAB 25: PRINT
     "SHAPES": NORMAL
9530  VTAB 9: HTAB 5: PRINT "W *
     L =";: HTAB 25: PRINT "RECT
     ANGLE"
9540  VTAB 11: HTAB 5: PRINT "S^
     2 = ";: HTAB 25: PRINT "SQUA
     RE"
9550  VTAB 13: HTAB 5: PRINT "B
     * H = ";: HTAB 25: PRINT "PA
     RALLELOGRAM"
9560  VTAB 15: HTAB 5: PRINT "PI
      * R^2 = ";: HTAB 25: PRINT
     "CIRCLE"
9570  VTAB 17: HTAB 5: PRINT "1/
     2 * H * (B+T) =";: HTAB 25: PRINT
     "TRAPEZOID"
9580  VTAB 19: HTAB 5: PRINT "1/
     2 * PI * R^2 =";: HTAB 25: PRINT
     "SEMI-CIRCLE"
9590  VTAB 21: HTAB 5: PRINT "1/
     2 * H * B = ";: HTAB 25: PRINT
     "TRIANGLE"
9595  VTAB 24: HTAB 7: INVERSE :
      PRINT "HIT ANY KEY TO CONTI
     NUE";: NORMAL : GET A$: RETURN

9600  HOME : PRINT : PRINT "WOUL
     D YOU LIKE TO TRY:": PRINT :
      HTAB 10: PRINT "<1> SHAPES"
     : PRINT : HTAB 10: PRINT "<2
     > FORMULAS": PRINT : HTAB 7:
      PRINT "SELECT ONE: ";
9610  GET K$:FL =  VAL (K$): IF
     FL < 1 OR FL > 2 THEN 9610
9620 FL = FL - 1: RETURN
```

TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
BF	10	XJ	2500	DD	8020
VK	20	ZE	2510	RU	8030
UP	30	HG	2530	ET	8035
BP	40	NN	2540	GV	8040
DZ	50	HJ	2550	CM	8050
PO	100	HQ	2560	SG	8060
KO	110	EV	2570	AK	8070
TN	120	QY	2580	LN	8075
UY	130	FQ	2600	GV	8080
LG	140	ZB	2620	YX	8100
CK	150	HH	2630	SI	8110

GV	160	TE	2640	RQ	8500
JY	170	JM	2650	EU	8510
RP	180	AS	2660	JF	8520
LD	190	HX	2670	JW	8530
UZ	200	GV	2680	DE	8540
PT	210	DZ	3000	PB	8550
TF	220	RF	3010	MX	8560
EL	230	HG	3030	ET	8570
FO	240	LU	3040	BF	8580
CD	250	HJ	3050	DQ	8590
MP	700	HD	3060	OY	8600
LB	800	ER	3070	GK	8610
HI	810	DJ	3080	RY	8620
PM	820	HO	3090	WP	8630
NY	830	RI	3100	VS	8640
XV	840	IA	3110	DH	8650
QM	1000	WY	3130	HZ	8670
SA	1010	GY	3140	YQ	8680
XV	1020	QD	3150	ZK	8690
HG	1050	FQ	3160	MD	8700
LY	1060	WL	3180	RB	8710
HJ	1070	HS	3190	RJ	8720
HH	1080	GV	3200	WH	8730
PA	1090	ZY	3500	JD	8740
UZ	1100	XG	3510	VA	8750
HZ	1110	HG	3560	JS	8760
XI	1130	LO	3580	AE	8770
GU	1140	HJ	3590	VT	8780
GV	1150	IE	3600	LZ	8790
ET	1500	QF	3610	HT	8800
LX	1510	RV	3620	TV	8810
HG	1530	GV	3670	TL	8820
NP	1550	FZ	4000	JI	9000
HJ	1560	CR	4010	FU	9010
HO	1570	HG	4040	QL	9020
EO	1580	MQ	4050	RX	9030
UZ	1590	HJ	4060	RI	9040
HZ	1600	HJ	4070	HL	9050
ZB	1620	ZS	4080	GV	9060
HF	1630	BY	4090	ZA	9500
GV	1650	IX	4110	BK	9510
JM	2000	YQ	4130	XQ	9520
EZ	2010	HA	4140	UB	9530
HG	2040	GV	4160	AP	9540
LW	2050	FL	4500	TI	9550
HJ	2060	TR	4510	IY	9560
HF	2070	WF	4520	CJ	9570
RV	2080	IC	4530	ZG	9580
TM	2090	QT	4540	VN	9590
IN	2100	EY	4550	BJ	9595
BC	2130	TX	8000	ES	9600
GS	2140	ID	8005	JV	9610
GV	2160	HO	8010	OQ	9620

Total checksum = 8747350

continued on next page

HEX.ENTRY

HEX.ENTRY is ***II Computing***'s program for entering object code and other non-BASIC programs and routines. To use HEX.ENTRY, first type in the program on this page and check it with TYPO.II.

Now run HEX.ENTRY, and turn to the Software Library page containing the object code listing. For each row in the object code listing, first type in the hex address (but don't type the colon that follows it) and press RETURN. Then enter each hex value in the row, following it with a RETURN. After the 32nd hex value, HEX.ENTRY will print a checksum on the screen. The checksum should match the checksum at the end of the line in the object code listing; if it doesn't, type the line again, beginning with the hex address.

When you're finished, be sure to save what you've typed in with a BSAVE command. With HEX.ENTRY, you can be sure that your object code is correctly typed and ready to use!

```
10  REM  * HEX CODE LOADER AND C
    HECKSUM PROGRAM
20  REM  * BY FRANK HAYES
30  REM  * (C) 1986 ANTIC PUBLIS
    HING, INC.
40  REM  * II COMPUTING  VOL.1 N
    O.6
100  PRINT "LOADING ADDRESS IN H
    EX (OR 0 TO QUIT) ?  ";
102  INPUT A$: IF A$ = "" THEN 1
    02
110  GOSUB 1000
112  IF B =  - 1 THEN  PRINT : GOTO
    100
114  IF B > 65535 THEN  PRINT "V
    ALUE TOO LARGE": PRINT : GOTO
    100
116  IF B = 0 THEN  END
120 AD = B
130 CH = 0
140  FOR C = 0 TO 31
142  PRINT C + 1;"  ";
144  IF C < 9 THEN  PRINT " ";
146  INPUT A$
150  GOSUB 1000
152  IF B =  - 1 THEN  PRINT : GOTO
    142
154  IF B > 255 THEN  PRINT "VAL
    UE TOO LARGE": PRINT : GOTO
    142
156  POKE AD + C,B
158 CH = CH + B
160  NEXT C
170  PRINT : PRINT "CHECKSUM = "
    ;CH
172  PRINT "IF CHECKSUM DOESN'T
    MATCH,"
174  PRINT "  RETYPE THIS ROW."
176  PRINT
180  GOTO 100
999  END
1000 B = 0
1010  FOR A = 1 TO  LEN (A$)
1012 B$ =  MID$ (A$,A,1)
1014  IF B$ < "0" OR B$ > "F" THEN
     GOTO 1018
1016  IF B$ < ":" OR B$ > "@" THEN
     GOTO 1020
1018  PRINT "BAD HEX VALUE":B =
     - 1: RETURN
1020 B1 =  ASC (B$) - 48: IF B1 >
    9 THEN B1 = B1 - 7
1022 B = 16 * B + B1
1024  NEXT A
1026  RETURN
```

TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
XR	10	LB	142	XH	180
LC	20	WU	144	EY	999
UP	30	OG	146	YC	1000
RB	40	GS	150	IA	1010
PT	100	AJ	152	II	1012
OL	102	AR	154	RY	1014
GS	110	NO	156	LV	1016
XT	112	QF	158	PP	1018
FA	114	KE	160	TE	1020
GJ	116	UF	170	VS	1022
PX	120	PQ	172	KA	1024
NN	130	MG	174	GV	1026
ZP	140	HE	176		

Total checksum = 511440

CIRCLE & POLYGON MAKER

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POLYGON. DEMO

```
10   REM * POLYGON DEMO
20   REM * BY JENNY SCHMIDT
30   REM * (C) 1986 ANTIC PUBLISH
     ING, INC.
40   REM * II COMPUTING  VOL.1 NO
     .6
100   PRINT  CHR$ (4);"BLOAD POLY
     GON.MAKER"
110   HIMEM: 37888
120   HOME : TEXT : HGR2 : HCOLOR=
     3:SCLE = .86:ARC = 1
130 X0 = 140:Y0 = 96
140 POLY = 37888
150   FOR I = 3 TO 20
160 ANGLE = 6.283 / I
170   FOR J = 0 TO 20
180 CX = 50 -  INT ( RND (1) * 1
     00) + X0:CY = 50 -  INT ( RND
     (1) * 100) + Y0
190   CALL POLY,X0,Y0,CX,CY,ANGLE
     ,ARC,SCLE
200   IF  PEEK ( - 16384) > 127 THEN
      POKE  - 16368,0: TEXT : END
210   NEXT J
220   HGR2 : HCOLOR= 3
230   NEXT I
240   GOTO 150
```

TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
QL	10	OJ	130	KA	190
BS	20	AJ	140	VB	200
TH	30	AA	150	KS	210
DS	40	WZ	160	IS	220
FH	100	ZQ	170	KQ	230
WW	110	GE	180	XW	240
DN	120				

Total checksum = 316132

POLYGON MAKER

Enter using HEX.ENTRY

```
9400: A9 00 8D 2D 03 20 BE DE 20 67 DD A0 03 A2 0A 20 2B EB 20 52 E7 A5 50 48 A5 51 48 20 BE DE 20 67 CH: 3362
9420: DD A0 03 A2 0F 20 2B EB 20 52 E7 68 A8 68 AA A5 50 20 57 F4 20 BE DE 20 67 DD A0 03 A2 14 20 2B CH: 3590
9440: EB 20 BE DE 20 67 DD A0 03 A2 19 20 2B EB 20 BE DE 20 67 DD A0 03 A2 00 20 2B EB 20 BE DE 20 67 CH: 3709
9460: DD A0 03 A2 05 20 2B EB 20 BE DE 20 67 DD A0 03 A2 1E 20 2B EB A0 03 A9 0F 20 66 EA A0 03 A2 0F CH: 3381
9480: 20 2B EB A0 03 A9 1E 20 F9 EA A0 03 A9 19 20 66 EA A0 03 A2 19 20 2B EB A0 03 A9 05 20 F9 EA A0 CH: 3584
94A0: F0 A9 6B 20 7F E9 20 63 EB A0 03 A9 00 20 F9 EA 20 69 EA 20 52 E7 A5 50 8D 2E 03 A5 51 8D 2F 03 CH: 3709
94C0: A0 03 A9 00 20 F9 EA 20 EA EF A0 03 A2 23 20 2B EB A0 03 A9 00 20 F9 EA 20 F1 EF A0 03 A2 28 20 CH: 3778
94E0: 2B EB A0 03 A9 14 20 F9 EA A0 03 A9 0A 20 A7 E7 A0 03 A2 0A 20 2B EB A0 03 A9 19 20 F9 EA A0 03 CH: 3597
9500: A9 0F 20 A7 E7 A0 03 A2 0F 20 2B EB A0 03 A9 0A 20 F9 EA A0 03 A9 23 20 7F E9 A0 03 A2 00 20 2B CH: 3280
9520: EB A0 03 A9 0F 20 F9 EA A0 03 A9 28 20 7F E9 A0 03 A9 00 20 A7 E7 A0 03 A2 00 20 2B EB A0 03 A9 CH: 3590
9540: 0F 20 F9 EA A0 03 A9 23 20 7F E9 A0 03 A2 05 20 2B EB A0 03 A9 0A 20 F9 EA A0 03 A9 28 20 7F E9 CH: 3550
9560: A0 03 A9 05 20 BE E7 A0 03 A2 0F 20 2B EB A0 03 A9 19 20 BE E7 A0 03 A9 1E 20 7F E9 20 52 E7 A0 CH: 3509
9580: 03 A9 00 20 F9 EA A0 03 A2 0A 20 2B EB A5 51 F0 05 8D 2D 03 D0 4D A5 50 C9 C0 90 05 8D 2D 03 B0 CH: 3449
95A0: 42 48 A0 03 A9 14 20 BE E7 20 52 E7 A5 51 C9 01 F0 08 90 12 8D 2D 03 68 B0 29 A5 50 C9 18 90 06 CH: 3276
95C0: 8D 2D 03 68 B0 1D AD 2D 03 F0 0F 68 A6 50 A4 51 20 57 F4 A9 00 8D 2D 03 F0 09 68 A8 A5 50 A6 51 CH: 3303
95E0: 20 3A F5 AD 2E 03 38 E9 01 8D 2E 03 B0 0A AD 2F 03 F0 08 E9 01 8D 2F 03 4C 0C 95 20 B7 00 60 00 CH: 2667
```

THINKING ABOUT THINKING

Article on page 63

BACKCHAIN

```
10   REM  * BACKCHAIN
20   REM  * BY DANIEL WOLF AND FR
     ANK HAYES FOR II COMPUTING
30   REM  * (C) 1986 ANTIC PUBLIS
     HING, INC.
```

continued on next page

```
40  REM  * II COMPUTING  VOL.1 N
    O.6
50  REM  THIS VERSION CAN USE UP
     TO 10 RULES AND 10 VARIABLE
    S
60  HOME
100  REM    FIRST INITIALIZE ARR
    AYS WITH VARIABLES AND RULES
110  DIM AN$(10),RU(10,7)
120 AN$(1) = "PRINTER IS TURNED
    OFF"
130 AN$(2) = "NO PRINTER IS CONN
    ECTED"
140 AN$(3) = "PRINTER IS NOT ON
    LINE"
150 AN$(4) = "COMPUTER HAS PERFO
    RMED 'PR#1'"
160 AN$(5) = "COMPUTER HAS LOCKE
    D UP BECAUSE OF THE PRINTER"

170 AN$(6) = ""
180 AN$(7) = ""
190 AN$(8) = ""
200 AN$(9) = ""
210 AN$(10) = ""
220  REM  THE CONCLUSION WE'RE T
    ESTING IS VARIABLE NUMBER 5
230 T = 5
240  REM  THERE ARE THREE RULES
250 RULES = 3
260  REM   EACH DATA STATEMENT R
    EPRESENTS A RULE
270  DATA 3,4,0,0,0,0,0,5
280  DATA 1,0,0,0,0,0,0,3
290  DATA 2,0,0,0,0,0,0,3
300  DATA
310  DATA
320  DATA
330  DATA
340  DATA
350  DATA
360  DATA
370  FOR C1 = 1 TO RULES
380  FOR C2 = 0 TO 7
390  READ RU(C1,C2)
400  NEXT C2
410  NEXT C1
420  REM  NOW INITIALIZE TRUE/FA
    LSE ARRAY
430  DIM TR(10)
440 TR(0) = 1
450  REM   INITIALIZE STACK
460  DIM ST(255):SP = 0
470  REM   NOW PERFORM THE CONCL
    USION CHECK ROUTINE
480 A = T: GOSUB 520
490  IF R = 1 THEN  PRINT AN$(T)
    : END
500  IF R =  - 1 THEN  PRINT "IT
    'S NOT TRUE THAT ";AN$(T): END

510  PRINT "DON'T KNOW WHETHER "
    ;AN$(T): END
520  REM    THIS SUBROUTINE FIND
    S OUT WHETHER A VARIABLE IS
    TRUE OR NOT
530  IF TR(A) <  > 0 THEN R = TR
    (A): RETURN
540 C1 = 1
550  IF A <  > RU(C1,7) THEN 680
560 C2 = 0
570 ST(SP) = C2:SP = SP + 1
580 ST(SP) = C1:SP = SP + 1
590 ST(SP) = A:SP = SP + 1
600 A = RU(C1,C2)
610  GOSUB 520
620 SP = SP - 1:A = ST(SP)
630 SP = SP - 1:C1 = ST(SP)
640 SP = SP - 1:C2 = ST(SP)
650  IF R < 1 THEN R = 0: GOTO 6
    80
660 C2 = C2 + 1: IF C2 < 7 THEN
    570
670 R = 1:TR(A) = R: RETURN
680 C1 = C1 + 1: IF C1 < RULES +
    1 THEN 550
690  IF A = T THEN 780
700  PRINT "IS IT TRUE THAT ";AN
    $(A);"?"
710  PRINT "Y-YES, N-NO, D-DON'T
     KNOW  ";
720  GET K$: IF K$ = "" THEN 720

730  IF K$ = "N" THEN R =  - 1: GOTO
    770
740  IF K$ = "Y" THEN R = 1: GOTO
    770
750  IF K$ = "D" THEN R = 0: GOTO
    770
760  GOTO 720
770  PRINT K$: PRINT
780 TR(A) = R
790  RETURN
```

TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
EZ	10	FB	300	JK	550
NY	20	FB	310	LV	560
UP	30	FB	320	SD	570
RB	40	FB	330	RU	580
JM	50	FB	340	TW	590
FV	60	FB	350	US	600
NH	100	LF	360	YA	610
UV	110	DY	370	JK	620
QM	120	MM	380	AT	630
LZ	130	NF	390	BD	640
ZF	140	PY	400	SO	650
JC	150	PV	410	NR	660
GP	160	WG	420	FT	670
MX	170	GU	430	YQ	680
NC	180	MQ	440	YV	690
NH	190	YY	450	PC	700
NM	200	VZ	460	PY	710
JF	210	HK	470	WL	720
FM	220	HL	480	ER	730
ZJ	230	IW	490	JK	740
RA	240	FL	500	ED	750
CU	250	HZ	510	XZ	760
YQ	260	TJ	520	JU	770
ON	270	KX	530	YD	780
MN	280	LX	540	GV	790
MP	290				

Total checksum = 1514935

CLOCKWORKS

Article on page 72

```
10  REM * TIMECLOCK MENU
20  REM * BY WILLIAM V R SMITH
30  REM * (C) 1986 II ANTIC PUBL
    ISHING, INC.
40  REM * II COMPUTING  VOL.1 NO
    .6
50 D$ =  CHR$ (4)
60  GOSUB 1000
70  GOSUB 3000
80  PRINT D$;"PR#3": PRINT : HOME

90  GOTO 2000
99  REM * PRINT LINE PATTERNS
100  POKE 1403,XP: INVERSE : PRINT
    "      ";: NORMAL : PRINT : RETURN

200  POKE 1403,XP: INVERSE : PRINT
    " ";: NORMAL : PRINT "    ":
    RETURN
300  POKE 1403,XP: PRINT "    ";
    : INVERSE : PRINT " ";: NORMAL
    : PRINT : RETURN
400  POKE 1403,XP: INVERSE : PRINT
    " ";: NORMAL : PRINT "    ";:
    INVERSE : PRINT " ";: NORMAL
    : PRINT : RETURN
450  POKE 1403,XP: PRINT "      "
    : RETURN
699  REM ****
700  VTAB 1
710  FOR Z = 1 TO  LEN (A$(N))
720 C =  VAL ( MID$ (A$(N),Z,1))

730  ON C GOSUB 100,200,300,400,
    450
740  NEXT
750  IF  PEEK ( - 16384) > 127 THEN
    POP : VTAB 1: RETURN
760  RETURN
799  REM  * READ TIME AND STRIP
    H,M,S
800  IF CL = 0 THEN  VTAB 1: RETURN

810  PRINT D$;"IN#";CL
820  VTAB 6: INPUT "";M$
830  PRINT D$;"IN#0"
840  IF M$ = T$ THEN 950
850 T$ = M$
860 H$ =  MID$ (M$,12,2):M$ =  MID$
    (M$,15,2):S$ =  MID$ (T$,18,
    2)
870 XP = 1: IF  LEFT$ (H$,1) = "
    1" THEN N = 1: GOSUB 700: GOTO
    890
880  FOR N = 1 TO 5: VTAB N: PRINT
    "      ": NEXT
890 XP = 8:N =  VAL ( RIGHT$ (H$
    ,1)): GOSUB 700
900 XP = 20:N =  VAL ( LEFT$ (M$
    ,1)): GOSUB 700
910 XP = 28:N =  VAL ( RIGHT$ (M
    $,1)): GOSUB 700
920 XP = 40:N =  VAL ( LEFT$ (S$
    ,1)): GOSUB 700
930 XP = 48:N =  VAL ( RIGHT$ (S
    $,1)): GOSUB 700
940  VTAB 1: POKE 1403,65: PRINT
    LEFT$ (T$,10): VTAB 20
950  IF  PEEK ( - 16384) < 129 THEN
    800
960  RETURN
999  REM * NUMBER/PATTERN SETUP
1000  DATA 0,14441,1,33333
1010  DATA 2,13121,3,13131
1020  DATA 4,44133,5,12131
1030  DATA 6,22141,7,13333
1040  DATA 8,14141,9,14133
1050  FOR X = 0 TO 9: READ A$,A$
    (X): NEXT
1060  RETURN
1999  REM  *  MAIN MENU
2000  HOME :MS = 1:NE = 4
2010 M$(1) = "CATALOG DISKETTE"
2020 M$(2) = "LIST PROGRAM"
2030 M$(3) = "BOOT DISKETTE"
2040 M$(4) = "EXIT TO BASIC"
2050 M$(5) = ""
2060 M$(6) = ""
2070 M$(7) = ""
2080 M$(8) = ""
2090 M$(9) = ""
2099  REM * DRAW SCREEN
2100  FOR X = 1 TO NE: GOSUB 220
    0: NEXT X
2110  VTAB 23: HTAB 5: PRINT "US
    E ARROW KEYS TO SELECT FUNCT
    ION"
2120  INVERSE : VTAB 7: FOR X =
    1 TO 78: PRINT " ";: NEXT : NORMAL
: PRINT
2130 X = MS
2140  GOTO 2220
2199  REM * DRAW MENU ITEM ON SC
    REEN
2200  VTAB 10 + X: HTAB 20: PRINT
    X;" - ";M$(X)
2210  RETURN
2220  REM * KEYBOARD SCAN AND IN
    PUT CHECK
2230  INVERSE : GOSUB 2200: NORMAL

2240  IF  PEEK ( - 16384) < 129 THEN
    GOSUB 800
2250  GET I$:I =  ASC (I$)
2260 Z =  VAL (I$): IF Z = 0 OR
    Z > NE THEN 2290
2270  IF Z = X THEN 2370
2280  GOSUB 2200:X = Z: GOTO 222
    0
2290  IF I <  > 8 AND I <  > 11 THEN
    2320
2300  GOSUB 2200:X = X - 1: IF X
    < 1 THEN X = NE
2310  GOTO 2220
2320  IF I = 21 OR I = 32 OR I =
    10 THEN 2340
2330  GOTO 2360
```

continued on next page

```
2340  GOSUB 2200:X = X + 1: IF X
    > NE THEN X = 1
2350  GOTO 2220
2360  IF I <  > 13 THEN  PRINT :
    GOTO 2250
2370  GOSUB 2200
2380 MS = X
2390  PRINT : PRINT D$;"PR#3"
2400  ON X GOSUB 4000,5000,6000,
    7000,8000,9000
2410  GOTO 2000
2999  REM * FIND SLOT
3000 I = 0
3010 I = I + 1
3020 SA = 49152 + 256 * I
3030  IF ( PEEK (SA) +  PEEK (SA
    ) <  > 16) THEN 3080
3040  IF ( PEEK (SA + 1) +  PEEK
    (SA + 1) <  > 240) THEN 3080

3050  IF ( PEEK (SA + 2) +  PEEK
    (SA + 2) <  > 80) THEN 3080
3060 CL = I
3070  GOTO 3100
3080  IF I < 7 THEN 3010
3090 CL = 0: RETURN
3100  PRINT D$;"PR#";CL: PRINT D
    $;"IN#";CL
3110  INPUT "%";A$
3120  PRINT D$;"PR#0": PRINT D$;
    "IN#0"
3130  RETURN
3999  REM ***
4000  PRINT D$;"CATALOG"
4010  GET A$: POKE  - 16368,0
4020  RETURN
4999  REM ***
5000  LIST
5010  GET A$: POKE  - 16368,0
5020  RETURN
5999  REM ***
6000  PRINT D$;"PR#6"
6999  REM ***
7000  END
```

TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
CF	10	FC	950	HD	2310
XE	20	GV	960	JY	2320
AE	30	ED	999	HW	2330
DS	40	CL	1000	UZ	2340
RR	50	YS	1010	HD	2350
GS	60	AR	1020	RW	2360
GW	70	DJ	1030	HA	2370
WX	80	DY	1040	UX	2380
GP	90	KZ	1050	UZ	2390
IL	99	GV	1060	XZ	2400
MY	100	LM	1999	GP	2410
QA	200	OT	2000	GX	2999
DC	300	XK	2010	YJ	3000
DE	400	WL	2020	PL	3010
IL	450	AD	2030	EG	3020
DM	699	RK	2040	ZQ	3030
KA	700	QA	2050	HA	3040
DZ	710	QE	2060	DU	3050
AM	720	QI	2070	RR	3060
YD	730	QM	2080	GU	3070
FA	740	QQ	2090	IY	3080
MQ	750	ZV	2099	NV	3090
GV	760	AR	2100	LN	3100
XP	799	EE	2110	BG	3110
TX	800	RG	2120	DP	3120
WR	810	PB	2130	GV	3130
ZV	820	HD	2140	VK	3999
GM	830	JO	2199	RX	4000
YI	840	IA	2200	JP	4010
WU	850	GV	2210	GV	4020
MC	860	SU	2220	VK	4999
LG	870	OJ	2230	HG	5000
RY	880	PG	2240	JP	5010
JW	890	KT	2250	GV	5020
CA	900	HH	2260	VK	5999
DZ	910	RQ	2270	LG	6000
FI	920	YP	2280	VK	6999
HH	930	CV	2290	EY	7000
HQ	940	QU	2300		

Total checksum = 1644917

CLOCKLESS DATE-STAMPING

PRODOS ONLY

Article on page 73

```
10   REM * CLOCKLESS DATESTAMPING

20   REM * BY RICK ROBEY
30   REM * (C) 1986 ANTIC PUBLISH
     ING, INC.
40   REM * II COMPUTING  VOL.1 NO
     .6
50   ONERR  GOTO 65
55   PRINT  CHR$ (4);"VERIFY DATE
     "
60   GOTO 100
65   DIM AA$(12):DA$ = "00/00/00"
70   FOR X = 1 TO 12: READ AA$(X)
     : NEXT
75   PRINT  CHR$ (4);"STORE DATE"

80   DATA JAN,FEB,MAR,APR,MAY,JUN
     ,JUL,AUG,SEP,OCT,NOV,DEC
100   TEXT : HOME : NORMAL : CLEAR

110   PRINT  CHR$ (4);"RESTORE DA
     TE"
120   HOME : PRINT : VTAB 21: FOR
     X = 1 TO 39: PRINT "=";: NEXT
```

```
    X: PRINT
130  PRINT "ENTER TODAY'S DATE:
    ";DA$;: HTAB 20: INPUT " ";I
    MP$
140  IF IMP$ = "" THEN 160
150 DA$ = IMP$
160  IF  MID$ (DA$,1,8) = "00/00
    /00" THEN 120
170  IF  MID$ (DA$,3,1) <  > "/"
     OR  MID$ (DA$,6,1) <  > "/"
     THEN 120
180 MO =  VAL ( LEFT$ (DA$,2)):D
    A =  VAL ( MID$ (DA$,4,2)):Y
    R =  VAL ( MID$ (DA$,7,2))
190 MO$ = AA$(MO)
200  HOME : PRINT "TODAY'S DATE
    IS: ";MO$;" ";DA;", 19";YR
210  VTAB 3: PRINT "CORRECT (";:
     INVERSE : PRINT "Y";: NORMAL
    : PRINT "/N) ? ";: GET AN$
220  IF AN$ <  > "Y" AND AN$ <  >
    "y" AND AN$ <  >  CHR$ (13) THEN
    120
230  HOME : PRINT "THANK YOU...D
    ATESTAMP INSTALLED..."
240  POKE 49041,YR * 2 + (MO > 7
    )
250  POKE 49040,(MO - ((MO > 7) *
    8)) * 32 + DA
260  IF IMP$ = "" THEN  END
270  PRINT  CHR$ (4);"STORE DATE
    "
280  END
```

TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
EV	10	YM	80	NC	190
CA	20	AO	100	YL	200
TH	30	QY	110	KN	210
DS	40	YR	120	KH	220
HX	50	UK	130	VG	230
NU	55	FS	140	FY	240
XH	60	EF	150	YP	250
KV	65	XE	160	RC	260
IP	70	XJ	170	OF	270
OF	75	ZV	180	EY	280

Total checksum = 816239

II ERR IS HUMAN

Dan Morris of Columbus, Ohio, spotted several errors in the **Digital Gardener**'s program code in our April/May issue and submitted these corrections:

```
165  DIM SR(30)
180 OH = 0:L = 30:W = 15:I = 1
250 I = 2:OH = I
1220  IF HS(J) = H THEN TEMP$(I)
      = VEG$(J):SR(I) = RS(J):PT(
    I) = PD(J):RT(I) = RD(J):NT(
    I) = PL(I):HT(I) = HS(J):I =
    I + 1:J = M: GOTO 1240
1260 RS(I) = SR(I):VEG$(I) = TEM
    P$(I):PD(I) = PT(I):RD(I) =
    RT(I):PL(I) = NT(I):HS(I) =
    HT(I)
1755  IF OH = 0 THEN  HOME : INVERSE
    : PRINT "YOU MUST PLAN YOUR
    GARDEN": PRINT "BEFORE YOU C
    AN PRINT IT": NORMAL
1756  FOR P = 1 TO 2500: NEXT P:
     GOTO 1970
```

Lines 180, 250, 1755 and 1756 trap an error that occurs if you accidentally try to print a garden before you create one. Lines 1220 and 1260 preserve and restore the correct vegetable list when you change the number of plants and rows.

Also, the menu selection for Digital Gardener was inadvertently omitted from the startup menu on the April/May Action Disk. You can still access the program by booting the Action Disk, pressing ESCAPE, and typing RUN GARDEN.LAYOUT at the "]" prompt. Or, if you feel adventurous, you can fix the startup menu. Just boot the disk and, when the menu of program choices appears, press the ESCAPE key; then type the following six lines, in order and exactly as you seen them here:

```
LOAD STARTUP

 420  FOR I = 1 TO N: READ ST$(I)
     ,DT$(I)
 500  DATA  6
 570  DATA  DIGITAL GARDENER,GARD
     EN.LAYOUT
UNLOCK STARTUP
SAVE STARTUP
LOCK STARTUP
```

. . . And that's it—your April/May Action Disk is now complete.//

CIRCLE 031 ON READERS SERVICE CARD

CIRCLE 120 ON READERS SERVICE CARD

CIRCLE 072 ON READERS SERVICE CARD

CIRCLE 140 ON READERS SERVICE CARD

See over for Back Issue Information...


2
+4
?

What Should Parents Know?

The Home-School Computer Connection

by MRS. BOBBY GOODSON

There it is, just waiting for you. Your Apple II computer. You bought it because they said it would be great for your kids' education. Are they right? Where do you begin?

Take heart. You did the right thing. Studies are starting to show measured successes from computer use by children, and there's some fine software for you to choose from.

***Mrs. Bobby Goodson, a former math teacher, was the first computer coordinator in Cupertino, California (the birthplace of the Apple II). She was there knocking on Apple's door (and getting in!) right from the start. Now she runs her own educational computer consulting business through which she advises schools on computer curricula. She's also worked closely with the state of California on choosing educational software. Here are her suggestions for getting the most from your Apple II when it comes to education.* —The Editors.**

First of all, get involved with your children's computer use. Learn from and with your children—they often catch on much quicker than we do. They will be delighted to show you what they are doing at school, and the experience of learning a new piece of software together may give you fresh insight into your child's capabilities.

Three years ago a national survey by H.J. Becker of Johns Hopkins University found that the majority of schools with microcomputers had fewer than five. Yet, a recent Talmis study showed that at the end of 1985 there was an installed base of 1.2 million computers in American schools (and half of them are Apples). So there's a good chance there's a computer or two in your child's school.

As the level of student use of computers continues to increase in the schools, you're probably wondering just what the appropriate home use of microcomputers is.

WHAT'S HAPPENING AT SCHOOL

Parents need to find out how computers are being used in their children's schools. How often do the children use the computer and how does their computer time relate to their general school work? Studies are now showing that home use related to school use can be very helpful. If your children aren't using the computers at their school, you may want to find out why!

A high school student may be taking either computer science (probably programming in BASIC or Pascal) or application courses, such as word processing. These classes probably take place in a computer lab, but does your child have a chance to study or practice outside of the scheduled class? Does he or she have an opportunity to use word processing for creative writing or assignments in other classes? If not, there is certainly an advantage to owning a home computer.

The type of computer may or may not be the same as that used at school. (A high school student won't have much trouble understanding how two different computers operate.) More important is to have the same language being studied or a comparable word processor. If they're using something like Magic Slate or Bank Street Writer at school, it's probably not best to use a significantly more complicated program such as WordPerfect or WordStar at home.

A good home project for high school students is learning how to use online databases—you can access information of interest to the whole family and encourage development of research skills in your child. This requires a modem and most services charge for connect time.

FOR THE JUNIOR HIGH-ER

At the junior high school level, there may be a computer lab and students

continued on next page

Stuart Gold

may be taking an introductory computer course or electives in databasing or word processing. These junior high-ers won't have as much homework. But, if your child has a strong interest in these activities it's a plus having more time to experiment. If he or she is learning to use a word processor, more practice and the opportunity to use it for other assignments will help develop a valuable lifetime skill. Typing programs, such as Microtype from South-Western or Scarborough's Mastertype, will also help master that skill.

It may be more desirable for the junior high student to have the same computer at home and at school: younger students may find the differences between machines confusing.

There are many ways the whole family can participate in computer activities: writing letters, writing original stories, making up databases about the states, presidents, baseball heroes, you name it. Integrated programs such as AppleWorks are good tools, and accessory programs from Pinpoint and Megahaus and databases from ImagiMedia add to AppleWorks' usefulness.

ELEMENTARY LEVEL TOO

In the elementary schools the trend is to integrate computer use into the general learning process. Word processors designed for younger students and programs like Bank Street StoryBook by Mindscape encourage creative expression. Activities involving the Logo language and many drawing programs help children learn to follow directions and develop the ability to sequence specific processes.

Delta Drawing by Spinnaker helps very young children do many of the things they do with Logo but without Logo's complexity. Both art and math teachers are using drawing programs! Dazzle Draw from Broderbund Software and Blazing Paddles by Baudville make artistic creativity something the whole family can enjoy.

A good way to see computers in action is to visit your child's school. Back-to-school and parents' night programs are sure to highlight computer use. Traditional drill and practice programs, particularly useful when a child needs extra help or wants to advance, are still widely used. They often come with the capability to record a student's progress or to adjust to a student's particular needs. Since all students do not have access to a home computer some programs are better left for school use, particularly if they are going to be used for group activities. However, there are now many curriculum-oriented programs designed for home use. I recommend reading educational software reviews in this magazine and others, such as *Family Computing.*

MANY PROGRAMS TO LEARN FROM

One of the most exciting examples of computer use you may see involves software designed to teach problem-solving techniques, available for students of all ages. Sunburst Communications offers many problem-solving programs as does The Learning Company. You'll find problems in the form of puzzles and challenges, stories or adventure games. These programs may involve basic math or reading skills in addition to the problem-solving and reasoning skills. There are many programs of this type available for home use.

Adventure games themselves such as the Adventure Construction Set from Electronic Arts or Phantasie II from SSI are interesting problem-solving activities. And, if you are concerned that your child is spending several hours in front of the computer playing these games, don't worry. Sometimes it takes time to understand and master them. Use your common sense about time spent in front of the video screen. Fresh air and exercise are important—so is working out new concepts.

News stories show us pictures of teenage hackers, shunning contact with others, breaking into confidential files of major corporations for the excitement of it. The best way for a parent to be in control is to be involved. Share with your child; suggest using programming languages and utilities you can both enjoy and learn from.

HOW YOUNG TO START?

You may be wondering about the "right" age to introduce children to the computer. A recent study conducted in Cupertino, California, by Dr. Robert Hess of Stanford University explored the question of computer use by kindergarten children. Hess looked at school and home use, focusing on reading readiness. The study found that the computer-using kindergarteners showed a significant advantage in reading readiness when compared to the non-computer-using classes. Children who used computers at home showed little additional gain unless home use was coordinated with school use. Where similar software was used in the home and at school, and parents and teachers coordinated their efforts, the gains made by the students were double those shown by students who used their home computers in an unplanned manner.

Companies like Mindscape (the Tink Tonk Series) and Springboard (Early Games) have designed excellent programs for pre-schoolers. The Muppet Learning Keys (Sunburst) provide easier access to the computer before children develop the ability to use the regular keyboard.

SOFTWARE SELECTION

After finding out about computer use in the local schools, you should select software carefully. See if anyone at school has prepared a software list for home use. Fairfax County, Virginia, for example, is doing this. You may be able to locate regional centers with software collections or public libraries with computers and software.

The teacher may be able to provide some guidance in software selection, but don't underestimate your own ability to choose what you think your children will enjoy and learn from. You've probably been choosing your children's books for years.

Find software and computer stores that cater to the educational market. Ask to see software "in action" before buying! Check that the reading, vocabulary and interaction levels are appropriate. Look for software that will "wear" well—that has more than one activity, progresses to more difficult challenges as you become more familiar with it, and has visual appeal.

Keep in mind software that several children can use together. One of the unexpected benefits of educational computer use is that it helps develop children's social skills.

Finally, think of quality—not quantity. You'll use well-selected software for a long time if you do.//

PRODUCT INFORMATION

MAGIC SLATE
Sunburst Communications
39 Washington Ave.
Pleasantville, NY 10570
(800) 431-1934
64K; $89.95
CIRCLE **252** ON READER SERVICE CARD

BANK STREET WRITER
Broderbund Software
17 Paul Drive
San Rafael, CA 94903
(415) 479-1170
64K; $69.95
CIRCLE **253** ON READER SERVICE CARD

MICROTYPE
South-Western Publishing Co.
5101 Madison Ave.
Cincinnati, OH 45227
(513) 271-8811
32K; $39.95
CIRCLE **254** ON READER SERVICE CARD

MASTERTYPE
Scarborough Systems, Inc.
55 S. Broadway
Tarrytown, NY 10591
(914) 332-4545
48K; $39.95
CIRCLE **255** ON READERS SERVICE CARD

APPLEWORKS
Apple Computer, Inc.
20525 Mariani Ave.
Cupertino, CA 95014
(408) 996-1010
128K; $250
CIRCLE **256** ON READER SERVICE CARD

PINPOINT
Pinpoint Software
P.O. Box 13323
Oakland, CA 94661
(415) 654-3050
128K; $69
CIRCLE **224** ON READER SERVICE CARD

REPORTWORKS
Megahaus
5703 Oberlin Drive
San Diego, CA 92121
(619) 450-1230
128K; $125
CIRCLE **257** ON READER SERVICE CARD

FACTWORKS
ImagiMedia Software
16640 Roscoe Place
Sepulveda, CA 91343
(818) 891-3707
128K; $32.95
CIRCLE **211** ON READER SERVICE CARD

BANK STREET STORYBOOK
Mindscape, Inc.
3444 Dundee Road
Northbrook, IL 60062
(312) 480-7667
64K; $39.95
CIRCLE **258** ON READER SERVICE CARD

APPLE LOGO
Apple Computer, Inc.
20525 Mariani Ave.
Cupertino, CA 95014
(408) 996-1010
64K; $100
CIRCLE **259** ON READER SERVICE CARD

DELTA DRAWING
Spinnaker Software
1 Kendall Square
Cambridge, MA 02139
(617) 494-1200
48K; $39.95
CIRCLE **260** ON READER SERVICE CARD

DAZZLE DRAW
Broderbund Software
17 Paul Drive
San Rafael, CA 94903
(415) 479-1170
128K; $59.95
CIRCLE **261** ON READER SERVICE CARD

BLAZING PADDLES
Baudville
1001 Medical Park Dr. S.E.
Grand Rapids, MI 49506
(616) 957-3036
48K; $49.95
CIRCLE **262** ON READER SERVICE CARD

ADVENTURE CONSTRUCTION SET
Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 571-7171
64K; $49.95
CIRCLE **263** ON READER SERVICE CARD

PHANTASIE II
Strategic Simulations, Inc.
883 Stierlin Road
Bldg. A-200
Mountain View, CA 94043
(800) 772-3545, x335
48K; $39.95
CIRCLE **264** ON READER SERVICE CARD

THE LEARNING COMPANY
545 Middlefield Road
Menlo Park, CA 94025
(415) 328-5410
CIRCLE **265** ON READER SERVICE CARD

TINK TONK SERIES
Mindscape, Inc.
3444 Dundee Road
Northbrook, IL 60062
(312) 480-7667
48K; $19.95 each
CIRCLE **266** ON READER SERVICE CARD

EARLY GAMES
Springboard Software, Inc.
7807 Creekridge Circle
Minneapolis, MN 55435
(612) 944-3915
48K; $34.95 each
CIRCLE **267** ON READER SERVICE CARD

MUPPET LEARNING KEYS
Sunburst Communications
39 Washington Ave.
Pleasantville, NY 10570
(800) 431-1934
48K; $79.95
CIRCLE **268** ON READER SERVICE CARD

Touch Window

by LARRY KRENGEL

TOUCH WINDOW
Personal Touch Corporation
4320-290 Stevens Creek Blvd.
San Jose, CA 95129
(408) 246-8822
64K
$200
CIRCLE 212 ON READER SERVICE CARD

Have you *touched* your computer lately? Well, pull up a chair—or better yet, a monitor. Now you can make your computer touch sensitive and give the term "hands on experience" a whole new meaning.

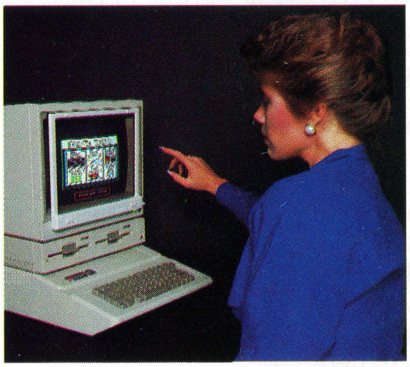
The concept of a touch sensitive pad for the personal computer is not new. But Personal Touch Corporation has turned an interesting idea into a tangible product: the **Touch Window.**

The Touch Window is made of transparent plastic and mounts to the front of your video monitor with Velcro strips. Once the screen has been set in place and calibrated, the controls are literally at your fingertips. The potential applications seem limitless.

The Touch Window comes with a healthy assortment of software. A word processor, a spreadsheet, a graphics program and two games (checkers and a graphic puzzle) are all included in the price tag. And there are presently eleven other publishers producing software compatible with the screen. (They're listed at the end of this review.)

You can easily remove the screen from your monitor and use it as a lap-held tablet like any other graphics pad. And the developers have one other lap-top trick up their sleeve. . .

An interactive book, also part of the Touch Window package, can be placed over the screen on your lap. The book contains half a dozen slick programs for various levels and ages. One program will mesmerize pre-



Mary Rhomberg Lavery

school-age children: they must find the hidden monkeys in a full-page picture. When a child touches the monkey in the book, it appears on the monitor and dances to a tune.

At the other end of the spectrum is a trip-planning program. You select a map, place it on the Touch Window, establish the scale and trace your course. Your mileage is displayed as your finger travels, and your total distance is used to determine the time you'll spend en route. Personal Touch developers packed forty pages of material into the interactive book.

There are many other applications under development for the Touch Window. These include educational applications, especially for working with the very young and the special student. The device is well oriented to the needs of these groups; it eliminates the need for keyboard proficiency and in many cases fine motor skill requirements are minimal.

If you yearn to develop your own application, you might find Personal Touch's Touch Window Tool Kit to be useful. This contains the assembly language routines you need to produce high resolution graphics and coordinate them with the Touch Window.

Perhaps I can best illustrate the simplicity and popular appeal of the Touch Window this way: As a school teacher I often use my school as a test site. With the window in place, I booted the demo disk and left my Apple out where it could be seen by students and staff alike. It attracted a continuous line of kids and teachers. Ooh's and ah's were heard down the hall as each discovered the computer that liked to be touched.//

Larry Krengel teaches in Marengo, Illinois.

These publishers are creating software compatible with the Touch Window:

Avant-Garde
37B Commercial Boulevard
Novato, CA 94947
1-800-874-6544
CIRCLE **225** ON READER SERVICE CARD

Baudville
1001 Medical Park Drive S.E.
Grand Rapids, MI 49506
1-800-824-8873
CIRCLE **226** ON READER SERVICE CARD

Beagle Brothers Micro Software
3990 Old Town Avenue
San Diego, CA 92110
1-800-227-3800, ext. 1607
CIRCLE **227** ON READER SERVICE CARD

Broderbund Software
17 Paul Drive
San Rafael, CA 94903
(415) 479-1170
CIRCLE **228** ON READER SERVICE CARD

Hayden Software
600 Suffolk Street
Lowell, MA 01854
1-800-343-1218
CIRCLE **229** ON READER SERVICE CARD

Koala Technologies
2065 Junction Avenue
San Jose, CA 95131
1-800-562-2327
CIRCLE **230** ON READER SERVICE CARD

The Touch Window, a useful new tool, can help the very young and special student and can also serve as a graphics tablet.

Laureate Learning Systems, Inc.
1 Mill Street
Burlington, VT 05401
(802) 862-7355
CIRCLE **231** ON READER SERVICE CARD

Mindscape
3444 Dundee Road
Northbrook, IL 60062
1-800-221-9884
(in Illinois, 1-800-942-7315)
CIRCLE **232** ON READER SERVICE CARD

Penguin Software
P.O. Box 311
Geneva, IL 60134
1-800-323-0884
CIRCLE **233** ON READER SERVICE CARD

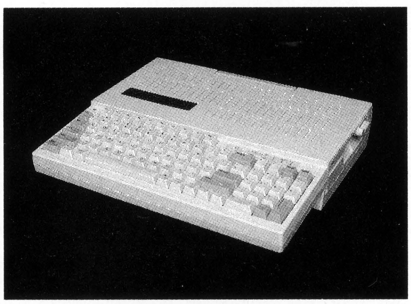
Springboard
7807 Creekridge Circle
Minneapolis, MN 55435
(612) 944-3912
CIRCLE **234** ON READER SERVICE CARD

Sunburst Communications
39 Washington Avenue
Pleasantville, NY 10570
1-800-431-1934
(in New York, Hawaii, Alaska or Canada call collect: (914) 769-5030)
CIRCLE **235** ON READER SERVICE CARD

Laser 128

by FRANK HAYES, Assistant Editor

LASER 128
Video Technology Computers Ltd.
Distributed by Central Point Software, Inc.
9700 S.W. Capitol Highway, Suite 100
Portland, OR 97219
(503) 244-5782
$415 postpaid
CIRCLE **221** ON READER SERVICE CARD



Mary Rhomberg Lavery

The **Laser 128** is the functional equivalent of an enhanced Apple IIe equipped with 128K, a mouse port, a modem port, serial and parallel printer ports, and an RGB interface board. It sells for between $400 and $500, which is less than half the price of an Apple IIe.

Is it what it claims—"the best of the Apple IIe and IIc at half the price"?

Physically, the Laser 128 looks like a IIc on steroids: thicker, heavier, and wide enough to accommodate a numeric keypad to the right of the main keyboard. It has a built-in disk drive, an external power supply, an earphone jack and volume control, a line of connectors across the back, and a carrying handle that doubles as a rear leg. This has led some reviewers to assume that the Laser 128 is a IIc clone, but it's not: it's designed to function like an enhanced IIe loaded up with an extended 80-column card, a serial/parallel printer interface, a serial communications card, a mouse interface and a disk controller.

continued on next page

The Laser has a single expansion slot on the left side of the machine. The slot is horizontal—that is, any card you plug into it will stick sideways out of your computer. The manufacturer plans to offer an expansion box that will connect to the slot, converting it into two slots that will function as slot 5 and slot 7.

Even without the expansion box, most IIe expansion cards that don't require a specific slot will work with the Laser. We tested it with an accelerator card, a clock, a CP/M card, and Apple's Unidisk 3.5 controller, and everything worked. Cards that depend on being in a particular slot, such as the SwyftCard from Information Appliance, won't operate—but generally, if a card works with the IIe it'll work with the Laser.

The Laser's keyboard has a better feel than the IIc, though not as good as the IIe. It includes function keys (not programmable) and a numeric keypad, along with special keys such as PAUSE and BREAK. Also on the keyboard are switches to select a serial or parallel printer, a monochrome or color monitor, and a 40- or 80-column display.

The internal disk drive is very quiet, without the annoying machine-gun rat-a-tat familiar to those who have genuine Apple drives; there's also a drive speed adjustment on the Laser's underside. Any Apple-compatible drive with a IIc-style cable can be used as a second drive.

Configuring the Laser's built-in printer, communications and mouse interfaces is unusual; instead of setting DIP switches, you press the CONTROL, P, and RESET keys simultaneously, which brings up a menu for configuring the interfaces. We discovered by trial and error that you've got to press CONTROL-P-RESET from BASIC; otherwise, returning from the configuration menu resets the system and wipes out your new settings. The manual doesn't mention this, and it was a source of aggravation until we figured out how to do it.

The Laser 128's BASIC is, well, BASIC. It operates just like Applesoft BASIC; everything we tried worked, including PEEKs, POKEs, double-hi-res graphics and sound. The *User's Guide* that comes with the Laser includes a 129-page BASIC reference manual; though it's not a tutorial, it's a more complete manual than Apple offers. (The *User's Guide* is perfect for beginners—it starts by assuming nothing, and follows a careful step-by-step approach for setting up and using the machine.)

The Laser 128 works like an enhanced IIe full of interface cards, but at a fraction of the price. It's not perfect, but it's worth a careful look.

Appleworks—probably the best quick test of IIe and IIc compatibility—works fine. So do Apple Writer IIe, Dazzle Draw and everything else we tried—though some didn't seem to work at first. Many apparent incompatibilities turned out to be related to the way the printer and communications ports were configured—remember, that's a bit complicated and easy to foul up. Programs that make special ROM calls may not work, although any that follow Apple's official guidelines for using the ROM routines should work. As ROM incompatibilities are discovered, new ROM sets for the Laser are being issued; there's a small hatch on the underside of the Laser that allows you to change ROMs without opening the case.

The computer also comes with its power supply and monitor cable. Not included, but available at additional charge, are serial and parallel printer cables, an RGB monitor cable, a modem cable, and the expansion box for plug-in cards.

Why buy a clone like the Laser 128 when you could get the real thing? The only real reason is the price: at $400, you could buy two or three Lasers for the price of a comparably equipped IIe. That difference in price may make it possible for some people to be able to afford a second computer—or even a first one.

There's a minor legal tempest surrounding the Laser 128 at the moment: the U.S. Customs Service has okayed the machine for importation, but Apple has sued, claiming patent and copyright infringement, and the legal maneuvering may take years. In the meantime, the Laser 128 is a highly Apple-compatible computer at a fraction of the Apple price. If you're in the market for a second Apple II, or want to try an Apple for the first time, the Laser 128 is an inexpensive alternative.//

Jeeves, Fingertips and Pinpoint: A Comparison

by CHRIS ALBERTSON

JEEVES
PBI Software, Inc.
1111 Triton Drive, Suite 201
Foster City, CA 94404
(415) 349-8765
Apple IIc, enhanced Apple IIe (requires 128K and interrupting source)
$49.95 (add $15 for optional IIe Interrupt Board)
CIRCLE 222 ON READER SERVICE CARD

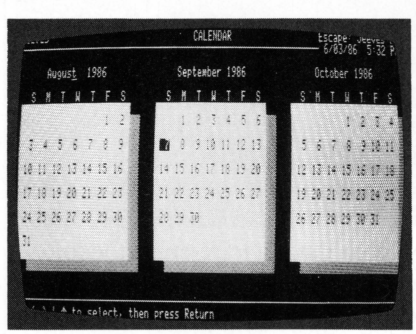
FINGERTIPS
Northwest Synergistic Software, Inc.
830 N. Riverside Drive
Renton, WA 98055
(206) 226-3216
Apple II, II+, IIe, IIc (double-sided disk contains DOS 3.3 and ProDOS versions), printer and modem optional
$39.95
CIRCLE 223 ON READER SERVICE CARD

PINPOINT
Pinpoint Publishing
P.O. Box 13323
Oakland, CA 94661
(415) 654-3050
Apple IIc, enhanced Apple IIe (requires extended 80-column card), one disk drive (two recommended)
Supports UniDisk, ProFile hard disk, most memory expansion cards and Hayes-compatible modem (300 or 1200 baud)
$69
CIRCLE 224 ON READER SERVICE CARD

You don't have to own an IBM-compatible computer to have seen ads for SideKick, a popular program that features pull-down menus and conveniently places a calculator, notepad, appointment calendar and address book just a few keystrokes away. If you own an Apple II series machine, seeing such handy desktop accessories made available for "that other machine" may induce a tinge of envy, but take heart: your time has come. There are now several similar Apple II programs, and we will take a look at three: **Pinpoint, Jeeves** and **Fingertips.**

The obvious question is, can they deliver? Obvious, because—memory cards notwithstanding—a normally configured Apple II has only 48 to 128K of RAM, depending on the model, and 640K is not uncommon in the MS-DOS world.

Jeeves, touted as the first desktop organizer for the Apple IIc and enhanced IIe, is written specifically for use with AppleWorks, whose screens it emulates. One nice thing about this program is that it nestles



JEEVES

in a 12K area of the auxiliary memory bank and does not take up any AppleWorks desktop space, but it has very little else to recommend it. Jeeves is of course a stereotypical name for a butler, and that idea is played to death with cute screen prompts: QUIT becomes "Take the day off?" and EXIT is "Will that be all?" You get the idea.

As for the features: the software-based alarm clock is slowed down a bit each time you access a disk, but it will warble pretty close to the time you set it for; the phone directory has an automatic dialer, and allows a long distance number and authorization code to be privately embedded; the four-function calculator has the look of 1979 user group programs, but functions well; the appointment calendar looks better than the calculator, and the same can be said of the memo pad. To run in the background, Jeeves has to take advantage of an interrupting source, such as a clock card, the Apple IIe mouse card (whose normal functions it does not support), or the optional

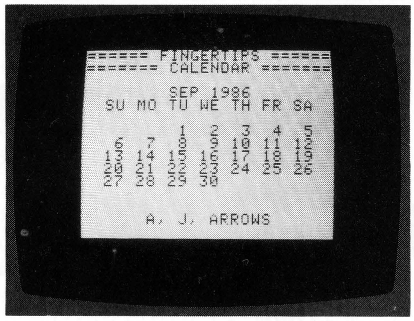
continued on next page

PBI Interrupt Board, which is an added cost you may have to consider.

According to the manual, Jeeves will run with "a few other ProDOS-based packages," and the manufacturer suggests that you experiment, but guarantees compatibility with only one other: BASIC. So, unless you are a steady user of AppleWorks, or do a good measure of ProDOS BASIC programming, Jeeves is probably not for you. Then, too, having to put the Jeeves disk into the auxiliary drive each time you access one of these features soon makes you want to give Jeeves the old pink slip. Therefore I cannot recommend this program to anyone not having a well-endowed memory board or a high-capacity disk drive—or both.

Some six years ago, I spent many enjoyable hours working my way through a game called Odyssey: The Compleat Adventure, but I'm afraid **Fingertips**—by the same author—will not get much of my time. The most recent Apple desktop package to emerge, it comes in ProDOS and DOS 3.3 versions (on the same two-sided disk), which means that it will run on all models of the Apple II. According to the manual, one can install Fingertips on a copy of AppleWorks, run it as a stand-alone package or use it with a number of other programs, including Bank Street Writer, Cut & Paste, Ultima IV, Visifile, and some of the Beagle Bros. products. I followed the instructions for modifying a copy of AppleWorks, but all I ever got was a frozen screen. Then I looked at some of the features, the calculator, note pad and appointment calendar, and decided that this package is no more useful than Jeeves.

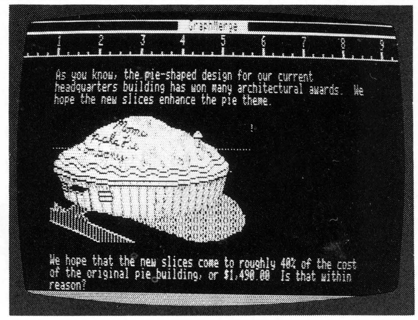
[Editor's note: Northwest Synergistic Software, publisher of Fingertips, told us that the software probably failed because it will not work in a computer with a clock card. We then installed Fingertips on AppleWorks and tried the program on several Apple IIe's, a Laser 128 and an Apple IIc. It failed to work on every computer except the IIc. The program does *work on a stand-alone basis with each of these computers.]*



FINGERTIPS

That leaves **Pinpoint**, which has been out for some time, and is clearly the most sophisticated of the three. Like Jeeves, Pinpoint is essentially a supplemental program for AppleWorks, but it can also be installed for ProDOS BASIC. Pinpoint also leaves AppleWorks' 55K desktop intact, but it has an appealing professional quality that is immediately evinced by slick, Mac-type screen designs and a well-written 216-page manual. Among its useful features are some not found in Fingertips and Jeeves: QuickLabel, an easy way to address an envelope or make a mailing label without having to re-enter the information; the Typewriter mode, which sends one line at a time to the printer and allows full use of its options; GraphMerge, an easy way to place from 10 to 16 pictures (created with such programs as MousePaint or Dazzle Draw) into a word processing file. The latter feature is slow, but it works, and you are given four size options for each merged image.

Of these three desktop accessories, Pinpoint is the most powerful and professional, offering more options and easier access.



PINPOINT

Following the manual's simple procedure, I easily created a modified AppleWorks Startup disk with Pinpoint installed, but I did not get very far using the new disk before I encountered a serious bug. From AppleWorks, Pinpoint is invoked by pressing the [Closed-Apple]-P combination, but ESCAPE should be used to return to the main program. However, I made the mistake of using the [Closed-Apple]-P combination again (a natural mistake), and that freezes up the machine, forcing a re-boot. I consider this a serious flaw in an otherwise well-designed program.

Other than that, Pinpoint delivered services well beyond my expectations. The calculator looks and works like the hand-held types, and it can be dragged around the screen to a suitable spot, but automatic transfer of figures to a word processing file is not one of its virtues, so, again, it would probably be easier to have a real hand-held calculator on the actual desk. Pinpoint's Communications module has an auto-answer mode, a capture mode, and a Phone Directory that stores up to eight numbers for making connections with other modems. In addition, you can type numbers on the screen, and the Dialer will start your voice calls by looking for telephone numbers there, then keep dialing if there is a busy signal. If there are many numbers on a screen, you can tab from one to the next with an arrow key, and dial by hitting RETURN. The Appointment Calendar offers an easy way to see a month or a day at a glance, and when there is a phone number on it, the Dialer can use it.

I have devoted more space to Pinpoint because this is the only program that really merits it. With such optional packages as Pinpoint Toolkit, Information Engine, and Spelling Checker, it can be an even more powerful tool. I say "can be," because even Pinpoint loses its charm when used with a basic two-floppy, 128K system. //

Chris Albertson, a contributing editor to Stereo Review, *has been writing about jazz since 1953; his involvement with computers dates back to 1979. He prefers to keep the two subjects separate.*

Sensible Grammar

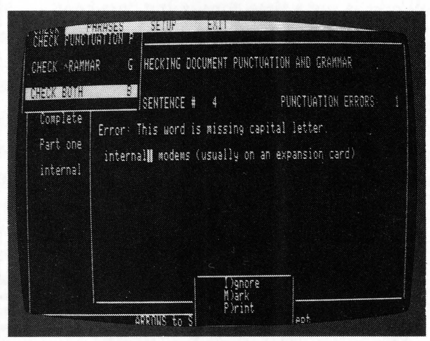
by CHARLES RUBIN

Sensible Grammar
Sensible Software, Inc.
210 S. Woodward Ave.
Suite 229
Birmingham, MI 48011
(313) 258-5566
128K, 80 column
ProDOS
$99.95
CIRCLE 213 ON READER SERVICE CARD

Only one out of twenty people can write with confidence, and of them, only one out of ten can write well. Word processors help by making what you write easier to review and change, but they're not much good if you don't realize what you've done wrong. Now, Sensible Software, whose Sensible Speller has been the premier Apple II spelling checker for years, has brought hope to the unlettered masses with **Sensible Grammar**.

Sensible Grammar is a helpful companion to Sensible Speller: It helps writers through the complex and frequently baffling rules of punctuation and usage. This program is no substitute for a skilled human editor, but it's right often enough. It will make your initial documents more professional, and, with regular use, it will help you become a more effective writer.

The program checks each line of a word-processed document twice, once for punctuation errors such as capitalization, comma placement, and spacing between sentences, and



once for grammatical errors. In the grammar department, Sensible Grammar compares your documents against a library of about 1500 commonly misused English phrases. The phrases are grouped in categories such as Pompous, Vague, Sexist, Wordy, Legal and Redundant, and you can choose groups of phrases against which to check a document each time. Two other groups of phrases used alternately can either find contractions and suggest full-word substitutes, or find full-word phrases and suggest contractions for less formal work. Further, you can add to or change the contents of the phrase library, substituting problem phrases of your own for those Sensible Grammar supplies.

As it checks a document, the program stops at every suspect grammar or punctuation error and highlights in context. With punctuation errors, the program identifies the problem and lets you mark them for further study with your word processor. With grammatical errors, the program suggests alternate usages, and you can substitute the changes to see how they would look and then replace them if you like. You can also mark problems so you can locate them easily when you get back into your word processor, or you can skip over problems if you disagree with the program's advice. You're bound to disagree with some of the suggestions, because the program has to make certain assumptions about the context in which you're using

continued on next page

Sensible Grammar helps you improve your word usage and grammar; it's a clever program that may make you a better writer.

phrases, and those assumptions aren't always correct.

In my tests, it took about five minutes to get through a seven-page document. I was checking the document against the maximum number of phrases Sensible Grammar can work with at a time (about 1000). In my case, the program highlighted words like "expertise" (it found this pompous, and suggested "knowledge" as a replacement), and also found that I'd only left one space instead of two between sentences at one point. One particularly handy feature is the program's ability to locate repeated words (where you've typed "the" twice in a row, for example). A spelling program wouldn't catch problems like this, because both words are spelled correctly.

On the whole, Sensible Grammar is a handy, well-designed program. It is extremely easy to use, and is supported with a clear, concise manual. Along with changing phrases in its library, you can also alter other values, such as the number of spaces the program should allow between sentences. Sensible Grammar can be a real eye-opener even for experienced writers, but is apt to be of the most help to the timid, inexperienced scribes who tend to use vague or pompous phrases. (Somehow, timid writers tend to think that business correspondence should read like lawyers have slaved over it.)

Sensible Speller can be moved to a hard disk with Quark's Catalyst program, and it has no trouble dealing with document files on a hard disk or UniDisk 3.5. The program comes on both 5¼-inch and 3½-inch disks. It directly supports AppleWorks, Apple Writer, Format II, MouseWord, Word Juggler and Zardax, and will also work with plain text files from any other word processor.

When you consider that the quality of your writing is a direct reflection on you, Sensible Grammar's $99.95 price tag seems a small amount to pay to look your best.//

Charles Rubin's latest book, Command Performance: AppleWorks, *was published in March by Microsoft Press. He is also the author of the best-selling* AppleWorks *and* The Endless Apple, *and writes about technology for a variety of publications.*

Thinking About Thinking, Part 1

by DANIEL WOLF, Ph.D

Microcomputer systems available today are much faster and more powerful than those purchased just a few years ago. We usually think of this "computer revolution" in terms of hardware: smaller, faster systems with more memory. But another, slower evolutionary process has been taking place in software, and one new direction involves processing knowledge and symbols, rather than numbers.

There was a time when symbolic processing required massive computing resources. But today, logic and symbol languages such as PROLOG (for "PROgramming LOGic language") and LISP ("LISt Processing language") are available for microcomputers, making intelligent systems more widely accessible. Unlike procedural computer languages such as BASIC and Pascal, LISP and PROLOG are *declarative* languages: the programmer "declares" things, such as symbolic or logical relationships between variables—"what" rather than "how."

One area where the new power of artificial intelligence has recently been harnessed for commercial products is the *expert system*, in which the computer provides expert assistance in specialized areas of knowledge. These programs incorporate the knowledge of a human expert on some subject, along with rules that let the program process that knowledge to reach the same conclusions that a human expert would. When the expert system is called upon for help, it uses those rules to draw conclusions. The expert system may ask questions (if the rules require answers to those questions) and may combine the user's replies with the rules and other information to produce an answer. Typically, an expert system can also provide an explanation of how a conclusion was reached.

Developing all the rules and information to make a good knowledge base is a slow process. But even if an expert system isn't perfect, it can be a good training tool—and it can get better, especially if it has well-designed facilities for adding or changing rules to fine-tune and debug it.

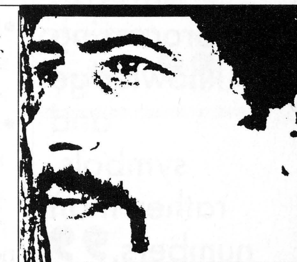
THE INFERENCE ENGINE

The brain of an expert system is a part of the program called an *inference engine*. (It's called an inference engine as a tribute to Charles Babbage, the 19th-century mathematician who designed a mechanical computer he called the "analytical engine.")

The inference engine is a special interpreter that handles the rules making up the expert system. Usually the rules are in the form of "IF (a) THEN (b)" statements, in which (a) and (b) are variables; an expert system may consist only of a bundle of these statements. The inference engine can interpret a large group of rules, and use its conclusions from one rule to interpret others. Rule statements aren't necessarily processed in a predetermined order; some rules may be examined again and again until the inference engine has drawn its final conclusions, while others may be completely ignored.

LISP and PROLOG are good for designing inference engines, but the Apple II is a little small to do very much with these languages. An alternative is to design a custom inference engine—and that's the approach I took when I wrote The Advisor, an Apple II expert system design language (it was reviewed by Rich Moore in the December 1985/January 1986 issue of ***II Computing***). With The Advisor you can develop knowledge systems with up to 255 rules on any Apple II.

continued on next page



Daniel Wolf is a scientist who likes to use microcomputers to explore mathematics and scientific concepts. A musician as well, Dr. Wolf has an academic background in biology, physics and math.

An Advisor rule looks like this:

- IF A and B and C and D and E and F and G THEN H

A, B, C, D, E, F and G are called the *antecedents* and H is the *consequent*. You don't have to use all seven possible antecedents in every rule; a rule can have as few as one antecedent, but not more than seven. Rules may also "chain" to each other: the consequent of one rule can be the antecedent in other rules.

The Advisor uses a number of different techniques for drawing conclusions from the rules. One of them—the one we'll examine this time—is called *backward chaining*.

Let's look at an example with two rules:

- IF (printer is not on line) and (computer has performed "PR#1") THEN (computer has locked up because of the printer)
- IF (printer is turned off) THEN (printer is not on line)

Suppose you're trying to fix a computer that's not working, and you give your expert system these rules. The program's inference engine goes into action: it backtracks from (computer has locked up because of the printer) to the two antecedents. For (printer is not on line), it will backtrack again and find the second rule, with its single antecedent. No more rules are available, so the system stops to ask a question about whether the printer is turned off. Your answer to that question either causes the system to quit with a conclusion about whether the computer has locked up because of the printer, or else to stop and ask whether the computer has performed a "PR#1" and then make its conclusion. The first answer may or may not be enough information for the inference engine to draw the final conclusion, but it's smart enough not to ask directly whether the printer is on line if it can get by without it.

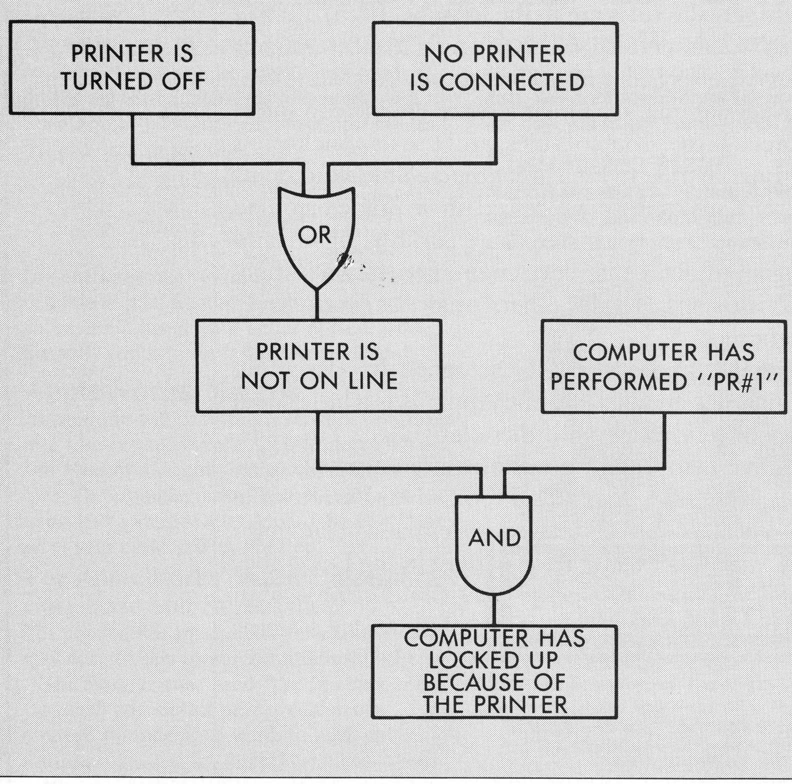
"One new direction in software involves processing knowledge and symbols, rather than numbers."

In this two-rule example, we might as well have just put (printer is turned off) in place of (printer is not on line) in the first rule. The beauty of an expert system is that you can easily add or change rules, then test the "reasoning" of your system, since the rules and the inference engine are completely separate.

Let's add a third rule:

- IF (no printer is connected) THEN (printer is not on line)

Now there are two ways to find out whether the printer is on line. The inference engine will try one rule first, then the other only if necessary.



The inference engine must "know" it has sufficient information to draw a conclusion; it should stop asking questions and processing rules whenever a conclusion is possible. Thus, the expert system should be able to reach a conclusion under a variety of conditions. Whether the printer is not connected or is simply turned off, you can still get an answer from the expert system.

Most expert systems let you set up variables, then create rules using the variables. You can fine-tune the resulting "knowledge base" by specifying the order in which rules will be used, in case more than one rule can apply to the situation. The resulting program of rules can be laid out in a tree-structure, with logical AND and OR branches. Figure 1 shows our three-rule tree. Using backward chaining, an inference engine would work its way through the tree, assigning each variable a result of *true*, *false* or *unproven*.

RECURSION

The process of backtracking from the consequent of a rule to its antecedents is more complicated than it sounds. Each time the inference engine tries to prove a statement true, it follows exactly the same process: it looks for rules where the statement is a consequent, then tries to prove that the antecedents are true. That, of course, starts the whole proving process all over again—but it's important for the inference engine not to lose its place. The *process* starts over again, but it starts at a different place in the tree.

This kind of process is called *recursion*. In a computer program, it's usually in the form of a subroutine that calls itself. There's a simple example in Figure 2: a BASIC program that calculates factorials. (The factorial of an integer consists of all the positive integers up to and including that number multiplied together; it's usually indicated with an exclamation point. For example, 2! is 1*2, or 2; 3! is 1*2*3, or 6; and 5! is 1*2*3*4*5, or 120.)

Notice that the subroutine repeatedly calls itself with the GOSUB 1010 command in line 1040. In this way, it keeps looping back to itself until all the multiplications for the factorial are complete.

Figure 2

```
10  INPUT A
20 F = 1: GOSUB 1000
30  PRINT A;"!=";F
40  END
999  REM  RECURSIVE SUBROUTINE T
    O CALCULATE FACTORIAL
1000 C = 1
1010  IF A < C THEN  RETURN
1020 F = F * C
1030 C = C + 1
1040  GOSUB 1010
1050  RETURN
```

Applesoft BASIC isn't really designed for using recursive subroutines; it has only global variables, and a limit of 24 simultaneous GOSUBs and FOR/NEXT loops. That's why the program BACKCHAIN (in the Software Library on page 45) has to avoid using FOR/NEXT loops to work. Type in the program and check it with Typo II, or select it from the Action Disk menu.

BACKCHAIN uses the three rules and five variables of our printer problem to solve it automatically. It starts by looking for a rule with (computer has locked up because of the printer) as a consequent. Then for each such rule, it checks the seven antecedents; if the antecendents are all true, the consequent must be true. If one of the antecedents isn't known to be true or false, the program backtracks to see if it's a consequent to any other rules. It asks only the questions it needs, and finally draws a conclusion.

The variables are stored as strings in lines 120 through 138, and the rules are in the data statements from lines 150 through 168. You can create your own variables and rules to use with the program: after all, a variable is just a statement, and a rule is a list of seven variable numbers (the antecedents) followed by another variable number (the consequent). For example, the rule represented by the data statement

```
DATA 3,4,0,0,0,0,0,5
```

means "IF (variable 3) and (variable 4) THEN (variable 5)." (The zeros are ignored.)

BACKCHAIN uses only one of the methods that expert systems can use to prove statements true or false. The Advisor uses several other techniques, including *forward chaining* and *negation*. Next time we'll look at how these techniques can work to make a micro-based inference engine even more powerful.//

"The beauty of an expert system is that you can easily add or change a rule, then test the ''reasoning'' of your system."

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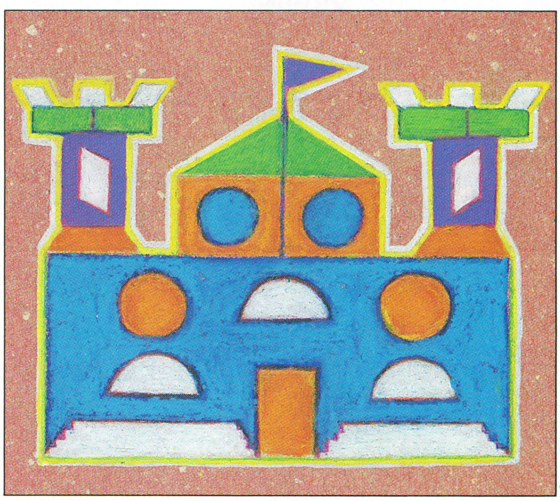
Castle Game

by TRACY and LORI HERSHEY

Tracy and Lori Hershey program for the Apple II, and enjoy writing educational software for children.

This month's Game Frame is all about shapes—squares and circles, rectangles and triangles, parallelograms, semicircles and trapezoids. And it's a game for parents to play with their kids. If you've ever built a castle out of wooden blocks that came in different shapes and colors, you've already played part of the game. But this time you'll build your castle on the computer's screen—using every color in the Apple's hi-res rainbow.

But you're doing more than just building a castle. To add each colored shape to the castle's outline, you and your child must identify the shape by name. And once you've mastered the names, there's a further challenge: identifying each shape by the geometrical formula for its area.



THIS IS HOW THE COMPLETED CASTLE LOOKS.

PLAYING THE GAME

Type in the program CASTLE.GAME from the Software Library on page 40 and check it with Typo II—or select it from the Action Disk menu. When you RUN the program, you'll see the area formulas for the seven shapes that form the castle: circles, squares, triangles, semicircles, parallelograms, trapezoids and rectangles.

The first step is to choose whether to use the version for young children, in which you try to identify each shape by name, or to play the more advanced version, recognizing the formula for each shape's area. Then the computer draws the castle in outline form, and begins to show you the shapes.

As each shape appears on the screen, you and your child try to identify it. If the answer is correct, the shape is added to the castle in color; if not, you'll have to try again.

Once you've built the entire castle, the program will remind you of how many times you didn't correctly identify a shape. The fewer mistakes you've made, the better you've done!

THE PROGRAMMER'S PERSPECTIVE

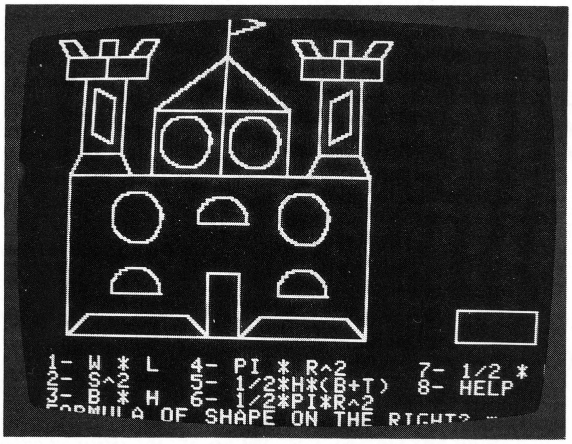
Writing an educational game program that uses graphics so heavily can get a little tricky in Applesoft BASIC. This program just fits into the space allotted for it below hi-res memory. With space so tight, that can cause problems. Normally, BASIC starts keeping track of its variables just after the end of the BASIC program. There's no room for that—the variables try to take up the same memory space as the hi-res screen, and the castle would come crashing down.

To avoid that problem, there's a LOMEM command in line 50. LOMEM sets the lowest memory location that BASIC will use for storing variables; LOMEM: 24576 forces BASIC to start its list of variables above the second hi-res screen—safely out of harm's way.

To simplify all the graphics work in the program, the Castle Game's graphics routines get their infor-

GAME FRAME

HERE IS THE HELP SCREEN, COMPLETE WITH FORMULAS.



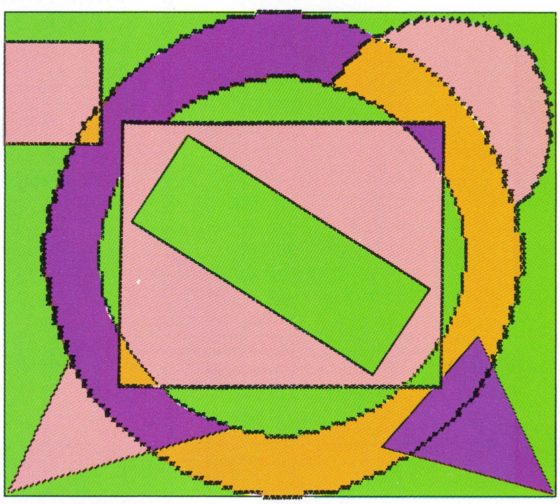
mation from DATA statements. As a result, a handful of drawing and coloring routines can be used to create the shapes that form the castle—in all their different sizes and colors. The same routines could be used to create any picture—a house, an animal, a machine—simply by changing the DATA statements. In fact, the Castle Game could easily become a Horse Game—or a Contraption Game. All it would take is a little time and design work—and a lot of DATA!//

Circle and Polygon Maker

by JENNY SCHMIDT

Jenny Schmidt is currently interested in the use of computer graphics in art and recreational software. She programs in Applesoft, Pascal and assembly language.

How often have you wanted to draw circles, arcs, or regular polygons on your Apple's hi-res screen, but found that it was more trouble than it was worth? If you use the Applesoft BASIC functions SIN and COS for drawing these figures, it takes much longer than you really want for a game, demonstration or simulation. Maybe you've wished for a CIRCLE or POLYGON command in BASIC—something to draw them as quickly and easily as HPLOT draws lines.



Anne Doering

That's what POLYGON.MAKER is designed to do. With it you'll be able to draw a circle, arc or regular polygon with a single line of BASIC—and draw it faster than the group of regular BASIC lines that it replaces!

A SLOW BEGINNING

Using SIN and COS to draw a hi-res circle is a slow process. For example, you can draw a circle with its center at X,Y and radius R with just a few lines in BASIC:

```
5  HGR : HCOLOR= 7
7 X = 140:Y = 90:R = 50
10 TWOPI = 2 * 3.1416
20  FOR A = 0 TO TWOPI STEP .02
30  HPLOT X + R *  COS (A),Y + R
     *  SIN (A)
40  NEXT A
```

But the cosine and sine functions in line 30 are complicated, and it takes a long time to do them over and over.

You can also draw any regular polygon in a similar way. For example, if you divide a circle's circumference into four equal parts, you've marked the four corners of a square; dividing the circle with five equal parts marks the five edges of a pentagon; and so on for any regular polygon. Thus, you can draw any regular polygon with N sides and a center of X,Y with a routine that's very similar to the circle routine:

```
5  HGR : HCOLOR= 7
7 X = 140:Y = 90:
     R = 50:N = 5
10 TWOPI = 2 *
     3.1416
15  HPLOT X + R,Y
20  FOR A = 0 TO
     TWOPI +
     .0001 STEP
     TWOPI / N
30  HPLOT  TO X + R *  COS (A),Y
     + R * SIN (A)
40  NEXT A
```

But we've got the same problem as before—though it's faster than a circle, it's still using the slow sine and cosine functions from BASIC.

POLYGON.MAKER

POLYGON.MAKER is a machine-language routine for Applesoft that alleviates these problems. It's faster in two ways: it uses a better way of finding points on the circle, and it works in machine code.

To use POLYGON.MAKER, type it in from the Software Library on page 45 using the HEX.ENTRY program on page 44; it's also on this month's Action Disk. For a demonstration of some of POLYGON.MAKER's abilities, type in the program POLYGON.DEMO from page 45 of the Software Library and check it using Typo II, or select it from the Action Disk menu. This demo program generates polygons and circles in a pleasing pattern. You can stop the program by pressing any key.

To use POLYGON.MAKER in your own programs, first BLOAD it and then set HIMEM to 37888 to protect the routine. Next, initialize the screen with HGR or HGR2 and set the color with HCOLOR. To draw a circle or polygon you must issue a CALL with the following format:

CALL 37888,x0,y0,centerx,centery,angle,arc,scale

The first two parameters, x0 and y0, are a point on the circle or a corner of the polygon. Centerx and centery are the center of circle or polygon. Angle is the angle in radians; the angle determines how many sides the polygon has. You can calculate the angle by dividing 6.283 by the number of sides; for example, 6.283/5 will generate a pentagon. (A circle is simply a polygon with an infinite number of sides. Of course, POLYGON.MAKER doesn't draw infinite sides, but a very large number of sides will approximate a circle. A value of 6.283/30 (.2) for the angle will draw a good circle.)

The sixth parameter, arc, determines how much of the circle or polygon to draw; a value of one will draw the entire figure, while .25 will draw a quarter of it. Arc should always be greater than zero and never exceed one. Finally, scale allows you to change the proportions of the figure. A value of .86 produces figures that are as tall as they are wide; other values will produce figures that seem out of proportion. For example, squares will look rectangular.

A few examples demonstrate how versatile POLYGON.MAKER is:

CALL 37888,30,80,20,80,.2,1,.86 draws a circle centered at 20,80 and passing through 30,80.

CALL 37888,60,80,50,80,.2,1,1 draws an oval centered at 50,80 and passing through 60,80.

CALL 37888,90,80,80,80,.2,.25,.86 draws the bottom right quarter of a circle centered at 80,80 and passing through 90,80.

CALL 37888,120,80,110,80,-.2,.25,.86 draws the upper right quarter of a circle centered at 110,80 and passing through 120,80.

CALL 37888,150,80,140,80,6.283/3,1,.86 draws an equilateral triangle centered at 140,80 with a corner at 150,80.

Other calls produce other figures. Experiment!

HOW IT WORKS

POLYGON.MAKER uses Applesoft's floating-point math to do almost all of its calculations. (For more information about the floating-point math routines in Applesoft, see "Applesoft Internal Entry Points," *All About Applesoft*, published by the Apple Puget Sound Program Library Exchange.) It calculates points and then draws lines between the points to connect them:

$X_{n+1} = X_n\cos(A) - Y_n\sin(A)$

$Y_{n+1} = Y_n\cos(A) + X_n\sin(A)$

These formulas calculate a new point on the figure from the previous point given. X_n and Y_n are the coordinates of a point on the figure with a center at 0,0; the real center is added to the newly generated point when it's time to plot. The value A is the angle given by the user. Because cos(A) and sin(A) only need to be calculated once, these formulas calculate each point faster than our original version, even in BASIC; in machine code, it runs faster still.

> "You can draw a circle, arc or regular polygon with a single line of BASIC."

Whenever a point to be plotted would be off the screen, a machine-code variable named CLIP is made non-zero and the point is not plotted. When the point is back on the screen, it's plotted and CLIP is set to zero. The rest of the time, each line segment is drawn from the old point to the new point.

POLYGON.MAKER can be used in a variety of ways to enhance your graphics programs. Polygons, circles and arcs are at your beck and CALL 37888.//

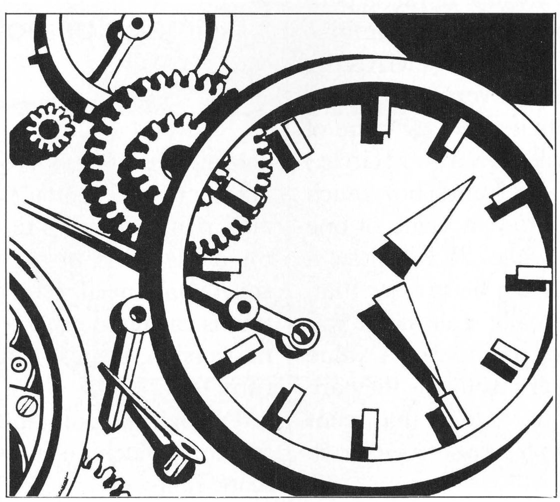
Clock Works

by WILLIAM V. R. SMITH

Bill Smith is president of Artsci, a software company specializing in business products for the Apple II, and a former contributor to Softalk.

Are you a clock watcher—and sometimes frustrated? If you have a clock card installed in your Apple II, II+ or IIe, your computer has constant access to a clock that's accurate within fractions of a second—but many programs won't even give you the time of day.

CLOCKWORKS is different: its purpose *is* to give you the time of day. Type it in from the Software Library on page 47 and check it with Typo II, or select it from the Action Disk menu. You'll see the time appear in large block characters at the top of your screen. A sample menu shows four items below the clock display, and the time is constantly updated while the program waits for keyboard input. The program requires an 80-column display; it will run without a clock card, but only the menu bar will appear on your screen—not the clock display.



Steve Hing

CLOCKWORKS is intended as a demonstration—and if you take the time to examine how the program works, you'll be able to use its routines in your own programs to get the time from your clock card, display oversized numbers and use an inverse menu bar for user selections. That may sound like complicated activity, but it's not so hard to understand if you look at each of the routines in turn.

THE TIME AND DATE ROUTINE

Long ago, Apple established guidelines for clock cards that would work with the Apple II. Since most clock manufacturers have followed Apple's guidelines, a standard set of BASIC subroutines will work with most clock cards without modification for reading the time and date.

The first step is to determine what slot the clock is in. To do this, the program searches the memory locations assigned to each slot, looking for the clock card identification number. (Clock cards, printer cards and disk drive controllers each contain a unique ID number.)

The "find slot" subroutine starting at line number 3000 searches slots 1 through 7 looking for a clock card ID number. If it finds a clock, the slot number is assigned to variable CL; if not, CL becomes zero. The subroutine also initializes the card for later use.

Now the program can read the time using the BASIC IN# and INPUT commands. The routine starting at line 800 reads the time and places it in variable M$. The balance of the routine is used to strip out the hours, minutes and seconds.

The manual that came with your clock card may show a number of different time and date formats. This program's routine will initialize the clock for

continued on page 74

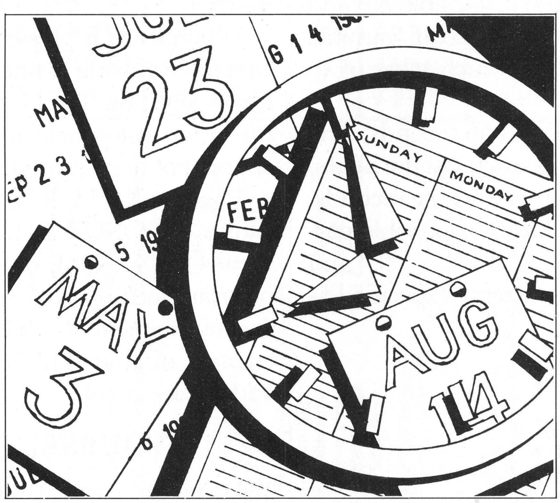
Clockless Date-stamping With ProDOS

by RICK ROBEY

Rick Robey is an independent consultant who enjoys outdoor sports and setting up small business computer systems.

I love ProDOS! I admit it freely: I'm in love with the Apple II's newest disk operating system. Its extra features help with file selection; its disk access is much faster than DOS 3.3; and its new commands are making life simple again for programmers like me.

But the path of true love isn't always easy. You see, I had no clock, so my love and I weren't dating. Every time I CATALOGed a disk, the "created" and "modified" columns dampened my passion for ProDOS with their <NO DATE> message. In desperation I sought an answer. After a session with Don Worth and Pieter Lechner's book *Beneath ProDOS,* it looked like my new love and I had found an answer to our trouble.



Steve Hing

Whenever ProDOS saves a file, it checks certain memory locations to read the time and date, and then saves this information along with the file. At first glance the solution seemed simple: merely POKE the time and date values wherever they were needed, before saving each file. However, figuring out exactly what values to POKE was not as easy as I expected.

SETTING THE DATE

Let's suppose that today is September 30, 1986. Using the following formulas, we (or a program) can calculate the values to place into the special ProDOS date memory locations for month and day.

Since it's September 30, 1986, the MONTH is 9, the DATE is 30, and the YEAR is 86.

The first formula calculates the ProDOS half-year H:

```
H=YEAR*2+(MONTH>7)
```

YEAR, of course, is 86. MONTH>7 is either 1 (if the value of MONTH is really greater than 7) or 0 (if MONTH is 7 or less). Since in this case MONTH is 9:

```
H=86*2+(9>7)
  =172+1
  =173
```

The half-year value H is stored at 49041, so we need to POKE 49041,173.

Next comes the ProDOS day D:

```
IF MONTH>7 THEN D=((MONTH-8)*32)+DATE
IF MONTH<8 THEN D=(MONTH*32)+DATE
```

In this case MONTH is 9, so we'll use the first formula:

```
D=((MONTH-8)*32)+DATE
  =32+30
  =62
```

continued on page 75

CLOCKWORKS
continued from page 72

use with the large display, but once you've mastered the routines needed to read the clock card, you can experiment with different formats in your BASIC programs.

THE LARGE TIME DISPLAY ROUTINE

The most impressive routine in the program is the large time display. This routine reads the time from the clock card and displays it in large block text.

The heart of the routine can draw the numbers from zero through nine. Each number is five lines high and five characters wide, and is designed using four basic patterns. The patterns are drawn at line numbers 100 through 400, and they're set up at line numbers 1000-1060.

> "CLOCKWORKS gives you the time of day."

Starting at line 800, the program reads the time and the hours, minutes and seconds are placed in variables H$, M$ and S$. Next, at line 890, the TAB for each number is placed in variable XP and the number to be displayed is placed in variable N. Then comes GOSUB 700, which takes us to the draw routine.

Suppose the time is 07:34 and 56 seconds. The routine first displays the left character of the hours, then the right; then the minutes and the seconds. Each line of each character has four possible patterns: 1="*****", 2="*   ", 3="   *", and 4="*   *". Thus, the number zero is specified as 14441:

```
1: *****
4: *   *
4: *   *
4: *   *
1: *****
```

The draw routine at line 700 uses the number to be drawn as an index into the character pattern array, A$(). Each variable holds five pattern numbers, one for each line of a character. The routine gets each pattern number from array variable A$(N) and uses the number to GOSUB to the proper line pattern draw routine. Each line is drawn at the TAB value held in variable XP.

After the number is drawn, the program checks for keyboard input. If a key has been pressed, the program returns to the keyboard/menu routine.

Incidentally, it's possible to change the look of the large numbers by changing pattern number 1 from "*****" to " *** " in line 100. Can you make the change?

You can use the large number display in many different applications. If you have a temperature board, you might use it to show degrees; amateur radio operators could use it to show both local and Universal time.

THE MENU ROUTINE

The menu routine uses an inverse bar to show the current item selected. The arrow keys or number keys move the inverse bar to different menu items. Once the bar is on the right item, you can press RETURN or the item number to select the option—or you can just type the item number twice to select the option quickly.

The menu software routine starts at line 2000. The main screen is displayed through line 2230; then the program checks for keyboard input and a chance to redraw the time display via a GOSUB to line 800.

Variable NE holds the number of items in the menu; it can handle up to nine items. If you add or delete items from the menu, remember to change variable NE to the new number of menu items.

When a key is pressed, the program checks the character starting at line 2320. Valid characters are arrow keys, the RETURN key, or a number key up to the value held in variable NE. Any other characters are ignored.

Pressing RETURN, or the item number twice, causes a GOSUB to the proper routine by way of the ON X GOSUB statement in line 2400. The program includes four sample menu items, but all line numbers above 7000 are available for you to create handling routines for any new items you add to the menu.

DO IT YOURSELF

You can use each of these routines in your own BASIC programs to find the time, display numbers or set up a menu—and the entire program can be used as a menu routine in other programs to control menu item selections. Try the routines in different combinations. Experiment, and you'll find that using a clock menu is easier than you think.//

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A. What kind of computer do you own?
1. ☐ Apple II 4. ☐ Apple IIc
2. ☐ Apple II+ 5. ☐ Apple Compatible
3. ☐ Apple IIe 6. ☐ Other __________

B. What products do you plan to buy in the next 6 months?
1. ☐ Printer 6. ☐ Memory expansion boards
2. ☐ Modem 7. ☐ New Apple Computer
3. ☐ Color monitor 8. ☐ Softstrip reader
4. ☐ UniDisk 3.5
5. ☐ Hard disk drive

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ProDOS

CLOCKLESS
continued from page 73

D is stored at 49040, so to complete our date we POKE 49040,62.

Of course, it's simple enough for a short program to calculate these values and POKE them into the correct memory locations. But I didn't want to have to run a program and type in the date every time I rebooted. The problem wasn't quite solved.

The final step was to create a way to tell my clockless Apple the date, and then save the information so that booting the disk would set the date automatically. This was easy using ProDOS with the STORE and RESTORE commands to save the variable (in this case, the date information) to the disk.

With all the above combined together, I found that I had CLOCKLESS—a handy startup program that could do date stamping without having a clock installed.

USING THE PROGRAM

Type in the program CLOCKLESS from page 48 in this issue's Software Library and check it with Typo II, or select it from the Action Disk menu. Don't SAVE it as Clockless, though—instead, type:

```
SAVE STARTUP
```

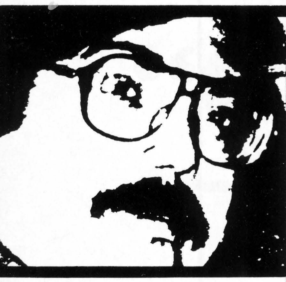
Now when you boot this disk, ProDOS will automatically run the STARTUP program. It will ask you for the date, verify the date in English, and give you an opportunity to correct any errors.

There are two things to watch out for. First, as you type in the date, be sure to "trace over" with the cursor any part of the date that you don't need to change. Otherwise the program will lose part of the date. Second, after you've run the program you'll find a new VAR file on your disk named DATE. This is the file that contains the date information, so don't delete it. If you do, the date will come up as "00/00/00" and you'll have to enter it again.

But once you've added this STARTUP program to your ProDOS disks, you'll find that your CATALOGs will be dating, just like mine—and even without a clock, you'll love ProDOS too!//

Starships, Magicians and the Unknown Sardines

by NEIL SHAPIRO



Neil Shapiro is editor-at-large of MacUser *magazine and is also chief sysop of the MAUG Apple Group on Compuserve.*

A DREAM COME TRUE

The day I picked up my first Apple II (back in 1978) I started hunting for a space game that would make me feel like I was aboard the bridge of a real starship, cruising through hostile space. But I'm happy to report that I've now found a game I can lose myself in for hours at a time, boldly going where I've not been before: **Elite** from Firebird.

Elite is billed as a "strategic space trading and combat adventure with flight simulation," but it's more. It's a dream captured on a disk.

When you boot Elite the first thing you'll notice is the use of crisp, highly animated vector graphics for the main display. The white straight-line shapes on a black background jump off the screen at you, looking far more realistic than many other games using full-color design.

Below the main view are the starship's instruments and readouts. The flight grid scanner shows all other ships in your vicinity, using a three-dimensional form of radar. Other readouts allow you to quickly track variables like cabin temperature, altitude and weapons status.

Your first assignment is to trade goods from one planet to another at enough of a profit to buy better weaponry and components for the starship. Each planet has a distinct technological level and buys and sells commodities at different prices.

Perhaps an enemy ship approaches, determined to keep you from finishing a crucial cargo run. Do you duck and roll? Turn and run? Corkscrew about and fire? The maneuver possibilities are endless—because this starship responds to the joystick like a true three-dimensional flight simulator. This is one starship that feels like more than the arcade.

Once you are docked, the cargo will be sold and new cargo taken on. Selling cargo at a profit builds up your funds so you can add things like tactical lasers, expanded cargo holds, energy bombs and other trappings of the successful star captain to the ship's offensive and defensive repertoire.

From world to world the saga continues as your rank advances from Harmless to Mostly Harmless to Competent and perhaps all the way to Elite on the ranking scale.

From slick documentation that includes a novelette (*The Dark Wheel* by Robert Holdstock, which is a fine, well-honed piece of speculative fiction), a reference card, a manual and a poster of target shapes, Elite is high-quality all the way. There are, of course, areas that might be improved in a sequel. For example, the planets do not appear to have true gravity and cannot be landed upon. (Also, in the earliest versions the documentation on saving a game is wrong. To save a game requires a DOS 3.3 disk and hitting "L" while in a space station. Firebird says that updates have been sent and the newer manuals do have this information.) But, overall, Elite gets my vote as the most advanced space game yet seen on any microcomputer.

NOT FOR TREKKIES ONLY

Good things come in threes, so it's not surprising two other space-oriented games that are a cut above the rest have recently been released. **Starfleet 1: The War Begins!** from Cygnus and **The Kobayashi Alternative** from Simon and Schuster will appeal to two different types of science fiction gaming aficionados.

Starfleet 1 is similar in concept to the old Star Trek computer game that has become a classic, but this new version updates the original with many interesting fillips and techniques. The Kobayashi Alternative is a text adventure game, but it has a very interesting parser and the true flavor of the

FOR THE FUN OF IT

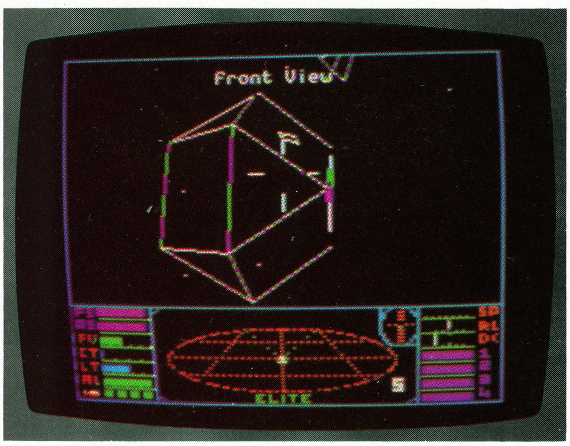
Star Trek TV show.

In Starfleet 1 you assume the role of commander of one of the Galactic Alliance's heavy cruisers. It will be up to you to rid the galaxy of the requisite number of both "Krellan" and invisible "Zaldron" ships.

To do this you must move the starship through 64 quadrants in an eight-by-eight grid, each quadrant containing 64 sectors. The starship hunts its prey using phasers and photon torpedoes.

As the commander, you are guided by an on-screen display which includes a tactical map of the quadrant as well as a display of ship's shields, long range sensors and written reports. A joystick (or keyboard) may be used to cycle through all of the game's many commands visible on a menu bar

ELITE



at the bottom of the screen. I found this method of command entry to be extremely easy and far better than having to type in (and remember the abbreviations of) all the commands.

And there are many commands, which contribute to the game's feeling of authenticity. You can control everything from internal security (if an intruder comes aboard) to mining a quadrant with stationary torpedoes. From tractor beams to the ship's computer, everything is readily available to the discerning starship captain.

The Officer's Manual that arrives with the game is a well-written tome of 100 indexed pages. And, if that seems too scanty, you can send in your registration card and get a 68-page (indexed as well) Training Manual.

The Kobayashi Alternative's text and story were written by Diane Duane. In this adventure game the player is asked by Star Fleet to participate in a simulation of the U.S.S. Enterprise's rescue of the U.S.S. Robert A. Heinlein. The player controls all the actions of the Enterprise's crew. And

continued on next page

the crew is all there—Admiral Kirk, Captain Spock, Doctor McCoy, Commander Scott, Commander Uhura, Lt. Commander Chekov and Captain Sulu all act and respond the way any Star Trek devotee could hope for.

The parser of this game allows, even expects, that the player will have a good grasp of the relationships between the crew. The player makes crew members talk to each other by, for example, entering the command "Kirk to Spock," to which Mr. Spock might respond, "Spock here."

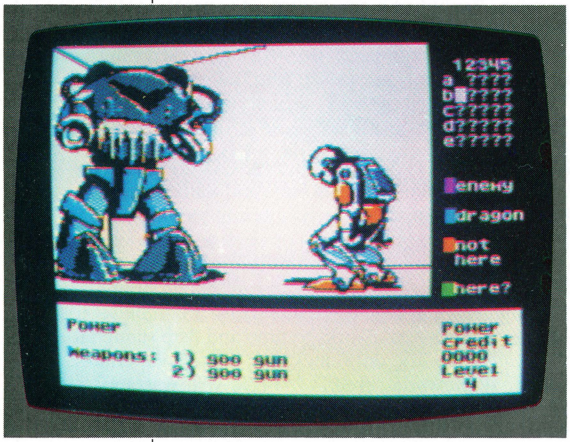
The game also depends on the use of function keys to drop objects, shoot weapons and the like. Many of these commands create primitive windows on-screen. The windowing technique is the worst part of the program because the programmer did not use any of the IIe's windowing routines and so the overall effect is sluggish.

But for someone to whom the words, "Uhura, open a hailing frequency" mean adventure is on the way, The Kobayashi Alternative will be a welcome addition to a gaming library.

WATCH YOUR BACK, WIZARD

Wizard's Crown, from Strategic Simulations Inc. (SSI), adds tactical combat to the standard role-playing formula. As in many games, the player begins by forming a party of eight adventurers to recover a treasure. In this case, the quest is for the Crown of the Emperor which has been stolen by an evil wizard hight Tarmon.

The party is moved as a group on a strategic map. But when they are attacked, the screen clears to a tactical display. On the tactical display each member of the party is shown in silhouette, as is every member of the opposition.



FOOBLITZKY

The battles become an intricate game of move and countermove, of thinking through options in order to outwit some very canny opponents. Only the best tacticians will emerge from a fight with their party intact.

Once orders are entered for the characters to do battle, the action is very much like an animated cartoon. My only real complaint is that because the silhouettes are difficult to distinguish, I sometimes entered the wrong orders for the wrong character. I often wished that when I was about to enter an order the character affected would blink or highlight.

Still, if you are looking for something different in role-playing adventures, then Wizard's Crown is one of the year's more original offerings.

DEDUCTION AND LAUGHTER

Infocom is well-known for their text adventures, but now they have come out with what has to be the most succesful party game for a computer. The game of **Fooblitzky**, for two to four players, will have you thinking as hard as you're laughing.

At the beginning of the game each player picks one of the eighteen objects shown on-screen (which range from screwdrivers to fish, from paddle balls to sardines). Each player's object is kept a secret from the others.

The idea is to be the first at a checkpoint carrying one of every person's object. The task, then, is to deduce what people have chosen and to obtain those objects.

The City of Fooblitzky has four quadrants, each of which contain places like grocery stores and hardware stores. By checking to see what is in stock, you can deduce what other players are holding. There are also figures like The Chance Man, who may offer you a free object or simply drop a piano on your head.

Of course, when you bump someone (by landing on their square as you move about the on-screen game board) they drop everything they are carrying and you get first choice when you help pick it all up. This may ruin quite a few friendships.

The graphics are light-hearted and the game rules are simple enough for a child, or challenging enough for adult play.

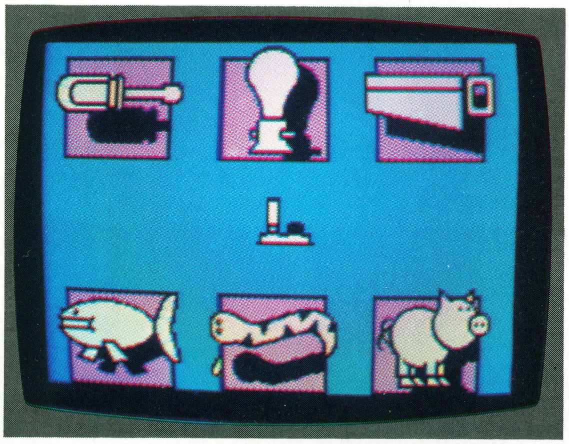
DASHING THROUGH THE GOO

Two new arcade-style games, **Super Boulder Dash** and **Megabots**, offer different types of on-screen excitement.

Super Boulder Dash, from Electronic Arts, is a two-in-one package. First, it offers 16 new levels for the popular Boulder Dash game. The new levels are filled with interesting mazes and puzzles as the player tunnels about and drops boulders onto fluttering enemies. In addition, the older "Boulder Dash I" game is included on the flip side of the disk. So, if you haven't gotten into the physics of animated rocks yet, here's your chance.

Megabots from UXB is a sort of three-dimensional version of "Hunt the Wumpus." You just move a robot through a building looking for a power supply while other robots try to stop you.

MEGABOTS



What saves the game from mediocrity are the graphics—some of the most cartoonish and funny screens I've seen. Until you see a robot lose to a "Goo Gun" you just haven't lived.//

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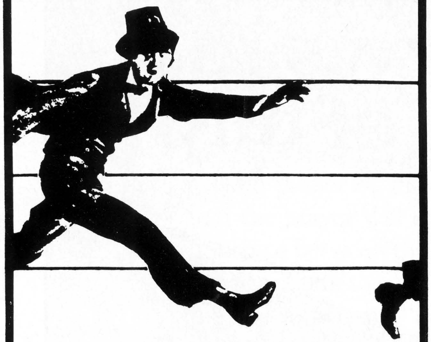

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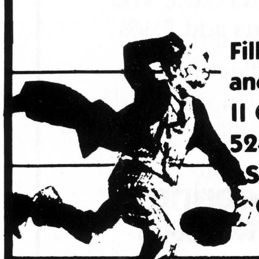

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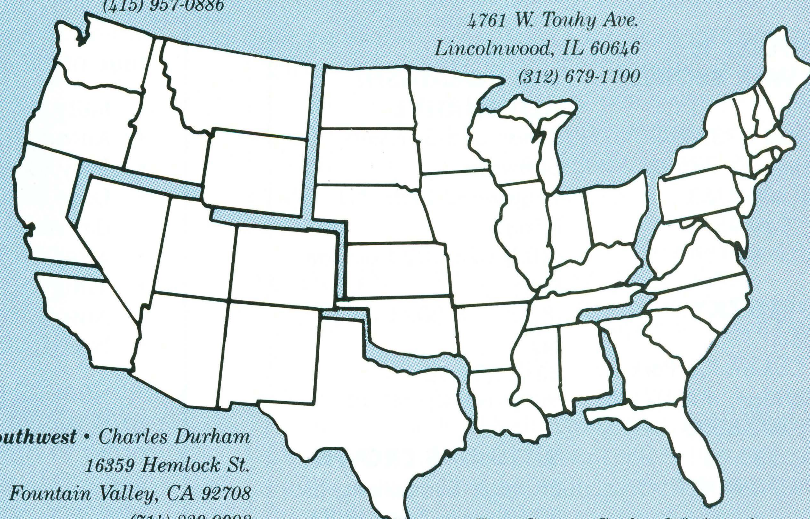

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continued from page 20

With an Apple II you have the LaserWriter's power at your disposal.

a group purchase by a school district or small group of business people. Another solution is to find a local print shop with a LaserWriter and arrange to rent time on it; if you have a IIc, you can carry it to the shop, or you can send your file by modem. As more bug-free, user-friendly software designed for the LaserWriter becomes available, this could become an economical means of creating near-typeset-quality text and graphics with an Apple II.//

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San Franciscan Scott Anthony holds a B.A. in biology from Dartmouth College. Currently he is a fine and commercial artist, a musician, and a computer software and hardware developer.

There Are a Lot of Great Reasons to Own MouseWrite...

Reasons like being able to quickly correct any mistakes with **MouseWrite Speller.** It's built-in so it's there whenever you need it. Want form letters, labels, or 1000 individually addressed envelopes? **MouseWrite's Mail Merge** and **Glossary** get the job done for you.

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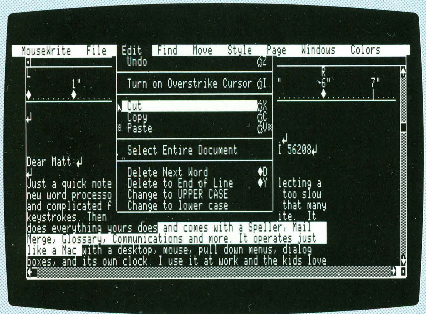
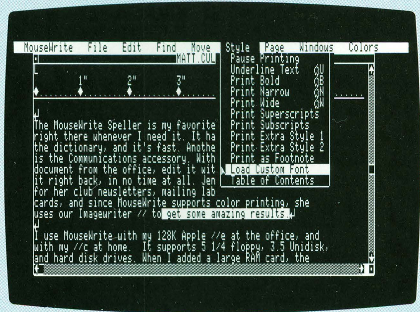
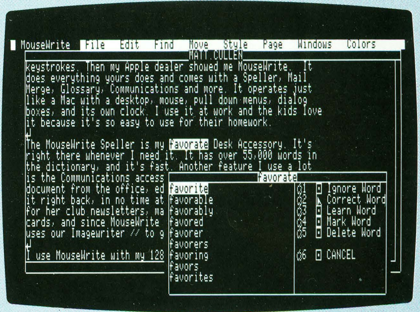
"**Cut, Copy, Paste & Undo** with Mac-like pull down menus"



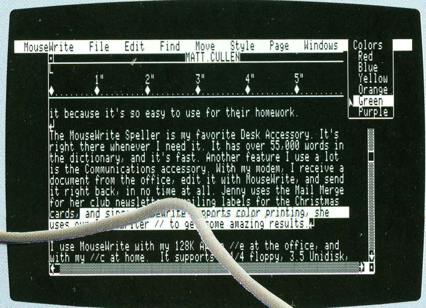
"Add style to your writing with downloadable **Custom Fonts**"



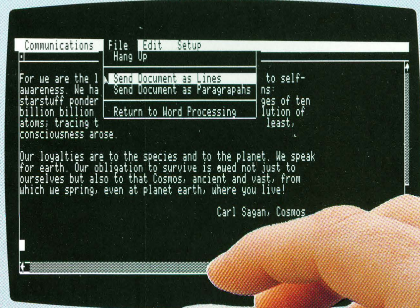
"Correct errors fast with the integrated **MouseWrite Speller**"



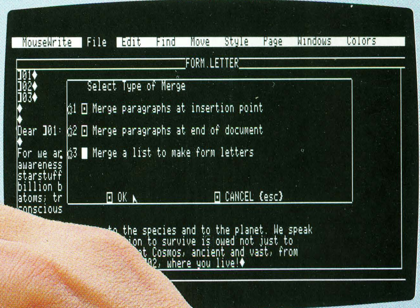
"Make a splash by adding color with **ImageWriter II** and others"

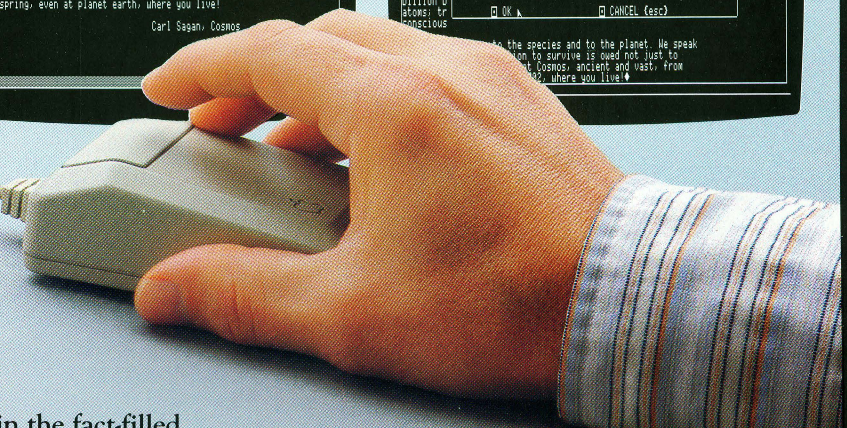


"Send and receive files with built-in **Communications**"



"Form letters in a flash with **Mail Merge**"





MouseWrite will also load AppleWorks documents directly, or even your old DOS 3.3 Text files. It works with your 5-1/4" disk, Unidisk 3.5, hard disk, or Extended RAM card.

Suggested Retail Price: $149.95

Ask your local dealer, or get all the details in the fact-filled **MouseWrite** brochure by calling:

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MouseWrite requires an Apple //c or 128k Enhanced Apple //e / Apple, Appleworks, ImageWriter are trademarks of Apple.

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