

Trivia Contest
Winners Inside!

July 1985
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A CWC/I Publication

Incider

The Apple II Journal

VOICE RECOGNITION:

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Ports at Your
Command

■ EDITORS'
CHOICE:
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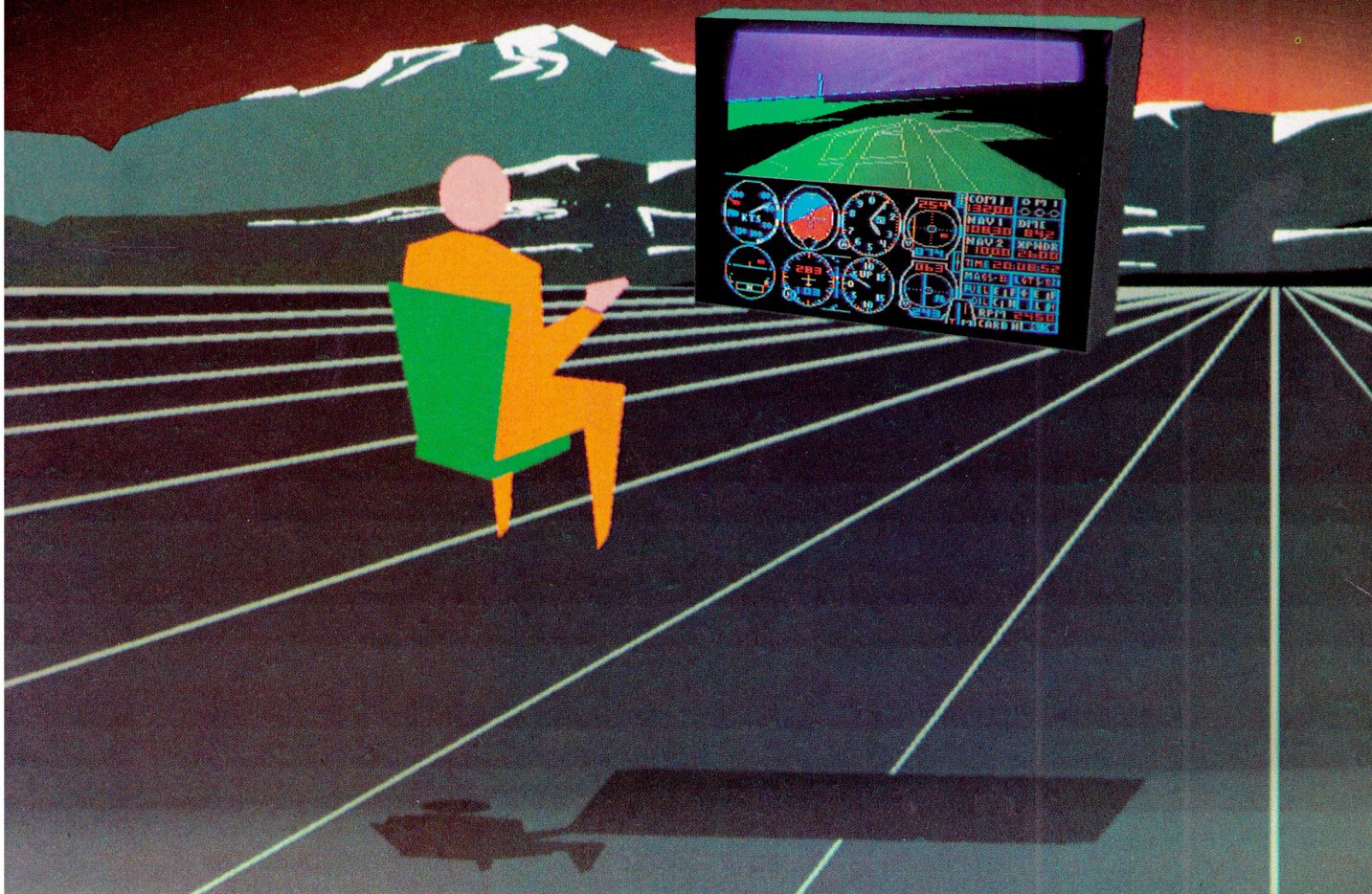
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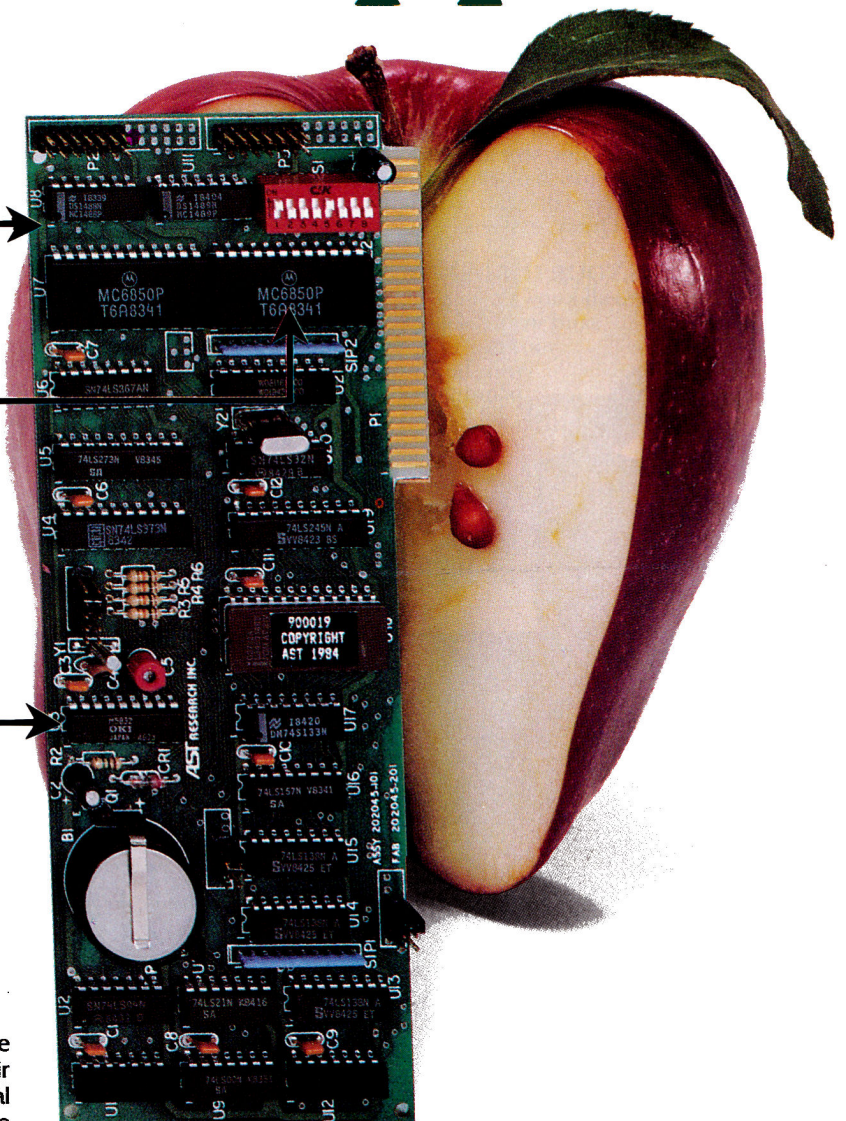
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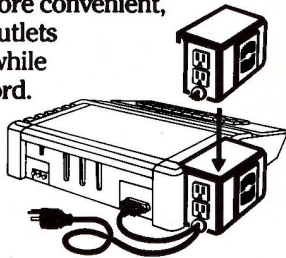
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SYSTEM SAVER® from Kensington Microware quietly protects close to 1/4 million Apple® II's every day. Often referred to as "the piece Apple forgot," System Saver's unique combination of features have made it the most versatile, most convenient, best selling accessory ever made for the Apple.

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To make your Apple system more convenient, System Saver provides extra outlets for your monitor and printer, while replacing the Apple's power cord. One front-mounted power switch controls your whole system.



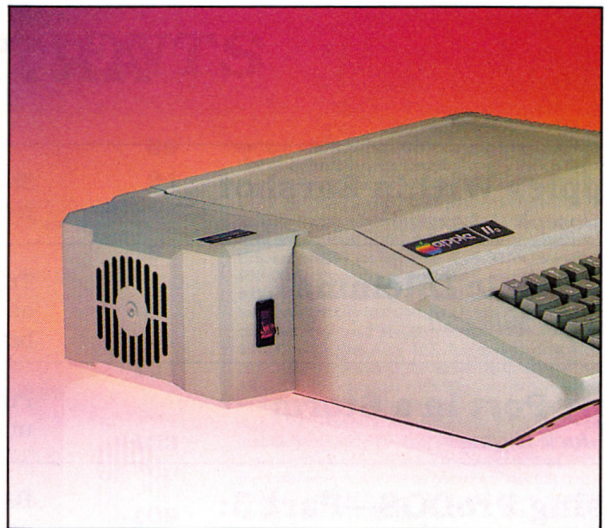
System Saver solves power line problems.

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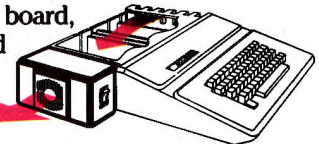
System Saver clips surges and spikes at a safe level and filters out line noise. It makes your Apple more accurate, more efficient and more reliable.

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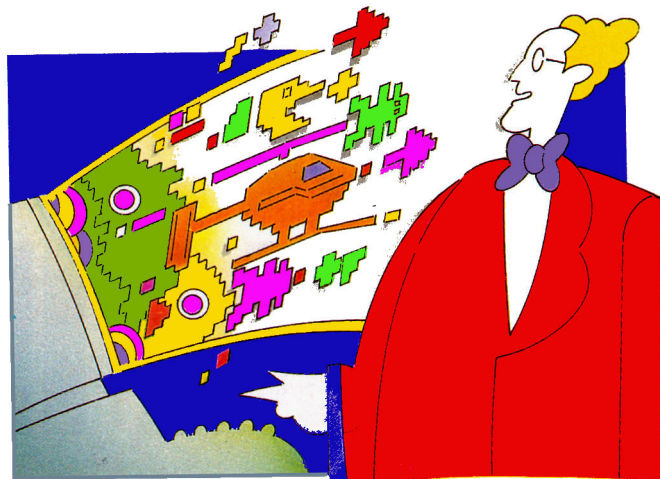
Close to 1/4 million Apple owners think of System Saver as the piece Apple forgot. And 1/4 million well-protected Apples agree. Available at your local dealer. For more information, contact Kensington Microware, 251 Park Avenue South, NY, NY 10010, (212) 475-5200
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inCider



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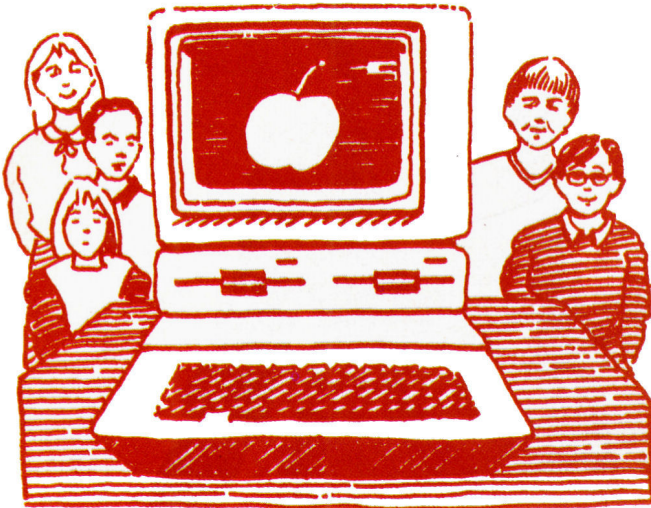
With an analog-to-digital converter, let your Apple master a variety of high-tech peripherals.

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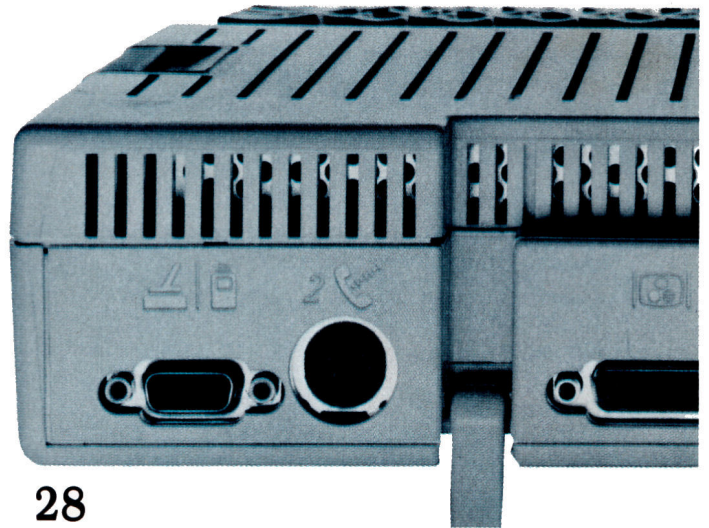
Trivia Contest Winners Announced!

And now the news you've been waiting for—the winners of *inCider's* Great Apple Trivia Contest.

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Editorial

The Interface and I

Question: In the following group, which element doesn't belong?

- A. Keyboard
- B. Mouse
- C. Joystick
- D. Graphics tablet
- E. Light pen
- F. Human voice

A trick question, of course. The answer is none, since, vis à vis your Apple these days, all of the above are potential "input devices."

A single, universal interface does not exist. As we're suggesting in this issue, there's more than one way to get your computer to do what you want it to do.

Ask different people how they perceive the computer interface, and, depending upon their applications, they may voice as many responses as the blind men of the fable did when describing an elephant. In the story, you may recall, the man who touched the tail claimed the elephant was most like a rope; the one who felt its side thought it most resembled a wall; the one who stroked its trunk was certain an elephant was like a snake, and so on.

So might one user claim that interacting with a computer is like Trans Am gear-shifting; another, like drawing on a "magic" pad (you know, the kind you had as a kid: lift the transparent overlay and your sketch disappears); a third, well, something like typing. As in the moral of the blind men and the elephant tale, not one of these paints a complete picture.

I'll admit I've been most comfort-

able with keyboards. So comfortable, in fact, I have to remind myself that not everyone shares that level of comfort with me—or may ever have to. My preference has as much to do with my 15 years of touch-typing experience as with the fact that word processing is my primary application. (Okay, I'll also admit to the worst hand-eye coordination in the office.)

We resist new technology the way we resist anything unfamiliar and threatening to our habits—anything that forces us, in fact, to conceive of ourselves differently. A recent scene at *inCider* comes to mind.

Late one afternoon, our technical editor, Bob Ryan, alone in his office, could be heard intoning monosyllables of a strangely menacing note: "Two. . .three. . .four," each followed by "Return." One by one, people got up from their desks to "see" what he was doing.

He was, in fact, training the computer to recognize his voice. Yet even those of us who were familiar with our cover feature ("Apples Within

Earshot," page 14), as well as with the sound of Bob's voice, were struck by the strangeness of hearing, then "seeing," Bob speaking to, or rather at, his //e.

Certainly, there was something weirdly anthropomorphic about this scene, even within the limits of the voice-recognition technology available today—enough to give us pause, and inspire self-conscious allusions to HAL in 2001. In this context, the phrase "giving a computer commands" steps out of the metaphorical into the literal.

As Sherry Turkle, MIT professor and author of *The Second Self: Computers and the Human Spirit*, and others have suggested, the incontrovertible presence of the personal computer in our lives, and the evolving nature of its applications are leading us to define not only what connects us to, but also what separates us from, our own machines.

And perhaps that's why I've taken a solemn vow never to use the word "interface" to describe any form of human interaction. ■



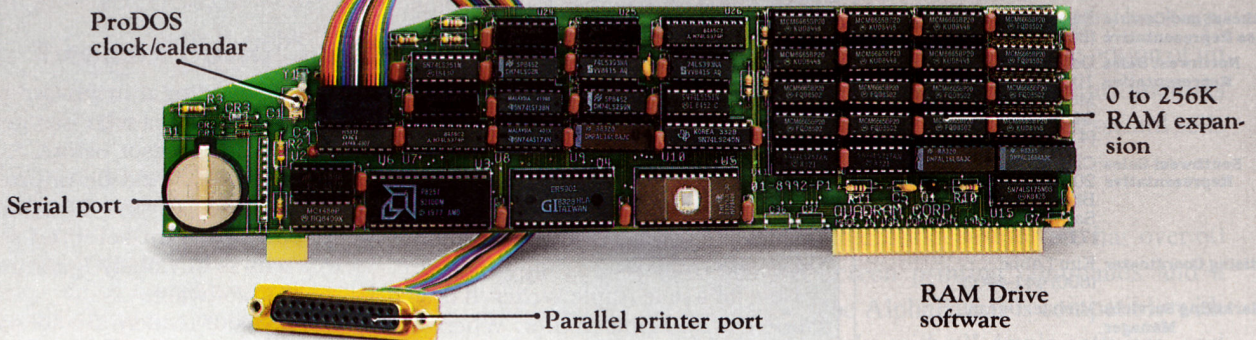
by Susan Gubernat

Quadram Enhances Apples!

Quadram expands the power of the Apple II series personal computers. Quadram set the standard with the Quadboard. Now we offer you Multicore, the card that delivers RAM expansion to 256K, parallel and serial ports, a ProDOS clock/calendar, and RAM drive software. Plus, there's the new Extended Multifunction Card, Clock/Calendar Card, Serial Interface Adapter, and Buffered Serial Interface Adapter. All designed to bring out the best your Apple has to offer. For further details on these cards as well as our popular APIC parallel interface and eRAM 80 cards visit the dealer nearest you, or contact us at 4355 International Blvd., Norcross, Georgia 30093 (404) 923-6666.

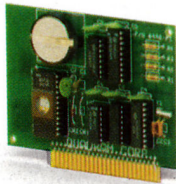
Multicore by Quadram

Easy menu-driven set up



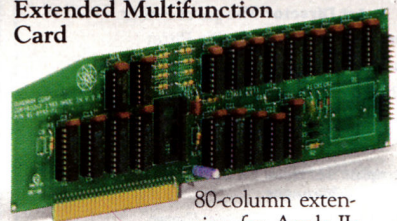
Pro-DOS Clock/calendar

Long-life Lithium battery • Easy to use date/time software.



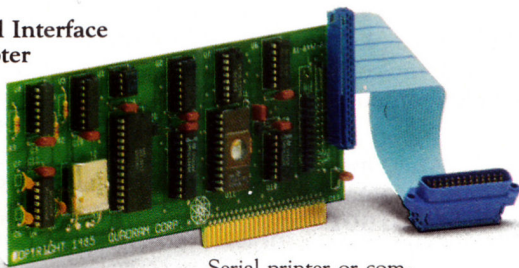
Extended Multifunction Card

80-column extension for Apple IIe
 • 64K RAM expansion option
 • Color RGB interface • ProDOS clock/calendar.



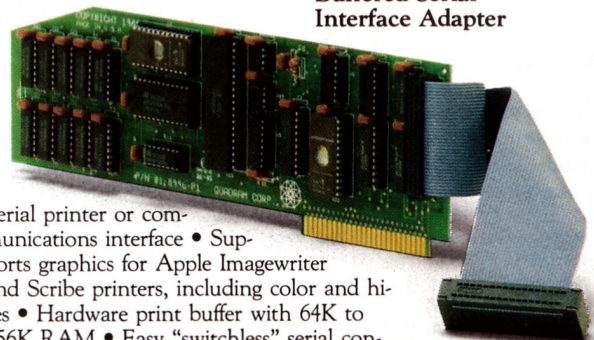
Serial Interface Adapter

Serial printer or communications interface • Supports graphics for Apple Imagewriter and Scribe printers
 • Apple Super Serial Card compatibility
 • Easy "switchless" serial configuration.



Buffered Serial Interface Adapter

Serial printer or communications interface • Supports graphics for Apple Imagewriter and Scribe printers, including color and hires • Hardware print buffer with 64K to 256K RAM • Easy "switchless" serial configuration.



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WPL Information, Please

I'm looking for in-depth information on Apple Writer's WPL—more than the skimpy overview contained in my Apple Writer II documentation. Information, although included in the Apple Writer //e documentation, is unavailable to II Plus owners unless we purchase the //e version which doesn't run on the II Plus. Documentation alone isn't available from Apple and neither is any II Plus support.

Despite the rhetoric, Apple Computer doesn't support the entire Apple II family. The Apple II and II Plus have been eliminated from "family" consideration. Witness the fact that Apple Computer no longer distributes Apple software that will run on these two Apples.

Now let's take Apple Writer. It first came out as Apple Writer. When it was revised to include WPL, it became Apple Writer II. After it was revised to use the //e's special keys, the name changed to Apple Writer //e. Now I see Apple Computer has released a ProDOS version called Apple Writer II. Gee, I recognize that name—it's the version that runs on my II Plus! No way, Jose! It, like everything else Apple sells, runs on nothing less than a //e.

It was through the loyalty of the early Apple customers that Apple succeeded. Now that it's a "big boy," Apple behaves like any other impersonal entity. My answer to this attitude is simply, "Why buy Apple?" When I'm ready to upgrade my computer, you can guess which company I won't consider.

Robert P. Alekshun
77 Appleton Road
Auburn, MA 01501

You must keep in mind that Apple Computer is a profit-making organization, not a club. People buy a computer for the machine—not the

company. Also, Apple stopped manufacturing the II Plus in December 1982. Although Apple included the II Plus in system upgrades, it didn't follow the same path for applications.

Concerning specific questions about Apple Writer or other Apple-related products, you'll probably get the most help from your local Apple dealer.

—eds.

Star-Crossed Review?

Imagine sending a new word processor to a reviewer who has never seen a word processor before. Such an assignment would be unprofessional to say the least, but that is what you did. You selected a reviewer who is obviously ignorant of astronomy software.

Some of your readers are not so ignorant; some of them will purchase astronomy software—including my chief competitor (TeleStar by Scharf Software Systems). They'll read your review of *The Observatory* (May 1985, p. 90) with interest. They can only be astonished by such remarks as Mr. Wright's complaint that calculations can take up to 2½ minutes "even though it's a machine-language program." With TeleStar they must wait more than 3½ minutes and in the end they get less for their patience.

They'll also recognize, as your reviewer clearly didn't, the pioneering accomplishments of *The Observatory*: the large number of celestial objects calculated in so short a time, scene magnification, the moons of Jupiter, and solar eclipses. Unfortunately, your readers will remain uninformed of the other achievements available only from *The Observatory*: transits of the sun, the phases of the moon, and extreme accuracy across centuries.

The comment that "Lightspeed has attempted a task that is too great" is particularly ridiculous.

Considering my comments about the competition, Lightspeed has done what has been done before, only better.

I'm surprised that a magazine of *inCider's* caliber is unable to find a reviewer who is knowledgeable and competent enough to criticize astronomical software. As it stands, the review is unfair. I believe it works to the detriment not only of me, but of *inCider* and the reviewer as well.

Gary J. Lassiter
Lightspeed Software
2124 Kittredge Street
Berkeley, CA 94704

inCider welcomes reader and manufacturer comments—both negative and positive—regarding its reviews. Totalitarian we're not. In this case, as in our other reviews, we stand behind our reviewer and his findings. Please note that Mr. Wright reviewed The Observatory and its merits. He didn't review the astronomy software market as you contend. —eds.

Family Feuds

While browsing in a software store, I listened to the store manager torpedo the Apple //c with a young couple that was determined to buy a computer for their daughter's education. They started out at a local Apple dealer because the public school system placed //c's in the elementary classrooms. The dealer advised them to look at software first, then select the computer.

The couple asked why many packages were for the Apple II, II Plus, and //e, but few mentioned the //c. The store manager told them that there is little software available for the //c, and that even though some say otherwise, software for other members of the Apple II family won't work on the //c.

The couple felt misled by the Apple

Next-Generation Interfaces

Street Electronics introduces a new generation of Apple® interfaces that makes using printers, modems, clocks, and other peripherals easier than ever before. And, these new products are available at prices that will surprise you.

The **BusinessCard™** is an Apple II+ and IIe multifunction card with a printer and modem port, clock with battery back-up, built in graphic screen printing capabilities, and the option of up to 64k of print buffering. Purchasing the equivalent functions separately would cost well over \$500, yet the BusinessCard sells for less than \$200.

The **AlphaBits™ II** serial printer/modem interface has over 60 built in graphics and text screen printing commands and a 16-64k print buffer option. The AlphaBits II is compatible with a wide variety of printers, works with all Apple software, and sells for less than \$100.

The **LiveWire™** is an intelligent printer cable with a built in clock/calendar that connects a *parallel* printer to the *serial* port on your Apple IIc. The serial to parallel converter and clock are inside the LiveWire's unique connector—no additional hardware is needed. Also under \$100.

See your local Apple dealer.

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LETTERS

dealer (even though he sent them to look at software before making a purchase) and cried foul. The store manager added that the //c is being pushed by Apple dealers because it's a cheap, high-profit machine. He made Apple's integrated chip design sound like a dirty trick. Following his advice, the young family dropped the software and ran out to buy a Commodore.

As a new //c owner, I was upset. Perhaps you could set the record straight by addressing this software compatibility and availability issue. You might also comment on Apple's strategy and level of commitment to the //c.

Randy Madsen
1715 Swannanoa Drive
Greensboro, NC 27410

It has been our experience that most software designed for the II Plus and //e will run on the //c. The biggest incompatibility problem is that many programs with inverse capital letters get mouse characters on the //c instead of the inverse capital letters.

In our opinion, Apple shows a greater commitment to the //c than other members of the II family. Of course, even the //c takes a back seat to the Macintosh family which has received much corporate and media attention within the last few months. —eds.

//c Supremacy

As the premier Apple II magazine, *inCider* needs increased //c coverage. According to *InfoWorld*, the //c took 28 percent of the Christmas market, compared to the //e's 11 percent. The //c, in fact, sold more than the //e and the Mac combined.

My Apple dealer is selling three //c's for every //e, and the gap is widening. Software and hardware support for the //c are sure to increase, given its incredible sales record.

I believe that the //c and //e don't

"I like the technical stuff in *inCider*!"

compete against each other. Each serves a distinct market. It's clear that the consumer has recognized the //c not as a "hacker's" computer, but as "the computer for the rest of us."

I hope your magazine is in the forefront of covering, promoting, and supporting the //c.

Robert P. Lyle, Jr.
1873 Potwin Drive
Baton Rouge, LA 70810

inCider, as the cover emphasizes, is "The Apple II Journal." Despite Apple's continued Mac-hype policy, we remain devoted to the II family—which includes the //c. Ninety-nine percent of the time, if you can do it on a //e, you can apply the same procedure to a //c. Bob Ryan, inCider's technical editor, would be glad to answer specific questions.

You're right, Robert, as far as recognizing a buyer's personality for each computer. While the //c was designed for those who don't want to be bothered with "what's under the hood," keep in mind that it is supported by a wide software selection made available by the //e.

—eds.

Catalog Modifications

Thanks for the excellent program, Mini-Catalog ("The Incredible Shrinking Catalog," March 1985, p. 49), by John T. White. This utility has given me tremendous assistance in organizing and managing my disk files, and is a real time-saver when working with disks containing multiple, diverse files.

Since the program works only for Epson printers, and I have a C.Itoh 8510A dot-matrix, I had to make certain printer-code adjustments to use

my printer's compressed-type features—compressed character pitch, line spacing, and bold print—in the Mini-Catalog program mode. The program line modifications are as follows:

415 PRINT CHR\$(27) + CHR\$(81):

PRINT CHR\$(27) + CHR\$(66):

PRINT CHR\$(27) + CHR\$(33)

Delete line 420.

447 PRINT CHR\$(27) + CHR\$(78):

PRINT CHR\$(27) + CHR\$(65):

PRINT CHR\$(27) + CHR\$(34)

I thought these changes might interest your readers in adapting Mr. White's original Mini-Catalog program to their printers. Again, thank you for the article. I look forward to reading more of them in the future.

Edward C. Martin
5184 Colonial Park Road
Birmingham, AL 35243

Technical Treasures

I like the technical stuff in *inCider*! It has been getting harder and harder to find. But how about publishing reviews on the PDQ 68000 Coprocessor, the Quantum Leap Megatask Plus, The Sider 10-megabyte hard disk, the Legend S Card (1-megabyte RAM), Roger Wagner Publishing products, and the Demco Graphics Card?

Carl Stocker
9117 Briergate Court, F
Indianapolis, IN 46229

Check the April 1985 issue, page 93, for *inCider*'s review of *The Sider*. Expect to find reviews of Roger Wagner Publishing products and the Demco Graphics Card in future issues.

—eds.

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Camping Capers

Big Bird and Cookie Monster may not be among the campers, but children 8 to 12 years old can enroll in the Sesame Place Computer Camp, where they'll learn computer vocabulary and programming concepts.

Sesame Place, an action-oriented play park in Langhorne, Pennsylvania, offers the children's computer camp as part of its Computer Campus pro-

gram. A camper's day starts at 8:30 a.m. with scheduled classes, activities, and breaks running until 5 p.m. Sesame Place emphasizes individualized training—each child works at his or her own Apple //e during instruction times.

Sessions run weekly until August 9, 1985. Camp fee is \$175 per week, and it includes snacks, camp T-shirt, and class materials. If you're thinking of sending your child to computer camp, contact Sesame Place at (215) 752-4900.

Get It Right

They're glad the phones are ringing off the hook at The Public Domain Exchange, but unfortunately it's for the wrong reasons. We didn't mean to lead you astray, but The Public Domain Exchange doesn't offer an Apple II public-do-

main software listing as reported in April's Cider Press ("Yours for the Asking," p. 13). The organization does publish a book, *The Best of Public Domain Software*, available for \$6.95 plus \$1.50 postage. We regret any inconvenience this might have created.

Fruitful Semester

Teachers can have Apples on their desks every morning, thanks to an Apple Computer Inc. special purchase program. "An Apple for the Teacher" gives those in the educational field 25 percent or more off the retail price of an Apple personal computer system. Teachers can choose from a //e with 64K of memory, with Disk II drive, Monitor II display, and 80-column display interface card; a //e with 64K of memory, two Disk II drives, Monitor II display, and an interface card that provides 80-column display and an added 64K of

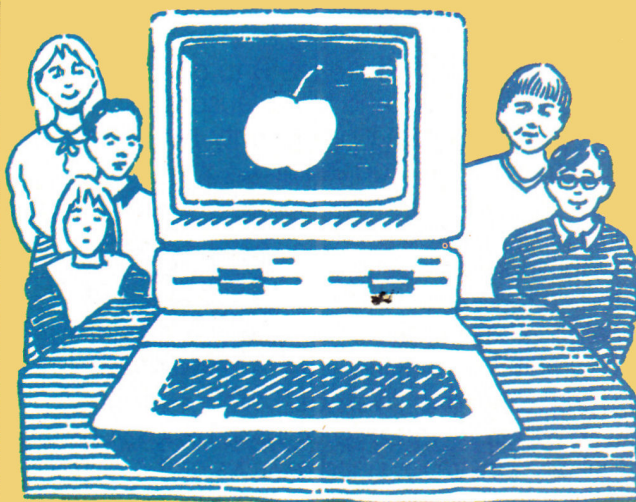
memory; a //c with monitor stand; or a Macintosh with 128K of memory.

To qualify for the program, you must be a certified, full-time professional employee at a K-12 non-profit public or private school, college, university, consortium, state board of education, vocational and technical school, public special education school, county educational computer center, Indian school, or Catholic diocesan education curriculum center.

If you'd like to apply for Apple's program, write for an order kit to: An Apple for the Teacher, P.O. Box 306, 125 Main Street, Half Moon Bay, CA 94019. The offer is available until September 30, 1985.

INSIDE OUT

- Card power.** . . Rumor has it that Apple may be producing a new RAM card that will increase the //e's random access memory to 1 megabyte.
- Disk upgrade.** . . We hear that a 3½-inch drive may be on the way from Apple. The single- or double-sided high-capacity disk should support ProDOS and have a quad density that provides up to 800 kilobytes of storage per disk.
- //c sales.** . . Apple has announced that more than 400,000 //c's have been purchased in the year following the computer's introduction. In comparison, it took 2½ years to sell the first 50,000 II's and 74 days for the first 50,000 Macs.
- Software survey.** . . According to a Software Access International survey, almost half of those people who work for large companies rely on computer specialty stores as their primary source for software.
- Advertising flair.** . . *Advertising Age* selected Apple Computer Inc.'s television commercial, "1984," as one of the best TV commercials of 1984.



Illustrations by Katherine Mahoney

by Cynthia K. Carr, inCider staff

Artistic Endeavors

Talk about computers as state of the art... an exhibit called "Emerging Expressions: The Artist and the Computer," at the Bronx Museum of the Arts, features the work of 47 contemporary artists.

Last year, the museum started looking for artists who use computers as creative tools through an exhibition competition. No monetary prizes were awarded. "It's more for the public exposure," says Luis R. Cancel, museum director. He notes the museum is devoted to educating the public, and computer art is a new form worthy of attention.

Reaction to the computerized canvas has been mixed. Cancel says galleries have a harder time pre-

sending the computer artwork, but "museums are hanging back, looking at what type of work is being developed." The artists' reactions are different. "They're really excited. Artists are a different kind of hacker—a visual hacker—pushing the machine and manipulating light and sound."

Within a year, Cancel says the museum wants to set up a computer graphics workshop where artists without the financial means can experiment with computer equipment. If all goes according to plan, the museum could give artists residency for a period of time, such as six months.

The exhibit runs until September 22, 1985. For more information, contact the Bronx Museum of the Arts, 1040 Grand Concourse, Bronx, NY 10456, (212) 681-6000.



Laurence M. Gartel's "Logarithmic Folk Art"

Cloning Around

Franklin computer owners needn't feel like lost waifs. The Franklin Users Group supports members

We're always looking for news of the Apple world. If you're making news, send your press releases and photographs to The Cider Press, 80 Pine Street, Peterborough, NH 03458.

with a newsletter, public-domain software library, and technical assistance. Membership is open to those with Franklins, Apple clones, or Apples. The group, however, emphasizes the Franklin and clones, group member Douglas M. Trueman says. For more information, send a self-addressed, stamped envelope to Trueman at East Wind Road, Apt. L, Tecumseh, MO 65760.



Bankers' Hours

The last thing you need when conducting financial transactions is a bank hassle—especially if you work or travel overseas. CompuServe, an on-line information service, and the NCR Universal Credit Union offer transcontinental home banking by personal computer. Called Companion at-Home, the service is currently available only to NCR Universal Credit Union members. The Northwest Orient Airlines Employee Credit Union, Pacific IBM Employees Credit Union, and O.R.N.L. Credit Union will offer the service soon.

With Companion at-Home, members can access financial and information services 24 hours a day.

"The new international capability is an important enhancement to the system, because it frees our members from the restriction of geographic barriers and international time zones," says W.A. Smith, president of NCR Universal Credit Union.

Companion at-Home costs \$10 a month for NCR Universal Credit Union members, and the fee includes 90 minutes of connect time. Additional time costs 15 cents per minute. CompuServe members are charged 20 cents per minute during the day and 10 cents per minute at night.

Calendar



15-18

NATIONAL COMPUTER CONFERENCE '85
Chicago, IL
contact:
NCC Registration
1970 Chain Bridge Road
McLean, VA 22109
(800) NCC-1985

22-25

LOGO 85
Cambridge, MA
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Special Events Office
Massachusetts Institute of Technology
Room 7-111
Cambridge, MA 02139

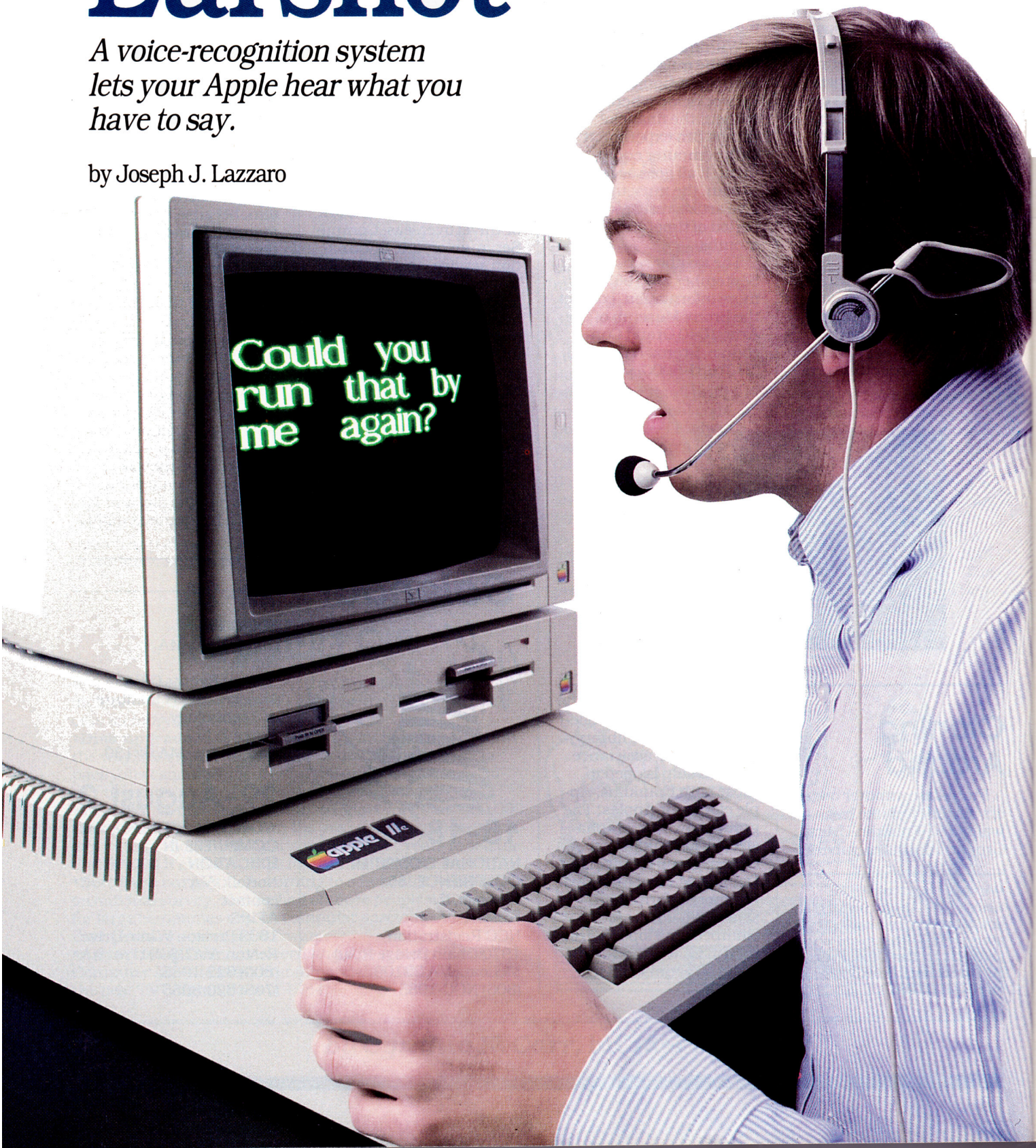
29-August 2

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Norfolk, VA
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AFIPS
1899 Preston White Drive
Reston, VA 22091
(800) 622-1985
(703) 620-8955

Apples Within Earshot

*A voice-recognition system
lets your Apple hear what you
have to say.*

by Joseph J. Lazzaro



You're on the road without your computer, and you have to retrieve a phone number—right now—from the data base in your office. You step into the nearest phone booth, drop a coin into the slot, and dial.

"Hello, Hal."

"Hello, Joe, what can I do for you?"

"Run the phone list, please."

"Running. . . Whose number do you want, Joe?"

"Bob's."

"I'm sorry, Joe, his number has been deleted from the directory. Shall I look up another name?"

It's not just science fiction anymore—computers with the power to recognize and respond to the spoken word are beginning to appear in our homes, offices, schools, and factories. If voice-recognition technology continues its rapid rate of development, we won't have to wait until 2001 to talk to our computers.

Phoning Home. . . and Other Applications

How can computers even begin to mimic this most sophisticated of human abilities?

Sound gathering and sound-pattern matching form the basis of computerized voice recognition. The apparatus converts sound waves entering the system microphone to electronic signals the computer can understand, then compares them to a digital template (the computer's "audio memory") stored on disk and recalled into random access memory during the matching process. If the incoming signal resembles one of the template words, the computer "recognizes" the sound as a word in its vocabulary.

The voice-recognition equipment we have today is the result of research on the potential military applications of the technology. In the early 1970s, the Defense Advanced Research Projects Agency within the Department of Defense constructed a voice-recognition hardware/software system with a 1000-word vocabulary and an error index of less than 10 percent. The DARPA project was the first serious exercise in continuous-speech recognition, but private industry subsequently took over its development for commercial applications.

You may integrate a voice-recognition system into your computer's applications software environment with data bases, word processors, telecom-

munications packages, spreadsheets, and games. Any software package that can accept keyboard input can be modified to accept voice input. Saving the voice templates and the template-loader software to an applications disk is the procedure to follow with unprotected software and programs you've written yourself.

If you are interested in adapting software packages for voice recognition, look for programs written in standard Apple DOS 3.3 formats. If you can catalog the disks, load and list files, integrating the voice-recognition software shouldn't be difficult. Public-domain software is a good place to start. These programs are usually easy to work with, small enough to fit on a disk with the voice-recognition templates, and available for experimentation at no cost.

Handicapped and disabled users, particularly those with impaired manual dexterity, can find in voice-recognition systems the key to autonomy in their home and work lives. Speech difficulties are no hindrance to use of a speaker-dependent voice-recognition system—the ability to make distinct sounds is the only requirement. Voice recognition can be tied into household-maintenance software packages designed to perform such tasks as turning room lights on and off, activating appliances, dialing the telephone, controlling temperature, and so on, as well as the personal and business applications that can give disabled people full access to the "computer revolution." This new technology can mean the difference between independence and restrictive personal care.

Security encoding is another aspect of voice-recognition technology at work. The sci-fi scenario in which a character's voiceprint is matched against those on file is not far-fetched. You can prepare a program disk with a set of voice templates that restricts program access to particular users. A voice-recognition security scheme is more effective than a password, since templates cannot be easily falsified.

And as we noted at the beginning of this article, interfacing a voice-synthesis/recognition setup with a home or office telephone creates a non-computer-dependent link to your Apple while you're on the road, letting you access your home or office system from any standard telephone.

To set up this link yourself, you will have to hard-wire the recognition apparatus to your telephone—connect

the voice-recognition system speaker to the microphone input of your phone, then connect the speaker output of your phone to the microphone input of the voice-recognition system. You and your computer will then be able to both hear and speak to each other in a conventional manner. You can also give the touch-tone or rotary dial a more central role by adding passwords or other layers of operation. You will also have to integrate the voice-recognition driver software with your data base (or other applications program) as described earlier. Modifying your speech-recognition equipment to produce non-modem-based remote access is a fascinating, challenging project for the intermediate computer user.

Technologically Speaking. . .

Let's take a look at the theory behind the product. Voice-recognition systems are classified according to the type of template they employ, and the type of speech to which they respond.

A *speaker-independent* unit contains factory-installed, fixed templates that allow the system to recognize only a limited vocabulary, although almost any speaker may deliver the words. Speaker-independent hardware is costly, and is usually custom-built for business applications, such as banking machines, in which its fixed repertoire is not a limitation.

A *speaker-dependent* system, on the other hand, has virtually unlimited vocabulary potential, but recognizes only the voice of the person who initializes the system—you must create your own templates on disk by speaking displayed words into the system through a microphone. Such units retail for less than \$500.

A *discrete-utterance* unit can recognize phrases and sentences only if short breaks (at least 200 milliseconds) fall between the words. Searching for short pauses of dead air, the momentary silences that form the gaps between words, it processes the sounds in between by comparing incoming signals to its templates. Discrete-utterance systems perform best with short, multiple-syllable command sequences, such as "catalog," "return," or "delete."

Discrete-utterance systems are derived from a simplified approach to voice recognition, but continuous-utterance units more closely resemble the science-fiction concept. They can identify larger blocks of data, streams of unbroken language that represent a

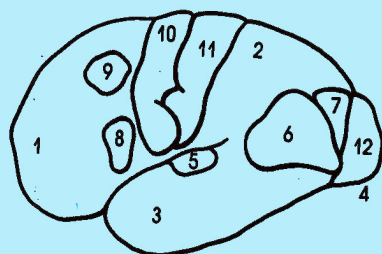
Continued on p. 17.

Listening with the Brain: Human Speech Perception

It's more intelligent than any man-made machine, more capable than any multilingual speech processor. It's the most complex piece of voice-recognition software nature's ever come up with—the human brain.

Although our ears receive sound waves and convert them to electrical signals passed along the auditory nerves, it is the auditory center in the left temporal lobe of the cerebrum that gives us our sense of hearing. But distinguishing *speech* from other sounds is an even more specialized process. Toward the posterior part of the left temporal lobe, between the auditory and visual regions, lies the portion of the brain known as *Wernicke's area* (see the **Figure**). Since the last quarter of the 19th century, scientists have noted that patients with lesions in this part of the cerebral cortex cannot comprehend spoken language. They can still produce fluent speech sounds, although the meaning of their sentences is often quite jumbled. Wernicke's area appears to recognize words—that is, it stores memories of word sounds and pairs them with ideas.

Figure. Left cerebral cortex, with speech-related areas indicated.



- | | |
|-------------------|---------------------------|
| 1 frontal lobe | 7 visual association area |
| 2 parietal lobe | 8 Broca's area |
| 3 temporal lobe | 9 Exner's area |
| 4 occipital lobe | 10 motor cortex |
| 5 auditory area | 11 sensory cortex |
| 6 Wernicke's area | 12 visual area |

As in the rest of the brain, the mechanisms in Wernicke's area do not operate in isolation. "Language"—speaking, listening, reading, and writing—is a multilayered ability involving motor skills, sensory reception, learning, and memory. Bundles of nerve fibers connect Wernicke's area to three other main language centers, all in the left hemisphere. Perception of written

language is centered in the *visual-association area*, adjacent to the part of the cortex that gives us our sense of sight. *Broca's area*, located in the frontal lobe near the area controlling lip, tongue, and jaw muscles, coordinates our physical ability to talk—it stores the memories of the muscle movements necessary to produce speech. *Exner's area*, near the part of the motor cortex associated with hand movement, regulates our ability to write language.

Damage to Wernicke's area often brings with it seemingly strange side-effects (in addition to major speech-comprehension difficulties)—writing and sometimes reading disabilities. Because the process of writing depends on our association of hand movements with auditory representations of words stored in Wernicke's area, patients tend to interchange letters that stand for similar sounds.

And reading appears to depend on the coding of letters into phonemes—the smallest units of speech that can be distinguished from each other. Deaf people, however, cannot rely on audition in learning to read and write—their memories of word/idea relationships are stored in the visual-association area. Deaf patients with Wernicke's lesions show no reading and writing impairment.

Normal perception of others' speech mediates the development of language production. Results of studies with infants as young as one month of age suggest that we are born with the ability to distinguish speech from other types of sounds. Long before we are capable of creating speech sounds, we can perceive different phonetic features—the acoustic characteristics arising from the way we articulate different sounds. Even before a young child can pronounce all the phonemes of his or her language, he or she can recognize them in the speech of others. Congenitally deaf children, however, never learn to speak normally. Even the experimental impairment of hearing through delayed auditory feedback—preventing a person's speech from reaching his or her ears for a few seconds—disrupts speech production.

Most models that attempt to explain speech cognition in the brain are variants of the *motor theory* of perception. When we speak, we hear our own words, and when we hear others' speech, we unconsciously anticipate our own reproduction of those words. As we listen, we recall the ideas we were expressing when we pronounced the same words, and thus know what the other person means. Some studies have even detected minute movements in the larynxes of people listening to others' speech.

The straight template design of computerized speech-recognition devices does not seem to serve as a theory for human speech perception. We routinely understand different acoustic stimuli—owing to wide variations in stress, accent, and intonation—as the same phoneme. There can be no direct matching of sound waves to cognitive representations.

A compromise theory is the mechanical *analysis-by-synthesis* model. When we hear speech, we store those original auditory signals and generate hypotheses about their characteristics according to our own internal rules. We speculate: What would this input be like if our hypotheses were true? We then compare our descriptions to the stored input until we achieve a match.

Cognitive theorists acknowledge the vagueness of our current analysis of human speech perception. Our models barely scratch the surface of the complex of abilities we call cognition. Within our constructions, we cannot yet account for even the comparatively minute amount of biochemical and physiological data we have gathered. How is Wernicke's area connected to the auditory cortex, and what mechanism filters out speech from other sound? How does a network of nerve-cell connections add up to something as complex as our conscious sense of understanding when we listen? Computers as tools may someday help us sort out the mystery of the human mind—but not even the most sophisticated machine can duplicate it. □

—Eileen T. Terrill
inCider staff

The Lis'ner 1000: Conversing with Your Apple

With the right equipment, you and your Apple can have a two-way conversation. Micromint's Lis'ner 1000 is a speaker-dependent Apple II voice-recognition expansion board based on a General Instruments SP-1000 chip; it also incorporates a speech synthesizer based on the SSI-263 voice chip. The Lis'ner comes bundled with two standard Apple-format floppy disks containing voice-to-text template builders, linkers, loaders, and editors, with an unlimited-vocabulary text-to-speech algorithm for the SSI-263.

Any communication usually mediated via keyboard and screen can be expressed through the Lis'ner 1000. You can adapt the factory-selected templates of DOS and Apple-soft commands to your own voice, or you can create your own templates, allowing you to use the Lis'ner simultaneously with other applications software, such as word processors, data bases, telecommunications packages, and games. The Lis'ner software includes listable Applesoft BASIC routines you can modify easily. Its assembly-language subroutines come complete with their respective source codes in fully documented, standard DOS 3.3 text-file format. Any commercially available assembler/editor can then re-assemble the source-code routines.

The Lis'ner 1000 comes in kit or factory-tested format. Just plug the board into any Apple expansion slot, except number 3. Plug the headphones and a standard 8-ohm speaker into the board, then boot up the supplied software.

The Voice Trainer is the first option on the Lis'ner main menu (see **Photo 1**). Before you try to use the Lis'ner 1000 the first time, you must select this option to let it "hear" your voice and store the recorded vocal patterns on disk as templates. The software then recalls templates into RAM when the system tries to make a voice match.

The Trainer presents you with highlighted words on the Apple screen (see **Photo 2**), which you must speak carefully into the microphone. The more precisely you

pronounce the words, the more accurate will be the recognition process. This dependency on voice templates means that the Lis'ner will recognize only the particular voices you've stored. The hardware and software are so configured that you will have to initialize the system—create a template disk—for each person who will use it.

In simple terms, an analog-to-digital converter transforms the micro-



Photo 1. The Lis'ner main menu.



Photo 2. The Lis'ner's Voice Trainer lets you initialize the system to your own voice.

phone input into discrete signals, which are then passed through filters to get rid of unwanted room noise and other frequencies confusing to the system. Special hardware splits your voice into several different frequency components, which the system compares to the current series of templates in memory. If a close match is achieved, the Lis'ner tells your computer to print your words on screen or act on your command. If the attempted match is off the mark, the Lis'ner will not "recognize" the word, or it may confuse it with a similar-sounding word in the template. You must be careful to pronounce each word the same way you did when you initialized the system.

So start talking—and listen closely when your Apple answers back. □

—J.J.L.

Continued from p. 15.

more natural way of speaking. But hardware and software design must be much more complex to process average human speech. The system must be intelligent enough to know where one word ends and another begins, and it must be fast enough to handle the input in real time.

Today's personal computers lack sufficient central-processing speed and random access memory to efficiently accomplish the task of real-time continuous-speech recognition. The CSR procedure involves some of the same sound-gathering and sound-matching techniques the human brain employs (see the sidebar on human speech perception), but is crude in comparison.

Through an ordinary microphone, sound enters the computer's voice-recognition circuitry as periodic sine waves, which are useless to the computer in their analog form. The voice-recognition hardware must convert them to a linear stream of digital signals—a series of ones and zeroes that stand for the on and off states of the computer's electronic circuits—before the computer can recognize or manipulate the data.

An analog-to-digital converter circuit transforms a wave into digital signals by assigning numeric values to the high and low energy points corresponding to an X/Y graph representation of the wave. The computer then evaluates incoming sound by statistically analyzing these equivalent digital data and comparing them to templates resident in RAM.

The voice-recognition device actually compares the sound between pauses. The system "listens" to you, and when it notes a break in your speech, it decides that it has "heard" a whole word, which it compares to its stored templates. The system assigns to each incoming word a probability value representing the closeness of its match to one of the stored templates. If the probability is above a certain value (fixed by the software designers), the system registers a match. Templates for independent systems are designed and installed at the software factory, while a dependent system comes with blank templates the user must initialize.

A discrete-utterance voice-recognition system is not practical for word processing or any other application in which speech must flow normally. Continuous-speech recognition must

Continued on p. 19.

When Mind Meets Machine

High tech is invading our language, and there exists no better example than the word "interface." The problem with adopting technical words into the vernacular, however, is that their specialized meanings can become blurred. *Interface* suffers more than most from this phenomenon: The interface I'm talking about is not the verb that describes what you do with your friend or your "space," but the noun that describes how you get your computer to do what you want it to do.

Back when computers were young (and built out of vacuum tubes), you got your machine to perform a task by hard-wiring the flow of information through it—and you had to re-wire it every time you ran a new program. Luckily, John von Neumann came up with the stored-program concept and saved us all from a horrible fate.

Now that programs were to be stored in memory, you had to have a way to enter them into memory. This led to the first advance in user interfaces—the front panel. It wasn't much—just a row of switches and lights that let you enter programs and data, one bit at a time—but it sure beat re-wiring your computer.

It wasn't long, however, before the front panel was replaced by that darling of the mainframe, the card-punch machine.

We would probably still be punching our programs and data onto cards and running them through a card reader were it not for a (then) little company called Digital Equipment Corporation. In the early sixties, DEC began selling minicomputers. These machines had operating systems that allowed you to boss your computer around using a video-display terminal (VDT)—essentially a keyboard (for input) married to a video monitor (for output). System operators had used VDT's (or their hard-copy cousins, teletype terminals) for many years, but it was the minicomputer that relegated the card-punch machine to the dustbin of history.

The earliest microcomputers used a front panel as the primary input device (a technological example of ontogeny recapitulating phylogeny). It wasn't long, however, before the VDT became the standard microcomputer interface. (Luckily, card-readers were almost totally bypassed in the development of the desktop computer.) Although micros borrowed the VDT

concept from minicomputer design, manufacturers quickly realized they would sell millions of personal computers only if they made their machines extremely easy to use.

The current fashion in interfaces was designed and developed at the Xerox Palo Alto Research Center in Palo Alto, California. It consists of windows, pull-down menus, and icons, and is complemented by the use of a peculiar pointing device called a mouse. The first personal computer to popularize this interface was the Apple Lisa. Before long you could buy a number of software packages that emulated the Lisa interface to some degree; several computers (including, of course, the Macintosh) have such interfaces built in.

In a mouse/windows environment, it's pretty easy to get your computer to do what you want, but you still have to know how to use a keyboard and how to manipulate a mouse. What I look forward to is the day when I can tell my computer what to do simply by *telling* it what to do—and that's the promise of voice recognition. □

—Bob Ryan,
inCider Technical Editor

Voice-Recognition Glossary

Algorithm. A set of instructions to solve a particular problem, such as finding a square root, or recognizing speech.

Artificial intelligence. A computer containing large data bases, with the ability to make decisions based on its stored data. Some AI computers are called expert systems because they concentrate on a small area of knowledge.

CSR. Continuous-speech recognition, the identification of spoken words without unnaturally long pauses between them.

DUSR. Discrete-utterance speech recognition—single words with distinct pauses between them.

Error index. A measure of the number of errors a system makes. An error index of 5 equals a 5 percent error rate.

Hal. Heuristically programmed ALgorithmic computer, from the Arthur C. Clarke movie *2001: A Space Odyssey*. Heuristic means having the ability to gather additional knowledge—a non-static computer program.

Lis'ner 1000. A speaker-dependent, discrete-utterance voice-recognition expansion board for the Apple II series of computers. An optional voice synthesizer with unlimited vocabulary is also available as part of the Lis'ner package.

LPC. Linear predictive coding, a mathematical algorithm predicting the next most likely event based on previous data.

SP-1000. The speech-recognition chip in the Lis'ner 1000 expansion board.

Speaker-dependent system. A voice-recognition system that must

be initialized by the person who will use it.

Speaker-independent system. A voice-recognition system that can respond to any speaker and requires no initialization by the end user.

SSI-263. A Silicon Systems unlimited-vocabulary speech-synthesis chip in the Lis'ner 1000.

Template. A disk file containing words or phrases to be used as the basis for speech comparison in a voice-recognition system.

Voice-to-text algorithm. A computer program with a complex set of rules to translate speech into digital signals.

Voice Writer. A speech-activated word processor, currently under development, that can convert words to typed, formatted text.

Continued from p. 17.

rely on the context of words, however. The complexity of this task, so effortlessly accomplished by the human brain, significantly increases the amount of computer memory necessary to make the system fast enough to be practical.

A continuous-recognition program must include the rules of English grammar and syntax, because the system will have to predict the word most likely to come next. Understanding the context of natural language is a problem still debated by cognitive psychologists, and represents a formidable task for the computerist, given the huge number of word-combination possibilities to be cross-referenced.

In the technology of voice recognition, *linear predictive coding* is the science of assigning a probability value to the next event. For example, in the sentence, "Let's go to the . . .," only a limited number of possible answers can satisfy the blank. We might say "store" or "movies," but wouldn't be likely to use "doorknob." A linear predictive system assigns a probability value to each word in the context of the preceding phrase, and the machine waits for a member of a select group of words to complete the sentence.

To add to the difficulty, any voice-recognition system we build must function in the real world of confusing homonyms, bad grammar, loud noises, common colds, regional slang, and foreign accents. And an unlimited-vocabulary, continuous system will have to do all its processing in "real time"—one-tenth of a second per phrase—to be of any practical use in the real world.

Looking to the Future

What do speech-recognition computerists see as the future of this technology?

A number of companies, including Thomas Watson Labs and Kurzweil Speech Systems, are currently engaged in serious competition to develop a voice-activated word processor, a speaker-independent, continuous-speech recognition system. The "voice writer" will translate spoken input directly into neatly typed text. Its vocabulary will be in the tens of thousands of words, and it will have sufficient computing power and speed to recognize a variety of speech patterns and accents. These corporate projects are aiming at a completion time of less than five years. The "voice writer" is

expected to have a serious impact on the business scene when it hits the open market. And clean copy will no longer belong solely to fast touch-typists.

In general, the cost of voice-recognition hardware will continue to go down, with the stepped-up mass production of chips such as the SP-1000 (see the sidebar on the Lis'ner system for Apple II computers). The natural course of increasing miniaturization and integration will hasten this trend.

These advancements are already apparent. A typical voice-recognition system built in 1982 with a 100-word vocabulary sold for about \$2000, while units with ten times the word capacity retailed for nearly \$10,000. Today you can have the same capability for less than \$300. In the next two to three years, we can look forward to faster, more reliable speech-recognition boards in the \$100 to \$200 price range. Many of these new systems will have the capacity to respond to a number of selected speakers. And it is reasonable to expect the development of a speaker-independent voice-recognition board with a nearly unlimited vocabulary in the next three to five years.

In the electronics labs of Silicon Valley, engineers are working on a board with a series of fast parallel microprocessors, a megabyte or two of RAM, and a programmable ROM to hold the templates—Hal's baby brother. A state-of-the-art voice-recognition board will incorporate principles of artificial intelligence to accomplish its tasks with sufficient speed and accuracy: The ideal system will have the ability to learn along the way. The user will "teach" it the basics at start-up, then the machine will take over, continually updating its PROM-based dictionary as it asks its owner to repeat unfamiliar words and phrases. The key to the real advancement of voice-recognition technology is just this: A speaker-independent, continuous-speech recognition system will have to "know" quickly that it has run across a new word or phrase and be able to notify the user that its PROM requires modification.

The skills of many professionals—the computer programmer, the electronics engineer, the linguist, the cognitive psychologist—will blend in the search for the most intelligent voice-recognition system we can create. Complete replication of our own innate capacity to understand the spoken word—language, a uniquely human ability—is *not* the primary

goal. But we can create a tool that will interact with us in a familiar way, help us work, help us learn, help us learn about the process of learning, perhaps. No, the real Hal hasn't arrived on the scene yet, but he's well on his way. ■

Write to Joseph J. Lazzaro at P.O. Box 524, Revere, MA 02151.

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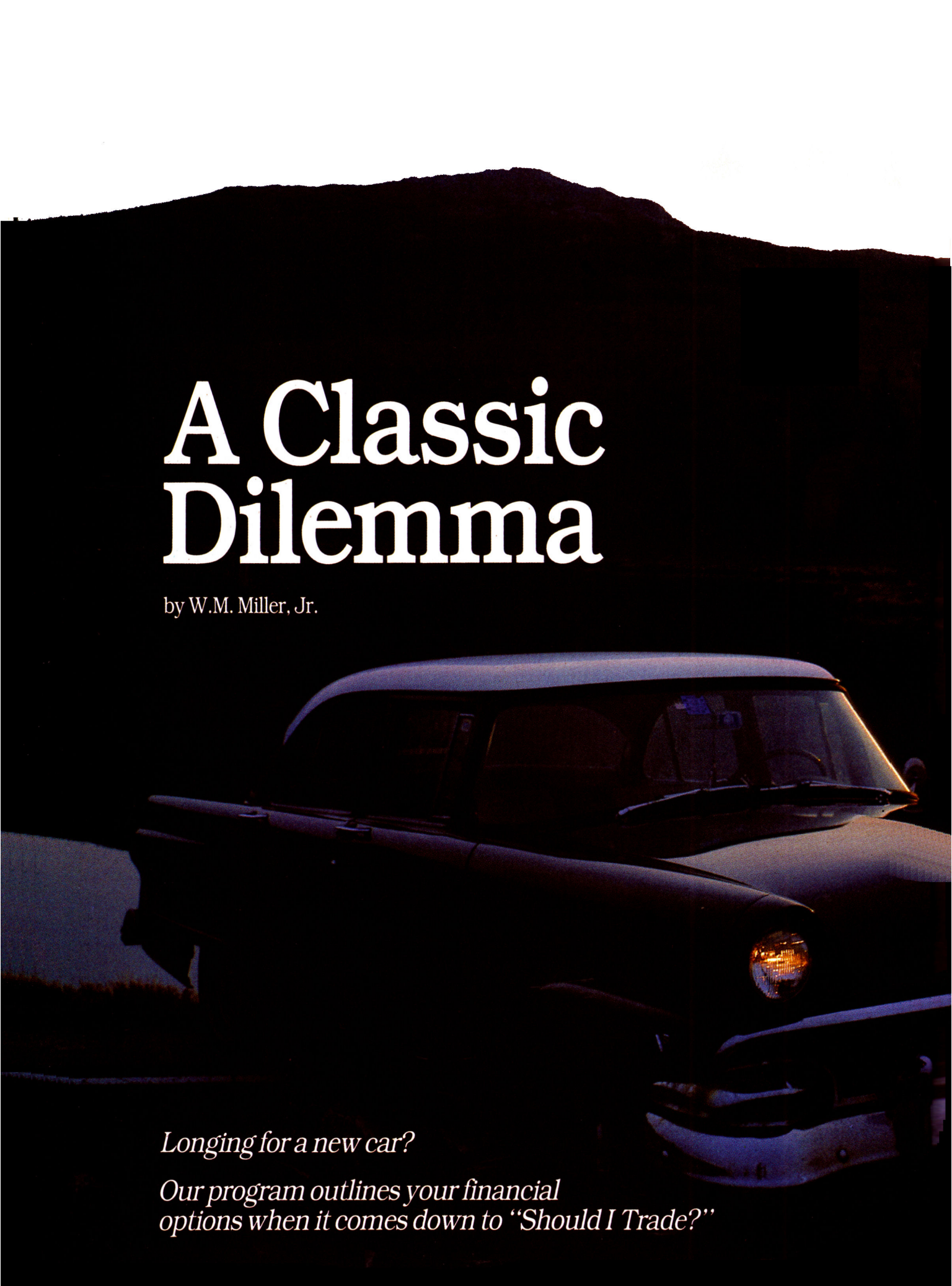
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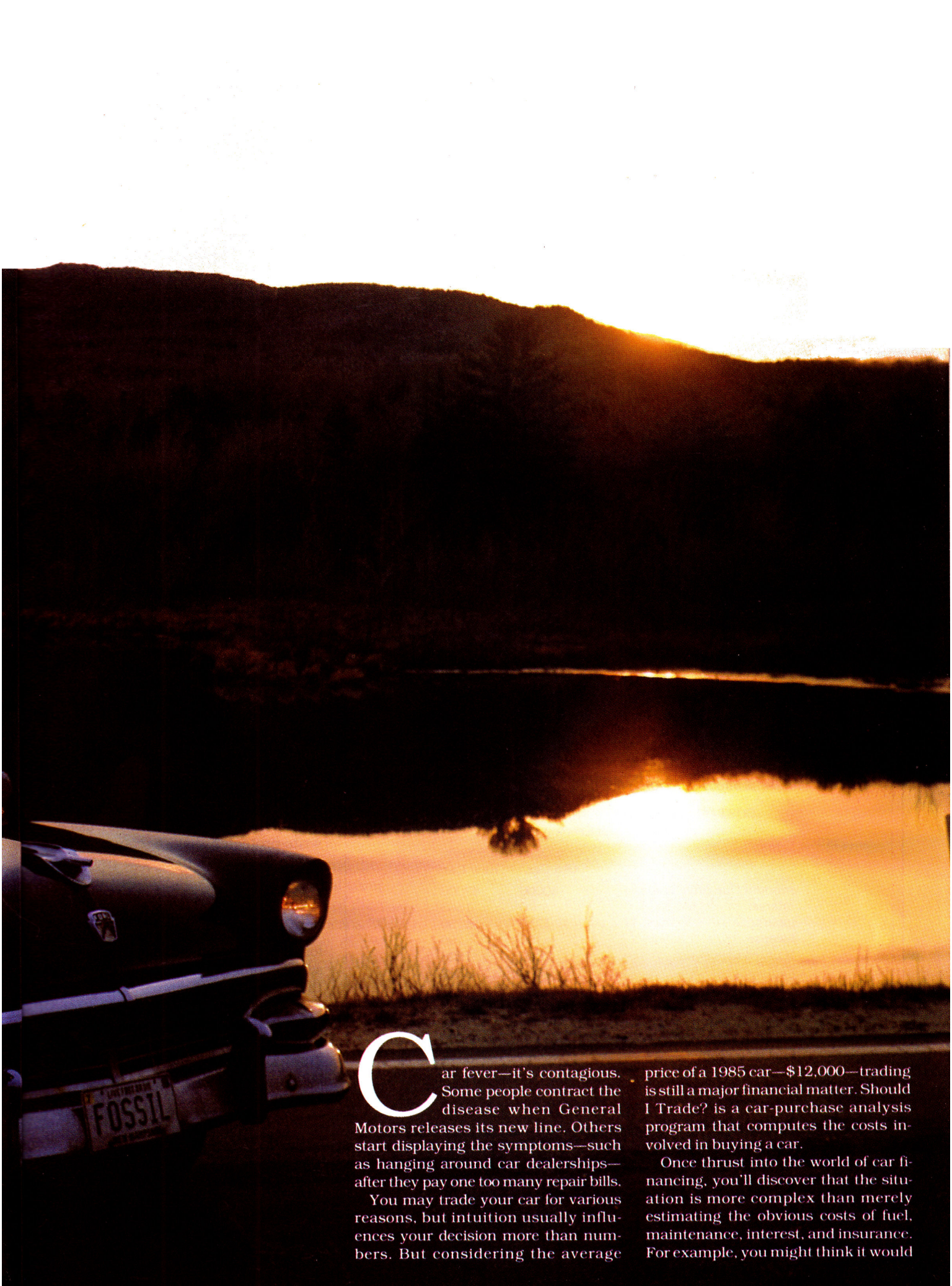
A classic car, possibly a 1950s sedan, is shown in silhouette against a bright sunset sky. The car's headlight is illuminated, and the background features a dark silhouette of a mountain range. The overall mood is nostalgic and contemplative.

A Classic Dilemma

by W.M. Miller, Jr.

Longing for a new car?

Our program outlines your financial options when it comes down to "Should I Trade?"



Car fever—it's contagious. Some people contract the disease when General Motors releases its new line. Others start displaying the symptoms—such as hanging around car dealerships—after they pay one too many repair bills.

You may trade your car for various reasons, but intuition usually influences your decision more than numbers. But considering the average

price of a 1985 car—\$12,000—trading is still a major financial matter. Should I Trade? is a car-purchase analysis program that computes the costs involved in buying a car.

Once thrust into the world of car financing, you'll discover that the situation is more complex than merely estimating the obvious costs of fuel, maintenance, interest, and insurance. For example, you might think it would

Table 1. Sample printout for economics of trading a car.

Miller Associates
6744 Ransome Drive
Baltimore, MD 21207
(301) 944-0708

1-18-85

ECONOMICS OF TRADING CAR

Prepared for:

W.M. Miller, Jr. 6744 Ransome Drive Baltimore, MD 21207

Assumptions:

1. Price—Regular Gas:	\$1.05
2. Price—Nolead Gas:	\$1.10
3. Inflation—Gas:	8%
4. Inflation—Maint.:	6%
5. Interest—Savings:	9%
6. Interest—Finance:	12%

Present Car:

Model Year and Make—Present Car: 80 Pontiac
Mileage on Present Car: 64000
Miles/Gallon—Present Car: 18
Miles Driven per Year: 12000
Expected Trade-in Value of Old Car: \$4000
Gas Type: Nolead
Insurance—Old Car: \$350
License Tags—Old Car: \$20

New Car:

Price of New Car: \$12000
Estimated Miles/Gallon—New Car: 22
Miles Driven per Year: 12000
Gas Type: Nolead
Payment Method: Financing—36 Months
Insurance—New Car: \$350
License Tags—New Car: \$20

FINANCING INFORMATION

Monthly Payments	\$265.71
Total Principal	\$8000
Total Interest	\$1565
Total Paid	\$9565

Table 2. Sample printout comparing five-year costs of old car and new car.

COST OF BUYING AND OWNING NEW CAR
(Compared With Cost of Keeping Old Car)

	Cost Over Next 5 Years	
	Old Car	New Car
Amount Due After Trade	\$0000	\$8000
Interest	0	1565
Insurance	1750	1750
License	100	100
Maintenance	2840	1223
Fuel	4300	3518
Interest Penalty on Purchase	0	3516
Interest Penalty on Other Costs	2168	1576
Total	\$11158	\$21248
Trade-in Value After 5 Years	\$2110	\$5066
Cost for 5 Years	\$9048	\$16182

Buying new car will cost \$7134 more than keeping old car over the next 5 years. This amounts to \$1426 per year.

Note:

This analysis is based in part on predictions of future costs. Since these predictions can't be made with absolute assurance of their accuracy, and because we can't possibly program in some of the peculiarities of costs unique to some situations, Miller Associates cannot be responsible for actions taken as a result of information furnished. However, extensive efforts have been made to provide you a sound economic basis for your decision on trading your car.

be more expensive to buy a new car than to stick with the old jalopy. Down the line, however, the new car will be worth more than the old one after the same length of time. But you also must keep in mind that if you paid cash for the new car, the money expended would have drawn interest in a savings account had you not bought the car. This is called an interest penalty, and it's a legitimate cost. The interest penalty applies to all car expenses, whether you trade or not, and should be calculated for a valid comparison.

Should I Trade? computes these costs and presents the results in a neat summary printout (see **Tables 1 and 2**). Should I Trade? can help you become an informed car consumer—and you can save thousands of dollars if you take the most economical route. The program runs on the Apple //e, //c, and II Plus with 48K of memory. It also requires one disk drive and a printer capable of printing in 80 columns.

Test Drive

You must supply the Should I Trade? program with information about your present car and the proposed new car. The program then computes the costs of each over the next five years. By subtracting the projected trade-in value of each car at the end of five years, the program gives you the bottom line, the net five-year cost, each way. **Tables 1 and 2** illustrate typical program printouts.

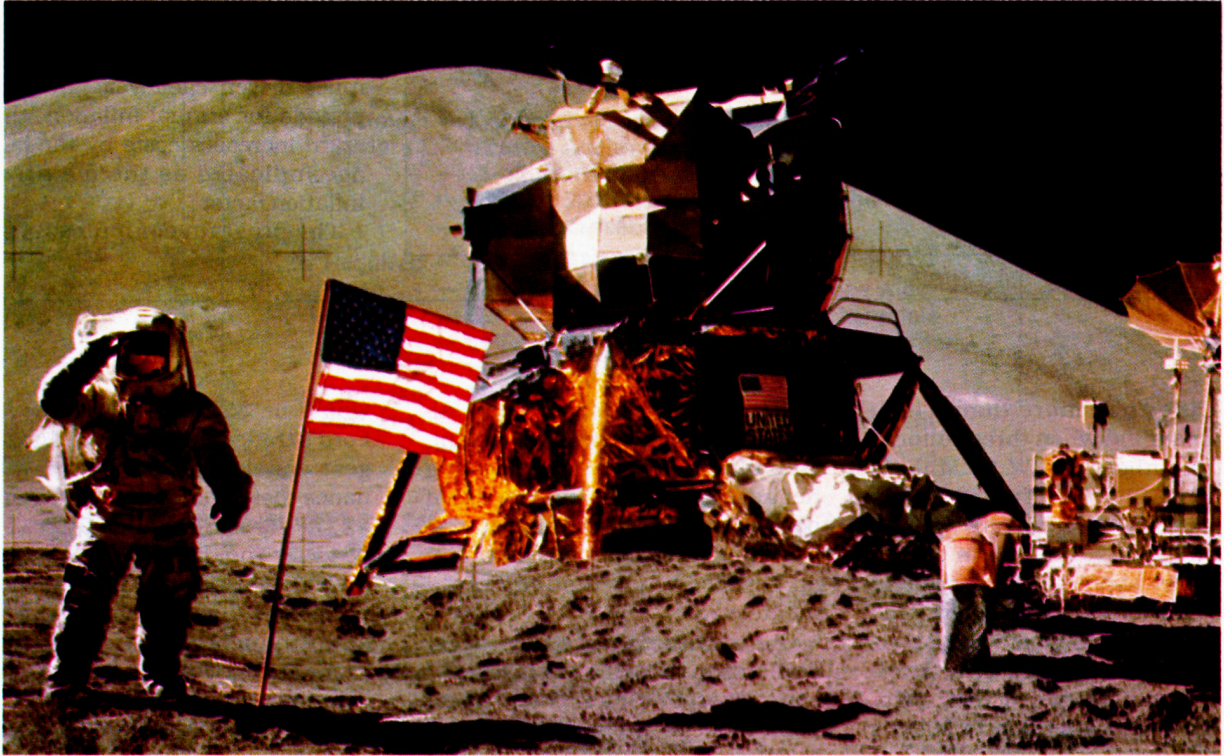
Type in the **Program listing** and save it to disk under TRADE. (Refer to *Beginner's Cookbook* on page 94 for directions on typing in *inCider's* programs.) To run the program, enter the command RUN TRADE. Don't use a write-protected disk, because you'll need to add data to it. The program creates text files as you run it, and modifies them when you change headers and customized parameters.

From the main menu (see **Table 3** for an explanation of the listed options), select option 1. The program prints out the values of its preprogrammed parameters (gas prices, gas and maintenance inflation rates, and savings and financing interest rates) in the paragraph labeled "Assumptions." Decide which factors you want to change for subsequent runs. (Parameters you create or change with option 3 are saved to disk for future runs.)

Calculating the Worth of Your Car

While some of the program's calculations are apparent, others involving maintenance, fuel, interest penalties,

THE AMERICAN WAY TO THE TOP



This July 4th, we at Applied Engineering hope that all Americans will take time out to ponder who and what we are.

It is hoped that we can remind ourselves what it means to be an American.

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America is a country where two young men started a company in their garage and three years later Apple Computer is the industry leader. Applied Engineering started much the same way and we became the leading Apple peripheral manufacturer, with no outside sales force, no marketing strategy,

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While others look to the Orient for solutions to their engineering and manufacturing problems, we at Applied Engineering feel differently because we know America's inventive past and her inventive future and we're excited.

To quote Dr. Robert Goddard in a letter to H. G. Wells, "There can be no thought of finishing, for 'aiming at the stars,' both literally and figuratively, is a problem to occupy generations, so that no matter how much progress one makes, there is always the thrill of just beginning."


APPLIED ENGINEERING
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Table 3. *Should I Trade?* menu options.

Option	Explanation
1) Run with Preprogrammed Parameters	Runs the program using built-in parameters such as gasoline costs and interest rates. Program contains default values for these parameters, to be used if you don't specify your own.
2) Run with Customized Parameters	Runs the program using your customized parameters.
3) View, Create, or Change Parameters	Lets you view the preprogrammed parameters, and create or change customized parameters.
4) Put Your Name on Printout	Replaces author's company address with your name and address.
5) Quit	Returns you to BASIC.

totals, trade-in values, and five-year costs aren't as clear-cut. Should I Trade? incorporates these figures into the program based on the elementary information you provide on price, mileage, and financing.

Maintenance costs are *all-inclusive*, covering preventive maintenance, corrective maintenance, and tires. A formula computes expenses that reflect growing maintenance costs as the odometer reading and the number of miles driven each year increase. To provide for annual inflation, the program increases costs by the percentage indicated as the maintenance inflation factor.

The program computes fuel costs

Continued on p. 56.

Keep It!

inCider had more than a tech check in mind when three editorial staff members ran W.M. Miller's program, *Should I Trade?* Purely inquisitive—and perhaps partly selfish—motives led them to find out if they should, in fact, trade in their cars for something new. One late afternoon (after reading about 8.8 percent financing), these hard-working souls devoted their valuable time and attention to Miller's program.

A little background first:

Lafe Low, Assistant Editor. Drives a 1956 Ford Mainline he inherited from his grandfather five years ago. The "FOSSIL," as its license plates read, has accompanied Lafe on numerous road trips and instilled immeasurable pride, but repair costs—a couple thousand dollars' worth—have made him think about buying a new car.

Cindy Carr, News Editor. Absolutely adores her 1983 Plymouth Turismo, her symbol of independence, her first car, her pride and joy. But after an anonymous encounter in Peterborough's infamous A&P parking lot and almost 30,000 miles racked up on the odometer, she's wondering if she'll get more by trading it now instead of waiting until next year.

Bob Ryan, Technical Editor. Often seen driving to Adams Field for a softball game in his copper-colored 1979 Chevy C-10 van. Emma, as she is affectionately known, has helped almost everyone in town, including half the *inCider* editorial

staff, move to new apartments. Although Emma has been a constant, faithful companion, she is showing her age. Bob admits he "done that poor van wrong," but imposing repair bills have drained his wallet and eroded any remaining sentimental value.

Our threesome visited a local car dealership to price their "new" cars. Everyone picked the latest 1985 models—no second-hand vehicles for this crew. Lafe chose a \$12,000, four-speed Jeep Cherokee that gets an estimated 20 miles per gallon. Cindy stepped up to a Chrysler Laser Turbo with sunroof and an estimated 21 miles per gallon for \$15,560. Bob selected a Plymouth Voyager SE, five-speed, with tinted glass and 23 miles per gallon—\$11,500. Each prospective buyer used Miller's car-purchase program to help decide whether to take a new four-wheeled friend home.

Should I Trade? required standard information about their respective cars, such as gas mileage, maintenance costs, yearly mileage, and insurance rates. The program uses this input to calculate comparison costs. All three editors followed the same parameters for inflation rate, gas prices, savings interest rate, and finance rate. While Lafe and Bob own their vehicles, Cindy still owes her firstborn to the bank, so she adjusted her program parameters accordingly.

The results? The program indicated Lafe's monthly payments

would be \$256.33, given his '56 Ford's trade-in value alone. His biggest consideration was maintenance costs over the next five years: \$2227 for the Ford, compared to \$640 for the Jeep. But Lafe won't trade the Fossil: "The program does not consider sentimental value. . . and, financially, I don't need to [trade the car]." A new used car is a definite possibility for Lafe, as he plans to restore the antique Fossil.

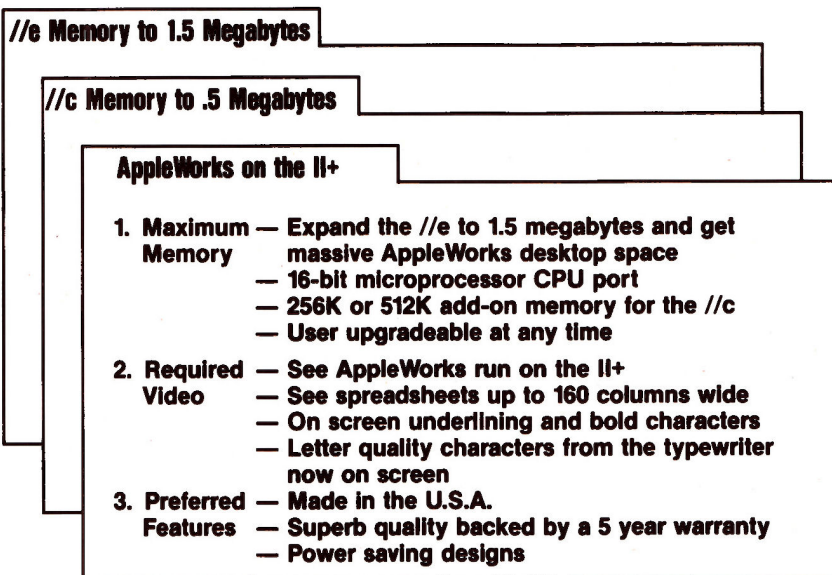
"I guess I'd better not get my heart set on that Laser," Cindy decided after reading her printout. The monthly payments, \$289.29, were too steep for her budget. She's still thinking about trading her car, but it will have to be for a lower-priced model.

"One thing this program shows you is that you'll never pay less," Bob notes. But his car analysis indicated he would pay only \$150 a month for a new Voyager. Of the three, Bob started out as the least likely to buy a new car. Should I Trade? has him leaning in the other direction. "The actual difference is less than five bucks a day. Big deal. So I don't go to Nonie's for lunch. So I don't drink beer. . .naa," he remarks. "Seriously, is five bucks a day such a sacrifice? That's the price you pay."

So if you happen to pass by *inCider*'s Elm Street offices and see a silver, 1985 Voyager with tinted glass parked out front, you'll know who has W.M. Miller to thank. □

—Cynthia K. Carr
inCider staff

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Any Port

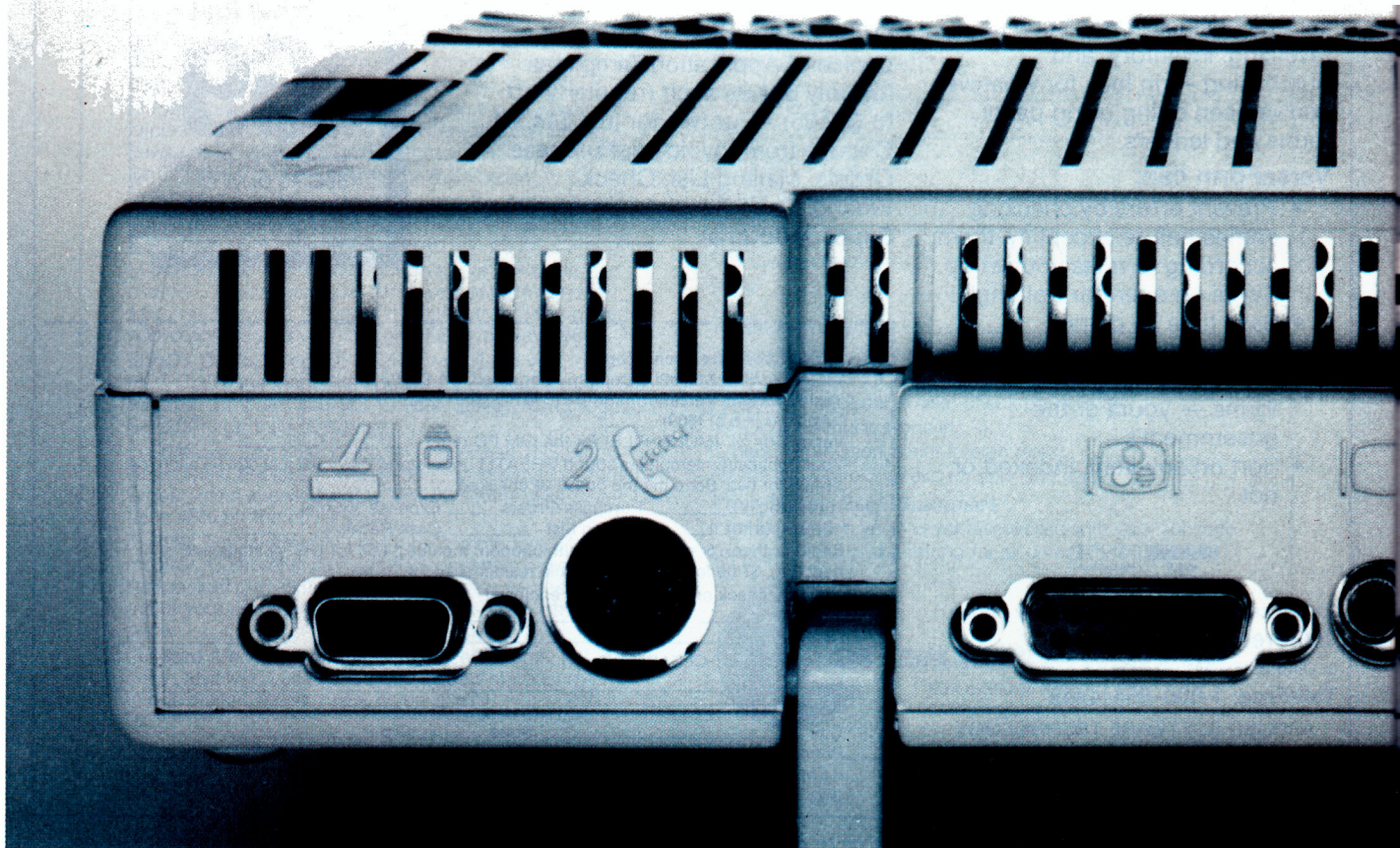
by Jack Higbie

Learn how to configure

Your Apple //c's twin RS-232 ports are its link to the world outside—to a printer or plotter, to a remote computer via a modem, even to another computer hooked to it by cable. If you can set the appropriate parameters—the encoded values that describe the form of the data your computer is transmitting through its ports—your //c can drive any serial device.

Currently, there are three ways to configure your //c's serial ports. My purpose is to present a fourth. At the same time, I hope you will learn something about the inner workings of your computer.

The first way to configure your serial ports is simply to turn on your computer. The default configuration (discussed below) is loaded from ROM whenever you apply power to your computer. The second method is to use the System Utilities disk. It's a slow process, but the configuration will survive any type of reboot short of turning your computer off. The third method available to you is to configure the ports "on the fly," by sending them configuration codes after they have been activated with a PR#1 or a PR#2. It's fast, but you have to resend the configuration to the ports every time you activate them.



in a Storm

your //c's serial ports for DOS 3.3.

The method I present will permit you to configure the ports without resorting to the laborious System Utilities disk, yet the resulting configuration will survive all forms of reset except turning your computer off.

Let's look at your //c's default configurations. The upper 64K of RAM in your //c, the *auxiliary memory*, contains an area allocated for the text-screen display called text page 1X. Part of it is unused, however; this area is called the *screen-holes* region. When you turn your //c on, port configuration programs stored in ROM load the default parameters (values preset at the factory) into the screen holes in

the page 1X region. The default values are "permanent" in the sense that they are always loaded into RAM whenever you turn on the computer—they're protected from all forms of reset, including a forced "cold start" (pressing the open-apple/control/reset key combination).

Four bytes are allotted to each serial port for its collection of parameter values. When you activate a serial port by typing in PR#n, 2 bytes set the control and command registers of that port's ACIA chip (the asynchronous communication interface adapter, a 6551-type chip), and the other 2 bytes are transmitted to screen holes in

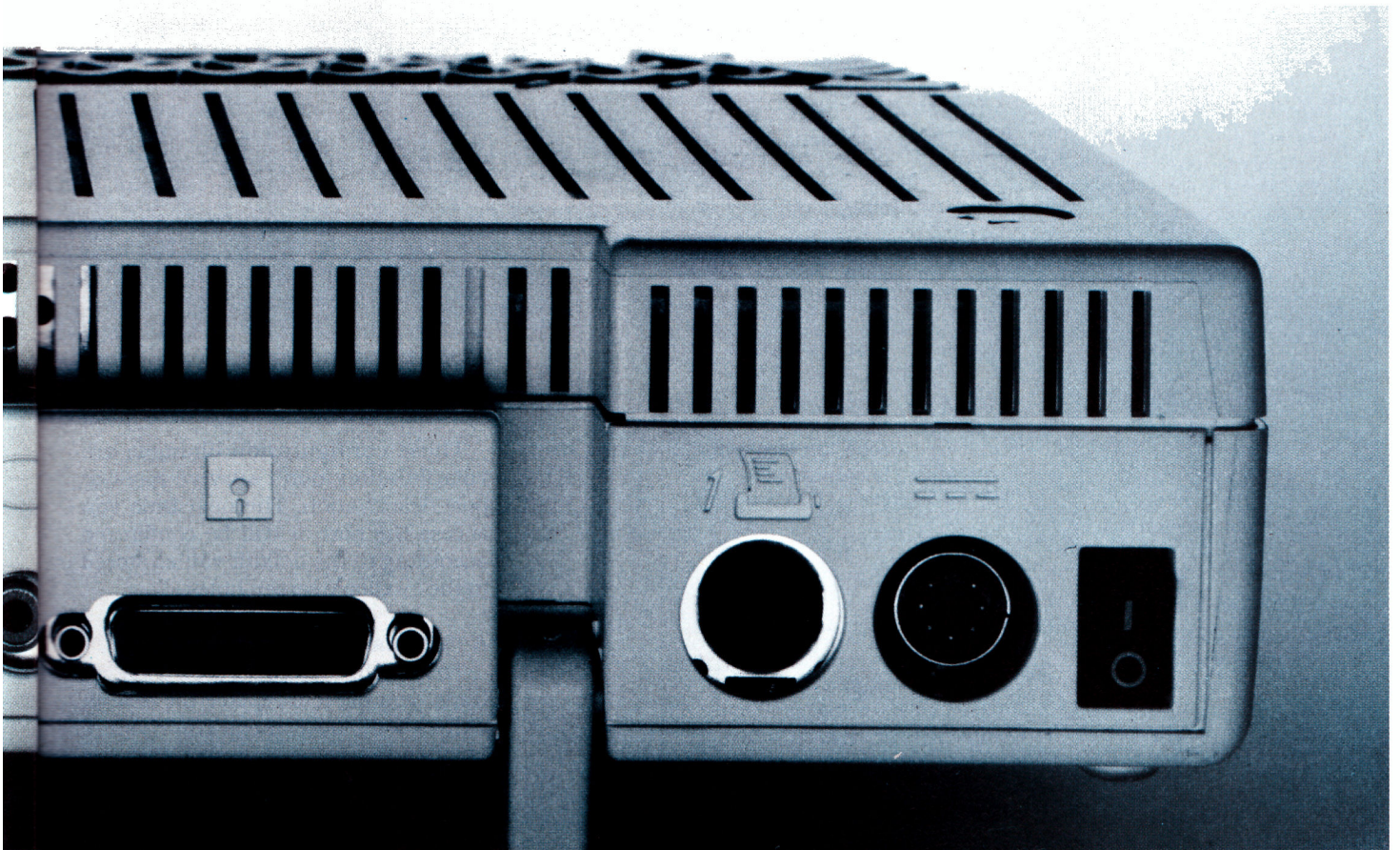


Table 1. Configuration commands for port 2. For port 1, change control-A to control-I.

Commands	Description
Control-A T	Enter terminal mode
Control-A I	Echo to screen
Control-A L	Issue line feed after carriage return
Control-A R	Reset port and exit
Control-A nnB*	Set baud rate
Control-A nP	Set parity
Control-A Z	Zap ignore further commands, do not format output (no carriage return)
Control-A Q	Quit terminal mode
Control-A N	No echo
Control-A K	Kill line feed after carriage return
Control-A S	Issue BREAK
Control-A nD	Set data format
Control-A nnnN	Line length, no echo

*All n's are decimal values.

Table 2. Codes for baud rate, data format, and parity.

Baud Rate		Data Format (Data bits/stop bits)	Parity
nnB*		nD*	nP*
(1) 50	(9) 1800	(0) 8/1	(0,2,4,6) none
(2) 75	(10) 2400	(1) 7/1	(1) odd
(3) 109.92	(11) 3600	(2) 6/1	(3) even
(4) 134.58	(12) 4800	(3) 5/1	(5) mark(1)
(5) 150	(13) 7200	(4) 8/2	(7) space(0)
(6) 300	(14) 9600	(5) 7/2	
(7) 600	(15) 19200	(6) 6/2	
(8) 1200		(7) 5/2	

*n's indicate the values in parentheses.

Table 3. Auxiliary-memory and main-memory screen-hole values.

Auxiliary-Memory Screen Holes (default values in parentheses)

Port 1

\$478 (\$9E)–\$C09B ACIA Control register	ddd cbbb	data, clock, baud
\$479 (\$0B)–\$C09A ACIA Command register	pppx xxxx	parity
\$47A (\$40)–\$0779	elxx xxxc	echo, line feed, communications
\$47B (\$50)–\$0579		line length

Port 2

\$47C (\$16)–\$C0AB ACIA Control register	ddd cbbb	data, clock, baud
\$47D (\$0B)–\$C0AA ACIA Command register	pppx xxxx	parity
\$47E (\$01)–\$077A	elxx xxxc	echo, line feed, communications
\$47F (\$00)–\$057A		line length

Main-Memory Screen Holes

Port 1	Port 2	Description
\$479	\$47A	Reserved
\$4F9	\$4FA	Reserved
\$579	\$57A	Line length
\$5F9	\$5FA	Temporary storage
\$679	\$67A	Bit 7 set while parsing command
\$6F9	\$6FA	Command control character (control-I, control-A)
\$779	\$77A	elxx xxxc echo, line feed, communications
\$7F9	\$7FA	Current column

main memory (the //c's lower 64K of RAM).

Examination reveals the following default configurations:

Port 1: 9600 baud, 8 data/2 stop bits, no parity, no echo, carriage return/line feed, control-I

Port 2: 300 baud, 8 data/1 stop bits, no parity, no echo, no carriage return, control-A

A Temporary Fix

You can reconfigure the ports from within a program or from the keyboard by issuing a command control character—control-I for port 1 (the printer port) and control-A for port 2 (the communications port). The command control character serves to get the port's attention. The port responds by displaying a flashing question mark on screen, and interprets the next characters you type as configuration commands (see **Table 1**). You can change the command control character for a particular port by typing the new value immediately after the current one. For example, if you want to change control-A to control-V, enter control-A control-V.

If your //c is using a modem to talk to another computer, either modem can control your //c port, as well. Control-T from your modem puts your //c into terminal mode (indicated by a flashing underline cursor), and control-A Q means "quit" terminal mode. Control-R from the remote device also takes your //c out of terminal mode.

Table 2 shows baud (data transmission) rate, data format (bit types: data and stop bits), and parity codes (for error detection). If you want to set your port for 300 baud, 7 data bits followed by 2 stop bits, and space parity, for example, you would type in control-A 6B (choice 6 under baud) control-A 5D (choice 5 under data format) control-A 7P (choice 7 under parity). From inside an Applesoft BASIC program, the command string would be:

```
10 PRINT CHR$(1) + "6B" + CHR$(1) +
"5D" + CHR$(1) + "7P"
```

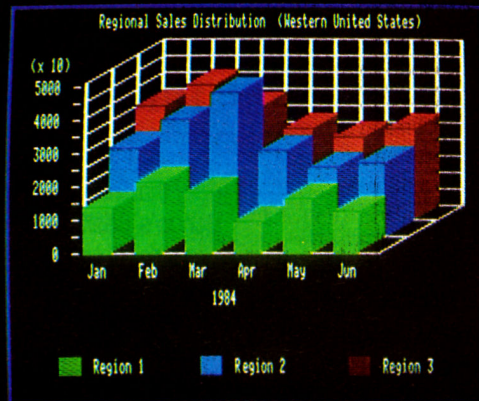
These configuration changes are volatile—they don't survive reset or port deactivation. The next time you access the port, it will be configured according to the default values stored in the auxiliary screen holes.

A "Permanent" Patch

To reconfigure the ports on a lasting basis, you need to replace the default values with new ones. The System Utilities disk will accomplish this, but it is infernally slow. What you need is

Continued on p. 34.

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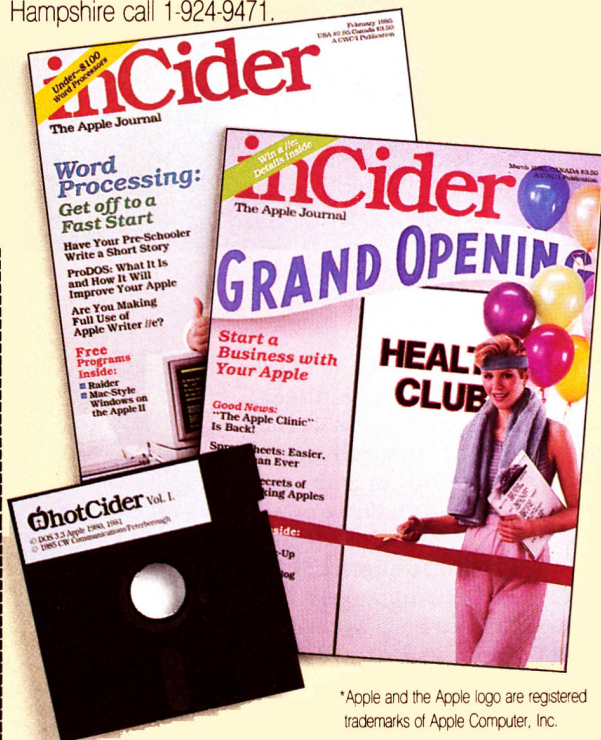
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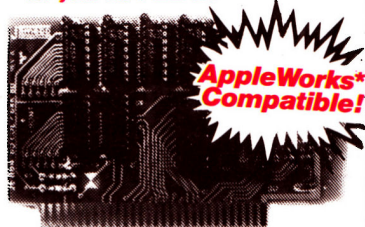
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a fast method of changing the values in the auxiliary screen holes.

Table 3 contains the default-configuration values and auxiliary screen-hole addresses (given in hexadecimal notation). Other addresses of interest include the ACIA status register—\$C099/\$C0A9 (hard-wired); and the transmit/receive register—\$C098/\$C0A8 (port 1/port 2). The communications port uses page 8 (\$800–\$8FF) of the auxiliary memory as an input/output buffer, so information there will be overwritten.

The important thing in configuring the serial ports is to get the proper values into the auxiliary screen holes. That's where my program comes in.

If you put the short Applesoft routine I present (see the **Program listing**) at the beginning of a program that accesses the serial ports, or on a separate disk as a preboot, the routine will POKE new values into the auxiliary screen holes, thereby setting the new port "defaults" you specify. Here's how it works.

First, the routine accesses the auxiliary text page (page 1X) by POKEing

the 80STORE soft switch (location \$C001 hex, 49153 decimal), and the PAGE2 soft switch (location \$C055 hex, 49237 decimal). When finished, the program returns things to normal by POKEing the companion locations of these soft switches in line 100.

Lines 20–50 set port 1, and lines 60–90 set port 2. You can delete either set of lines if you wish to set only one port.

To demonstrate how you would configure a port, assume you want to set the default for port 2 to 1200 baud, 7 data/2 stop bits with space parity, automatic line feed after carriage returns, and a line length of 40 characters. You would first delete lines 20–50 from the routine and proceed as follows:

- Line 60 sets the data format and baud rate. Consulting **Table 2**, you find that the 7/2 data format is the fifth data-format entry. The number five, therefore, describes the data format you desire. Note that 1200 baud is the eighth entry under baud rate. Therefore, the number eight describes the baud rate you want.

From **Table 3**, you find that the data format/baud byte takes the form *dddc*

bbbb, where *ddd* describes the data format, *c* determines the clock bit (*c* is always 1 unless you are using an external clock), and *bbbb* describes the baud rate. Now you plug in the appropriate numbers. The number five (describing data format) is 101 in binary, so *ddd* equals 101. As mentioned, *c* equals 1. The number eight (describing baud rate) is 1000 binary, so *bbbb* equals 1000. Putting it all together, *dddc bbbb* equals 1011 1000. This bit pattern produces hex number \$B8, which is equivalent to 184 decimal. Consequently, to configure port 2 to the 7/2 data format and 1200 baud, line 60 should read:

```
60 POKE 1148,184 : REM port 2, data
    format, baud rate
```

- Space parity is the seventh entry in the parity section of **Table 2**, and thus *ppp* (from **Table 3**) equals 111 (the binary equivalent of 7). The rest of the bit pattern (*x xxxx*) is always 0 1011, so the total pattern for space parity is 1110 1011 (*pppx xxxx*). This equals \$EB hex, or 235 decimal. The value 235, therefore, is POKEd into location 1149 in line 70.

- For the echo/line-feed/communications byte, you indicate no echo by setting bit 7, the leftmost bit, to zero. You establish a line feed by setting bit 6 equal to one. Since you plan to use the port to drive a modem, set the communications bit (bit 0) to one. The remaining bits in the byte are zero—this yields the bit pattern 0100 0001—*clxx xxxx*—\$41 hex, 65 decimal; put 65 into line 80.

- To get an output line length of 40 characters, simply put 40 into line 90. The port will automatically produce a carriage-return character after every 40 characters. If you want unformatted output (no automatic carriage returns), this control byte should be zero (the default value for port 2, as **Table 3** shows). Incidentally, if you specify a zero line length using the control character command control-A ON, you actually get a line length of 255 characters. The only way to get a true zero line length is to POKE zero into \$47F (1151 decimal) or main-memory location \$57A (1402 decimal).

With the example above in mind, you should be able to determine the proper values to put into the program for any configuration you want.

Applications

In most applications, you can insert the patch in the **Program listing** into the start-up program to configure the

Binary/Hex/ Decimal Conversions

Notice that the default value for port 1 is \$9E; its composition is indicated by the string *dddc bbbb*. The first 3 high-order bits (*ddd*) contain the code for data format: For \$9E, that's 100 in binary (\$4 hexadecimal and 4 decimal). Looking at the data format in **Table 2**, note that the fourth entry is the format 8/2—8 data bits followed by 2 stop bits. The 4 low-order bits (*bbbb*) contain the baud designation—1110 binary, \$E hexadecimal, 14 decimal. Again from **Table 2**, the 14th entry under baud is 9600 baud.

Hexadecimal notation is convenient because memory addressing is organized on this basis. For those not familiar with this number system, hex numerals 0–9 represent their decimal equivalents, and the letters A through F the decimal numbers 10–15, respectively. Each hex position has a value 16 times that of the position immediately to the right of it (just as in decimal no-

tation the value of each position is ten times that of the one to the right). For example, the hex number \$C0A9 is 49,321 in decimal notation (a dollar sign preceding a number indicates hex):

$$\begin{aligned} \$C0A9 &= (12 \cdot 4096) + (0 \cdot 256) + \\ &(10 \cdot 16) + (9 \cdot 1) = 49,321 \end{aligned}$$

In binary notation the value of each position in the number is two times greater than that of the position to its right—reading right to left, 1, 2, 4, 8. The binary number 1001 is \$9 in hex, or 9 in decimal:

$$\begin{aligned} 1001 &= (1 \cdot 8) + (0 \cdot 4) + (0 \cdot 2) + (1 \cdot 1) = \\ &= 9 = \$9 \end{aligned}$$

Likewise, the binary number 1110 is \$E hex, or 14 decimal:

$$\begin{aligned} 1110 &= (1 \cdot 8) + (1 \cdot 4) + (1 \cdot 2) + (0 \cdot 1) = \\ &= 14 = \$E \end{aligned}$$

Combining the numbers from the two previous examples produces the binary number 1001 1110. Note it is equal to \$9E hex (1001 1110 = \$9E). □

—J.H.

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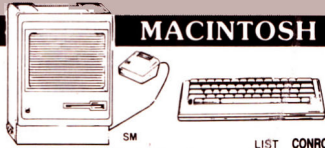
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Program listing. Port conversions.

```

10 POKE 49153,0 : POKE 49237,0 : REM 80STORE, PAGE 2 on
20 POKE 1144,xxx : REM port 1, data format, baud rate
30 POKE 1145,xxx : REM port 1, parity
40 POKE 1146,xxx : REM port 1, echo, line feed, comm.
50 POKE 1147,xxx : REM port 1, line length
60 POKE 1148,xxx : REM port 2, data format, baud rate
70 POKE 1149,xxx : REM port 2, parity
80 POKE 1150,xxx : REM port 2, echo, line feed, comm.
90 POKE 1151,xxx : REM port 2, line length
100 POKE 49236,0 : POKE 49152,0 : REM PAGE2, 80STORE off
    
```

ports automatically when you turn the computer on.

In the telecommunications half-duplex mode, each computer must be in "local echo" mode (the echo bit set to one) to transmit input to its own screen. To begin, turn on the communications port by typing IN#2. Then put your //c into terminal mode (control-A T), make the phone call, and connect the computers. If you want a record of the transaction, type PR#1 to route input/output through the printer port.

To use full-duplex communication, you must designate one of the computers as the host, to echo input back to the source. If you'd like your //c to be the full-duplex host, type PR#2 and engage "local echo" to see your own input. Control-R from the remote computer takes your //c out of terminal mode, and makes the remote computer's keyboard and screen the input/output devices for your computer.

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Table 4. Pin assignments for wiring the port connectors.

Pin 1	DTR	Data terminal ready (output)
Pin 2	TXD	Transmit data (output)
Pin 3	GND	Power and signal ground
Pin 4	RXD	Receive data (input)
Pin 5	DSR	Data set ready (input)

If the remote-computer user wants to run a DOS application, he or she simply types RUN PROGRAM (where PROGRAM is the name of the application). The program executes exactly as if you had typed the command yourself (providing you loaded DOS initially). To run protected software from the remote computer, you will have to break into the program to reestablish the output hooks—to get started, the remote computer needs to send PR#6, and in doing so, disrupts the conditions IN#2 and PR#3.

One last bit of information: If you want to wire the port connectors yourself, see **Table 4** for the pin assignments on the 5-pin DIN connectors.

That's all you need to take control of your //c's serial ports. A solution at last! ■

Write to Jack Higbie at the University of Queensland, Physics Department, Brisbane, Queensland 4067, Australia.

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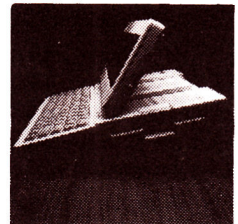
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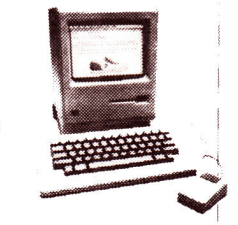
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Using ProDOS Part 5

The ProDOS—BASIC Connection

by Lee Swoboda

Now that you're familiar with the commands ProDOS offers and what they do, I'll explain how ProDOS works in an Applesoft BASIC program. When you turn on your Apple, it automatically loads your operating system from the disk, stores it in memory, and connects it to other functions of the computer. If that operating system is DOS 3.3, the Applesoft prompt (!) appears when this process is complete. ProDOS, however, doesn't automatically connect to BASIC; you must provide the system file—BASIC.SYSTEM—to connect the two.

ProDOS also differs from DOS 3.3 in the way it's stored in memory. (Figure 1 compares the two for a 48K Apple II Plus.) After loading DOS 3.3, the computer stores it in a fixed location at the top of available memory—just above memory location 38400. Whenever a BASIC program uses a DOS 3.3 command (signified by the control-D in a PRINT statement), the computer goes to this location and looks at the table

You've learned the commands—now discover how ProDOS works in an Applesoft BASIC program.

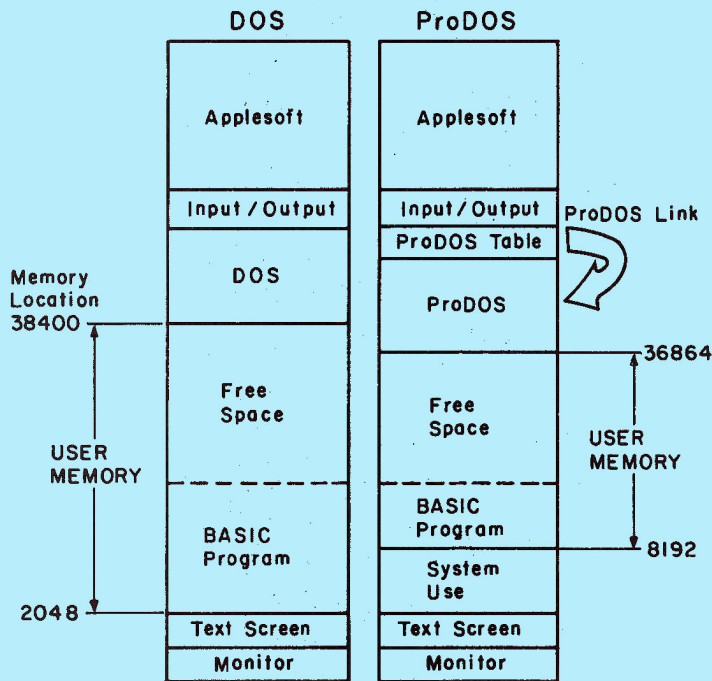
containing all DOS 3.3 commands. On the other hand, the only part of ProDOS that must be at a specific spot in memory is the table of parameters, the system global page (labeled ProDOS Table in Figure 1), which tells the computer where to find ProDOS.

Apple recommends a 64K configuration for ProDOS since this operating system has 7.5K more overhead (memory devoted to the computer's use) than DOS 3.3. If you're using ProDOS

with a 48K Apple II Plus, ProDOS must reside just below the I/O buffers—the same place DOS 3.3 would reside. Since ProDOS is 1.5K bytes larger than DOS 3.3 and reserves the bottom 6K of memory for loading ProDOS or a system program, only 28K remains to hold BASIC programs (compared with 36K with DOS 3.3).

ProDOS automatically determines the type of computer you're using and how much memory is available. If you

Figure 1. DOS and ProDOS memory maps of a 48K Apple II Plus.



have a //e, a //c, or a II Plus, ProDOS locates itself in the 16K RAM card area of memory and updates its parameter table accordingly. **Figure 2** shows the memory configuration for a 64K Apple (48K Apple II Plus and 16K RAM card, //e, or //c). Because of the fixed location of DOS 3.3, however, even if you have an Apple //e, a //c, or a 64K Apple II Plus, DOS 3.3 can't easily take advantage of the additional 16K of available memory.

Setting up a BASIC Disk

A ProDOS disk must have three characteristics: It must be formatted—magnetically on the disk; it must contain the file PRODOS (on which the ProDOS utilities are recorded); and it must contain a system file. (This file is BASIC.SYSTEM if you're using BASIC.)

To format a BASIC disk, follow the appropriate procedure in *Beginner's Cookbook* (p. 94). Format the blank disk using /PLAYING as the volume name. Your disk will boot (start up) in "ProDOS BASIC"—Applesoft BASIC with the enhancements discussed in Part 4 of this series. This formatting process is a more complicated version of the DOS 3.3 INIT command, but it's worth the effort to have the extra features ProDOS offers. To format additional disks, you merely need to use the Volume Copy Utility. I recommend you use your newly created disk as a master for future BASIC boot disks.

Now, put /PLAYING in drive 1, type PR#6, and press the return key. The disk boots your system and displays "ProDOS BASIC 1.0" on the screen. When you first start ProDOS, it looks for a program named STARTUP. Since /PLAYING doesn't have such a program, ProDOS displays the BASIC prompt (>). Normally, you'll want the computer to run a program automatically when you first start it, rather than dump you in BASIC. To create a simple start-up program, from the BASIC prompt, type:

```
10 PRINT CHR$(4);"CAT"
```

and press the return key. Type SAVE STARTUP and press the return key. Now, whenever you boot /PLAYING, the computer will automatically display a 40-column catalog before depositing you in BASIC.

From the BASIC prompt, type CAT and press the return key. The computer lists the three files on your disk: PRODOS, BASIC.SYSTEM, and STARTUP. These three files are fundamental to any disk that uses ProDOS from BASIC. If you write your

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In the April New Products, the price of the W65FC02 chip from Western Design Center (p. 107) is misleading. For 1-99 units, the price is \$9.15; for 100-499 units, the price is \$6.55.

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own BASIC program, name it START-UP so the computer will run your program every time you start the disk.

Starting a BASIC program in ProDOS is similar to starting one in DOS 3.3. You will need to exercise special care, however, with some ProDOS commands. (See **Table 1.**)

Changes to Applesoft

Ten Applesoft commands—HIMEM, HGR, HGR2, TEXT, INPUT, IN#, PR#, TRACE, NOTRACE, and FRE—behave differently depending on which operating system (ProDOS or DOS 3.3) you're using. **Table 2** briefly discusses each command. For more information, refer to *BASIC Programming with ProDOS*.

Converting Applesoft Programs to ProDOS

The primary reason to convert any program to ProDOS is to avoid switching between two operating systems. (Long-time Apple owners may remember switching between DOS 3.2 and 3.3.) A more significant reason is that for certain types of BASIC programs ProDOS offers advantages over DOS 3.3:

- Programs that use sequential text files. ProDOS reads, writes, and appends text files much more rapidly than DOS 3.3.

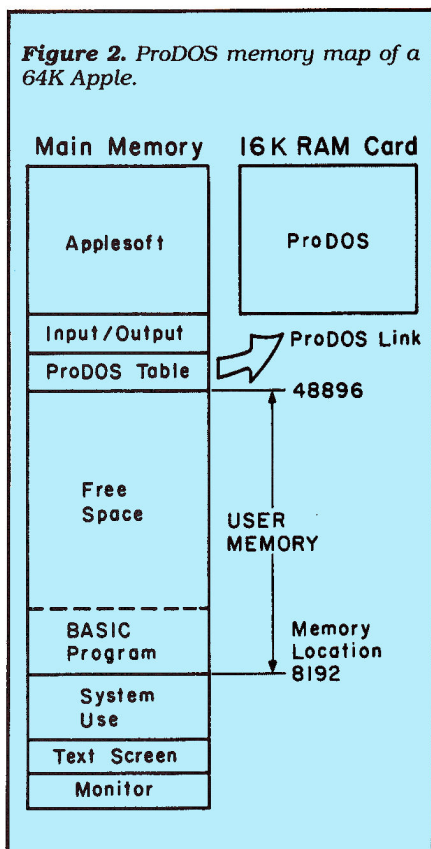


Table 1. Using selected ProDOS commands in a BASIC program.

Command	Use
RESTORE	If you've created variables in another BASIC program and saved them using ProDOS's STORE command, you should recall those variables early in the program with the RESTORE command.
HIMEM	ProDOS has a moving HIMEM (described in more detail in Table 2). If you set HIMEM in your program, you must do so before you open any files and before you declare any strings. If you want to use HIMEM to protect a machine-language program from being overwritten by BASIC, see Appendix A of the <i>ProDOS Technical Reference Manual</i> .
PREFIX	In ProDOS, you have to use the full path name every time you access a file. If you're going to access only a few volumes or subdirectories, you should set the prefix to the volume and subdirectory containing the files you'll be using.
/RAM	If you have a 128K Apple (Apple //c or //e with an extended 80-column card), ProDOS lets you use the extra memory as a "RAM disk": The computer loads your data files into the extra memory and accesses the data from memory rather than from disk. Treat the RAM disk as you would any other disk drive. At the start of the program, you'll have to read text files from your floppy disk and write them to /RAM; but, once you've done this, access will be much faster. Before you end the program, you must write that data back to the floppy disk. Otherwise, you'll lose it.
CLOSE	ProDOS doesn't automatically close files at the end of a BASIC program as DOS 3.3 does, so you should insert a global close (PRINT D\$;"CLOSE") into your program before you end it.

Table 2. Applesoft commands that react differently under ProDOS and DOS 3.3.

Command(s)	Operation
HIMEM	The HIMEM command sets the upper limit on the memory BASIC has available for programs. In DOS 3.3, the location of HIMEM is permanent (unless you change MAXFILES). In ProDOS, the location is flexible to accommodate files as they are opened and closed. This may cause problems for machine-language programs written for DOS 3.3 but run in ProDOS. It won't cause problems for BASIC programs, though, because ProDOS moves variables around in memory to accommodate the moving HIMEM.
HGR, HGR2, and TEXT	ProDOS reserves the graphics-screen memory areas for graphics. HGR and HGR2 start this reservation, TEXT cancels it.
INPUT	Applesoft's INPUT statement doesn't allow commas or colons in the string you are entering. Complex data-entry routines using GET are required. ProDOS corrects this deficiency.
IN# and PR#	The IN# and PR# commands switch control of the input and output, respectively, for each of the eight peripheral slots (seven plus the keyboard/video screen) in an Apple II. The line: 999 PRINT D\$;"PR#1" activates the interface card (usually a printer interface card) located in slot 1.
TRACE and NOTRACE	The Applesoft TRACE command lets you watch a BASIC program execute step by step. In DOS 3.3, however, when TRACE is on, DOS 3.3 commands are not executed. With the ProDOS TRACE command, ProDOS commands are executed. NOTRACE still turns the TRACE function off.
FRE	ProDOS's FRE command is superior to Applesoft's. If you put the FRE command in a PRINT statement with a control-D, the computer will pass the command to ProDOS rather than to Applesoft: 10 PRINT CHR\$(4);"FRE"

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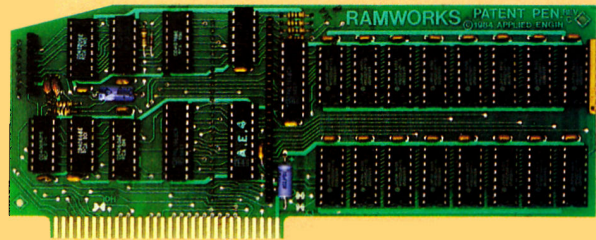
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- Programs that use strings extensively. The ProDOS FRE command concatenates (cleans up) old string garbage much faster than the Applesoft BASIC FRE command, which DOS 3.3 uses.

- Programs that use large text files or are constantly reading information from disk or writing it to disk. Not only do you benefit from ProDOS's faster disk access, but with ProDOS you can use a hard disk.

- Programs that can run on an Apple III. ProDOS and SOS (the Apple III's operating system) have compatible text-file formats. (Although their text files are compatible, the BASIC programs are not.)

Conversely, you shouldn't try to convert other programs:

- Programs written in Integer BASIC. ProDOS doesn't support this language.

- Programs that use the INIT command to format disks from within the program. In ProDOS, you must format blank disks with the Format utility on the master disk.

You can run simple Applesoft BASIC programs on ProDOS merely by converting them from DOS 3.3 to ProDOS. (See Part 2 of this series or pages 103-119 of the *ProDOS User's Manual*.) But ProDOS is different enough from DOS 3.3 that some programs present problems. You may have to change some of the commands in your Applesoft BASIC program to make it run in ProDOS. If programs are difficult to convert, you may want to leave them in DOS 3.3.

The easiest way to find out if an unmodified program will run in ProDOS is to try it. Run a few tests to make certain the program isn't producing garbage as output. If it doesn't run, you'll have to change all incompatible statements.

You should now have a good understanding of ProDOS commands and how to use ProDOS in BASIC. Next month, I'll wrap up this study of ProDOS with an examination of the differences between BASIC programs in DOS 3.3 and ProDOS, including a discussion of all the new errors ProDOS will let you make. ■

Lee Swoboda can't answer all your questions individually. If the answer isn't lengthy and you include a stamped, self-addressed envelope, he'll do his best to respond. Answers to other questions will appear in future articles or in inCider's Letters column. You can write to Lee c/o Padapple Computer Consulting, 1451 NE Paulson Road, Poulsbo, WA 98370.



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Everything Is Under CONTROL

Need a burglar alarm? Want to tally items on a production line? The solution is simple: hook your Apple to an analog-to-digital converter.

by Jerry Faughn

For the ardent Apple fan, interfacing your computer with a variety of external devices lets you control many routine tasks and provides hours of rewarding experimentation. Previously, I've discussed a number of interface projects (October 1983, p. 122; June 1984, p. 72; and September 1984, p. 77). Of all the accessories you can connect to a computer, however, an analog-to-digital converter (ADC) is perhaps the most flexible.

A photoresistor connected to an ADC, for example, is useful in determining each day's output on an assembly line. Since a photoresistor changes resistance with light intensity (usually decreasing in resistance with increasing light intensity), a special program can keep count each time a product passes by and blocks off light

to the apparatus. This process could also be used as a burglar alarm—a break in the light beam would make the computer trigger a siren.

You can also connect an ADC to a thermistor, a device that changes resistance with temperature fluctuations. This setup can turn on an oven, for instance, when the temperature falls below a certain level, and shut it off when the temperature climbs too high.

After I explain how an analog-to-digital converter works, I'll show you how to connect these instruments to a typical ADC, National Semiconductor's 0809 ADC chip.

Volts to Binary Numbers

Voltages, currents, and pressures are all examples of analog quantities: Their values can vary continuously.

For example, if a power supply has output ranging from zero to 20 volts, you can adjust it to produce 12 volts or any increment slightly higher or lower (12.1, 12.14, 11.981).

Computers, on the other hand, respond only to binary numbers—or, more specifically (in the case of the Apple II), only to decimal integers from zero to 255. To enable a computer to interpret or analyze data, you must convert analog values to digital numbers using an ADC.

National Semiconductor's 0809 chip is an 8-bit, 5-volt ADC: It converts an incoming analog signal (which must be between zero and 5 volts) to an 8-bit binary number. Using 3 volts as an example for the analog input, study the internal procedure the ADC performs to convert this signal to binary output:

- The ADC first compares the incoming signal to half its maximum range, 2.5 volts. Since the 3-volt signal is greater than this value, the ADC sets the most significant bit of its binary output, bit 7, high (1).
- Next, the ADC compares the 3-volt

- signal to the middle value of the new range ($2.5 + 2.5/2 = 3.75$ volts). The 3-volt signal falls short, so the ADC sets bit 6 low (0).
- Because the 3.75-volt comparison signal overshoot the 3-volt signal, the new comparison signal is reduced to

- $2.5 + 2.5/2 - 2.5/4 = 3.125$ volts. This value is still higher than the incoming signal, so bit 5 is set low.
- The next comparison signal is $3.125 - 2.5/8 = 2.81$ volts. The incoming signal is higher than this, so the ADC sets bit 4 high.

These steps should now be evident. As you've probably determined, the next comparison signal is 2.97 volts, and bit 3 is set high.

The Apple Slots

To understand how to connect the 0809 ADC chip to the Apple, you must be familiar with a few of the signals your Apple's slots transmit—through pin 18, the read-write pin (R/W); pin 41, the device-select pin (DS); and pin 38, the clock signal. (A bar above the pin designation indicates that its function becomes active when the pin is set low, or grounded.) **Figure 1** designates a slot's pins (a "pin-out"), with the address lines (buses) to the computer labeled A0–A15 and the data lines labeled D0–D7.

Each slot is assigned certain memory addresses. (See **Table 1** for the memory addresses for slots 1–7.) Whenever one of the addresses within this range appears on the address bus, this slot opens—the DS pin goes low. The computer then needs to know whether to send information (write) to an external device connected to the slot or to read information from that device. The R/W line takes care of this function. For example, if you use a POKE statement to write something to the ADC, the computer sets the R/W line low. When you read something from the ADC with a PEEK statement, the computer sets the R/W line high.

The Apple clock signal is crystal-controlled and generates approximately one million square waves per second—that is, it goes from a high to a low a million times per second. This signal controls all internal operations of the Apple. Information can be sent to or from the computer only when the clock signal is low.

Figure 1. Pin-out of an Apple slot.

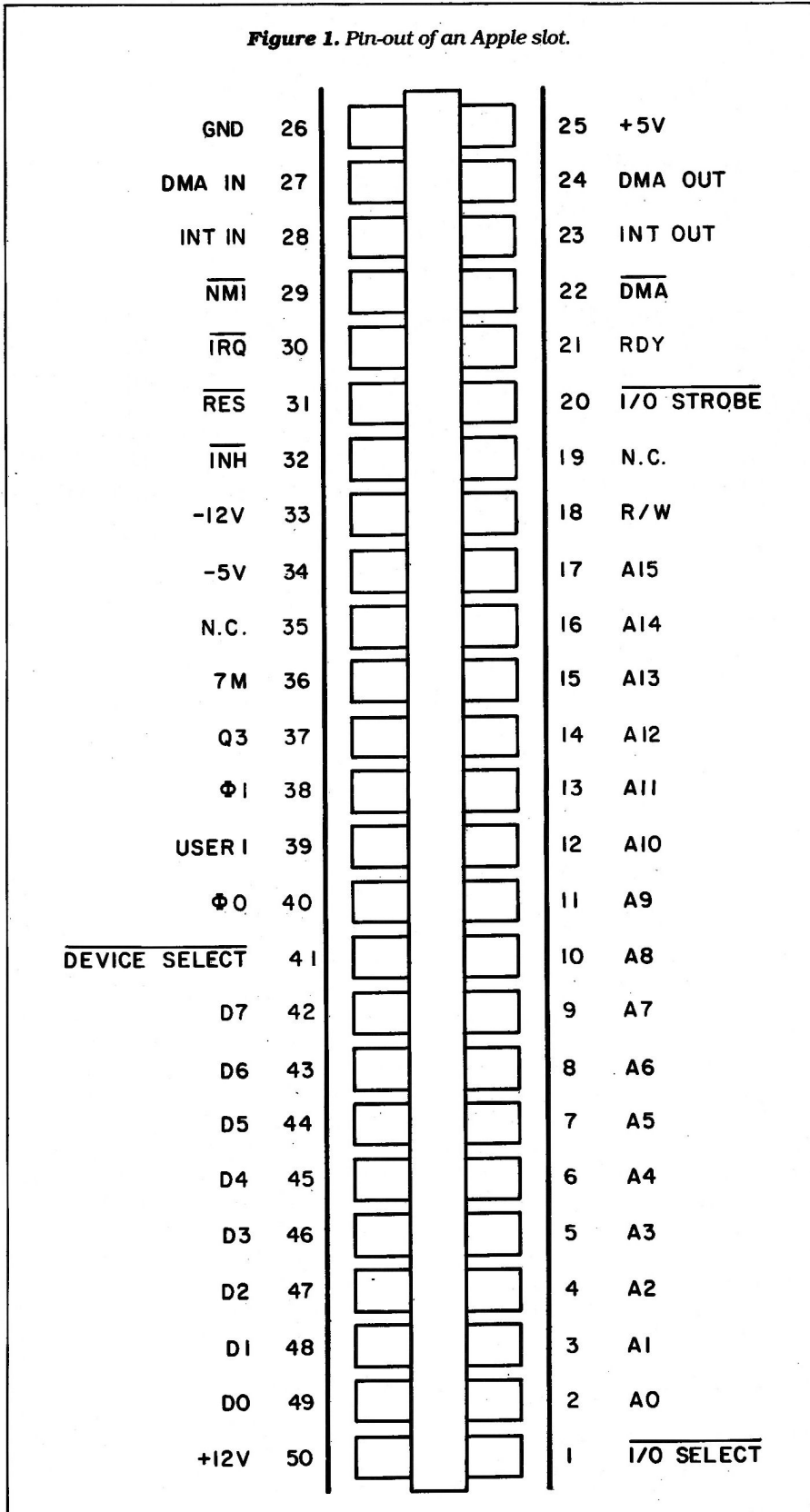


Table 1. Memory addresses opening slots 1–7.

Slot	Memory Locations
1	49296–49303
2	49312–49319
3	49328–49335
4	49344–49351
5	49360–49367
6	49376–49383
7	49392–49399

ADC Connections

To see how you will use these signals to connect the ADC to the Apple, consider a few of the ADC pins—address latch enable (ALE), START, and output enable (OE).

Figure 2 shows a circuit you can use to set up your ADC. One of the major steps in programming an ADC is to tell it through which of eight possible pins the analog signal will be transmitted. I'll focus on pin 26 of the ADC. Pins 23, 24, and 25 are connected to address lines A2, A1, and A0, respectively. (P4, P3, and P2 on **Figure 2** signify pins 4, 3, and 2 of the Apple slot shown in **Figure 1**.) When these lines are low, pin 26 becomes the analog input pin for the ADC.

If you convert address 49344 to binary, you'll see that the 3 lowest bits are all zeroes. Thus, a statement such as `POKE 49344,0` sets pins 23, 24, and 25 all low, and simultaneously chooses pin 26 for analog input. Only the address POKEd matters—not the number POKEd. That is, `POKE 49344, 63` would have worked equally well. Finally, you should note that the ADC recognizes the address and responds to it only when the ALE pin is set high.

The START pin on the ADC does exactly what its name implies: It tells the ADC to get busy and convert an analog signal to a digital signal. The START pin is active when set high. **Figure 3** shows the ALE and START pins connected. The ALE pin indicates which analog input is being used; if START is simultaneously set high, this tells the ADC to look at the signal coming in at pin 26 and convert it to a digital value.

Set the OE pin low when the ADC is performing a conversion. Then, when the conversion is complete, set this pin high, so that the computer can read the resulting digital number.

Table 2 summarizes the steps you must take to get the ADC to start a conversion. The clock signal must be low; the R/W line must be low, so that you can write information from the computer; and the \overline{DS} signal must also be low, so that you can communicate with the instrument at this port (see **Figure 3**). The computer's clock, \overline{DS} , and R/W are all connected to the input pins of a triple-input NOR gate. When all inputs are low, the output of this device is high. Since it is connected to the ALE and START pins of the ADC, they also go high, and the ADC proceeds to convert an analog signal to a digital signal.

Once the analog-to-digital con-

Figure 2. Complete circuit to set up your ADC.

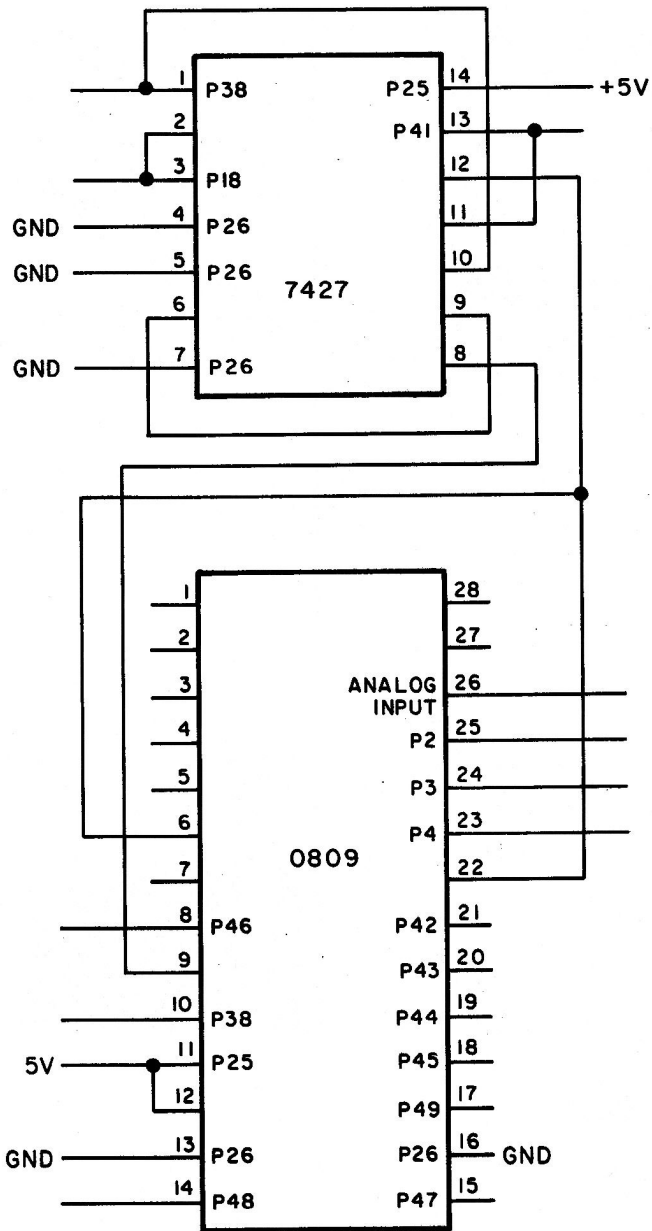
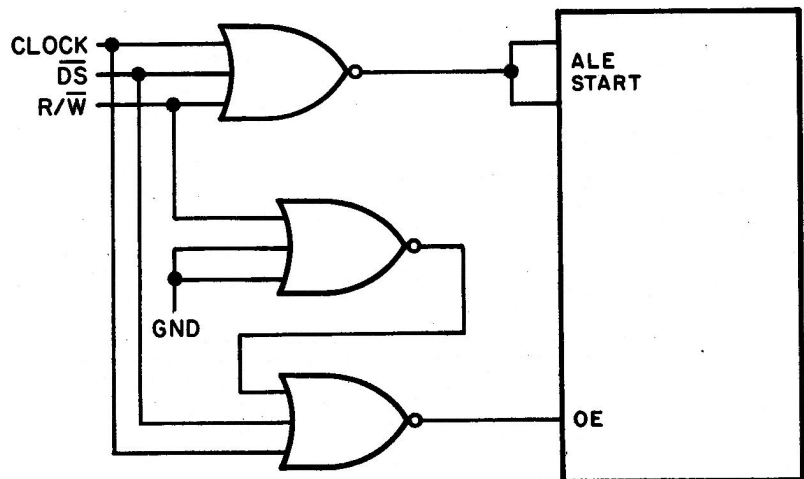


Figure 3. Circuit that sends digital values from the ADC to the computer. The second line of Table 2 shows the pin configuration.



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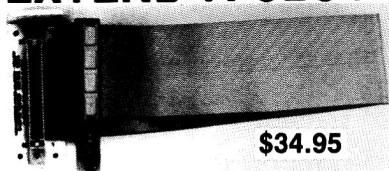
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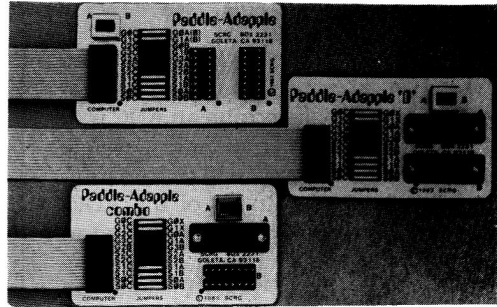
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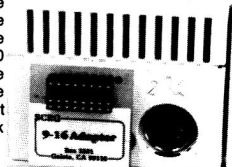
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The **quikLoader** has eight sockets for EPROMs. These sockets can accommodate standard EPROMs from 2716 to 27512. These types can be freely intermixed. The memory capacity of the **quikLoader** depends on the EPROMs used. For example, the 2716 can hold 2K of programs, and the 27512 can hold 64K. (Frankly, the current costs of the 27512 is prohibitive, but should come down drastically in the next year.) At this writing, the least cost-per-bit is provided by the 2764, which can hold an 8K program. Using these "chips", the **quikLoader** becomes a 64K ROM. Using larger capacity EPROMs allows it to become a 128K, 256K, or even a 512K card. If more memory capacity is needed, the **quikLoader** operating system supports multiple **quikLoaders**.

INCREASED DISK CAPACITY

Since DOS is loaded from the **quikLoader** every time the computer is turned on, it is not necessary to take up valuable disk space with DOS. This will give you more than 5% additional space for programs and data on your disks.

ABOUT THE DESIGNER

The **quikLoader** was designed by Jim Sather, author of **UNDERSTANDING THE APPLE][** (forward by Steve Wozniak), published by **QUALITY SOFTWARE** (21601 Marilla Street, Chatsworth, CA 91311 (818) 709-1721).

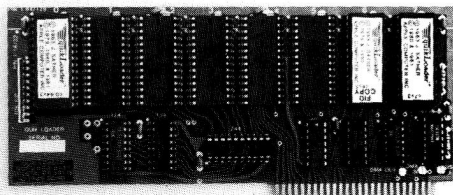
SYSTEM REQUIREMENTS

The **quikLoader** plugs into any slot of the **APPLE][** [+ or //e. If used in a][+, a slightly modified 16K memory card is required in slot O. A disk drive is required to save data.

DOS, INTEGER BASIC, FID, and COPYA are copyrighted programs of **APPLE COMPUTER, INC.** licensed to Southern California Research Group to distribute for use only in combination with **quikLoader**.

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quikLoader™



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If you have a program that is valuable, it will become more valuable when it is instantly available to you. We are actively seeking licenses from software publishers to allow their popular programs to be made available for the **quikLoader**. Independent authors are encouraged to write programs suitable for the **quikLoader**. If the author wishes, we will market the program (with appropriate royalties), or the author can take care of all marketing. In either case, we will make known to our customers the availability of these programs.

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version has taken place in the 0809, you must obtain the digital values by changing some signals going to the ADC (see **Table 2**). Set the clock signal low; the R/W line of the computer must be high, since you want to read from an external device. The \overline{DS} , ALE, and START must all be low. (A low ALE and START ensure that another conversion won't begin until you've read the results of the first one.) Set OE high to read data from the ADC (refer to **Figure 3**). The 7427 chip in **Figure 2** contains three triple-input NOR gates to perform the decoding **Figure 3** demonstrates.

Connecting the Circuit

A Douglas Electronics breadboard provides a simple way to make connections to the Apple slots. Attach a cable and headers (available from electronic supply houses such as Jameco and Jade) to it so that you can do all your wiring outside the Apple. The **Photo** shows this breadboard assembly.

Once you set up your circuit, you can test it to see if it's working properly by hooking up a potentiometer across zero and 5 volts with its center tap linked to pin 26 of the ADC (**Figure 4**). With the connections made to slot 4 of the Apple, enter and run the following program:

```
10 POKE 49344,0
20 PRINT PEEK (49344)
30 GOTO 10
```

As you rotate the knob of the potentiometer, the output on your monitor should vary from zero to 255.

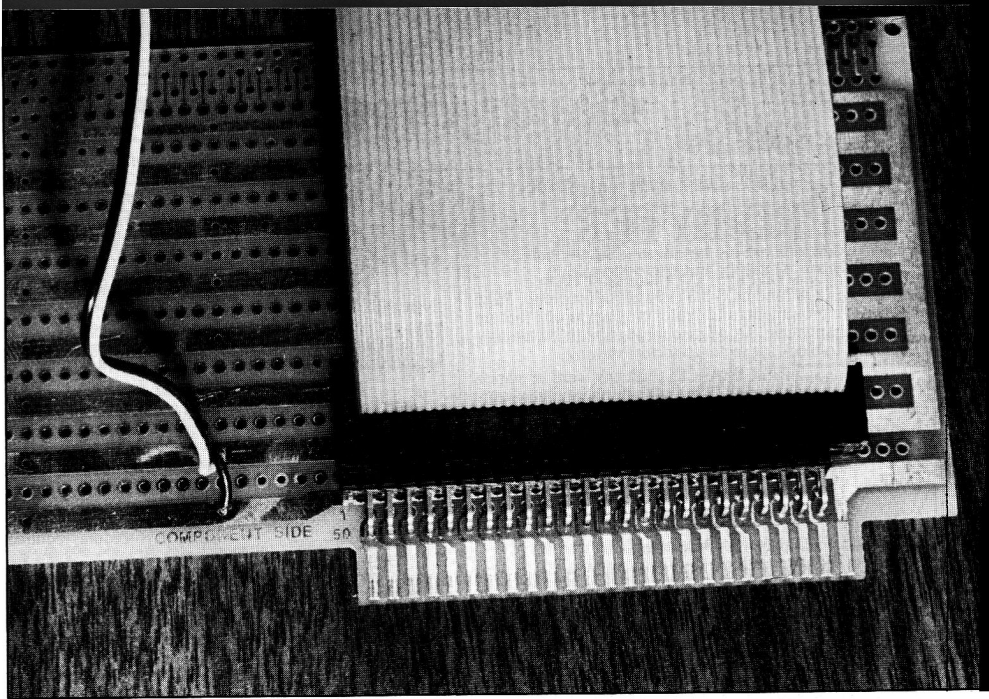


Photo. Breadboard assembly.

ADC Projects

Figure 5 shows you how to attach a photoresistor to your ADC. A typical value for the fixed resistor in the circuit is about 30,000 ohms. With this circuit connected, run the program above and note how the signal to the monitor changes when you block off light to the photoresistor.

Replace the photoresistor described above with a thermistor and run the same program again. Warm the thermistor in your hand, and note the change in temperature on your display.

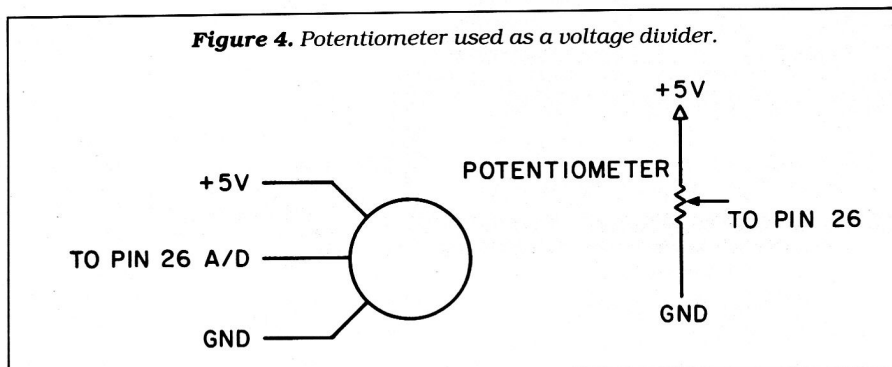
As an extra exercise, write a graphics program that reads the output from a photoresistor or a thermistor and plots the data in the colors of lo-res or hi-res mode—the results are guaranteed to wow your friends. ■

Address correspondence to Jerry Faughn, Physics Department, Eastern Kentucky University, Richmond, KY 40475.

Table 2. Configuration of ADC to start a conversion.

	Clock	R/W*	\overline{DS} *	ALE START	OE
From computer to ADC	0	0	0	1	0
From ADC to computer	0	1	0	0	1

Figure 4. Potentiometer used as a voltage divider.

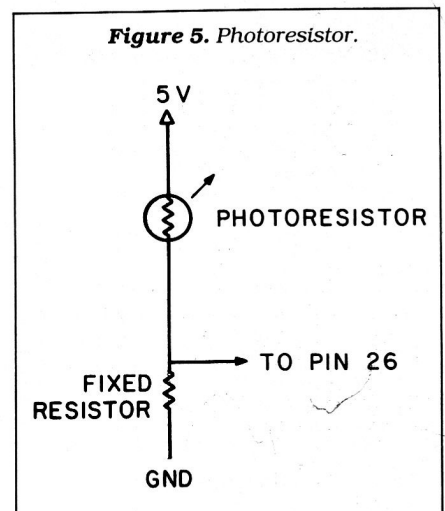


Manufacturer Information

Douglas Electronics
718 Marina Boulevard
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Figure 5. Photoresistor.



Beagle Bros Apple Software Report

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Ad Number 222—Page 1

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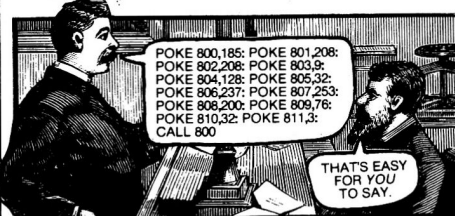
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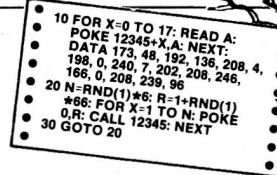
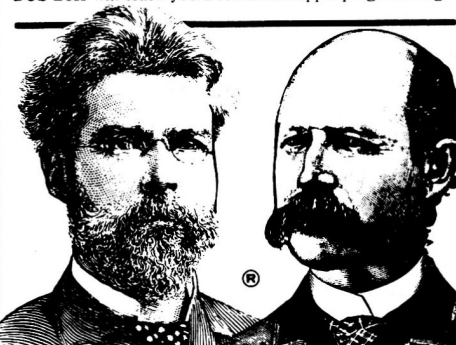
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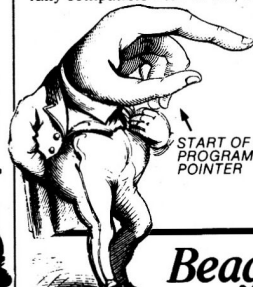
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1 HOME: HTAB 5: POKE 33,28: FOR C=1 TO 92: POKE 50,255-192*(C-4 OR C-64)
9 J=J+1-31*(J=31): PRINT CHR\$(9*(J=1)): SPC(2*(J<10)): J: NEXT: PRINT
85 POKE 33,1: PRINT "JULY..AUG..SEPT..."

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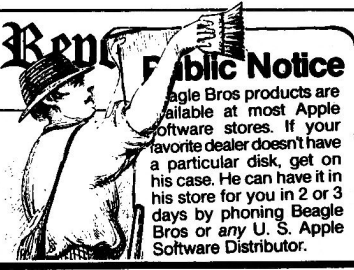


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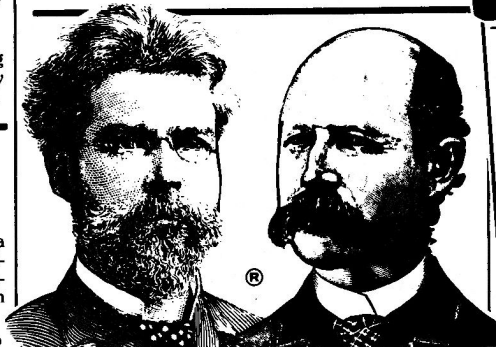
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Program listing. Should I Trade?

```

101 DIM D1$(17),QA$(17),QA(17),C(11,6,6),C$(11,6,6)
105 D$ = CHR$(4)
106 E1$(1) = "MILLER ASSOCIATES"
107 E1$(2) = "6744 RANSOME DRIVE"
108 E1$(3) = "BALTIMORE MD. 21207"
110 W$(1) = "1. PRICE-REGULAR GAS"
112 ONERR GOTO 117
113 GOSUB 683
114 GOTO 120
117 PRINT D$;"CLOSE HEAD": GOSUB 672
120 W$(2) = "2. PRICE-NOLEAD GAS "
130 W$(3) = "3. INFLATION-GAS "
140 D1$(1) = "TODAY'S DATE "
150 D1$(2) = "NAME "
1360 D1$(3) = "MODEL YEAR AND MAKE-PRESENT CAR "
170 D1$(4) = "MILEAGE ON PRESENT CAR "
180 D1$(5) = "MILES/GALLON-PRESENT CAR "
190 D1$(6) = "MILES DRIVEN PER YEAR "
200 D1$(7) = "PRICE OF NEW CAR "
210 D1$(8) = "ESTIMATED MILES/GALLON-NEW CAR "
220 D1$(9) = "EXPECTED TRADE-IN VALUE OF OLD CAR"
230 W$(4) = "4. INFLATION-MAINT. "
240 D1$(10) = "CASH OR FINANCE "
241 D1$(11) = "NO. OF MONTHS FINANCED "
242 D1$(12) = "TYPE GAS USED IN OLD CAR: "
243 D1$(13) = "TYPE GAS USED IN NEW CAR: "
244 D1$(14) = "INSURANCE - OLD CAR: "
245 D1$(15) = "LICENSE TAGS - OLD CAR: "
246 D1$(16) = "INSURANCE - NEW CAR: "
247 D1$(17) = "LICENSE TAGS - NEW CAR: "
250 W$(5) = "5. INTEREST-SAVINGS "
260 W$(6) = "6. INTEREST-FINANCE "
290 PP$(1) = "1.05"
300 PP$(2) = "1.10"
310 PP$(3) = "8"
320 PP$(4) = "6"
330 PP$(5) = "9"
340 PP$(6) = "12"
370 HOME
390 PRINT SPC(12);"SHOULD I TRADE?": PRINT " ": PRINT SPC(
11);"COPYRIGHT AUG. 1980": PRINT " ": PRINT SPC(11);"MI
LLER ASSOCIATES": PRINT " ": PRINT SPC(11);"6744 RANSOM
E DRIVE": PRINT " ": PRINT SPC(10);"BALTIMORE, MD. 2120
7"
400 PRINT " ": PRINT " ": PRINT " "
410 PRINT SPC(12);"SHOULD I TRADE?"
420 PRINT " ": PRINT " ": PRINT " "
430 PRINT "1. RUN WITH PREPROGRAMMED PARAMETERS"
440 PRINT "2. RUN WITH CUSTOMIZED PARAMETERS"
450 PRINT "3. VIEW, CREATE, OR CHANGE PARAMETERS"
455 PRINT "4. PUT YOUR NAME ON PRINTOUT"
460 PRINT "5. QUIT"
470 PRINT " ": PRINT " ": PRINT " "
480 INPUT " INDICATE YOUR CHOICE BY PRESSING APPROPRIAT
E NUMBER; THEN PRESS 'RETURN'. ";A1
490 IF A1 > 0 AND A1 < 6 AND A1 = INT(A1) THEN HOME : GOTO
520
500 HOME : VTAB 10: INPUT " PLEASE JUST PRESS ONE OF THE
NUMBERS 1,2,3,4, OR 5 AND THEN PRESS 'RETURN'.
NOW PRESS 'RETURN' AND WE'LL TRY AGAIN.";A1$
510 HOME : GOTO 410
520 ON A1 GOTO 540,550,570,531,530
530 HOME : END
531 HOME : VTAB 7: PRINT " TYPE THE HEADING AS YOU WANT I
T TO APPEAR. YOU HAVE UP TO 3 LINES. PRESS 'RETURN' AFT
ER EACH LINE, EVEN IF YOU WANT NOTHING ON THE LINE. ":
PRINT " "
532 INPUT " ";E1$(1),E1$(2),E1$(3),E1$(4)
533 GOSUB 671
534 HOME : VTAB 10: INPUT " YOUR HEADING WILL NOW APPEAR
AT TOPOF PRINTOUT AND YOUR NAME WILL APPEAR IN DISCLAIM
ER. PRESS 'RETURN' TO GET BACK TO MAIN MENU. ";A1$
535 HOME : GOTO 390
540 FOR N = 1 TO 6:CR$(N) = PP$(N): NEXT N: GOTO 1150
550 ONERR GOTO 555
552 GOSUB 610
553 GOTO 560
555 PRINT D$;"CLOSE PARAMS"

```

Listing continued.

Continued from p. 24.

for the first year by multiplying the price of gasoline by the number of gallons used. The latter figure is determined by dividing miles driven per year by miles per gallon. Costs after the first year are increased by the percentage provided by the program as the annual fuel inflation factor.

If you buy a new car, you'll use money you would have saved otherwise, whether you pay cash or finance the car. The interest this money would have earned over the five-year period is called *Interest Penalty on Purchase*, and is calculated using *Interest-Savings*.

Money spent on maintenance, insurance, and the like would also accrue interest if left in the bank. Interest on costs other than the purchase price is called *Interest Penalty on Other Costs*. The program uses the *Interest-Savings* percentage to calculate this figure, too.

Total Costs over the five-year period compare the expense of keeping the old car as opposed to buying the new car. These costs aren't directly comparable, however, because after five years the new car will be worth more than the old one. To compensate for this factor, you must consider trade-in value and five-year cost.

The program calculates your old car's trade-in value after five years by depreciating the current trade-in value 12 percent per year. The new car's trade-in value after five years is determined by immediately depreciating the cost 20 percent, then depreciating the result 12 percent each year.

The cost of a car for five years is the total cost for five years minus the trade-in value after five years. These figures are directly comparable.

You'll need to manipulate parameters if you are still financing your current car, or if you intend to put money down on a new car in addition to the trade-in value of your old one.

Before You Buy . . .

The lure of a brand-new car is hard to resist. But buying an automobile these days represents a major investment. Economic factors, such as high maintenance costs and poor gas mileage, can help you justify your decision to trade if you need to see firm figures—not just listen to your sixth sense—before you sign on the dotted line. ■

Write to W.M. Miller, Jr., at 6744 Ransome Drive, Baltimore, MD 21207.

Listing continued.

```

556 HOME : VTAB 10: INPUT "
YOU CAN'T RUN WITH CUSTOMIZED PARAMETERS UNTIL YOU H
AVE CREATED THEM. PRESS RETURN TO GO BACK TO THE MAI
NMENU. THEN SELECT OPTION 3 IF YOU WANT TO CREATE CUSTOM
IZED PARAMETERS.";A$
557 HOME : GOTO 390
560 FOR N = 1 TO 6:CR$(N) = CU$(N): NEXT N: GOTO 1150
570 PRINT SPC(3);"VIEW, CREATE, OR CHANGE PARAMETERS"
580 PRINT " ": PRINT " ": PRINT " "
590 PRINT SPC(21);"PROGRAM CUSTOM"
595 ONERR GOTO 598
596 GOSUB 610
598 PRINT D$;"CLOSE PARAMS"
600 GOTO 680
610 PRINT D$;"OPEN PARAMS,L10"
620 FOR N = 1 TO 6
630 PRINT D$;"READ PARAMS,R";N
640 INPUT " ";CU$(N)
650 NEXT N
660 PRINT D$;"CLOSE PARAMS"
670 RETURN
671 D$ = CHR$(4)
672 PRINT D$"OPEN HEAD,L80"
673 FOR N = 1 TO 3
674 PRINT D$;"WRITE HEAD,R";N
675 PRINT E1$(N)
676 NEXT N
677 PRINT D$;"CLOSE HEAD"
678 RETURN
680 GOSUB 1110
681 GOTO 690
682 D$ = CHR$(4)
683 PRINT D$"OPEN HEAD,L80"
684 FOR N = 1 TO 3
685 PRINT D$;"READ HEAD,R";N
686 INPUT E1$(N)
687 NEXT N
688 PRINT D$;"CLOSE HEAD"
689 RETURN
690 PRINT " ": PRINT " ": PRINT " "
700 PRINT "C - CREATE OR CHANGE CUSTOM PARAMETER"
710 PRINT "R - RETURN TO MAIN MENU"
720 PRINT " ": PRINT " ": PRINT " "
730 INPUT " INDICATE YOUR CHOICE BY PRESSING APPROPRIAT
E LETTER (C OR R); THEN PRESS 'RETURN'. ";A1$
IF A1$ = "R" THEN HOME : GOTO 390
740 IF A1$ = "C" THEN GOTO 770
760 IF A1$ < > "R" AND A1$ < > "C" THEN HOME : GOSUB 1100:
PRINT " ": PRINT " ": PRINT " "
762 INPUT " PLEASE JUST PRESS 'C' IF YOU WANT TO CREATE
OR CHANGE PARAMETERS, OR PRESS 'R' TO RETURN TO MAIN MENU.
";A1$: HOME : GOTO 740
770 HOME : PRINT SPC(21);"PROGRAM CUSTOM"
780 PRINT " ": PRINT " "
790 GOSUB 1110
810 PRINT " ": PRINT " "
820 INPUT " PRESS THE NUMBER OF A PARAMETER TO BE CREATED
OR CHANGED;THEN PRESS RETURN.
AFTER ALL PARAMETERS ARE SET, JUST PRES
S RETURN.";A1$
830 IF A1$ = "" THEN GOSUB 1030: HOME : GOTO 390
840 A1 = VAL(A1$)
850 IF A1 = > 1 AND A1 = < 6 AND A1 = INT(A1) THEN GOTO
880
860 HOME : VTAB 10: INPUT " JUST PRESS A NUMBER FROM 1 TO
6 AND PRESS 'RETURN'. BUT FIRST PRESS 'RETURN' TO
TRY AGAIN.";A1$
870 GOTO 770
880 HOME : PRINT " ": PRINT " ": PRINT " "
890 PRINT " TYPE THE VALUE YOU WANT TO USE FOR ";W$(A1)
910 INPUT " ";CU$(A1)
920 IF A1 = > 1 AND A1 = < 6 THEN GOTO 970
960 GOSUB 1100: GOTO 770
970 FOR N = 1 TO LEN(CU$(A1))
980 A2$ = MID$(CU$(A1),N,1)
990 IF A2$ = "." THEN NEXT N: GOSUB 1100: GOTO 810
1000 IF VAL(A2$) = > 0 AND VAL(A2$) = < 9 THEN NEXT N:
GOSUB 1100: GOTO 810
1010 N = LEN(CU$(A1)): NEXT N
1020 PRINT "PLEASE PRESS A NUMERICAL VALUE.": GOTO 890

```

Listing continued.

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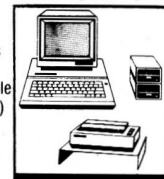
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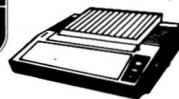
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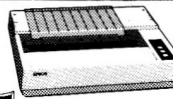
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Listing continued.

```

1030 PRINT D$;"OPEN PARAMS,L10"
1040 FOR N = 1 TO 6
1050 PRINT D$;"WRITE PARAMS,R";N
1060 PRINT CU$(N)
1070 NEXT N
1080 PRINT D$;"CLOSE PARAMS"
1090 RETURN
1100 HOME
1110 FOR N = 1 TO 6
1120 PRINT W$(N); SPC( 7 - LEN (PP$(N)));PP$(N); SPC( 8 - LEN
(CU$(N)));CU$(N)
1130 NEXT N
1140 RETURN
1150 FOR N = 1 TO 6:CR(N) = VAL (CR$(N)): NEXT N
1155 VTAB 10: INPUT " PLEASE USE NO COMMAS, DOLLAR SIGNS,
PERCENT SIGNS, OR OTHER CHARACTERS NOT REQUESTED IN RESP
ONDING TO THE FOLLOWINGQUESTIONS.
PRESS 'RETURN' TO CONTINUE.";A$
1160 PRINT " ": PRINT " ": HOME : VTAB 10: INPUT "TYPE TODAY'
S DATE. " ;QA$(1)
1170 PRINT " "
1180 HOME : VTAB 10: INPUT "TYPE NAME.
";QA$(2)
1200 HOME : VTAB 10: INPUT "TYPE MODEL YEAR AND MAKE OF PRESE
NT CAR. " ;QA$(3)
1204 HOME : VTAB 10: INPUT "STATE MILEAGE ON PRESENT CAR NOW.
";QA$(4)
1208 HOME : VTAB 10: INPUT "INDICATE THE OVERALL GAS MILEAGE
THE PRESENT CAR GETS IN MILES PER GALLON. " ;QA$
(5)
1212 HOME : VTAB 10: INPUT "HOW MANY MILES DO YOU DRIVE IN A
YEAR? " ;QA$(6)
1215 HOME : VTAB 10: INPUT "TYPE AMOUNT PAID PER YEAR FOR INS
URANCE ON PRESENT CAR. " ;QA$
(14)
1217 HOME : VTAB 10: INPUT "TYPE AMOUNT PAID PER YEAR FOR LIC
ENSE TAGS ON PRESENT CAR. " ;QA$
(15)
1218 HOME : VTAB 10: INPUT "STATE PRICE OF PROPOSED NEW CAR.
";QA$(7)
1219 HOME : VTAB 10: INPUT "INDICATE ESTIMATED MILES PER GALL
ON FOR NEW CAR. " ;QA$
(8)
1220 HOME : VTAB 10: INPUT "INDICATE EXPECTED TRADE-IN VALUE
OF PRESENT CAR. " ;QA$
(9)
1222 HOME : VTAB 10: INPUT "TYPE ESTIMATED AMOUNT TO BE PAID
PER YEAR FOR INSURANCE ON NEW CAR. " ;QA$
(16)
1225 HOME : VTAB 10: INPUT "TYPE AMOUNT TO BE PAID PER YEAR F
OR LICENSE TAGS FOR NEW CAR. " ;QA$
(17)
1240 HOME : VTAB 10: INPUT " INDICATE WHETHER PAYING CASH OR
FINANCING. TYPE C FOR CASH OR F FOR FINANCING
";QA$(10)
1250 IF QA$(10) = "C" THEN GOTO 1270
1260 HOME : VTAB 10: INPUT "FOR HOW MANY MONTHS WILL THE CAR
BE FINANCED?. " ;QA$
(11)
1270 HOME
1272 HOME : VTAB 10: INPUT "TYPE GAS USED IN PRESENT CAR - RE
GULAR OR NOLEAD? TYPE AN R FOR REGULAR OR AN N FOR NOLE
AD. " ;QA$(12)
1274 HOME : VTAB 10: INPUT "TYPE OF GAS USED IN NEW CAR - REG
ULAR OR NOLEAD? TYPE AN R FOR REGULAR OR AN N FOR NOLE
AD. " ;QA$(13)
1280 HOME : PRINT "THIS IS A PARTIAL LIST OF THE DATA YOU JU
ST PROVIDED:"
1290 FOR N = 1 TO 13: PRINT N;" . ";D1$(N);QA$(N): NEXT N
1300 PRINT " ": INPUT "THERE SHOULD BE NO UNITS OR $ SIGNS IN
4,5,6,7,8,9 OR 11 - JUST NUMBERS. IF THIS DATA IS OK
, PRESS 'RETURN'. IF YOU WANT TO CHANGE ONE, PRESS THE NU
MBER OF THE ITEM TO BE CHANGED, AND THEN PRESS 'RETURN'.
";A1$
1310 IF A1$ < > "" THEN HOME :A1 = VAL (A1$): PRINT "
TYPE PROPER VALUE FOR " ;D1$(A1);" ": INPUT
"" ;QA$(A1): HOME : GOTO 1280
1312 HOME : PRINT "THIS IS THE REMAINDER OF THE DATA YOU PR
OVIDED."
1313 FOR N = 14 TO 17: PRINT N;" . ";D1$(N);QA$(N): NEXT N
1314 PRINT " ": PRINT " "

```

Listing continued.

Listing continued.


```

1315 INPUT "IF THIS DATA IS OK, PRESS 'RETURN'. IF YOU WANT
      TO CHANGE AN ITEM, PRESS THE NUMBER OF THE ITEM TO BE C
      HANGED AND THEN PRESS 'RETURN'. ";A1$
1317 IF A1$ < > "" THEN HOME :A1 = VAL (A1$): PRINT "
      TYPE PROPER VALUE FOR          ";D1$(A1): INPUT " ";QA
      $(A1): HOME : GOTO 1312
1318 ONERR GOTO 3470
1319 HOME : VTAB 11: HTAB 11: PRINT "WAIT! - CALCULATING"
1320 IF QA$(12) = "R" THEN G1 = VAL (CR$(1))
1330 IF QA$(12) = "N" THEN G1 = VAL (CR$(2))
1340 IF QA$(13) = "R" THEN G2 = VAL (CR$(1))
1350 IF QA$(13) = "N" THEN G2 = VAL (CR$(2))
1352 FOR N = 4 TO 9:QA(N) = VAL (QA$(N)): NEXT N
1354 QA(11) = VAL (QA$(11))
1355 FOR N = 14 TO 17:QA(N) = VAL (QA$(N)): NEXT N
1356 QA$(7) = "$" + QA$(7)
1358 QA$(9) = "$" + QA$(9)
1360 CR$(1) = "$" + CR$(1)
1361 CR$(2) = "$" + CR$(2)
1362 FOR N = 3 TO 6
1363 CR$(N) = CR$(N) + "8"
1364 NEXT N
1400 IF QA$(10) = "F" THEN GOTO 3200
1410 C(1,0,0) = QA(7) - QA(9)
1420 PU(0) = 1 * C(1,0,0)
1425 PV$(0) = "0"
1430 C(1,6,0) = QA(7) - QA(9)
1440 C(1,6,0) = INT (C(1,6,0))
1450 FOR Z = 0 TO 1
1460 FOR Y = 1 TO 5
1470 C(2,Y,0) = (((Y - 0) * QA(6) - QA(6) / 2) / 2678810.61) *
      QA(6) * (CR(4) / 100 + 1) ^ (Y - 1) + .0064 * QA(6) * (C
      R(4) / 100 + 1) ^ (Y - 1)
1480 C(2,Y,1) = (((QA(4) + Y * QA(6) - QA(6) / 2) / 2678810.61
      ) * QA(6) * (CR(4) / 100 + 1) ^ (Y - 1) + .0064 * QA(6) *
      (CR(4) / 100 + 1) ^ (Y - 1)
1490 C(2,Y,Z) = INT (C(2,Y,Z))
1500 C(2,6,Z) = C(2,6,Z) + C(2,Y,Z)
1510 C(3,Y,0) = (QA(6) / QA(8)) * (CR(3) / 100 + 1) ^ (Y - 1) *
      G2
1520 C(3,Y,1) = (QA(6) / QA(5)) * (CR(3) / 100 + 1) ^ (Y - 1) *
      G1
1530 C(3,Y,Z) = INT (C(3,Y,Z))
1540 C(3,6,Z) = C(3,6,Z) + C(3,Y,Z)
1550 NEXT Y
1560 NEXT Z
1570 C(4,6,0) = C(1,6,0) * (((1 + CR(5) / 1200) ^ 60) - 1)
1575 IF QA$(10) = "F" THEN C(4,6,0) = IZ
1600 FOR Z = 0 TO 1: FOR Y = 0 TO 6: FOR X = 1 TO 4
1610 C(4,Y,Z) = INT (C(4,Y,Z))
1620 C(5,Y,Z) = C(X,Y,Z) + C(5,Y,Z)
1630 NEXT X: NEXT Y: NEXT Z
1631 FOR Y = 1 TO 5
1632 C(7,Y,0) = QA(16)
1633 C(7,Y,1) = QA(14):C(7,6,0) = C(7,Y,0) + C(7,6,0):C(7,6,1)
      = C(7,Y,1) + C(7,6,1)
1635 C(8,Y,0) = QA(17)
1637 C(8,Y,1) = QA(15):C(8,6,0) = C(8,Y,0) + C(8,6,0):C(8,6,1)
      = C(8,Y,1) + C(8,6,1)
1638 NEXT Y
1640 C(6,6,0) = QA(7) * .8 * .88 ^ 5
1650 C(6,6,1) = QA(9) * .88 ^ 5
1660 C(6,6,0) = INT (C(6,6,0)):C(6,6,1) = INT (C(6,6,1))
1662 FOR Z = 0 TO 1: FOR Y = 0 TO 6
1664 C(9,Y,Z) = C(5,Y,Z) + C(7,Y,Z) + C(8,Y,Z)
1666 NEXT Y: NEXT Z
1670 FOR Z = 0 TO 1: FOR Y = 0 TO 6
1680 C(10,Y,Z) = C(9,Y,Z) - C(6,Y,Z)
1690 NEXT Y
1700 NEXT Z
1701 FOR Z = 0 TO 1: FOR Y = 1 TO 5
1702 C(11,Y,Z) = C(2,Y,Z) + C(3,Y,Z) + C(7,Y,Z) + C(8,Y,Z)
1703 C(11,Y,Z) = C(11,Y,Z) * ((1 + CR(5) / 1200) ^ (66 - 12 *
      Y) - 1)
1704 C(11,6,Z) = C(11,6,Z) + C(11,Y,Z)
1705 C(11,6,Z) = INT (C(11,6,Z)):C$(11,6,Z) = STR$(C(11,6,Z)
      ): NEXT Y: NEXT Z
1706 SN = C(4,6,0)
1709 C(9,6,0) = C(9,6,0) + C(11,6,0):C(9,6,1) = C(9,6,1) + C(1
      1,6,1)
1710 FOR Z = 0 TO 1
1720 FOR Y = 0 TO 6

```

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```
1730 FOR X = 0 TO 10
1740 C(X,Y,Z) = INT (C(X,Y,Z))
1750 C$(X,Y,Z) = STR$( C(X,Y,Z))
1760 NEXT X: NEXT Y: NEXT Z
1765 HOME
1840 PRINT D$;"PR#1"
1845 PRINT CHR$( 9)"80N"
1850 PRINT " 80N"
1855 PRINT " ": PRINT " ": PRINT " ": PRINT " ": PRINT " "
1860 GOSUB 683
1862 FOR N = 1 TO 3
1864 PRINT SPC( 40 - LEN (E1$(N)) / 2);E1$(N)
1866 NEXT N
1890 PRINT SPC( 62);QA$(1)
1900 PRINT " ": PRINT " ": PRINT " "
1910 PRINT SPC( 28);"ECONOMICS OF TRADING CAR"
1920 PRINT " ": PRINT " "
1930 PRINT SPC( 3);"PREPARED FOR:"
1940 PRINT SPC( 7)QA$(2)
1950 PRINT " ": PRINT " "
1952 PRINT "ASSUMPTIONS: "
1954 FOR N = 1 TO 6: PRINT SPC( 5);W$(N);": ";CR$(N): NEXT N
1956 PRINT " "
1957 PRINT "PRESENT CAR: "
1958 FOR N = 3 TO 6: PRINT SPC( 5);D1$(N);": ";QA$(N): NEXT
N
1960 PRINT SPC( 5);D1$(9);": ";QA$(9)
1961 PRINT SPC( 5);"GAS TYPE: ";
1962 IF QA$(12) = "R" THEN PRINT "REGULAR"
1963 IF QA$(12) = "N" THEN PRINT "NOLEAD"
1964 FOR N = 14 TO 15: PRINT SPC( 5);D1$(N);"$";QA$(N): NEXT
N: PRINT " "
1965 PRINT "NEW CAR"
1966 PRINT SPC( 5);D1$(7);": ";QA$(7): PRINT SPC( 5);D1$(8)
;": ";QA$(8)
1967 PRINT SPC( 5);D1$(6);": ";QA$(6)
1968 PRINT SPC( 5);"GAS TYPE: ";
1969 IF QA$(13) = "R" THEN PRINT "REGULAR"
1970 IF QA$(13) = "N" THEN PRINT "NOLEAD"
1972 PRINT SPC( 5)"PAYMENT METHOD: ";
1973 IF QA$(10) = "C" THEN PRINT "CASH"
1974 IF QA$(10) = "F" THEN PRINT "FINANCING - ";QA$(11);" MO
NTHS"
1976 FOR N = 16 TO 17: PRINT SPC( 5);D1$(N);"$";QA$(N): NEXT
N
1980 PQ = (PI - 1) * 100
1990 MQ = (MI - 1) * 100
2000 FQ = ((CR(3) / 100 + 1) - 1) * 100
2010 PR = (IP - 1) * 100
2771 FOR N = 1 TO 4: PRINT " ": NEXT N
2773 IF QA$(10) < > "F" THEN GOTO 2922
2780 PM(0) = 100 * PM(0)
2790 PM(0) = INT (PM(0))
2800 PM(0) = PM(0) / 100
2810 PMS(0) = STR$( PM(0))
2811 PM(2) = VAL (PMS(0)):PM(2) = INT (PM(2))
2812 PM(3) = PM(0) - PM(2):PM(3) = ( INT (100 * PM(3))) / 100
2813 PMS(3) = STR$( PM(3))
2814 IF PM(3) = 0 THEN PMS(0) = PMS(0) + ".00"
2815 IF LEN (PMS(3)) = 2 THEN PMS(0) = PMS(0) + "0"
2820 PU(0) = INT (PU(0))
2830 PUS(0) = STR$( PU(0))
2832 PT = INT (PT):PTS = STR$( PT)
2840 PV(0) = PT - PU(0):PV(0) = INT (PV(0))
2850 PV$(0) = STR$( PV(0))
2868 C(9,6,0) = C(9,6,0) + PV(0):C(9,6,0) = INT (C(9,6,0)):C$(
(9,6,0) = STR$( C(9,6,0))
2870 PRINT SPC( 29);"FINANCING INFORMATION"
2880 PRINT SPC( 29);"-----"
2890 PRINT SPC( 27);"MONTHLY PAYMENTS"; SPC( 8 - LEN (PMS(0)
));"$";PMS(0)
2900 PRINT SPC( 27);"TOTAL PRINCIPAL "; SPC( 8 - LEN (PUS(0)
));"$";PU(0)
2910 PRINT SPC( 27);"TOTAL INTEREST "; SPC( 8 - LEN (PV$(0)
));"$";PV$(0)
2920 PRINT SPC( 27);"TOTAL PAID "; SPC( 8 - LEN (PTS)
);"$";PTS
2922 PRINT CHR$( 12)
2924 GOSUB 4000
2950 PRINT SPC( 6);"NOTE: "
2960 PRINT SPC( 8);"THIS ANALYSIS IS BASED IN PART ON PREDIC
TIONS OF FUTURE COSTS. SINCE"
```

Listing continued.

Listing continued.

```

2970 PRINT "THESE PREDICTIONS CAN'T BE MADE WITH ABSOLUTE ASS
URANCE OF THEIR ACCURACY, AND"
2980 PRINT "BECAUSE WE CAN'T POSSIBLY PROGRAM IN SOME OF THE
PECULIARITIES OF COSTS UNIQUE"
2990 PRINT "TO SOME SITUATIONS, ";E1$(1);" CAN NOT BE RESPON
SIBLE FOR ACTIONS TAKEN"
3000 PRINT "AS A RESULT OF INFORMATION FURNISHED. HOWEVER, E
XTENSIVE EFFORTS HAVE BEEN"
3010 PRINT "MADE TO PROVIDE YOU A SOUND ECONOMIC BASIS FOR YO
UR DECISION ON TRADING YOUR"
3020 PRINT "CAR."
3030 IF QA$(10) = "F" THEN FOR N = 1 TO 8: PRINT " ": NEXT
3040 IF QA$(10) < > "F" THEN FOR N = 1 TO 13: PRINT " ": NEXT
3045 PRINT CHR$(12)
3050 PRINT D$;"PR#0"
3060 END
3070 GOTO 1840
3200 IX = (CR(6) / 1200) / (1 - (1 / (1 + (CR(6) / 1200))) ^ QA
(11)))
3210 PU(0) = QA(7) - QA(9)
3220 PM(0) = IX * PU(0)
3240 PY(0) = PM(0) * 12
3250 PT = QA(11) * PM(0)
3260 P$ = "PAYMENTS"
3265 IZ = PM(0) * (((((1 + (CR(5) / 1200)) ^ QA(11)) - 1) / (
CR(5) / 1200)) * (((1 + (CR(5) / 1200)) ^ (60 - QA(11)))) -
QA(11))
3270 GOTO 1430
3470 HOME : INPUT "SOMETHING HAS NOT WORKED PROPERLY. IF YOU
PRESS 'RETURN' WE'LL GO BACK TO THE MAIN MENU AND YOU CAN
START OVER.";A1$
3480 HOME : GOTO 390
4000 FOR N = 1 TO 5: PRINT " ": NEXT N
4010 PRINT SPC(23);"COST OF BUYING AND OWNING NEW CAR"
4020 PRINT SPC(20);"(COMPARED WITH COST OF KEEPING OLD CAR"
4030 PRINT " ": PRINT " "
4040 PRINT SPC(42);"COST OVER NEXT 5 YEARS": PRINT SPC(42
);"-----"
4050 PRINT SPC(47);"OLD CAR"; SPC(3);"NEW CAR"
4055 PRINT SPC(47);"-----"; SPC(3);"-----"
4060 PRINT SPC(16);"AMOUNT DUE AFTER TRADE"; SPC(11);"$000
0"; SPC(9 - LEN(C$(1,6,0)));"$";C$(1,6,0)
4070 PRINT SPC(16);"INTEREST"; SPC(29);"0"; SPC(10 - LEN
(PV$(0)));PV$(0)
4080 PRINT SPC(16);"INSURANCE"; SPC(29 - LEN(C$(7,6,1)))
;C$(7,6,1); SPC(10 - LEN(C$(7,6,0)));C$(7,6,0)
4090 PRINT SPC(16);"LICENSE"; SPC(31 - LEN(C$(8,6,1)));C
$(8,6,1); SPC(10 - LEN(C$(8,6,0)));C$(8,6,0)
4100 PRINT SPC(16);"MAINTENANCE"; SPC(27 - LEN(C$(2,6,1)
));C$(2,6,1); SPC(10 - LEN(C$(2,6,0)));C$(2,6,0)
4110 PRINT SPC(16);"FUEL"; SPC(34 - LEN(C$(3,6,1)));C$(3
,6,1); SPC(10 - LEN(C$(3,6,0)));C$(3,6,0)
4120 PRINT SPC(16);"INTEREST PENALTY ON PURCHASE"; SPC(10 -
LEN(C$(4,6,1)));C$(4,6,1); SPC(10 - LEN(C$(4,6,0)));
C$(4,6,0)
4125 PRINT SPC(16);"INTEREST PENALTY ON OTHER COSTS"; SPC(
7 - LEN(C$(11,6,1)));C$(11,6,1); SPC(10 - LEN(C$(11,
6,0)));C$(11,6,0)
4130 PRINT SPC(49);"-----"; SPC(3);"-----"
4140 PRINT SPC(16);"TOTAL"; SPC(32 - LEN(C$(9,6,1)));"$"
;C$(9,6,1); SPC(9 - LEN(C$(9,6,0)));"$";C$(9,6,0)
4145 PRINT " "
4150 PRINT SPC(16);"TRADE-IN VALUE AFTER 5 YEARS"; SPC(9 -
LEN(C$(6,6,1)));"$";C$(6,6,1); SPC(9 - LEN(C$(6,6,0)
));"$";C$(6,6,0)
4152 R1 = C(9,6,1) - C(6,6,1):R1$ = STR$(R1):R2 = C(9,6,0) -
C(6,6,0):R2$ = STR$(R2)
4155 PRINT " "
4160 PRINT SPC(16);"COST FOR 5 YEARS"; SPC(21 - LEN(R1$)
);"$";R1$; SPC(9 - LEN(R2$));"$";R2$
4170 PRINT " ": PRINT " "
4171 IF R1 < R2 THEN P1$ = " MORE":AS$ = STR$(R2 - R1)
4172 IF R2 < R1 THEN P1$ = " LESS":AS$ = STR$(R1 - R2)
4173 AS = VAL(AS$):A5 = AS / 5:A5 = INT(A5):MO$ = " $" + STR$(
A5)
4180 PRINT SPC(10);"BUYING NEW CAR WILL COST ";"$";AS$;P1$;
" THAN KEEPING OLD CAR"
4181 PRINT SPC(5);"OVER THE NEXT 5 YEARS"
4183 PRINT " "
4190 PRINT SPC(10);"THIS AMOUNTS TO ";MO$;" PER YEAR."
4195 FOR N = 1 TO 6: PRINT " ": NEXT N
4200 RETURN

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End of listing.

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BOSTON

The Apple Clinic is a forum for discussing Apple II hardware and related subjects. If you have questions or answers, or wish to make a statement, write to Jim Sather. His recent book, Understanding the Apple IIe, published by Quality Software, may also help you. Write to Jim c/o Apple Clinic, inCider, 80 Pine Street, Peterborough, NH 03458.

Franklin Drives

Can I hook up an Apple Disk II to a Franklin Ace 1000 with Franklin controller card? If not, can I hook up an Apple controller card/Apple disk drive combination to an Ace 1000? Is the alignment mechanism and tolerance—discussed several times in *inCider*—the same for Franklin and Apple disk drives? Thank you.

Bob Warren
Kingsville, TX

Apple II and Franklin drives and controllers are fully compatible and interchangeable. Track alignment on Apple and Franklin drives is identical. Comprehensive alignment procedures and tools (such as alignment disks) designed for Apple-compatible drives should work with Franklin drives.

The Cable Did It!

I'd like to pass on to your readers a small tale of woe about a printer, a computer, and a very large headache.

My brand-new Apple II-compatible Unitron 2200 and C. Itoh 8510 printer with standard mail-order printer interface card were not working at all. The printer kept dropping characters. It would print for several seconds, take itself off-line, then drop a character after I brought it back on-line. This made printing hex dumps messy and inexact. Letters were interesting, too. How would you like to "a;lkj-oidf"?

Connected to an Apple IIe at my local dealer's, the printer would not fail, no matter how many times we tried to force it. I took it home; it wouldn't print without dropping characters. Suspecting the interface card, I took it and the printer to the dealer. Same story! It wouldn't fail—page after page of perfect print. I took it home; it wouldn't work.

Next, I took my Unitron 2200, interface card, and printer to the dealer, where they worked perfectly. After taking them home, I finally discovered that the problem was something the dealer never suspected—the interface cable. At home, the printer cable went across both disk drive cables, two power cables, and a joystick cable—a situation that never occurred at the dealer's. By simply moving the printer to the other side of the computer and rerouting the cable so that it was near no other cables, the electromagnetic interference that was disrupting the printer vanished. Now it won't fail. Hallelujah!

The moral of this story may be never buy a cheap interface card that might have an equally cheap cable. It can also be said that nothing is ever as simple as it looks. But in the end, this problem took months to solve because of the dealer's lack of insight. I therefore warn you to select your dealer quite carefully.

Wallace Williams
APO NY, NY

Thanks for the interesting problem description, Wallace. I agree that choosing your dealer is important. Yet I see a different moral in your story. When you take a malfunctioning computer or peripheral in for servicing, take along all peripherals, cards, and cables that were connected when the symptoms were observed.

There's one thing that bothers me about the solution to your problem. The cables in the back of my Apples

are intertwined like spaghetti, but it has never caused any problems. Also, I usually buy the cheapest peripherals and interface cards I can find. I therefore suspect that you still have a bug somewhere, and that your printer will drop again the characters it needs so carefully to send.

Communicating with the Big Boys

I have a combination hardware/software question. After almost 30 years in the business, I broke down and bought an Apple IIe (two disk drives, printer, and so on). It's worked to my satisfaction in all areas except one—telecommunications. (The Applesoft BASIC editor is unbelievably primitive.) I have purchased several modems, including the fanciest (read most expensive), as well as several other software packages, but maybe what I want to do isn't possible.

I have access to several VAXes (UNIX) and several large CDC CYBERs (NOS and UNIX). I want to use Apple Writer to build some text files in either C, Pascal, or LISP; send them to the systems; compile, execute, and write to a file on the system; and send the file back to me. This will minimize my log-in time on systems that get bogged down during the university term. Could you recommend a system I could use on the Apple, as I now use it as a dumb terminal. At present I'm using a Multi-Tech modem and software, but Multi-Tech must have gone out of business as it's not answering mail.

Bernard W. Marschner
Fort Collins, CO

Welcome to the world of personal computing, Bernard. I hope your experiences with your own computer are as fulfilling as mine have been. Your question is indeed a soft-

by Jim Sather

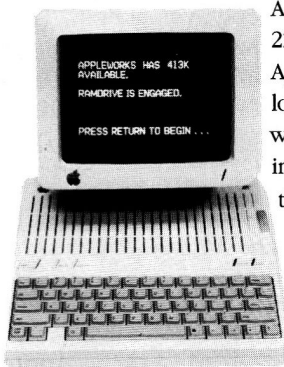
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ware/hardware question, as many are, and it serves to highlight the fact that most computer hardware is only as good as the program controlling it. In a nutshell, the solution to your problem is to find the right software and buy it. See *The Blue Book for the Apple Computer* (third edition, WIDL Video Publications, 1983) for a list of numerous communications programs available for the Apple II.

I don't have any experience making the Apple II communicate with the big boys, but I met a person at the Northeast Computer Show in Boston who does it regularly. He agreed to write a "guest answer" to your question. Thanks to Murphy A. Sewall for this highly informative letter. Judging from his response, the right software for your task may be *Softerm 2*.

Guest Answer

Sadly, most mainframe communications software was written before there were microcomputer users wanting to transfer files. Mainframe-to-Apple is usually simple because most Apple communications programs provide for "capture" of text as it comes. Text files can be transferred to most host systems, but you need some knowledge of the mainframe's communications protocol.

Most mainframe communications software typically expects a terminal with a maximum line width of 130 characters, although a communications buffer of 256 characters is common (that is, your carriage return must be sent after every 255 characters, at least). *Apple Writer* and *Screenwriter* treat carriage returns as paragraph breaks, and consequently can overflow a mainframe's buffer. (Hayden's *PIE Writer* stores carriage returns with every line and avoids this problem.)

Text files containing C, Pascal, or LISP programs do have carriage returns frequently enough to satisfy most mainframe buffers. Difficulty in uploading probably is a failure to coordinate transmission of text lines with the mainframe's readiness to accept them.

After a line is transmitted, the Ap-

ple's software must wait for a "signal" that the mainframe is ready for the next line. In other words, the Apple's software needs to recognize that it has sent an end-of-line character and should wait for some specific "solicit" character (sometimes called a prompt) before sending the next line.

If the mainframe normally supplies the line feed after a terminal's carriage return, then the end-of-line character is a carriage return; otherwise, it usually is a line feed (control-J). Most mainframes transmit a printable solicit character (such as a > or .), often followed by X-ON (control-Q), which may or may not be "swallowed" by the Apple software (depending on the program) before the file transfer program can read it. Normally, a transfer works fine if the software is told to wait for the printable solicit character; if not, try waiting for a control-Q.

Most of the more sophisticated communications programs for the Apple (*Apple Access II*, *ASCII Express: The Professional*, *Softerm*, and *Transcend*, to name only a few) have the capacity to adapt to mainframes' requirements for file transfers. It's rather difficult with *Apple Access II*, because waiting for a solicit apparently can only be done from within a command file, and the documentation isn't very helpful.

Softerm, on the other hand, is well-documented and has options that cover nearly any contingency. *Softerm* also allows a "transparent" capture to disk (so the control codes the mainframe is sending can be displayed), which is a very useful diagnostic.

Murphy A. Sewall
Storrs, CT

Rotated Display

I've owned an Apple //c since July. I have one problem: The lines on my monitor //c are slanted a bit clockwise. What can be done about this?

Greg Kirk
Lexington, TN

You should do nothing unless you're qualified to repair high-volt-
Downloaded from www.Apple2Online.com

age assemblies. The insides of monitors and televisions are very dangerous, and amateurs should leave the repair of such devices to trained technicians. Take your monitor to your Apple dealer. The technician there can align the display by simply rotating the deflection yoke on the neck of the picture tube.

Heads or Tails?

In reference to "Rub-a-Dub-Dub" in the March *Apple Clinic*, now that you've solved Soon Kim's problem on how to activate disk drive 2 in order to clean it, how about helping those of us who don't have a computer science degree and who rely on commercial programs to operate our Apples? I know a little about BASIC, but not the first thing about assembly-language routines.

In your reply, you stated, "I used to clean heads when I was in the navy." Does this imply that you now don't think it's necessary to clean heads?

D.C. Cox
Sarasota, FL

Sorry if I threw you a couple of curves. The March program listing can be entered and run using monitor instructions given in all versions of *Apple II* reference manuals. Alternately, you can run the *Applesoft BASIC Program listing* accompanying this month's *Apple Clinic*. This program *POKEs* the assembly-language program into RAM and *CALLs* it.

The heads I cleaned in the navy had nothing to do with floppy disk drives. I no longer clean those heads these days. (Other fathers of infants will understand.) As far as disk drive heads are concerned, I clean mine

Program listing. Applesoft BASIC program to activate drive 2.

```
10 REM
20 REM DRIVE 2 --- TRACK 0
30 REM
40 DATA 162, 96, 134, 43, 189, 142, 192, 189
50 DATA 140, 192, 189, 139, 192, 76, 56, 198
60 FOR A = 0 TO 15 : READ B : POKE 4096 + A,
  B : NEXT
70 CALL 4096
```

when I happen to have the cover off for any reason, which is about once a year.

Although that keeps them clean enough for me, I must admit that I'm not the type of person to lose sleep over dirty read/write heads. I'm sure that many users don't feel safe unless they clean their heads every three months or so. I don't disagree with them in any way because it's unlikely that anyone will clean their heads too often, and much of your disk data is simply too valuable to risk storing on unreliable disk drives.

What's in a ROM Chip?

I purchased a slot 0 RAM card and upgraded my Apple II to an Apple II Plus by transferring the ROM chips from my firmware card to the motherboard. The motherboard had D0, E0, E8, F0, and F8 ROM chips. Can you tell me just what these chips are for? Is there some way I can make DOS work with an Integer firmware card in a slot

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other than slot 0, so I won't have to reload Integer all the time?

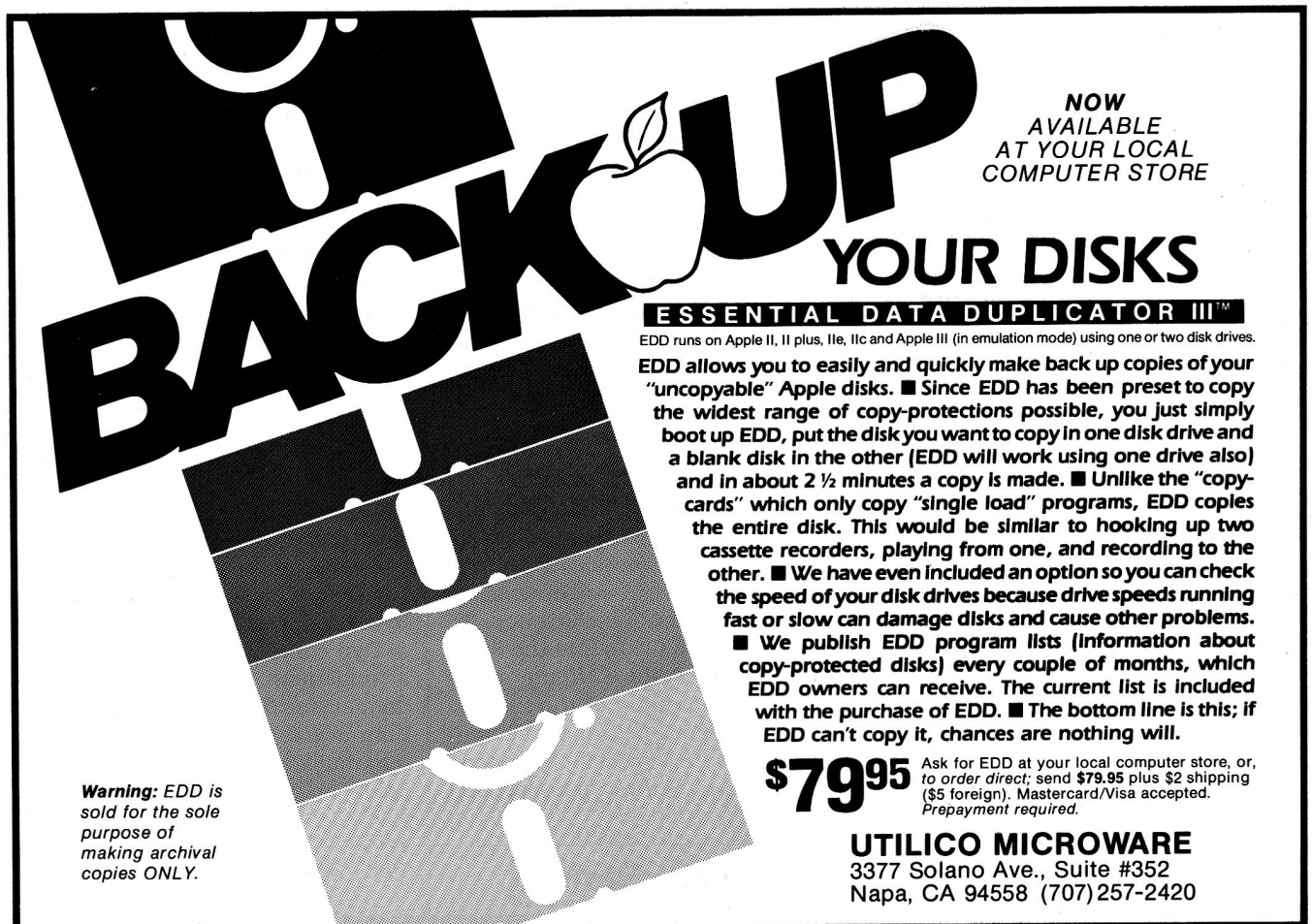
James J. Breslin
Harrisburg, NC

In your motherboard's original Integer chip set, E0, E8, and F0 contain the Integer BASIC interpreter, some 6502 floating-point routines, a 6502 mini-assembler, and the Sweet16 16-bit pseudo machine interpreter. F8 contains either the original Apple system monitor or the newer Autostart monitor. D0 contains some other utility, probably the old D0 utility chip that Apple used to sell.

In the Applesoft chip set, D0, D8, E0, E8, and F0 contain the Applesoft BASIC interpreter, and F8 contains the Autostart monitor. The mini-assembler, floating-point utilities, and Sweet16 aren't present in the Applesoft chip set. Floating-point arithmetic is, of course, incorporated into Applesoft.

You can patch DOS 3.3 to locate Integer or Applesoft BASIC in a slot 1-7 firmware card by adding the firmware card slot number times \$10 to the values stored at \$A5B8 and \$A5C0 of the DOS. If the firmware card is in slot 5, change \$A5B8 from \$80 to \$D0 and change \$A5C0 from \$81 to \$D1. From BASIC, POKE - 23112, SLOT * 16 + 128 and POKE - 23104, SLOT * 16 + 129.

Another patch is to change \$BFD3-\$BFD5 from \$8D, \$00, \$E0 to \$EA, \$EA, \$EA. With this patch, booting DOS 3.3 will not clobber Integer BASIC in the 16K RAM card. To make the patch from BASIC, POKE - 16429, 234 : POKE - 16428, 234 : POKE - 16427, 234. ■



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Reading and Writing: Learning the 'BASICS'

Most people I know who get into computing start by buying a few games, and maybe a couple of application packages. When the urge to program overtakes you, however, one lesson you'll have to learn is how BASIC accesses data files on disk. The task is not as formidable as you might think, and once you have mastered it, a whole new world of BASIC is open to you. My column this month begins a short series on disk input/output (I/O) in applications programming.

Let's look at a few terms you'll encounter in any discussion of disk storage:

- **Byte.** A single character of alphanumeric data, such as a letter, digit, or punctuation mark.
- **Field.** A string of bytes that together represent a specific item of data—for example, a string of five digits denoting a ZIP code, or a two-character state abbreviation. Many commercial database management (DBM) programs refer to fields as "attributes."
- **Record.** A collection of related fields representing a unit of information about a specific topic—for example, data relating to an individual on a mailing list, including name, address, and phone number fields. DBM programs sometimes refer to records as "rows."
- **File.** The collection of records forming the entire body of stored information on a given topic—the complete mailing list, for example.

Sequential or Random?

Applesoft gives you two ways to store data on floppy disks: sequential access and random access. Since commercial packages have built-in disk-access routines, you're hardly aware

**Learning to
program means
knowing the ins
and outs of
BASIC disk
access.**

of the special programming required to save and retrieve data. The occasional blinking of the disk-drive light is the only indication that such processes are actually occurring. When you write your own programs, however, the differences between these two disk-storage techniques are a major concern.

Each field in a sequential file is only as long as the information it contains, plus 1 byte. For example, the name field SUE BROWN occupies 10 bytes, while HARVEY HAMILTON HARRISON takes up 25 bytes. The additional byte for each field is a special character the computer adds to indicate the end of that field. A sequential-access file consists of one large string of information with no wasted memory space, except for the special character separating one field from the next.

The unique field lengths and relatively simple structure of sequential access result in a few central drawbacks: slow retrieval, cumbersome editing, and overall I/O inefficiency. To search through a file to find the 82nd field, for instance, the computer must start at the beginning of the file and read through it one field at a time until it has counted 81 special characters. At that point, it "knows" it has arrived

at the beginning of field number 82.

Whenever you alter a field or record in a sequential file, the computer's disk I/O program must create an entirely new file to handle the updated information. For example, suppose Sue married Harvey. SUE BROWN HARRISON, requiring 19 bytes, will not fit into the same space as SUE BROWN with only 10. The disk I/O program must create a new file and fill it with the same data the old file contained, with the exception of this one updated name field. The program copies every record in the original file into the new one, then erases the old file from the disk and gives the new one the same name. When you delete a record, a vacancy remains until the program creates a new file and copies the old records into it.

Random-access files require a bit more planning than sequential files. You must first determine the maximum length of each field—then stick with it. For example, if you decide on a name field of 20 bytes, the I/O program will set aside 20 bytes for the name in every record in your file. For SUE BROWN, with 9 bytes, the computer will automatically add 11 blank spaces to fill the field. With HARVEY HAMILTON HARRISON, the computer will cut off characters beyond the 20th, leaving HARVEY HAMILTON HARR. When you enter data you must keep the field limits in mind—you might settle for HARVEY H. HARRISON, which consumes only 18 bytes and will fit the predefined field.

Two considerations arise from this arrangement. The first is that a random-access file may take up more disk memory than its corresponding sequential-access file, which doesn't pad fields with unused bytes. The second

by Dan Bishop

is that you must sometimes compromise the data you enter into a random-access file, to get them to fit into fields of predefined length. When you set up a random-access file, the trade-off is between a field long enough to encompass the majority of items entered and a field that wastes too much space.

The advantages of random-access disk I/O far outweigh these drawbacks. First, all records in the file are exactly the same length. Suppose your 20-byte name field is combined with six other fields to make up a record, the total length of which is 100 bytes. If you tell the computer to find record 82, it simply multiplies 81 times 100 and adds one. It jumps directly to byte 8101 in the file, "knowing" it will be the first byte in record 82. This procedure is considerably faster than the field-by-field searching sequential access requires.

The second advantage becomes apparent when you need to update the information in a given field. Since the length of the modified field will always be the same as that of the original, the I/O program can simply write the new data into the same area of disk storage the old field occupied. No adjustment of other fields or records is necessary. Adding and erasing records is just as easy, and if you design your program to keep track of deleted records, it can use that information to write new records into those vacancies.

The purpose of disk storage is greater efficiency in handling large data files; writing a new disk-based program that uses sequential files is normally not justified. Tape files, on the other hand, are necessarily sequential. If you want to convert a tape program to a disk system in a hurry, sequential disk access provides the "quick and dirty" approach you may need.

Disk Commands: the Fundamentals

A series of Applesoft commands lets you directly control the information stored on your disk.

The first disk command most beginning users learn is CATALOG, which lists the entire directory of stored files on your display, or passes it to your printer. The computer treats programs and data files the same way—in a sense, the stored information making up a program contains "records" of in-

"Mastering disk access opens up a new world of BASIC."

structions for the computer to follow.

If your list of files is too long to be displayed on a single screen, the entire directory scrolls by, with the last 22 file names remaining on screen. Pressing control-S stops the scrolling; the same key combination restarts it, as well.

Each line in the directory display contains three pieces of information: I, A, B, or T, indicating integer BASIC program, Applesoft BASIC program, binary program, or text file; the number of disk sectors (256-byte chunks) the file takes up; and the name you gave the file.

A file name in Applesoft BASIC may contain up to 30 characters. The first character must be a letter, but remain-

ing ones may include spaces or any keyboard characters except the comma. You must assign each file a unique name, because the computer uses it in its search procedure.

You may also add password protection by making a control character part of the file name. Hold down the control key and press another key. The resulting character will not appear in the directory name displayed, but you must type it in to open that file.

To remove a file from a disk, type the word DELETE followed by the name of the file—for example, DELETE DAILY EXPENSE ACCOUNT. The disk space occupied by that file is now free for files you may wish to add later. To change the name of a file, type RENAME and the current name of the file, followed by a comma and the new name, as in RENAME THIS YEARS TAXES, LAST YEARS TAXES.

LOAD, RUN, and SAVE are three disk-operating system commands that work only with BASIC program files, not data files or binary program files. Keep in mind that your computer

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can interpret commands and deal with data only if they are stored in RAM. Program instructions and data in permanent storage on disk must be copied from the disk into the computer's RAM before you can use them.

For example, if you type LOAD MASTER MAIL LIST, the computer searches the disk directory for a file by that name; when it finds the file, the disk routine copies the program instructions in that file into RAM. Those data continue to reside on disk, however. If you remove the disk and turn the computer off, you lose only the RAM copy of the program—the disk copy is unchanged.

To execute the program after loading it into RAM and viewing it, enter the command RUN. If you want to load and execute the program without checking it or making any changes, just type RUN and the program name.

Use the SAVE command followed by a valid file name to copy the BASIC program currently in RAM into a disk file. The program in RAM remains unchanged. If the computer doesn't find

the file name on the disk directory, the I/O routine creates a new file and copies the contents of the BASIC program into it. On the other hand, if a file of that name already exists on the disk directory, the computer uses the same disk space and records the RAM contents right over the old program. The earlier version is replaced by the new one you're saving.

Programming Tips

When you write your own programs, get into the habit of using a different name for each successive version of your work. In case of power loss, you'd have to redo only the product of the latest session. And if you reach a dead end in your current version, you can always start again from an earlier one. A simple rule of thumb is to use the same alphabetic name for each version, but follow it with some indication of the date and time you saved the file to disk. A quick look at the disk directory (using the CATALOG command) reveals the order in which you saved the files, and relieves

you of having to remember version numbers or a list of names.

Remember to make frequent back-ups of your programs on a second disk. As soon as the drive stops running after a SAVE command, remove the working disk and insert the back-up. Give the computer another SAVE command, using the same file name, then put your working copy back into the disk drive.

Don't store your back-up and working disks in the same place. Your files are important. Think domestic disasters are too unlikely? Well, good luck. . . .

Next month I'll provide some specific program examples of random-access disk I/O in Applesoft BASIC. In the meantime, send in those user-defined functions (see June's Applesoft Adviser). If I receive some interesting responses, I'll devote an entire column this fall to your submissions. Keep 'em coming! ■

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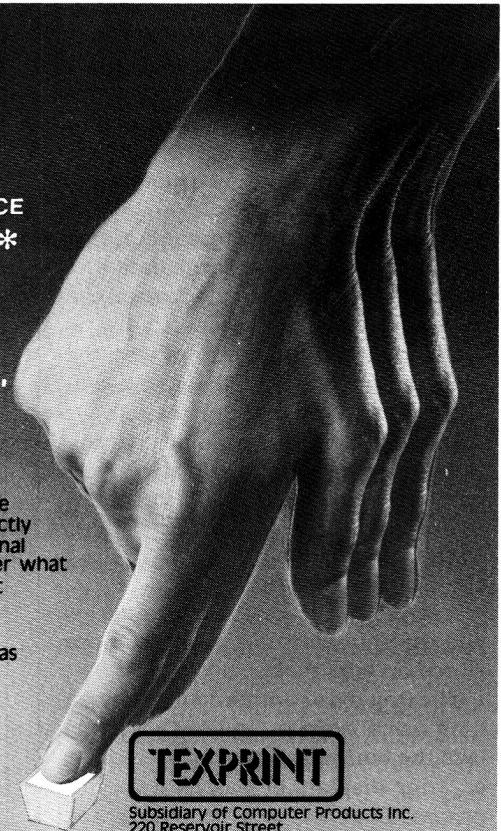
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SOFTWARE REVIEWS



inCider's Ratings

- ★★★★ Superlative
 - ★★★ Above average
 - ★★ Good
 - ★ Not recommended
- Stay away

The Perfect Score

Mindscape

3444 Dundee Road
Northbrook, IL 60026

SAT preparation
Any Apple II, 48K
\$69.95

★★★

At \$69.95, you have to wonder if Mindscape's *The Perfect Score: Computer Preparation for the SAT* can be any good at all. The answer is a qualified "yes."

The program consists of six double-sided disks covering the verbal and math sections of the Scholastic Aptitude Tests, with sample exams that "simulate a test-taking experience." Since post-test copies of the SAT's are now available, several publishing houses and software companies have been able to produce realistic sample tests and comprehensive reviews. It is usually the "how" and not the "what," however, that differentiates various programs, and that is the case here.

Little previous knowledge of computers is necessary to use Mindscape's SAT package. Simply follow the directions included in the manual and

printed on screen. Some of my students who had never taken a computer course and had some anxiety about computers had no problem running this program on Apple II machines.

The program is not strong in reviewing or introducing mathematical topics, relying instead on a brief example or two in the user's manual. A student who does not know the laws governing exponentiation, for instance, will probably not find enough examples or sufficiently detailed explanation to be able to solve such problems. The manual does a better job explaining verbal topics such as analogies and sentence completion.

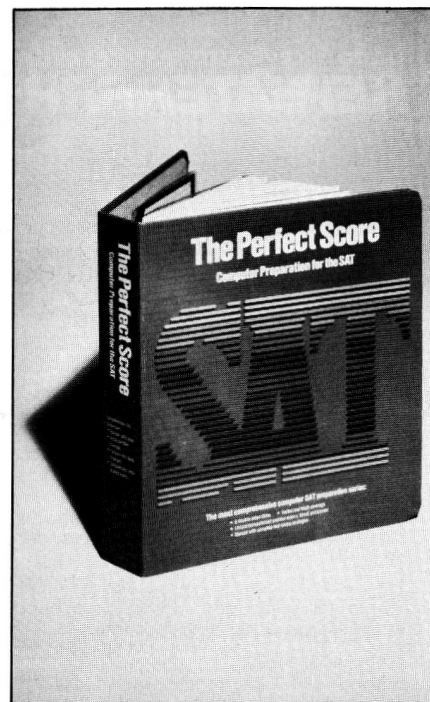
The program feature the manufacturer cites most proudly is a choice of operating mode. In the testing mode, you simply answer questions, with a chance to repeat items you miss a second and even a third time. At the end of a section test results are displayed.

My students, however, who vary widely in ability and background, found the learning mode more helpful. All agreed it would be beneficial in preparing for the SAT's. One of them commented, "This is much better than the book I've been using. I wish I had this instead." In learning mode, a question is explained even if the student answers it correctly. In the case of a wrong answer, the program provides hints after each subsequent incorrect guess until all of the choices are eliminated. One of my students termed these explanations and hints "very helpful and easy to follow."

One feature of the learning mode, however—the program's response to an incorrect answer—proved distract-

ing and even insulting to students. Included are such comments as "Are you really trying?", "Don't call us, we'll call you," and "You're kidding, aren't you?". Similar phrases pop up after correct answers: "Home Run," "Go to the head of the class," and so forth. At least one of my students found this, too, "annoying after a while."

During the actual running of the program the student has the choice of using a time clock that may be displayed continuously on screen or only as desired. In addition, optional sound effects can accompany the learning mode. Wrong answers are greeted with suitably sad, bassoon-like notes, while correct answers are rewarded with a flourish. All of my students





Mickey and Pluto look for the missing crystal in Mickey's Space Adventure.

opted for silence after a while, agreeing that the sound effects were "rather juvenile." Some also wondered if they would distract others in the vicinity. In case of a mistyped response, the screen with its clearly written instructions remains on hold until an acceptable response is entered.

The questions themselves are well-conceived and well-written although not as numerous as they are in other programs. The lack of graphics can be distracting—you must turn to the user's manual whenever you have to solve a mathematics problem involving a diagram.

Circle 229 on Reader Service Card.

In sum, you do get what you pay for, and a bit more when you compare The Perfect Score to others available on the market. If you can ignore what are meant to be user-friendly responses to answers in the learning mode, this Mindscape program will be effective preparation for the SAT (and PSAT) exams. ■

Art Johnson
Nashua, NH

Mickey's Space Adventure

Sierra On-Line
P.O. Box 485
Coarsegold, CA 93614

Illustrated adventure for children
Any Apple II, 48K
\$34.95

★ ★

Looking back, we realize that 1984 was the year of the mouse. Not only were Mac and Lisa each equipped with one, but another version was available for the //e and //c. Not to be outdone, Sierra On-Line, in conjunction with an old-time mouse maker, Walt Disney, has just released one of its own. This mouse requires no desk space and is simple enough that an 8-year-old can use it. Mickey, as in Mouse, and his dog Pluto star in a new educational adventure game, Mickey's Space Adventure.

The game fills both sides of two disks. To begin, you must boot side A and follow the on-screen prompts through a short series of introductory displays. Once you have Mickey up and running, the plot is fairly simple. At one time, the inhabitants of a planet in the Alpha Centauri system kept their history on a crystal without a back-up copy. It was subsequently stolen and broken, the pieces cast adrift. Solar winds blew them to their resting places, one to each planet in our solar system. An unmanned space vehicle is launched; its destination is the planet where the first part of the crystal landed—Earth.

Mickey and Pluto come across the saucer and decide to help. They must locate the missing pieces in their correct order with the assistance of an on-

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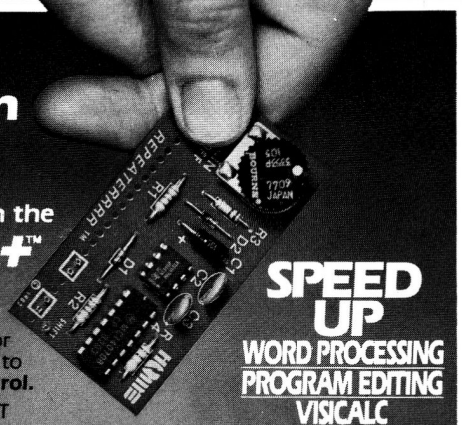
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board computer. As with all adventures, your child is going to have to assist Mickey in gathering some needed and useful objects during the journey. For instance, if he didn't pick up a scarf while at home, Mickey's going to have a hard time finding one of the pieces. As a matter of fact, without it, he'll have to backtrack to get it when he least wants to. Your child, however, will never be told exactly which item is missing.

Features

As in other adventure games, mapping becomes a very important skill. Players must keep maps of individual planet locations and certain areas within them.

Space Adventure relies on traditional two-word parsing. Available words are shown on two lines, verbs on the first line, objects below, at the bottom of the screen. This is the same format used in previous early-age-level adventure games. Players must form appropriate commands using the arrow and return keys. Generally, this is not difficult to do, but in situations where command lines are long or a command must be repeated a number of times to get the desired result, it can be cumbersome and frustratingly slow.

The educational values traditionally associated with this game genre are present here, too. Your child must learn and practice mapmaking skills, use logical problem-solving techniques and sequences, read for content and underlying hints, and deal with puzzles of varying complexity. In addition, Space Adventure presents a fairly complex body of astronomical data your child must learn well enough to use in the game. This includes, among other things, the names, relative sizes, composition, and order of the planets in our solar system.

One very appealing aspect of the program is its nonviolence. Players have to trade and negotiate with aliens, but never have to clobber one. And even after the computer repeatedly warns that Mickey's oxygen supply is dwindling, it never lets him die. Instead, the program tells your child that Mickey is too tired to continue, and to start again.

A save option also allows you to stop

in mid-game and continue from the same place at a later time. As this game could conceivably take an 8-year-old 20 hours to solve, this comes in very handy. Its only drawback is that you may save only one game per disk. When more than one child is using the program, this could be a disadvantage.

I've watched both an 8- and a 14-year-old play Space Adventure. My observation is that both of them are enjoying it and are continuing to make progress. Neither of them is bored with it, even though after six hours each they are not yet near to completing it. It has held their interest well.

Overall, Mickey's Space Adventure is a well-presented program. The graphics are beautifully executed and appropriate. A fair amount of educational value is offered in a format that is fun and challenging to the player. At \$34.95, it's not a bad buy for the beginning adventurer. ■

Doug Landin-Young
Fresno, CA

HomeFiler

MicroLab

2699 Skokie Valley Road
Highland Park, IL 60035

Home data base
Apple II series, two disk drives, 48K
\$50

★★

Blessed with a simple command structure and surprising storage capacity, HomeFiler is a no-frills database program offering home users a way to manage information quickly, easily, and inexpensively. As one might expect with \$50 data-base software, however, the program has some limitations—slow operation and a few poorly executed functions. Nevertheless, for those interested in computerizing their home recordkeeping, HomeFiler is worth a second look.

The program comes with a single floppy disk and a clearly written 12-page manual. It will work on all Apple



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SOFTWARE REVIEWS

II models; however, two disk drives are required. The flip side of the disk demonstrates how to create a file, but you may be better off learning by doing.

Getting Started

Insert the program disk in drive 1, a blank disk in drive 2, and turn on your computer. Following the title screen, HomeFiler presents you with three options: Begin a Data Disk, Change a Data Disk, and Exit. Select the first and type I, to initialize the disk in drive 2 for use with HomeFiler. Next assign a name to your file, and begin entering the names and lengths of the fields (categories) in your prospective data base. For example, if you want to create a field for names 25 characters long, simply type NAME (press the return key) 25 (press the return key). HomeFiler allows up to 88 fields per data disk, and 1239 characters per field.

Once you have defined all the fields, press the 0 key to inform HomeFiler that you're finished. Be certain you have all the fields you need before pressing that key—once you do, adding a field means starting the program from the beginning.

After you've determined that the field information is correct, the program writes the file variables to your data disk and displays the HomeFiler main menu. From this point you can enter, inspect or change data, view your file's parameters, and sort, delete, and search through records. You can also generate reports of all or selected records, produce mailing labels (a handy feature), get help, select a new file, or exit the program.

The Data

Data entry is simple. Just type information in the appropriate field and press the return key, or hit the return key alone to create a blank field. Pressing control-B backs up one field, control-E returns you to field 1, and control-A repeats data from the corresponding field of the previous record. This feature is especially useful if everyone on your address list lives in the same state, for example. When you are finished, press the Y key to confirm that all is correct, N to start over, or control-Q to quit and return to the main menu. When you press the Y key, the program writes the record to

disk, and you move to the next record.

Selecting the File Information option on HomeFiler's main menu enables you to examine the characteristics of a particular file in your data base. The program lists the name of the file; the number, length, and name of each field; the maximum number of records the file can contain; the number of records currently in use; whether the file will require one or two volumes (disks); and the number of records that will fit on Volume 1. When I created a sample file containing 11 fields, with a combined field length of 150 characters, I discovered that a file that size can hold 590 records, 559 of them on a single disk—that's pretty efficient.

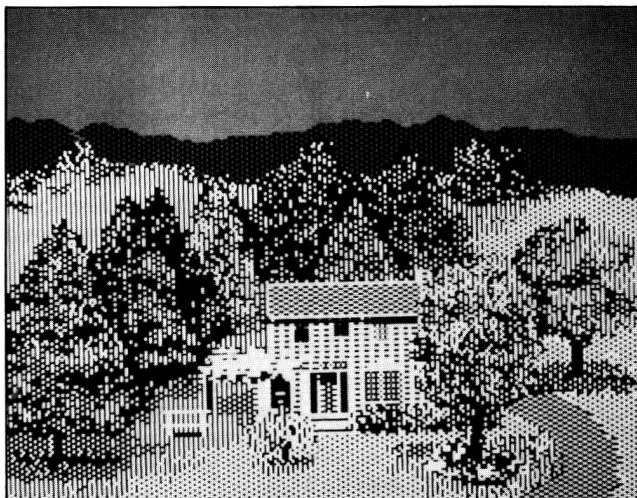
Complaints

What isn't so efficient is HomeFiler's limited array of sort, search, and report capabilities. The major difficulty is that you can sort or search on only one field at a time. While you can search a file for customers living in a certain state or those who haven't paid you in six months, for example, you can't do both at the same time.

HomeFiler sorts in either ascending or descending order, letting you list items alphabetically, by invoice number, or by date, but little else. The program can conduct searches by word, number, or date. You must specify whether the program is to match search criteria exactly or with any portion of a field entry. The latter option is an attempt at a wildcard function, but it isn't nearly precise enough. Searching a field for all names beginning with "AB," for instance, would turn up Abraham, Ahab, and Rabinowitz. Searching a date field for "01" would yield not only the January records you're after, but all records dated the first of any month, as well—not very helpful.

With the Report option, HomeFiler displays all records on screen or prints them with all or selected fields, record numbers, and field names, as you desire. Printing selected records, however—a central function of any report generator—requires HomeFiler's Search option. That's just bad program design.

My other complaints involve the program's slow pace, poor visual formatting, and excessive keyboard op-



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eration. In addition, the manual neglects to warn you that the HomeFiler disk will not work correctly if it is write-protected, as it comes from the manufacturer. Disk access is frequent and lengthy. I grew to despise the LOADING MENU message that appeared every time I entered or exited a menu option. And, since HomeFiler doesn't use an 80-column format, you may not be able to view an entire record at once.

Selecting Help from the main menu takes you on an extensive one-way journey through all of HomeFiler's options. I'd prefer a system of contextual help screens—screens that offer information relevant to particular points in the program.

Another improvement would be to replace many of the INPUT statements, especially those asking "Correct? (Y/N)," with GET commands. An INPUT requires at least two keystrokes—in the example above, Y or N plus the return key—before the program can process a response; a GET command moves you along as soon as you press the Y or N key.

The most serious flaw, however, is that unless the write-protect tab is removed from the program disk, HomeFiler crashes when you attempt to delete a record. To avoid this problem, make a copy of the program, put the original in a safe place, and use the back-up without a tab. Then you'll be ready to get out that jumble of records and put HomeFiler to work. ■

Wayne J. Sassano
Wethersfield, CT

Design Your Own Home: Landscape

Avant-Garde Publishing

P.O. Box 30160
Eugene, OR 97403

Graphics
Any 48K Apple II,
requires input device
\$69.95

★ ★ ★

There's more to landscaping than planting shrubs and building fences—planning, selection, and placement are necessary considerations, as well. Avant-Garde's Landscape Design helps homeowners and professional designers tackle outdoor-improvement projects.

One of three programs in the Design Your Own Home series, Landscape Design lets you create useful landscaping layouts, but you'll find the program confusing at first. The information you need is in the manual, but a poorly organized format makes it hard to locate. The complex designs you can devise with the program, however, make it a remarkable package well worth the price.

With Landscape Design, you can view layouts from above, and horizontally from four directions. Since the program lets you vary the size, location, and types of plants and structures, it provides a good tool for experimenting with your ideas. A workbook helps you plan and execute designs.

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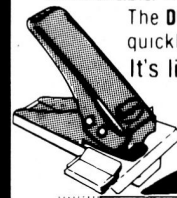
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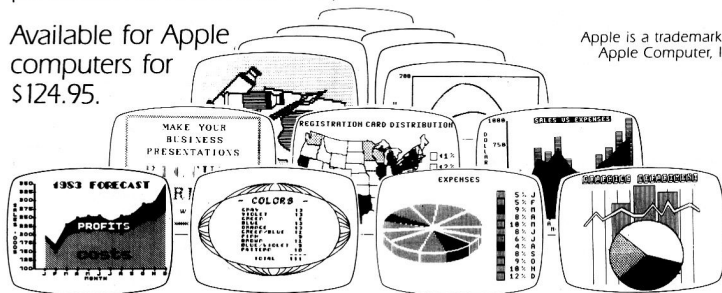
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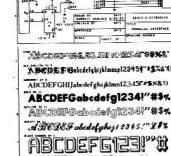
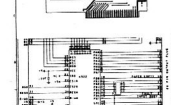
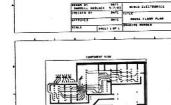
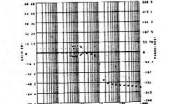


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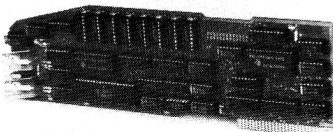
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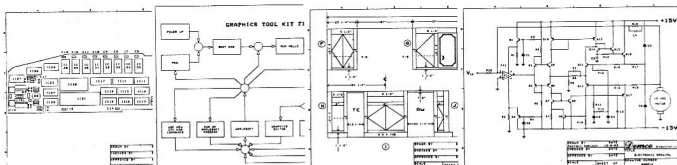
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To begin, you must outline your property as viewed from above, including the house and structures such as a patio, deck, or swimming pool. To place trees, shrubs, flowers, and grass, simply move the cursor to the desired location and select the plant type from almost 100 varieties listed on the reference cards. Experimentation is the key.

Other features let you paint the layout (or the house and the sky, if you want) and add labels to your drawing. The program can also identify your plants, measure distances, and move plants around.

You may use a mouse, paddle, joystick, or graphics pad in your line drawings and plant placement. (A separate program for the mouse is provided.) The keyboard is reserved for selecting plants, sizing, and choosing colors. These devices aren't as easy to use as they should be. One annoying feature is the small, period-sized cursor that marks positions in the initial line-drawing mode. Also, the response to mouse movement is slow; it's easy to pass the point you intend to move before you realize it.

To compensate, it's fairly easy to erase or correct errors—once you know how. The documentation's tutorial fails to cover all of the program's capabilities, and the reference section is a hodgepodge of various types of information. Fortunately, the manual does have a fair technical appendix.

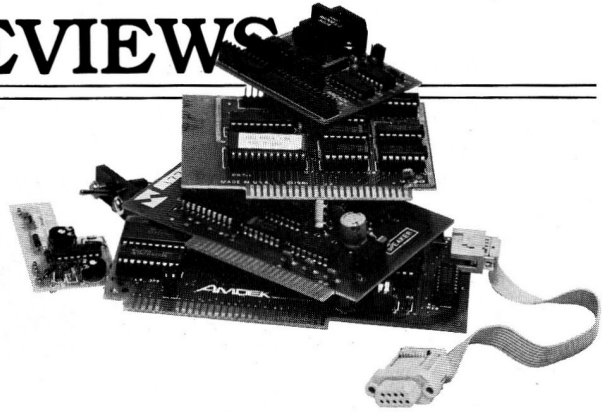
Two disk drives are a must with Landscape Design. Because you must access the program disk whenever you change menus, program and data disk swaps are frequent if you have only one drive.

Although the printer-installation utility appears straightforward, I was unable to get the Gemini 10X printer (one of 11 printers supported by the program) to produce drawings properly. (Some rather cryptic on-screen instructions seem to have slipped by alpha and beta tests.)

If your printer can function with the program, Landscape Design has everything homeowners and professionals should expect in a landscaping program. Its major drawbacks are a confusing manual and the amount of time required to learn the program. ■

Michael A. Banks
Milford, OH

HARDWARE REVIEWS



inCider's Ratings

- ★★★★ Superlative
- ★★★ Above average
- ★★ Good
- ★ Not recommended
- Stay away

A + Mouse

Mouse Systems

2336 H Walsh Avenue
Santa Clara, CA 95051

Optical mouse

Apple //c, and //e with Apple
MouseCard

\$150

★★

When you place the sleek new A + optical mouse next to Apple's mechanical one for the //c and //e, or compare it to the older Macintosh version, the children's story of the city mouse and the country mouse comes to mind.

The A + Mouse is a model of urban chic: svelte, technologically sophisticated, and smooth to operate. The Apple peripheral is somewhat less worldly—chunky, slightly old-fashioned, and a bit slow on the draw. Yet, true to its literary counterpart, the A + Mouse is at a disadvantage. Threatening its survival are a high price tag and the possibility that dealers may not sell Apple //e users the MouseCard interface required to operate it.

For //c and Mac owners, the A + Mouse is well worth investigating. It uses infrared light, rather than a trackball, so there are no moving parts to

wear out or accumulate bits of debris. Noise and friction are also greatly reduced, for the A + Mouse glides on little felt feet over its metal MousePad, which has non-skid rubber strips to make it stay put.

The device's design—smooth lines and a low profile tapering down towards the button—make the A + Mouse fit neatly into the curve of your palm. In contrast, the Apple mouse seems awkward—sloping up to a ridge where the button is located, then down again.

Tested with MacPaint, A + Mouse drew details with greater precision than either of Apple's models. The latter, however, did appear to operate more smoothly when placed on the A + MousePad.

Moving the Mouse

Since all software packages designed for the Macintosh use a common mouse interface, the ratio between mouse and cursor movement remains constant from program to program. My tests indicated that the A + Mouse can take you all over the Mac's screen without nearing the edge of its MousePad. For //e and //c packages, however, the mouse/cursor ratio can vary greatly.

In some programs, extensive mouse travel produces only small changes in cursor position. With a mechanical mouse, you simply trackball a longer distance. But since the optical mouse must remain on the MousePad, you may have to lift and reposition the A + several times.

Try out the mouse-compatible programs in which you're interested, to make sure the A + MousePad will be big enough to let you traverse the entire screen in a single pass. Even if it's

not, you may find that the A + Mouse's ease of operation offsets the annoyance of frequent repositioning.

Do You Want One?

Is the A + Mouse really a good buy? While it's superior to the Macintosh mouse, you probably should resist the temptation to spend \$150 for a device you don't really need. If you're dissatisfied with the drawing capabilities of the Mac mouse, however, and you're willing to pay for greater precision and fast, noiseless, silky-smooth operation, I strongly recommend the A + Mouse.

If you own a //c, consider your options carefully. For \$100, you can buy the Apple //c Mouse. It includes a graphics program called MousePaint, a manual covering both the mouse and the software, and instructions for using the mouse in your own BASIC programs. For \$150, you get the A + Mouse, MousePad, a promotional brochure, and a brief fact sheet. You can also buy the A + with Bank Street Writer (a word processor from Broderbund Software) and Dollars and Sense (Monogram's money-management program) for \$239—not a bad deal.

Apple //e owners also have an easy choice. For \$150, there's the Apple //e Mouse; it's identical to the //c package, except that it includes a MouseCard, a circuit board that must be inserted into one of the //e's interface slots. No mouse works on a //e without it. The A + Mouse package costs the same, but doesn't include the MouseCard, so you'll have to shell out at least another \$50 for the interface, assuming you can buy one separately. Many dealers are reluctant to break up a //e Mouse package; check to see if yours would be willing to order a MouseCard from

Apple's service department.

Overall, the A+ Mouse earns high marks for performance, design, and ease of operation. Its optical technology brings out the best in graphics programs such as MacPaint, and the absence of moving parts should ensure years of trouble-free use. The price of the A+, however, is grossly inflated. Apple owners should seriously consider the Apple //c Mouse for \$50 less, or the //e version (with MouseCard) for the same price. And with MousePaint software to boot, the country cousin may just be the winner here. ■

Wayne J. Sassano
Wethersfield, CT

MultiView 80/160

Checkmate Technology

509 South Rockford Drive
Tempe, AZ 85281

80/160 column card

Apple II, II Plus, //e

Requires a monochrome monitor

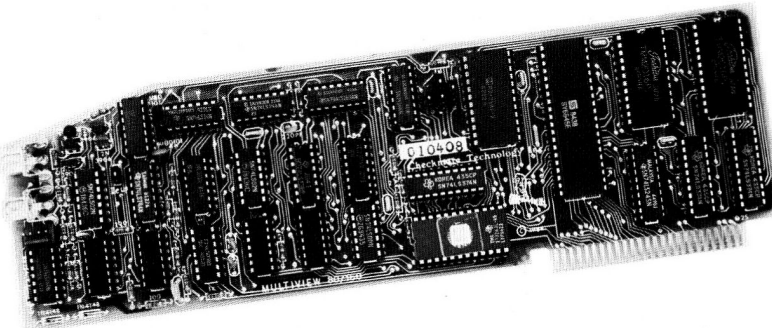
\$349.95

★★★

An investment in a high-quality, versatile video interface is no luxury for those of us who are writers, programmers, and business analysts spending extended periods of time at the computer. If you're a heavy computer user, you'd do well to purchase a MultiView 80/160. You'll exhaust neither its many features nor your eyes.

MultiView is an intelligent video-display card with a selection of seven screen sizes and a dozen combinations of background and text attributes, including inverse, bold, and underlined. For extended periods of computer use, you can modify your screen display to lessen eyestrain or other visual discomfort. Experimenting, I found that inverse backgrounds were hard on the eyes, but a normal background with an underline cursor and a bold intensity was delightful.

You can easily install MultiView in slot 3, even in the Apple //e whose auxiliary connector slot is reserved for ordinary 80-column display cards. If you have an extended memory (64K) 80-column card in the auxiliary connector, you can still use MultiView because its design lets it access that extra



MultiView gives your Apple up to 160 columns.

memory for spreadsheets, written documents, and BASIC programs.

MultiView requires a monochrome monitor with a video bandwidth of 12 MHz or better, a prerequisite most monitors meet. The Monitor Adjustment Aid program on the demonstration disk prompts you to scale the display (using vertical and horizontal controls) and to optimize clarity (using the brightness, contrast, and focus controls). If you can't initially capture the total width of the 96-by-24 or the 160-by-24 displays, external horizontal adjustment knobs will immediately correct fall-out (loss of characters at the left and right margins). The Apple Monitor II doesn't have these knobs, but a dealer can make the necessary internal adjustments.

Monitor II owners must confront another problem that's treatable but not curable. The Monitor II CRT is coated with a low-persistence green phosphor that causes a flickering display when you use the 80-by-32, 80-by-48, or 132-by-30 mode. Lowering the brightness and decreasing the contrast reduce this annoyance but don't eliminate it.

The manufacturer claims that a 132-column display is as clear to read as an 80-column display. Not only is this assertion true (the 8-by-9 matrix characters are near letter-quality), but a unique Eye Saver feature expands the space between characters, making the display extraordinarily clear.

Demonstration programs included with MultiView contain remark statements in the Applesoft BASIC and assembly-language source listings that help you exploit programming techniques MultiView uses. A special feature, reverse scrolling of up to 4096 characters, lets programmers retrieve

code that has scrolled off the screen without having to relist the program. Software developers will appreciate the availability of up to five prompt lines, freeing the rest of the screen for user workspace.

Preboot Programs

If you're not a programmer, Checkmate Technology's packaged software will help you use MultiView with your spreadsheet, word-processing, and data-base programs. Because such programs don't expect to find a MultiView card in slot 3, you have to use a preboot program (ranging in price from \$25 to \$50) to turn on the card first.

Checkmate has released a Universal Spreadsheet Preboot, which was included in my review package. With MultiView installed, all you have to do is insert the preboot disk into the drive, turn on the computer, and follow the clear and uncomplicated instructions on the screen. You're prompted for the spreadsheet you'll be using (VisiCalc, Multiplan, MagiCalc, AceCalc, THE Spreadsheet, or IACalc), the display size you want from a large selection, and the attributes you'd like.

After the preboot disk is configured (automatically) the way you want, the screen prompts you to insert your spreadsheet program disk and press the return key. MultiView doesn't support VisiCalc Advanced yet, but technical support people at Checkmate assured me that a preboot for VisiCalc Advanced is slated for release in the spring.

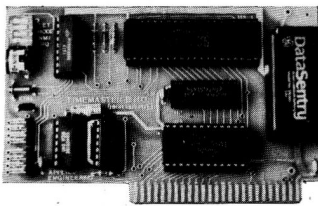
Preboots are available for all ProDOS and DOS versions of Apple Writer II. MultiView supports other word-processing software (Magic Window and Format II, for example), but only in

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- Absolutely, positively, totally PRO-DOS and DOS 3.3 compatible.
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BRAND A	NO	NO	YES	NO	NO	NO	NO	NO
BRAND C	NO	NO	NO	NO	NO	NO	NO	NO
BRAND M	NO	NO	NO	NO	NO	NO	NO	NO
BRAND P	YES	YES	NO	YES	NO	NO	NO	NO
BRAND S	NO	NO	NO	NO	NO	NO	NO	NO
BRAND T	YES	NO	NO	NO	NO	NO	YES	NO

Full emulation of all other clocks. Yes, we emulate Brand A, Brand T, Brand P, Brand C, Brand S and Brand M too. It's easy for the H.O. to emulate other clocks, we just drop off features. That's why the H.O. can emulate others, but none of the others emulate us. The Timemaster II H.O. will automatically emulate the correct clock card for the software you're using. You can also give the H.O. a simple command to tell it which clock to emulate. This is great for writing programs for those poor unfortunates who bought some other clock card.

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- The VIEWMASTER incorporates all the features of all other 80 column cards, plus many new improvements.

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SUPERTERM	MORE	NO	YES	NO	NO	NO	NO	YES	YES
WIZARD 80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION 80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
COMUNIVISION	MORE	NO	NO	NO	NO	NO	NO	YES	YES
VIEWMAX 80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
SMARTERM	MORE	YES	YES	NO	NO	NO	YES	YES	NO
VIDEX	MORE	NO	YES	YES	NO	NO	YES	NO	YES

The VIEWMASTER 80 works with all 80 column applications including CP/M, Pascal, WordStar, Format II, Easywriter, Apple Writer II, VisiCalc, and all others. The VIEWMASTER 80 is THE MOST compatible 80 column card you can buy at ANY price!

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standard 80-column-by-24-line mode. Future preboot releases will include programs for PieWriter and Screen-Writer.

Filing and data-base systems currently supported include dBase II and Checkmate's InfoBank II. An AppleWorks preboot is available for integrated-software users and allows Apple II Pluses to run AppleWorks. Checkmate anticipates an updated version of ArtSci's Magic Office System will take full advantage of MultiView without the need for a preboot.

In addition to the customary 96 ASCII characters, MultiView offers 32 alternate characters: a checkmark, an apple, a degree sign, and a copyright symbol to name a few. Other enhancements include a light-pen port (under \$100) and a SuperWorks PROM (\$40), which offers a BASIC line editor, a user-programmable function key option, and a screen-dump command.

The documentation accompanying the MultiView card and preboot programs is well-organized and well-written. The paper quality of the user's man-

ual, however, is flimsy, and the pages are poorly bound and probably won't stand up to normal wear and tear.

MultiView 80/160 is warranted for five years, and diagnostic programs on the demo disk can help you determine if your card is malfunctioning. As a registered MultiView owner, you're sent a periodic newsletter and you can expect to receive strong technical support. ■

**Cynthia Field
Wakefield, RI**

Riteman F +

Inforunner

431 North Oak Street
Inglewood, CA 90302

Dot-matrix printer
Parallel interface standard
Serial interface available
\$399

★★

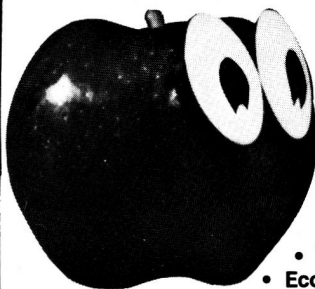
Perhaps the best feature of the Riteman F+ dot-matrix printer

is its transportability—it's small enough to actually fit into an attache case. If that's important to you, and you also want a full complement of software-selectable features, consider the Riteman F+.

Despite its compact size, the F+ is a full-feature printer with pica, elite, compressed, and proportional type fonts. The proportional font prints pica-sized characters in emphasized mode and avoids the smeared or "mushy" appearance some other printers produce. In addition to bold-face (double strike), double width, sub-superscripts, and underlining, the F+ offers italics and several international character sets. (Subscript and superscript don't function in proportional font.) The F+ prints graphics in single, double, or quadruple density.

The 96 standard ASCII characters are formed in a 9-by-9 matrix with full descenders in lowercase. This print quality, especially in proportional mode, is acceptable for most home or school applications, and puts the Riteman on a par with other dot-matrix

Circle 204 on Reader Service Card.



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The DS-65 is an intelligent peripheral card with on-board software in 2708 EPROM. Check these software features:

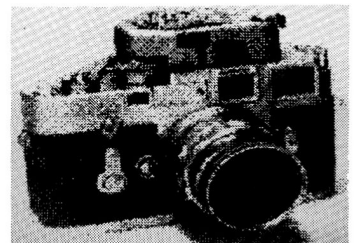
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Use the DS-65 for precision security systems; computer portraiture; robotics; fast to slow scan conversion; moving target indicators; reading UPC codes, musical scores and paper tape and more! **GIVE YOUR APPLE THE GIFT OF SIGHT!** DS-65 Price: \$349.95
RCA 1500 Series Camera w/6:1 zoom lens Price: \$399.90/Combination Price: \$729.95

ADDITIONAL SOFTWARE FOR THE DS-65

— **Picture Scanner:** An applications tool for processing video images for display on the Hi-Res screen. A variety of dithering algorithms are provided, for compressing the digitized image into the Hi-Res screen and simulating grey scales. Price: \$39.95

— **Superscan:** Enables you to enhance the DS-65's Hi-Res pictures with colors! Choose from 21 different colors and assign them to grey scale values, modify pictures, zoom, enhance contrast, etc. Includes print routines for Anadex 9500 or 9501; Epson MX-80GFT and MX-100; and IDS 460 Paper Tiger*. Written for The Micro Works by Magna Soft. Price: \$99.95



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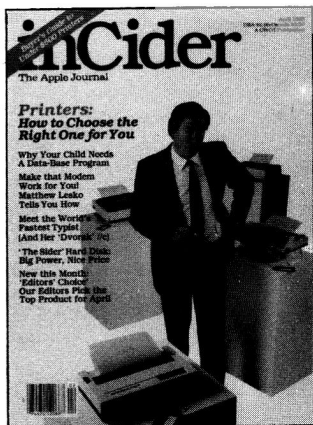
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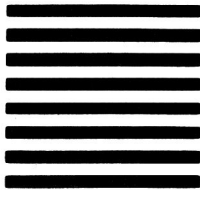
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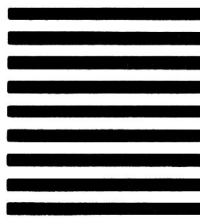
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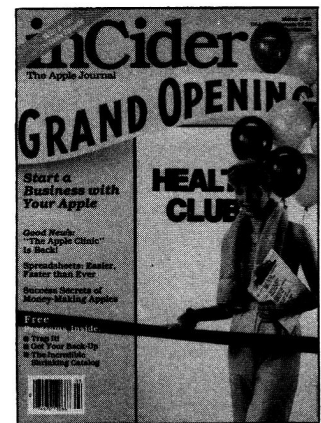
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2598	ALPHABET ZOO	29.95 20.30
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0025	APPLE SOFTWARE 1985	19.95 15.45
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printers in its price range. The manufacturer claims the speed is 105 characters per second in draft mode and 52 cps in expanded mode, but those figures don't include time lost in carriage returns.

The F+ printer can handle cut-sheet or continuous-form paper in a range of widths from 4 inches to letter size. An unusual front-loading mechanism makes the printer easy to use and doesn't waste the first sheet of paper. On the other hand, this design makes aligning the perforation to establish the top-of-form difficult.

The manufacturer calls the ribbon an "exclusive cassette design"—no other printer or typewriter uses one like it. Make sure your dealer is prepared to stock the cassettes for you, and check the cost.

Formatting options include top, bottom, left, and right margins and horizontal and vertical tabs. A unique software command generates a reverse line feed in increments of your choice, although the machine cannot produce reverse form feed. You can print out hexadecimal code instead of the standard ASCII characters by holding down the form-feed and line-feed buttons when you turn the printer on.

A clone of Epson's assortment of printer commands has been programmed into the Riteman's ROM chip, giving you nearly universal compatibility with software and printer interface cards. A Centronics-compatible parallel interface port is standard, and an RS-232C serial port and an 8K buffer are available as options.

Installing the printer consists mostly of taking it out of the box, removing the packing material, and plugging in the power cord and interface cable. You may have to remove one screw to uncover the DIP switches if you want to examine the factory settings, or if you are using an unusual interface card in your computer.

The F+ manual is barely adequate compared to those from other printer manufacturers. The documentation's dry tone reflects its electrical-engineering orientation, and it also appears to have been translated into English without benefit of a good dictionary. The sections on user-defined fonts, font downloading, and bit-image graphics are especially difficult to comprehend.

For those of you who need the convenience of a portable printer, however, the Riteman F+ may provide the versatility and efficiency you're looking for. ■

James B. Munro
Youngstown, NY

QC-10 Hard Disk

Quark
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Denver, CO 80219

Hard disk
Apple //e and //c
\$1995

★★

Quark's QC-10 hard disk adds 10 megabytes of on-line storage to your Apple //e, //c, ///, or Macintosh—but in trying to be a jack of all trades, it's quite possibly a master of none.

The Quark QC-10 comes with two disks, one for Macintosh and one for SOS/ProDOS applications. It also includes cables for the Macintosh, //e, and //c. I ordered an Apple /// cable with my hard disk, as well. Two switches on the back of the unit let you specify the computer you're using.

At \$1995, the QC-10 costs almost three times more than the Sider 10-megabyte unit, but the Sider only connects to the Apple //e and its clones. Even Apple's own 10-megabyte Profile is only //e-compatible. Quark's drive looks like the appropriate choice for the Apple user with a variety of equipment.

With the QC-10's software, you can divide the 10-megabyte area into smaller segments and use it as several disks, or as one contiguous volume. The review unit I received was already divided into separate sections for the Apple ///, II series, and Macintosh. Each portion was about 2 megabytes in size, leaving 4 megabytes for my own volumes.

You'll get the first hint that something's wrong when you try to exit the Filer routines. Apple-coded BASIC.SYSTEM is the default file you'd run on the standard utilities disk. But there is no BASIC.SYSTEM on the Quark disk; you have to run QC.QUARK. The

Quark designers, however, didn't bother to re-code the Filer to indicate that.

You rename QC.QUARK. to BASIC.SYSTEM on the original disk and the copy. Since you can exit the Filer correctly and all other functions appear to be working, you'll probably feel confident you can now reboot the system with your new copy. But you're wrong—you'll get the message "Interpreter Not Found." The disk looks for QC.QUARK. as the first file loaded after ProDOS and will accept no substitute. You must go back and copy BASIC.SYSTEM (formerly QC.QUARK.) to another file and call it QC.QUARK. (Rename your copy, too.) Finally, you feel everything should work correctly—but you're wrong again.

Apple's ProDOS utilities, like most ProDOS software, accept the volume name of the boot disk as the default path name for your disk activity; you can call the disk any name you want. But Quark hard-codes the volume name /QC.SOFTWARE into its utilities. If you name your disk anything else, you'll get a "Volume Not Found" error—before you can even do any real work on the hard disk.

Quark's product works well on the Macintosh, but with multi-machine capability built in, the designers need to take its development a few steps further: make the software more logical, and give the QC-10 a common, compatible area where Apple II's, ///'s, and Macintoshes can swap files. As the QC-10 stands now, it's rather disappointing. I don't have time to wait—it's back to the Profile for me. ■

Bill O'Brien
Fort Lee, NJ

Editor's note: In February Quark released a new version of the ProDOS/SOS software disk. According to project manager Perry Moss, "when you exit the program, it now returns you to our utilities program. The problems Bill O'Brien encountered no longer exist." Each portion of the software—for the Apple ///, II series, and Mac—has been reduced to 1 megabyte, and Moss reminds users that unless they plan to operate all three computers they may erase the programs for the two unused machines.

NEW SOFTWARE



The Professional offers Mac graphics on a //c.

Very Important Professional

The **VIP Professional** is a tough-but-tender integrated spreadsheet. It takes the memory of the //c or the enhanced //e—128K—and provides a mouse and pull-down menus to the Macless. The VIP also takes advantage of the double high resolution of the II series. The powerful spreadsheet combined with data base and business graphics compares favorably with Lotus 1-2-3. But the VIP is easier to use. The price is only \$199, from VIP Technologies, 132 Aero Camino, Goleta, CA 93117, (805) 968-4045. For more information circle number 486 on the Reader Service card.

Science Fair

The **Temperature Lab** is the first in a series of science laboratory offerings from Hayden Software. The programs will enable students to conduct experiments illustrating scientific phenomena. Temperature Lab features a temperature sensor that

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plugs into an Apple II through the game port. Recorded temperatures are also displayed immediately on the monitor. An alcohol bulb thermometer is included to check directly measured readings against the computer. The Temperature Lab and Experimenter's Guide retails for \$99.95, from Hayden Software, 600 Suffolk Street, Lowell, MA 01854, (617) 937-0200. For more information circle number 470 on the Reader Service card.

Super Apple

SuperCalc 3a is the only spreadsheet with integrated graphics and data management for the Apple //c and enhanced Apple //e. Features like file conversion, send and receive utilities, ProDOS file support, full use of the 65C02 processor, and 50 more built-in functions mark the speed and sophistication of SuperCalc 3a. You can convert AppleWorks and VisiCalc files to SuperCalc formats, and even transfer files between Apples and IBM PCs. The Sideways utility is provided, which ends cutting and pasting by printing wide reports horizontally. All this for \$195 from Sorcim/IUS Micro Software, 2195 Fortune Drive, San Jose, CA 95131, (408) 942-1727. For more information circle number 471 on the Reader Service card.



Temperature Lab measures and interprets.



Build a spreadsheet in ten minutes with SuperCalc.

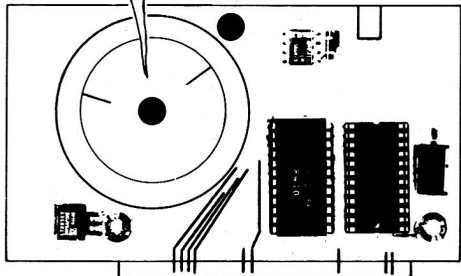
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Votrax Announces

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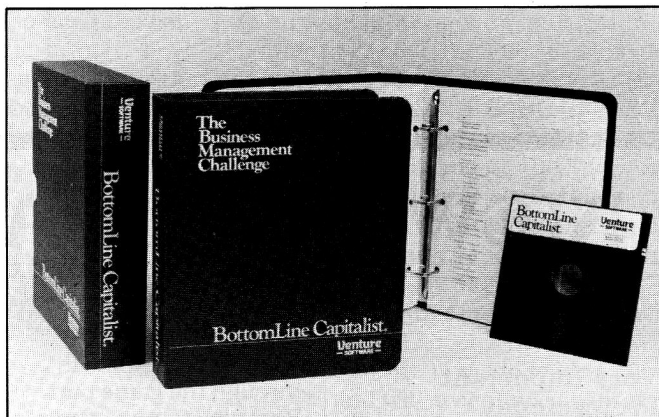


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NEW SOFTWARE



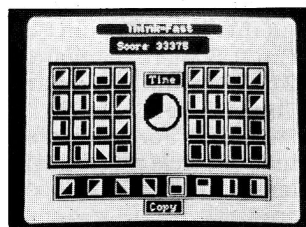
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Personal Safety

Keeping Safe teaches children as young as five how to handle potentially dangerous situations. A wide variety of encounters are projected—ranging from “Strangers in Cars” to dealing with “People You Know”—giving the youngsters a chance to experience potential problems in a non-threatening way. The computer adds reinforcing or correcting feedback and delightful graphics—a wise way to handle a delicate subject, for \$49.95, from Marshware, P.O. Box 8082, Shawnee Mission, KS 66208, (800) 821-3303. For more information circle number 487 on the Reader Service card.

Supercharged Turbo

Turbo Pascal 3.0 offers a twofold increase in compile and execution speeds over Version 2.0, while adding graphics, optional binary-coded decimal support, I/O redirection, and a memory-mapped editor to its list of new features. The Turbo Pascal language-development environment includes a high-speed single-pass native code compiler, full-screen editor, runtime error checking, commented source code, and a

MicroCalc spreadsheet. Turbo 3.0 requires 35K bytes of memory. Version 3.0 sells for \$69.95 (owners of Turbo 2.0 can trade in that version for a credit of \$39.95), from Borland International, 4113 Scotts Valley Drive, Scotts Valley, CA 95066, (408) 742-1133. For more information circle number 474 on the Reader Service card.

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Wishbringer brings adventure into your life, even if you shy away from excitement, like the dreamy postal clerk whose imagination leads him into Infocom's latest fantasy. Written by Brian Moriarty for the introductory-level player, it is highly interactive—the story is open-ended and many of the puzzles have more than one solution. You need imagination, skill, daring, and maybe just a bit of luck, to find the cat The Evil One has captured from the ancient crone at The Olde Magick Shoppe. Wishbringer for the Apple II, //e, and //c retails for \$39.95 from Infocom, 55 Wheeler Street, Cambridge, MA 02138, (617) 492-1031. For more information circle number 472 on the Reader Service card.

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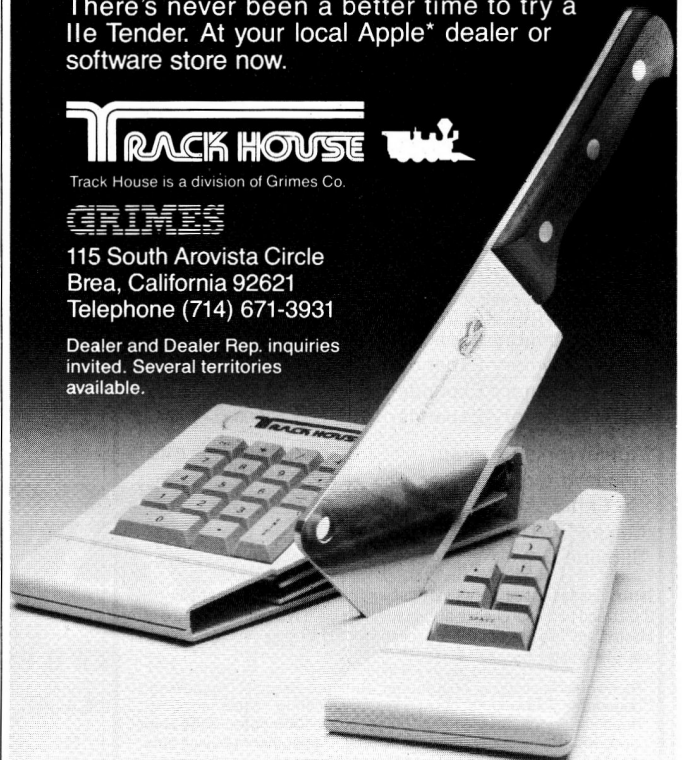
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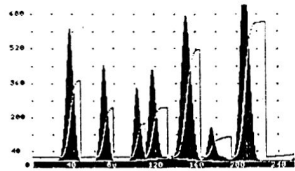
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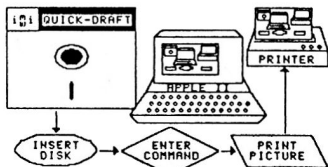
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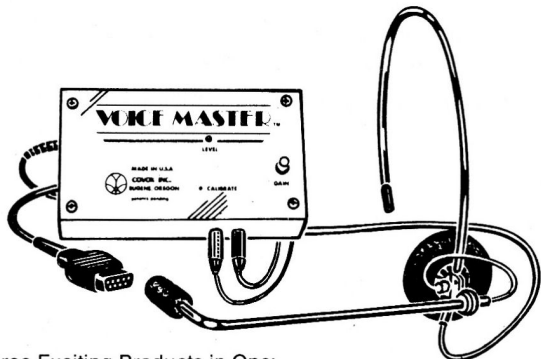
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Double Disks

The **Turbo II** is an affordable disk duplicator for medium- to large-volume production of 5¼-inch disks. It copies all soft-sector 5¼-inch formats: single-sided, double-sided, floppy, single density, double density, or quad density. It copies the difficult group-encoded Apple format at a rate of 2500 copies per eight-hour day. The \$5600 price tag includes a complete Apple //e. If you

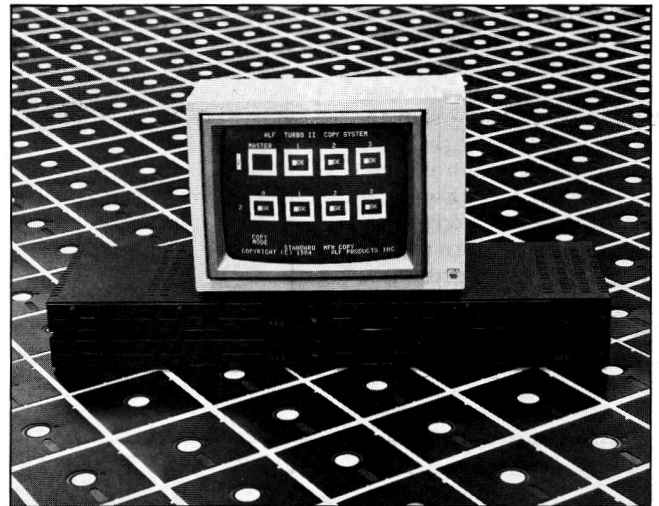
already own a machine, the price comes down to an easy \$1500, from ALF Products, 1315F Nelson Street, Denver, CO 80215, (303) 234-0871. For more information circle number 461 on the Reader Service card.

Troubleshooting Guide

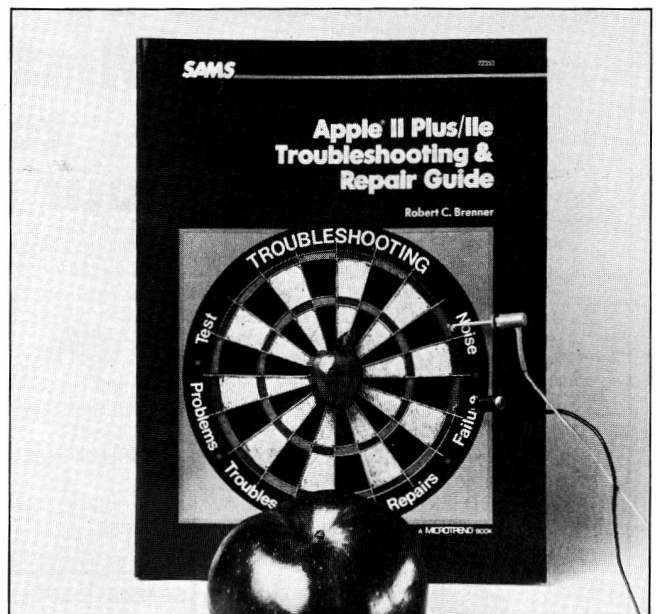
The **Apple II Plus//e Troubleshooting and Repair Guide** takes users through proper II Plus and //e diagnostic techniques and lists specific malfunctions. The author of the 256-page guide, Robert C. Brenner, wants the book in the hands of the user in those "95 percent of all circumstances where knowledge and a good reference are enough to . . . find and repair a failure." Development of custom hardware and software diagnostic tools is covered, as well. The abundantly illustrated volume is available for \$19.95 from Howard W. Sams, 4300 West 62nd Street, Indianapolis, IN 46268, (317) 298-5400. For more information circle number 458 on the Reader Service card.

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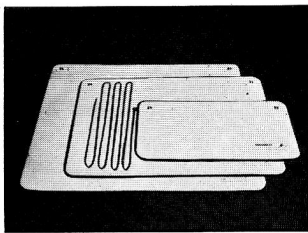
The Turbo II, for large-volume floppy-disk duplication.



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edited by Paul Statt

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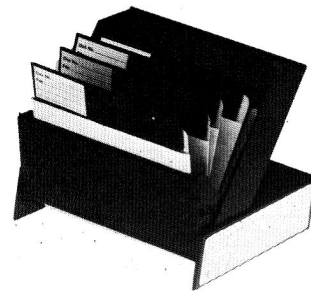
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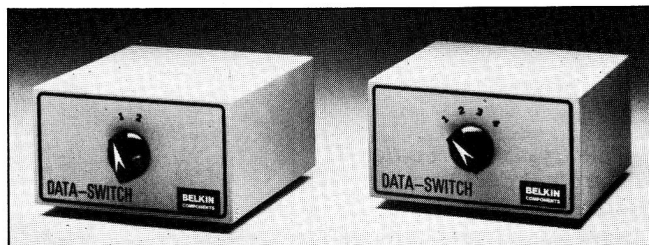
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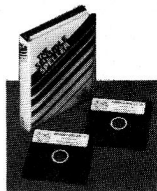
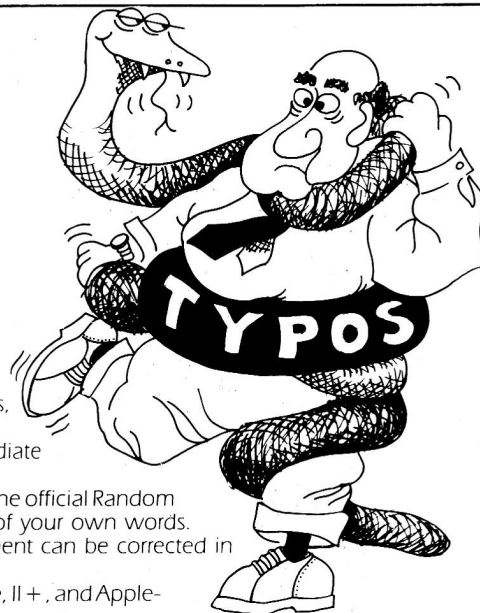
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Apple Wristwatch?

The Seiko **PC Data-graph RC-1000** is a multifunction quartz wrist terminal. It connects to an Apple at home and stores 2K of data on the arm. The user selects information on the computer, connects the Datagraph, and loads. Data are ready for instant recall—anywhere, any time—on the scrolling 2-line, 24-character, dot-ma-



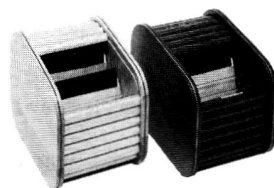
The Seiko RC-1000, for Dick Tracy types.

trix LCD readout. This is a Seiko—time of day, year, month, date, day of the week, hour, minute, and second are hard-wired. Numbers, schedules, addresses, stocks, and other facts can be stored in 12 files. With cable and Apple software, the PC Data-graph retails for \$150, from the Consumer Electronics Division of Hattori America, 1330 West Walnut Parkway, Compton, CA 90220. For more information circle number 454 on the Reader Service card.

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The Magellan **Light Pen System II**—unlike toy graphics systems and joysticks—interacts directly with your monitor or TV screen. With the Light Pen single-dot accuracy is achieved on the Apple graphics display—that's high resolution. The Light Pen is controlled by the hand and a button on the pen itself—the user never touches the keyboard or joystick. An interface card for any of the II, II Plus, or //e expansion slots is included, as are Quick-Draw and Amper-Pen software. The complete package for Apple artists retails for \$189.95, from Magellan Computer, 4371 East 82nd Street, Suite D, Indianapolis, IN 46250, (317) 842-9138. For more information circle number 456 on the Reader Service card.

Now you can monitor and control the world (or at least your part of it) with a little help from APPLIED ENGINEERING

12 BIT, 16 CHANNEL, PROGRAMMABLE GAIN A/D

- All new 1984 design incorporates the latest in state-of-art I.C. technologies.
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- Very fast conversion (25 micro seconds).
- Analog input resistance greater than 1,000,000 ohms.
- Laser-trimmed scaling resistors.
- Low power consumption through the use of CMOS devices.
- The user connector has +12 and -12 volts on it so you can power your sensors.
- Only elementary programming is required to use the A/D.
- The entire system is on one standard size plug in card that fits neatly inside the Apple.
- System includes sample programs on disk.

PRICE \$319

A few applications may include the monitoring of ● flow ● temperature ● humidity ● wind speed ● wind direction ● light intensity ● pressure ● RPM ● soil moisture and many more.

A/D & D/A

A/D & D/A Features:

- Single PC card
- 8 channels A/D
- 8 channels D/A
- Superfast conversion time
- Very easy programming
- Many analog ranges
- Manual contains sample applications

A/D SPECIFICATIONS

- 0.3% accuracy
- On-board memory
- Fast conversion (.078 MS per channel)
- A/D process totally transparent to Apple (looks like memory)
- User programmable input ranges are 0 to 10 volts, 0 to 5, -5 to +5, -2.5 to +2.5, -5 to 0, -10 to 0.

The A/D process takes place on a continuous, channel sequencing basis. Data is automatically transferred to its proper location in the on-board RAM. No A/D converter could be easier to use.

D/A SPECIFICATIONS

- 0.3% accuracy
- On-board memory
- On-board output buffer amps can drive 5 MA
- D/A process is totally transparent to the Apple (just poke the data)
- Fast conversion (.003 MS per channel)
- User programmable output ranges are 0 to 5 volts and 0 to 10 volts

The D/A section contains 8 digital to analog converters, with output buffer amplifiers and all interface logic on a single card. On-card latches are provided for each of the eight D/A converters. No D/A converter could be easier to use. The on-board amplifiers are laser-trimmed during manufacture, thereby eliminating any requirement for off-set nulling.

PRICE \$199

SIGNAL CONDITIONER

Our 8 channel signal conditioner is designed for use with both our A/D converters. This board incorporates 8 F.E.T. op-amps, which allow almost any gain or offset. For example, an input signal that varies from 2.00 to 2.15 volts or a signal that varies from 0 to 50 mV can easily be converted to 0-10V output for the A/D.

The signal conditioner's outputs are on a high quality 16 pin gold I.C. socket that matches the one on the A/D's so a simple ribbon cable connects the two. The signal conditioner can be powered by your Apple or from an external supply.

FEATURES

- 4.5" square for standard card cage and 4 mounting holes for standard mounting. The signal conditioner does not plug into the Apple, it can be located up to ½ mile away from the A/D.
- 22 pin, .156 spacing edge card input connector (extra connectors are easily available i.e. Radio Shack).
- Large bread board area.
- Full detailed schematic included.

PRICE \$79



I/O 32

- Provides 4, 8-Bit programmable I/O Ports
- Any of the 4 ports can be programmed as an input or an output port
- All I/O lines are TTL (0-5 volt) compatible

- Your inputs can be anything from high speed logic to simple switches
 - Programming is made very easy by powerful on-board firmware
 - The I/O 32 is your best choice for any control application
- The I/O manual includes many programs for inputs and outputs.

Some applications include:

Burglar alarm, direction sensing, use with relays to turn on lights, sound buzzers, start motors, control tape recorders and printers, use with digital joystick.

PRICE \$89

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Make the switch with HanZon's Universal Data Buffer.

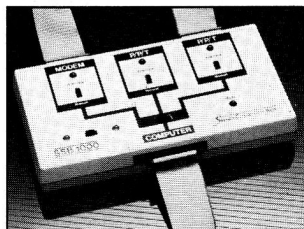
Trouble-Free Interfacing

The **Universal Data Buffer** is an intelligent device that connects any computer with serial or parallel output to any printer. The buffer's microprocessor automatically checks the computer and reconfigures the interface to match. The test feature varies baud rates and word sizes to determine switch settings. Standard baud rates from 300 through 19,200 are supported. The Universal Data Buffer is available for \$385 from HanZon Data, 18732 142nd Avenue N.E., Woodinville, WA 98072, (206) 487-1717. For more information circle number 450 on the Reader Service card.

Intelligent Connection

The **Smart Switch Box** is an easy way to connect a modem and two peripherals to a single computer. It has one computer port and three peripheral ports—one dedicated to a modem and two for printers, plotters, or terminals. The Smart Switch uses 25-wire ribbon cables, and employs logic circuitry to make the correct RS-232C connection between any computer and peripheral. The Smart Box will indicate which piece of equipment is disabling data transfer in the event of trouble, and includes two six-foot-long cables with male and female DB25

connectors to accommodate any port. Available for \$159.95 from IQ Technologies, 11811 NE First Street, Suite 308, Bellevue, WA 98005, (206) 451-0232. For more information circle number 459 on the Reader Service card.



IQ's Smart Switch Box connects your Apple to any serial peripheral.

Cheap Letters

The **Juki 6000** is a compact, efficient, economical letter-quality printer. The new printer weighs only 13 pounds, and measures just 15¼ inches wide, 9 inches deep, and 5½ inches high. Its maximum print speed is 10 cps. The bidirectional, logic-seeking printing system combines a 9-inch wide printing area (12-inch platen) with a smooth friction paper feed. The Juki 6000 uses single-strike or fabric ribbons, and is available with Centronics or RS-232C interface, for \$295. That's right—less than \$300—from Juki Industries of America, 299 Market Street, Saddle Brook, NJ 07662, (201) 796-3666. For more information circle number 457 on the Reader Service card.

Print It Yourself

The **U-Print Universal Printer AP64** for the Apple //c offers 64K of internal memory for buffering output data. A copy button allows for as many as 255 multiple manuscripts, and a reset button clears the buffer memory. U-Print has a standard Centronics parallel interface. The AP64 sells for \$199.95, and the **AP16**—with 16K of internal memory—for \$139.95. Both from Digital Devices, 430 Tenth Street, Suite N205, Atlanta, GA 30318, (404) 872-4430. For more information circle number 451 on the Reader Service card.

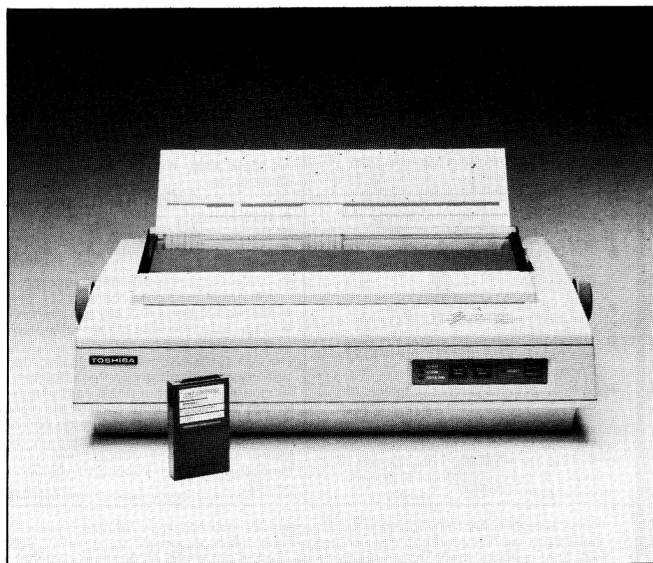
Office Peace and Quiet

The Toshiba **P351** is an enhanced version of the 24-pin, 3-in-1 dot-matrix printer. Plug-in font cartridges make changing type a snap, and the high-speed draft printing rate of 288 characters per second is among the fastest in the business. The cabinet has been acoustically redesigned to reduce the noise level by four decibels. The P351 also offers Qume

Sprint 11 letter-quality emulation, a forward-stacking sheetfeeder, and the ability to print in bold-face without slowing down. The suggested retail price is the same as that of the P1351, \$1895, from Toshiba America Information Systems, 2441 Michelle Drive, Tustin, CA 92680, (714) 730-5000. For more information circle number 455 on the Reader Service card.

Only Connect

The **ApriCord //c** is one of a family of parallel printer interfaces that allows you to print with any of the popular Centronics-compatible machines and your //c. The ApriCord //c requires no external power supply. It contains fewer, but more advanced, electronic components than standard interfaces. The electronics are encased in an injection-molded shell—no expansion module is required. The ApriCord //c sells for \$79.95 from Apricorn, 7050 Convoy Court, San Diego, CA 92111, (619) 569-9483. For more information circle number 466 on the Reader Service card.



The P351 printer, Toshiba's acoustic wonder.

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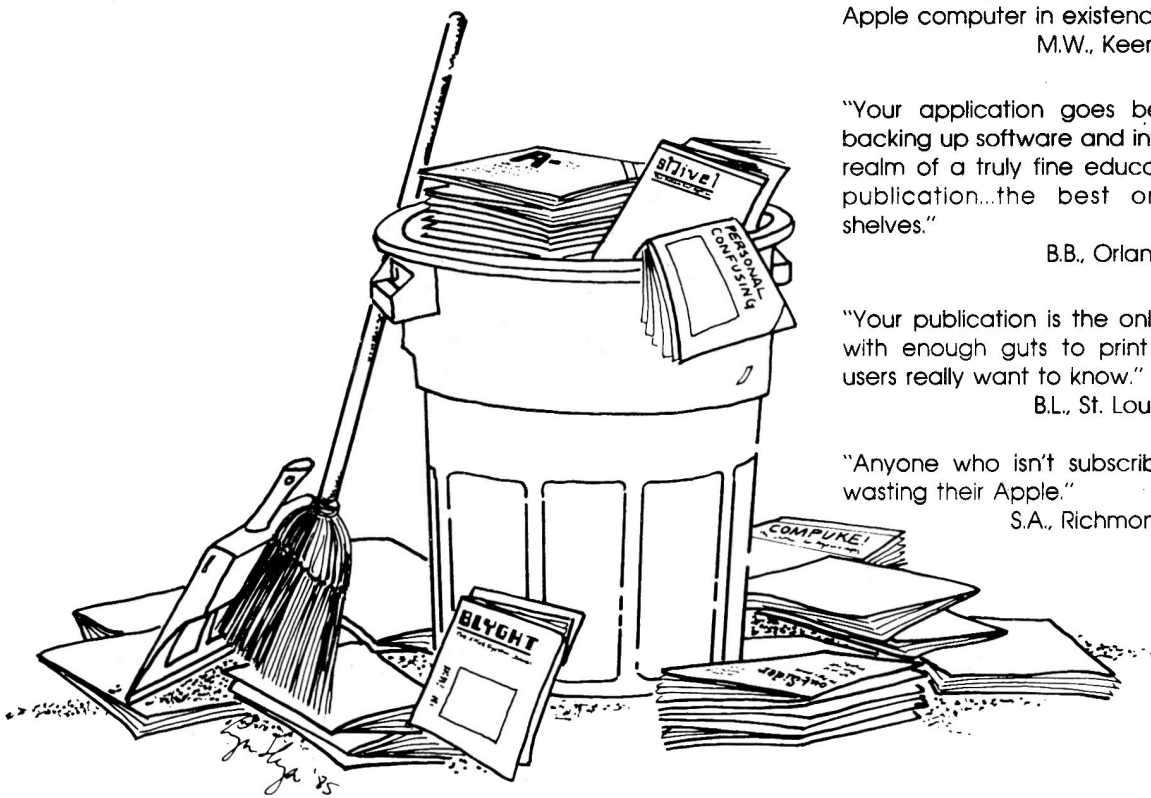
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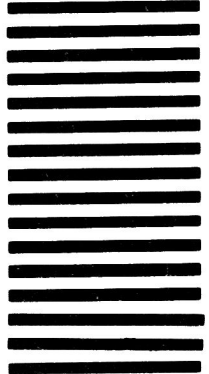
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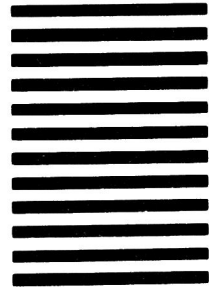
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In *The Game Reserve*, Brian Murphy reviews six to eight of the most recent Apple games to hit the market. Look here for inCider's scoop on the latest fun.

Game Ratings

-  Boffo
-  Cut above
-  Mundane
-  Futile

Situation: Critical



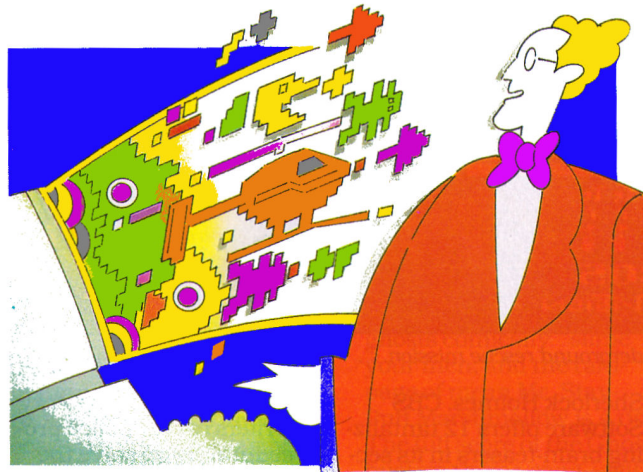
Prism Software
26600 Southfield Road
Lathrup Village, MI 48076
\$29.95
Any Apple II, 48K
Joystick optional

The future of computer games looks promising. I've found two exciting ones this month, among a number of other entertaining offerings.

Situation: Critical packs a lot of bang for the buck (**Photo 1**), requiring you to complete three



Photo 1. *Situation Critical*—lost in space. . .



challenging arcade games. It might become a lifetime quest.

First you must steal the components of a doomsday bomb from the alien Xarlons, who look like No-



Photo 2. . . . you need a steady throttle hand. . .

lan Bushnell robots with a mean streak. You race from room to room, zapping Xarlons and grabbing parts of the nuke. If your armor hasn't been blown away, you hop into a jet that speeds you to the next scenario.

Once in your plane, you must negotiate the heavily defended subterranean grottoes under the surface of Xarlon. You must dodge anti-aircraft guns, laser guns, and laser force screens, or destroy them

with your guns and bombs. Watch the rocky, twisting passages—you have only one plane (**Photo 2**). Winning takes more than one try—more than 20, come to think of it.

Finally you fly over the plains of Xarlon, bombing docks, roads, ships, bridges, and refineries (**Photo 3**). The Xarlons send up fighters and anti-aircraft missiles, but this is the easiest mission of the game. If you can conserve your fuel and evade enemy missiles, you can bomb Xarlon all night.

Situation: Critical—all three games—is fun, fun, fun. Each game was programmed by a different author, and each is beauti-



Photo 3. . . . but color graphics make bombing easier.

fully designed. The animation in the grottoes of Xarlon is very good, reminiscent of *Star Blazer*. The color, action, 3-D, and simulated scrolling in the bombing scenario are out of this world. Check out *Situation: Critical!*

H.E.R.O.



Activision
P.O. Box 7287
Mountain View, CA 94039
\$39.95
Any Apple II, 48K

The second good arcade game of the month is **H.E.R.O.**—Helicopter Emergency Rescue Operation. In this fantasy, you guide a rescuer with a mini-helicopter strapped to his back through subterranean labyrinths to seek trapped miners (**Photo 4**).

Using a joystick to move this little superguy, you plant explosives, fire bursts at the nasty creatures who inhabit the tunnels, and thread your way through the shafts when the lights inexplicably go out (**Photo 5**).

This "lights out" feature is one of the most inventive and effective in the game. As you proceed through the advanced levels, you will enter scenes that remain on screen only a split second, to be replaced by blackness. You can still see the creatures lurking in the caverns, but the passages remain dark.

The game is difficult to

by Brian J. Murphy

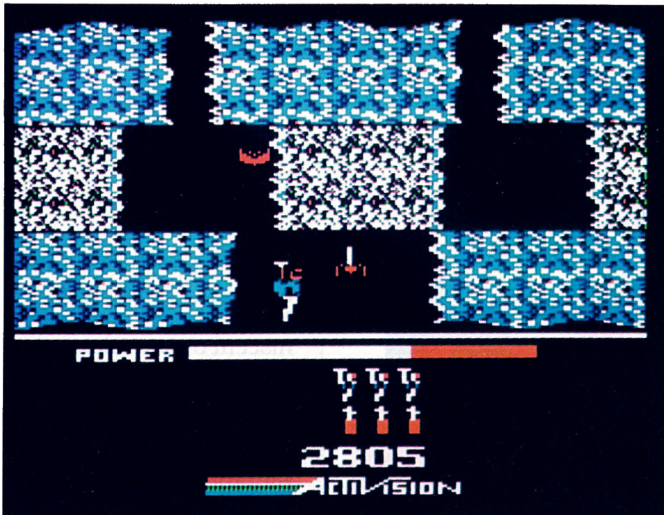


Photo 4. Your H.E.R.O. is on an underground rescue mission. . .

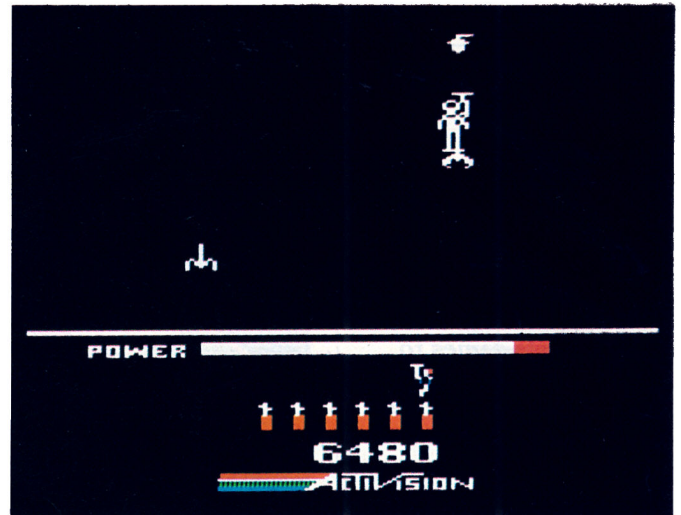


Photo 5. . . .when suddenly the lights go out.

master. After an hour's practice you can work your way down to level 4 or 5, but it will be many hours before your four miners (plus any extra you pick—one per 20,000 points) dig as deep as the 20th level and below. You need to learn how to use dynamite safely, how to flee the lava flows, and how to snake through complex mazes.

Is this an original idea? It's original enough to prevent Activision from being taken to court for copyright infringement. The concept of the game should be familiar enough to omnivorous arcade addicts, but I heartily recommend H.E.R.O. for its challenge, smooth action, and unpredictability.

Felony!



CBS Software
One Fawcett Place
Greenwich, CT 06836
\$34.95
Any Apple II Plus, //e, or //c, 48K

Like mysteries? Silly question—most people adore a good detective story, with twists and turns that would defy even

Sherlock Holmes. CBS Software offers 12 tantalizing brain-teasers in its second mystery game.

Felony!—it's got a winner here.

If you can recall a delightful collection of mayhem from CBS called *Murder by the Dozen*, you'll have an idea of how *Felony!* works.

The game presents you, or several of your friends, with a crime to crack—it could be the theft of a precious jewel, a kidnapping, or a murder. Your job is to figure out whodunit and supply a plausible motive for the wrongdoing, plus physical evidence for your suspicions.

Begin by selecting one of 12 crimes. The game shows you a case history of the misdeed. You may go to the scene of the crime, or the homes of suspects and witnesses. Wherever you proceed, you select people to interview and the next place to search for physical evidence.

For each selection you make, a series of numbers appears on screen corresponding to hints in the clue book—the statement of a witness, a piece of physical evidence, or the simple message "No clue."

Each scenario of *Felony!*

is actually what mystery writers call a "police procedural": you solve the case not by flights of intuition (although they can be very helpful), but by the careful collection and thoughtful analysis of the evidence, including witnesses' statements. Make sure you write down all the salient points, especially the names of witnesses and locations to be visited. If you forget to take notes, you may wind up interviewing the same witness twice—and that lowers your score.

Be sure to question every witness who can help you, but try to differentiate between those who have something to say and those who don't—every useless lead you follow lowers your final score. Start with the "hot" leads mentioned in the case summary, especially the ones that arouse your suspicion during interviews.

Look for inconsistencies in the stories witnesses tell. If two witnesses contradict each other, chances are one of them is your suspect.

This is a handsome game, well-supported by the clue book and other documentation materials. It doesn't take long to learn, and its entertainment value is exception-

ally high. As a simulation of actual police work it's right on target in recreating the feel of the job. *Felony!* (the game, not the actual crime, that is) offers excitement, intellectual challenge, and lots of fun. Now get out there and book 'em, Danno.

Suspect



Infocom
55 Wheeler Street
Cambridge, MA 01238
\$44.95
Any Apple II, 48K

Reporters are seldom asked to nice parties. That's why you, a working journalist, have accepted an invitation to a Halloween masked ball at Ashcroft Farm from your old friend Veronica Wellman.

You find yourself attending a costume party at a mansion belonging to one of the first families of Maryland's "horse" set. You are dressed as a cowboy. You look rather dowdy beside some of the extravagant outfits at the soirée.

No matter. You decide to play it safe, hanging around the bar and danc-

ing in the main ballroom. Early in the evening you see Veronica spill a drink on her costume, staining it. She rushes out, and you don't see her for the rest of the night. You witness an argument—apparently regarding the price of horses—and watch the wealthy come and go—nothing special.

Late in the evening someone comes and announces that Veronica has been murdered. She has been strangled to death, and her body lies in the office of the estate. It's shocking news, but not nearly as astounding as what happens later: The local police arrive, snap the handcuffs on you, and arrest you for the murder of the lady of the house! You protest that you've been in the ballroom all night and have plenty of witnesses to prove it. No good—you must stand trial and await an uncertain destiny.

That's the story of Infocom's new text adventure, **Suspect**. Don't try to play it safe by avoiding such messy things as murder scenes, skullduggery among the upper classes, and repartorial snooping. To save your skin, you must actively seek out clues to the riddle of who is framing you and why.

I have not yet solved the mystery, but I do have some hints to offer to get you started. First, look for telling facts. The game describes Veronica as heavily veiled, and her voice as indistinct. Could it be that the Veronica in the ballroom was a phony, and the real Veronica has already been murdered as the game begins?

One character furtively threw an object into the ballroom fireplace. Is it something worth singed fingers to save? What are the contents of the ten missing pages of the mystery novel in the mansion library? Who has a motive

to kill Veronica? Her cowering husband? Her catty, jealous friends? You can raise the odds of your survival by snooping around the house and the party, asking about Veronica and finding out who likes her and who doesn't.

Infocom rates this game "advanced"—it's a super-toughie. Time is limited—the police will arrive to arrest you at a predetermined hour. You have only a few minutes to figure out a very tricky puzzle. To add to the atmosphere of genteel violence, the game includes the usual Infocom goodies: an invitation from Lady Veronica, the invoice for your costume, and a magazine story about Maryland's horsey scene in general and your hosts in particular. Read the articles carefully—you may detect a motive. Ask yourself one important question: Who would profit from Veronica's death?

You might come up with a list of suspects early, but producing the evidence to satisfy the police will take all your adventuring skills. Suspect is another great mystery from Infocom, a company that seems unable to write a bad game.

Ghostbusters



Activision
P.O. Box 7287
Mountain View, CA 94039
\$39.95
Any Apple II, 48K

If there's something strange in your neighborhood, call the Ghostbusters. If you need a good laugh, catch the movie *Ghostbusters*. If you want to hear a good rocking song, Ray Parker, Jr.'s "Ghostbusters" is better than most.

Then there's the **Ghostbusters** arcade game. It has some nice touches,

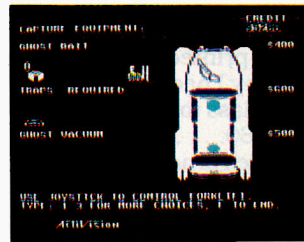


Photo 6. You'll need a vacuum cleaner for ghostbusting.

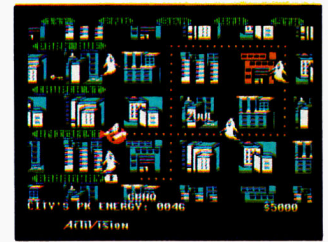


Photo 7. The city streets swarm with spirits.

but on the whole is disappointing. You build your Ghostbusters franchise with a cute forklift that loads ghost vacuums into your ectomobile. The ghosts comically "slime" your men, and the rampage of mean Mr. Stay-Puft Marshmallow is a riot. The full score of the Ghostbusters theme song—with sing-along lyrics—is included.

Nice details, but Ghostbusters isn't a very good game.

You drive along the city streets, visiting haunted buildings and vacuuming up ghosts along the way (**Photos 6 and 7**). At each haunting your two operatives set out a portable trap, turn on the particle-accelerator beams, and maneuver the spook over the trap. The more ghosts you trap, the more money you make. If you're in the black, you penetrate the Temple of Zuul (**Photo 8**)

once the Keymaster and the Gatekeeper—little lock and key symbols wandering the streets—have met. If you trap no ghosts, the city's PK energies will rise and Mr. Stay-Puft Marshmallow will be released.

Somewhat a fine scenario turns out to be boring and frustrating. The flaw in the design is that once the ghostbusters turn on their particle streams, they can't chase ghosts with them. You can't shorten, lengthen, or separate the streams. And if your timing is a bit off and the ghost isn't below the point of convergence, you lose him and get slimed.

Frankly, learning the basics just takes too long. I'm not talking about success, just the skill to get into the fray—simple timing. It takes no special talent to vacuum up a ghost on the street. You get a dull game.



Photo 8. What's behind that creaking door?

Fifth Eskadra



Simulations Canada
P.O. Box 452
Bridgewater, N.S., Canada
B4V 2X6
\$60
Any Apple II, 48K

I like Simulations Canada because it writes war games on off-beat topics. **Fifth Eskadra** is based on a hypothetical war between American and Soviet naval forces in the Mediterranean. It might begin the day after tomorrow—or never—depending on the wisdom of politicians and the flow of the currents of luck in the Middle East. **Fifth Eskadra** has immediacy going for it. It does not, however, have graphics going for it. This is a "hybrid" game,

with a map sheet and die-cut cardboard counters with printed information so tiny I needed a magnifying glass to read it. All this for \$60. . . .

The game itself is good. It's a less complex, Middle Eastern version of Strategic Simulations' North Atlantic '86. You organize task forces, search for enemy battle groups, and intercept them with ship-to-ship missiles and air strikes. During each turn you can form new task forces, split them, give them new orders, and raise the level of conflict—from rising tensions (no combat), through conventional warfare, tactical nuclear war, and operational nuclear war, to global nuclear war. The side that escalates from one level to the next loses victory points. And if the game moves to that last level, everyone loses.

Until then, keep your powder dry and shadow the enemy task forces. It's a game of cat-and-mouse that calls for some fancy footwork. Would it be to your advantage after all to fire the first shot? No, unless you have overwhelming strength against a cornered enemy.

When combat begins, you automatically hit the other guy with everything you've got. You may choose which enemy force to bombard with air strikes, but combat-ready ships within range of each other will attack without orders. During combat keep your eyes glued to the screen. The action reports come in fast during a battle, and you don't want to miss any important developments.

This game gets high marks for excitement and ease of play, but only a passing grade in graphics and convenience.

Come on, Simulations Canada—even a low-resolution map would be better than pushing counters on a sheet of paper. It's what consumers expect and what other complex games deliver. If you want to be competitive, you have to bite the bullet and go graphics!

simulation of the war the Axis waged against Britain's sea lifeline in World War II—good idea, but a poor game.

You make up task forces, convoys, wolf-packs, and battle groups, and send them on patrol or escort duty. Once the ships are out, you have no further tactical control over them, except to send a task force on an interception if an enemy fleet is sighted. The action's only a step away from the computer playing itself—forget it.

Trivia News

A few months ago, while still in the guise of Warden Shiftky, I posed three trivia questions:

1. Who invented Pong?
2. Who invented the Analytical Engine?
3. What was the first application of data punch cards?

I promised to print the answers and the names of those who got all three right. Here we go:

1. Nolan Bushnell, founder of Atari
2. Charles Babbage
3. The programming of the Jacquard loom in early 19th-century France

I've received correct responses from Franklin D. Egolf, Jr., of Elizabethtown, NC; Steve Frank of Dickinson, ND; Vincent Lim of Vancouver, BC; Flavian Stellerine of Trenton, NJ; Bill Dieter of Rochester, MI; and Mark Fung of Tenafly, NJ.

Thanks for responding and for reading the column. I'll print any correct responses that arrived before April 30, 1985. Until next time, aloha. ■

Brian Murphy is anxious to learn what you think of the present state of computer games. Write to him at inCider magazine, 80 Pine Street, Peterborough, NH 03458.

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Battle of the Atlantic

No rating
Simulations Canada
P.O. Box 452
Bridgewater, N.S., Canada
B4V 2X6
\$60
Any Apple II, 48K

We have little to say about **Battle of the Atlantic**. Bob Ryan (*inCider's* technical editor) and I found that it has an unhealthy tendency to hang up at unpredictable points in play, with no way to recover.

The game itself is supposed to be a strategic

If you have a question, our technical editor has the answer. Send your queries about Apple computing to Bob Ryan, Ask inCider, 80 Pine Street, Peterborough, NH 03458.

Rodentmania

Dear inCider:

I am interested in buying a mouse, and I would like information about products (other than MousePaint) that take advantage of the AppleMouse. I have heard that a mouse, in conjunction with the open-apple and closed-apple keys, is the equivalent of a joystick. Is there any truth to this?

Keith Namoit
25 Lewis Avenue
Great Barrington, MA 01230

Dear Keith:

In the October 1984 issue of inCider (p. 76), we published a list of available Apple II programs that use the AppleMouse. Since then, a number of other mouse-driven programs have been released. Check the New Software sections of back issues for details about individual products.

The problem with most of these programs is that they use the mouse in a very cursory (no pun intended) fashion. They do not attempt to replicate the Macintosh/Lisa interface on the Apple II—they merely use the mouse as a substitute for the cursor keys or a joystick.

The reason these programs do not do more with the mouse is that support for the device is not built into most Apple II computers. The only machines that directly support it are the //c and the new enhanced //e. As more //c's are sold, and as more //e owners upgrade to the 65C02 and the new monitor and character-generator ROM's, you will see many more programs that make full use of the Macintosh/Lisa interface.

Using a mouse in conjunction with the open-apple and closed-apple

keys does not take the place of a joystick. While pressing the apple keys produces the same result as pressing the buttons on a joystick, the computer does not handle mouse input the same way it does joystick input—a program that requires a joystick will not necessarily work with a mouse. Most manufacturers, however, are including routines to handle mouse input as an alternative to joysticks.

If you are interested in writing routines to incorporate the mouse into your programs, refer to "The Mouse That Roars," by Bill O'Brien, in the October 1984 issue of inCider (p. 72).

Right of Assembly

Dear inCider:

I have just begun to learn machine language on my Apple //e, and in a number of books I have come across references to Apple's assembler. When I tried to find out about this assembler in my manuals, I could only find reference to the mini-assembler. Is an assembler built into the //e? If so, how do I call it up, from the monitor or from Applesoft BASIC? If not, are there any assemblers on the market that I could purchase?

I read in your April issue that a chip upgrade is available for the //e. Will software written for the 6502 still work on the 65C02?

Beno Rubin
3845 Sedwick Avenue
Bronx, NY 10463

Dear Beno:

Apple supplies three assemblers for the //e. Two of these—the DOS 3.3-based Tool Kit Assembler and the ProDOS Assembler—come on disk. The third, the mini-assembler, comes in two forms: in the new monitor ROM chips that are part of the //e upgrade, and in the Integer BASIC that comes with the DOS 3.3 System Master disk. There are also a number

of third-party assemblers on the market. The most widely used are the S-C Macro Assembler (S-C Software, 2331 Gus Thomasson, Suite 125, Dallas, TX 75228, 214-324-2050), the Lisa Assembler (Lazerware, 925 Lorna Street, Corona, CA 91720, 714-735-1341), Merlin and Merlin Pro (Roger Wagner Publishing, 10761 Woodside Avenue, Suite E, Santee, CA 92071, 619-562-3670), the Microsparc Assembler (Microsparc, 45 Winthrop Street, Concord, MA 01742, 617-371-1660), and ORCA/M (Hayden Software, 600 Suffolk Street, Lowell, MA 01853, 617-937-0200).

With regard to your second question, all software for the 6502 will work on the 65C02. The reason that some software for the //e will not work on the //c is related to other differences in the machines, not to their microprocessor function.

Pop Go the Keycaps

Dear inCider:

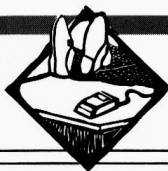
I have an Apple //c and want to make use of the alternate keyboard configuration (Dvorak) that Apple decided to implement on the //c. The Apple //c owner's guide tells you to just flip the keyboard switch and presto! I'd like to know how to remove the keycaps and replace them in a Dvorak layout.

Jeff Gonzalez
2557 North 62nd Street
Wauwatosa, WI 53213

Dear Jeff:

Switching keycaps on the //c is easy. First, get a flat-head screwdriver and gently pry the keycaps from the keyboard—they should come off very easily. Next, consult page 17 of the //c owner's guide for a diagram of the Dvorak layout. Finally, replace the keycaps as shown—they simply snap into place. You now have a full-fledged Dvorak keyboard.

by Bob Ryan, inCider Technical Editor



Sizing Up Spreadsheets

Spreadsheets aren't impossible to understand—they just seem difficult at first. Most of the initial problems you might have with spreadsheets arise from their underlying three-dimensional structure; breaking down this conceptual barrier can make learning to use a "calc" program much easier.

The Manual Approach

"Manual" spreadsheets have existed for some time, and even today most stationery stores still supply them. First used in accounting, spreadsheets have now found their way into a number of other applications because of their simple construction—horizontal and vertical lines dissecting a sheet of paper to create a multitude of small boxes, or cells.

You address each cell by referencing its column and row location, denoted by a pair of Cartesian coordinates—either "row,column" or "column,row." (There is no standard notation.) The first cell position is always the upper left-hand corner of the sheet at "address" 1,1 (or A,A or A,1).

Although they make organizing numeric work easier, manual sheets suffer from a lack of clarity. You can't tell if the entry in any particular cell is a

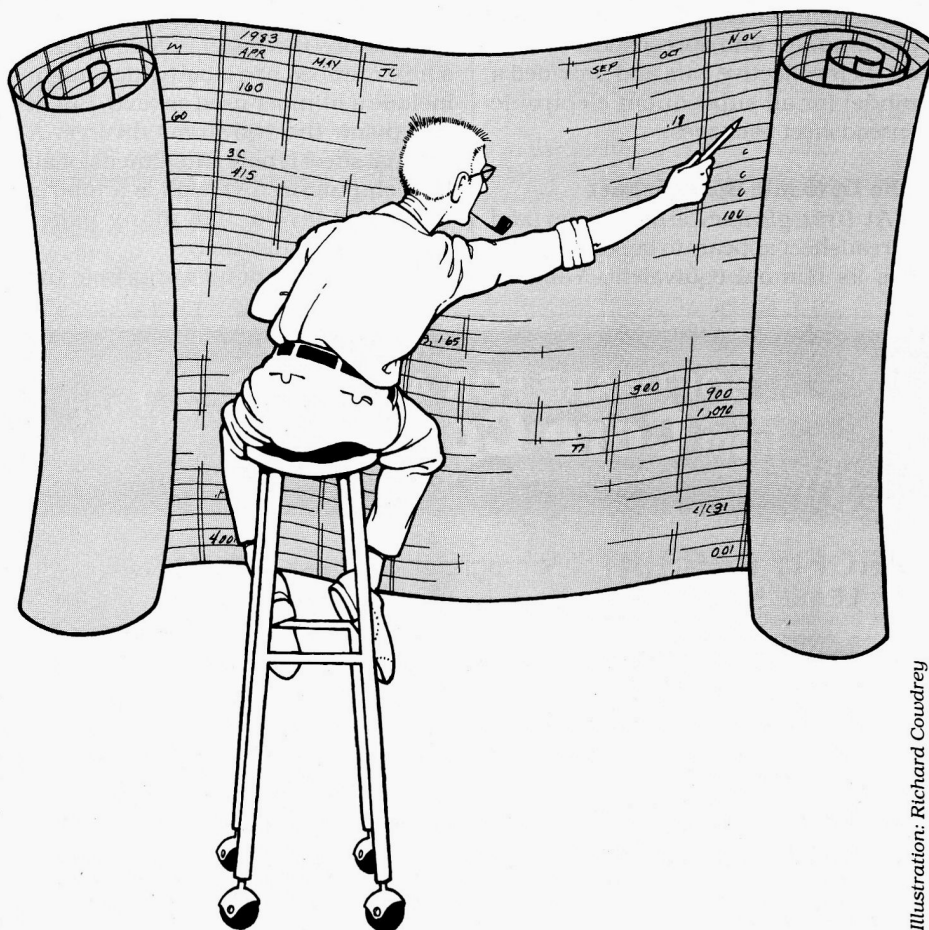


Illustration: Richard Cowdrey

number or a value derived from a formula. And even if you know that the result you're looking at is derived from a formula, there's no obvious way to discover what formula was used.

You could annotate all of the entries on the sheet, clearly delineating their meaning and origin. But even in a small sheet of 15 columns by 20 rows, that would mean 300 additional entries—and a spreadsheet should make your life easier, not create extra work.

Using a pencil and paper to play with numbers is not simple. If you're lucky, you might have to erase the contents of only one cell. If the value in a cell is part of a formula that affects other cells, however, you might have to erase an entire column or row—or even half the sheet.

When paper accounting gets out of hand, let your Apple crunch those numbers.

by **Bill O'Brien**

You might expect that the introduction of microcomputers would make this process easier. It didn't at first—not until Daniel Bricklin and Robert Frankston created a program called VisiCalc. Its elegant design set the microcomputer and spreadsheet worlds on their collective ears and provided a model for all subsequent electronic spreadsheet packages.

The Dynamic Spreadsheet

At first glance, a computerized spreadsheet appears to be surprisingly like its manual equivalent. You can

use it for the same variety of purposes, and it's composed of cells addressed in the same row, column or column, row manner. Just as in the manual version, the image you see in a computerized spreadsheet's cell can be any designator—the result of a formula, a single number, or a label (which might include a number used as text). But at this point, the two forms diverge. A manual sheet is only two-dimensional; the computerized version is a matrix of several levels, like many paper sheets stapled together.

Because a computer works from the

instructions you give it, you essentially annotate the sheet as you fill it out. The lowest level, an empty cell, contains the cell's coordinates. A literal copy of the data you enter fills the next layer. The computer then adds a layer describing the type of entry you've made—numeric, text, or formula. On top of that is another layer containing the value of your entry. If the entry is a number, the cell repeats it; if it's a formula, the cell contains its computed value. A text entry is generally given the value of zero.

Most spreadsheets also contain a layer for formatting the entry. Text may be flush left or right, or centered in the cell area. Numbers can appear in as many different formats as the programming allows—for example, standard, decimal (with a user-defined number of decimal places), dollar (with or without commas), or accountant (parentheses used for negative numbers).

The final layer displays the actual image of your entry with all formatting, positional enhancements, and calculations performed. If you enter the formula $120 * .10$, for example, and tell the program to display it in dollar format, you'll see \$1.20 as the final result in that cell.

Sometimes, if the spreadsheet has a large number of cells, a minute or more may elapse as the computer calculates formulas, then checks each cell and changes values where appropriate. You may now realize that the "typical" computerized spreadsheet is a fairly complex construction.

The Material World

If there were only one spreadsheet program on the market, deciding which one to buy would be easy. But advertisements everywhere proclaim each spreadsheet larger than the next: 200 rows by 64 columns, 300 rows by 300 columns. It sounds great, but consider this: A 300-by-300 matrix occupies 90,000 (90K) bytes. If you enter integers only (which have a minimum storage requirement of 2 bytes), 180K of memory is required—in addition to the spreadsheet program's own memory-overhead requirements. Real numbers (with decimals) can be squeezed into 4 bytes, but that's still 360K. The amount is astronomical when you deal with text. And you can't put even

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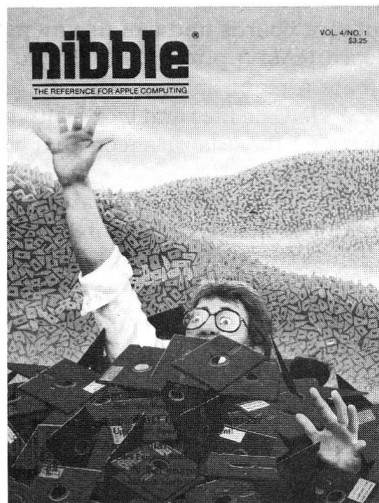
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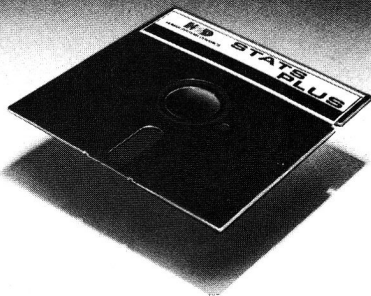
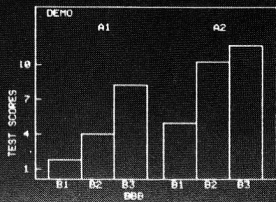
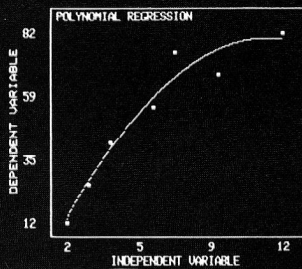
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Variety of arithmetic features is another consideration in your purchase. Most programs support all the low-level math functions—addition, subtraction, multiplication, and division. Some offer higher functions (such as sine, cosine, and absolute value) and accounting functions (net present value, mean, and standard deviation). The larger the number of features, the higher the price—save some money and buy a spreadsheet that includes only the features you want.

If you're looking for a program for personal use—to help with the monthly budget—IACcalc from the International Apple Core may be just what the doctor ordered. It works with most 80-column boards and can use memory-board RAM (up to 512K), so you can create a giant spreadsheet. It'll even read VisiCalc files and work with hard disks, for those large sheets that won't fit on your floppy.

VisiCalc is still around, and there's also Multiplan. One advantage of Multiplan is that it prints the lines forming the cells. If you're sending your spreadsheet to the IRS as part of your tax statement, ruled (lined) paper is required.

SuperCalc 3a from Sorcim/IUS (for the //c or the //e with an 80-column card and Apple's upgrade kit) uses the new ROM's and 65C02 (CMOS) processor available from Apple. The program also supports business graphics to help emphasize your statistical data. SuperCalc 3a requires a minimum of 128K of RAM.

So take the plunge. Once you've learned how to use them, electronic spreadsheets offer convenience, organization, and precision. They're ideal tools for the management of your home and business finances.

IN THE NEWS

Almost one year behind schedule, Apple released its LCD screen for the //c. It hit the market with a whimper and a pop, greeted by all as old technology and no great improvement in readability over past offerings from other vendors. It does make the //c more transportable, but other than that, there's little justification to spend your money on it.

You'll probably hear that the LCD has a problem. It does and it doesn't. If you're using it in single high resolu-

tion and in mixed text and graphics mode, the leftmost row of dots on the screen is distorted. Apple has tested more than 100 programs on the screen, however, and found that none of them uses that particular combination of modes. At first I thought it was a cover-up—single high resolution in mixed text and graphics modes just had to be common. Except for some games, though, I couldn't think of any. So if you hear anyone giving Apple a bad time about the screen, you might tell them the facts.

Also noteworthy is a recent IBM development. After a solid week of chiding Apple on its closing of three production facilities for a week to let inventory levels drop, journalists finally got a chance to take a shot at IBM. Big Blue has ceased production of the PCjr owing to lack of interest. This follows four months of media praise after the company "turned around declining Junior sales by redesigning the computer to better address its market."

Has anyone forecasted a downward trend in IBM stock or expressed concern about its fate? No. Has anyone mentioned IBM's financial loss almost since the day the Junior was released? No. Why would any journalist want to engage in speculative reporting about IBM when no one at the company will talk about the issues long enough to even lay the groundwork for a misconception? I guess the moral of the story is that if you want a company no one will criticize no matter what it does, name it IBM.

COPY PROTECTION

Copy-protected software has always been a sore point with me. It's frustrating and promotes the growth of a cottage industry—as soon as a new system materializes, hackers immediately see who can break the protection first.

That's why I was pleased to receive a press release from the folks at StoneWare—the company has dropped the copy protection on DBMaster. I can't resist saying it was overdue—the copy-protection scheme was causing problems with disk reliability. I also can't resist applauding the firm for its decision to market a copyable version.

For companies to continue to offer non-protected software, users must refrain from distributing bogus copies.

Overall software prices will drop if program sales remain healthy.

NEXT MONTH

Whatever you do, don't miss my August column. It's a little different, and I'll have some startling news for *in-Cider* fans. See you next month. ■

Contact Bill O'Brien at P.O. Box 1010A, Fort Lee, NJ 07024 or through CompuServe at user ID 74216,1215.

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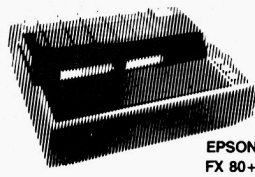
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Editor's note: If you can't connect with one of these data bases, it may be temporarily—or permanently—off the air. Many data bases are non-commercial ventures and can encounter financial difficulties. Feel free to contact Matthew Lesko if you continue to run into obstacles. ■

Matthew Lesko is the founder and president of Information USA, Inc., a computer data-base consulting and publishing company. He is the author of seven information books—two of which made the New York Times best-seller list. For a free copy of his newsletter on computer data bases, write to Information USA, Inc., 4701 Willard Avenue, #1707, Chevy Chase, MD 20815, or call (301) 657-1200.

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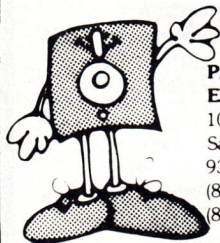
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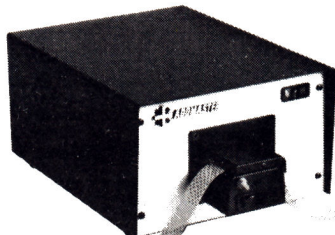
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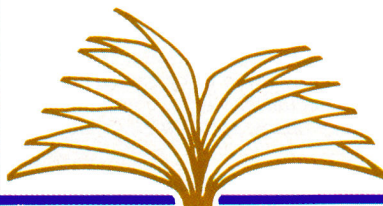
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Coming Attractions

- **Apple languages: Which one is best for you?**
- **Pascal Primer: Tom Swan begins his Pascal tutorial column in August. Don't miss it!**
- **SuperCalc 3a—will it make Apple owners forget about Lotus 1-2-3?**
- **Take your Apple //c for a ride**
- **Simplify your correspondence with our small—but powerful—envelope addresser**
- **Do you have what it takes to explore the Pyramids of Egypt?**

- **Hints and Techniques: Text-Screen Tricks and Superfriendly Menus**



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Trivia Contest Winners Announced!



The drum roll, please. And now the news you've been anxiously waiting for—the winners of *inCider's* Great Apple Trivia Contest!

We had a hunch you'd like the contest (we're all trivia buffs down deep) and who could pass up the chance to win an Apple //e Professional System (//e with extended 80-column card, DuoDisk drive, and monitor)? Twelve multiple-choice questions couldn't be that difficult, could they?

Well, only 25 percent of the 1325 entrants answered every question correctly. The number seems low, but as Editor in Chief Susan Gubernat explains, "Trivia questions are deceptively simple, and we designed a contest to ferret out those people who know the Apple culture."

On March 27, 1985, we drew the name of the first-prize winner: Dean Ouchida, a 21-year-old junior at Oregon State University who's majoring in, conveniently, computer science.

Three second-prize winners received Hayes 300-baud modems from Hayes Microcomputer Products, Inc., and five third-prize winners were awarded Mach III joysticks, courtesy of C.H. Products. Refer to the **Winners' Box** for the names of the prize recipients.

All of us at *inCider* (except for our proofreader, Peter Bjornsen, who had to wade through the en-

tries every day) were pleased with the number of people who participated. Look for more contests in *inCider* during the coming months.

To settle your curiosity, here are the answers to *inCider's* Great Apple Trivia Contest, which appeared in the March issue, page 128:

1. A, 2. C, 3. A, 4. A, 5. C, 6. A,
7. C, 8. B, 9. B, 10. A, 11. C, 12. B

Winners' Box

First Prize:

Apple //e Professional System
Apple Computer
Dean Ouchida
Corvallis, OR

Second Prize:

Hayes 300-baud Modem
Hayes Microcomputer Products
Andrew Baldrige
Carrollton, TX
Gene Harjamaki
Mankato, MN
Craig Ketover
Harrison, NY

Third Prize:

Mach III Joystick
C.H. Products
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Editors'



Every month, hardware and software manufacturers release dozens of new products into the Apple II market. The Editors' Choice singles out one product each month that the inCider editors feel is a significant addition to the Apple II family of products.

With MouseWrite, a new word processor from Roger Wagner Publishing, the "radical ease of use" that characterizes the Macintosh now belongs to the Apple II.

MouseWrite is the first product for the II family that makes full use of MouseText characters and the AppleMouse. It's on the leading edge of Apple II software technology, incorporating the Mac interface into Apple II programs.

MouseWrite is a direct result of the //e enhancement Apple announced in March. (The upgrade is available to current //e owners for \$70.) Apple replaced the microprocessor, monitor ROM's, and video-generator ROM with a new set of chips offering greater compatibility with the //c, greater support for the AppleMouse—and an environment that makes it easier to write programs employing a Mac-like user interface.

"If you're an Apple II user who's suffering from Mac envy, you'd do well to look at MouseWrite," says Editor in Chief Susan Gubernat. "Its pull-down menus, windowing, and mouse support all contribute to a word processor that combines power with the latest in interface technology."

Technical Editor Bob Ryan adds, "Even if MouseWrite had a standard interface, it would still be a powerful word processor. The addition of the Mac-like interface, however, makes it just about the easiest-to-use full-featured word processor on the Apple market." (See **Photo 1.**)

MouseWrite supports a healthy list of Apple-compatible printers, and makes it easy to access special printer functions, such as boldface and condensed print. With MouseWrite, formatting your documents is simple (**Photo 2**).

MouseWrite runs under ProDOS, giving it a crucial advantage over MacWrite, as Review Editor Paul Statt points out. "MouseWrite is fast," Statt notes. "You don't waste a lot of time listening to the disk drives hum."

MouseWrite is not a MacWrite

clone—it can't produce a variety of fonts, for instance, as MacWrite can. But MouseWrite is the best reason yet for an Apple II owner to purchase one of those curious rodents from Apple.

MouseWrite is marketed by Roger Wagner Publishing, Inc., 10761 Woodside Avenue, Suite E, Santee, CA 92071, (619) 562-3670. MouseWrite runs on the //c or 128K //e with the enhancement kit installed. At press time, the suggested retail price was expected to be \$125. ■

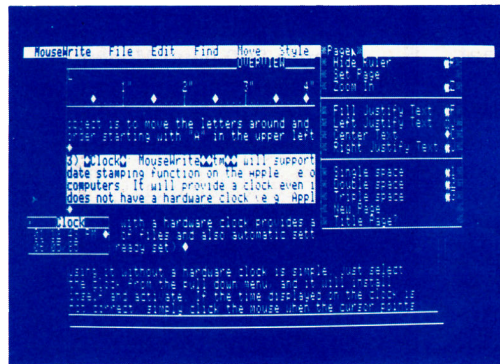


Photo 1. MouseWrite features include a built-in software clock and hardware-clock support.

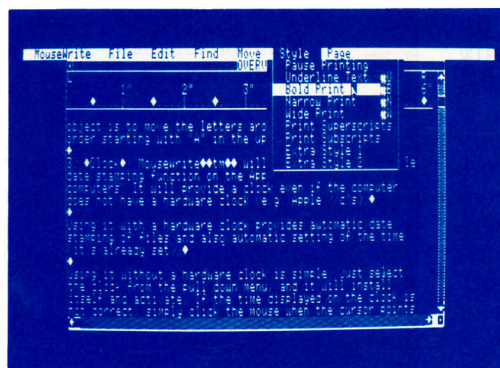
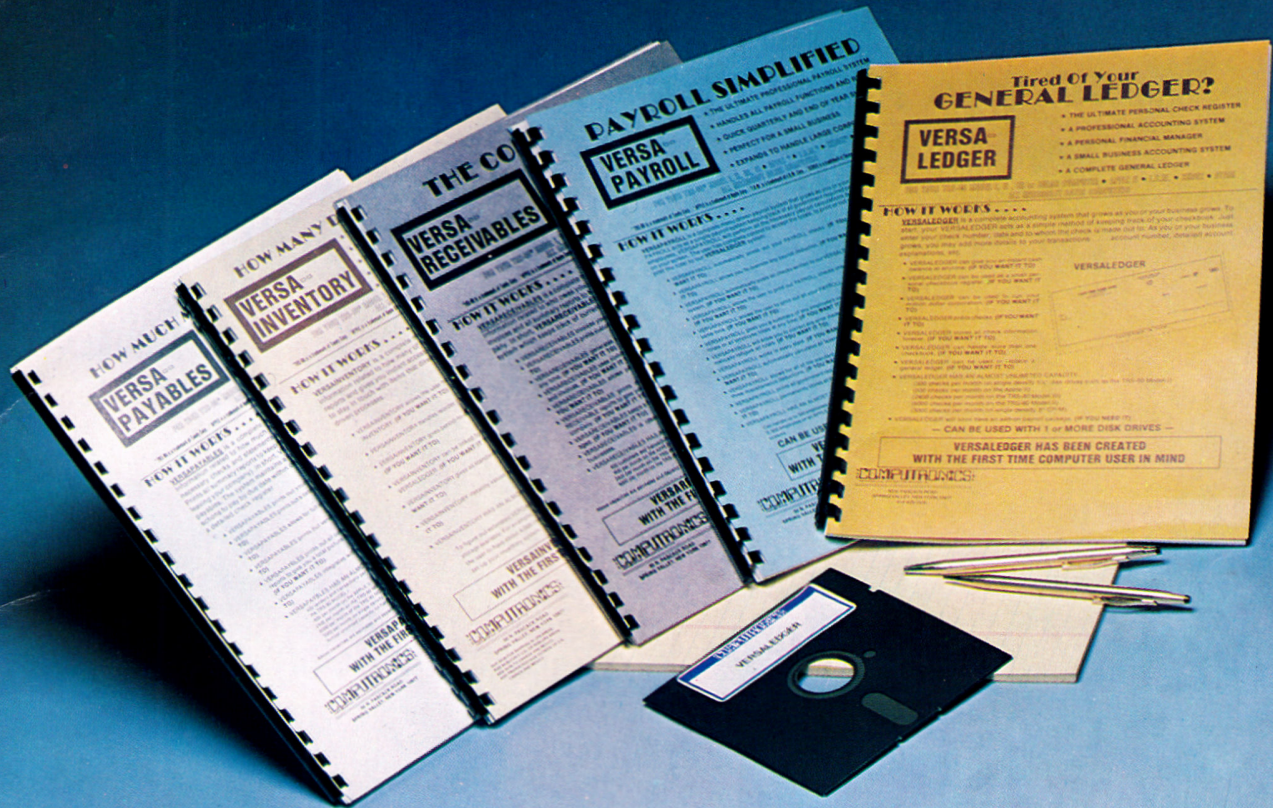


Photo 2. Choosing print options is easy with MouseWrite's pull-down menus.

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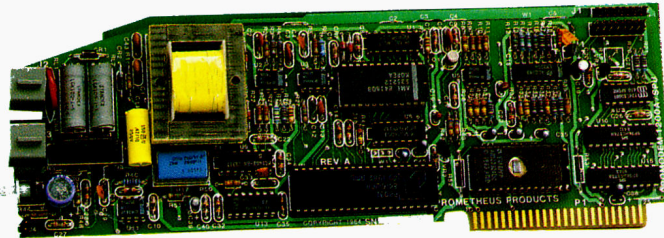
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```
○ 1) COMMUNICATIONS
○ 2) FILE TRANSFER
○ 3) OPTIONS
○ USE ESC TO EXIT
○ ENTER SELECTION
```

```
○ 1) BAUD RATE 1200 300
○ 2) DATA BITS 8 7
○ 3) PARITY NONE ODD EVEN MARK SPACE
○ USE ESC TO EXIT
○ ENTER SELECTION
```

```
○ 1) TYPE XMODEM LINE
○ 2) DIRECTION SEND RECEIVE
○ 3) FILE NAME
○ USE ESC TO EXIT
○ ENTER SELECTION
```

```
○ 1) PRINTER ON OFF
○ 2) CLOCK ON OFF
○ 3) STATUS LINE ON OFF
○ 4) KEYBOARD ON OFF
○ 5) CAP LOCK ON OFF
○ 6) ECHO ON OFF
○ 7) LF AFTER CR ON OFF
○ USE ESC TO EXIT
○ ENTER SELECTION
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