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"Excuse me, have you seen this woman?"

EXPLORATIONS

WHERE IN THE WORLD IS CARMEN SANDIEGO?™

BY DANE BIGHAM

SOMEONE HAS MADE OFF WITH the Statue of Liberty's torch...and you've been assigned to the case! This could only be the work of *Carmen Sandiego and her gang*—the dastardly crew that has sworn to swipe each and every one of the world's most famous landmarks and treasures.

You're off on a whirlwind international chase! From London, to Bamako, to Peking, to Kathmandu...you'll find yourself in one strange city after another, with only your Crime Computer and your trusty copy of The World Almanac to guide you. You'll learn to use your computer and Almanac together to find your way around and decipher the clues you uncover. And, with enough dogged detective work, you'll soon collar the cunning culprit.

But don't get overconfident! The Mona Lisa, The Crown Jewels... you've got more treasures to protect, more cases to crack, more crooks to catch.

So now that you know what you're up against, what in the world are you waiting for?

WHERE IN THE WORLD IS CARMEN SANDIEGO? *combines all the best aspects of graphic adventures, mysteries, and arcade animation in a captivating crook's tour of the world. It comes complete with* The World Almanac® *and Police Dossier on Carmen and her gang. Players can work together, with one operating the computer while the other scours The Almanac and Dossier for vital information. With 10 possible suspects, 30 cities, and nearly 1,000 clues,* Carmen Sandiego *is a different game every time you play—for endless hours of family entertainment.*

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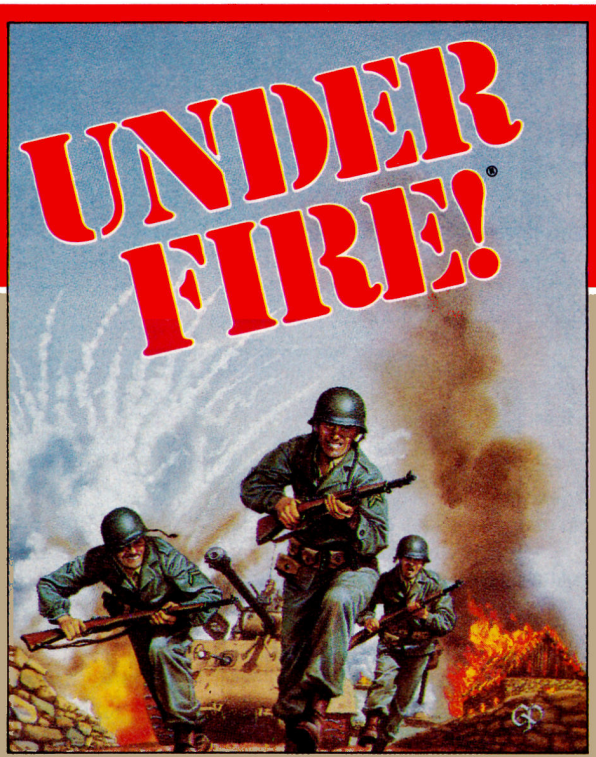
WHERE IN THE WORLD IS CARMEN SANDIEGO? is available for Apple personal computers. Look for it at your favorite Brøderbund Software dealer. For more information about Brøderbund products, please write us at 17 Paul Drive, San Rafael, California 94903-2101. Apple is a registered trademark of Apple Computer, Inc. The World Almanac is a registered trademark of Newspaper Enterprise Association, Inc. © 1985 Brøderbund Software, Inc.

UNDER FIRE!®



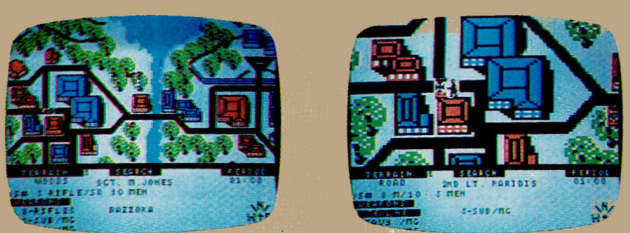
It was quiet under the blistering Russian sun except for the rumble of gunfire off through the hills. Through his binoculars, the Soviet lieutenant could see the road leading into the dacha. The hedge blocked his view of most of the ground, and nothing could be seen moving among the second story windows. His orders were to take his squads and three T34/76 tanks in and occupy the abandoned country house.

From the wheatfields of Russia to the hedgerows of northern France, this is the world of **Under Fire**, the game of tactical World War II combat. Commanding an array of armor, infantry and support guns, take your men into the razor's edge of combat.

The lieutenant stood up and waved his arm in a circle. Around him arose fifty men who deployed in a line. Silently, they passed through the cool woods toward the hedge, their eyes scanning the windows, their fingers calmly resting on the trigger guards of their rifles.

Men and weapons from the United States, Germany and the Soviet Union are represented. The map is a topographic re-creation of the ground they fought over, shown in three different scales. Choose the situational map for the strategic flow of battle, or the tactical screen that shows the terrain in amazing detail.

They were 30 meters from the hedge when the land exploded in smoke and flame. A machine-gun nest spoke from a window, sending the patrol to the earth. The hissing rocket from a panzerfaust caused one of the tanks to explode, its crew bailing out of all hatches. Two Panther tanks moved out from under their cover. The lieutenant ran forward in a crouch, waving to the squads that were not pinned under fire to follow.



Strategic and Tactical Maps.

Front line combat is never predictable. Hidden units can appear out of nowhere, attack and vanish again. If caught in the open, a green squad can break and suffer horrendous casualties, while veterans rush for cover. In **Under Fire**, squads are rated for morale and training. The computer handles all line-of-sight problems, and can direct the fire of your units. Without the complexities of figuring odds and terrain charts, finding the proper strategy depends upon instinct and experience. All of the uncertainties of combat are present.

The lieutenant and his patrol moved swiftly and methodically through the woods. One of the T34's entered the yard and was trading shots with the Panther. A German squad was suddenly flushed from their hidden position and was cut down by the tank's machine gun.

Under Fire, lets you begin play immediately! All orders are entered using simple keyboard or joystick commands, and there is a helpful tutorial in the rulebook to take you step-by-step into your first battle. The nine scenarios range from open-field firefights to house-to-house conflict. Each scenario can be different when you change the ten variables, including nationality, skill level and victory conditions.

A Wargame Construction Set!

Design your own maps and scenarios. It's easy with **Under Fire**. The Mapmaker disk can re-create the **bocage** of Normandy, the Russian steppes and the final assault on Berlin! Design the order of battle to emphasize infantry, armor or a mixture of the two. Choose among other factors, the weather, map scale, general orders and victory conditions. Order a squad to attack or defend terrain, destroy the enemy, delay the advance or break out of the pocket. Finally, save your own scenarios to disk and they'll be ready to play anytime (the computer is always willing to play). **Here's what you get:**

- **Three disks:** containing the game, a roster of German, Russian and American infantry and tanks, and nine scenarios. The Mapmaker disk helps you create maps for your own scenarios.
- An extensive **rulebook**, containing all the rules, tactical notes, a tutorial to start you on your first scenario right away, and an index of screen commands.

$59.95

Computer Requirements:

Apple® II family of computers (II+, IIe, or IIc), 64K
One disk drive
Joystick required for II+; optional for IIe and IIc
Mockingboard™ optional
TIME SCALE: varies.
MAP SCALE: From 12 meters/position to 72 meters.
UNIT SCALE: infantry squad, individual tanks and guns.
PLAYERS: One or two, also recommended for team play.
PLAYING TIME: From 10 minutes for a two-squad battle to five hours for 32-squad firefight.
COMPLEXITY: High.
SOLITAIRE SUITABILTY: Very high.

Under Fire is The Avalon Hill Game Company's trademark for its Microcomputer Game of World War II Infantry Combat

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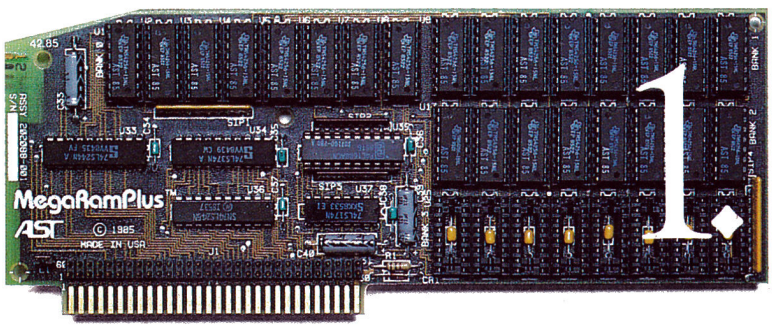
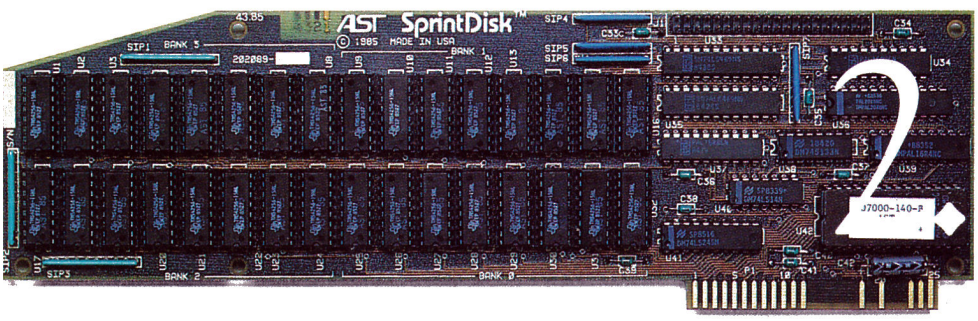
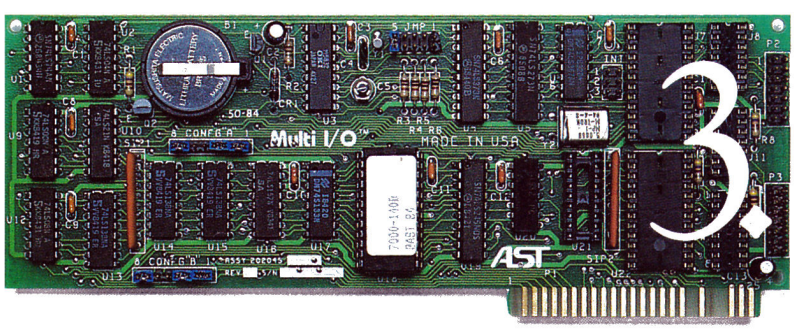
Five ways to spo







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il your Apple® IIe.™

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- Software utilities included
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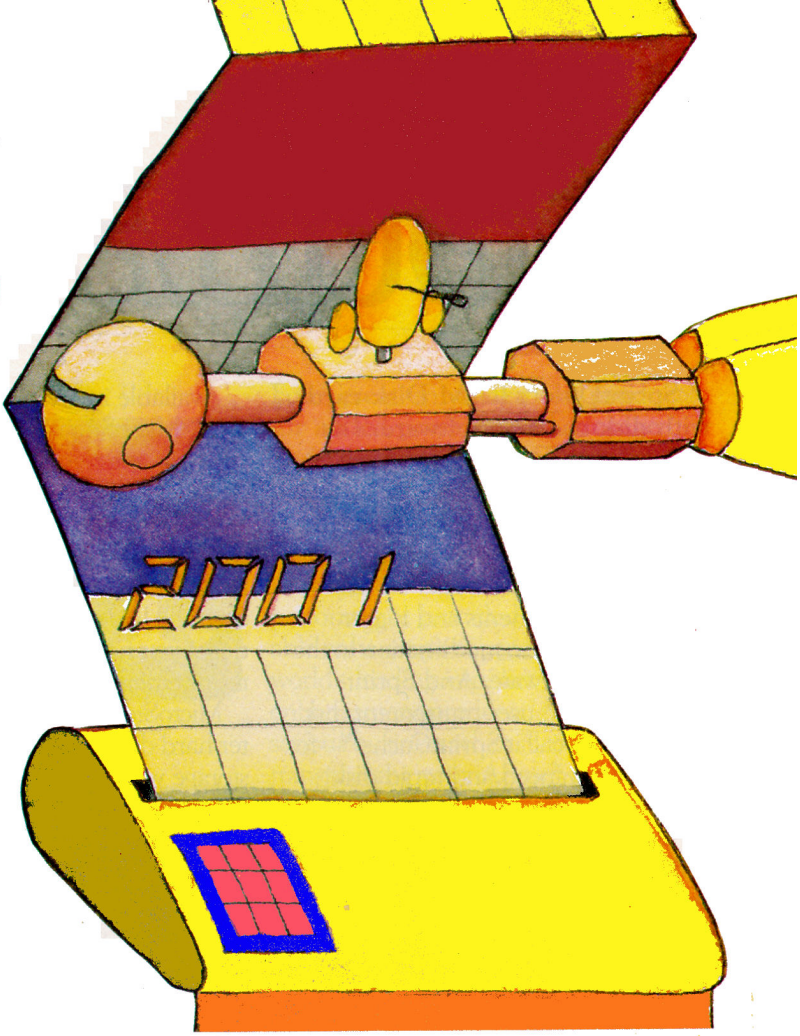

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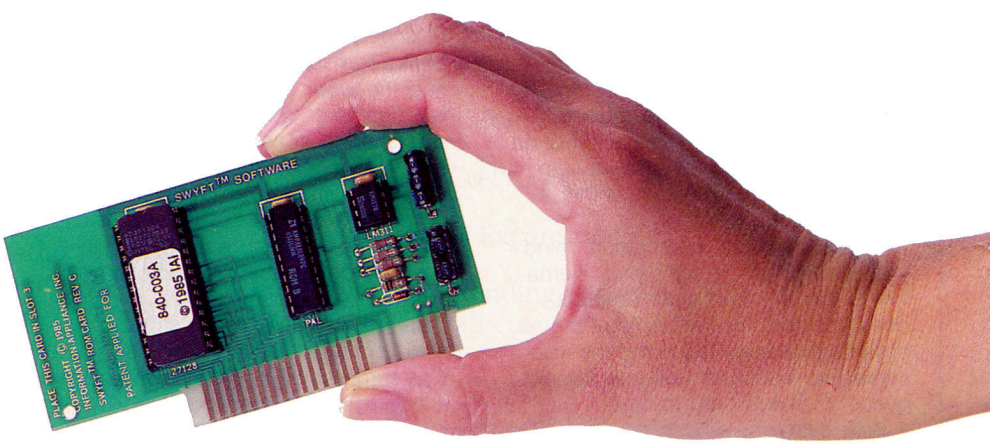

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EDITORIAL

Still an Alternative, After All These Years

by Susan Gubernat

Apple is approaching the end of its first decade after experiencing a healthy last quarter that exceeded Wall Street's expectations. Steve Jobs is out, but of course still wrangling with Apple over his right to use what might be "proprietary information" in starting his new company, Next Inc. As I write this, a court battle looks likely.

But then again, that could change. If anything has distinguished Apple's recent history, it's the revolving theater of events that play out, it seems, more as struggles of personality than as corporate deals and intrigues. Without a Royal Family in our society, we cast about for culture heroes, and, oddly enough, find them not on the Great Plains and not always in Hollywood, but sometimes within a high-tech corporation.

And not just any corporation, mind you. It's Apple, the self-styled alternative to the way corporate America does business. So, will Apple—the reorganized, Sculley-led company—become less worthy of gossip-columnist curiosity? That's hard to say.

With everyone—including Adam Osborne—fantasizing out loud and in print about the Return of the Woz to Apple, Steve Wozniak showed up at a recent meeting of Apple employees to remind everyone he hasn't *really* left. There's theater in that, certainly. We are as fond of the great comeback as a plot device as we are of Horatio Alger stories.

And have you noticed how Wozniak has been appearing in ads for Apple II software and hardware from third-party developers—like a retired baseball pro reentering the scene as a highly credible sportscaster?

Maybe we won't have Steve Jobs to kick around anymore (though I wouldn't bet on it), but even as Jobs fades into the background, Woz's mug and accompanying endorsements remind us of the computer whose open architecture continues to inspire developers as it maintains a loyal following.

The Nostalgia Factor

Years ago, I got my first Apple II Plus demo, oddly enough, in the back room of a craft shop that carried the work of local potters and woodcarvers. The local Apple dealer was sharing space with an artisans' cooperative that trafficked in handmade dulcimers and honey jars.

Yes, it was in a small town, where such things are more likely to happen, no doubt, than in Hoboken. And today, like countless others, a computer retailer has set up shop in a mall on the major highway that girds that same small town. First there was a boom; now I hear the guy who owns the dealership is experiencing some rough times.

Has it all changed that quickly? Yes, and I would suggest that the reason we all watch Apple Computer Inc. as ferociously as we do is to discern signs of the times. How often have you read a description of either Jobs or the Woz as "jeans-clad"? It still happens—someone's trying to convince us that something isn't over yet.

Yessiree, two ordinary whiz kids and a soldering iron can make as much business history as a Carnegie or a Rockefeller.

I might also mention that we've seen the word "entrepreneur" do a 180-degree turnaround in connotation over the last ten years. (I remember a time when its meaning was less than heroical.)

What a weird tactic it was, then, for Apple to run its first Christmas ads during Dustin Hoffman's acclaimed *Death of a Salesman* performance last fall. With their "and-a-little-child-shall-lead-them" themes, the ads proved a dissonant counterpoint to the classic tragedy of the failure of the American dream, embodied in the Loman family's tale.

I guess if Biff had shown Willy how to keep a customer file on a data base—you know, the way he kept track of his own stats before the big game—Willy Loman might have found a way to get by on more than just a "shoeshine and a smile."

As a short-term strategy, Apple has set out to capture the Christmas market. That means selling ma and pa on the delights of the //c. Through strategic price cuts, and with the comparatively low visibility of a Commodore Amiga or an Atari ST (after all, how many people-on-the-street can name the founders of those companies?), Apple's the firm best positioned to do just that.

In the long term, though, we'll all be watching the way Apple and the developers of Apple-compatible products peddle their wares—not as the embodiment of an alternative lifestyle, but as alternative interfaces to those provided by IBM products in the business market. Certainly, that's marketing's version of theater in the making.■

Want More AppleWorks™ Power?

You could put an Apple™ 1 meg memory expansion card in slot 4 and add another Apple 1 meg memory expansion card in slot 5 (Apple's card only expands to 1 meg). You'll need a separate 80 column card for the auxiliary slot. Oh, and put a printer buffer card in slot 2. If you want RGB color, you'll need an RGB board in slot 7 then buy a hard disk (if you have any slots left).

You'll have a bigger AppleWorks desktop, but you'll still be limited to a maximum of 1350 records in the data base. And you're stuck at 2250 lines in the word processor. And AppleWorks won't automatically load itself into memory, and make sure you don't create a file bigger than your disks can hold because Apple's memory card won't segment a file onto multiple disks.

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You'll also have up to 16,300 records (not 1350) in the data base and up to 16,300 lines in the word processor (not 2250). AppleWorks will now automatically load into RAM. And if you create a file greater than your disk capacity, no problem. RamWorks II will automatically save it on multiple disks. And because of our built-in printer buffer, you can continue to use AppleWorks while your printer is printing. Nice. RamWorks II has an RGB option, 16 bit option and is expandable to 3 megabytes. And don't forget, RamWorks II is the software industry standard for memory expansion in the IIe. RamWorks II is automatically recognized by virtually all memory intensive programs (and many more are on the way) and is 100% compatible with all IIe software. So save your money and save your slots for other peripherals. Order RamWorks II today! Want more info? Just turn the page.

	RamWorks II®	Apple's™ Card
Maximum Desktop	2277K	1012K
Maximum Number of Records in Database	16,300	1350
Maximum Number of Lines in Word Processor	16,300	2250
Autoloads AppleWorks	YES	NO
Auto Segments Files	YES	NO
Built-in Printer Buffer	YES	NO
Compatible With All Versions of AppleWorks	YES	NO
Displays Time & Date on AppleWorks Screen with Clock	YES	NO
Saves Slots	YES	NO
RGB Option	YES	NO
16 Bit Co-Processor Port	YES	NO
Memory Expansion Port	YES	NO
Patent Pending Power-Saving Circuit	YES	NO
80 Columns Built-in	YES	NO
CP/M RAM Disk	YES	NO
Compatible with Franklin 2000 Software	YES	NO
Maximum Total Functions	6	1
Software Standard	YES	YES
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Warranty	5 years	90 days
Price with 256K	$219	$249 est.

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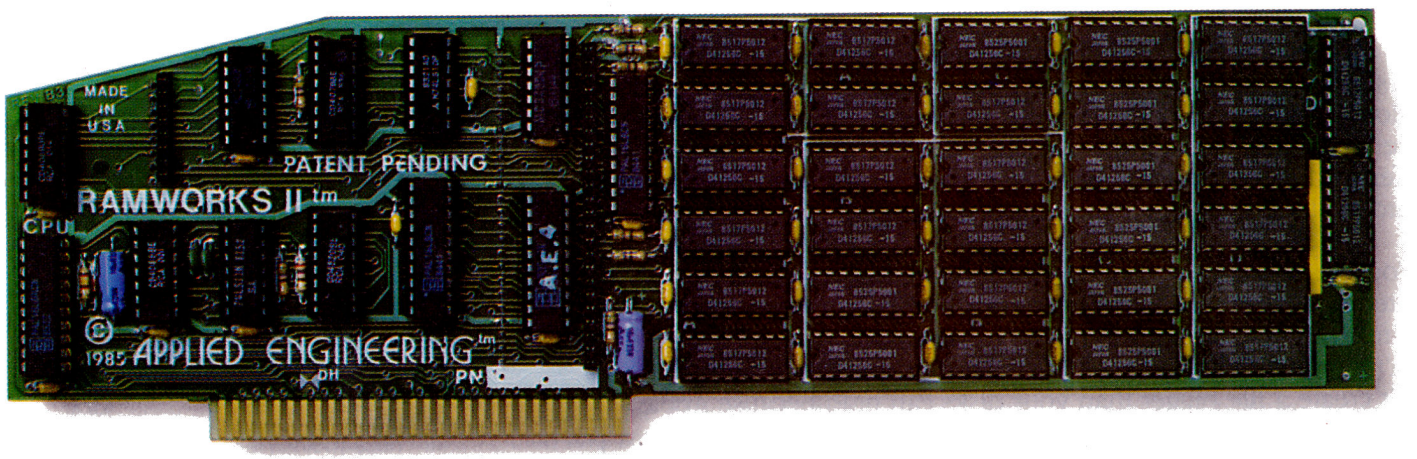

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But AppleWorks has certain internal limits, independent of available memory. Fear not. Only RamWorks II (and the original RamWorks of course) removes those limits. Only RamWorks II increases the maximum number of records available from 1,350 to over 16 000. Only RamWorks II actually increases the number of lines permitted in the word processing mode. And only RamWorks II features a built-in printer buffer, so you no longer have to wait for your printer to stop before going back to AppleWorks (256K or larger RamWorks II required).

With RamWorks II, you won't have to split your data into 2 or more separate files because you'll have the necessary memory to access ALL your data ALL the time, quickly and conveniently.

RamWorks II	AppleWorks Desktop
128K	101K
256K	188K
512K	378K
1 MEG	758K
1.5 MEG	1136K
3 MEG	2277K

The Most Friendly, Most Expandable Card Available.

RamWorks II is compatible with more off-the-shelf software than any other RAM card. Popular programs like Advanced VisiCalc, Magic Office System, Flashcalc, The Spread Sheet, Diversi-DOS, Supercalc 3A, Magicalc, etc. (and hardware add-ons like Profile and Sider hard disks). Fact is, only RamWorks is 100% compatible with all software written for the Apple 80 column and extended 80 column cards. In addition, RamWorks II can emulate most other RAM cards, so you can use programs written for them without modification. And any size RamWorks II can be user upgraded later to any larger size.

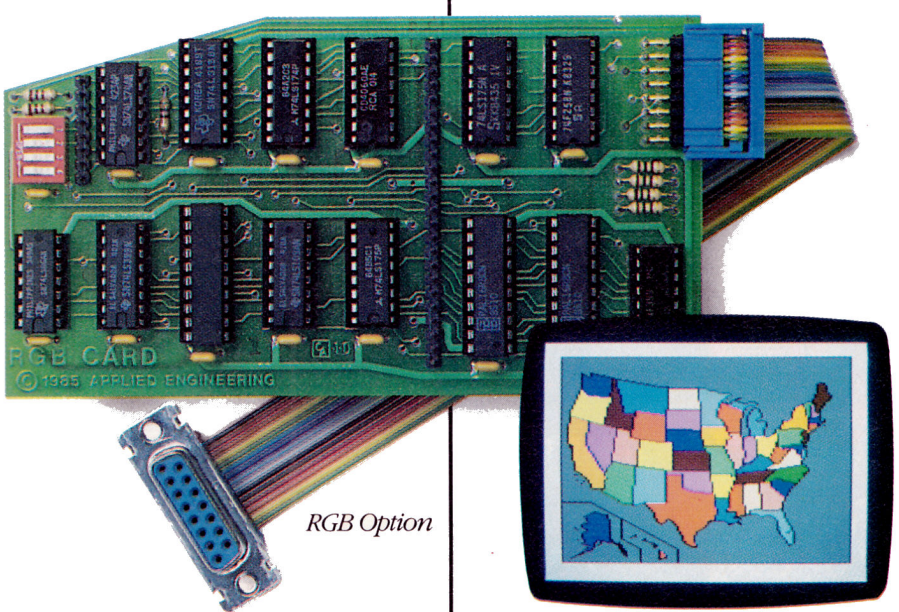
RamWorks II was designed so you could take full advantage of future developments in 16 and 32 bit microprocessors. As your needs grow, so can RamWorks II. A handy coprocessor connector allows the latest and greatest coprocessor cards to access all 3 MEG

of RamWorks II memory. And speaking of more memory, RamWorks II has a memory expansion connector on board so a low profile (no slot 1 interference) memory expansion card can add another 512K or 2 MEG of memory.

Unlike Apple's smaller, more expensive RAM card, RamWorks II plugs into the IIe auxiliary slot and therefore leaves slots 4 and 5 available for other peripheral cards.

It's In Color

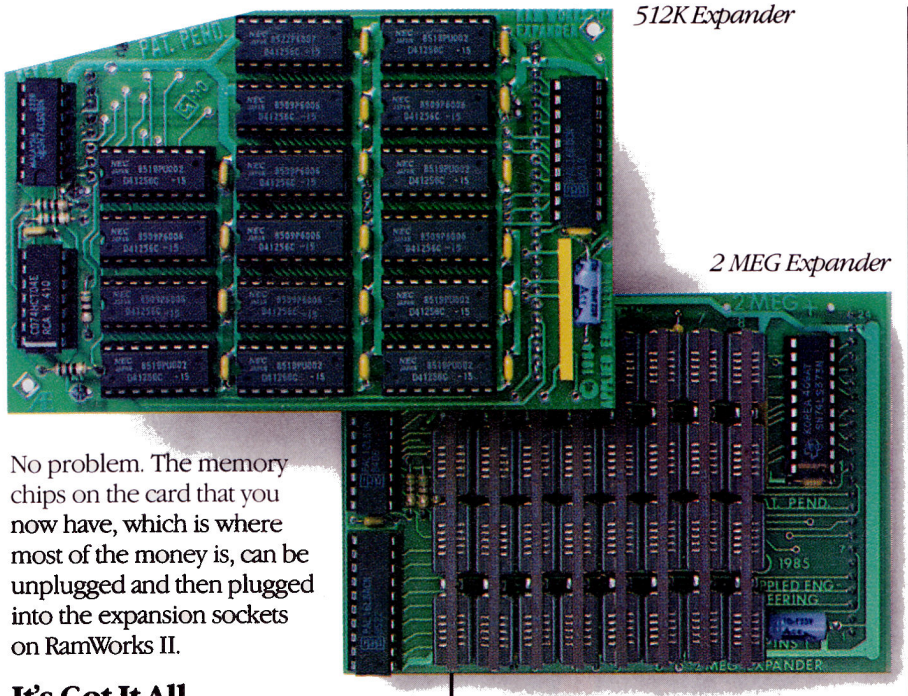
RamWorks II by itself is *fully* compatible with both the Apple monochrome and color monitors. But if you want better color graphics *plus* a more readable 80 column text (that blows away any composite color monitor) you'll appreciate our RGB color option. For only $129, it can be added to RamWorks II, giving you a razor sharp, vivid brilliance that's unsurpassed in the industry. The RGB option does not waste another valuable slot, but rather plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and attaches to virtually any RGB monitor. And remember. You can order the RGB option with your RamWorks II. Or add it on at a later date.



RGB Option

It Corrects Mistakes.

Let's say you bought some other RAM card (and that's a mistake) and your RAM card is not being recognized by AppleWorks, Advanced Visicalc, Flashcalc, Supercalc 3A, or other programs, and you want RamWorks II.



512K Expander

2 MEG Expander

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Review/New Products Editor Paul Statt
News Editor Cynthia K. Carr
Copy Editor Robin Florence
Assistant Editor Lafe Low
Proofreader Peter Bjornsen
West Coast Editor Wendy Lea McKibbin (415) 328-3470

Advertising

Sales Manager/Northeast Sales Representative Paul Boulé (800) 441-4403 (603) 924-7138
Southeast and Central Sales Representative Rich Alden (800) 441-4403
West Coast Sales Representative Donna Pomponi 1060 Marsh Road Menlo Park, CA 94025 (415) 328-3470
Advertising Coordinator Kim Labbe (800) 441-4403
Marketing Services Manager Michael Duran

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Art Director Donna Wohlfarth
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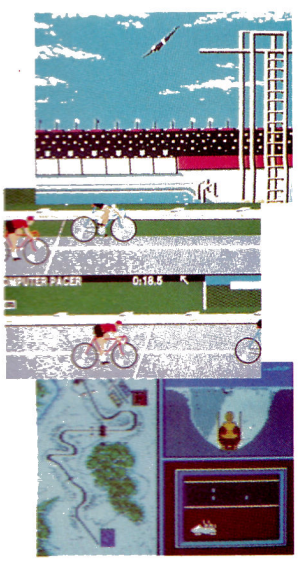

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LETTERS

ComputerEyes Connections

Since Digital Vision's ComputerEyes digital acquisition system (reviewed in the August 1985 *inCider*, p. 72) uses the 16-pin game I/O port on the Apple //e and II Plus, you can't use it directly with the //c. Southern California Research Group, though, advertises a "9-16 Adapter" (*inCider*, August 1985, p. 87). SCRG claims this adapter lets all 16-pin devices function properly through the //e or //c nine-pin game I/O port, except those that use the C040 strobe or annunciators.

Have you tried using ComputerEyes with the //c and an adapter? If so, did it function properly? If SCRG's adapter doesn't work, can you name one that does? I would greatly appreciate it if you could clear this up for me.

Blair Dillman
14 Fellview Drive
Pittsford, NY 14534

The ComputerEyes digital acquisition system does use the C040 strobe and annunciators, so the SCRG adapter won't work. A representative of Digital Vision says there aren't any adapters available that will let you use the original version of ComputerEyes with the Apple //c, but the company has recently produced a //c version, available since October 1985. —eds.

Epson Modifications

David Seidel asked about printing labels with an Apple II and an Epson RX-80 printer (Letters, September 1985, p. 10). I use an Epson MX-80, and the modifications needed for the RX-80 should be minimal.

You can use almost any word processor to print labels. I use Apple Writer, and the key is to designate a six-line page.

For 5/16-inch labels, separate three-line labels by typing an empty line, set the top margin to zero, bottom margin to one (zero for four lines), lines per page to six, single page to zero, and page number to zero.

A program to print labels can be very helpful, letting you maximize the capabilities of the MX-80. I have two such programs—one that prints five-line labels as you type them, and another that files labels as you type them and can print the entire file at once. You can easily modify either program to include lowercase type. I'd be glad to send these programs and the lowercase subroutine to anyone requesting them—just include a disk and return postage. Minor modifications can convert these programs for use with other printers.

Joseph Fulford
P.O. Box 512
Pacifica, CA 94044

Trend Setting

I don't know if you consider "nominations" for Editors' Choice, but I'd like to make one anyway.

I recently purchased an Elfware "Elf Pack" at a computer swap show. I spent $29.95 (list price $35) for two programs called Elf ABC and Elf Games I. My two kids love these programs, and have spent much more time with them than they did with Spinnaker's Kindercomp or Weekly Reader's StickyBear.

I think these programs are a new trend in software, or at least I hope so. They are super programs that cost less and are at least as good as the overpriced stuff on the market now. If this is a new trend, we'll all benefit.

I think you should consider using the Elfware programs as an Editors' Choice, because they're the best buys on the educational-software market. By the way, I think the Editors' Choice column is right on. It's a great source of information for the Apple II user. I've already purchased Infocom's The Hitchhiker's Guide to the Galaxy (April 1985) and a Zoom Telephonics Zoom/Modem IIe (June 1985). Soon I'll look into a First Class Peripherals Sider hard disk (May 1985).

Jim Hoag
5534 Westmont
Whittier, CA 90601

Look for a review of Elfware software in an upcoming issue of inCider. *Thank you for your comments—we're pleased you find our Editors' Choice column so helpful. —eds.*

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inCider *welcomes readers' comments regarding articles, letters, or other topics of interest. We reserve the right to edit letters for clarity, style, and space. Please address your correspondence to Letters,* inCider, *80 Pine Street, Peterborough, NH 03458.*

CORRECTIONS

The price and distributor of the C-Vue flat-panel display for the //c were printed incorrectly in the November 1985 New Products section of *inCider* (p. 88). The price is really $475 and is available from Roger Coats, 4684 Firestone Street, San Diego, CA 92117, 1-800-GET-CVUE.

Nutri-Byte's manufacturer and the company's address were listed incorrectly in the September 1985 Software Reviews section (p. 76). The heading should read: ISC Consultants, 14 East Fourth Street, New York, NY 10012.

Don't get teed off, but the correct telephone number for 1 Step Software (News Line, December 1985, p. 14) is (704) 525-6688 in North Carolina.

WE ASKED THE EXPERT

We went to the inventor of the Apple *II*, the man who helped launch the personal computer revolution, Steve Wozniak. We wanted to know if the Mouse Series,™ our new family of software for the Apple *II*, could bring new excitement to the first industry standard:

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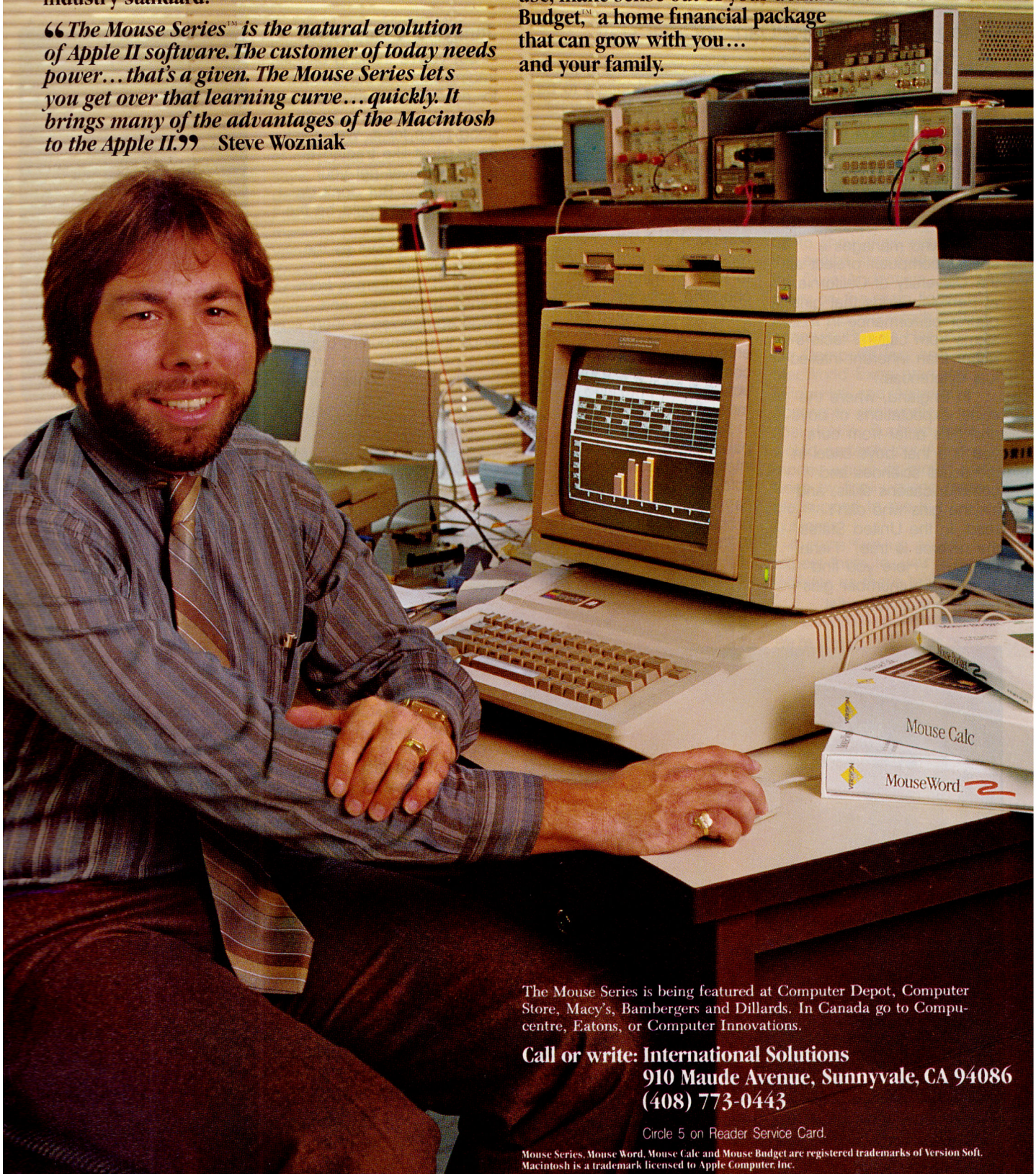

The Mouse Series is being featured at Computer Depot, Computer Store, Macy's, Bambergers and Dillards. In Canada go to Compucentre, Eatons, or Computer Innovations.

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NEWS LINE

edited by Cynthia K. Carr, *inCider* staff

Girls Only

Studies indicate a parallel between girls' early resistance to math and their subsequent indifference toward computers, says Glenn Fisher, a computer specialist and former elementary-school teacher. Fisher, who manages a special computer project at the University of California at Berkeley, adds that girls' poorer performance in math stems from cultural factors rather than inherent intellectual differences.

"In England, where the social expectations of boys and girls differ from ours, you find that boys excel in the social sciences and communications skills, and it's the girls who can't read. In the United States, the reverse is true," Fisher explains. "Here you find that boys outnumber girls two to one in remedial reading classes—and the only variable appears to be socialization or the cultural factor."

Some educators say parents can give their daughters a nudge toward higher math and science scores by introducing them to a computer at home. Fisher recommends three factors to keep in mind when choosing software: Educational games should be nonviolent and task-oriented, while involving the completion of an entire project (not just unrelated moves).

According to Fisher, if parents exercise care and intelligence when selecting software for the home, they can secure material that promotes the child's ability to think and reason.

—W.L.M.

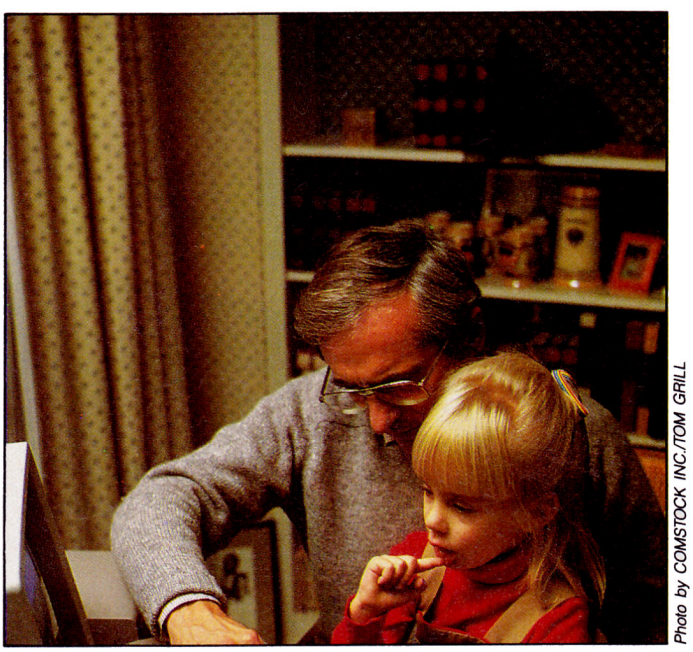

Photo by COMSTOCK INC./TOM GRILL

Junkyard Computers

So, you're thinking of trading that old computer in for a new one—and you think you can get a pretty good price for it. Well, think again. Just like trading a car, you never get your asking price. But don't despair, Cosalco could be the answer.

Cosalco, known as the computer-junk specialist, buys old mainframes from banks, universities, and large companies. It then strips the computers of usable peripherals and circuit boards, which contain precious metals. Cosalco sends these boards to refineries in Taiwan, where gold and other metals are removed. The computer scrap also yields silver, platinum, palladium, and copper.

Phil DeLeon and Sheldon Pollock, founders of the Markham, Ontario-based company, estimate that they handled three million pounds of computer "corpses" in 1984 and 4.5 million pounds during 1985.

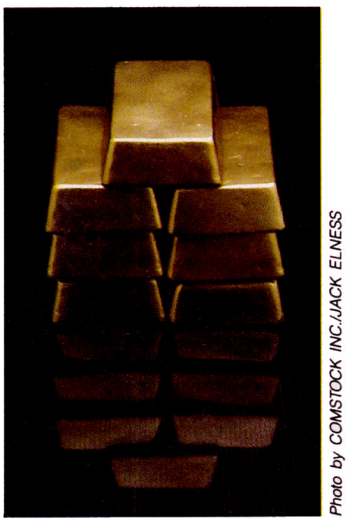

Photo by COMSTOCK INC./JACK ELNESS

INSIDE OUT

- **Apple Goes to China. . .** Representatives from Apple's International Group are part of a task force that meets quarterly with China's Ministry of Education. The group helps prepare computer-literacy standards for China's youth. It's a task of staggering proportions. China's installed base of computers for its 900 universities, 900,000 schools, and more than 10 million teachers and 200 million students is negligible.
- **Is Smaller Better?. . .** Bob Katzive, vice president of Disk Trend in Mountain View, California, doubts that Apple's new 3½-inch drive will do much to push the microfloppy-disk-drive market. "If IBM comes out with a 3½-inch drive for its PC line, then the market will take off. Otherwise, we'll see only moderate growth," Katzive says.
- **Straight A's. . .** Talmis Research reports that Apple Computer has consolidated its lead in the educational market. The company increased its market share from 48 percent in 1984 to 54 percent in June 1985.
- **Aiding the Blind. . .** Students at the Tennessee School for the Blind in Nashville are now using Apple computers with the help of voice synthesizers, large-print monitors, paperless and hard-copy braille, and various optical aids.

—Wendy Lea McKibbin
inCider staff

Aces High

Franklin Computer upped the ante in the computer industry with the release of the ACE 2000 series—three models that run most Apple II software. The product marks Franklin's return to the market after suffering financial losses in 1984, following Apple Computer's successful suit against Franklin for copyright infringement. The company has developed Franklin DOS 2 in an atmosphere of "peaceful coexistence" with Apple, according to Morton E. David, Franklin's chairman and chief executive officer.

The ACE 2000 series is Franklin's "first new-product introduction in two years and comes after a period of corporate turmoil," David says. "The computer was designed to reestablish Franklin in its traditional markets, reemphasizing the values that built a loyal dealer and user base. The ACE 2000 is feature-packed, competitively priced, and built for ruggedness and reliability."

All models include 128K of random access memory, built-in parallel printer card, switchable 40- or 80-column display, 90-key detachable keyboard with numeric keypad, 12 programmable function keys, and game port with 9- and 16-pin connectors. The model 2200 includes two built-in disk drives; the 2100 comes with one; and the 2000 has no drive.

inCider plans to review the Franklin ACE 2000 series in an upcoming issue.

Photo by COMSTOCK INC./JACK ELNESS

Photo courtesy of Franklin Computer

IIs at Mac Expo?

If you were planning to attend the MacWorld Expo in Brooks Hall in San Francisco this month, you may be pleasantly surprised to find a rather large exhibit space devoted to none other than Apple II products.

We have heard that more than 50 companies are lined up to show their wares in the exhibit space located in the Civic Auditorium, upstairs on the main floor above the Macintosh exhibit space in Brooks Hall. Apple Computer Inc. and MacWorld Expo promoter Mitch Hall and Associates apparently are working out final details. Such an exhibit would certainly put Apple's money where its mouth has been by finally giving tangible support to the II in business.

If plans firm up as we expect them to, you can look for us there too!

We're always looking for news of the Apple world. If you're making news, send your press releases and photographs to News Line, inCider, *Suite C-200, 1060 Marsh Road, Menlo Park, CA 94025.*

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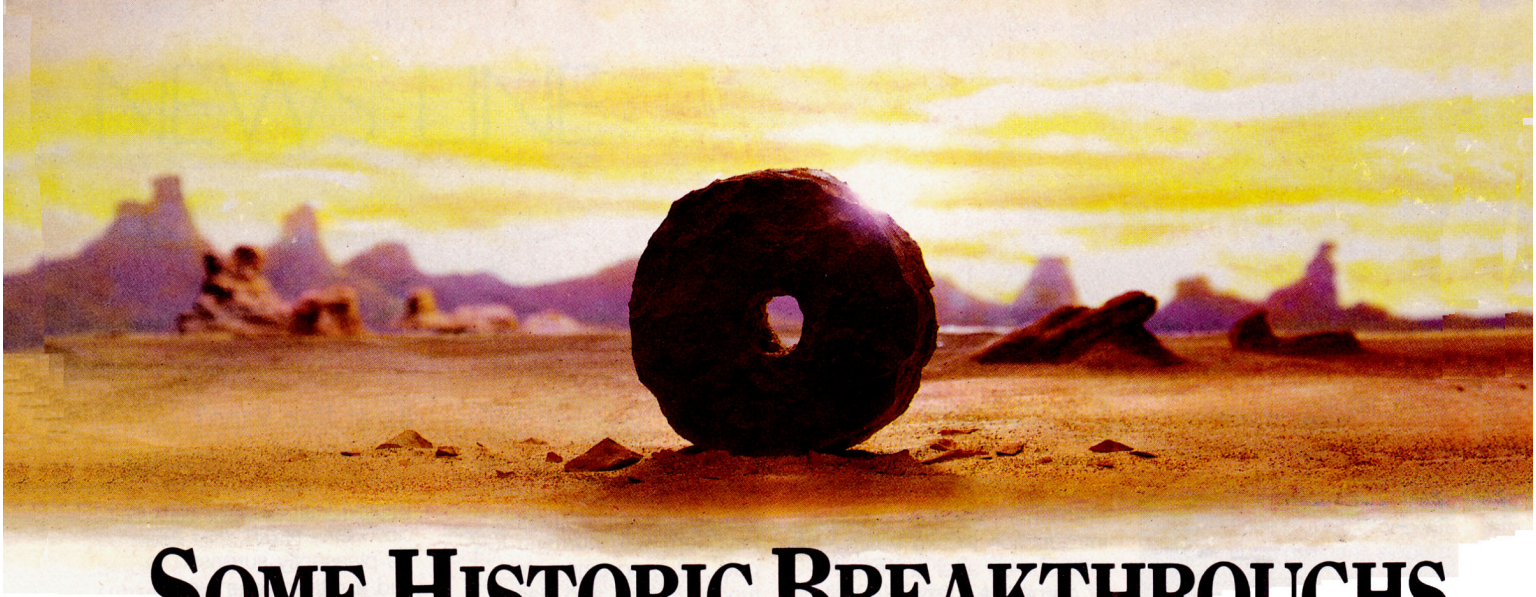

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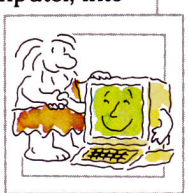

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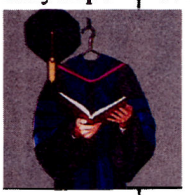

The College Board, operated by the College Entrance Examination Board, gives tips on preparing for the SAT, choosing a college and getting financial aid.

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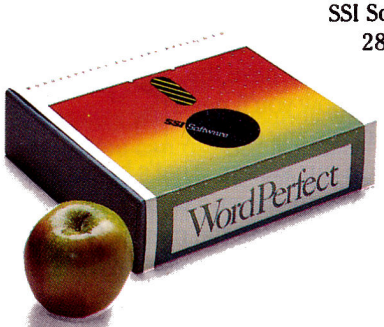

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Keep your Apple fit and functioning with the proper care and protection.

AN OUNCE OF PREVENTION

by Bill O'Brien

Murphy's Law reigns when it comes to Apple maintenance. Your Apple is likely to break down at two times: when you need it. . .and when you *desperately* need it. This isn't some magical occurrence that transcends the laws of cause and effect. Nor is it some spectacular revelation. Neglect is the prime factor.

I'm sure if you own a car, you take the time to change the oil. You may even clean the lint out of your washing machine. But when it comes to our Apples, we play dumb and subscribe to the notion that what we don't know can't hurt us. We conveniently forget that disk-drive stepper motors make more rigorous starts and stops than any car—and that the environment can put as much residue (dust, ash, tars) on sensitive chips as the fullest-capacity washload can shed lint.

But before you investigate the care and feeding of your Apple II, I must issue a warning. If your Apple is still under warranty, you'll invalidate it by disassembling it or performing any repair work. That's the rule. I suggest you enroll your machine in the AppleCare extended-warranty program. If it breaks, the company fixes it—no matter how many times it breaks during the contract period or why (excluding the odd dash against the wall). The repair costs won't exceed the AppleCare contract price. The only drawback is that you won't have your computer during the re-

pair period.

For those who are somewhat more adventurous, there are ways to prevent and solve the more common problems awaiting your Apple.

Death Threats

The environment is the number-one killer of Apple computers. You don't need a battery of complex devices to examine your Apple's habitat, though. You yourself are the best judge: Are you comfortable in that room? Are you too hot in the summer or too cold in the winter? If you are, your Apple is, too.

The Apple II can operate in temperatures ranging from 30 to 115 degrees Fahrenheit. Although you may never do your word processing in the antarctic, has the temperature ever hovered in the 80's during a round of Summer Games? That may seem to give you a 35-degree leeway, but that's not necessarily the temperature inside your Apple. Depending on the complement of add-on boards, the internal temperature can be 30–40 degrees higher. The results may not be immediately apparent, but your Apple will eventually pass out.

To prevent a high-tech "stroke," buy a fan. Kensington Microware (among others) sells one. That's all it takes, and it costs less than a repair bill. Should you buy a fan anyway, even if the temperatures seem all right? Probably yes. If you can keep the internal components of your Apple within the median range of its operating temperature (about 75 degrees), you can extend its life threefold.

Water is another killer. The Apple can survive in 5–85 percent *noncondensing* relative humidity. Although few of us have water trickling down our walls, don't kid yourself—we do have more than our fair share of days above 85 percent humidity. Water mixed with oxygen corrodes the chip legs, the copper teeth of the interface cards, and even the rear-panel connectors. Corroded contacts cause poor conductivity.

If you're in a humid environment, get a dehumidifier. You might be pleasantly surprised at how well your own sinuses respond to treatment prescribed for your Apple.

It's in the Air

Dry air creates its own problems. Take a very dry day, add pile rugs or woolen clothing, and you have static electricity. One little blue zap can pass thousands of volts through your Apple. Whether or not the static shock annoys you, the computer-repair bill definitely will. Look in any INMAC or Radio Shack catalog for a host of antistatic mats and sprays.

Electrical power is another silent killer. Everyone suspects it's a problem, yet no one knows how to handle it. Power companies, just like everyone else, replace equipment only when they realize something's wrong—usually after someone complains. In my area, I've measured line voltages as high as 130 volts. Since the operating range for the Apple is 107–132 volts AC, that's not a good enough margin. Even if your wall outlet pumps a steady flow of 110 volts, once your electric company puts a 3 percent drop on the line to offset peak usage, you're stuck with 106.7 volts.

Surge protectors can help when spikes (temporary voltage increases) occur. In most prolonged high- or low-voltage situations, though, your Apple's switching power supply will refuse to work. It was intelligently designed, but that still means you can't use your Apple. If that's a frequent concern, you might consider a power-line conditioner. These devices work over a wide input-voltage range, yet pump out a steady 120 or 125 volts (depending on how they're ordered).

A third option, an uninterruptible power supply (UPS), may be the ideal answer for areas of frequent brownouts (drops in voltage) or blackouts (total power loss for a limited period of time). They're a last-ditch effort because of their high price, but they do provide battery backup when the power fails—even if only momentarily.

Grounding

Grounding your computer is immensely important. If your electrical service doesn't have three-prong outlets, buy an adapter. This includes a wire connector that's bolted to the wall outlet's center screw and carries the line back to ground through the metal of the outlet box and wiring jacket. If your electrical contractor installed PVC-type power receptacles and conduit, run the adapter's center wire to a cold-water pipe (a radiator pipe will suffice). For once, you'll get a million dollars' worth of use out of an 89-cent device.

Dust and its atmospheric ilk contribute to the list of problems. The integrated circuit comprises only a small portion of what we assume an IC chip is. The surrounding epoxy housing protects the delicate silicon device and acts as a heat sink to transfer heat

from the IC into the air. Dust acts as an insulator. A $^{1}/_{64}$-inch layer of dust on an IC can severely impair heat transfer and raise the internal temperature beyond optimal working range. Cooling fans can be beneficial, but they draw air in and across the Apple's motherboard. With that air come any and all pollutants.

Though its health benefits are dubious, an ionizer can be helpful; it makes airborne particles drop rather than remain free-floating. A strong room fan with a filter can do the same thing.

Your Nose Knows

Many maintenance problems center around the disk drives. That's natural for most computers, since the drive is the single most mechanical device aside from the printer.

Consider this scenario, for instance: You've just installed your Apple and now you want to boot a disk. You turn it on and all the drive does is spin and spin some more. First, you should turn the system off (press the control-reset key combination to stop the spinning, then turn the computer off). Second, pick up the drive and smell it. If you detect a sickly sweet burnt odor, you've made a classic mistake: a bad connection on the interface card. On Disk IIs, also remove the top cover and check the connector on the top of the drive. (Whenever you move the system, you should do this before you turn it on again.) If you find both the odor and a cable that's either misaligned or half out of its connector, you've probably blown the 74LS125 chip on the drive's analog board (see **Photo 1**).

It's easy to try another boot disk, but under some conditions, the blown 74LS125 can cause your drive to write to the disk randomly and destroy it. You can safely try a different disk if you don't detect an odor or loose connections.

When you open the drive, you might notice the remains of an electrolytic (can-type) capacitor, which looks like white stuffing. If you see that or the results of a *violent* 74LS125 blowout (I've seen them literally split the analog board), you'll need to replace the entire board. That means professional repair (unless your service department will swap the board with you and save you the cost of labor).

You can try to repair the problem by replacing just the 74LS125, but your best bet is to replace all the chips. You can purchase them for less than $15 from a well-stocked electronics store (not Radio Shack, in this case) or, in some instances, by mail order.

A similar problem—disk spinning, but without the burning smell—occurs if any of the other 74LS-type chips on the analog board give up the ghost. If you don't notice the odor and your connections look sound, pull the top cover off the drive and see if the read/write head moves back and forth across the surface of the disk. If it doesn't, the stepper motor could be dead. Before you attempt to repair it, try replacing the 74LS-type chips (about $5 total), which are less hardy than stepper motors.

Also, if the drive continuously spins with a Duo- or UniDisk installation, check the individual cable strands between the interface card and the Apple's rear-panel connector. Careless insertion or removal of boards into or from slot 5 or 7 (depending on which way you've routed the intermediary interface cable) can cause breaks in the individual wires under the insulation where you can't readily see them. Try squeezing each strand together between your fingers. If the drive works momentarily after that, you've found the problem.

Diagnostic DOS

If you're trying to load DOS, ProDOS, or the Utilities and suddenly the machine hangs up (and the drive stops) or dumps you into the Monitor, you might think that the disk itself, or the drive, is bad. Try another disk first. If the problem persists and you have a two-drive system, turn the computer off, change the drive connectors (so drive 2 is drive 1), and try it again. If you still have problems, the drive probably isn't at fault. And, if the disk works on another Apple, the operating system has given you a good clue to the source of your woes—memory.

DOS or ProDOS loads into the high-memory areas (ProDOS System Utilities load into the extended-memory area). So, if that area contains one or more bad memory chips, that load will be incomplete. If you discover missing dots or odd colors in your hi-res displays, a RAM chip could be bad. In color mode, the Apple uses 7 bits of each 8-bit memory byte for the seven dots of the screen display, and the eighth bit for the color value. With 4116 (Apple II) and 4164 (Apple //e and //c) RAM chips at an all-time low price, replacing a full bank of memory in either machine by yourself costs less than most service departments charge for labor alone.

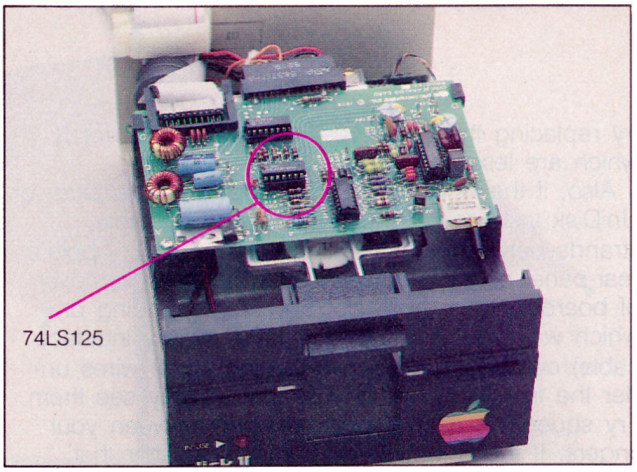

Photo 1. Analog board of a Disk II showing orientation of the 74LS125.

Cleaning Your Drive

A host of electronic reasons might cause your drive to start acting erratically. The easiest problem to deal with is a dirty read/write head. On Disk IIs, you should use a cotton swab and alcohol to clean the head. (You'll need a flashlight to see into the drive if you don't want to take it apart. The read/write head is the white assembly, about ½ inch in diameter, with two small, black stripes just below eye level if you're looking straight in through the door.)

I hesitate to mention the other approach because we are all, at heart, paranoid, but you'll need it for half-height drives. Use any of the commercially available *nonabrasive* head-cleaning kits for *single-sided* disks. The kit you buy *must* be both nonabrasive—so it doesn't literally wear the head away—and be designed specifically for single-sided drives. Apple's single-sided drives (and almost everyone else's) use a small, porous load button (attached inside the drive, along the door mechanism) to hold the disk against the read/write head when the door is closed—you don't want to contaminate the button with head-cleaning solution.

At best, in a poor environment with terrible, bottom-of-the-line, cheap disks, you should clean the head every six months. If you can almost see the ferric-oxide coating falling off the disk as you put it into the drive, you may need to clean it more frequently. (It's better to get a higher-quality disk.) Under normal usage and conditions, cleaning the head once a year is more than adequate.

One other possibility for a misbehaving disk could be a dislodged load button. If you can find a dealer who'll sell you one, push the load button into the small hole in the door shaft at the point where the shaft passes over the read/write head.

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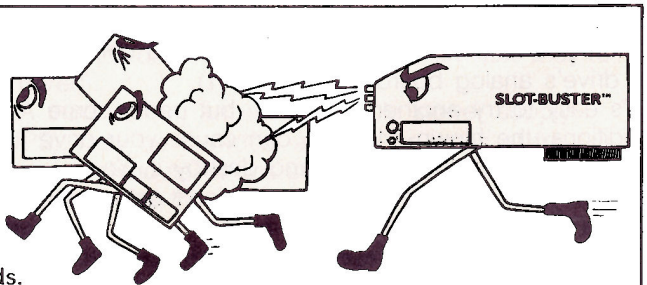

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Coming Up to Speed

What makes disk drives spin faster or more slowly? Anything, everything, and nothing. As facetious as those answers sound, they're all true. Any problem, from a slight binding of the pulley assembly (don't *ever* lubricate your drive) to voltage variations from the motor-control board, can contribute. When something's wrong, your copy-protected software acts cranky, not always booting or never booting on your machine, but always on anyone else's.

Apple claims that the drive-motor speed can vary from normal by as much as ±10 percent before the problem becomes noticeable. Unfortunately, some copy-protected software isn't that forgiving. It will cost you about $50 to have a repair shop adjust the drive's speed, but if you have enough innate mechanical ability to make a peanut-butter sandwich without messing up your hands, you have enough talent to adjust the drive yourself.

Disk II owners can pat themselves on the back because all they'll need is a Phillips screwdriver, a small, flat-bladed, *nonmetallic* screwdriver (like the TV tuning wands Radio Shack sells), and a fluorescent light source. Apple //c, DuoDisk, or UniDisk owners need some special software. I'll cover both methods.

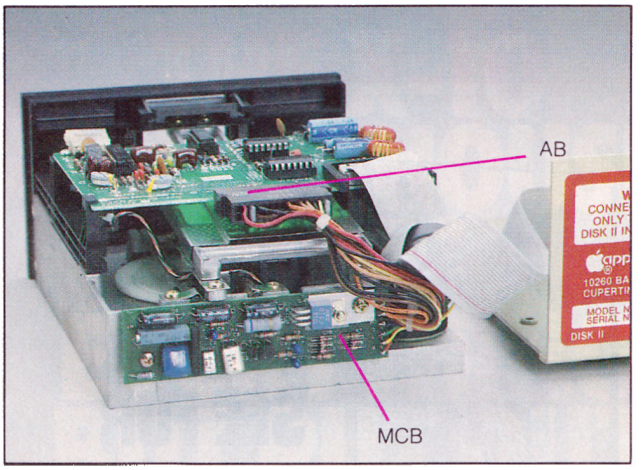

Photo 2. Three-quarter view of disk drive from back with arrows to motor-control board and analog board.

For the Disk II, turn all power off and disconnect the power cord from your Apple, so that you don't accidentally turn the machine on. *(Editor's note: Apple recommends you keep the power cord attached when you work on your machine.)* Don't disconnect the drive; instead, carefully unscrew the top cover and the bottom plate. Because of the shorter lengths of interconnect cables on the RFI-compliant drives, this is the most difficult part of the procedure. When disassembly is complete, check that you haven't pulled the connector loose from the analog card on top of the drive (the small electronic board across

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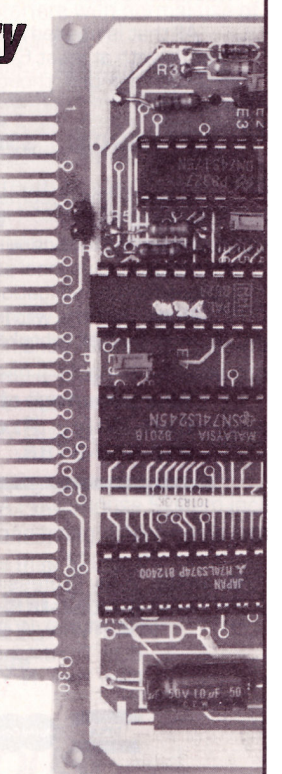

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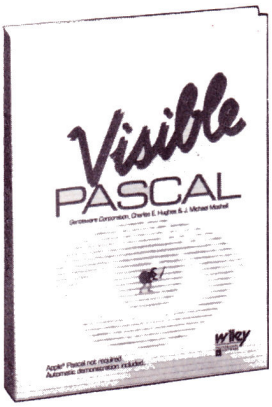

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the back is the motor-speed control board; see **Photo 2**).

Stand the drive on its side and look at the bottom. On the large round drive pulley, you'll see two strobe patterns, one within the other. Your system uses the outer strobe pattern if 60-cycle-per-second (Hz or CPS) electricity (USA) powers it, and the inner pattern if 50 Hz powers it. On the motor-control board, you'll see a small rectangular variable resistor (about ½ by ⅛ by ⅛ inch in size and usually blue or gray in color) with a tiny brass-colored shaft slotted to fit a small, flat-bladed screwdriver.

Reinsert all the power plugs, and, being careful that nothing is leaning against any of the drive's circuit boards, turn the system on. Create a redundant EXEC file (one that ends by EXECing itself again) or a looping Applesoft program to read the directory from a disk in this drive. As the drive spins, watch the appropriate strobe pattern under the fluorescent light. If you adjusted the drive correctly, the pattern will appear to stand still. If not, the individual black bars will seem to be moving.

Use the flat-bladed screwdriver to turn the variable-resistor shaft until the strobe pattern stops. (If you turn it the wrong way, the pattern movement will speed up.) If you've used a metal screwdriver, stop, remove it from the variable resistor, and check the strobe pattern again. The metal can give you a false reading when it's touching the resistor's shaft. When you've done that, pull the plugs again and put the drive back into its case.

Because Apple has decided to wrap the //c's half-height drives, as well as the Duo- and UniDisk, in an extra metal skin, disassembling them creates a problem. No matter which unit you have, turn it over on its back and look carefully at what would be the bottom-right corner at the front of the drive. You'll see a small round access hole. Inside this hole, the disk contains the same type of variable resistor as the Disk II to control its speed. You'll need a jeweler's or eyeglass screwdriver and a good light source to get in there. But, since there's no strobe pattern to look at, how do you know when you're finished?

Apple supplies its dealers with software that creates a hi-res display showing a line down the center of the screen and an arrow (or similar indicator). If the drive speed is correct, the arrow lies dead on the center line. I doubt that you can liberate a copy of those diagnostics, but programs like LockSmith and Copy II (as well as all of the "disk-doctor"-type software) have speed-checking programs similar to Apple's. Just run the software with a formatted disk in the drive in question and adjust as needed. Lacking a fluorescent light, you can do the same to your Disk II.

Multiple-Choice Problems

Problems with your Apple itself can be very complex. Even in the //e, with its relatively low chip count, trying to trace the interaction among the ICs,

November's Editors' Choice in Cider Magazine

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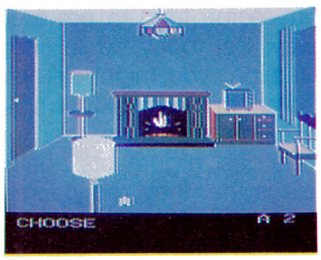

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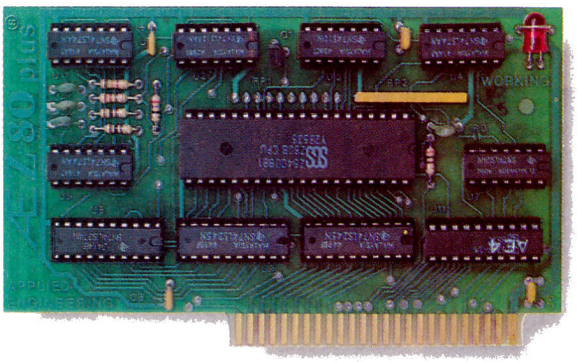

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resistors, and capacitors can drive a sane person over the edge. Apple supplies its dealers with a checklist of possible solutions to various recurrent problems, but any technician will tell you there are many ways to interpret the problem. Video is a great example.

If you see nothing on your display, is it because the Apple is sending no video signal or because the brightness line (monitored and controlled by a variable resistor in early Apple IIs) is dead? Or is the RCA connector bad? Three possible solutions to a problem are two more than I care to bother with, especially when resolving them depends on oscilloscopes and signal tracers. I prefer to leave the more complex problems for the repairperson and solve the simpler ones myself.

Joystick

If I'm in the middle of an intense game of Space Buffoons, for instance, and find that every time I press the joystick button, the Apple reboots or the screen image scrambles, I know it's quite possible that the pull-up resistor inside the joystick has shorted. Pressing the joystick's button sends 5 volts to ground inside the Apple, but a properly working pull-up resistor limits the current and prevents the computer from shorting out.

To end that problem, I'd open up the joystick and match the color coding on the resistor to a new one. (I rarely worry *what* the coding means, as long as new and old parts match.)

Interface Cards and Intelligent Software

If I have problems after I install a new interface card, I switch slots. The driver routines for an interface card (if it needs them) will check each slot, send an initialization command, and hope for a response. This continues until the card it's looking for responds. Sometimes the wrong card answers and everything comes to a halt.

Slot swapping also works with an old Apple problem—too much ROM on an interface card. Each card has its own ROM limits, predefined by Apple. All early manufacturers didn't live within those limits, though—some tried to get around the constraints in any way. So, today, while cooperation mostly solves the situation, you might still find the odd card that works well in slot 5 only if slot 4 is empty.

The cards themselves can present problems. One of the largest arguments against slots and IC-chip sockets is that they reduce reliability. I discussed corrosion already, but even in a well-maintained environment, heat and air can soil the contacts and make the computer act erratically.

Every few months, I pull the cards and clean their edge connectors with a cotton swab and alcohol. The older recommendation was to use an eraser, but so many people erased the thinly coated metal

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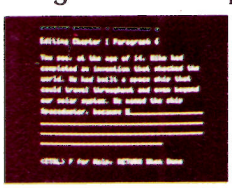

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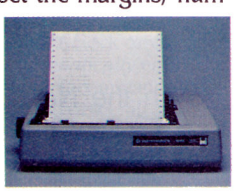

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contacts by rubbing too hard that this method isn't popular anymore.

Dust, Dirt, and Grime

If I open the cover of my Apple and see that someone has scribbled "clean me" in the dust, I whip out the vacuum. Although some micro vacuum cleaners are made especially for cleaning circuit boards, I've found that a regular noncanister type works fine. Just tape a bendable drinking straw to the crevice tool (with duct or gaffer's tape) to create an excellent small-parts cleaning attachment. If you pinch the end of the straw, you can even use it inside the slots.

How many of you have ever taken the time to see what's living inside your keyboard? Dust, hair, ashes, and even part of yesterday's lunch could be under those keys. To remedy that, you need only a broad-edged, flat-bladed screwdriver and some self-confidence. You can pry up every key except the space bar. If you use your finger to maintain even pressure on the key, you can keep it from flipping out. The vacuum trick (or tweezers in dire cases) works equally well here.

A Quick Check

Apple includes a self-diagnostic routine in //e's so that plant managers can randomly check production standards without resorting to specialized software, and no one says you can't use this same routine to do your own quick check of the RAM and ROM. Before you press the control/closed-apple/reset key combination to activate this test, though, make sure you've taken any interface cards out of the machine. (Although the diagnosis won't harm the cards, the cards might make the diagnosis incorrect.)

None of these maintenance tips will keep your Apple fit as a fiddle (or a computer), though, if you're unwilling to try them. I can understand your reluctance. The computer is an alien device with practically no moving parts, not to mention that it's also quite expensive. But keep this in mind: The Apple was developed and built in a garage. The basic design of the machine hasn't changed in seven years, despite the move toward automated assembly procedures. It's a rugged piece of equipment that's quite durable as long as you don't abuse it.■

Apple Resolutions

With the New Year upon us, you might make a few additional resolutions, starting with the New Year's celebration:

1) Champagne, confetti, and streamers are good for me but not for my CPU. I promise I will keep the party away from my Apple.
2) Once each year, I will clean the read/write head in my disk drive using only a cotton swab and alcohol, or a nonabrasive cleaner kit designed for single-sided drives.
3) Every three months, I will clean the interior and exterior of my Apple, including the keyboard. I'll use only a damp cloth on the exterior and never spray or pour cleaning solution on it.
4) Every six months, I will clean the edge connectors on the interface cards with alcohol and a swab—I won't erase them.

Of all the resolutions I make this year, I will keep at least these four, since I love my Apple and I'd prefer not to spend the money on a replacement.□

—W.O'B.

Bill O'Brien has been working with microcomputers since 1978. His articles have appeared in a number of national publications, including Microcomputing, Science Digest, *and* Creative Computing. *He is the author of* The Apple //c Book *(Bantam, 1984),* The Macintosh *(Bantam, 1984), and* Making Your Macintosh Excel! *(Scott, Foresman, 1986). Write to Bill at P.O. Box 1010A, Fort Lee, NJ 07024.*

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Continued on p. 30.

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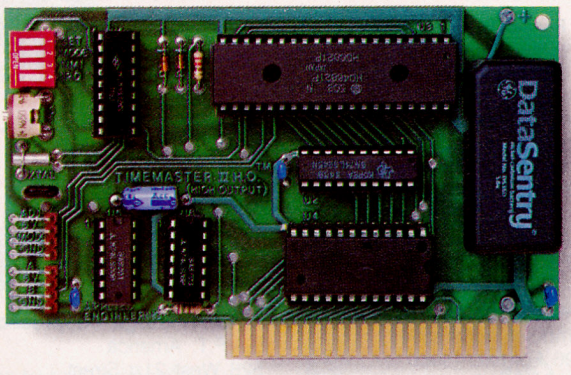

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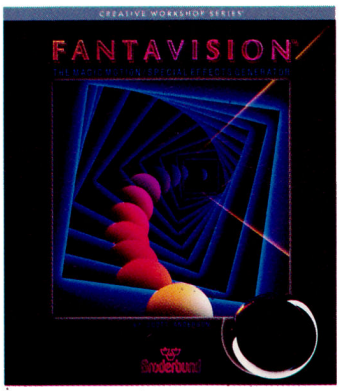

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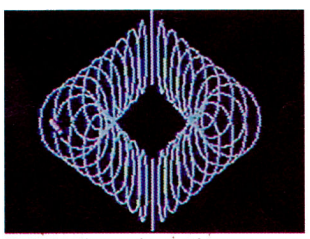

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An Apple IIc

An Apple IIc with Z-RAM

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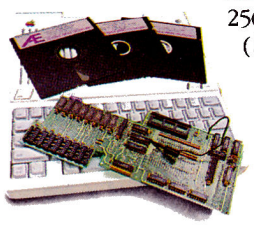

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> *Steve Wozniak, the creator of Apple Computer*

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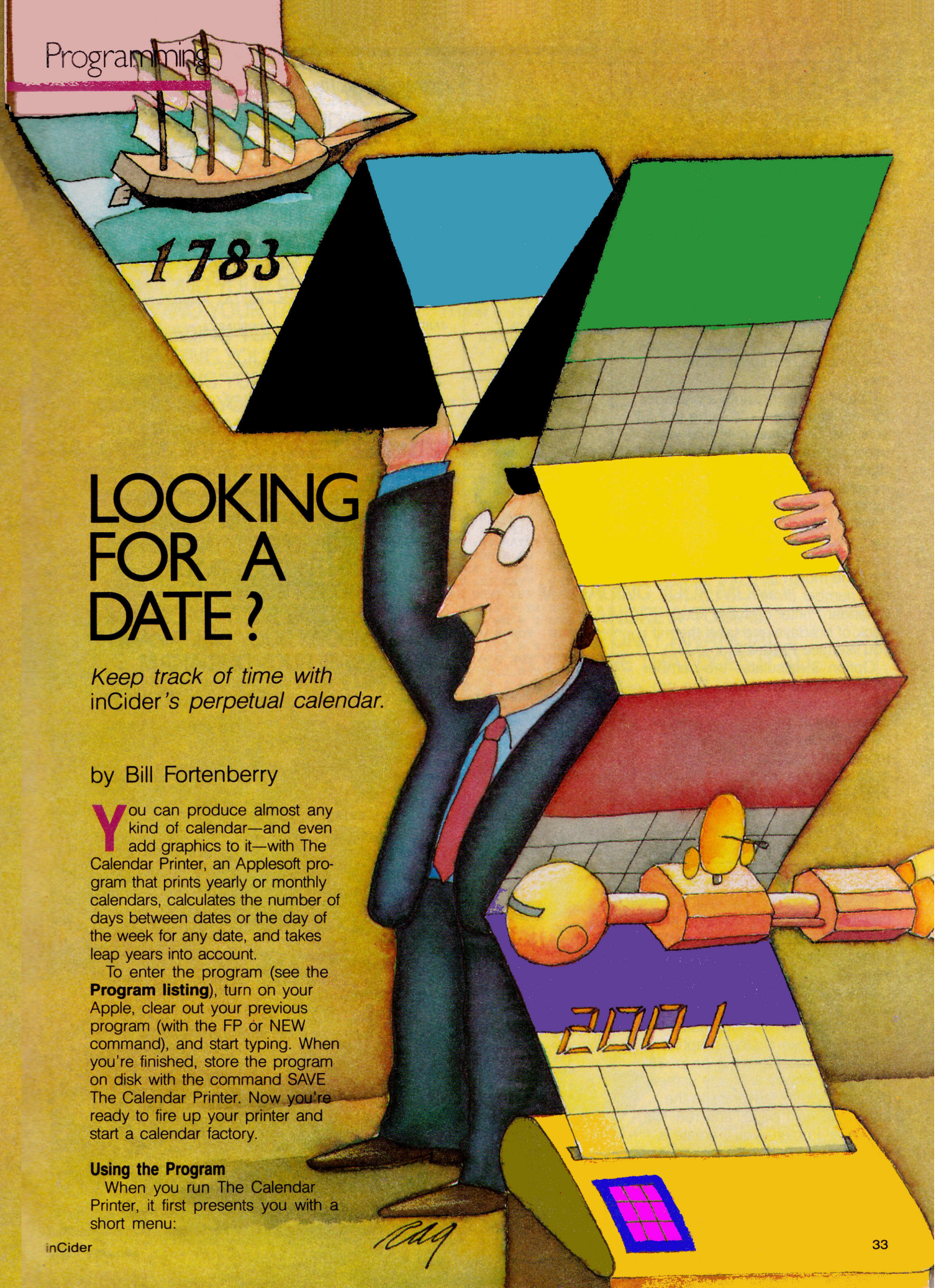

LOOKING FOR A DATE?

Keep track of time with inCider*'s perpetual calendar.*

by Bill Fortenberry

You can produce almost any kind of calendar—and even add graphics to it—with The Calendar Printer, an Applesoft program that prints yearly or monthly calendars, calculates the number of days between dates or the day of the week for any date, and takes leap years into account.

To enter the program (see the **Program listing**), turn on your Apple, clear out your previous program (with the FP or NEW command), and start typing. When you're finished, store the program on disk with the command SAVE The Calendar Printer. Now you're ready to fire up your printer and start a calendar factory.

Using the Program

When you run The Calendar Printer, it first presents you with a short menu:

1) Print a calendar for one year
2) Print a calendar for one month
3) Find the number of days between dates
4) Calculate information about a date
5) Quit

After you select an option, the program asks you a few questions about the date (or dates) with which you're working. Then whenever the program finishes a particular function, it returns to the menu.

The first option prints a calendar for any year from 1753 (the first full year the Gregorian calendar was used in America) on. Type in four digits (1777, for example). The months will appear in compressed format (see **Figure 1** on p. 37).

With option 2, you can print a calendar for one specific month. You'll have to type in the year as before, then the month as a one- or two-digit number (from 1 to 12). The Calendar Printer can also keep track of holidays and label them if you like (see **Figure 2** on p. 37).

Option 3 calculates the number of days between dates. The program prompts you for the two dates, which you should type in in month-day-year format: the month and day as two digits each, and the year as four digits. Be sure to separate items with commas.

The fourth option gives you information about a specific date, including the day of the week on which the date occurs, how far into the year the date falls (its number out of 365 or 366), and whether the year is a leap year. Type in the date in month-day-year format.

The last selection on the menu lets you exit to Applesoft BASIC.

You can use The Calendar Printer to make custom-graphics calendars (see **Figure 3** on p. 38). Print your picture with any screen-dump program, advance to the top of the next page, and run The Calendar Printer—you'll create a wall calendar that will look great next to your computer.■

Write to Bill Fortenberry at 2906 36th Avenue, Meridian, MS 39305.

Program listing. The Calendar Printer.

```
1  REM   THE CALENDAR PRINTER
2  REM   BY: BILL FORTENBERRY
3  REM          2/85
4  REM   ====================
10  TEXT : HOME : DIM MN$(13),MD(13),DY$(7),DA$(7),C(13,7,6),
    LY$(1),SP$(8),HD$(12,31,2)
20 M$(1) = "Print calendar for one year.":M$(2) = "Print cale
    ndar for one month.":M$(3) = "Find number of days betwee
    n dates.":M$(4) = "Calculate information about a date.":
    M$(5) = "Quit."
30 SP$(0) = "      ":SP$(4) = SP$(0):SP$(8) = " "
40 LY$(0) = "not ":LY$(1) = ""
50 H1$ = "====================":H2$ = " S  M  T  W  T  F  S"
60 D$ =  CHR$ (4):I$ =  CHR$ (9)
70  FOR I = 1 TO 12: READ MN$(I): NEXT :MN$(0) = MN$(12):MN$(
    13) = MN$(1)
80  DATA "       JANUARY        ","       FEBRUARY       ","
      MARCH         ","       APRIL          ","         MAY
         ","         JUNE          "
90  DATA "         JULY         ","        AUGUST        ","
    SEPTEMBER       ","      OCTOBER         ","       NOVEMBER
        ","       DECEMBER       "
100  FOR I = 0 TO 13: READ MD(I): NEXT : DATA 31,31,28,31,30,
    31,30,31,31,30,31,30,31,31
110  FOR I = 1 TO 7: READ DY$(I),DA$(I): NEXT : DATA SUN,"Sun
    day",MON,"Monday",TUE,"Tuesday",WED,"Wednesday",THR,"Thu
    rsday",FRI,"Friday",SAT,"Saturday"
120  INVERSE : PRINT " THE CALENDAR PRINTER      BY: BILL FORT
    ENBERRY ": NORMAL
130  PRINT "You may:": FOR I = 1 TO 5: PRINT I". "M$(I): NEXT
    : PRINT : PRINT
140  VTAB 10: INPUT "Your selection (1-5) ";A$:A =  VAL (A$):
     IF A < 1 OR A > 5 THEN 140
150  VTAB 10: PRINT M$(A): PRINT : PRINT
160  ON A GOTO 180,380,720,820,170
170  HOME : END
180  VTAB 12: INPUT "Year for calendar (YYYY) ";YR: IF YR < 1
    753 THEN 180
190 DY = 1:MN = 1: GOSUB 900: GOSUB 960: GOSUB 1020
200 I = DW
210  FOR M = 1 TO 12
220 R = 1
230  FOR D = 1 TO MD(M)
240 C(M,I,R) = D
250 I = I + 1: IF I = 8 THEN I = 1:R = R + 1
260  NEXT D
270  NEXT M
280  GOSUB 1040: HOME : PRINT : PRINT D$"PR#1": PRINT I$"80N"
290  PRINT  SPC( 36);"********": PRINT  SPC( 36);"* "YR" *": PRINT
     SPC( 36);"********"
300  PRINT : PRINT : FOR M = 1 TO 4
310  PRINT "     ";MN$(M);"       ";MN$(M + 4);"       ";MN$(M +
    8)
320  PRINT "     "H1$"       "H1$"       "H1$": PRINT "     "H2$"
         "H2$"       "H2$": PRINT "     "H1$"       "H1$"       "
    H1$
330  PRINT "     ";: FOR R = 1 TO 6
340  FOR X = 0 TO 8 STEP 4: FOR I = 1 TO 7: IF C(M + X,I,R) =
    0 THEN  PRINT "    ";: GOTO 360
350  PRINT  SPC( C(M + X,I,R) < 10);C(M + X,I,R);" ";
360  NEXT I: PRINT SP$(X);: NEXT X: PRINT : PRINT "     ";: NEXT
    R: PRINT : PRINT : PRINT : PRINT : NEXT M
370  PRINT  CHR$ (12): PRINT D$"PR#0": RUN
380  VTAB 12: INPUT "Month for calendar (1-12) ";M1: IF M1 <
    1 OR M1 > 12 THEN 380
390  VTAB 14: INPUT "Year for calendar (YYYY) ";Y1: IF Y1 < 1
    753 THEN 390
400  VTAB 16: INPUT "Do you want holidays to appear (Y/N) ";H
    $: IF H$ = "Y" THEN H = 1: GOTO 430
410  IF H$ = "N" THEN H = 0: GOTO 430
420  GOTO 400
430 MN = M1 - 1:YR = Y1: IF MN = 0 THEN MN = 12:YR = YR - 1
440 DY = 1: GOSUB 960: GOSUB 1020:MN = M1:YR = Y1: GOSUB 900
450 I = DW
460  FOR M = MN - 1 TO MN + 1
470 R = 1
480  FOR D = 1 TO MD(M)
490 C(M,I,R) = D
500 I = I + 1: IF I = 8 THEN I = 1:R = R + 1
510  NEXT D
520  NEXT M
530  IF H THEN  GOSUB 1050
540  GOSUB 1040: HOME : PRINT : PRINT D$"PR#1": PRINT I$"80N"
550  PRINT  SPC( 26);YR;MN$(MN);YR: PRINT : PRINT
```

Listing continued.

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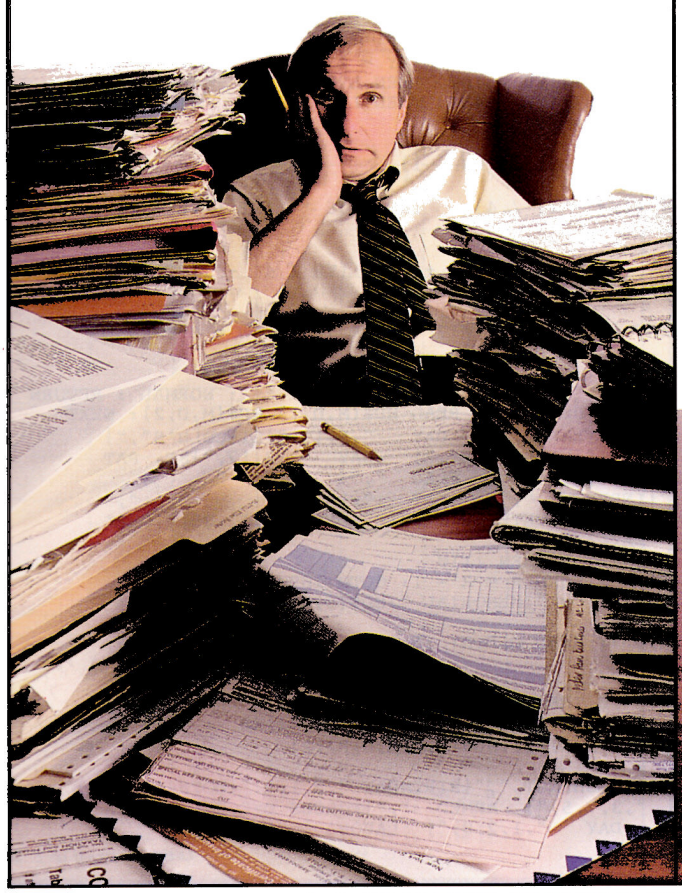

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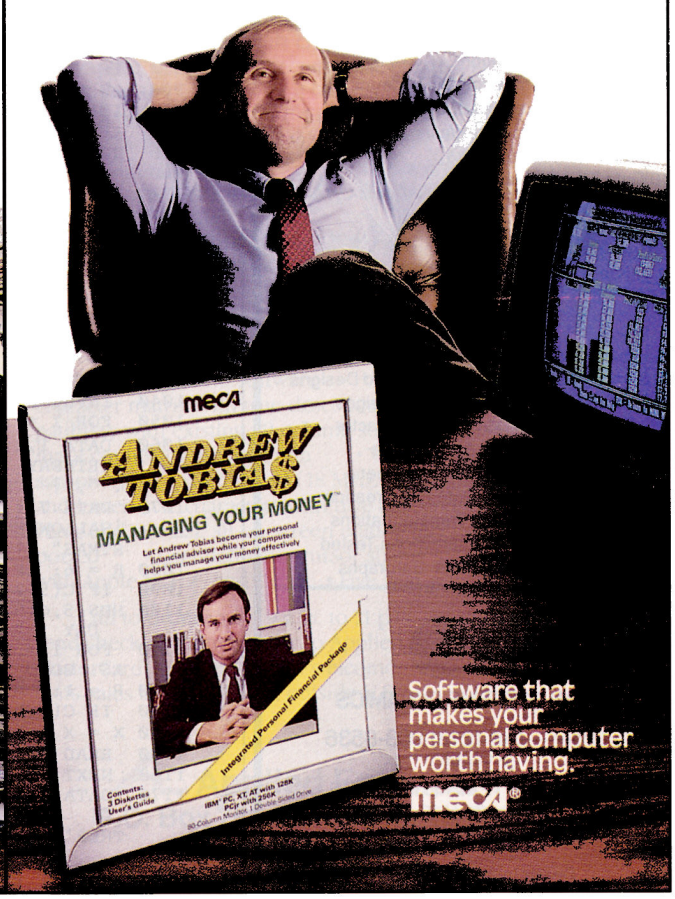

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Listing continued.

```
560  PRINT "     ";: FOR I = 1 TO 71: PRINT "=";: NEXT : PRINT
     : PRINT "     ";: FOR I = 1 TO 7: PRINT "|   "DY$(I)"   "
     ;: NEXT : PRINT "|": PRINT "     ";: FOR I = 1 TO 71: PRINT
     "=";: NEXT : PRINT
570  FOR R = 1 TO 6: PRINT "     ";: FOR X = 1 TO 7
580  PRINT "|       ";: IF C(MN,X,R) = 0 THEN  PRINT "    ";: GOTO
     600
590  PRINT  SPC( C(MN,X,R) < 10);C(MN,X,R);" ";
600  NEXT X: PRINT "|": FOR X = 1 TO 4: PRINT "     ";: FOR J =
     1 TO 7: PRINT "|          ";: NEXT : PRINT "|": NEXT
610  FOR J = 1 TO 2: PRINT "     ";: FOR X = 1 TO 7: IF HD$(MN
     ,C(MN,X,R),J) = "" THEN  PRINT "|          ";: GOTO 630
620  PRINT HD$(MN,C(MN,X,R),J);
630  NEXT : PRINT "|": NEXT
640  PRINT "     ";: FOR X = 1 TO 71: PRINT "-";: NEXT : PRINT
650  NEXT R
660  PRINT : PRINT  SPC( 17);MN$(MN - 1)"       "MN$(MN + 1): PRINT
      SPC( 17);H2$"       "H2$
670  PRINT  SPC( 17);: FOR R = 1 TO 6
680  FOR X =  - 1 TO 1 STEP 2: FOR I = 1 TO 7: IF C(MN + X,I,
     R) = 0 THEN  PRINT "    ";: GOTO 700
690  PRINT  SPC( C(MN + X,I,R) < 10);C(MN + X,I,R);" ";
700  NEXT I: PRINT "     ";: NEXT X: PRINT : PRINT  SPC( 17);
     : NEXT R: PRINT
710  PRINT  CHR$ (12): PRINT D$"PR#0": RUN
720  VTAB 12: INPUT "First date (MM,DD,YYYY) ";MN,DY,YR: IF M
     N < 1 OR MN > 12 THEN 720
730  IF YR < 1753 THEN 720
740  IF DY < 1 OR DY > 31 THEN 720
750  GOSUB 960:D1 = F
760  VTAB 14: INPUT "Second date (MM,DD,YYYY) ";MN,DY,YR: IF
     MN < 1 OR MN > 12 THEN 720
770  IF YR < 1753 THEN 720
780  IF DY < 1 OR DY > 31 THEN 720
790  GOSUB 960:D2 = F
800  VTAB 16: PRINT  ABS (D1 - D2);" days between dates."
810  GOTO 890
820  VTAB 12: INPUT "Date (MM,DD,YYYY) ";MN,DY,YR: IF MN < 1 OR
     MN > 12 THEN 820
830  IF YR < 1753 THEN 820
840  IF DY < 1 OR DY > 31 THEN 820
850  GOSUB 960: GOSUB 1020
860  PRINT : PRINT "This date falls on "DA$(DW)"."
870 F1 = F:MN = 1:DY = 1: GOSUB 960: PRINT "It is day ";F1 -
     F + 1;" of the year."
880  GOSUB 900: PRINT YR"       is "LY$(LY)"a leap year."
890  VTAB 18: INVERSE : PRINT "PRESS ANY KEY";: NORMAL : GET
     A$: PRINT A$: RUN
900 MD(2) = 28:LY = 0
910  IF YR / 4 =  INT (YR / 4) THEN LY = 1
920  IF YR / 100 =  INT (YR / 100) THEN LY = 0
930  IF YR / 400 =  INT (YR / 400) THEN LY = 1
940  IF LY THEN MD(2) = 29
950  RETURN
960 F = 365 * YR + DY + 31 * (MN - 1)
970  IF MN > 2 THEN 1000
980 F = F +  INT ((YR - 1) / 4) -  INT (.75 *  INT ((YR - 1) /
     100) + 1)
990  GOTO 1010
1000 F = F -  INT (.4 * MN + 2.3) +  INT (YR / 4) -  INT (.75
      * ( INT (YR / 100) + 1))
1010  RETURN
1020 DW = F +  INT (( - 1 * F) / 7 + 1) * 7: IF DW = 0 THEN D
     W = 7
1030  RETURN
1040  INVERSE : PRINT "** TURN ON YOUR PRINTER **": NORMAL : RETURN
1050  FOR I = 1 TO 9: READ M,D: READ HD$(M,D,1),HD$(M,D,2): NEXT
1060  DATA 1,1,"|NEW YEARS","|   DAY    ",2,12,"|LINCOLN'S","|
     BIRTHDAY ",2,14,"|VALENTINE","|   DAY    ",3,17,"|ST. PAT
     . ","|   DAY    ",6,14,"|   FLAG   ","|   DAY    "
1070  DATA 7,4,"|INDEPEND.","|   DAY    ",10,31,"|         ","
     |HALLOWEEN",11,11,"|VETERAN'S","|   DAY    ",12,25,"|CHRI
     STMAS","|   DAY    "
1080 R = 6: IF MN <  > 5 THEN 1110
1090  IF C(5,2,R) = 0 THEN R = R - 1: GOTO 1090
1100 HD$(5,C(5,2,R),1) = "|MEMORIAL ":HD$(5,C(5,2,R),2) = "|
      DAY    "
1110  FOR I = 1 TO 7: READ C,D,M: IF M <  > MN THEN  READ A$,
     A$: GOTO 1160
1120 R = 1:X = 0
1130  IF C(M,D,R) = 0 THEN R = R + 1: GOTO 1130
1140 X = X + 1: IF X < C THEN R = R + 1: GOTO 1140
1150  READ HD$(M,C(M,D,R),1),HD$(M,C(M,D,R),2)
1160  NEXT
1170  DATA 3,2,2,"|WASHINGT.","|BIRTHDAY ",2,1,5,"|MOTHER'S "
     ,"|   DAY    ",3,7,5,"|  ARMED   ","|FORCES DY",3,1,6,"|FA
     THER'S ","|   DAY    ",1,2,9,"|  LABOR   ","|   DAY    "
```

Listing continued on p. 38.

Figure 1. *The Calendar Printer can produce a calendar for any year from 1753 on.*

```
********
* 1777 *
********

      JANUARY                MAY                 SEPTEMBER
 S  M  T  W  T  F  S    S  M  T  W  T  F  S    S  M  T  W  T  F  S
                1  2  3  4                1  2  3     1  2  3  4  5  6
 5  6  7  8  9 10 11    4  5  6  7  8  9 10    7  8  9 10 11 12 13
12 13 14 15 16 17 18   11 12 13 14 15 16 17   14 15 16 17 18 19 20
19 20 21 22 23 24 25   18 19 20 21 22 23 24   21 22 23 24 25 26 27
26 27 28 29 30 31      25 26 27 28 29 30 31   28 29 30

     FEBRUARY                JUNE                OCTOBER
 S  M  T  W  T  F  S    S  M  T  W  T  F  S    S  M  T  W  T  F  S
                   1                   1  2  3  4  5  6  7           1  2  3  4
 2  3  4  5  6  7  8    8  9 10 11 12 13 14    5  6  7  8  9 10 11
 9 10 11 12 13 14 15   15 16 17 18 19 20 21   12 13 14 15 16 17 18
16 17 18 19 20 21 22   22 23 24 25 26 27 28   19 20 21 22 23 24 25
23 24 25 26 27 28      29 30                  26 27 28 29 30 31

      MARCH                  JULY               NOVEMBER
 S  M  T  W  T  F  S    S  M  T  W  T  F  S    S  M  T  W  T  F  S
                   1                1  2  3  4  5                 1
 2  3  4  5  6  7  8    6  7  8  9 10 11 12    2  3  4  5  6  7  8
 9 10 11 12 13 14 15   13 14 15 16 17 18 19    9 10 11 12 13 14 15
16 17 18 19 20 21 22   20 21 22 23 24 25 26   16 17 18 19 20 21 22
23 24 25 26 27 28 29   27 28 29 30 31         23 24 25 26 27 28 29
30 31                                         30

      APRIL                  AUGUST             DECEMBER
 S  M  T  W  T  F  S    S  M  T  W  T  F  S    S  M  T  W  T  F  S
          1  2  3  4  5                   1  2           1  2  3  4  5  6
 6  7  8  9 10 11 12    3  4  5  6  7  8  9    7  8  9 10 11 12 13
13 14 15 16 17 18 19   10 11 12 13 14 15 16   14 15 16 17 18 19 20
20 21 22 23 24 25 26   17 18 19 20 21 22 23   21 22 23 24 25 26 27
27 28 29 30            24 25 26 27 28 29 30   28 29 30 31
                       31
```

Figure 2. *The Calendar Printer notes holidays and labels them in monthly calendars.*

```
                    1986        FEBRUARY        1986

|    SUN    |    MON    |    TUE    |    WED    |    THR    |    FRI    |    SAT    |
|           |           |           |           |           |           |         1 |
|         2 |         3 |         4 |         5 |         6 |         7 |         8 |
|         9 |        10 |        11 |        12 |        13 |        14 |        15 |
|           |           |           | LINCOLN'S |           | VALENTINE |           |
|           |           |           | BIRTHDAY  |           |    DAY    |           |
|        16 |        17 |        18 |        19 |        20 |        21 |        22 |
|           | WASHINGT. |           |           |           |           |           |
|           | BIRTHDAY  |           |           |           |           |           |
|        23 |        24 |        25 |        26 |        27 |        28 |           |
|           |           |           |           |           |           |           |

      JANUARY                 MARCH
 S  M  T  W  T  F  S    S  M  T  W  T  F  S
          1  2  3  4                      1
 5  6  7  8  9 10 11    2  3  4  5  6  7  8
12 13 14 15 16 17 18    9 10 11 12 13 14 15
19 20 21 22 23 24 25   16 17 18 19 20 21 22
26 27 28 29 30 31      23 24 25 26 27 28 29
                       30 31
```


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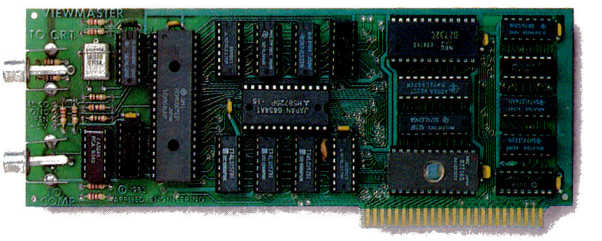

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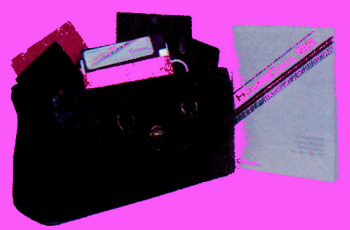

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Figure 3. The Calendar Printer and your screen-dump program let you create attractive picture calendars.

Listing continued from p. 36.

```
1180  DATA 2,2,10,"|COLUMBUS ","    DAY   ",4,5,11,"|THANKSGI
      V","|   DAY   "
1190  FOR I = 1 TO 21: READ Y,M,D: IF Y <  > YR THEN 1210
1200 HD$(M,D,2) = "| EASTER  "
1210  NEXT
1220  DATA 1980,4,6,1981,4,19,1982,4,11,1983,4,3,1984,4,22,19
      85,4,7,1986,3,30,1987,4,19,1988,4,3,1989,3,26,1990,4,15,
      1991,3,31,1992,4,19,1993,4,11,1994,4,3,1995,4,16,1996,4,
      7,1997,3,30,1998,4,12,1999,4,4,2000,4,23
1230  FOR I = 1 TO 11: READ Y,M,D: IF Y <  > YR THEN 1250
1240 HD$(M,D,1) = "| HANUKAH ":HD$(M,D,2) = "| BEGINS  "
1250  NEXT
1260  DATA 1980,12,3,1981,12,21,1982,12,11,1983,12,1,1984,12,
      19,1985,12,8,1986,12,27,1987,12,16,1988,12,4,1989,12,23,
      1990,12,12
1270  RETURN
```

End of listing.

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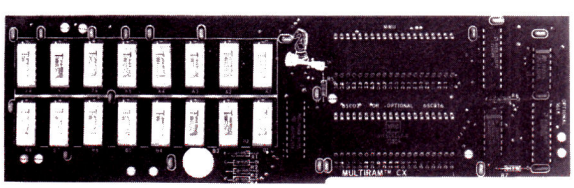

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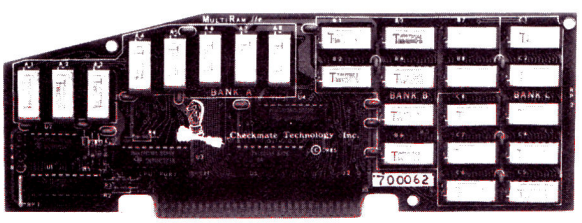

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BEGINNER'S PAGE

From time to time *inCider* will run Beginner's Page—step-by-step instructions to help novice Apple users type in and enjoy the programs *inCider* publishes.

The instructions assume that you have an Apple II, II Plus, //e, or //c computer with one disk drive and either DOS 3.3 or ProDOS. You also need one blank, 5¼-inch disk. If you're using the UniDisk 3.5, you will be restricted to ProDOS and, of course, you will need a blank 3.5 inch disk. To type in and run *inCider*'s programs, just follow the instructions.

Creating a BASIC Programs Disk

The first step is to prepare a disk on which to save your programs. This process is called *formatting*. In addition, ProDOS requires you to copy two files, PRODOS and BASIC.SYSTEM, to create a start-up disk. For details about creating a DOS 3.3 disk, see the *DOS Programmer's Manual*. You will find information about creating a ProDOS start-up disk in *BASIC Programming with ProDOS* or the *System Utilities Manual*.

Typing in BASIC Programs

- When you find a program you'd like to type in, put your programs disk into drive 1 (the internal drive on the //c) and turn on your computer. After the disk stops, the Applesoft BASIC prompt "]" appears on the screen. At this point, type in HOME and hit the return key to move the prompt to the upper-left corner of the screen. Next, enter NEW and press the return key.
- Having cleared memory with the NEW command, you are now ready to enter the first line of the BASIC program. First, type in the line number (most BASIC programs begin with line 10), and then type the rest of the line exactly as it appears in the magazine. Don't worry if the line is longer than the width of your screen display. The program line will automatically jump to the next line on your screen. Once you have entered the entire program line, hit the return key.
- Continue to enter program lines in this manner until the entire program is in memory. Now, even before you run the program, save it to disk so that all of your work won't accidentally be lost. The SAVE command copies a program from main memory (RAM) to disk. Just type SAVE *file name* (where file name is the name of the program) and press the return key.
- Since the program is still in memory, you can run it with the RUN command. Unless you are a very careful typist, you now face the task of removing syntax errors from the program. For example, if, when you run the program, you get a message saying SYNTAX ERROR IN 1050, it's a good bet that you made a typing error in line 1050. The simplest way to correct it is to retype the entire line. The computer will automatically delete the old line and replace it with the new one.
- When you have the program running properly, save the corrected version by typing SAVE file name again. This command overwrites the old version of the program with the corrected version.

Typing in Machine-Language Programs and Shape Tables

Many programs in *inCider* use machine-language routines and shape tables. The listings for machine code consist of hexadecimal RAM addresses followed by the hex code (5E00- A9 04 30 65 FA 8C 1B 09, for example). To type in such a listing, follow the guidelines below:

- Turn on your computer with your programs disk in drive 1.
- From the Applesoft prompt, type in CALL -151 (the dash is a minus sign) and hit the return key.
- An asterisk, the Monitor prompt, now replaces the Applesoft prompt.
- At this point, get the first address of the machine-language program from the listing. This address is the first four characters in the listing.
- Type in this address, followed by a colon (*not* a minus sign!). Now type in the hex numbers as they appear in the magazine. For example, if the hex line shown above were the first line of a hex program, you would enter:

5E00: A9 04 30 65 FA 8C 1B 09

and then hit the return key.
- For subsequent lines in the machine-language listing, you don't have to type in the address. Just type in a colon at the start of each line and then the hex bytes, followed by a return-key press.
- To check your typing before you save the listing, type in the starting address of the program and hit the return key. The number that appears is the content of the byte at the address shown. Hitting it again produces the rest of the first program line on the screen. Pressing the return key subsequent times makes additional program lines appear for your inspection. If any line requires changing, just retype that line, being sure to include the address and to use a colon in place of the minus sign.
- Once the entire listing is correct, you have to save it. First, type in 3D0G and hit the return key to return to the Applesoft prompt.
- Now type BSAVE file name,A*a*,L*l* (where a is the starting address of the routine and l is the length). If these are hexadecimal instead of decimal values, a $ will precede them. Don't worry about having to figure out the address and length parameters yourself; these are always published with the program.

You now know what it takes to type in and use the programs published by *inCider*.■

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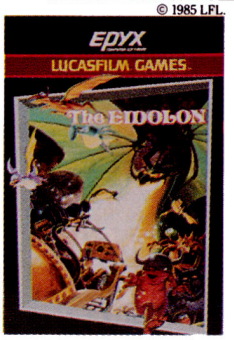

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BACKTALK RESPONSE

Computers in the Classroom

Last fall, *inCider* asked you to tell us what you think about the effects of classroom computers on learning and U.S. schools (BackTalk, November 1985, p. 31). Judging from the heavy response to our survey, we'd say "computer literacy" is a controversial area of education these days—and even deciding what the term means is a problem. As one reader reminds us, *"A pre-schooler is no less literate than a systems analyst if both can function successfully at their individual levels."*

Virtually 100 percent of those responding to our questionnaire indicated they approve of computer education in schools, but differ in the ways they'd like to see it implemented. One third say teachers should use computer-aided instruction (CAI) to enhance daily academic subjects—that is, to help students develop thinking ability and creativity.

"My wife shows her first-grade class how to use commercial software to practice concepts she is teaching—vowel sounds, addition, and so on. They think it's fun—and if they aren't careful, they are going to learn something!"

Tools vs. Technology

One third of our respondents say schools should focus on hands-on applications, such as word processing and data-base use, to broaden students' basic knowledge and job skills.

"Using applications should be as easy as getting behind the wheel of a car. Learning fundamental types of software is a must for all."

Another third of those who replied to the survey say schools should offer programming courses. Only two thirds of those advocating programming instruction, however, say those courses should be used as pre-professional technological training. A sizable minority indicate that they consider programming courses just a practical necessity, given the extent of computers in everyday life.

Ninety percent of our respondents say that computers in the classroom enhance the educational experience, but half of these people also assert that computers are not a substitute for the teacher. One quarter of all our respondents predict that computers will decrease student-teacher interaction, while a sixth say computers may stifle children's creativity.

It's evident from our results that "computer literacy" means a whole range of different things to different people. One issue is clear: Although parents, teachers, and students wholeheartedly endorse computers in our schools, they are still confronted with the problem of deciding just what the role of those computers in their individual curricula will be.■

CORRECTION

The information listed under "Beagle Bros Chart" in our Holiday Gift Guide (December 1985, p. 48) contains an inaccuracy. The Peeks, Pokes and Pointers wall chart is free *with purchase only* from Beagle Bros.

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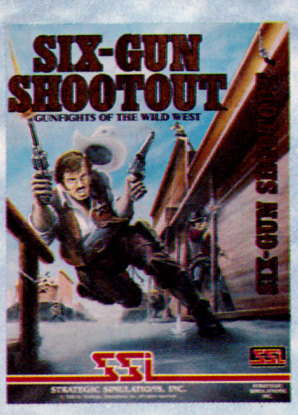

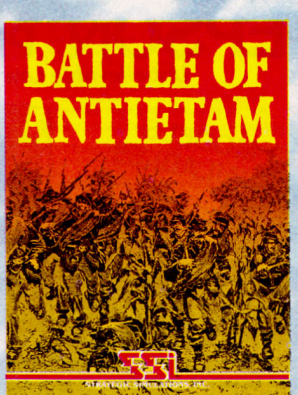

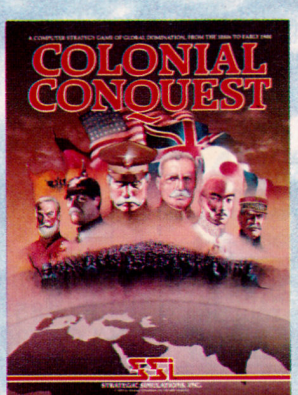

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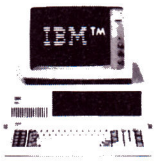

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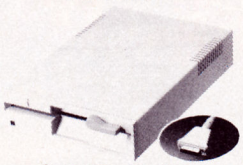

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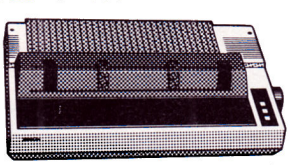

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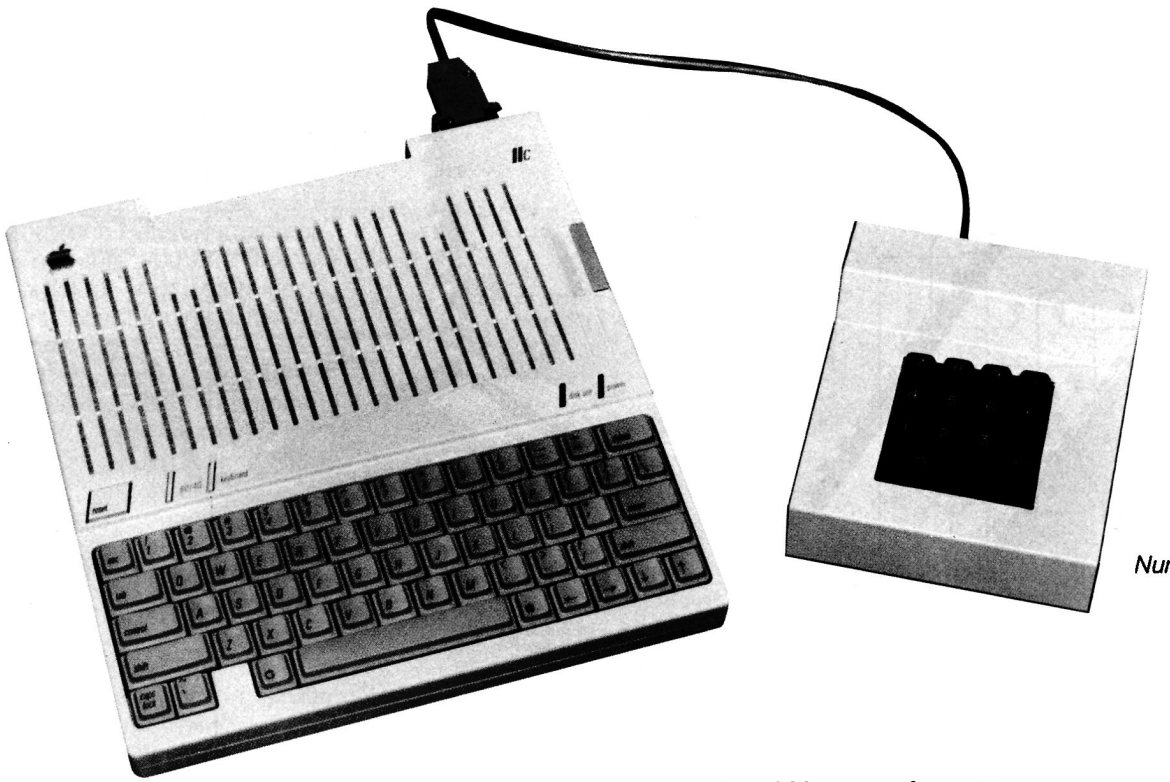

Photo 1. Numeric keypad for the //c.

by Wayne Arnett

With a little soldering and about $25, you can build a numeric keypad to enhance your //c's versatility.

Although the Apple //c already has an impressive repertoire of built-in features, the limited availability of peripherals designed for its rear-panel ports inhibits its expandability. For instance, if you use your //c for spreadsheets, accounting, or other number-intensive applications, you could definitely use a numeric keypad; but the keyboard lacks one, your dealer can't sell you one, and you can't lift the lid and plug one into an expansion slot.

Don't trade in your computer just yet, though. With a little spare time and about $25, you can have the convenience of an auxiliary numeric keypad for your //c. And, in the process, you can take a look inside the computer you weren't supposed to open.

The keypad I built consists of the ten digits (zero to nine), plus decimal point and return key (the enter key in **Photo 1**). Two extra keys (the minus sign and the comma in **Photo 1**) provide cursor-right and cursor-down—used in AppleWorks and other spreadsheets to accept an entry, then move the cursor from that cell to the one immediately to the right or below, respectively. If you want to speed up the entry of numerical data statements in BASIC programming, you can wire one of the extra keys as a comma instead.

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Getting Started

To build the keypad, you don't have to change any software or make any internal circuitry changes in the computer since the keypad is simply connected in parallel with the keyboard. This project does require some skill with a soldering iron and household tools, though, and the willingness to cut a small hole for a new port in the back of your computer.

Whenever you arm yourself with tools and embark on a hardware project, you risk damaging your equipment. So, if you lack experience with hardware projects, find someone to help you. The following directions will take you step by step through a simple procedure, but don't start something you're not sure you can finish. The interior of your computer is the worst possible place to learn how to solder.

Also, only you can decide whether a keypad is important enough to justify an irreversible change in your computer's appearance. The decision for me was easy: One more connector on the rear panel is hardly noticeable, and the benefit far outweighs any effect it may have on resale value or rear-panel aesthetics.

Jameco Electronics supplies most of the necessary parts, including the keypad itself (see **Table 1**). You should also have a 25- to 30-watt soldering pencil with a narrow, pointed tip; rosin-core solder (never use acid-core solder in a computer); flat-blade and Phillips-head screwdrivers; and small wire cutters.

Table 1. List of parts available from Jameco.

Item	Catalog Number	Cost
Numeric keypad*	K14	$ 9.95
15-pin plug	DA15P	1.79
15-pin socket	DA15S	2.39
Hood for plug	DA15H	1.15
15-conductor cable, 6-foot length	S-C15	.79/foot
Keypad enclosure**	DTE-8	28.95

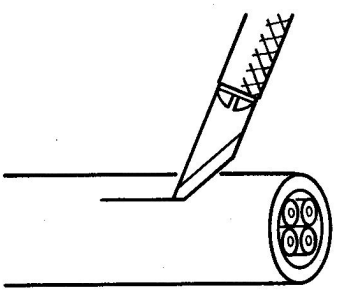
*Keypad must have normally open, single-pole, single-throw, momentary-contact mechanical switches.

**I used one from Circuit Specialists, P.O. Box 3047, Scottsdale, AZ 85279, (602) 966-0764, catalog number LMB #MDDC-663, which costs $10.04.

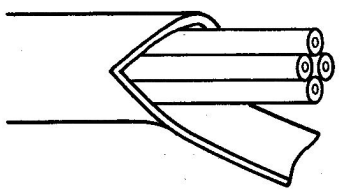
Jameco Electronics, 1355 Shoreway Road, Belmont, CA 94002, (415) 592-8097 for phone orders. Send $1 for current catalog.

Figure 1. Preparing wires from the 15-conductor cable.

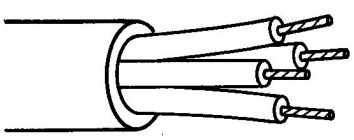
A) Cut through outer insulation.



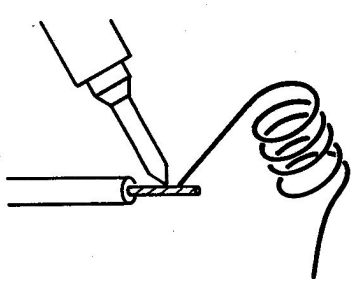
B) Pull outer insulation away, snip it off, and unpeel the foil.



C) Strip 1/4 inch of insulation from each of the 15 wires. Wire strippers are helpful, but wire cutters will do the job.



D) Twist the strands until they stay together. "Tin" the tips by holding the soldering pencil against the wire, then applying a small amount of solder. Touch the solder to the heated wire, not the soldering iron.

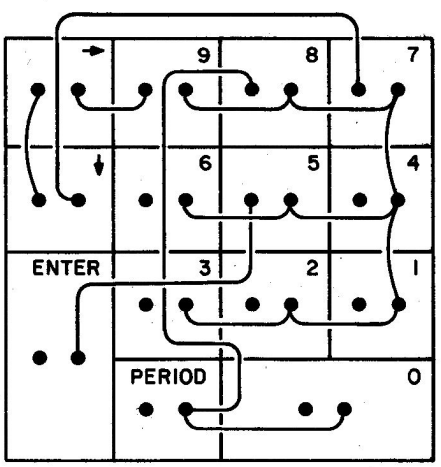


The Blueprint

Like the one from Jameco, most keypads are mounted on small printed-circuit (PC) boards. The thin copper lines connecting the keyswitches lead to a central plug or connection point. Use a sharp knife to cut a small gouge out of all copper strips except those connecting keys one through nine, so the individual keys have no connections among them other than one through nine. You can ignore any small electronic components on the board.

Cut off about 3 inches from the 15-conductor keypad cable and remove the wires. Strip a quarter inch of insulation from each end of several wires and prepare the tips as shown in **Figure 1**. With these short lengths of hook-up wire, connect the keys as shown in **Figure 2**. Touch the soldering pencil to the blob of solder holding the keyswitch pins to the board. Then, before you remove the pencil, put the end of your hook-up wire into the molten solder and melt the solder on the wire tip. Finally, let the connection cool before you release the wire.

Figure 2. Underside of the keypad showing the connections between the poles of the various keyswitches made with short lengths of hook-up wire.



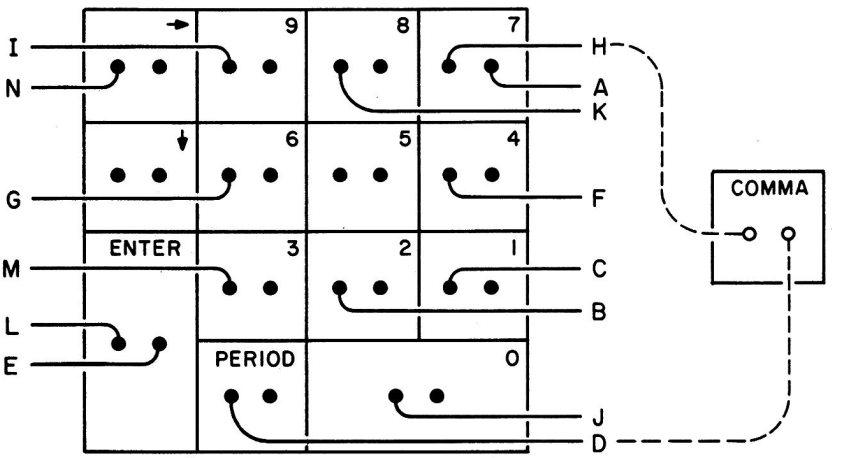
Cut off 2-3 feet from the 15-conductor cable to use as the cable connecting the auxiliary keypad to the computer. Remove about 3 inches of outer insulation and foil wrapper from one end, and prepare the wire tips as before (**Figure 1**). In the same manner in which you soldered the short hook-up wires, solder one wire from the cable to each let-

tered location (see **Figure 3**) and note the wire's color on a chart (the red wire to point A, for instance). At this time, the color of the wire you solder to any given point isn't important, as long as you keep track of each one on the chart. Inspect every wire carefully, so that you won't confuse red, red with a white stripe, red with a black stripe, and so on.

After you make all the connections, one colored wire and the bare ground wire will remain. Note the color of the leftover wire and snip it off where it comes out of the cable, but save the ground wire for later use. Place a length of tubing (such as insulation stripped from a larger-diameter wire) over the ground wire, leaving only a quarter inch exposed at the end. If tubing isn't available, you can wrap the ground wire in tape.

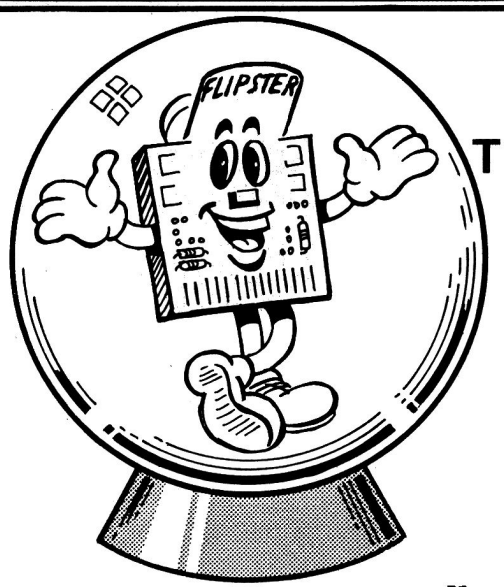
Before setting the keypad aside, carefully inspect your work for short circuits between hook-up wires or blobs of solder bridging across two separate connection points. If you find a solder bridge, reheat the excess solder and knock it loose with a knife or toothpick.

Figure 3. Underside of the keypad showing the connection points for the colored wires from the 15-conductor cable and the optional comma connection.



Preparing the Cable

On the free end of the keypad cable, remove 1¼ inches of the outer insulation and foil. Snip off the leftover colored wire and prepare the remaining wire tips as



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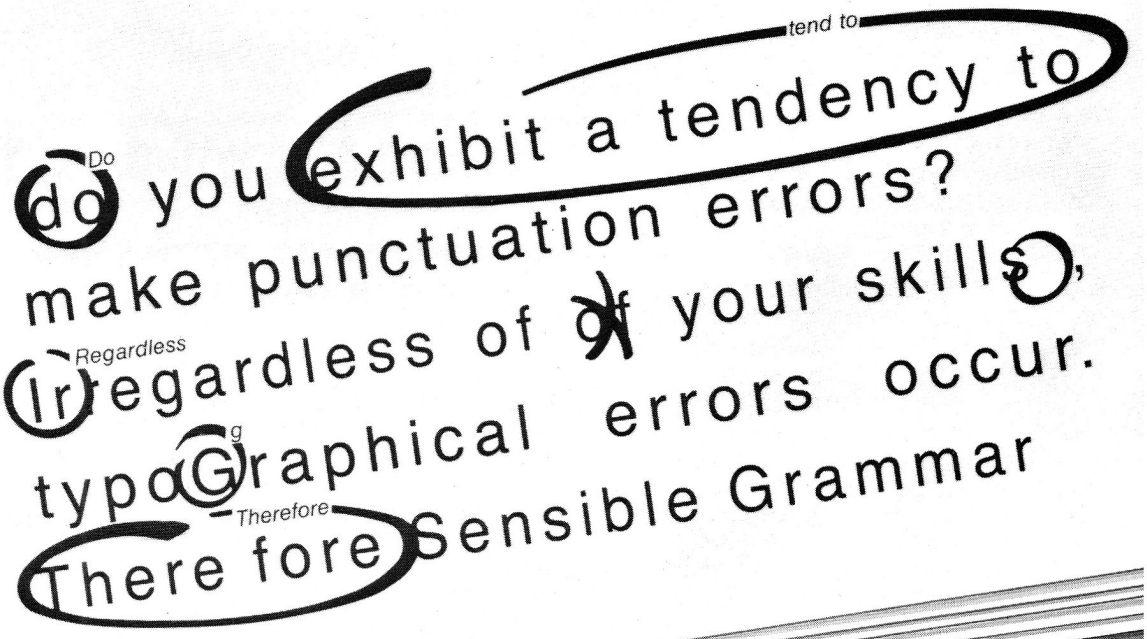

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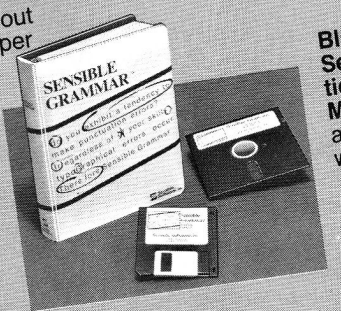

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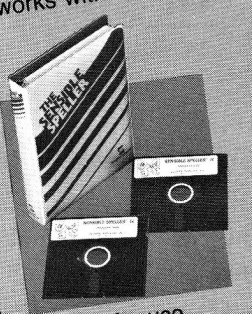

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AppleWorks Compatible!

*Sensible Grammar and Speller ProDOS work with the following word processors, AppleWorks, Apple-Writer-ProDOS version (Apple Computer, Inc.); Format II Enhanced-ProDOS (Kensington Microware), Mouse Write (Roger Wagner Publishing); Word Juggler (Quark Inc.); Zardax-ProDOS (Computer Solutions) and others. **Sensible Speller ProDOS** also works with PFS:WRITE-ProDOS (Software Publishing, Inc.); MouseWord (International Solutions); Word-Talk (Computer Aids) and WordPerfect (SSI Software). **Sensible Speller IV** works with DOS 3.2 and DOS 3.3-AppleWriter (Apple Computers, Inc.), Bank Street Writer (Brodebund); Format II (Kensington Microware); HomeWord & Screen Writer (Sierra On-Line Inc.); †PFS: WRITE-DOS (Software Publishing, Inc.); †CP/M-Wordstar (Digital Research Corp.-Micropro International), and others. Owners of trademarks indicated in parentheses: Black's Law Dictionary (West Publishing, Inc.); Stedman's Medical Dictionary (Waverly Press, Inc.).

†Note: CP/M, Pascal and PFS:WRITE-DOS versions do not suggest correct spelling of words or allow immediate correction of misspellings.

Sensible Grammar™ is available for $99.95; **Sensible Speller**™ for $125.00 in either the "IV" or ProDOS version; **Sensible Technical Dictionary**™ for $59.95; **Stedman's Medical Dictionary**™ for $99.95; and **Black's Law Dictionary**™ for $99.95. The three specialized dictionaries require the **Sensible Speller.** All programs are available separately and run on Apple® computers.

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shown in **Figure 1**. Use tubing or tape to insulate the ground wire.

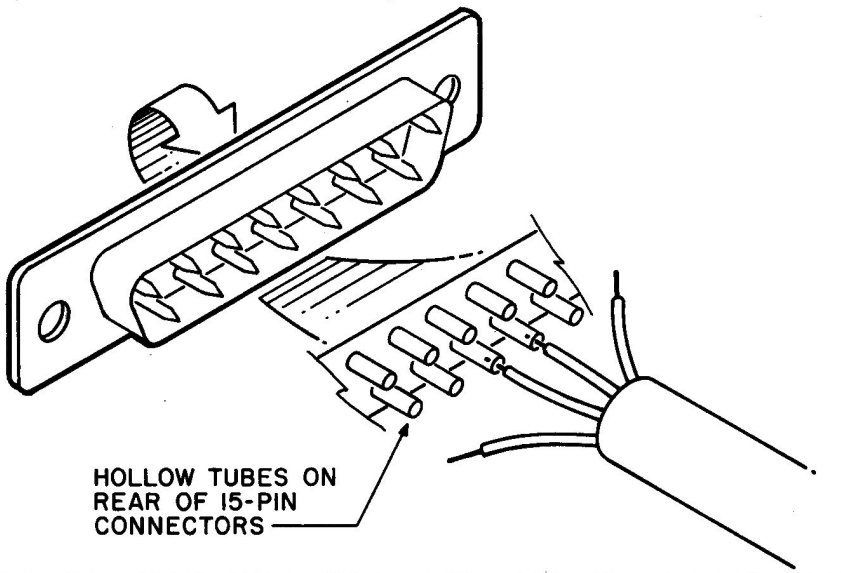
To connect the keypad to the computer, use one plug and one socket, each with 15 separate connections. The plug, which goes on the keypad cable, has solid, gold-colored pins exposed on the front and hollow tubes on the back. The socket, which you will install on the computer's rear panel, has receptacles on its front side for the 15 gold pins and hollow tubes on the back identical to those on the plug.

Set the 15-pin plug face down on your work area. Then, hold the soldering pencil against the side of one tube at a time and let a small amount of solder flow inside. Don't let the solder overflow and run down the outside of the tubes.

When you have thus "primed" all 15 tubes, hold the pencil against one tube until the solder melts, and insert one of the wires from the keypad cable into it (see **Figure 4**). The color of the wire is still unimportant at this stage. Remove the pencil and let the connection cool before you proceed to the next one. Repeat the procedure until there's a wire in each tube. You may need a third hand to keep the connector from wandering around on the table.

Next, cut 20 inches from the remaining supply of 15-conductor cable. Remove $1^1/_4$ inches of outer

Figure 4. A rear closeup of the 15-pin plug and socket. The hollow tubes are "primed" with solder before inserting the wire tips.



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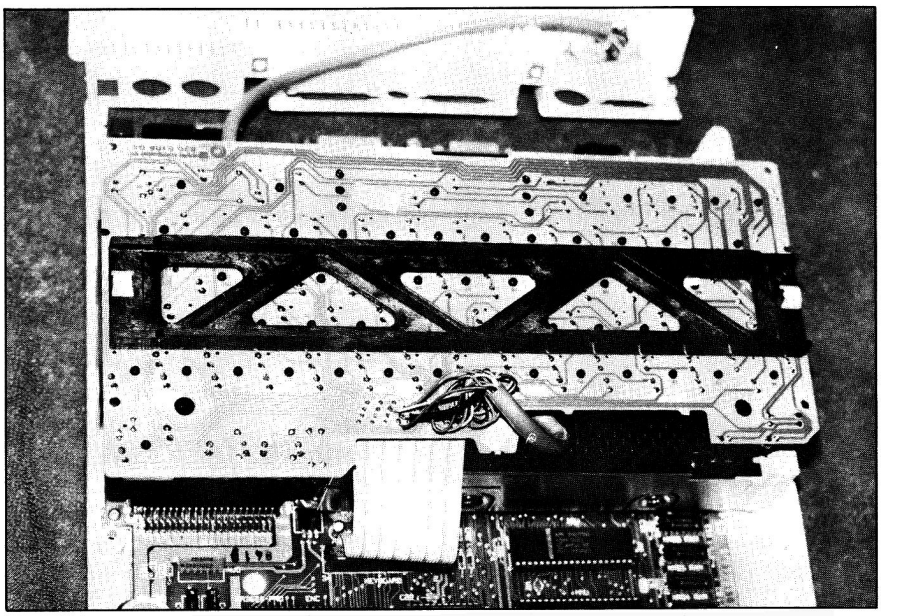
insulation and foil from one end and 2 inches from the other, and prepare the wire tips at both ends as shown in **Figure 1**. Again, use tubing or tape to cover all but the tip of the bare ground wire, and snip off the leftover colored wire. That takes care of the tedious tasks; now it's time to open up your computer.

The Inside View

Getting inside the //c isn't difficult, but it does require a cautious and unhurried approach. Before you begin, put the soldering pencil where it can't burn a hole in the computer case and spread a towel over the table. Turn the //c face down and remove the four screws under the keyboard and the two at the back nearest the handle, but not the remaining four that hold the disk drive to the circuit board.

Now, turn the computer right side up with the keyboard facing you. Insert the blade of a flat-tipped screwdriver into the space between the upper and lower cabinet sections, halfway between the left and right sides (lining up between the B and N keys is about right). Hold the rear of the computer with your free hand, and gently push the screwdriver inward until the clip holding the two sections together breaks free. Twisting the screwdriver won't open the case any faster, but it

Photo 2. The underside of the keyboard.



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will gouge scars in the plastic.

Two more clips on either side of the disk-drive door will give way with gentle encouragement from the screwdriver. Don't worry if they break off in the process; an Apple repairman told me he often breaks the clips when opening //c's, and my computer seems to work fine without them.

All that's holding the top cabinet now is the rear panel. Carefully ease your way upward and backward so the remaining clips by the on-off switch and joystick/mouse port can pull free. Then work the rear panel away from the connectors. Finally, remove the handle and set the upper cabinet aside in a safe place.

Gently pull the keyboard out of the notches in the disk-drive box, and lay it upside down on top of the disk drive (see **Photo 2**). Unplug the flat-ribbon cable that runs between the keyboard and the main circuit board from its circuit-board socket (the computer end of the cable, not the keyboard end) by gently working the cable plug loose from the socket. Use a small screwdriver and work alternately from both sides; keep the plug as straight as possible while it's inside the socket. When you get the plug out, the keyboard is free. Set the computer elsewhere so that it's safe from harm.

Now place the keyboard upside down on the towel with the space bar facing away. You should see nine diagonal rows of solder blobs (see **Figure 5**). Get the 20-inch length of cable you prepared earlier. Using the end with 2-inch prepared wires and referring to your color chart, carefully solder the A wire to the main keyboard's point A, the B wire to point B, and so on until you've connected each wire. Again, don't mix up any two-color wires, such as blue and blue/white. (**Table 2** lists the keyboard solder points shown in **Figure 5** and their internal connections within the keypad.) The wire tips should stand up at right angles to the circuit board, and not be allowed to "lie down" across the solder blobs. (Again, refer to **Photo 2**.)

Don't linger too long with the soldering pencil, and use no additional solder at all. Between what's already on the circuit board and the material on the wire tips, there's plenty of solder

Table 2. Solder points underneath keyboard and their internal connections within the keypad.

Keyboard Solder Points	Internal Keypad Connections
A	1, 2, 3, 4, 5, 6, 7, 8, 9
B	2
C	1
D	Period, comma
E	5, enter
F	4
G	6
H	7, comma, cursor down
I	9, cursor right
J	0
K	0, 8, period
L	Enter
M	3
N	Cursor down, cursor right

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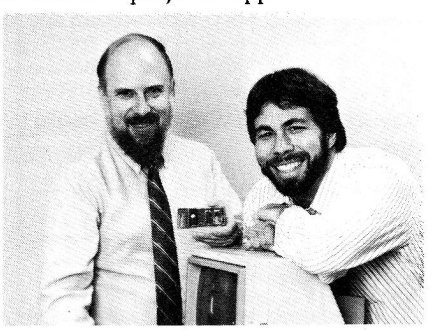

SwyftCard creator Jef Raskin and Apple II creator Steve Wozniak

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to make good connections. Go slowly to avoid short circuits caused by dragging the hot pencil across two blobs of solder.

When you finish, hold the keyboard up to a bright light and scrutinize your work. Look for loose connections, solder bridges, and touching wires. When you're satisfied, hold the keyboard above the bottom half of your //c, and plug the flat-ribbon cable into its socket on the circuit board. It fits only one way, so don't force it.

Carefully bend the new cable toward the right side of the computer and check again for any wire tips that may be touching. Pull the cable up from beneath the keyboard through the indentation in front of the disk drive and lay it across the disk drive. Fit the top of the keyboard into its notches in the drive and let it settle onto its supports above the circuit board.

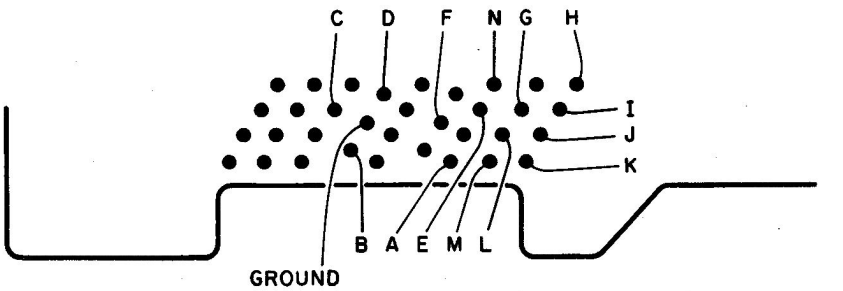
Another Port

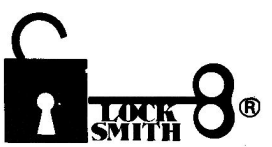
You're now at the point of no return: It's time to cut a hole in the computer's rear panel. Firm up your resolve to have a better computer, and find a sharp knife.

With the rear panel facing you, remove the third through seventh vertical bars from the left (refer to **Figure 6**). First make horizontal cuts about 3/16 of an inch above the bottom of the bars. Then cut along the top horizontal edge to remove the five bars altogether. Test the fit of the 15-pin socket from outside the cabinet; continue scraping away the remaining stubs of the plastic bars until the socket fits flush against the cabinet surface when inserted from outside.

Work slowly, since the unsupported bar stubs are now a little rubbery and can bend or twist. The outer lip of the socket is larger than the opening in the computer, so it will cover most mistakes you make with the knife. Be sure a small screw will fit through both mounting holes (#2 screws and

Figure 5. Nine diagonal rows of solder connections on the underside of the //c keyboard.





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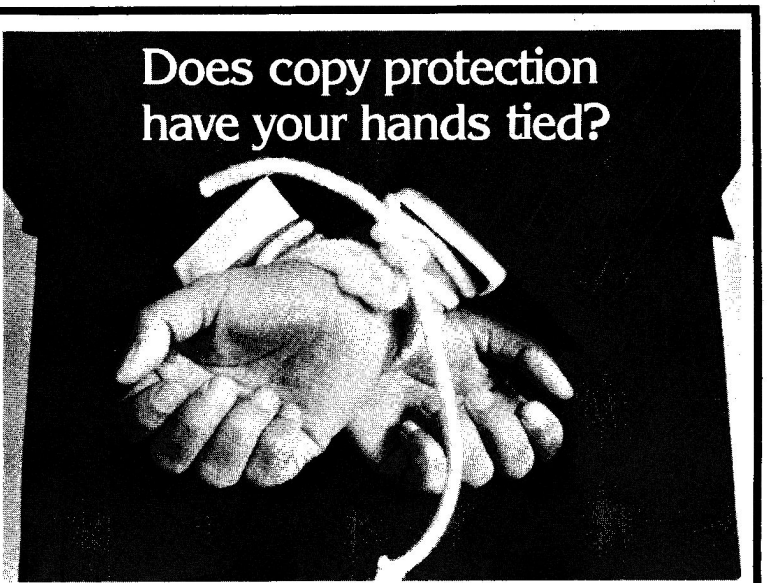

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bolts, available at any hardware store, are fine). Use a small nail or narrow-blade knife to enlarge the passageway if necessary.

Remove the socket and set it face down on your work area. As you did with the keypad plug, heat each hollow tube on the back of the socket and let a small amount of solder flow inside. Now pass the free end of the keyboard cable through the new opening in the cabinet, and lay the cabinet loosely over the computer. Pull the cable out and away from the computer, and cover the //c with a heavy towel to prevent accidents with the soldering pencil. Push the 15-pin socket onto the mating keypad plug, and position the pins near the cable coming from the back of the computer.

Using the wires connected to the keypad plug as a color guide, match each corresponding color on the computer cable and solder it to the appropriate pin. Take your time and be sure the colors are matched perfectly: red across from red, blue across from blue, ground wire across from ground wire, and so on. Be sure to touch the soldering pencil to the outside of the tube and insert the prepared wire tip into the tube of molten solder. Continue until all 14 colored wires and the ground wire are connected.

When you're finished, separate the socket from the plug and inspect your soldering job for loose connections, touching wires, and solder bridges between tubes. Install the gray hood over the keypad plug, using the screws that came with it. Set the keypad aside.

Now pull the cable back into the computer case until the socket is seated in the opening, and use two screws and nuts to secure it in place. About an inch from the socket, carefully bend the wires at a right angle to the rear panel, so that the cable can run along the rear panel to the left. After bending the wires, check once again for short circuits.

Final Steps

Before closing the computer or installing the keypad in its enclosure, you should check for any errors. First, raise the lid and make sure you didn't leave any tools, bits of wire, or other odds and ends inside the computer. Connect your monitor and power supply, but not the keypad.

Turn on the computer with no disk in the drive. After the drive stops chattering, your screen should say, "Check disk drive." Press the control-reset key combination; you should see the right bracket prompt and blinking cursor. If anything else happens—a string of characters racing across the screen, for instance—immediately turn off the power and look for touching wires either at the keyboard's nine diagonal rows or the 15-pin socket. Otherwise, type a few words and numbers to make certain the keyboard is still working properly.

Now turn the computer off and connect the keypad plug to its socket on the rear panel. Start up again, press control-reset, and check for any problems. As you press each key on the keypad, make sure it does what it's supposed to do on the screen. If the first test goes okay, but you have trouble with the second, the keypad or its plug is at fault. Check for touching wires at the plug or for a mistake in wiring the keypad board (compare your wiring to **Figures 2** and **3**).

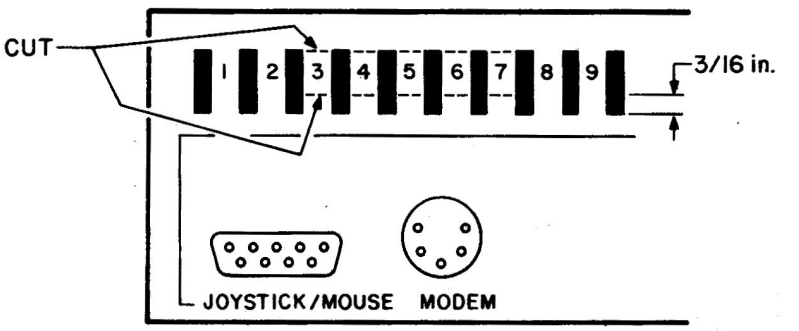
Turn off the computer; disconnect your keypad, monitor, and power supply; and set the keypad aside. Lift the top cover and guide a 4-inch length of fishing line or string through two holes in the disk-drive box at the left edge, near the keyboard. Position the keyboard cable along the left side of the drive, and tie it in place with the string to prevent it from wandering over the top of the drive and binding under the cabinet. Guide the cable around the back of the drive and along the rear panel.

Reinstall the top cover by following the removal steps in reverse. First, set the carrying handle in its notches. Then, gently work the rear panel over the ports/connectors and ease the clips at either edge into place. Come forward, pushing gently downward on the top cover. If the clips around the disk-drive door survived, they should snap into place. Finally, make sure the cover clears the keyboard and that the reset, 80/40, and keyboard switches fit into their respective openings. Press the cover down over the clip in front of the space bar until it snaps closed.

Turn the //c upside down on the towel and put the six screws back in, being careful not to overtighten them. The four that look the same go under the keyboard; the other two go in the back by the handle.

All that's left is finding a suitable enclosure for the numeric keypad. Jameco sells a sloping box that should work well, but it costs more than the rest of the parts combined. Check electronic-parts outlets in your area for a bargain cabinet, or shop Radio Shack for

Figure 6. The rear of the //c and the location of the five vertical bars to be removed to make room for the 15-pin socket.



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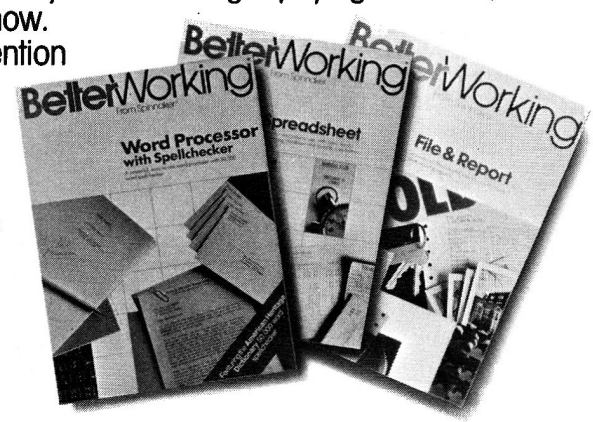

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* Comparison based on Apple® II Series versions.

a variety of hobby-project boxes with sloped tops. I obtained the enclosure in **Photo 1** from Circuit Specialists. Most parts houses stock the LMD line of aluminum cabinets.

Select an enclosure that's big enough and deep enough to accommodate your keypad. The one shown here is wider than necessary, but the large surface provides a convenient resting place for your thumb. Whatever enclosure you choose, you need to cut a large enough opening in the top for the keyswitches, so you can insert the keypad from below. The Jameco keypad has four predrilled mounting holes for securing the board to the box. A small notch at the rear of the box will pass the cable. If your case doesn't have rubber feet, I suggest you buy some from Radio Shack.

To maximize the benefits of shielded cable, find a place to attach the ground wire to the keypad case. Loosen a bolt in the case, scrape away any paint, and retighten the bolt with the ground wire curled under it.

Variations

If you prefer a comma to the cursor-control keys, modify the keypad wiring as shown in the inset of **Figure 3**. Choose the key you want to use as a comma and make sure it's not already wired for something else. Then use two short wires to connect one pole of its switch to point D on the period key, and the other to point H on the seven key. No other changes are necessary.

If you have a special application that requires more than just numeric keys, you can use these guidelines to develop any custom keyboard, including a hexadecimal or a fully detached keyboard. To find the connection point for any key on the //c's keyboard, touch one probe of an ohmmeter to either of the poles of a given key on the bottom of the keyboard. With the keyboard unplugged from the computer circuit board, quickly drag the other probe along each of the nine diagonal rows (see **Figure 5**) until the meter moves.

Concentrate on that area until you find the solder blob that gives a meter reading of zero ohms, and label it on a diagram of the nine rows. Move the meter probe to the other keyswitch pole, and repeat the process. Within the nine rows, you'll find two points for each key on the keyboard. Do this for every key you want to identify.

Whether you build this keypad or design your own, you'll be increasing the versatility of an already good computer, and helping to change the //c's undeserved image of being a hermetically sealed, non-expandable unit.■

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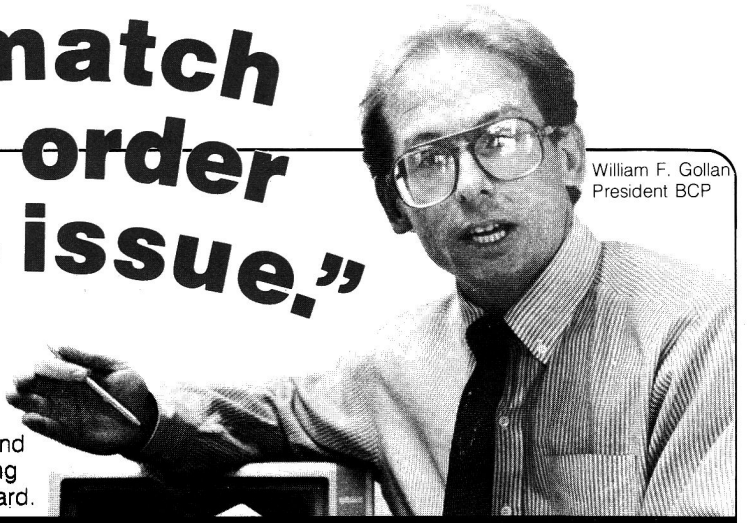

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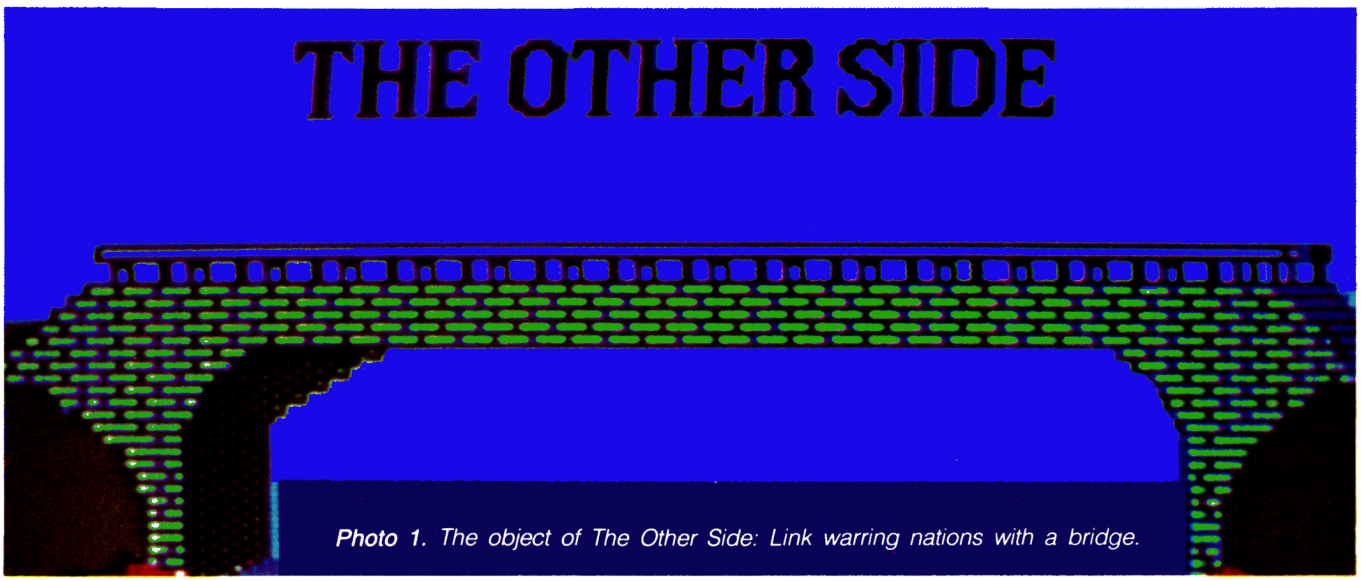

Photo 1. The object of The Other Side: Link warring nations with a bridge.

inCider's Ratings

★★★★	Excellent
★★★	Above average
★★	Good enough
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Support	★★★
Overall	★★★

Now teenagers can master something adults through the centuries haven't managed successfully—establishing peace between two nations. The object of The Other Side is simple: Build a bridge linking two countries (see **Photo 1**). Achieving peace seems easy—that is, until you encounter nationalism, selfishness, and aggression. But if you have an Apple, Hayes, or compatible modem, you may accomplish what big-shot diplomats haven't—even if only symbolically.

Each side, or team, receives a program disk, Players' Guide, game board, water-soluble-ink pen, and Modem Instructions pamphlet. Unlike war games, this program doesn't ask you to pulverize electronic aliens—real people, albeit unpredictable people, make up the other side. You can work with them or against them. Once on line, teams work independently and simultaneously at their planning consoles. Each turn represents one year.

Natural Resources

To start, inspect your country for fuel reserves. When not on home turf, you must send prospectors to find fuel in foreign territory. Then you can build drillers to tap into wells containing blue, orange, or green fuel. Blue fuel is easy to find—it's practically everywhere. You can locate green fuel only in the green country; orange fuel only in the orange country.

Prospecting for fuel and building drillers cost a lot, but they're worth it. Once you find fuel and ship it to your storage tanks, you can run the mixer to make money (**Photo 2**); you need funds to buy and lay down the bricks necessary to build a bridge (**Photo 3**). Each brick costs $10 more than the previous one—talk about inflation.

Like keeping the peace, The Other Side sounds simple enough in theory. But then you must deal with "variables," such as a national Computer Assisted Defense system (C.A.D.) with a mind of its own—which it will use if you don't buy its secret code.

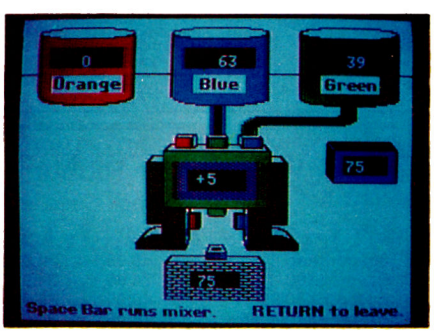


Photo 2. Find fuel, ship it into storage tanks, and mix it in the proper proportions to make money. . .

Opening Communications

A hotline (**Photo 4**) lets you exchange messages with the opposing

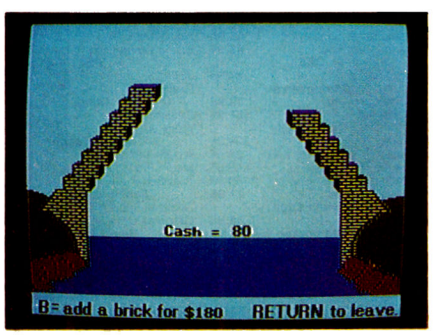
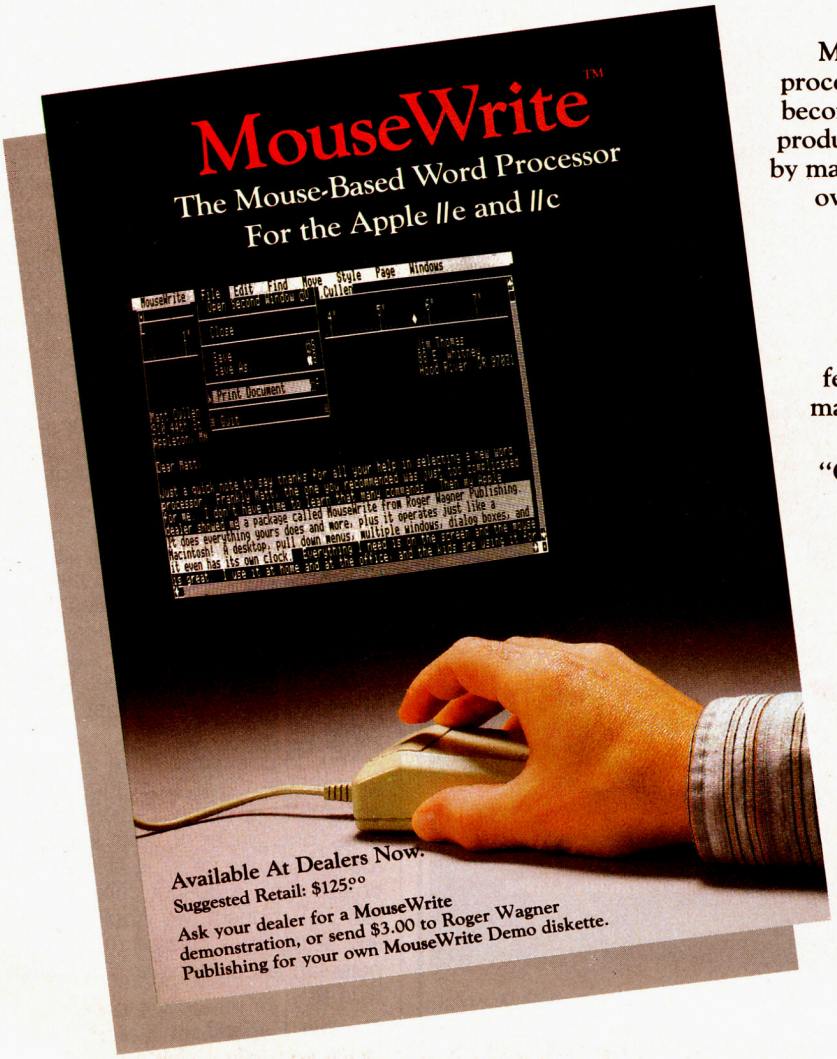


Photo 3. . . . Money with which you lay increasingly expensive bricks into your bridge.

"MouseWrite takes word processing another step forward."

- Paul Freiberger, author of "Fire in the Valley"



MouseWrite, the Macintosh-like word processor for the Apple //e* and //c is fast becoming recognized as a significant new product. Already well received in reviews by many leading computer magazines, you owe it to yourself to discover what the **MouseWrite** excitement is all about. Here are the highlights of some of those reviews:

"...just about the easiest to use full-featured word processor on the Apple market." **InCider Magazine, July, 1985**

"One thing that really impresses me is the speed at which the windows and menus work." **A+ Magazine, Sept. 1985**

"...I would recommend **MouseWrite** without reservation to anyone searching for a full featured word processor..." **Creative Computing, Sept. 1985**

MouseWrite is in computer stores now! To find out more about **MouseWrite**, stop by your local computer store and ask for a demonstration.

*MouseWrite runs under ProDOS (hard disk compatible), and requires an Apple //c or enhanced //e with extended 80 column card. Mouse is optional, but recommended.

Circle 250 on Reader Service Card.

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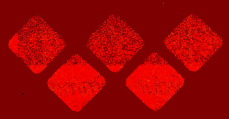

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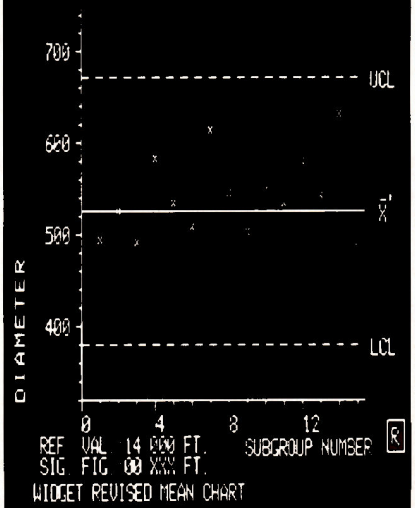

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team. Since C.A.D. messages can be deceiving, you should use the hotline often.

Even when you collaborate with the other side, your respective C.A.D. systems can start invasions, plant explosives, or detonate bombs. The C.A.D. is concerned only with national security, and it will defend itself. For example, just when you think the other side is cooperating (especially after you send a gift of money or fuel), you might receive a C.A.D. message notifying you of an attack.

You also must cope with seemingly minor details such as fuel tank leaks and national strikes. The most insidious problem, though, is the contamination from exploding bombs. During our game, the other side bought the remaining two bricks needed to build the bridge. But our out-of-control C.A.D. set off one last bomb. The screen message read, "Game over. World too contaminated. You must try again." Ten years of negotiations went up in smoke.

The lessons you learn seem more realistic when you play this game by modem. You don't have to take turns—the software eliminates those artificial breaks, and you don't see the members of the other side. And except for hotline messages or C.A.D. alerts, you don't know what they're doing.

You don't have to have a modem to play The Other Side, though. With one Apple at home, players take turns; one player or team leaves the room while the other is at the keyboard. Also, a 30-foot cable (for $15) lets you connect two Apples—a perfect setup for a classroom or computer-lab encounter with The Other Side. ■

Cynthia E. Field
Wakefield, RI

Photo 4. The hotline is your communications link with the other side.

Super Sofcrates: The Courseware Creator

Simpac Educational Systems
1105 North Main Street
Gainesville, FL 32601

Lesson-development aid
Any Apple II, 48K, joystick optional
$199

Ease of setup	★★★
Ease of use	★★★
Documentation	★★
Support	★★★
Overall	★★★

Directed at the "noncomputerist" in the teaching market, Super Sofcrates: The Courseware Creator is one of the most innovative courseware-authoring systems available. It lets you create, expand, and refine flexible courseware in a menu-driven environment that emphasizes content and aesthetics rather than one's programming ability. As a tool for the experienced computer user, Sofcrates surpasses most courseware-authoring systems—in any price range.

With Sofcrates, you can build colorful lessons in reading, science, and math, or put together interactive tutorials in drafting, electronics, and engineering. As an instructor, you can choose from among various teaching methods, including drill and practice, to modify the lesson structure. You can also change the lesson's features—right- and wrong-answer messages, repeated-question option, and controlled branching to selected lesson segments, for example. Only your knowledge and imagination limit the scope and depth of your lessons.

Other good lesson-design choices include a 75-word glossary for key definitions, a lesson-topic index for structured review, and scorekeeping to monitor each student's progress.

The Fancy

Graphics handling is superb. Text display and graphics include text in four fonts, flashing text, a paintbrush that creates block graphics for backgrounds, simple icon animation, and a pausing feature while the screen displays special messages or graphics.

You can easily integrate additional text fonts, hi-res diagrams, and "snapshot" pictures created with utilities such as KoalaPad or MousePaint. You can load these images as overlays and, to speed up display, compress them so that they occupy less disk space. This is definitely a useful feature, but one many courseware-authoring systems lack.

To create and edit lessons, use the joystick version of the mouse's point-and-click method. Simply position the hi-res cursor on the screen wherever you desire text or graphics, then supply the input from the keyboard. You can easily move, change, and paste text via Sofcrates' clipboard.

Final Notes

Only one drawback mars Sofcrates' otherwise significant impact as a useful teaching aid: The 51-page manual supplied with the Lesson Creator and Student Master disks is well designed and illustrated, but lacks good instructional-design documentation.

You can't ignore the human interaction this type of courseware demands. Like piloting a boat through a storm, plotting a good "course" requires good documentation and background knowledge. This well-conceived and nicely implemented teaching aid should definitely be on your wish list.■

David W. Hoover
Goodyear, AZ

Editor's note: Doug Simmons of Simpac reports that Holt, Rinehart and Winston will publish a textbook of computer-education instructional design early in 1986. The book will deal specifically with Super Sofcrates, and, according to Simmons, will address the limitations of the documentation accompanying the software.

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Simon & Schuster
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$49.95

Ease of setup	★★★
Ease of use	★★★
Documentation	★★★
Support	★★★
Overall	★★★

If you're one of those grade-school spelling-bee dropouts still reciting "i before e except after c," Webster's New World Spelling Checker can protect the credibility of your professional writing. As far as spelling checkers go,

Continued on p. 72.

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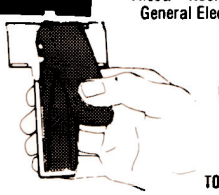

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Continued from p. 67.

Webster's is easy to use and includes features not found in some of the more expensive checkers—but it isn't free of the shortcomings inherent in spelling-checker programs.

Webster's spelling checker comes on a noncopy-protected double-sided disk, so you can back up the working program and the 144,000-word dictionary data base.

Webster's is compatible with most major word processors (Apple Writer II, Bank Street Writer, Homeword, and others) and all ASCII text files. Program options let you select scan level, create a corrected file, check repeated words, and load the auxiliary dictionary (1100 commonly used words) to the program or your document disk.

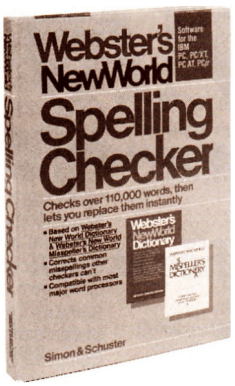
Spelling Bee

As a test, I created a sample text file riddled with various errors. After I loaded my document, Webster's began the scanning process. The program tells you what it's doing as it goes along, from loading the auxiliary dictionary and reading the document to giving you the total number of words and scanning the copy for "questionable words." After the initial scan, Webster's stops at each dubious word and provides a list of correct alternative spellings.

The alternative-spelling list contains a maximum of ten choices. In many cases, the ten choices included the correct answer. Sometimes only one or two selections (including the correct one) appeared on the list.

While the repeated-word function worked flawlessly (stopping at "the the," for example), the checker encountered a little trouble with certain spelling errors. Webster's had no problem with misspellings with a deleted or extra letter (such as meaningles or programm), but for words sporting an incorrect second letter (such as gessing for guessing or werd for word), it didn't select a correct alternative. Webster's seems to choose words that closely resemble the original and assumes the second letter is as correct as the first. For example, the alternatives for werk (work) included were, weren't, and weird.

It works fine on contractions missing apostrophes, but skipped some abbreviations. Webster's is quite selective when offering alternatives for words that run together. It separated "words that" from "wordsthat," but found no alternative for "runtogether" or "misspelledword" (which, ironically, is an example printed on the back cover of the book).



Webster's New World Spelling Checker helps you proofread your manuscripts.

Phonetic spellings followed the same selective pattern. Webster's presented the correct alternatives for fenomenal (phenomenal) and fonetically (phonetically), but was stumped by dikshunary (dictionary) and werk (work).

Webster's also performed erratically on words containing transposed letters. It corrected ulnch to lunch, but didn't give a correct alternative for prorgam. Here was another case of missing a word used as a text example.

Spelling Check

Even if Webster's fails to locate a correct alternative, or if it responds with the frustrating "None Available," it does stop at each suspected incorrect word. This gives you the chance to correct the word—assuming you know the right spelling or have a dictionary handy.

Webster's will also stop at proper and place names. This slows the completion of your document somewhat, but not excessively. But, you don't have to wait while it scans the dictionary. Just press any key if the name is correct.

Webster's is easy to use and moves along fairly quickly, considering it must scan an entire dictionary. On-screen editing is simple; the Replace and Edit and Dictionary Reference help screens remain on the lower left of the monitor during editing, ready when you need them.

Webster's is a fine proofreading program, despite its flaws, and can be very helpful when proofing a long document. But you'll still want to rely on your scrutinizing eyes to check your document for misteaks. . .er, mistakes.■

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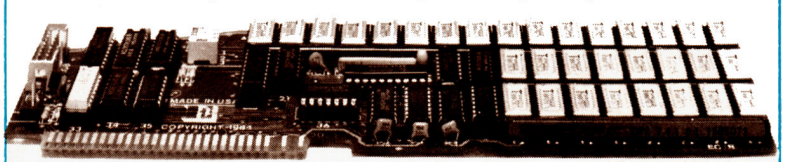

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Tymac MDD-640 Micro Disk Drive

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3½-inch disk drive
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$399

Ease of setup	★
Ease of use	★
Documentation	☆
Support	★★
Overall	★★

As a memory-hungry Apple user, you can satiate your appetite with the MDD-640—a double-sided, double-density micro disk drive that provides 640K bytes of formatted storage. The system, from Tymac Controls, consists of a 3½-inch micro drive with Canon mechanism, a disk-controller card, utilities disk, cable, and manual. But if you're not familiar with Apple hardware, you'll find the installation instructions frustrating. The MDD-640 is also limited in that it supports DOS 3.3 and ProDOS, but not Pascal or CP/M.

With the Tymac utilities, including DOS patches, a fast-copy program, and a disk-edit program, you can use the MDD-640 under DOS 3.3. When you operate the drive under ProDOS, you can use the standard Apple Filer utilities.

You can't ignore the racket the MDD-640 makes—the drive's construction and housing amplify the noise produced by the head posi-

Continued on p. 78.

Circle 28 on Reader Service Card.

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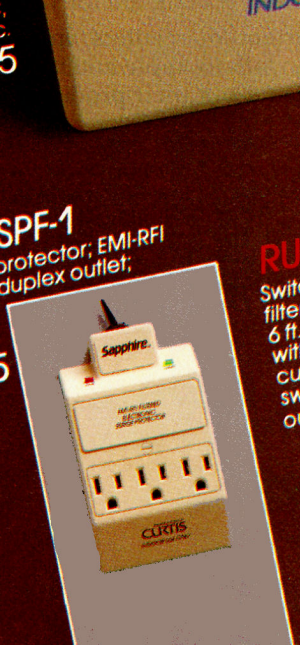

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The Macworld Exposition returns to San Francisco for the second annual gathering of all the products and services for the Macintosh computer.

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Day one is for dealers, distributors, retailers, and other third-party vendors to talk to Apple and the 100+ exhibiting companies about their products.

Days two and three are specifically geared for people interested in the Macintosh as a tool for business and anyone else interested in the Mac.

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Here's a sampling of what you will learn at the Macworld Expo:

- What software is available for the Macintosh for use in the office, school and home
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- Tips on database management
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FREE CATALOG

*Works with the Multram IIe & IIc cards from Checkmate Technology.

REVIEWS

Continued from p. 74.

tioner. A better cabinet mounting would solve this offensive problem.

Get It Together

The Tymac manual takes you through the installation procedures step by step, from placing the controller card in slot 7 to performing various tests. All processes run well, providing you use DOS 3.3. The MDD-640 wouldn't boot ProDOS—after each attempt, the computer was left in the Monitor with no way to run the operating system.

I moved the controller to slot 5 and booted from a conventional 5¼-inch ProDOS disk to solve that problem. The MDD-640 performed very well in slot 5 with ProDOS, and provided 1280 blocks of storage capacity. When booting DOS 3.3 while in slot 5, keep in mind that you must use the PR#5 command to handle the full 640K. I tried AppleWorks and other programs with both supported operating systems, and they functioned very well with the MDD-640. Although it's noisy, the drive never failed to save or retrieve data properly.

The increased storage capacity and hard-cased 3½-inch micro disks are a definite plus, but the MDD-640's noise could create a distraction. Tymac should also beef up its documentation and add support for operating systems such as Pascal and CP/M. With an improved drive housing to silence the noise, the MDD-640 could be a good medium-sized mass-storage alternative to the standard Disk II. For now, though, I'll stock up on floppies and watch what happens.■

Timothy P. McDonough
Springfield, IL

Editor's note: In response to our review of the Tymac MDD-640 Micro Disk Drive, Joe Giovannoli at Tymac said: "The drive is not quiet because it's fast and all metal. We are also doing some software tweeking to reduce the noise, and are looking at different screws and softer feet." He noted that the "ProDOS boot would require the cooperation of Apple," which Tymac has not had. Pascal and CP/M will be available in a second version, and the documentation has been updated.

Pro-Byter

Beagle Bros
3990 Old Town Avenue
San Diego, CA 92110

Apple DOS/Applesoft utility
Apple II, 64K, any version of ProDOS
$34.95

Ease of setup	★★★
Ease of use	★★★
Documentation	★★★★
Support	★★★★
Overall	★★★

Stomp around in ProDOS and DOS 3.3 to your heart's content with Pro-Byter, a collection of strange little programs that help you enter these operating systems block by block.

Pro-Byter consists of three sections: a main directory (Pro-Byter) and two subdirectories (Freebies and Home Movies). The last two are humorous and sometimes instructive, but Pro-Byter is the real meat-and-potatoes of the package. It contains some excellent utility programs that work on any Apple with ProDOS 1.1.1 or DOS 3.3.

BYTEZAP.PRO is the most important program in this directory. It lets you look at or change anything on disk in hex, ASCII, or decimal format. You can use it, for example, to change an item on disk, locate every occurrence of a word, or make minor repairs in a directory. You can also change and repair a disk directory. Since butchered disks are every programmer's bane, this program offers some assistance. The manual describes the material stored in the disk directory so you can fix it, change the names of files, and make them flash or inverse when cataloged.

One Step Forward

There's one unusual thing about BYTEZAP.PRO: To move forward or backward, use the less-than and greater-than symbols, but don't press the shift key.

Another interesting program, QSORT, is a quick machine-language sorter for arrays. It's very convenient if you need to alphabetize words. Note that QSORT starts with item #0, or A$(0), and not item #1.

Whatever you do with BYTEZAP .PRO, you can also do to your computer's memory with MEM.ZAP. You can change either your most current program or the operating system itself and save it. Every time you run the

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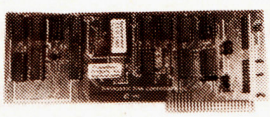

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The **JE877** serves as a diagnostic tool, an assurance/maintenance tool and a dual disk drive controller. The JE877 will verify and check the operating hardware of your system each time you turn on your Apple II, II+ or *IIe*.* Test your RAM, ROM, CPU, and disk drives. Diagnostic routines may be cancelled at the touch of a key. Complete with instructions.

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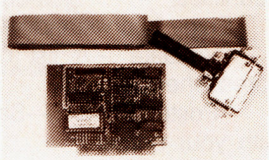

Parallel Printer Card

The **JE880** Printer Interface board is an intelligent interface to most of today's popular dot-matrix graphics printers. The JE880 is fully compatible with Apple CP/M, Apple Pascal (or FORTRAN), and most other operating systems and software packages available for Apple II, II+ and *IIe*.* The JE880 is shipped configured for the Centronics standard and can be re-configured for other standards if necessary. Advanced text printing features include: video screen echo ON or OFF, auto/disable linefeed after carriage return, set/clear the 8th bit of the output data, set left margin and more! Complete with instructions.

JE880 (PRT-1). $59.95

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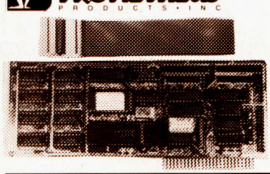

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ADD-514 (Disk Drive) $139.95
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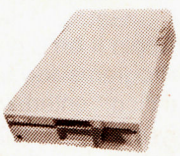

- Direct drive • 143K formatted • 35 tracks • Super quiet • Works with Apple Controllers or other compatibles (JE875) above • Complete with connector-just plug into your controller • Size: 5¾"W x 1⅝"H x 8"D • Weight: 4 lbs.

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16K RAM Card** (Language Card)

The JE860 RAM Card allows the Apple* II and II+ computers to expand from 48K to 64K. Complete with instructions.

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EAEC-1	Expanded Apple Enclosure Case only.	$34.95

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program, your specifications will appear. Basically, it lets you look at or change every byte in ASCII or hex format. A separate feature lets you type in a machine-language program. It also provides the opportunity to disassemble (change to assembly language) any block of memory.

The "L" for list in the disassembled format shows the assembly version 20 lines at a time, but the lines disappear fast. As with BYTEZAP.PRO, you can go in and set things up your way.

Since all this puttering and stomping can demolish your disk, Beagle Bros frequently reminds you to make a backup. You should also make a backup for the Pro-Byter disk, which isn't copy-protected—a Beagle Bros policy.

Inside Tip

Beagle Bros doesn't recommend using Pro-Byter with a hard-disk drive, but the company includes a few tips if you want to try. ProByter usually works with DOS 3.3 and always with ProDOS 1.1.1. Pro-Byter may or may not work if you have an abnormal ProDOS, DOS 3.2, Pascal, or CP/M disk (it isn't designed for such use).

If you want to add razzmatazz to programs, play with data stored on disk, or learn unusual programming techniques, Pro-Byter is for you. It's an excellent teaching tool and a utility package well worth the money.■

Elaine Holden
Peterborough, NH

Build a Book About You

Scarborough Systems
55 South Broadway
Tarrytown, NY 10591

Children's personalized storybook
Any Apple II, 48K
$24.95 (refill kits, $13.95)

Ease of setup	★★
Ease of use	★★
Documentation	★
Support	★★★
Overall	★★

Spend an afternoon with your child and a personalized book. Build a Book About You lets children develop a hardcover book that features them in the story line. Although it's entertaining, Build a Book About You doesn't meet its educational goals of advancing children's computer education or reading skills.

Depending on the refill kits you purchase, your child can become part of four stories: *The Mystery of Scented Mountain*; *The Holiday Dragon*; *Adventures on the Riddle Planet*; and *The Greatest Circus Story Ever Told*. The package includes two color page sets, two washable hard covers, binding materials, and order forms for additional materials. If you "publish" *The Mystery of Scented Mountain*, the book includes Scratch 'n' Sniff stickers.

The main menu offers six options: facts about the child; save and retrieve information on disk; set up the printer; print the narrative; and view the stories.

With the first option, facts about the child, you create a small data base that lists the child's name, address, school, birth date, pet, and friends. This is the only notable computer interaction involved in Build a Book About You, and it's simple enough for a child of reading age to handle. Once you save this information to disk, the personalized stories are ready for review and printing.

Not So Fast

But printing is a trifle complicated for a child. You must indicate the printer slot and interface card you're using. Then you need to test the printer's margins because of the program's erratic printing patterns required to avoid printing over the illustrations. Another twist is that the pages aren't printed consecutively because of some drawings. The computer guides you through this operation, but you must take care to avoid ruining the material.

Putting the book together also requires an adult's help. You must align the pages, cover them with a plastic binding strip, and sew them into place. An adhesive sheet placed in front of and behind the page sets seals the inside covers of the book. Assembly demands an adult's dexterity and patience.

The Critics

The primary weakness of Build a Book About You is the vacuous quality of the fantasy tales. Using the Dr. Seuss books as a standard of excellence for whimsical children's literature, the Scarborough stories fall sadly low on this measuring stick. For example, consider this excerpt from *Adventures on the Riddle Planet*: "The Master of Riddles snapped his fingers and a giant question mark fell out of the sky."

There is a giant question mark in my mind as to why a parent would invest almost $40 in reading materials that lack intellectual substance or educational value. Scarborough would have done better rehashing familiar classics such as *Grimm's Fairy Tales*, *Alice in Wonderland*, and *The Adventures of Robinson Crusoe*, and providing for personalization of these stories.

The company also has a fuzzy view of its audience. While Build a Book About You is aimed at children up to 12 years old, children approaching 6 are the only ones who could conceivably enjoy the Scarborough books. My 11-year-old nephew, who is starting a Mark Twain collection, will be wryly amused at *The Mystery of Scented Mountain*—the story of a Nose Monster who steals all the aromas in the neighborhood. If he uses the book at all, it will be to entertain his 4-year-old friend across the street.

Also, this younger age group will need the most adult supervision to complete the book-construction project. A very young child will enjoy watching mom or dad "build a book" one afternoon, and will also appreciate the lively color drawings that accompany the narratives.

Graphics notwithstanding, Scarborough delivers a final product that is mediocre at best. But Build a Book About You is based on a good idea and gives you a fun project to do with a child.■

Wendy Lea McKibbin
inCider *staff*

Editor's note: Jack McAuley of Scarborough Systems reminds readers that Build a Book is a "family project that kids will like to read because they're in the book." Scarborough does not claim that Build a Book has any particular literary or educational value.

The Notable Phantom

DesignWare
185 Berry Street
San Francisco, CA 94107

Music education
Apple //e, //c, or II Plus with joystick, 48K
$49.95

Ease of setup	★★
Ease of use	★★
Documentation	★★★★
Support	★★
Overall	★★★

If you've had training in music, dealing with notes—playing them on a keyboard or identifying pitches—becomes second nature. Helping chil-

dren acquire these abilities at the elementary-school level (ages 5–10) is the objective of a versatile program called The Notable Phantom.

The package includes a durable plastic overlay representing a piano keyboard. It covers most of the computer keyboard and includes a range of one and a half octaves with black and white keys, making the program easy to operate. You can also use removable stickers to identify the piano keys. The staff and notes that appear on screen are large enough for beginners, and the note sounds from the speaker are correctly pitched.

A songbook with the music for 20 familiar tunes comes with the program. Your computer can play any of them while showing each note on the screen's staff. You can play any succession of notes on the keyboard, then listen while your computer plays back the tune. If you like the melody you've just composed, you can save it on disk and build a library of songs.

Children learn music quickly on the computer because The Notable Phantom includes a game in which high scores depend on the speed and accuracy of response—and the game uses creatures children like most—ghosts, spiders, and phantoms.

A ghost glides across the lines and spaces of the staff and becomes a note where it stops. The child must press the corresponding piano key to change the ghost into a bat, which flies over to a "bat rack." A spider descends while clutching a letter from A to G. Striking the appropriate key sends the spider to a cage. A phantom rises as the computer plays a particular note. A correct key response sends it to the phantom house. Your child must respond within a particular time limit, which you can adjust to slow, medium, or fast. Mistakes show up immediately on the staff, along with the correct choice.

The Notable Phantom includes a built-in demonstration explaining the game. Unfortunately, there isn't enough time to study each frame of the demo program before it automatically switches to the next screen. As a result, it is much less effective than it could be.

The spider's letters are another consideration. The names of the notes at the lower end of the keyboard are shown as white letters to distinguish them from the notes at the upper end, but some are practically illegible since the background is also white. In addition, when you play scales or songs on the keyboard, some notes may not sound. This problem is infrequent, however, and doesn't always involve the same note.

If you hold a key down too long, its sound stutters and its screen representation fluctuates. At first, I associated this with the automatic-repeat feature of my Apple //e, but that's not clear, since the 20 built-in tunes play nothing but short notes, even when the songbook shows that the computer should hold those notes for a number of beats.

Despite minor flaws, The Notable Phantom is a first-rate package. While the program is aimed at 5- to 10-year-old children, I feel it can benefit budding pianists of all ages.■

Dan Dempsey
Orchard Park, NY

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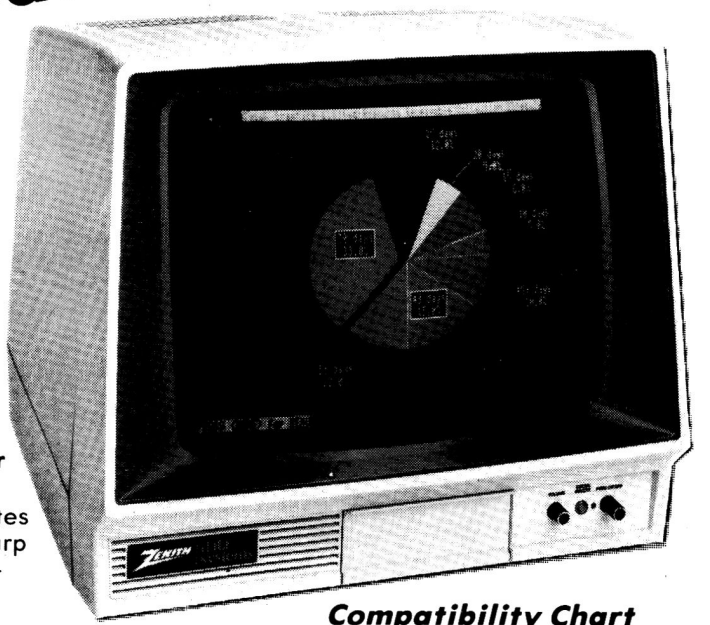

ZVM 131-Accessible by Many Popular Systems

The ZVM 131 is designed to interface with most personal computers, VCRs, video discs, video games and modular TV tuners that have either composite video or RGB direct drive outputs.

Compatibility Chart

Computer	Interfaces Via
Apple II	Composite
Aplus 3000	RGB
Apple III	RGB
IBM PC	RGB
Commodore 128	RGB/Composite
Commodore 64	Composite
Commodore Vic-20	Composite
TI 99/4	Composite
Atari 800	Composite
Atari 1200	Composite
Atari 1400	Composite

Connection Cables

RGB Cable — $19.95
C128, Aplus 3000 (Specify)

Composite — $9.95
Commodore, Aplus 3000, Atari (Specify)

The ZVM 131 Sound Of Quality

The output sound level is externally regulated by a user-adjustment volume control. Use the Zenith quality sound system to monitor the modern audio capabilities of the computer generation.

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ZVM 131's 13" diagonal display screen can exhibit impressive graphics and intensely clear copy. Easy-to-reach front access user controls (picture, black level, color level, tint, sharpness, audio volume, background noise control) make display adjustment simple and fast. An LED power on indicator notifies the user when the monitor is operable.

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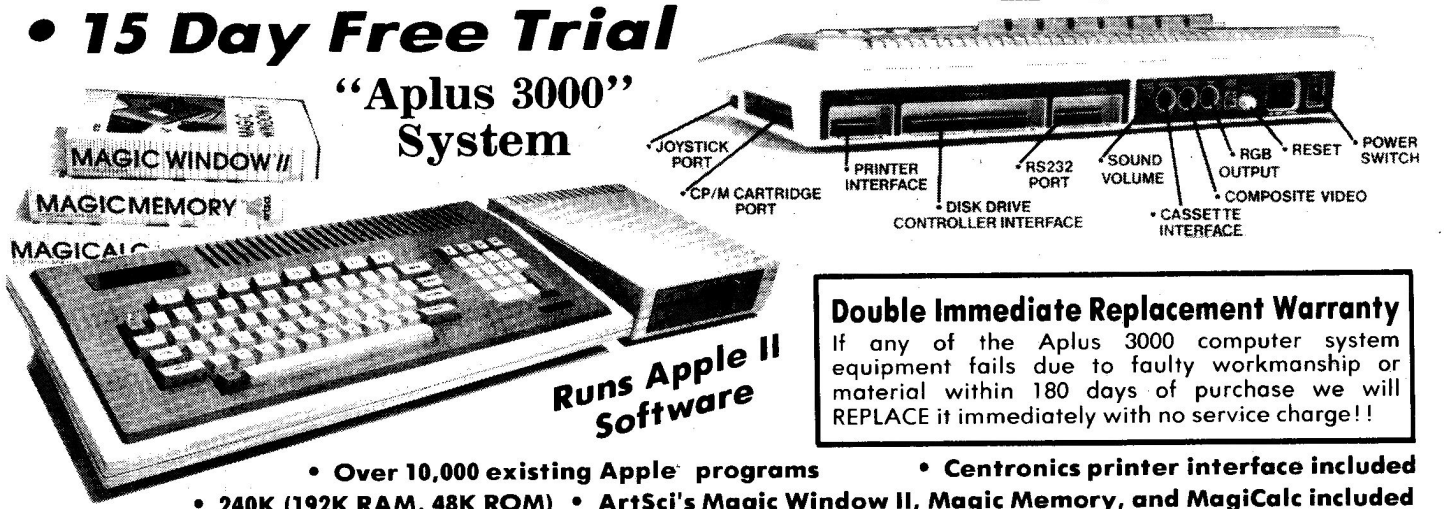

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A plus 3000 is a complete, self-contained computer based on the popular 6502A microprocessor and can tap into the tremendous software library of Apple II. Features include 192K Bytes RAM, 32KB Enhanced Microsoft BASIC, 80 column text, 560H X 192V color graphic display, 81 key sculptured keyboard and high efficiency switching power supply. Also included as standard are Centronics bus printer interface, Cassette interface, 4 channel sound generator, and 5¼" Apple Compatible Disk Drive.

- **TEXT**
  - 40 columns X 24 rows or 80 columns X 24 rows software selectable.
  - 5 X 7 characters in 7 X 8 matrix.
  - Upper and lower case characters.
  - One of Eight colors for characters/graphics and background, Red, Green, Blue, Cyan, Magenta, Yellow, Black and White.
  - Character set with normal, inverse and flashing capabilities.
- **GRAPHICS**
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  - 280H X 192V 8 colors bit image — Black, White, Red, Green, Blue, Cyan, Magenta, Yellow.
  - 560H X 192V 6 colors — Black, White, Violet, Green, Blue, Orange. (High resolution color monitor required)

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Features	Aplus 3000	Apple IIe	Commodore C-128
RAM	**192K**	64K	128K
Runs Apple II Software	**Yes**	Yes	No
Function Keys	**24**	None	16
4 Voice, 6 Octave Sound	**Yes**	No	Yes
Composite Video	**Yes**	Yes	Yes
Disk Drive	**included**	Extra Cost	Extra Cost
Numeric Keypad	**included**	Extra Cost	Included
Video Cable	**included**	Extra Cost	Extra Cost
RGB Color Card	**included**	Extra Cost	Included
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RGB cable (RGB Monitor hookup)	$ 24.95	$ 19.95
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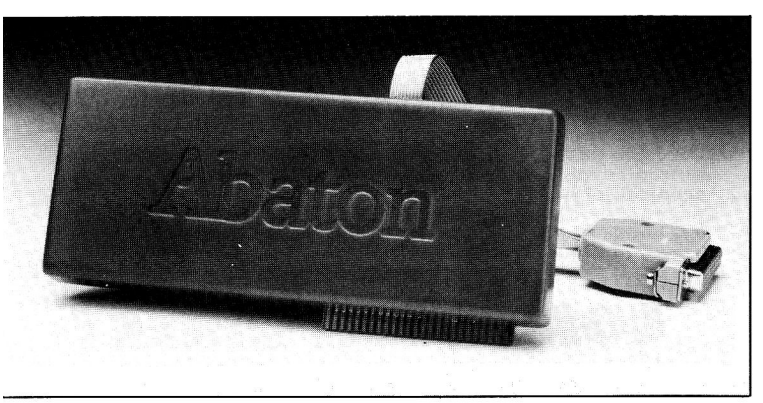
NEW PRODUCTS

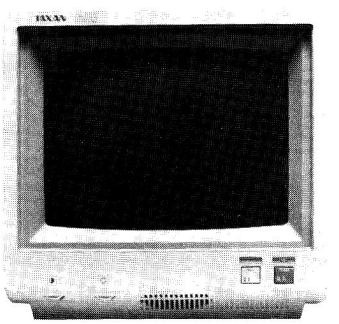
edited by Paul Statt

Copy Mac

Abaton Transform automatically regenerates Apple II applications for instant use on the Macintosh. Abaton translates II programs, including screen graphics, at the object-code level for the Macintosh, regardless of the original program's source language. The process often takes less than 15 minutes, and even the most sophisticated programs are translated in no more than six hours. Copy-protected programs cannot be translated; Abaton is intended for developers' use. Abaton Transform comes with an add-on card for the Apple II, and 5¼- and 3½-inch disks. Your Macintosh needs at least 512K. The price is a mere $1995, from Abaton Technology, 1526 Cloverfield Boulevard, Santa Monica, CA 90404, (818) 905-9399. For more information circle number 363 on the Reader Service card.

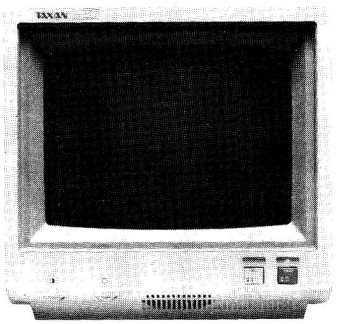


Abaton Transform translates Apple II applications into Mac-compatible programs.



Double Monitors

Taxan Models 610 and **620** RGB monitors offer you a choice of four text colors: green, amber, black-and-white reverse, and reverse green. The 610's resolution is 510 by 200 pixels with a 0.47mm dot pitch; the 620 offers 620-by-200 resolution and 0.37mm dot pitch. Both sport nonglare screens; the 620 has Super High Contrast. Prices are $470 for the Model 610 and $580 for the Model 620, from Taxan, 18005 Cortney Court, City of Industry, CA 91748, (818) 810-1291. For more information circle number 369 on the Reader Service card.



Instant Development

Developer Disk #1 helps you write friendly software for Apple //e and //c computers. The double-sided disk features the Nite Owl Run Time program that enhances ProDOS. LQuick Index is an auto-menu program selector capable of running programs, TYPEing text files, or indexing ProDOS subdirectories with a keystroke. PACKER condenses hi-res graphics into half the disk space, GETSTRING provides editing for Applesoft, and SETDATE lets you date-stamp disk files properly. The package, including an *Introduction to ProDOS and Applesoft*, sells for $19.95, from Nite Owl Productions, 5734 Lamar, Mission, KS 66202, (913) 362-9898. For more information circle number 353 on the Reader Service card.

Product descriptions contained in this section are based on information supplied to us by the respective manufacturers. These announcements are provided solely as a service to our readers and do not constitute endorsement by inCider *of any given product.*

View to a Kill

Viewtron, a pioneer in on-line videotext, now offers its services nationwide to Apple owners. It's a complete service: You can dial up home banking, data bases, shopping, air fares and schedules, and more. There's even a CB board that lets you chat across the country. Viewtron is easy to read because words appear on the screen a page at a time. The company charges no subscription fee and no monthly minimum—you pay just nine cents a minute nights and weekends, or 22 cents weekdays. The Viewtron Software Starter Kit sells for $9.95, with special deals on modem bundles: a 300-baud Anchor Mark X modem, $99.95; a Mark X modem with serial card for II or //e, $159.95; a 1200-baud Volksmodem 12, $189.95; Volksmodem 12 with serial card, $249.95. Call Viewtron, 1111 Lincoln Road, Miami Beach, FL 33139, (800) 543-5500, operator 9401. For more information circle number 361 on the Reader Service card.

Expert Opinion

MicroExpert builds and implements an "expert system" that applies as many as 400 rules. The Pascal program is fully open, letting you see how the knowledge base you've created asks questions leading to solutions for complex problems. Beginners can learn to write a knowledge base, and expe-

rienced artificial-intelligence programmers can easily transport Pascal routines written with MicroExpert to other systems. MicroExpert is inexpensive, too: $49.95 from McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, NY 10020, (212) 512-3493. For more information circle number 354 on the Reader Service card.

Today's Tomorrows

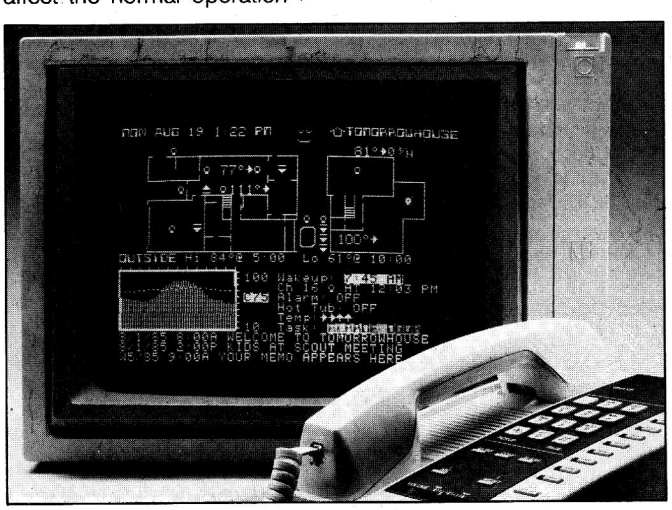
TomorrowHouse II software monitors and controls household appliances, energy use, and security in the home. This microcomputer-based system operates lights and appliances, and regulates the temperature of your home, hot tub, or pool. It can even sense when your garden needs watering—and waters it. You or the police hear quickly about security problems, and all status reports are written in plain English. You can also change and control the system with a touch-tone phone if you're on the road. For information contact TomorrowHouse, 2132 Ward Drive, Walnut Creek, CA 94596, (415) 932-1346. For more information circle number 362 on the Reader Service card.

Les Mots d'Apple

Mouse Word, imported from France, brings an integrated communications package and a Mac-style mouse interface to 128K Apple II word processing. Mail-merge and mathematic calculation are built into Mouse Word, giving you the power of an expensive integrated package. You can also cut and paste directly from Mouse Calc, the popular mouse-driven spreadsheet, for $149.95, from Version Soft and International Solutions, 910 West Maude Avenue, Sunnyvale, CA 94086, (408) 773-0443. For more information circle number 370 on the Reader Service card.

Apple Operating

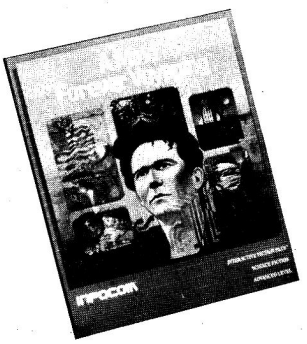
The **//c CP/M Plus System** consists of a Z-80 hardware module and an advanced version of the CP/M operating system configured especially for the //c. The Z-80 module offers a Z-80H (8 MHz) microprocessor and fast screen handling—up to four times as fast as the //c's built-in screen handling. The hardware fits entirely inside the //c and doesn't affect the normal operation of the machine. Bundled with ToolKey, a CP/M system utility, and Pocket WordStar, the //c CP/M Plus System sells for $360, from Greengate Productions, 2041 Pioneer Court, #15, San Mateo, CA 94403, (415) 345-3064. For more information circle number 368 on the Reader Service card.



TomorrowHouse II software for home control and security.

Cry Wolf

Werewolf!!, an animated, hi-res adventure, pits you against a maze of monsters and devilish devices in the depths of Castle Orloff. All the riddles and puzzles are original, and three levels of difficulty are available. Werewolf!! is suitable for players aged 10 and up, for $24.95, by mail only, from Gambit Software, 2418 Huldy, Suite II, Houston, TX 77019. (713) 520-5320. For more information circle number 351 on the Reader Service card.



Mind Moves

Infocom's latest, **A Mind Forever Voyaging**, makes you the computer—Prism, a 21st-century experiment in artificial intelligence. Your mission is to test The Plan, a government program designed to make America great again. Will The Plan work? If it doesn't, who will save the world from its effects? You get to decide, for $44.95, from Infocom, 125 Cambridge Park Drive, Cambridge, MA 02140, (617) 492-6000. For more information circle number 350 on the Reader Service card.

Brief Power

Briefcase Batteries are rechargeable, maintenance-free power sources that provide six hours of operation for the Apple //c. A voltage meter protects against low-voltage shutdown. The 12-volt nickel-cadmium battery has a one-year warranty and is fused to protect your investment. Briefcase Batteries sell for $179 (battery, voltage meter, and recharger), from Computer Coverup, 1740 North Marshfield, Chicago, IL 60622, (800) 282-2541. For more information circle number 367 on the Reader Service card.

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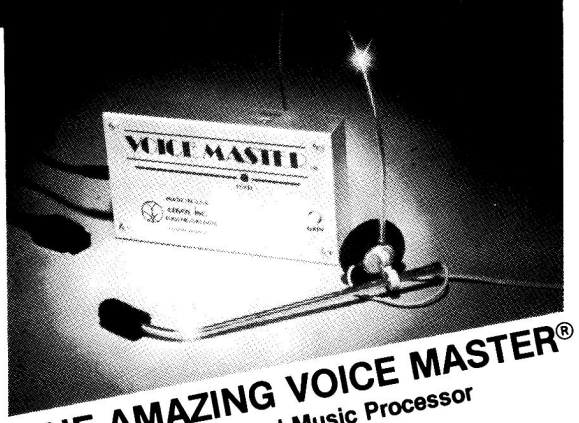

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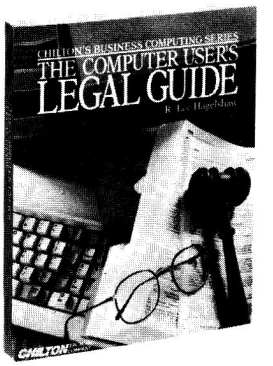

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The **Computer User's Legal Guide**, a 240-page paperback, is the legal adviser you need if you own a computer or software, especially if you write programs for sale. Attorney R. Lee Hagelshaw, author of the *Legal Guide*, uses his expertise to explain warranties, false promises, relicensing, your rights to custom-written software, marketing your own software, limiting your liability for software or a consultant's advice, partnerships and corporations, and protection from pirates. All for only $17.95, from Chilton Book Company, Radnor, PA 19089, (800) 345-1214. For more information circle number 364 on the Reader Service card.

Pascal Aid

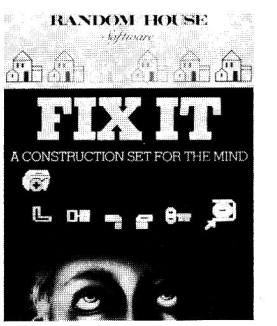
***EDIT** keeps Pascal programming simple. You can write and store keyboard macros for Apple Pascal 1.1 or 1.2. Features include find and replace, insert, delete, copy to buffer, exchange text, exchange case scrolling, and more. *EDIT supports Pascal-compiler error checking, and you can compile or assemble source code. The program is resident in RAM and requires little disk swapping to edit multiple files. *EDIT costs $39, from dogStar Software, P.O. Box 302, Bloomington, IN 47402, (812) 333-5616. For more information circle number 356 on the Reader Service card.

Clean Strip

Safe-Strip provides surge protection for stereos, videocassette recorders, and all other components that use integrated circuits, including your Apple II. It features six outlets (four switched, two unswitched), an illuminated on/off switch, a 7-foot grounded power cord, and built-in mounting brackets. Safe-Strip comes complete with 15-amp fuse protection against overloads, and sells for $29.95, from Curtis Manufacturing, 305 Union Street, Peterborough, NH 03458, (603) 924-7803. For more information circle number 365 on the Reader Service card.

Quick Fix

Fix It software, a construction set for the mind, tests your analytic thinking in a series of 200 kits. You must assemble a configuration of elbows, bouncers, and converters into a smoothly operating machine. Parts must be the proper size, shape, and color if the machine is to run. The results will amuse and satisfy you if you build the Fix It machine right. Competitive types can vie for time or set tasks for one another to solve. Fix It sells for $39.95, from Random House Software, 201 East 50th Street, New York, NY 10022, (212) 751-2600. For more information circle number 358 on the Reader Service card.



Color Wheel

With your Apple, **Prince** software and ribbons produce color prints with as many as 80 colors for paper or cloth transfer. Prince captures any standard or double-hi-res image for editing and printing. You can create your own T-shirts, greeting cards, banners, letterheads, or stickers with the Prince library of art and font styles. Prince includes a Craft Kit, with all you need for iron-ons, labels, and such, for $69.95, from Baudville, 1001 Medical Drive S.E., Grand Rapids, MI 49506, (616) 957-3036. For more information circle number 359 on the Reader Service card.

Do You Copy?

Echo Plus copies any disk, even the best-protected, for your backup. You don't even need to supply parameters—the Automatic Disk Copier feature analyzes the disk for tracks to be copied and reads selected tracks by adjusting parameters as necessary. The process may take 20 minutes, but otherwise-difficult tracks can be easily copied. Echo Plus is simple to use, employing windows, single-key commands, and menus. The cost is $59.95, from Agranat Systems, 10 Winthrop Circle, Weston, MA 02193, (518) 266-8718. For more information circle number 355 on the Reader Service card.

Product Updates

● The **Microline 182 TTY** is a high-performance dot-matrix printer designed for rough use in the telecommunications industry. It offers all the features of the standard 182, as well as special intelligent functions for communications. It sells for $350–$450 (depending on interface and speed).

● **MasterType** now speaks French. Scarborough Systems offers a foreign-language version of the best-selling typing teacher. It will be distributed in France by Ediciel Matra & Hachette, and in Quebec by Frantek—but that's as close to the USA as it's coming.

● Scarborough has also enhanced the **Filer** list-management program for the Apple II. **MasterType's Filer** has been rewritten in assembly language to increase speed, and color and sound have been added for ease of use. Still only $39.95.

● The latest software to take advantage of Apple's UniDisk 3.5 and RAM Expansion Card is the ever-faithful **AppleWorks**. An updated version of the integrated package supports the two peripherals and Catalyst, but includes no new commands—or rodents.

● **AppleWorks** left Symphony in the dust at a run-off of integrated software last fall. Of course, the Apple //e that outpowered the PC was souped up with an Applied Engineering **RamWorks** card. And, of course, AE sponsored the contest. The latest AE development—look for it next month in New Products—is **RamWorks II**: 2 megabytes standard, or up to 3 megabytes optional. Where will it end?

● **Voice Master //c** provides sonic aid to //c users through the joystick port. You can record and store speech and music, or compose. Voice-recognition options are available, from Covox, in Eugene, Oregon.

● Apple Computer's **Apple Pascal 1.3** seems to be for real—it will probably support the UniDisk 3.5 and the II RAM Expansion Card. Watch for details.

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ASK INCIDER

by Bob Ryan,
inCider Technical Editor

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.*

Instant Pictures

Dear *inCider*:

I have an Apple //c and a mouse. With MousePaint I draw pictures and transfer them to DOS 3.3 for use in some of my programs. Then I BLOAD the pictures to hi-res page 1 or hi-res page 2. When loading, the pictures appear on screen 1 bit at a time. I'd like to know how to get the pictures to appear all at once. Do you know a faster way to put pictures on screen in DOS 3.3?

Tim Broderick
53 Mountain Drive
South Windsor, CT 06074

Dear Tim:

You can use a number of methods to decrease the real or apparent time it takes to BLOAD a picture into memory. The first method is to use a DOS that is quicker than DOS 3.3, but otherwise compatible—programs like ProtoDOS (Beagle Bros, 3990 Old Town Avenue, San Diego, CA 92110, 619-296-6400) or Diversi-DOS (Diversified Software Research, 34880 Bunker Hill, Farmington, MI 48018, 313-553-9460). You can also use the Extra Screens utility in Beagle Bros' Extra K package to load multiple screens into memory and switch among them with lightning speed.

Your third alternative is simple—don't display the hi-res screen while you're loading a picture. Load the picture first, then display the screen. For an example of this technique, see Right of Assembly in our October 1985 issue. Listing 1 (p. 74) demonstrates how to draw on the hi-res screen without displaying the image. To modify the routine for your purposes, simply replace lines 30–75 with the code you use to BLOAD a hi-res picture. When line 85 is executed, the picture will appear on screen instantaneously.

"Beagle Bros' Extra K switches among screens with lightning speed."

Printing Graphics 1

Dear *inCider*:

I own an Apple //c and an ImageWriter printer. What is the ImageWriter "dump code" that will print the screen? Also, is there a chess game available for the //c? I haven't seen one advertised.

Robert L. Crawford
P.O. Box 1918
Thomasville, GA 31792

Dear Robert:

There's no "dump code" that will make the ImageWriter print the contents of the Apple hi-res screen. You must use a screen-dump utility like the one on the Tool Kit disk that comes with the ImageWriter Accessory Kit.

Just about any chess program designed for the Apple II line will run on the //c. My favorites are Sargon III from Hayden Software (600 Suffolk Street, Lowell, MA 01853, 617-937-0200) and How About a Nice Game of Chess! from Odesta Corporation (3186 Doolittle Drive, Northbrook, IL 60062, 800-323-5423).

Apple Keys

Dear *inCider*:

How can I tell if a character has been pressed in conjunction with the open- and closed-apple keys? Is there some address that is PEEKed into, or is there an ASCII code for these keys? I have a //c and would like to incorporate the Apple keys into my programs.

Jeff Gilford
P.O. Box 1578
Kingsville, TX 78364

Dear Jeff:

The open- and closed-apple keys don't generate ASCII codes, nor do they modify the ASCII code of any other key; they're connected to the hand-controller switches. To see if the open-apple key is being held down, PEEK into location – 16287. If the value there is greater than 127, the open-apple key is being pressed. When the solid-Apple key is pressed, the value in location – 16286 will be greater than 127. To see if one of these keys is being pressed in conjunction with another key, PEEK into these locations, then read the keyboard as you normally would.

Game programmers will recognize these locations—they're the same ones you use to check the status of button-0 and button-1 on a joystick or paddle.

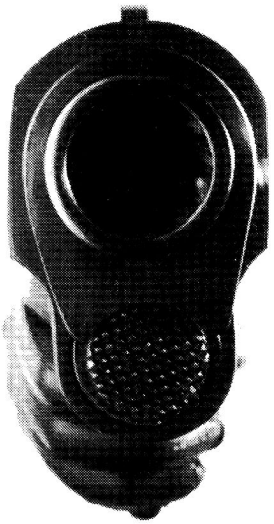
Printing Graphics 2

Dear *inCider*:

I'm looking for a program that will let me dump lo-res graphics to my ImageWriter. I have an Apple Super Serial Card. Some of the programs I use are for children, and they draw on the lo-res screen. How can I print these pictures?

Marsha M. Silberstein, M.D.
417 Spruce Street
Philadelphia, PA 19106

Gun For Hire



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ASK INCIDER

Dear Marsha:

Assuming you have some kind of hi-res graphics-dump utility, all you need is a program to convert lo-res pictures to hi-res pictures. inCider *published such a utility, Lo-Res to Hi-Res, in the January 1985 issue (p. 49). If you don't have a graphics-dump utility of any sort, I suggest you get a commercial utility that has a lo-res to hi-res conversion as well as the hi-res graphics dump. Printographer, from Roger Wagner Publishing (10761 Woodside Avenue, Suite E, Santee, CA 92071, 619-562-3670), is one hi-res graphics dump that includes a lo-res conversion utility. I'm sure there are others.*

Hard-Disk Talk

Dear *inCider.*

I need some basic information about hard-disk drives. Can I still use my two floppy-disk drives in conjunction with a hard disk? Are hard disks compatible with DOS 3.3? Would I have to buy disks for a hard-disk drive? Is there one directory on a hard drive or can you divide such a drive into smaller directories, as if there were many smaller drives? Finally, if you've ever used a hard disk, can you tell me what you think of them?

Shane Stedron
6535 Rolefson Drive
Oconomowoc, WI 53066

Dear Shane:

To answer your questions:

1) Yes, you can still use your floppy disks in conjunction with a hard-disk drive.

*2) Some hard disks are compatible with DOS 3.3, others are not. For example, The Sider, OmniDrive, and Sun*Disk work with DOS 3.3. The TeamMate, ProFile, and QC10 do not.*

3) Hard-disk units for the Apple are sealed during the manufacturing process and should never be opened. You don't have to buy disks for them.

4) Most hard disks let you partition the disk into two or more distinct volumes that emulate smaller floppy disks.

5) I've used The Sider and ProFile and haven't had any problems with either one. I like them both, but The Sider is an unbeatable value.

See "Hard-Driving Disks" (September 1985, p. 24) for a comparison review of the hard-disk drives mentioned above.■

APPLESOFT ADVISER

An Applesoft Loan-Payment Processor

by Dan Bishop

Part of the attraction of personal computers—and off-the-shelf software—lies in their potential to make our lives easier. But what do you do with that occasional simple problem that can't be handled by one of your "canned" programs? You could write a full-fledged BASIC program, but is it worth your time and effort?

This month I'll demonstrate how you can handle one such problem with only a single line of BASIC code. Then we'll see how that single line can become the heart of an applications program that can evolve into whatever level of complexity you desire.

The Quick Solution

Suppose you just caught an ad in the newspaper that promised 11.5 percent financing on that house you've always wanted. The house you've got your eye on is a good buy at $60,000, and you figure you could afford to spend $12,000 as a down payment. You can extend your $48,000 mortgage over a 20-year period. "What if I bought that new home?" you speculate. "How would my monthly payments compare with the $500 per month I'm currently paying for rent?"

Don't head off to the kitchen for a beer and forget the question you just asked yourself. Go to your bookshelf and dig around for the equation that calculates monthly payments on a loan. You may find the following formula:

```
A = I / (1 - PV)
```

where A is the amount of payment per dollar borrowed, I is the interest rate per period, and PV is something your book refers to as "the present value of $1." Further scrutiny reveals that the present value of $1 is given by PV = (1/(1 + I)) raised to the Nth power, where N is the total number of payments to be made and I is the interest rate per period.

Your one-line BASIC routine can become the kernel of a more complex Applesoft program.

At this point, go to your computer, enter NEW to clear the program memory, and, using a convenient line number such as 500, type:

```
500 PA = (P*I) / (1 - (1/(1+I)) ^ N )
```

where you have substituted the appropriate expression for PV and have multiplied the whole equation by P, the original loan amount, to get PA, the payment amount.

To use this one-line BASIC program without any further ado, all you need do is type in assignment statements for each of the three variables (P, I, and N), to give them the values you want them to have in your calculation. Type in these values while in command mode, without any program line numbers. For example, enter:

```
P = 1500
I = .095
N = 24
```

Then type in the command, GOTO 500. This causes the computer to execute the program without clearing the values for P, I, and N first. (The RUN command would zero these values before executing the program.) At the command prompt, which indicates that the computer has executed your program, type in PRINT PA or ? PA. Your computer will display the value PA resulting from the calculation.

To determine the payment on the home mortgage, convert the mortgage percentage to decimal form, 0.115, and substitute the appropriate values into the equation by typing in:

```
P = 48000
I = .115
N = 240
GOTO 500
? PA
```

The result, $5520, is more than a little disconcerting. On closer inspection of the formula, you realize that I, the interest rate, should be the interest rate per period, and you used the annual interest rate instead. To get around this problem, substitute AI/NP for both I's in the formula in line 500, where AI is the annual interest rate (in decimal form) and NP is the number of payments per year, since I = AI/NP. This gives:

```
500 PA = (P * AI/NP) /
  (1 - (1/(1 + AI/NP)) ^ N )
```

Of course, you now have one additional variable for which you must assign a value (NP, the number of payments per year).

Now comes the moment you've been waiting for—but before going further, you decide to check your algebra by testing the equation with the data for your current auto loan. Type in the following four assignment statements, GOTO 500, then PRINT PA:

```
P = 6800
AI = .16
NP = 12
N = 30
```

The result, $276.50, corresponds to your current payments for principal and interest.

Now type in the four values for your new house:

```
P = 48000
AI = .115
NP = 12
N = 240
```

followed by GOTO 500 and ? PA. Plugging your home-mortgage data into the equation yields $511.89. For $11.89 more each month, you could be living in your dream house! (Don't forget to include taxes, homeowner's insurance, and maintenance expenses, though.)

Germination

Your one-line BASIC program may not seem like much, but before you know it, your neighbor is having you check out business loans and your mother-in-law keeps asking you why

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you don't do something more useful than spending your spare time at the computer.

The important fact is that you're getting tired of typing in all the data for each new calculation as an assignment statement. The time has arrived to add input/output subroutines to the program. You'll need to convert the one-line "program" into a subroutine by adding:

```
510 PA = INT(PA * 100 + .5) / 100
520 RETURN
```

to round off the monthly payment and return to the main program (which you still have to write).

You want to keep things simple, though, so your data input will be handled with a subroutine that contains just the four necessary INPUT statements for the four variables the formula needs. The output subroutine will be just a single PRINT statement. Finally, of course, you'll need four lines for the main program, which will consist of three GOSUB statements and an END (see **Listing 1**). Now that the variables are assigned values from within the program, you can use the RUN command to execute this program each time you want a monthly payment calculation.

All goes well for a while, until you find that you occasionally like to run a series of calculations in which only one of the variables changes. As the program stands, you must type in all four variables each time you run the program. You decide it might be nice to be able to simply press the return key at an INPUT prompt to use the value you typed in for that variable on the previous run. This, of course, also requires that you add an additional prompt to the main program to let you either end the program or make the program cycle back to the beginning for yet another calculation.

The program in **Listing 2** (p. 96) meets each of these conditions. Note that each input-entry prompt now refers to two new subroutines. The subroutines beginning at line 1200 are PRINT statements that replace **Listing 1**'s INPUT prompts and specify exactly where the prompt is to appear on screen (with HTAB and VTAB commands). This approach ensures

Listing 1. Simplest form of loan-payment program containing built-in input and output modules.

```
1   REM   LOAN PAYMENT CALCULATION
2   REM   INCIDER - JANUARY 1986
5   REM  **********************
10   HOME
20   GOSUB 1000
30   GOSUB 500
40   GOSUB 2000
90   END
495   REM
496   REM  ******************
497   REM   PYMT CALCULATION
498   REM  ******************
499   REM
500 PA = (P * AI / NP) / (1 - (1 / (AI / NP + 1)) ^ N)
510 PA =  INT (PA * 100 + .5) / 100
520   RETURN
995   REM
996   REM  ********************
997   REM  DATA INPUT ROUTINE
998   REM  ********************
999   REM
1000   HOME : PRINT "ENTER..."
1010   INPUT "   BEG. BALANCE OF LOAN.....";P
1020   INPUT "   ANN.INT.RATE (EG. 0.115): ";AI
1030   INPUT "   NUMBER OF PYMTS PER YEAR: ";NP
1040   INPUT "   TOTAL NUMBER OF PYMTS.....";N
1050   PRINT "-------------------------------------"
1060   RETURN
1995   REM
1996   REM  ******************
1997   REM  OUTPUT ROUTINE
1998   REM  ******************
1999   REM
2000   PRINT "EACH PYMT WILL BE: $ ";PA
2020   RETURN
```

that the prompt and variable value always appear in the same places on screen whether you type in a new value or use an old value from a previous run.

The subroutine at line 200 handles actual keyboard input. The variable used is a string variable, so that the computer will accept a null value (pressing the return key at the prompt) as valid input. When the program returns from the subroutine at 200, the computer checks X$ to see if it is null. If so, the computer displays the prompt and old value for that variable, and the program jumps to the next input entry. If X$ is not null, then the computer gives the appropriate variable the value of X$. Since the process of keying in the value also caused the computer to display the number on screen, the computer needs to do nothing further with that variable.

There's another advantage to having a separate subroutine for the INPUT statement. You might decide to add error-trapping or data-qualifying lines to verify that you've typed in acceptable values. Having a single subroutine to handle keyboard input simplifies this programming task considerably.

As you can see, the program in **Listing 2** is not too much more complex than the earlier version, just as that version was not very much more advanced than the one-line program. Yet this sequence of versions illustrates graphically that useful programs can have very modest beginnings. It also shows that you can develop a complex program in clearly defined, easy-to-understand steps.

Conclusion

The program in **Listing 2** is a meaningful business-application program, despite its relative simplicity. Any real-estate office needs this type of program—so much so, in fact, that specialized hand calculators have been developed with this function. Car dealerships and banks can also use this little program on their personal computers.

Next month, I will take this example one step further, with the development of an amortization program using **Listing 2** as its core. In the meantime, take up the challenge of writing your own. In February, you can compare your approach to this problem with mine.■

Write to Dan Bishop at 4124 Beaver Creek Drive, Fort Collins, CO 80526.

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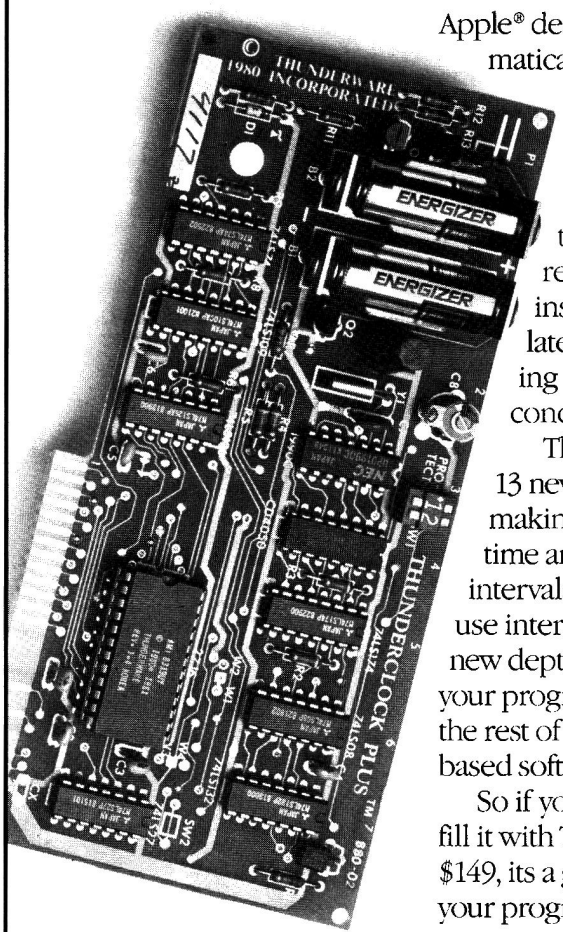

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Listing 2. Loan-Payment Processor, which allows repeat calculations using previously entered values.

```
1  REM   LOAN PAYMENT CALCULATION
2  REM   INCIDER - JANUARY 1986
5  REM  ************************
10  HOME
20  GOSUB 1000
30  GOSUB 500
40  GOSUB 2000
60  PRINT "DO YOU WANT ANOTHER RUN (YES/NO):";
70  INPUT X$
80  IF X$ = "YES" THEN  GOTO 20
90  END
195  REM
196  REM  ******************
197  REM  STRING INPUT
198  REM  ******************
199  REM
200 X$ = ""
210  INPUT "";X$
220  RETURN
495  REM
496  REM  ******************
497  REM   PYMT CALCULATION
498  REM  ******************
499  REM
500 PA = (P * AI / NP) / (1 - (1 / (AI / NP + 1)) ^ N)
510 PA =  INT (PA * 100 + .5) / 100
520  RETURN
995  REM
996  REM  ********************
997  REM  DATA INPUT ROUTINE
998  REM  ********************
999  REM
1000  HOME : PRINT "ENTER..."
1010  GOSUB 1200: GOSUB 200
1020  IF X$ = "" THEN  GOSUB 1200: PRINT P: GOTO 1040
1030 P =  VAL (X$)
1040  GOSUB 1210: GOSUB 200
1050  IF X$ = "" THEN  GOSUB 1210: PRINT AI: GOTO 1070
1060 AI =  VAL (X$)
1070  GOSUB 1220: GOSUB 200
1080  IF X$ = "" THEN  GOSUB 1220: PRINT NP: GOTO 1100
1090 NP =  VAL (X$)
1100  GOSUB 1230: GOSUB 200
1110  IF X$ = "" THEN  GOSUB 1230: PRINT N: GOTO 1130
1120 N =  VAL (X$)
1130  PRINT "---------------------------------------"
1140  RETURN
1195  REM
1196  REM  ******************
1197  REM  INPUT SCREEN DISPLAY
1198  REM  ******************
1199  REM
1200  HTAB 3: VTAB 2: PRINT "BEG. BALANCE OF LOAN:       ";: RETURN
1210  HTAB 3: VTAB 3: PRINT "ANN.INT. RATE (EG. 0.115): ";: RETURN
1220  HTAB 3: VTAB 4: PRINT "NUMBER OF PYMTS PER YEAR:  ";: RETURN
1230  HTAB 3: VTAB 5: PRINT "TOTAL NUMBER OF PAYMENTS:  ";: RETURN
1995  REM
1996  REM  ********************
1997  REM  OUTPUT ROUTINE
1998  REM  ********************
1999  REM
2000  PRINT "EACH PYMT WILL BE: $ ";PA
2020  RETURN
```


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PASCAL PRIMER

Facts on Filer: Part 3

by Tom Swan

Although learning to read and write Pascal text files (discussed last month) is an important step in mastering the language, it's just one part of the file-management system. In this column, I'll concentrate on Get and Put, two procedures you can use to read and write other kinds of files. I'll also add a few more commands to my continuing discussion of the Apple Pascal Filer.

Pointers and Buffers

To declare typed file variables, use the key words FILE OF and a data type. For untyped files (a subject for another time), use only the key word FILE. If you decide to store real numbers in a file, you could start the program this way:

```
PROGRAM MakeReal;
VAR
    RealFile : FILE OF real;
```

Associated with variable RealFile are an internal *file pointer* and *buffer variable*, items that have gone under more aliases than a pair of roaring '20s gangsters. Some writers talk about the file "window," one calls it a "marker," while others talk about the "file position." Such terms make a simple subject confusing. "File pointer" and "buffer variable" may sound technical, but when you know what they do, they're easy to understand.

Figure 1 illustrates a file of five real numbers. The file pointer points to a single element—in this case, real number 3.14159. The buffer variable holds a copy of that value.

When the program reads and writes files sequentially (as this month's examples do), it never directly accesses the file pointer. Instead, the file pointer moves automatically from one element to another every time you use either the Get or Put procedure.

The buffer variable is simply a variable of the file's element type. To use the buffer variable, put a caret (^) after the file identifier. As an example, the following statements first assign 4.5 to the buffer variable, then transfer it to disk with Put, advancing the file pointer by one element:

```
RealFile^ := 4.5;
Put( RealFile );
```

Pascal's Get and Put procedures let you read and write nontext files.

You can also read the current value of the buffer. The two statements below, for example, assign the current buffer value to real-number variable RealNumber. After that, Get advances the file pointer to the next element, loading that new value into the buffer.

```
RealNumber := RealFile^;
Get( RealFile );
```

Using Get and Put

Table 1 describes exactly what happens when you execute Get and Put. The two examples show you how to use these procedures in Pascal programs.

Listing 1, the completed MakeReal program, lets you type numbers, which it stores sequentially in disk file TEST.DATA. As a test, type in the values in **Figure 1**, then press control-C when you're done.

Look closely at line 14 of MakeReal: The program assigns the value of RealNumber to the file buffer. Then, in line 15 it executes Put (RealFile), transferring the buffer contents to disk and advancing the file pointer.

Listing 2, ReadReal, reverses that process, reading numbers from TEST.DATA. To make things interesting, it also totals them and finds their average value. Line 12 transfers the buffer-variable value to RealNumber, and line 16 executes Get(RealFile), advancing the file pointer and loading a new value into the buffer variable.

When ReadReal advances RealFile's file pointer past the end of the file, Pascal causes function Eof to return a value of true, as the WHILE statement in line 10 shows. This makes the loop end, sending the program to line 18, which prints the final total and average.

Always remember that when you reset a file, as in line 8, the program

Figure 1. File of five real numbers.

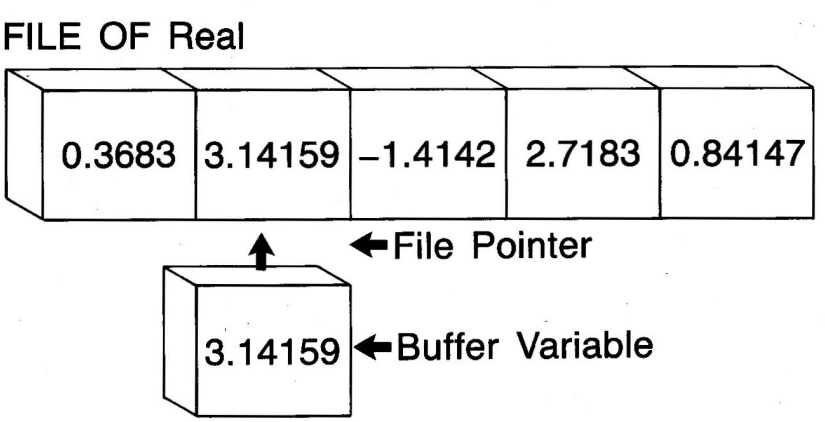

Table 1. Procedures Get and Put affect the file pointer and buffer variable as described here. Assume f is a file variable of any type, opened with reset or rewrite.

Get(f)
Moves file pointer ahead one element
Loads element into file buffer

Put(f)
Transfers buffer variable to file element
Moves file pointer ahead one element

automatically loads the first file element into the file buffer. In other words, reset performs an initial Get on the file. Consequently, the correct order of events is to access the file buffer first, then Get the next element, not the other way around, as might seem logical.

Text Files and Get

Using Get, you can also read text files one character at a time. The advantage of this is that Get doesn't limit lines to the maximum string length of 255 characters.

Listing 3, ReadChar, is similar to ReadReal. Again, because the reset in line 8 performs an initial Get, the program accesses the file buffer in line 14, then Gets the next element at the bottom of the WHILE loop at line 17, and ends the loop when Eof returns a value of true.

Line 11 is new. The Eoln Boolean function returns a value of true when the file pointer addresses the end-of-line marker, a carriage-return character. When reading a text file one character at a time, Pascal translates carriage returns into spaces before loading them into the buffer variable. Therefore, a program has to look for ends of lines and do a writeln as line 12 shows. To see why, replace lines 11–16 with the following:

```
Ch := CharFile^;
write( ch );
```

Now rerun the program. Type in the name of a text file, such as SYSTEM.WRK.TEXT. See? No ends of lines!

Counting Words

You can combine these ideas into a useful program that counts the number of words in a text file. Magazine editors, for instance, appreciate this information because it helps them judge article size for layout. I use a similar program several times a week and always put the number of words on the first page of a manuscript.

For simplicity, in **Listing 4**, Count, I take liberties with the definition of a "word," and simply call it an unbroken character sequence. With that definition in mind, look at the six words that follow:

```
WORD    123.456    #5:MYPROG.TEXT
(*        *)       Count:=(Count+1)
```

The program uses two Boolean variables, InWord and CharIsBlank, that report the number of words as the value of function WordsInFile. If InWord is false, it looks for the start of a word by testing in line 18 for non-blank characters. If true, InWord looks for blanks, which end the current word. It increases Count in line 24 only at the start of a word, therefore counting them all. Notice that, once again, the Get comes at the end of the WHILE loop in lines 16–27.

More Filer Commands

Table 2 lists five more Apple Pascal Filer commands. Remember, to use the Filer, type F at the main command line. When you're done, type Q to quit.

B(ad Blocks

After you format a new disk or receive an unexpected disk error, it's a good idea to do a bad-block scan to find unreadable blocks on a disk. To start scanning, type B, then specify any block-structured volume. For example, type #4: to do a bad-block scan of the disk in slot 6, drive 1.

Table 2. Disk-maintenance commands.

Command	Description
B(ad Blocks	Checks blocks for read errors
K(runch	Collects unused blocks
M(ake	Makes file of any size
X(amine	Fixes or marks bad blocks
Z(ero	Erases all files

The Filer then suggests a number of blocks to check:

```
Scan for 280 blocks ? (Y/N)
```

Answer Y to check 280 blocks, or N for a different number. The Filer checks the selected number of blocks, starting with block zero. If it finds any unreadable areas, it reports them to you as shown below:

```
Block 192 is bad
Block 193 is bad
```

Most of the time you'll see only a message indicating zero bad blocks. If you do have any bad blocks, though, you can either transfer readable files to a new disk and throw the bad one away, or use the X(amine command to attempt a recovery operation.

K(runch

If you receive a No Room on Disk error, try a K(runch before assuming the disk is full. Because of the way Pascal stores files on disk, unused disk areas often become fragmented, interspersed with text, code, data, and other files. Crunching a directory collects all unused blocks into one area.

Listing 1. MAKEREAL.

```
 0: PROGRAM MakeReal;
 1: VAR
 2:    RealFile : FILE OF real;
 3:    RealNumber : real;
 4: BEGIN
 5:    writeln( 'Make Real Number File' );
 6:    writeln( 'Press CTRL-C to quit' );
 7:    writeln;
 8:    rewrite( RealFile, 'TEST.DATA' );
 9:    REPEAT
10:       write( 'Value? ' );
11:       readln( RealNumber );
12:       IF NOT Eof( input ) THEN
13:       BEGIN
14:          RealFile^ := RealNumber;
15:          Put( RealFile )
16:       END
17:    UNTIL Eof( input );
18:    close( RealFile, lock )
19: END.
```

Figure 2. After many file operations, a disk's unused space becomes fragmented as shown in this partial directory. The Filer's K(runch command collects the unused disk space into one continuous area.

MAIN.CODE	24	11-Jul-85	6	512	Codefile
< UNUSED >	42		30		
SCUNIT.CODE	10	3-Jul-85	72	512	Codefile
< UNUSED >	36		82		
COMMUNIT.BACK	52	10-Jul-85	118	512	Textfile
MAT.TEXT	40	11-Jul-85	170	512	Textfile
< UNUSED >	54		210		
ZIPUNIT.CODE	11	31-May-85	264	512	Codefile
< UNUSED >	45		275		

To begin crunching, type K and a volume name or unit number. The Filer then asks:

From end of Volume, block 280 ? (Y/N)

Answer Y to move existing files to the top of the directory and all unused space to the bottom. If you answer N instead, the Filer prompts:

Starting at block #

Type in the block number (found in column 4 of an extended directory) where you want the Filer to collect unused space. For example, typing 170 when crunching the directory in **Figure 2** (part of a data-base system I'm working on) places all unused space immediately after file MAT.TEXT.

A little-known trick that reduces disk seek times is to put unused space in the middle of a directory. To do that, use a starting block of 140, half the number of blocks on a floppy disk. Don't worry about existing files. Apple Pascal doesn't chop files in half, even if you specify block numbers that are inside files.

Crunching has its dangers, though. If you interrupt a crunch in progress, you're likely to lose one disk file at best; at worst, the entire directory. For that reason, it's a good idea to copy a disk before crunching.

M(ake

Making a file inserts a name into a directory, but puts no data into the file itself. Data already on disk are the data in the new file. The command is therefore useful for reserving uninitialized data space or for recovering accidentally deleted files. To create a ten-block-long file, MYFILE.DATA, type M and then:

Make what file? MYPROG.CODE[10]

By specifying the number of blocks in brackets, you tell the Filer to make

Listing 2. READREAL.

```
 0: PROGRAM ReadReal;
 1: VAR
 2:    RealFile : FILE OF real;
 3:    RealNumber, Total : real;
 4:    Count : integer;
 5: BEGIN
 6:    writeln( 'Read Real Number File' );
 7:    writeln;
 8:    reset( RealFile, 'TEST.DATA' );
 9:    Count := 0; Total := 0.0;
10:    WHILE NOT Eof( RealFile ) DO
11:    BEGIN
12:       RealNumber := RealFile^;
13:       Count := Count + 1;
14:       Total := Total + RealNumber;
15:       writeln( Count:6, ': ', RealNumber:1:5 );
16:       Get( RealFile )
17:    END;
18:    writeln;
19:    writeln( 'Total   ', Total:1:5 );
20:    writeln( 'Average ', Total / Count:1:5 )
21: END.
```


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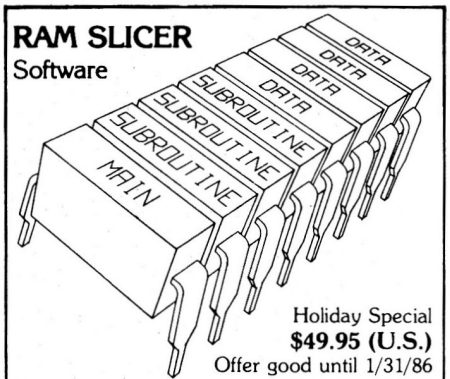

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the file on a best-fit basis, that is, in the smallest possible unused area. To make a file in the largest unused area, specify a zero block size or omit the brackets and number altogether, as shown below:

```
Make what file? BIGFILE[0]
```

An asterisk in brackets tells the Filer to create a file in either half the space of the largest unused area, or in the second largest area, whichever of those is greater:

```
Make what file? HALFSIZE[*]
```

X(amine

If a bad-block scan finds unreadable disk blocks, X(amine can sometimes fix them. Press X and type a volume such as #4: or APPLE1:. The Filer then requests a "Block-range." Enter a range of block numbers separated with a dash—for example, 126-242.

If any files exist in that range, the Filer lists them and requests permission to fix the blocks. It tells you something like this:

```
Files(s) endangered:
SYSTEM.LIBRARY 126 242
Fix them?
```

Type N to cancel the examination. If you type Y, the Filer tries to read and write the possibly bad disk blocks. Sometimes just writing to a disk refreshes its ability to store data there. But, it can also deposit garbage data inside an existing file. You may recover your disk, but lose file data.

While examining the disk, the Filer reports all potentially recovered blocks:

```
Block 126 may be ok
Block 127 may be ok
```

If the Filer finds permanently damaged areas, it tells you:

```
Block 126 is bad
Block 127 is bad
```

When it's finished examining the disk, the Filer also shows you which files it will erase if you request that it mark the bad blocks:

```
SYSTEM.LIBRARY    126 242
Mark Bad Blocks?  (Files will be removed!) (Y/N)
```

Type Y to mark blocks 126 and 127 bad. In this example, that tells the Filer to remove SYSTEM.LIBRARY from the directory, and in its place, put the file BAD.0002.BAD, marking the two bad blocks unusable. Future disk operations ignore those blocks, and you won't be permitted to store files in the marked areas or crunch them.

Z(ero

When you zero a disk volume, you create a new, empty directory on a formatted disk. You lose any files previously on disk; if you printed a directory listing, though, you could recreate them with M(ake.

Since this command has a lot of options, it's easier to explain with an example. While erasing a disk volume named MYDISK:, I had the following dialogue with Z(ero:

```
Zero dir of what vol? MYDISK:
Destroy MYDISK: ? Y
Duplicate dir ? N
Are there 280 blks on the disk ? (Y/N) Y
New vol name ? BLANK:
BLANK: correct ? Y
```

First, I typed the volume name, then confirmed that I wanted to destroy—erase—the directory, but I didn't want a duplicate directory. (Answering yes would have reserved another four disk blocks for a twin directory, automatically maintained by Pascal, but not normally accessible to programs.) Answering no to the fourth prompt lets you specify a different number of blocks, or enter 280 (the number of blocks on an Apple floppy disk) if for some reason an obviously incorrect value shows up here. Finally, I typed in the new volume name, BLANK:, then confirmed it.

This last prompt is important. If you answer no, the Filer changes nothing, regardless of your previous answers. It's always nice to have a way to change your mind at the last moment.

And Finally. . .

That wraps it up for this month. In the next column, I'll finish exploring the Filer, and introduce a new data structure—arrays.■

Tom Swan is the author of the Apple Pascal series, Pascal Programs for Business, Pascal Programs for Games and Graphics, *and* Pascal Programs for Data Base Management, *published by Hayden Book Company. Address correspondence to Tom at P.O. Box 206, Lititz, PA 17543. Please enclose a self-addressed, stamped envelope if you want a personal reply.*

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Listing 3. READCHAR.

```
 0: PROGRAM ReadChar;
 1: VAR
 2:    Ch       : char;
 3:    CharFile : FILE OF Char;
 4:    FileName : string[23];
 5: BEGIN
 6:    write( 'Read what file? ' );
 7:    readln( FileName );
 8:    reset( CharFile, FileName );
 9:    WHILE NOT Eof( CharFile ) DO
10:    BEGIN
11:       IF Eoln( CharFile )
12:        THEN writeln
13:        ELSE BEGIN
14:               Ch := CharFile^;
15:               write( Ch )
16:             END;
17:       Get( CharFile )
18:    END
19: END.
```

Listing 4. COUNT.

```
 0: PROGRAM Count;
 1: CONST
 2:    BlankChar = ' ';
 3: VAR
 4:    CharFile : FILE OF char;
 5:    FileName : string[23];
 6:
 7: FUNCTION WordsInFile : integer;
 8: VAR
 9:    Ch          : char;
10:    Count       : integer;
11:    InWord,
12:    CharIsBlank : Boolean;
13: BEGIN
14:    Count := 0;
15:    InWord := false;
16:    WHILE NOT eof( CharFile ) DO
17:    BEGIN
18:       CharIsBlank := ( CharFile^ = BlankChar );
19:       IF InWord AND CharIsBlank
20:          THEN InWord := false ELSE
21:       IF ( NOT InWord ) AND ( NOT CharIsBlank ) THEN
22:          BEGIN
23:             InWord := true;
24:             Count := Count + 1
25:          END;
26:       get( CharFile )
27:    END;
28:    WordsInFile := Count
29: END; { WordsInFile }
30:
31: BEGIN
32:    write( 'Count words in what file? ' );
33:    readln( FileName );
34:    reset( CharFile, FileName );
35:    writeln( 'Number of words = ', WordsInFile )
36: END.
```


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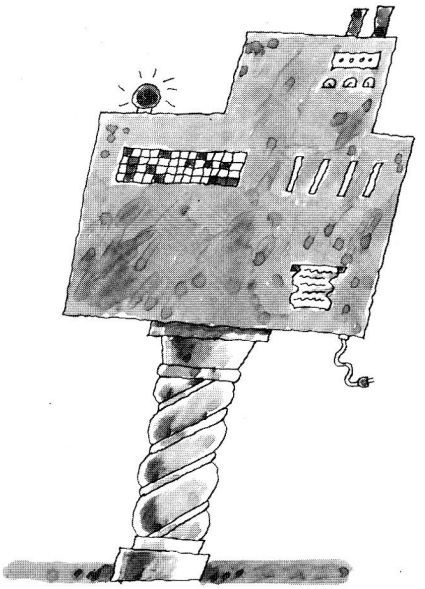

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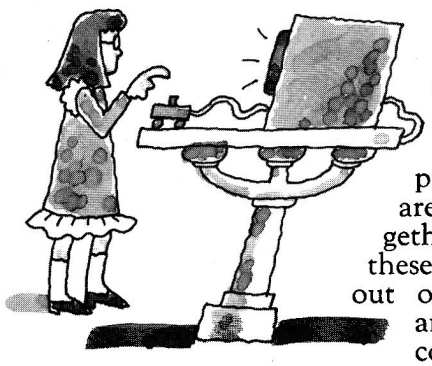

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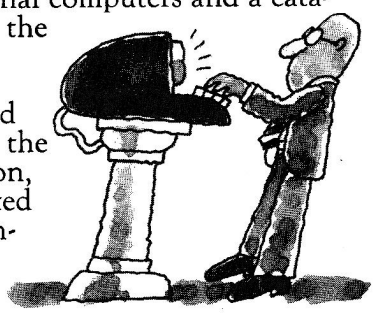

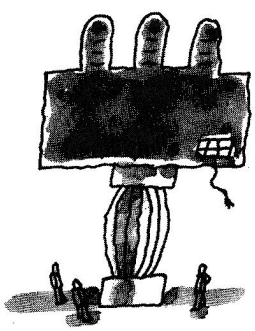

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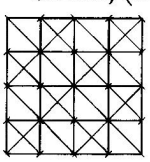

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RIGHT OF ASSEMBLY

Assembly-Language Wizardry

by Roger Wagner

With a sophisticated assembler, complex assembly-language programming can be as easy as BASIC.

Last month, we looked at the simplest of all assemblers, the mini-assembler present in all Apple //c's, enhanced //e's, and in Integer BASIC for older Apple II and II Plus machines.

The primary purpose of an assembler is to convert a text listing, called the *source file*, to a group of pure numbers, the *object file*, which the 6502 microprocessor can read directly as a machine-language program.

This month, we'll look at what a more sophisticated assembler has to offer, and I'll give you some general tips on how to use it to start writing more substantial programs than you can with the mini-assembler.

First let's see what the routine we used last month looks like when you enter it with the mini-assembler, and when you create it with the assembler Merlin. (Compare **Listings 1** and **2**. Although I'll use Merlin throughout this column, the listings are typical of virtually any assembler for the Apple computer.)

Entering Source Listings

When you use an assembler, you enter the source listing line by line, much like Applesoft BASIC. There are some differences, though. For instance, each line has a very specific structure. In last month's Right of Assembly (p. 106), I mentioned that each line in an assembly-language source listing has distinct fields—for a normal assembler, *label*, *instruction*, *operand*, and *comment* fields.

Besides the *horizontal* structure of each line, an assembly-language listing has a *vertical* structure, as well. To explain vertical structure, let's look at **Listing 2** line by line.

Assembly listings usually begin with some sort of title and an explanation of what the routine does. A date is also helpful so that you can tell not only how old the listing is, but often more importantly, which version of a program is the latter when you find yourself with two copies of the same routine on different disks.

You add dates and other full-line comments to a listing by starting the line with an asterisk character. This is very much like the REM statement in Applesoft BASIC. The asterisk also functions as a spacing character for visual clarity, as in lines 6, 9, and 11.

Lines 7 and 8 introduce one of the most powerful features of an assembler—the ability to use *labels* (something the mini-assembler can't do). Labels are names you give to memory locations in the computer. The beauty of labels is that you type in easily understood names for entry points to routines, memory locations to store numbers, and so on, and the computer automatically uses those address values when it creates the final object code for your program.

For example, when you use the mini-assembler, you enter JSR $FC58 as the first instruction of the program (see **Listing 1**). With an assembler, you tell it that you want to call location $FC58 (the entry point to the Monitor clear-screen routine) HOME. From now on, you use HOME just as you would an address, as in line 12 of **Listing 2**.

Line 10 introduces a new assembler *directive*, ORG. A directive is an instruction for the assembler itself, as opposed to an instruction for the 6502 that will ultimately be assembled into object code in memory.

In this case, ORG is a directive that tells the assembler where the assembled object code will ultimately run in memory. I'll use location $300 again, as in last month's column. The region from $300 to $3CF is a good area to use when creating your own short programs, mainly because this part of your Apple's memory is not used by other things like DOS, ProDOS, or Applesoft.

Line 12 starts the first line of actual program instructions. The first field in each line is the label field, and in this case, the label is START. There's a similar label in line 15, DONE. For the time being, the labels START and DONE just visually mark the beginning and end of the routine. Later, I'll show you how you can do JSR's to labels within your own routines just as easily as the JSR HOME is done in line 12.

The next field in line 12 is the instruction field, followed by the operand field. When you type listings into an assembler, pressing the space bar once after each field entry automatically moves the cursor to the next field position. It isn't necessary to manually fill in the spaces between fields as you type each line.

At the end of line 12, and all the remaining lines, the last field, the *comment field*, begins with a semicolon. Here you can add notes to remind yourself (or anyone else who looks at the listing) what each instruction does. Comments are optional in any given line, but they make life easier in the long run. An important habit to form now is creating listings other people can read. The reason is that six months from now, you'll feel as if someone else wrote the listing

Listing 1. Monitor/mini-assembler listing.

```
0300-  20 58 FC   JSR $FC58
0302-  A9 C1      LDA #$C1
0304-  8D BC 05   STA $05BC
0307-  60         RTS
0308-  ??
0309-  ??
```

Listing 2. Standard assembler listing.

```
 1   ********************************
 2   * PRINT A CHARACTER ROUTINE    *
 3   *         1/1/86               *
 4   *     MERLIN ASSEMBLER         *
 5   ********************************
 6   *
 7   HOME     EQU  $FC58       ; MONITOR ROUTINE
 8   SCREEN   EQU  $5BC        ; SCREEN LOCATION
 9   *
10            ORG  $300
11   *
12   START    JSR  HOME        ; CLEAR SCREEN
13            LDA  #$C1        ; THE LETTER "A"
14            STA  SCREEN      ; "PRINT" THE LETTER
15   DONE     RTS              ; WE'RE ALL DONE!
```

Figure. ***Listing 2*** *and tables displayed on screen after assembly.*

```
                 1   ********************************
                 2   * PRINT A CHARACTER ROUTINE    *
                 3   *         1/1/86               *
                 4   *     MERLIN ASSEMBLER         *
                 5   ********************************
                 6   *
                 7   HOME     EQU  $FC58       ; MONITOR ROUTINE
                 8   SCREEN   EQU  $5BC        ; SCREEN LOCATION
                 9   *
                10            ORG  $300
                11   *
0300: 20 58 FC   12   START    JSR  HOME        ; CLEAR SCREEN
0303: A9 C1      13            LDA  #$C1        ; 'A'
0305: 8D BC 05   14            STA  SCREEN
0308: 60         15   DONE     RTS

--End assembly, 9 bytes, Errors: 0

Symbol table - alphabetical order:

?  DONE     =$0308      HOME     =$FC58      SCREEN   =$05BC
?  START    =$0300

Symbol table - numerical order:

?  START    =$0300   ?  DONE     =$0308      SCREEN   =$05BC
   HOME     =$FC58
```

when you come across it on an old disk, and you'll be glad you made it easy to understand. Trust me—it's worth the small effort it takes to create readable listings.

The net effect of line 12 is identical to that of the first line of **Listing 1**, but you'll have to admit it's much more understandable than pure hex code. In fact, the secret's really out of the bag now. The reason machine-language programming has a reputation for being difficult is that once upon a time, there were no really good assemblers for the Apple, and machine-language programming was very difficult because of the manual typing and memorization required. I'm sure that with the aid of a good assembler to create listings such as **Listing 2**, you'll find assembly-language programming almost as easy as BASIC.

Now back to the program. Line 13 loads the accumulator with the value $C1 (not the contents of location $C1). Remember, $C1 is the value that will create the letter A on screen when stored in location $5BC.

Before getting to that step, here's another neat trick your assembler will do. Retype line 13 to look like this:

```
13  LDA #'A'  ; THE LETTER "A"
```

When you want to load a register with a value for a letter, you don't have to know the exact value to use. By putting single (or sometimes double) quote marks before and after the desired letter, your assembler will automatically know the number value to use during the assembly of your program.

Line 14 stores the contents of the accumulator in location $5BC, which I've called SCREEN. In large programs where possibly hundreds of memory locations are accessed, names like HOME and SCREEN are a lot easier to keep straight than $FC58 or $5BC.

Finally, line 15 will return control to you after your computer prints the letter A.

Assembling a Program

To actually *assemble* a listing, type in the appropriate command for your assembler, typically ASM, and press the return key. The screen then displays the material presented in the **Figure**.

Now, in addition to seeing the original listing, you'll also see the object code generated (the numbers in the left column), the total number of bytes the routine used, and a listing of all

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Listing 3. Modified source listing.

```
1   ********************************
2   * PRINT A CHARACTER ROUTINE #2 *
3   *          1/1/86              *
4   *      MERLIN ASSEMBLER        *
5   ********************************
6   *
7   HOME     EQU  $FC58      ; MONITOR ROUTSTART
            JSR  HOME       ; CLEAR SCREEN
13          LDA  #'Z'       ; THE LETTER "Z"!
14          STA  SCREEN+5   ; "PRINT" THE LETTER
15  DONE    RTS             ; WE'RE ALL DONE!
```

the labels used in the program in alphabetical order and in numerical order of the memory locations themselves. Question marks are printed next to any label not identified by a JSR or other direct reference within the listing. In very long source listings, you may want to delete labels you don't really need to free some memory for additional text in the source listing itself.

If there are no errors in the listing, you can then save both the source and object files to disk. To test your program, quit the assembler and get the Applesoft prompt (]). Then reload the object file from disk by typing BLOAD FILENAME (where FILENAME is the name under which you saved the object code). Finally, type CALL 768. The screen should clear, and the letter A should appear in the middle of the screen.

If you get errors during the assembly process, carefully check the text you typed in against **Listing 2**. Correct any errors and reassemble.

Editing Source Listings

To see how an assembler can really earn its keep, let's suppose you wanted to print the letter Z on screen, five spaces to the right.

Reenter the assembler, load the source file, and change the following lines of your program:

```
13 LDA #'Z'          ; THE LETTER "Z"!
14 STA SCREEN+5      ; "PRINT" THE
                       LETTER
```

You need to change only the appropriate lines. You don't have to retype the entire listing, as you would with the mini-assembler. Also notice that the assembler can do simple math for you as well. You really don't need to know the sum of $5BC + $5—the assembler will figure it out automatically.

The complete new listing should now look like **Listing 3**. Assemble this new program, and save both the source and object files to disk under new names. Then quit the assembler to BASIC and test your program. Pretty slick, eh?

New Registers, New Routines

So far, the only register in the 6502 I've talked about is the accumulator. There are two other registers as well, and they can be quite useful. They're called the X and Y registers, reminiscent of the simple variable names used in algebra and BASIC programming. In machine-language programming, you can think of them as your own special variables to use in your programs.

The accumulator has its own load and store commands (LDA, STA), and similar commands are associated with the X and Y registers. LDX and LDY will load the X and Y registers just as you'd load the accumulator. You can then use STX and STY to store the contents of the X and Y registers somewhere else in memory.

The real importance of the X and Y registers emerges when you start talking about entry and return conditions for Monitor routines, though. Remember that you used the accumulator in the Monitor routine PRBYTE last month to tell the routine the number to print on screen. Very often, you can use the X and Y registers (along with the accumulator) to pass information back and forth between various machine-language routines.

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Listing 4. Assembly-language game-controller read routine.

```
                        1    ********************************
                        2    * GAME CONTROLLER READ ROUTINE *
                        3    *          1/1/86              *
                        4    *      MERLIN ASSEMBLER        *
                        5    ********************************
                        6    *
                        7    HOME     EQU  $FC58      ; MONITOR ROUTINE
                        8    SCREEN   EQU  $5BC       ; SCREEN LOCATION
                        9    PREAD    EQU  $FB1E      ; READ A PADDLE
                        10   *
                        11            ORG  $300
                        12   *
0300: 20 58 FC          13   START    JSR  HOME       ; CLEAR SCREEN
0303: A2 00             14           LDX  #$00       ; CONTROLLER #0
0305: 20 1E FB          15   LOOP     JSR  PREAD      ; READ CONTROLLER
0308: 8C BC 05          16           STY  SCREEN
030B: 4C 05 03          17           JMP  LOOP       ; DO IT AGAIN (FOREVER)

(Symbol tables are not shown in the interest of conserving space.)
```

Listing 5. The Applesoft program Screen Character Printer.

```
0  REM SCREEN CHARACTER PRINTER
5  TEXT: HOME
10 PRINT CHR$(4);"BLOAD SCREEN PRINTER,A$300"
20 HTAB 20: VTAB 14: REM POSITION CURSOR
30 CALL 768: REM READ CONTROLLER ONCE AND PRINT CHAR + NUMBER
40 GOTO 20
```

For example, let's consider a new routine, PREAD ($FB1E = "Paddle READ"). This nifty routine will read a game controller (paddle, joystick, or touchpad) and return the resulting value between $0 and $FF (zero to 255).

You must put the number for the controller to be read into the X register. When the routine returns, the Y register will be set to the corresponding value for the game controller.

As an example, here's a new listing for you—take a look at **Listing 4**. (In the interest of conserving space, symbol tables are not shown.)

Follow the usual procedure for typing in the listing, assembling it, and saving both the source and object files to disk. When you run this program, you should be able to make any character you want appear in the center of the screen, including inverse and flashing characters.

In **Listing 4**, line 14 sets up the X register to hold the value zero, to tell PREAD which game controller to read. PREAD returns the value in the Y register, so line 16 is changed from STA to STY. Line 17 brings along another new 6502 instruction, JMP. JMP is the equivalent of BASIC's GOTO command, and you use it as you would JSR. Line 17 uses JMP LOOP to make the program loop back to JSR PREAD. The program will loop forever, or until you press the reset key, whichever comes first.

This illustrates an important principle: You use labels as you would line numbers in BASIC. In Applesoft, statements like GOTO 100 or GOSUB 1000 produce jumps in a program. A similar procedure in an assembly-language program would be JMP LOOP or JSR PREAD. Like GOTO and GOSUB, a JSR must always be matched eventually with an RTS. A JMP is a one-way jump to a new part of the program.

Here's an interesting challenge for you: Between now and next month, try to combine the PREAD and PRBYTE routines (I described PRBYTE in December's column) to print the hex value on screen while your computer is displaying the screen character for a given controller position. One hint: Try the calling Applesoft program in **Listing 5**.

That way, your routine needs to read a controller only once. It can then print the character and the hex value before returning to the main Applesoft program with an RTS. I'll show you the solution next month.■

Roger Wagner is the author of Assembly Line: the Book *and is president of Roger Wagner Publishing, the publisher of Merlin and MerlinPro assemblers. Write to Roger at Roger Wagner Publishing, 10761 Woodside Avenue, Suite E, Santee, CA 92071.*

APPLE CLINIC

by Jim Sather

The Apple Clinic is a forum for discussing Apple II hardware and related subjects. If you have questions or answers, or want to make a statement, write to Jim Sather, Apple Clinic, inCider, *80 Pine Street, Peterborough, NH 03458.*

Obtaining 65C02s

In the May 1985 Apple Clinic ("65C02 in the Apple II," p. 117), you answered a letter about the 65C02 microprocessor. I'd like to know where I could get the chip and what's involved in installing it.

Ray Gilbert
Lansdale, PA

For some reason, electronic-component retailers have been very slow in carrying the 65C02. As of this writing, I know of only one. JDR Microdevices sells a 2-MHz 65C02 for $13.50. Apple supplies the 2-MHz version in //c's and new //e's, but I believe the 1-MHz 65C02 should work in a //e. Nevertheless, I recommend you stick with the 2-MHz 65C02 since it only costs about a dollar more than the 1-MHz 65C02.

To install a 65C02 in a //e, turn off the Apple and touch the power supply to discharge any static electricity. Carefully pry out the 6502 using a small screwdriver, and install the 65C02 in its place.

An NCR or GTE 65C02 won't work reliably in an Apple II or II Plus. This, I believe, is because these chips won't actually perform to the 50-nanosecond read-data set-up time claimed for the 2-MHz version in the 65C02 data sheet. This only occurs with a few data-bus sequences which may not occur in some programs, so the symptom is occasional program crashing.

The 1-MHz Rockwell 65C02 I own works great in my Apple II Plus, but I don't know if this is an accident or a general characteristic of the Rockwell chip. One certain advantage of this chip is that it executes some instructions that the NCR/GTE chip doesn't. JDR Microdevices has carried more than one brand, so you may want to request a Rockwell 65C02 when you order. Incidentally, Apple supplies the NCR/GTE-type 65C02 in its computers, and in the Apple //e upgrade package.

Some hackers have made slight modifications to their Apple II's and II Pluses to make them accept 65C02s. If there is a little hacker in you, try replacing the 74LS174s at B5 and B8 and the 74LS257s at B6 and B7 with 74S174s and 74S257s. This speeds up read-data propagation from the RAM chips to the data bus. If your programs still crash, leave the S174s and S257s in and piggyback a 74LS08 quad AND-gate onto the 74LS08 at B11. Disconnect pin 3 on the motherboard LS08 from its socket and connect one, two, three, or four AND-gates in series between pin 3 on the motherboard LS08 and pin 3 on the socket. This adds delay to the 65C02 clock and should improve chances of reliable 65C02 operation. Add no more delay than is necessary for reliable operation.

Okidata 82A and The Print Shop

I have an Okidata 82A printer connected to the serial port of my //c, and use the System Utilities disk to specify 1200 baud, 7 data bits, 2 stop bits, even parity, and line feed after carriage return. I can't get The Print Shop program to operate with this setup.

There is no Okidata 82A option in The Print Shop, so I tried the Okidata 92A option, as well as all the others. Other programs such as AppleWorks, PFS:Write, and Apple Pascal work with no problems. Can you help?

Chuck Wakamoto
Orange, CA

Sorry, Charlie. The technical support people at Broderbund Software say that The Print Shop works only with the Okidata 92 or 93. They say the 82A will always produce extra line feeds throughout graphics, even if the printer's auto line feed is turned off. Some reader input on this would be great. Does anyone have a patch to make The Print Shop work with the Okidata 82A? Likewise, Mario J. Trovarelli of Anaheim, California, needs a patch to make The Print Shop work with an Apple Silentype printer.

Apple Writer Patch

By way of introduction, I'm the author of "The Docile Printer," which appeared in the February 1985 *inCider* (p. 75). I'd like to add some comments regarding printer control to those you included in your March column.

The solution to the problems presented in more than half of the mail I received in response to my article lay in understanding the distinction between decimal zero and one and the keyboard characters zero and one. Few printer manuals make this clear. While some printers allow the use of the keyboard characters zero and one (decimal 48 and 49) to turn features off and on respectively, many printers use control-@ and control-A (decimal zero and one).

Apple Writer //e uses the NUL character (decimal zero) as an end-of-file marker, precluding its use as a printer control character. Don Lancaster's great product, the Apple Writer Toolkit, includes the NUL patch to correct this mistake. It also contains other useful programs and about 250 pages of valuable information for Apple Writer //e owners.

Even if they solve the many technical problems involved in getting dot-matrix printouts, many people have better things to do with their time than to struggle through printer manuals and write glossaries or printer-con-

trol programs. I've enclosed copies of three software packages I wrote to make it easy for my clients to use the computer systems I recommended or installed for them.

James B. Munro
Youngstown, NY

You really hit the nail on the head with that comment about confusion between the characters zero and one and decimal codes zero and one. I'm supposed to be an expert in this business, and it took me a year to figure out that I had to specify vertical line spacing on my COEX-80 printer via escape-A-CHR$(n), not escape-A-n as the manual indicates. If I want the spacing to be 6/144 of an inch, for example, I have to make the computer output the code for escape, then A, then control-F. Why control-F? The ASCII code for control-F is six, the desired numerator.

The difference between zero and control-@ is more to the point for Epson MX-80 users who would like to underline or superscript. Outputting escape followed by zero or one performs no control function on this printer. Outputting escape followed by control-A or control-@ turns underlining on and off if the printer is equipped with Graftrax Plus firmware.

Since one very popular printer requires control-@ as part of some control sequences, it's amazing that you cannot embed the control-@ code in DOS 3.3 Apple Writer //e files. You can't embed them in the ProDOS version of Apple Writer either, but the latest version of the MinuteWare DOS 3.3/ProDOS Apple Writer glossary disk indicates that you can use control-_ (control-underscore) in place of control-@ in the ProDOS version.

Even if your printer doesn't require the control-@ code for control, you will probably need it if you ever design any custom characters for your printer. Some printers, including Epsons, let you download custom characters into printer RAM. Most character fonts contain at least one segment in which all dots are zero. Apple Writer //e won't print such custom characters unless you patch it so that you can embed control-@ (the NUL character) in text.

Most Apple Writer glossary disks contain a patch that enables Apple Writer //e to handle the control-@ code. I've compared a couple of patched Apple Writer disks and found that at least two of the glossary disks recommend the same patch. The following is a version of that patch, based on information in the MinuteWare glossary disk.

Use a ZAP program with a search feature such as the sector editor of Copy II Plus version 5.2 to locate and change the following byte sequences to all NOPs ($EA $EA $EA $EA). The track/sector-byte locations on my Apple Writer //e disk are given. Change $C9 $80 $F0 $0F at $18/$2-$E5, $C9 $80 $F0 $D6 at $5/$D-$BE and $8/$0-$37, and $C9 $80 $F0 $15 at $5/$0-$85 to $EA $EA $EA $EA.

With this patch active, you must use the left-arrow key in place of the delete key when editing file names, find/replace strings, glossary entries, and so on. You'll find that this causes no great hardship in practical use.

I developed a second patch to Apple Writer //e in response to a request from W.R. Lathrop, Jr., of Birmingham, Alabama. He wants to boot Apple Writer without pausing to insert a parameters disk. I worked out the patch just for fun because I didn't think the pause was that much of a nuisance. I changed my mind, though, after operating without the pause for a while. To make the patch, use your ZAP program to change $20 $42 $24 to $EA $EA $EA and to change $20 $B9 $23 to $EA $EA $EA. I found this code at track/sector-byte $19/$1-$4E and $18/$5-$48, respectively, on my DOS 3.3 Apple Writer //e disk. This patch probably won't work on the ProDOS version of Apple Writer.

The programs Jim Munro sent are his WPL.AUTO automated Apple Writer //e system, Printer Devils Utility Library for Epson printers, and Printer Devils for Spreadsheet and Plot Users. WPL.AUTO is an Apple Writer aid that automates the selection of Apple Writer features and facilitates the handling of form letters and address lists. It also includes glossary files for several popular printers. The Printer Devils utilities preset a printer to a given configuration before entering a user program. They also support the printing of hi-res pictures stored on disk files for persons with graphics-interface cards such as the Grappler. You can get more information on these programs by writing Printer Devils Software directly.■

Product Information

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CORRECTION

My reply to David Swain in December's Apple Clinic ("ImageWriter and Grappler Plus," p. 102) contains an error. My comments are true for Apple Dot-Matrix printers, but not for the ImageWriter. The ImageWriter is a serial-interface printer and does not work with the original Grappler Plus, a parallel interface card. (This was actually a case of overediting on my part. David's problems were with the Apple DMP; I'm the one who started calling it an ImageWriter.) Orange Micro, manufacturer of the Grappler Plus, has recently introduced the Serial Grappler Plus. This new version does work with the ImageWriter printer and also supports the color ImageWriter II.□ **—J.S.**

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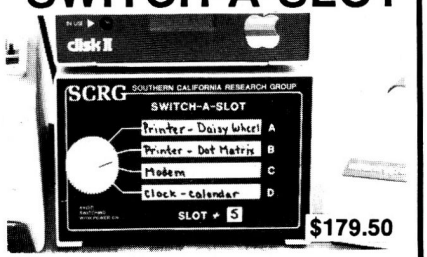

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January 1986

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If you're like most Apple users, you don't realize the many benefits of an IAC membership. Or what it can do for you and your computer.

So what's an IAC?

International Apple Core™ is a non-profit organization of Apple users and user groups. We are dedicated to providing education, information and support to users of Apple and Apple-compatible products.

We aren't just for clubs. An individual can enjoy all the special benefits we have been providing user groups since 1979. You may share information on new applications. Or learn the latest on products. Or keep up on Apple events. Even receive specialized training.

If you'd like to join a local user group or contact other Apple enthusiasts, we can help you find them.

A membership That pays you.

As a member of IAC you nearly get paid with what you will save. By joining you will save nearly $20 on our electronic spreadsheet, *IACcalc*™. Not to mention all the other benefits only available to you as a member.

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IAC provides many sources of information. Your $30 yearly membership fee brings a 12-issue subscription to *Nibble* magazine devoted to Apple systems and compatibles. *Nibble* features more than $50 worth of ready-to-run Apple programs in each issue. The programs focus on home, business, education and entertainment. *Nibble* also features new products, reviews, tips and techniques for learning more about your Apple and having fun doing it!

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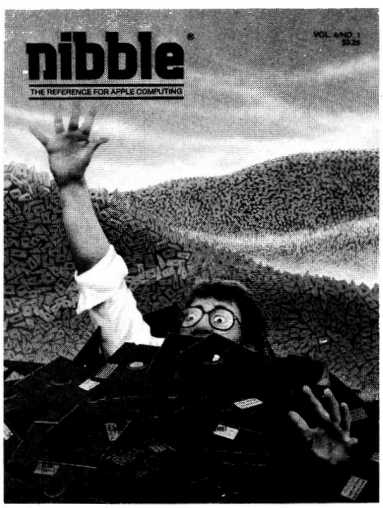

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GAME ROOM

Photo. Steer your ship and fire if you want to make a Rescue on Fractalus.

by Brian J. Murphy

In Game Room, Brian Murphy reviews four to six 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 ★

Rescue on Fractalus

★★★

Epyx Computer Software
1043 Kiel Court
Sunnyvale, CA 94089
Any Apple II, 64K, joystick, one disk drive
$29–$39 (dealer-determined pricing)

One of Lucasfilm's initial voyages into the realm of Apple II entertainment software, **Rescue on Fractalus**, turns out to be a better-than-average arcade game that uses sophisticated programming techniques to create a super flight simulation.

You are the pilot of an Ethercorps fighter assigned to prowl the hostile atmosphere of the planet Fractalus in search of downed pilots (see **Photo**). The deadly Jaggi (or "Jaggies" as you pilots call 'em) oppose you. The air on Fractalus may be poisonous to you and the temperature more than a little inhospitable, but the Jaggies are right at home. They're dug-in with beam weapons, patrolling saucers, and a few other tricks up their sleeves.

Fighting back seems easy. In fact, on the first few levels of play, it is easy. You won't take more hits from enemy fire than your screen can handle. Shooting Jaggies with your torpedoes is little more than target practice, and finding pilots is easy. At higher levels of play, day-and-night flying becomes a challenge, and the Jaggi ships and guns attack with fierce determination. Slowly, but surely, this game will addict you.

Crusade in Europe

★★★★

MicroProse Software
120 Lakefront Drive
Hunt Valley, MD 21030
Apple II, 64K, one disk drive
Joystick optional
$39.95

With **Crusade in Europe**, MicroProse has brought joystick-controlled war games to the Apple. Crusade uses a joystick command system and simulated horizontal and vertical scrolling to re-create the ease of play and excitement of Atari games.

Apple warriors play Crusade at the grand-strategic level. You control the whole Western European front for either the German or Allied side in World War II. Various scenarios simulate the Normandy invasion (with five variant games), the battle for France, the race for the Rhine, and Patton's dash for the German border. Crusade also includes long and short versions of the Battle of the Bulge and the airborne campaign against the Arnhem bridge. (Neither scenario is theater-sized in scale.)

The game's graphics are great. Maps are beautifully illustrated, with well-designed road, water, bridge, town, and fortress symbols. Crusade should have included a slightly more aggressive computer opponent, but it will still glue you to the screen for hours at a stretch.

Six Gun Shootout

★★★

Strategic Simulations
883 Stierlin Road, Building A-200
Mountain View, CA 94043
Any Apple II, 48K, Applesoft, one disk drive
Apple /// in emulation mode
$39.95

Pardner, do I love this game. **Six Gun Shootout** leaves out singing cowboys, horse kissing, and rides into the sunset. All that's left is the good stuff—the gunfights.

To win, all you have to do is make the cowpokes on your side kill all the galoots on the other side. (The teams are called the Good Guys and the Bad Guys, of course.) Your men can fire from standing, kneeling, and prone positions. They can be partially covered by walls, rocks, wagons, or anything else that will stop hot lead. Remember, when you're running from place to place for cover, you risk stopping a slug. This isn't like the movies—the good guys can lose.

The sound effects and Ultima-like graphics are of average quality. But I'd be willing to bet that the technicolor mind-movies this game generates will more than compensate for the so-so on-screen pictures.

Mindwheel

★★★

Broderbund Software
17 Paul Drive
San Rafael, CA 94903
Any Apple II, 48K, one disk drive
$44.95

The world is tearing itself apart in **Mindwheel**, an elaborately documented mind puzzler, and you have to travel into the past—into the minds of four key individuals who can alter the future. You also seek the Cave Master, keeper of the Wheel of Wisdom.

The trip is dangerous. Bucking the trend of most adventure games, Mindwheel thrives on violence. In fact, it may be a little too intense for younger players. If it were a movie, it would probably draw a PG-13 rating. (I, for one, love the grotesque imagery that abounds in every twist and turn of this dark adventure.)

The novel that comes with the game is well written and handsomely presented, and creates just the right atmosphere. As with all stories and novels included with adventures, a thoughtful reading to glean all possible clues is a must before playing the game.

Mindwheel is suitably challenging for beginners and players with two or three adventures under their belts and an intellectual turn of mind; it's not quite stimulating enough for the most advanced players, though. ■

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

What every Apple II+ and IIe user should ask before buying the "Sider" 10 MB hard disk:

When a company offers a superior quality 10 megabyte Winchester hard disk for only $695, it's bound to raise a few eyebrows...and a lot of questions. The fact is, you're probably already wondering "Can I really get a 10 megabyte hard disk that's *reliable* for only $695?" The answer is: ABSOLUTELY...when you choose the Sider from First Class Peripherals.

What's so great about the Sider?

For starters, the Sider lets you boot your ***Apple II+*** or ***IIe*** directly off the hard disk—unlike some other Winchester subsystems. Rebooting is also trouble-free. And the disk is partitionable, allowing you to allocate space to four operating systems on the same disk. The Sider supports: Apple DOS 3.3; Pro DOS™; Apple Pascal; and CP/M®

What's more, a small "footprint" lets you incorporate the compact Sider into your existing computer set-up with ease.

In addition, with the Sider, you not only pay far less for the subsystem, you also save money on installation. Because, unlike other 10 MB systems that require the purchase of expensive "extras," the Sider is *plug and play*. Everything you need is provided, including cables, host adaptor, installation software and manual.

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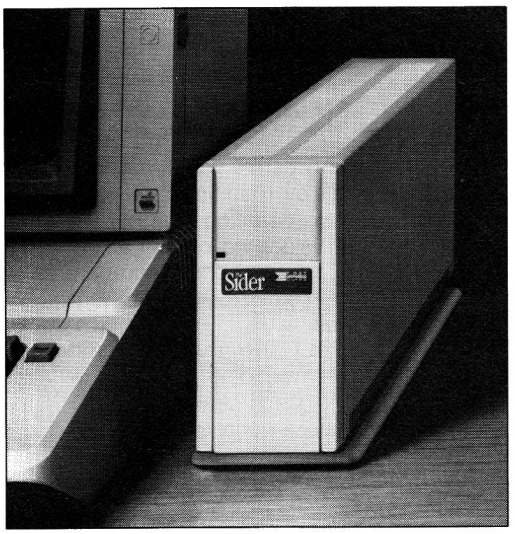

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HINTS/TECHNIQUES

Apple users know that there's always an easier way to get the job done. A shortcut here, an elegant twist there. That's what Hints/Techniques is all about. It's an information swap for readers who want to share their programming pointers, DOS tips, hardware secrets, AppleWorks applications, WPL enhancements, and all those other insights that make you go "Aha!" in the night. So read on and see if you don't find just the solution you've been looking for.

Print Using

by Jerry Hall

Have you run into some unexpected results while programming in BASIC with your Apple computer? I'm not referring to human error—I'm talking about the printed outcome of manipulating a series of numbers. For example, you may have written a simple program that adds several dollars-and-cents values, but the total shows a long string of decimal digits. Or perhaps you multiplied two or more decimal numbers that should have yielded a whole number, but your answer shows a decimal fraction. Your computer's internal rounding process is the culprit, but you can write a simple Applesoft subroutine into your program to compensate for this annoying quirk.

A Programming Dilemma

Your Apple doesn't "think" in terms of decimal numbers as we do—it operates on all values as binary numbers, then converts them to decimal equivalents for our convenience. Inevitably, it rounds off some decimal values.

Applesoft BASIC performs its internal rounding of floating-point values at the ninth significant figure. Thus, if you're programming with values that contain fewer numerals, it's easy to recognize unnecessary digits, especially if they trail off to the right past the decimal point. When your program adds several values representing dollars and cents, you can correct the result by rounding it to two decimal digits. Assuming you're working with values no greater than $999,999.99, this procedure compensates for the internal rounding in the computer itself.

When you're working with just dollars and cents, rounding the result to two decimal digits is straightforward. You can create a variable called ANSWER to contain the result. To round off in BASIC, you would use a statement like this:

```
ANSWER = INT (100 * ANSWER +
  .5) / 100
```

This program statement modifies the value in ANSWER so that it's accurate to two decimal digits every time. You'll still run into a problem, though, if you attempt to print a series of results for ANSWER as a column of numbers, whether you use the HTAB n, the TAB (n), a POKE 36,n, or a POKE 1403,n function (for the Apple //e), where n represents a numeric value. After rounding ANSWER, it may still contain a variable number of digits to the left of the decimal point. If you use only the functions mentioned above, the first digits of the column will be vertically aligned, but the decimal points will not. Furthermore, the program will display a value of $5.00 simply as 5, with no decimal point, and $5.10 will appear as 5.1, with no trailing zero.

If you want to round off the result to something other than two decimal places, you must rewrite the program statement accordingly. But what if you're writing a program that will print several different values, not all rounded to the same number of digits? You could use several different subroutines, each one rounding to a different number of decimal digits. Then, the program would simply go to the appropriate subroutine for the desired degree of rounding.

The Print-Using Solution

A more satisfactory solution for all of these problems is the print-using statement. Although not supported in Applesoft BASIC, this statement is available in some other versions of the language, issued in the following form (I'll discuss an Applesoft adaptation later in the article):

```
PRINT USING "#####.##"; ANSWER
```

The octothorps (# symbols) represent printed digits, or spaces reserved for digits to the left of the decimal point if there are no values to print. The print-using statement takes care of three tasks: It rounds the printed result to the number of decimal places indicated by octothorps after the decimal point in the print statement; aligns decimal points, if the program is printing columns of values, by leaving spaces when the value has fewer digits; and prints trailing zeros after the decimal point if there are no other digits.

For example, if ANSWER has a numeric value of 5, the print-using statement above prints four spaces, then 5.00. If the value of ANSWER is 5000, the program produces one space and 5000.00. If ANSWER has an unrounded value of 25.0000001, the print-using statement prints three spaces followed by 25.00. The program prints the same result if ANSWER contains 24.9999999, 24.995, or 25.0049999.

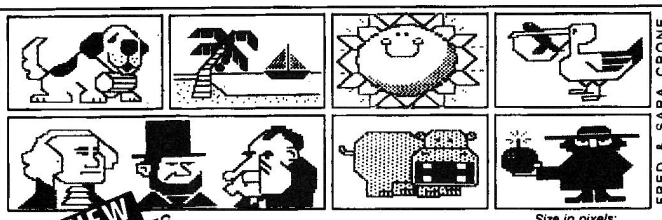
The information inside the quotation marks in the print-using statement is actually a string variable. The following statement produces results identical to those of the earlier print-using statement:

```
Z$ = "#####.##" : PRINT USING Z$;
  ANSWER
```

You can manipulate the format of the printed result by assigning different information to the string variable, Z$. Assigning Z$ a value of ##.#### produces the result with two numbers to the left of the decimal point and four after it.

Equating Z$ with ### prints a whole number up to 999. If ANSWER contains a value of 1000 or more with this Z$ format, a percent sign

Ad Number 241



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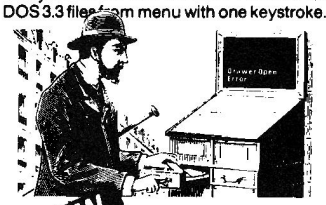

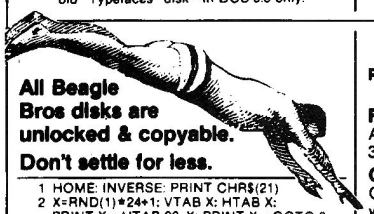

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```
1 HOME: INVERSE: PRINT CHR$(21)
2 X=RND(1)*24+1: VTAB X: HTAB X:
  PRINT X;: HTAB 26-X: PRINT X;: GOTO 2
```

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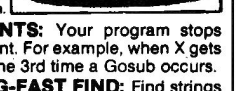

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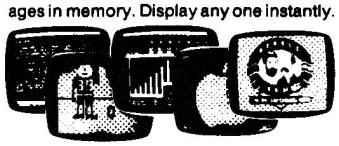

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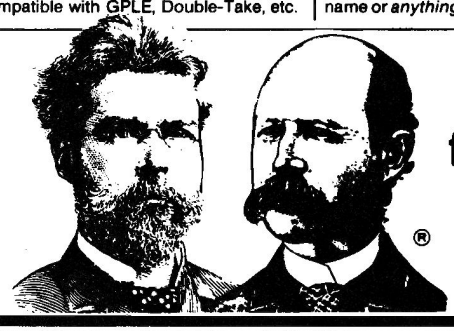

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Listing 1. Print-using subroutine.

```
10  REM ----------Subroutine to PRINT USING Z$----------
    ----------
11  REM  By Jerry Hall, K1TD, Wethersfield, CT
12  REM  Variables used: Z$, ZA$, Z, Z1, Z2, Z3, Z4, Z5
13  REM  Enter with Z$ as the PRINT USING format, i.e. "##,##
    #.##" or "##.###" or "#,###" or "###", etc.
14  REM  Enter with Z as the variable to be printed.
15  REM  Z is returned as the rounded value printed.
16  REM  ZA$ is returned as the string for this value.
17  REM  Z$, the print using format, is preserved.
18  REM  Values for Z1, Z2, Z3, Z4 and Z5 are destroyed.
19  REM  The carriage return is suppressed when printing.
20  REM  A zero prefixes decimal fractions that are less than
     1, i.e., 0.25. To avoid this 0 as for some accounting w
    ork, delete lines 40 and 41.
21  REM  Lines 23, 27 through 34 and 48 are used to verify th
    e correct PRINT USING format in Z$. They are not essenti
    al to program operation and may be deleted for some incr
    ease in speed.
22 Z1 =  LEN (Z$):Z2 = 0:Z3 = 0
23  IF Z1 = 0 THEN 48
24  FOR Z4 = 1 TO Z1: IF  MID$ (Z$,Z4,1) = "," THEN Z2 = Z4
25  IF  MID$ (Z$,Z4,1) = "." THEN Z3 = Z4
26  NEXT
27  IF Z2 = 0 OR Z3 = 0 THEN 29
28  IF Z3 < Z2 THEN 48
29  IF Z2 = 0 AND Z3 = 0 THEN ZA$ = Z$: GOTO 33
30  IF Z2 = 0 THEN ZA$ =  LEFT$ (Z$,Z3 - 1) +  RIGHT$ (Z$,Z1 -
    Z3): GOTO 33
31  IF Z3 = 0 THEN ZA$ =  LEFT$ (Z$,Z2 - 1) +  RIGHT$ (Z$,Z1 -
    Z2): GOTO 33
32 ZA$ =  LEFT$ (Z$,Z2 - 1) +  MID$ (Z$,Z2 + 1,Z3 - Z2 - 1) +
     RIGHT$ (Z$,Z1 - Z3)
33 Z5 = 0: FOR Z4 = 1 TO  LEN (ZA$): IF  MID$ (ZA$,Z4,1) < >
    "#" THEN Z5 = 1
34  NEXT : IF Z5 THEN 48
35  IF Z3 = 0 THEN Z3 = Z1
36 Z4 = 10 ^ (Z1 - Z3):Z =  INT (Z * Z4 + .5) / Z4:ZA$ =  STR$
    (Z): IF Z2 = 0 AND Z3 = Z1 THEN 45
37  IF Z3 = Z1 THEN 43
38 Z5 = 0: FOR Z4 = 1 TO  LEN (ZA$): IF  MID$ (ZA$,Z4,1) = ".
    " THEN Z5 = Z4:Z4 =  LEN (ZA$)
39  NEXT : IF Z5 = 0 THEN ZA$ = ZA$ + ".":Z5 =  LEN (ZA$)
40  IF Z5 = 2 AND  SGN (Z) =  - 1 THEN ZA$ = "-0" +  RIGHT$ (
    ZA$, LEN (ZA$) - 1):Z5 = 3
41  IF Z5 = 1 THEN ZA$ = "0" + ZA$:Z5 = 2
42  IF Z1 - Z3 >  LEN (ZA$) - Z5 THEN ZA$ = ZA$ + "0": GOTO 4
    2
43 Z5 =  LEN (ZA$): IF Z2 = 0 OR Z5 <  = (Z1 - Z2) THEN 45
44 ZA$ =  LEFT$ (ZA$,Z5 - (Z1 - Z2)) + "," +  RIGHT$ (ZA$,Z1 -
    Z2)
45  IF  LEN (ZA$) > Z1 THEN ZA$ = "%" + ZA$: GOTO 47
46  IF  LEN (ZA$) < Z1 THEN ZA$ = " " + ZA$: GOTO 46
47  PRINT ZA$;: RETURN
48  PRINT  CHR$ (7);"Z$ is not in the correct PRINT USING for
    mat.": PRINT "See the examples in statement 13.": POP : STOP
```

*Listing 2. Addendum to **Listing 1** to avoid repetitive keyboard entries while testing the subroutine.*

```
5  HOME : GOTO 100
100  INPUT "The format for Z$ (use quotes)? ";Z$
110  INPUT "The value for Z? ";Z
120  GOSUB 10: PRINT
130  PRINT : INPUT "Enter either a value for Z, a C to change
     Z$ format, or Q to quit: ";C$
140  IF C$ = "C" OR C$ = "c" THEN 100
150  IF C$ = "Q" OR C$ = "q" THEN  END
160 Z =  VAL (C$): GOTO 120
```

appears in front of the printed value, and the program may print the value in unformatted form. This result occurs whenever an out-of-range condition appears—a value with more characters to be printed to the left of the decimal point than the format allows. A minus sign is also a print-use character; so if you assign ### to Z$ and ANSWER is less than −99.4999999, the percent sign appears.

Print-using statements are not limited to controlling merely the number of characters printed and the number of digits the computer uses in rounding. For example, the variable Z$ can contain commas, such as #,###. With this statement, the program will print ANSWER values of 1000 or greater with a comma, in the form 1,000. Smaller values will simply show a space where a comma would otherwise appear.

If you assign #,###,### to Z$, the program will print ANSWER as a whole number, and values of 1 million or more will appear with two commas. Additional features available in a print-using statement include printing a dollar sign immediately in front of the printed number, a percent sign immediately following the number, a plus sign to the left of a positive number, and a minus sign to the right of a negative number, rather than to its left.

The Applesoft Adaptation

To apply the convenience of the print-using statement to Applesoft BASIC programs, I wrote the subroutine shown in **Listing 1**. This program performs the same task the print-using statement does in other versions of BASIC. (Compare **Figures 1** and **2**.) To use the subroutine, Z must contain the value to be printed, and Z$ must contain the printing format. A statement like the following should appear in your main program:

```
Z = ANSWER: Z$ = "#,###.##":
  GOSUB 10
```

The subroutine works with any format in Z$ that uses only octothorps and has a maximum of one comma and one decimal point. (The comma must fall to the left of the period.) It works with both positive and negative Z values. This subroutine doesn't alter one feature of Applesoft BASIC, though—very small numbers and very large numbers printed in Applesoft default to scientific notation. Although you can format Z$ to accommodate such numbers, scientific notation will prevail.

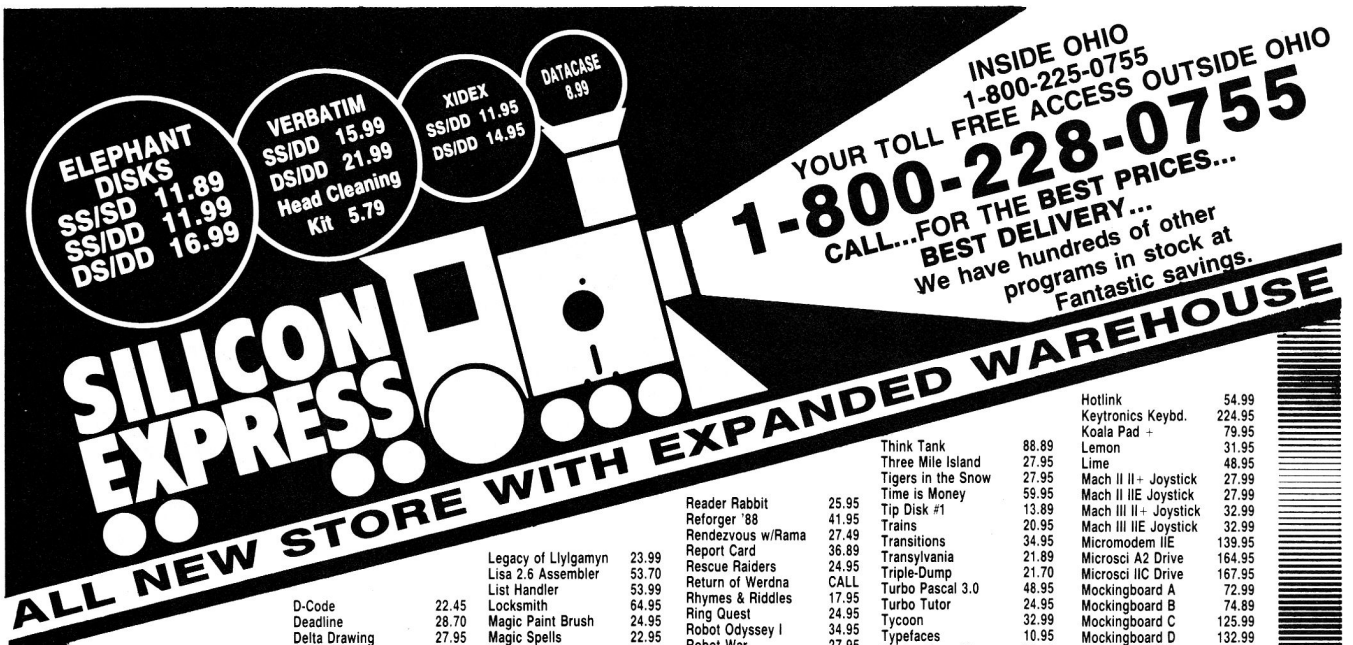

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Figure 1. A column of numbers printed without the print-using subroutine.

```
53.9087
1286
43.0982
1001
.39
0
546.98
```

Figure 2. The same numbers printed with the print-using subroutine.

```
    53.91
 1,286.00
    43.10
 1,001.00
     0.39
     0.00
   546.98
```


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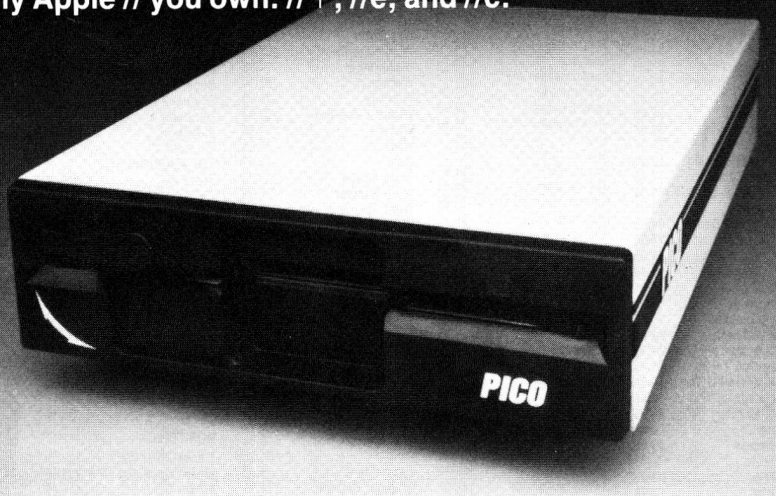

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The program doesn't provide for print-using features you'll need infrequently, such as plus signs, dollar signs, and percent signs. I omitted these features for two reasons. First, you can accomplish such operations easily with straightforward BASIC statements. Second, their inclusion would increase the complexity of the subroutine by requiring more testing of Z$—and therefore more execution time in BASIC. (If high speed is essential, you can compile the subroutine and issue a CALL statement, rather than a GOSUB statement.)

Listing 1 includes several remark statements that provide some capsule documentation—you won't have to refer to this article every time you incorporate the subroutine into a new program.

Note that the statement numbers begin with 10. Incorporating the subroutine with the line numbers shown allows faster access time in BASIC, since BASIC searches for the new line number in a program from beginning to end when a subroutine is called. Furthermore, I've incremented successive line numbers by only one to minimize the range of statement numbers. You can drop the subroutine into an existing program before other statement numbers without renumbering many lines in your main program.

Programming Hints

Type in **Listing 1** and save it in your library of routines. Later you may want to modify it for specific programs.

You don't need a complete program to test this subroutine—you can call it from the keyboard. To test the program once you've typed it in and saved it, though, you can avoid repetitive keyboard entries by adding the statements in **Listing 2**.

With the two listings combined, type in RUN. Try different values for Z to see how the program prints them—positive values, negative values, decimal fractions, whole numbers, and so on. Change the format in Z$, then try more values for Z. If the results aren't what you expect for the format you specified in Z$, check the subroutine for typing errors. If the format for Z$ is incorrect, the program will let you know.

You'll notice that the program suppresses the carriage return when it prints the value, a necessary procedure if you use the subroutine to print two or more values on the same line. Otherwise a carriage return will occur

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after the first printed value, and your second value will fall on a new line. If the value printed in the subroutine is the last item to appear on a line, you'll need to include a PRINT instruction in your main program, to be executed immediately after returning from the subroutine.

You can delete the suppressed-carriage-return feature by omitting the semicolon in line 47. Then you'll get a carriage return every time the subroutine prints a value.

Note that if your printed value is a decimal fraction between 1 and −1, the program will print a zero to the left of the decimal point. In other words, .25 will appear as 0.25, a common practice in scientific and mathematical work. For accounting tasks, though, the zero may become a nuisance. To omit this feature, delete lines 40 and 41.

Once you've incorporated this subroutine into your own program, you may want to shorten it. You can delete all the remark statements in lines 11–21 without disrupting the program. You should retain line 10, though, as a label for the subroutine.

You can shorten the program further in one other area. Several program statements check that Z$ follows the correct format—no more than one comma or period and no characters except octothorps. If you are careful in assigning variables to Z$, or if you've completed your program and debugged it, you can eliminate these statements—lines 23, 27–34, and 48. Deleting them not only shortens the program, it also speeds up execution time a little.

The next time you run into some unexpected results in a program you're writing, you'll know exactly what to do if internal rounding is the bug. Get out your trusty print-using subroutine, and your problem of internal rounding will be solved.■

Write to Jerry Hall at 181 Brimfield Road, Wethersfield, CT 06109.

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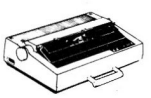

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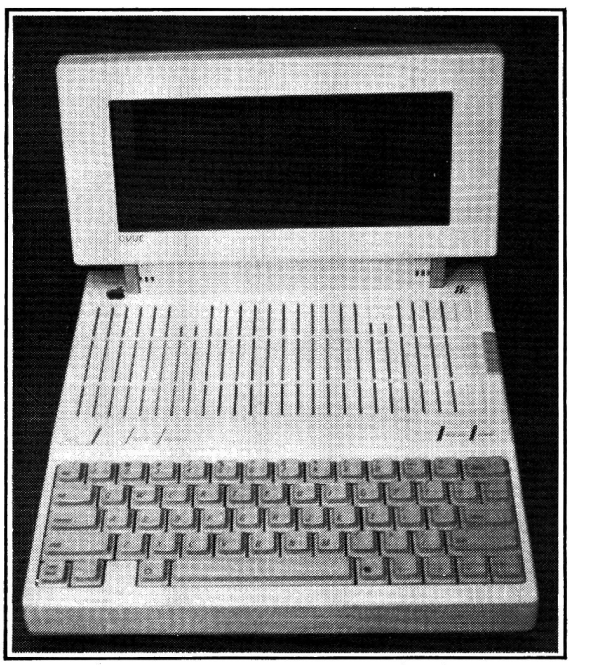

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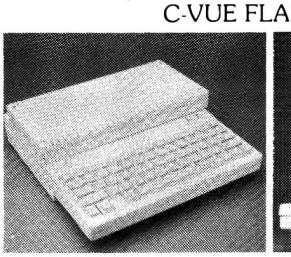

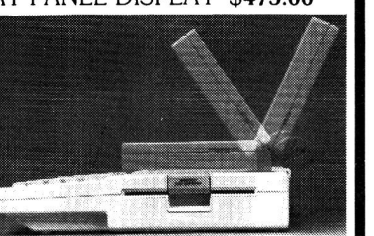

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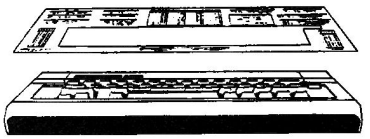

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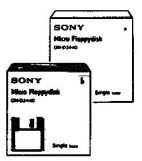

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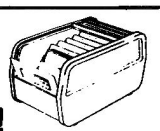

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EDITORS' CHOICE

SwyftCard

Every month, hardware and software manufacturers release dozens of new products into the Apple II market. Editors' Choice singles out one product each month that the inCider *editors feel is a significant addition to the Apple II family of products. Products evaluated in Editors' Choice are among the most recent releases and may not be available yet for retail distribution.*

Simplicity is the soul of this machine—Information Appliance's **SwyftCard** answers to five commands that do almost everything you want your Apple to do. Ask yourself this: What part of your computer work does *not* involve typing? Only a small fraction—because keyboard functions like creating text, correcting typos, moving paragraphs, storing telephone numbers, finding addresses, doing arithmetic, and setting up telecommunications do it all for most of us.

And SwyftCard does it all. The SwyftCard board holds the most primitive—in the best sense of the word—of software.

Install the little board in slot 3 in your //e, turn the power on, and start typing. With the simplest of word processors, SwyftCard can even wrap words around the ends of lines. Catch yourself mistyping and you can erase your error—just punch the delete key. And running short BASIC programs is as easy as typing them—you never leave the word processor.

Most corrections—and, in fact, most word-processing functions, as well as data-base management—ordinarily require you to move the cursor to a certain point in your text. SwyftCard's innovation is this: It accomplishes that leap in one fell swoop—and less than half a second—in a move aptly named a LEAP.

LEAP forward or backward in your text by hitting the closed- or open-apple key, then the character string to which you want to leap. "Like a lot of what you can do with the SwyftCard," the articulate guide, glossary, and reference manual assures you, "it is easier to do than to read the explanation. Try it once or twice."

Five commands—INSERT, SEND, CALCulate, PRINT, and DISK—manage all the tasks you need to perform. Try saving your prose or the particulars of your files to disk and be permanently spoiled. The SwyftCard formats a blank disk—without being forewarned that the disk is blank—and saves as many as 40,000 characters in less than eight seconds.

Printing text is a one-stroke affair. So is sending a document to your modem for telecommunicating. Your calculator appears with a mere control-N—it's Applesoft BASIC, which probably reckons as well as you'll ever need to. INSERT leads you easily to complex tasks such as moving blocks of text and embedding macros. If you're clever, you'll concoct rich recipes from the SwyftCard's fundamental commands.

"When I sat down to use the SwyftCard," Technical Editor Bob Ryan recalled, "I thought the designers had read my mind—they had eliminated all the nitpicking things I hate."

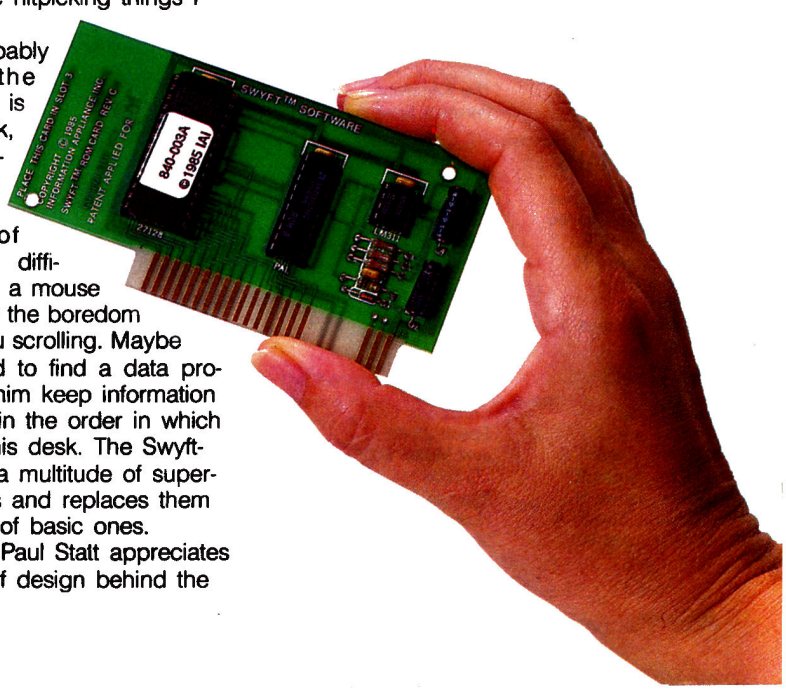
Bob was probably referring to the waste of time it is to format a disk, the waste of effort it is to try to use an exorbitant number of commands, the difficulty of handling a mouse while typing, and the boredom of mindless menu scrolling. Maybe he was just glad to find a data processor that lets him keep information in his Apple //e in the order in which he keeps it on his desk. The SwyftCard eliminates a multitude of superfluous operations and replaces them with a small set of basic ones.

Review Editor Paul Statt appreciates the philosophy of design behind the SwyftCard: "The SwyftCard is made *not* to provide many ways to do a task. The designers call this principle *monotony*, but I call it the 'Occam's Razor' of computer science—don't multiply entities unnecessarily. It's a philosophy that works in a field where 'user friendliness' too often translates into 'creeping complexity.' "

The SwyftCard is swift and simple. An ideal computer is also fast and fundamental: If it seems obscure, you've been looking at your Apple through an operating system, darkly. The SwyftCard puts you and the machine face to face, fast.

The SwyftCard is available for $89.95 from Information Appliance, 530 University Avenue, Palo Alto, CA 94302, (415) 328-5160. Jef Raskin, president of Information Appliance, is one of the original designers of the Macintosh, and also helped write some of those early, friendly Apple manuals. The SwyftCard and its documentation reflect his experience.■

The SwyftCard from Information Appliance: Simplicity is its soul.



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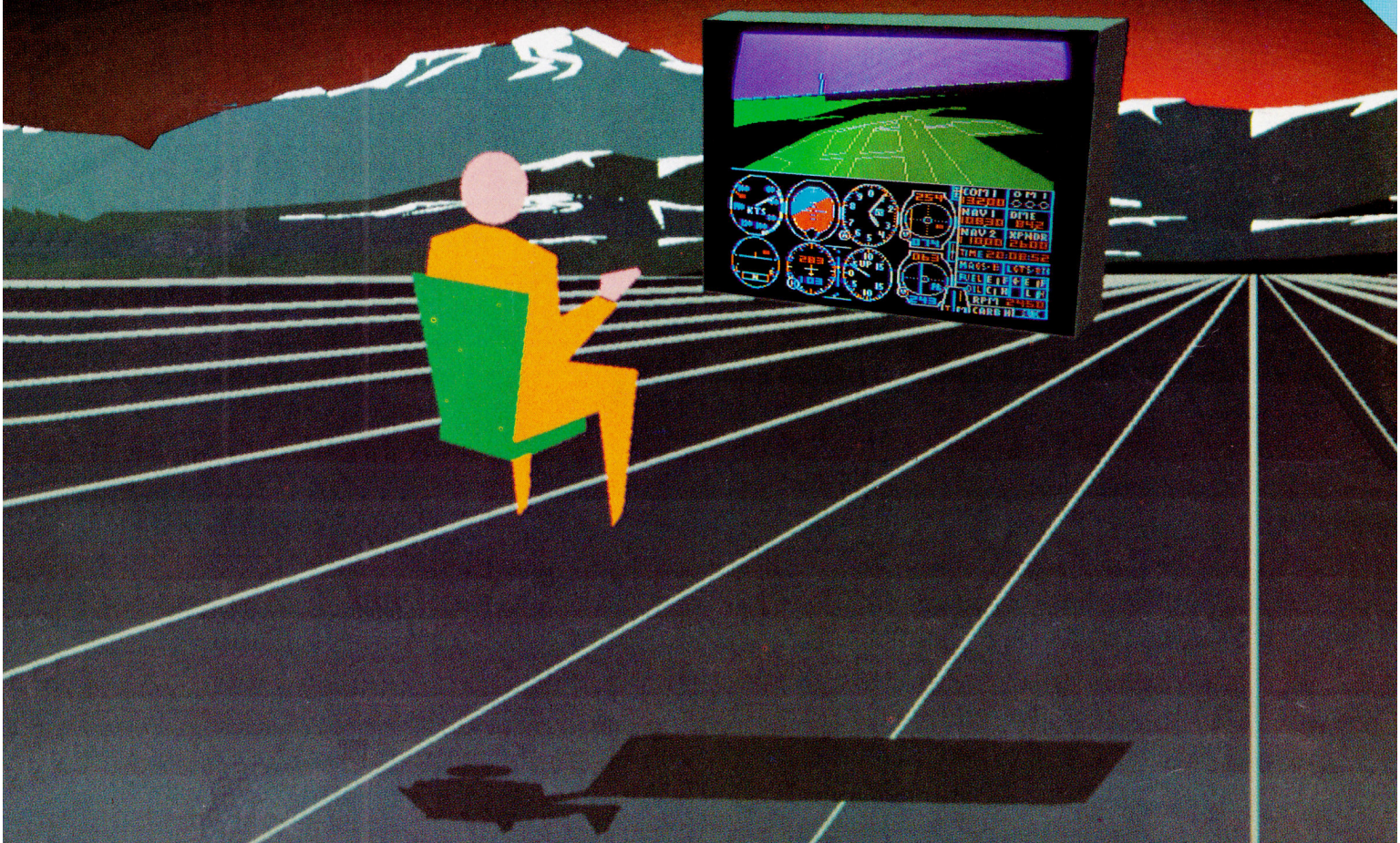

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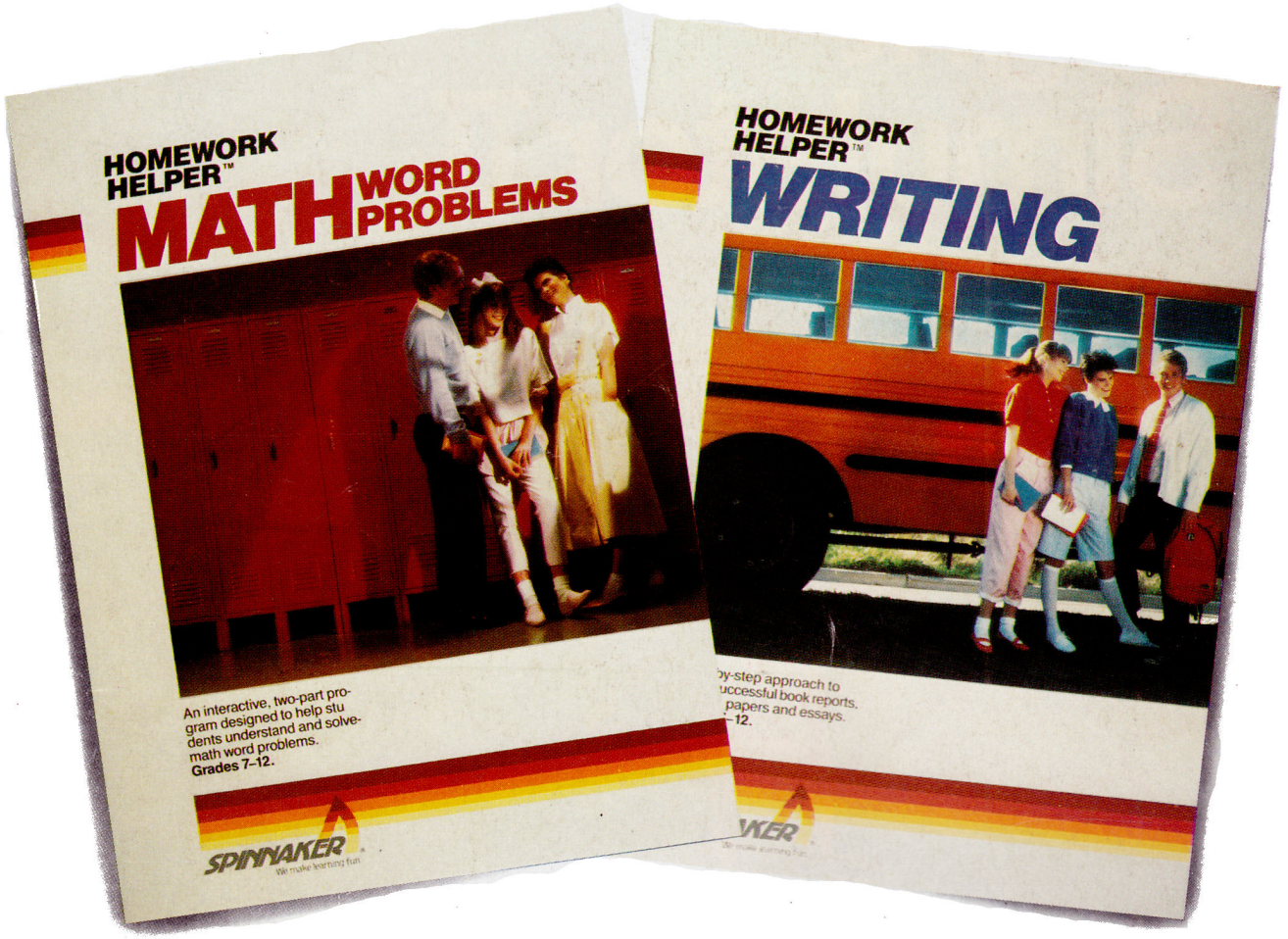

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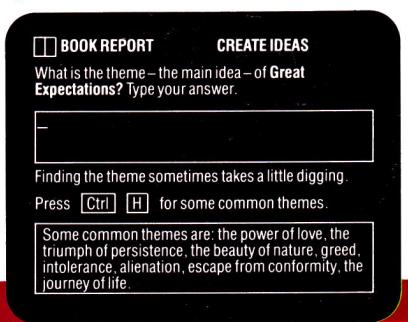

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