

Special Report: Modems

inCider

May 1985, USA \$2.95
A CWC/I Publication

The Apple II Journal

Modems: Your Link to the Future

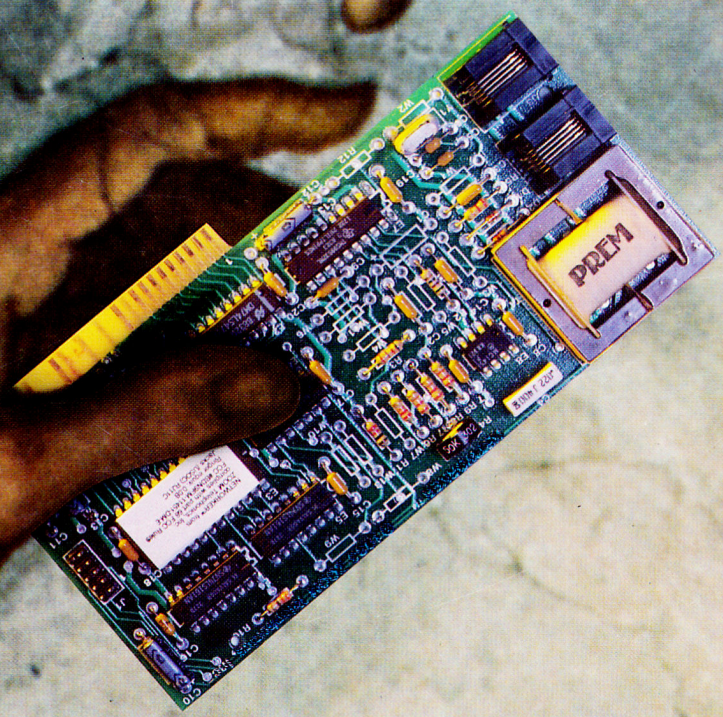
Seven Reasons Why
Your Business
Needs a Modem

Editors' Choice:
We Pick May's
"Best New Product"

How to Hook Up and
Run Your New Modem

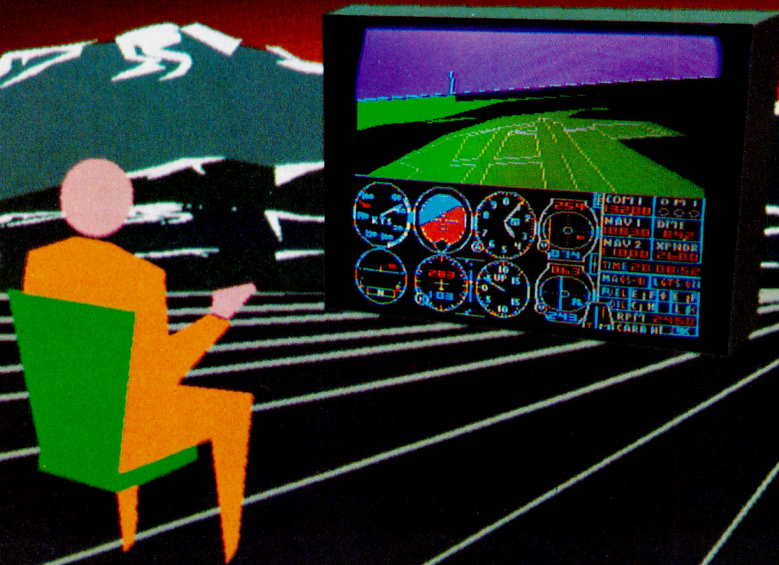
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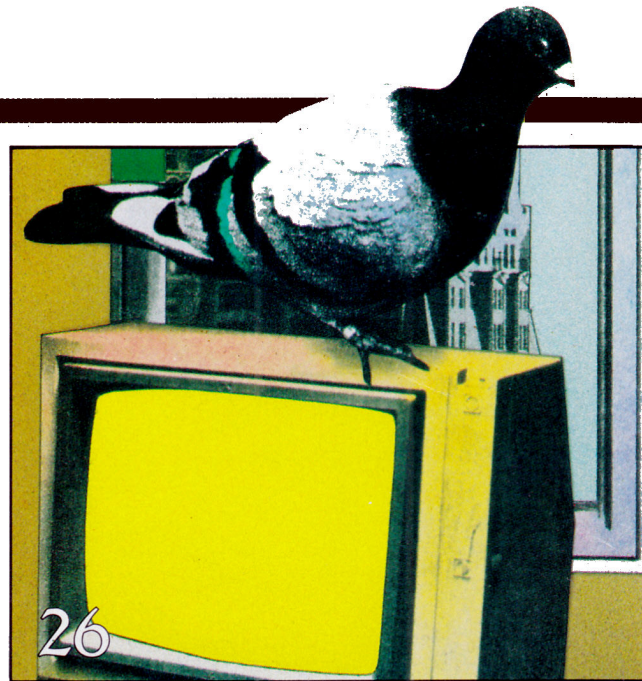
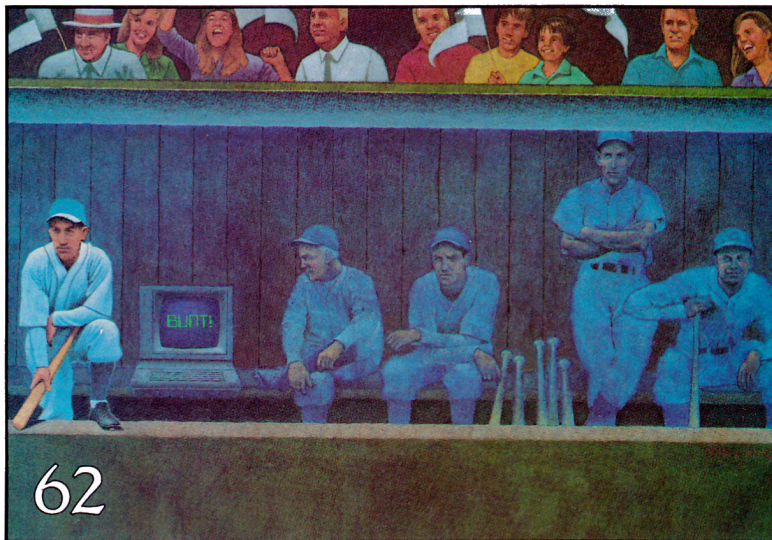
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Circle 54 on Reader Service Card.

inCider



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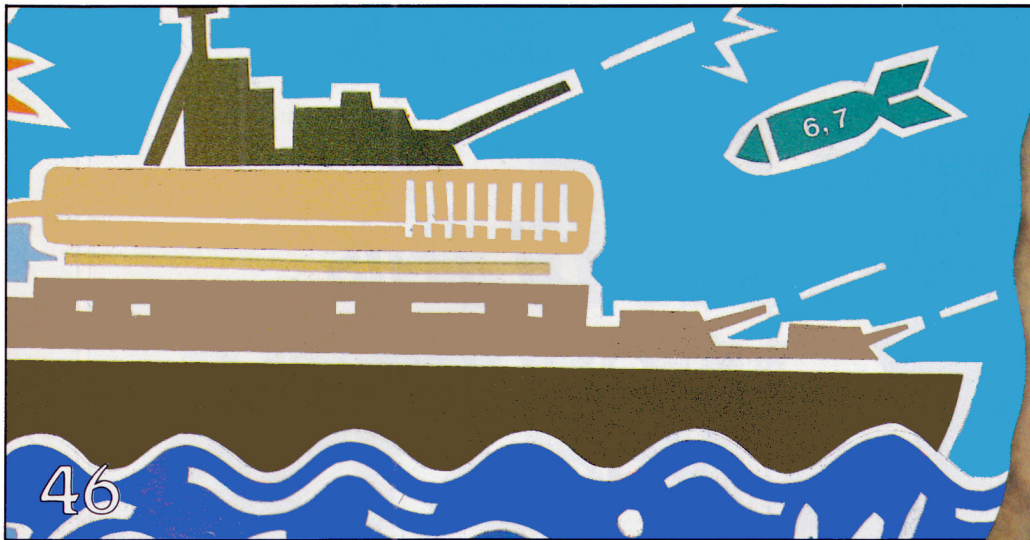
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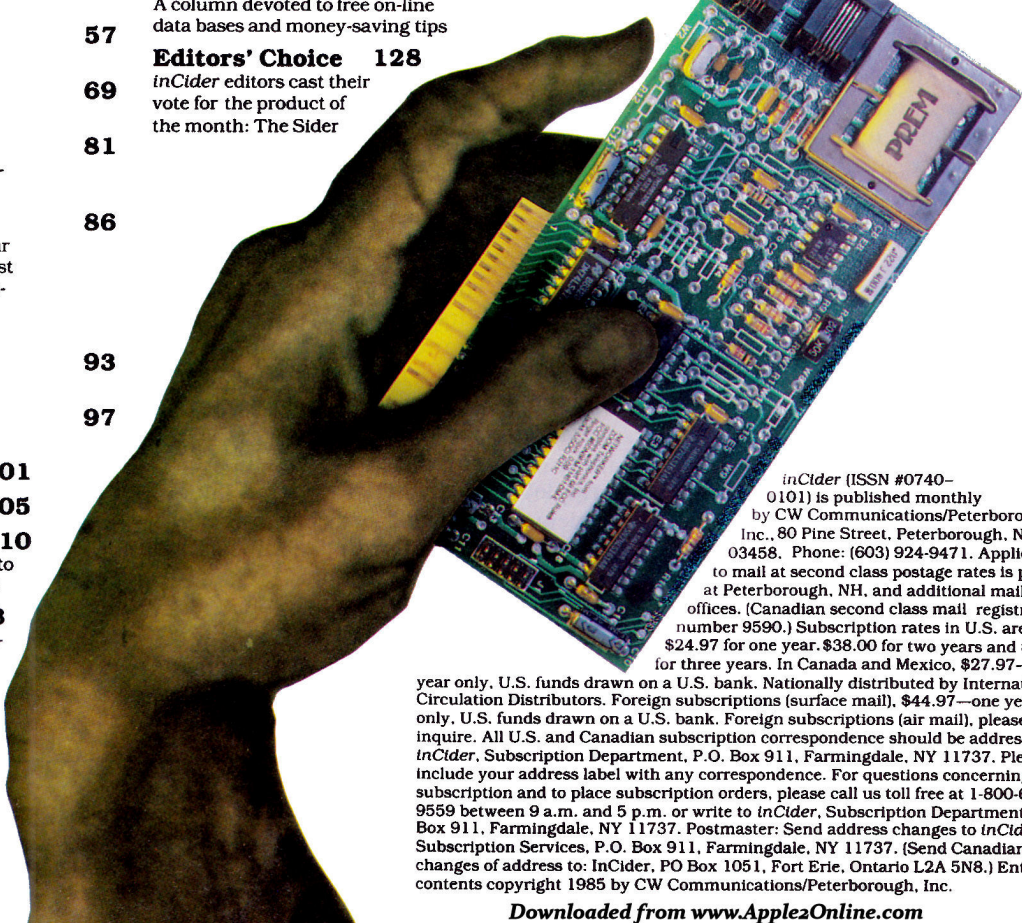
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inCider (ISSN #0740-0101) is published monthly by CW Communications/Peterborough, Inc., 80 Pine Street, Peterborough, NH 03458. Phone: (603) 924-9471. Application to mail at second class postage rates is pending at Peterborough, NH, and additional mailing offices. (Canadian second class mail registration number 9590.) Subscription rates in U.S. are \$24.97 for one year, \$38.00 for two years and \$53.00 for three years. In Canada and Mexico, \$27.97—one

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FERMENTATIONS



What This Country Needs...

No doubt about it—when you plunk down your dollars for an Apple //e or //c, you're getting a lot of bang for your bucks. But if you're like me, you can't help but mutter to yourself about certain features you'd love but really can't quite afford. What follows is my brief wish list.

Inexpensive color display. As a new Apple II owner, you have a cornucopia of color software awaiting your beck and call. Great. You can't wait to hook up that new Apple to your color television and enjoy some fine screen displays. Unfortunately, two problems surface:

- Novelty leads to intrusion when the rest of the family wants to watch *The A-Team*.
- The average television set's screen resolution simply doesn't measure up.

So, you go back to the store to buy the monitor you should have purchased in the first place. Here's where it gets expensive... and a little complicated.

The basic package for a new Apple II is built around monochrome capability. Average prices for a new //c are around the \$1200 mark, including monitor and stand. The monochrome monitor provides 80-column

capability, which is a necessity these days. Now, if you want color capability (and who doesn't) you have two alternatives. You could unbundle the //c from its factory monitor and replace it with an RGB interface/color monitor combination that will give you very nice color and 80-column capability. The net-price difference, however, could run anywhere from \$400 to \$700, depending on the monitor you choose.

Or, you could purchase the basic \$1200 //c package and simply add a composite color monitor—which is really nothing more than a color TV sans tuner—for about \$300. Although obviously not as expensive as the RGB route, it has two major trade-offs. First, the composite monitor can't handle 80-column displays. So, you're obliged to place the monitor beside the standard monitor and switch between the two, depending on whether you're using AppleWorks or the kids are playing Sticky Bear. The other compromise is that the resolution on a composite color monitor is acceptable, but falls far short of a full RGB display.

To get color without monopolizing the family TV set, you're faced with an additional investment of several

hundred dollars. That equates to a lot of Apple II users settling for monochrome. More's the pity.

A good, solid, letter-quality printer for \$200. Let's face it, a computer without a printer is a eunuch. Hard copy is an integral part of so many home, business, and educational applications that a printer is inseparable from the configuration. Still, many newcomers have to put off the purchase of a printer for months. When they do take the plunge, it's usually for a dot-matrix.

Now, it's hard to fault dot-matrix printers. They've been performing yeoman service for years. They're fast and a necessity for graphics. I'd wager, though, that when all is said and done, most printer buyers yearn for a unit that generates familiar typewriter characters—the next best thing to handwriting.

A portable Apple II. C'mon, the //c may be smaller than the //e, and it does have a handle, but it's still a stationary computer. On the other hand, America—or at least one editor I know—hungers for an Apple II designed for travel. Maybe by 1986 Apple will have overcome the miniaturization problems left over from the design of the //c. ■

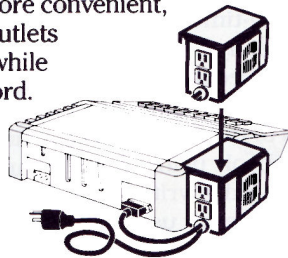
by Paul Quinn

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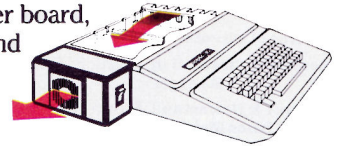
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The Sider

A company called First Class Peripherals has four-color, glossy ads for an Apple 10-megabyte hard disk (the Sider) for \$695, and advertises in your magazine, among others. The price is so low, the sell so hard, the ads so fancy and widespread that it sounds too good to be true.

An investigation and fast product review to see if these people are legitimate and the product is good—with no complaints from customers—would be an ideal project for *inCider*.

J. Water
801 Stags Hill Road
Baltimore, MD 21204

Talk about timing! We've got good news for you. We reviewed Sider last month, and the hardware seems to live up to its billing. Turn to our Editors' Choice page for the complete picture. —eds.

// Shopping

Your December Fermentations column ("Eeny, Meeny, Miny, Mac," p. 6) struck a resonant chord with me. As a fairly long-time user of an Apple II Plus, I recently faced the decision to acquire a second personal computer because my family began to fight for access to the first one: My wife is writing a book using Apple Writer; my 10-year-old is writing programs and making heavy use of applications like Graphics Magician; my 6-year-old is playing games like Stickybear Opposites; and I try to use the thing between 3 and 8 in the morning when everyone else is asleep so I can do my work (home finances, MCI Mail, spreadsheet business models, and, well, some adventure games).

Frankly, I was strongly drawn to the Macintosh because it came so close to what I watched develop at the Xerox Palo Alto Research Center nearly a decade ago. It's an impressive piece of work. But I started to

think about all the software I already had for the II Plus and how helpful it would be if it didn't matter which machine was free or which happened to break. So, I went out and bought an Apple //e. My choice was easy.

By the way, *inCider* is one of the best, well-focused, enthusiastic magazines in the trade press.

Vinton G. Cerf
Vice-President, Engineering
MCI
2000 M Street, NW
Suite 3000
Washington, DC 20036

Christmas Disks

I have a suggestion to make your magazine better, and it involves the issue of bar codes versus typing the listings yourself. Phil Burnette offered a good solution (listings recorded on thin, flexible plastic records) in your December issue (Letters, p. 12).

But if that doesn't prove economically feasible, I'd like to suggest another approach. Once a year, just in time for Christmas, offer readers a chance to purchase a disk that contains the programs *inCider* printed during the previous year. That would give those who would like the programs, but don't want to type them in, an alternative. It would also make an excellent, inexpensive Christmas present to ask Santa for.

Jim Schneider
P.O. Box 80863
College, AK 99708

An excellent idea, Jim. In fact, on page 64 of this issue we have some good news for you and all our other readers who'd like to see selected programs from inCider on disk.

—eds.

First Family

While reading my latest issue of *inCider*, I began filling out the reader service card and answering the questions about where I got my copy, do I

Smart Business Advice

Circle 355 on Reader Service Card.

Street Electronics' new BusinessCard™ is the smart solution to any combination of Apple® II+ and //e interfacing needs. The BusinessCard combines two serial interfaces, a clock/calendar with battery backup, and built-in graphic screen dump capabilities on a single card. And, it's compatible with the programs you're already using, like AppleWorks, MousePaint,™ and Apple Access //.

With the BusinessCard you can operate a printer, 300 or 1200 baud modem, date your ProDOS™ files, and print graphics to a wide variety of printers for under \$200.00. Or, you can buy two serial interface cards, a clock card, and screen dump software from other companies and spend over \$400.00. Now, which business decision should you make?

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actually type in the listings in the magazine, and so on. Upon reading item C, I felt that, for the first time in my life, a letter to the editor was called for. Item C states: Are you interested in reading more about the Macintosh or Lisa in *inCider*?

Since I purchased my computer almost three years ago, I've been constantly searching for and changing magazines. The two that I have stayed with are *inCider* and *Nibble*. The reason is quite simple: They have far more information than any other publication on the Apple II family of computers.

I was a charter subscriber to *A+* magazine, but will let my subscription run out because it devotes at least 50 percent of its coverage to the other Apple computers. This is great for computer dealers and people who are thinking of buying a computer, but if you already have a II, II Plus, or //e and have no intention of buying a Mac—or can't afford to have both—you want your information source to remain uncluttered by information that doesn't have anything to do with the computer you use.

I think there is a great, growing need for a magazine for Mac and Lisa owners, and they should have their own source of information—without having to thumb through a bunch of II-family information.

Please, for those of us who read *inCider* because it's a magazine for and about the II family, don't add Mac or Lisa information to the magazine.

Gary E. Karg
833 South 30 1/2 Lane
Pueblo, CO 81006

Take Two

The article "VCR and CRT: The Latest Media Marriage" (January 1985, p. 32) was very interesting. We at JAM have been involved in interactive videodisc training for more than four years, and are very pleased to see more educators taking an in-



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LETTERS

terest in it. I am, however, confused by the author's claim that videodisc is more expensive than videotape.

A complete system could include the Pioneer LD-700 videodisc player and the Pioneer IU-04 interface/controller unit for about \$1000 retail (and you can shop around and get it for less). This lets your computer control the videodisc through any standard serial port, and is comparable to the cost of a videotape player and the author's \$600 interface. Videodisc authoring systems are comparably priced at \$395. If you include the author's \$1300 videotape player, you could purchase a top-of-the-line videodisc setup for less! A Pioneer LD-V6000 player is about \$1500, and JAM sells an interface card and authoring system for \$395.

More important, however, are the numerous benefits videodisc offers over videotape. Videotape stretches. Each time you play the tape, the video and audio quality decreases. More to the point, you lose location precision. You can play a videodisc for years without any degradation of video or audio. Locating remains constant and precise.

The Search Is On

Videotape search time is slow. Searching for nearby segments is acceptable, but longer videotape searches quickly tire the student since the wait time increases. A combined benefit and hazard of interactivity is jumping out of a planned video sequence. With videotape, this often results in annoying waits. On a videodisc, a "worst case" search (one end of the disk to the other) is only two to seven seconds—depending on the player. Most search times are well under one second.

Another important point is that videotape players aren't designed for constant back-and-forth searching. It could cause the machine to break down. Although provision for this is being designed for new players, most available players don't have it now. Videodisc's design stands up to the

rigors of constant shuttling, which ensures consistent and trouble-free use over a longer life span.

Freeze Frames

While videotape is capable of freeze frames, if you use this feature for any length of time serious degradation of the video image will occur, and you'll find a damaging buildup of oxides on the tapehead. This makes frequent cleaning and maintenance a must. Freezing a specific image for a length of time can also eventually cause tape burn, which results in a dead spot on the tape. To simulate a freeze frame on videotape without stopping the tape would use prohibitive amounts of tape and would lock the student into the tape editor's notion of how much time the student needs to study an image.

A freeze frame on a videodisc takes one video frame, or 1/30 of a second. You can have up to 54,000 of them on a videodisc. On videodisc, you can show the same scene for hours and the image will be just as sharp after 1000 hours as it was the first time it was shown. Videodisc is also sturdier than videotape. It can't be erased by magnetism, won't be damaged or destroyed by a dirty or faulty player, and never comes in the wrong format.

At JAM, we've done extensive validation testing with both videodisc and videotape, and have found that videodisc holds the student's attention better. As video interaction increases, you begin to run into problems with latencies. Our experience with eye contact tests during videodisc and videotape lessons shows that interest is kept better by videodisc. Not only does the videodisc provide fewer distractions, it also gives the educational designer stronger tools and more freedom in design.

Granted, videodiscs are more expensive than videotapes, particularly if you're talking about a specialized, one-shot lesson. However, one aspect not mentioned is the quality of the video. If you're creating a lesson that will be used for years, you'll

prefer to have it taped by a professional studio. This provides the best quality video, which lets the student perceive the lesson as a more professional, more valuable product. Professional studio time will cost a great deal—a complete shooting and editing session can cost several thousand dollars—but this is true for either videodisc or videotape programs. From there, the investment in even a single pressing (which can be under \$2000) for a videodisc is clearly cost-effective in terms of the added benefits. And with a wider cost-sharing base, the pressing cost comes well within most budgets.

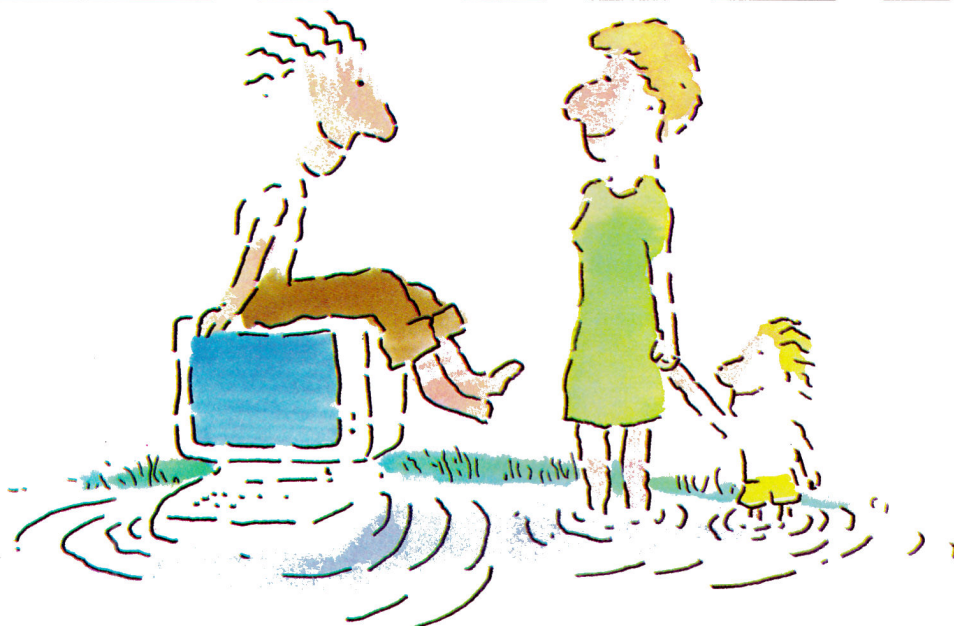
Videotape has its place in education. If your budget is limited, you should consider videotape. It's especially useful as a pilot for a final videodisc. You can easily reshoot and reread videotape until you have the complete course, then have a final version shot professionally and pressed. The superior interactivity, cost-effectiveness, and durability of videodisc over videotape deserves careful study by any educator who is interested in this new technology.

Nick Francesco
Learning Center Manager
JAM, Inc., Techniplex
300 Main Street
East Rochester, NY 14445

Thank you for the additional insights into videodisc and videotape technology. Your statements imply, however, that inCider's article doesn't mention videodisc's advantages over videotape. If you refer to page 39, a sidebar outlines each medium's positive and negative points. For example, the piece reiterates your comments concerning videodisc's faster search time and greater durability.

Videotape, though, offers those interested an alternative to videodisc. We agree with you that people should analyze each medium to see which best suits their needs. —eds.

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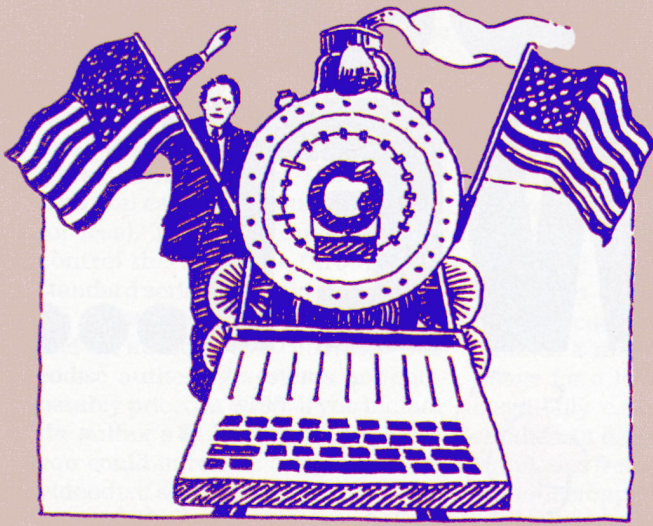
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-Brad Baldwin, InfoWorld Magazine

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Whistle-Stop Apples

Behind the flag waving, cheering crowds, and media hoopla, politics is—or should be—a tightly run business. More and more, political hopefuls are turning to microcomputers for campaign management. So says a study conducted by Aristotle Industries in Norwalk, Connecticut. According to researchers, the use of microcomputers like the Apple among candidates has increased 155 percent over last year.

Aristotle President John Phillips notes that a computer can't compensate for poor candidates or head off landslide returns, but "in a close race, the campaign that has the better-managed candidate will win."

Aristotle assists the political-management process with computers and software designed for the \$1 billion campaign market. Phillips says demand for his company's services

is growing 10 to 15 percent each month. Orders for its campaign-management software have practically doubled in one year: 1300 orders in 1984 compared to 700 in 1983. The company is selling products for 1986 campaigns now. Those ordering the software are campaign managers, consultants, and candidates, Phillips points out.

The company sells a \$750 campaign-management software package for Apple and IBM computers. This includes financial planning, scheduling, opposition research, demographic mapping, and voter listings. Phillips says he has customers in every state. He even claims users in Canada, Korea, the Philippines, Barbados, Mexico, and Ecuador.

While the president of the United States may not need Aristotle Industries' services, Phillips says senators, governors, and local-area candidates are integrating computers and campaign-management software into their election bids.

Five-Alarm BBS

Callers keep things hot at The Firehouse, a bulletin-board system based in Greenwich, Connecticut. Sysop James Weeks says that since the board started on March 2, 1984, he has received 8800 calls from 489 different people. The 24-hour service features downloads, public-domain software, E-mail, and a public notice board. Weeks adds or changes the offerings depending on caller demand.

What makes The Firehouse different from other bulletin-board services is that you are assigned a rank and security level that matches your knowledge of computers. You start out as a rookie—you can see files, but you can't write anything. Weeks explains that this built-in security feature prevents callers from listing false names or putting "garbage" on the system.

People work their way through the ranks—firefighter, EMT, pump opera-

tor, lieutenant, captain—by mastering levels of expertise or helping the sysop. Rookies can see files, type in hints, donate public-domain software, and answer other callers' questions. As sysop, Weeks saves the battalion chief's title for himself.

The ranking "is one of the things that attracts [callers] the most," Weeks says. "They come in positively about it."

Weeks notes that, for the most part, the board draws callers from above-average income areas. It pulls in "a lot of serious users" who work with spreadsheets and word processors every day.

The Firehouse runs on an Apple II Plus with 64K of memory, one floppy drive, an Infax 20-mega-byte hard drive, a Micro-modem II, a USI 1400/C monitor, and Bytemaster Software's BMBBS package. To date, Weeks has spent more than \$5000 on the system. He doesn't charge callers, but does accept donations.

There needn't be a fire to call The Firehouse at (203) 869-7569.



by **Cynthia K. Carr**

Crossed Phone Lines

Hello? Is anybody there? Not if you've been calling the Helena Apple Bulletin Board that we mentioned in our February issue (The Cider Press, p. 14). According to Sysop Robert Clarkson, the telephone company has installed a new line for the system. The number is now (406) 443-7330.



Stargazer

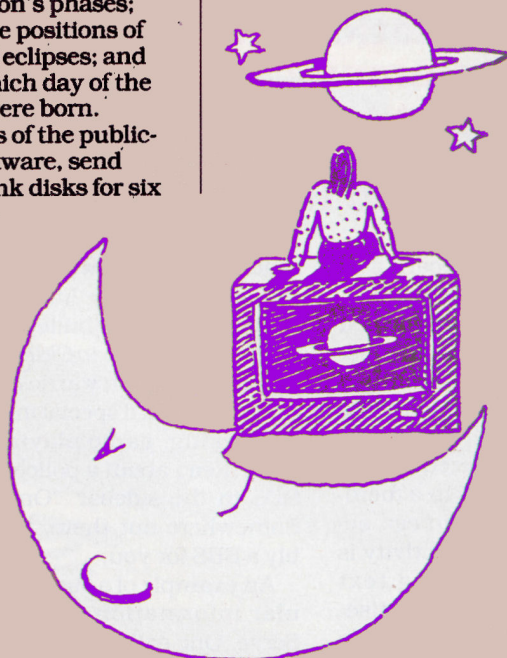
Got stars in your eyes? Then gaze into the heavens with the help of your Apple and public-domain astronomy programs compiled by John Mosley, the program supervisor at Griffith Observatory in Los Angeles.

When Mosley started using an Apple II at work, he set out to see what astronomy-specific programs were available. He found 50, including programs that calculate sunrise, sunset, and twilight times; trail the moon's phases; calculate the positions of comets and eclipses; and even tell which day of the week you were born.

For copies of the public-domain software, send enough blank disks for six

disk sides, a return mailing label, and return postage to Mosley at Griffith Observatory, 2800 East Observatory Road, Los Angeles, CA 90027. He also offers a free list of commercial astronomy programs. Just send a legal-size, self-addressed envelope to the above address.

"Our purpose is to educate the public," Mosley says. "We provide the computer information and disks as a service. This is part of what we do."



Computer Campers

Summer camp used to mean swimming, hiking, crafts, and sing-alongs around a campfire. During the summer of 1985 it will be Pascal, data files, and robotics. Hundreds of children, 9 to 18 years old, are expected to attend the 1985 National Computer Camps. Started in 1978, NCC is touted as America's first computer-camp organization. It has camps in Connecticut, Georgia, Maryland, Missouri, and Ohio.

Executive Director Dr. Michael Zabinski says campers may come in with only a little computer familiarity or a fair amount of experience acquired at school. Upon arrival, they are grouped according to their abilities.

The camper's day consists of two five-hour segments: computer in-

struction in the first and activities such as basketball, tennis, free computer time, and a Las Vegas night in the second. The camp creates a "very social [environment] in addition to being intellectually stimulating," Zabinski says. The campers enjoy two benefits: they learn about computing and have a fun summer.

A one-week session costs \$395, but campers may attend more than one session to explore different subjects or move up to new learning levels. For an NCC brochure and application, write to the National Computer Camps at P.O. Box 585, Orange, CT 06477, or call (203) 795-9667.

What's going on in your corner of the Apple world? Spread the word through The Cider Press, inCider, 80 Ptna Street, Peterborough, NH 03458.

How to Use a Modem: Getting Your Apple On-line

I by Brian J. Murphy

If I had to sum up all the reasons why it's a good idea to take the plunge into telecommunications, I'd put it this way: Until you're linked with the outside world, you are only partially realizing the potential of your Apple II. After you've added a modem, you'll find that you look at your computer from a new perspective. You'll acquire friends around the country, collect free software, shop and bank by computer, and access data bases and libraries hundreds and even thousands of miles away without leaving home.

To start, you must know what's available and whether or not it appeals to you. If you're a businessman, you can use your computer/phone link to send and receive work between offices or between your home and the office. You can even use it to do your banking. If you're a student or a professional, you can use a modem to gather research material from professional data bases around the country.

Those are great reasons if you're in business or in school, but what if you're just a hobbyist, strictly a home user? This group gravitates to two kinds of

Here's your initiation into the world of telecommunications. *inCider* guides you, step by step, through your first two log-ons—to our BBS and to CompuServe.

activities—BBSes (bulletin-board systems) and information utilities.

Bulletin-board systems are located all over the country and many are just a local call away. (The sidebar entitled "BBS Pioneer" describes the founding of an early BBS.)

BBSes are generally offered free-of-charge, although there may be a membership procedure before you can access all data files. The main activity is simply leaving and receiving text files—messages, stories, advertisements, or offers to buy, sell, or trade merchandise and services. Some BBSes also offer game- and utility-program downloads.

Some bulletin-board systems are

machine-specific, with messages dealing only with one kind of computer system. *inCider*'s bulletin board is an example. (See the *inCider* BBS update accompanying this article.) Others are oriented toward special interests, such as hacking, game playing, and religion. (Read about a police/community BBS in the sidebar "On-line Cops.") Somewhere out there, there's probably a BBS for you.

An example of a successful and popular information utility is CompuServe. One call opens a galaxy of possibilities. Here you can find computer shopping and news services; information on wine, food, and travel; companionship; and a CB simulation (see



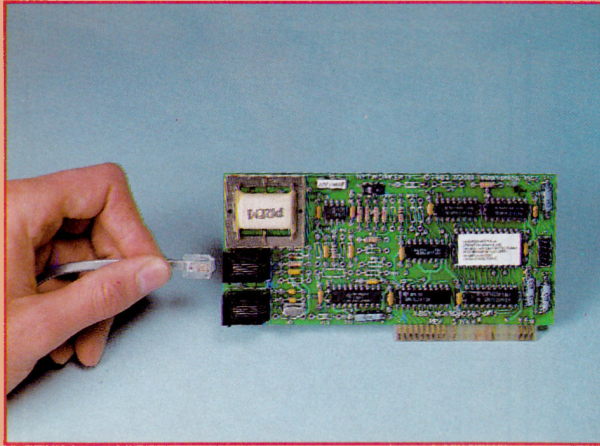


Photo 1. The first step in installing the Networker: hooking up the phone lines. Two plugs are needed—one to connect to your phone, the other to your phone jack.

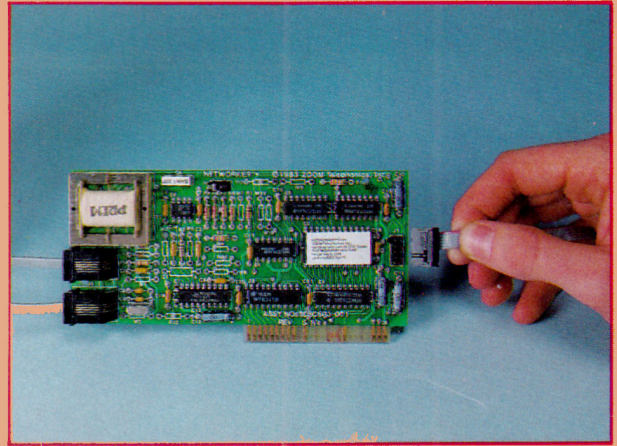


Photo 2. Next, you need to connect the Networker's control switch to the modem board. Be sure that you mate the pins properly.

BBS Pioneer

In the world of bulletin boards, Bill Blue earned the distinction of being a true pioneer by establishing one of the country's first personal-computer BBS services, People's Message System (PMS), in his San Diego home in 1979.

"Back then, there were only 15 boards throughout the country. The concept was so new I wrote my own bulletin-board software," Blue reports. Starting the PMS system out with only two Apple drives, Bill later experimented with other storage systems—8-inch floppies, hard disks, and quad 5¼-inch high-capacity drives—to keep up with his user base. PMS' popularity rose steadily. By the time PDMS (a dBase II system) replaced it in 1983, Blue's board had logged an astounding 90,000 incoming calls.

Blue describes his experience with early boards as "an important exercise for what would come later." The veteran system operator (sysop) notes he spent a lot of time "writing and refining the software, prompts, and [security] of the system."

Bill adds, "I'm reluctant to admit this, but at one time I had six monitors in different rooms connected to the Apple's RF port. I could watch the system from any room in my house. More than once I dashed from another room to the computer

when I saw the software start to falter, or someone getting too far into the system."

His vigilance and care paid off. The BBS pioneer quickly learned that his board had to withstand deliberate attempts to crash it, and the BBS commands had to be readily understood by new computer users. PMS' simple command structure both attracted users (one of Apple's founders, Stephen Wozniak, among others) and earned praise from industry figures like Ward Christiansen, the developer of the widely used Christiansen communications protocol. "I got a real thrill when Ward logged onto the system and congratulated me on how easy it was to use," Blue says.

The need for a good terminal package drove Blue to develop one. Today, a large number of Apple II owners use that package, now known as ASCII Express.

"Don't expect to make a lot of money if you run a for-profit, private board," he advises. "I don't know of any sysops who are making a lot of money from yearly or monthly subscriptions. I also don't know of many sysops who have made money selling their board software." (Blue reports he sold only about 100 copies of his PMS board software before turning to the

development of ASCII Express.)

Some of Blue's experiences may be important for present and future sysops:

- "Boards tend to take on the personality of their operator. Once the board has developed an 'on-line' personality, it may be almost impossible to change it, short of taking it down."
- "Games can consume a system. Unless you want to run a pure gaming system, don't put them up."
- "Boards should be easy to use. In 1979, most people who logged onto message systems were experienced computer users. Messages that weren't about computers or that didn't deal with programming were not encouraged or promoted. Today, there are a great many people who don't program, but who log onto boards looking for [topical] information."

The Bill Blue of today isn't really that different from the man who relinquished a career in recording engineering to learn programming and operate a bulletin board in the late 1970s. Although his business card reads Executive Vice President and his company (United Software Industries, Inc.) recently went public, you can still access the PDMS BBS in Santee, California, at (619) 444-7099.

"I don't know that I'd recommend running a board to anyone else, but it is interesting and a lot of fun," Bill says. □ —**Jim Forbes**

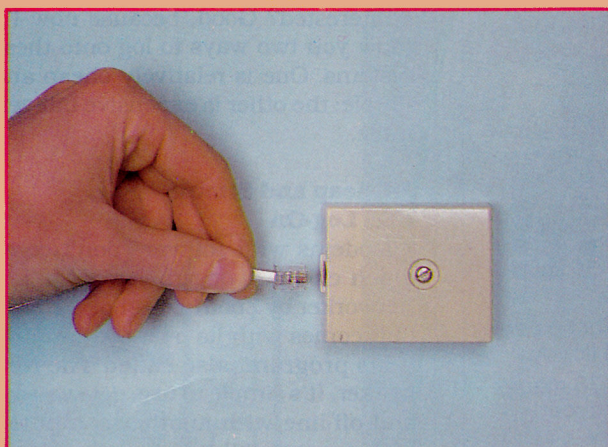


Photo 3. With all on-board connections made, you now make the proper external connections. Here, the Networker is plugged into the world's largest telecommunications network.

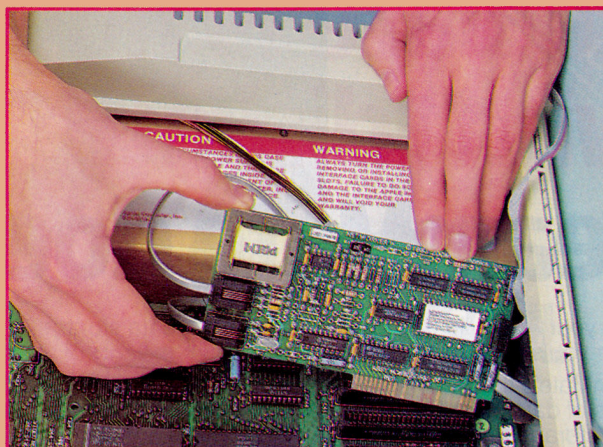


Photo 4. Finally, you plug the Networker into your computer. This Networker is being installed into slot #2, the preferred location. You are now ready to get on-line.

The inCider BBS Update

Last fall, *inCider* established a Bulletin Board System on an Apple //e using four Disk II drives, a Hayes Micromodem //e, and BBS software. This board gives *inCider* readers an easy (though expensive, considering long-distance charges) method of obtaining some of the programs *inCider* publishes. The board also provides a means for the editors and the readers of the magazine to interact.

Callers to the BBS have fallen into two general categories. One group is interested primarily in downloading programs. Some of these people have complained about the slowness of the download module. We rectified this problem somewhat by providing a 1200-baud option with

a Smartmodem 1200, but this isn't a cure-all. We are investigating further ways of speeding the downloading process, including modifying or replacing our BBS software. (If you have any suggestions in this area, drop me a line or leave me a message on the board.)

The second group of callers is more interested in interacting with other Apple users. They want to establish Special Interest Groups on the board, so they can exchange information and discoveries about their favorite topics. They have suggested we establish SIGs around a number of different topics including FORTH and Pascal programming, adventure gaming, and the Apple III. Recently, to satisfy these

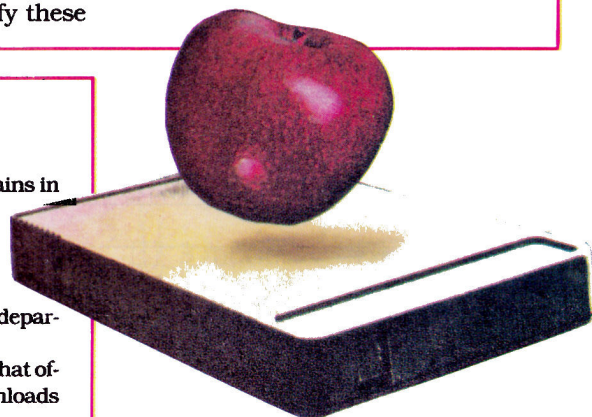
callers, we installed the Bulletin Board System on a hard disk. This move has given us the capacity to establish SIGs—something we could not do on four floppy drives. In the future, we hope we can run a few more phone lines into the board so board users can interact directly.

In the meantime, you can check out the *inCider* Bulletin Board System at (603) 924-9801, 24 hours a day, seven days a week. You can help make this board a more interesting and useful resource to all *inCider* readers. And stay tuned to *inCider* for more reports about the board. □

—Bob Ryan
inCider staff

Table. CompuServe services.

Service	Description
Comp-U-Store	A shop-at-home service for outstanding bargains in a wide variety of consumer goods.
AP Videotex Wire Service	The constantly updated wire service of the Associated Press with world and domestic news, sports, business, and features.
OAG Airline Guide	A listing of flight schedules, including times, departures, routes, and rates.
Special Interest Groups (SIGs)	Bulletin-board systems within CompuServe that offer consultation, a message board, and downloads of programs and text files.
CB Simulation	An on-line, real-time conference with people around the country.



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Now your Apple IIe can have high capacity data storage like a Winchester while you still enjoy the convenience and familiarity of a standard floppy. TeamMate's flexible disk drive from **Eastman Kodak** gives you 2.78 megabytes of data storage on one rugged diskette. You get unlimited expandable storage and access to Winchester capabilities... **at a very low cost.** Installation takes only minutes, thanks to TeamMate's software transparency with ProDOS. No software drivers or modifications are needed. Here are the TeamMate subsystems available now:

- TM 2203** ... A single Kodak flexible disk drive giving you 2.78MB on one diskette.
- TM 2206** ... Two Kodak drives for a total of 5.56MB of online, expandable storage.
- TM 2210** ... 10MB of Winchester storage, with the option of later adding a Kodak flexible drive.
- TM 2213** ... A 10MB Winchester combined with the Kodak 2.78MB flexible drive for built-in backup.
- TM 2232** ... 32MB of Winchester storage—the ultimate in high performance mass storage.

TeamMate Model	Quantity 1-2	Quantity 3-9	Quantity 10+
TM 2203	\$ 895	\$ 761	\$ 671
TM 2206	\$1295	\$1101	\$ 971
TM 2210	\$1295	\$1101	\$ 971
TM 2213	\$1695	\$1441	\$1271
TM 2232	\$2195	\$1866	\$1646
Kodak Diskettes	\$ 15	\$ 14	\$ 12

All TeamMate subsystems include drive(s), controller, TeamMate chassis, power supply, necessary cabling, and manual. Kodak subsystems include a Kodak diskette.



Price includes UPS surface shipping. Allow 3-4 weeks delivery.



Yes, I want to expand data storage on my Apple IIe. Please send me the following:

Quantity:

_____ TeamMate 2203 @ _____ ea.
 _____ TeamMate 2206 @ _____ ea.
 _____ TeamMate 2210 @ _____ ea.
 _____ TeamMate 2213 @ _____ ea.
 _____ TeamMate 2232 @ _____ ea.
 _____ Kodak diskettes @ _____ ea.

Subtotal _____

CA & MA residents, add sales tax _____

For optional UPS Blue Label delivery add \$10 per unit _____

Total Enclosed \$ _____

Ship To:

Name _____
 Address _____
 City _____
 State _____ Zip _____
 Daytime Phone _____

Payment Enclosed:
 check money order
 cashier's check

Make check payable to:
 Data Technology Corporation
 Dept. TM-1A
 2525 Walsh Avenue
 Santa Clara, CA 95051

For fastest delivery, call:
 In California, call collect:
 408-986-9545

1-800-824-3724

Continued from p. 14.

the **Table**).

Interested? Good, because now I'll show you two ways to log onto these systems. One is relatively cheap and simple; the other is expensive but versatile.

A Cheap and Simple BBS Log-On

Modems with software don't come much cheaper, or simpler, than The Networker by Zoom Telephonics. This unit comes with its own communications program, also called The Networker. It's simple to use, gets you on- and off-line with another computer, and can save a little text from the screen. It's perfect for a budget-minded user who simply wants to read files, leave messages, and chat.

The Networker is easy to use, but there are a few connections to make beforehand. You have to hook your phone into a modular jack on the modem (**Photo 1**), run a hand switch from the modem to your fingertips (**Photo 2**), and then install a phone line from the modem to the wall jack (**Photo 3**). Finally, the modem itself plugs into I/O slot 2 of your Apple (**Photo 4**).

To use, first boot up The Networker software and select BEGIN TERMINAL MODE. Then set the hand switch to the middle position, pick up your phone, and dial the number of the BBS. Using the *inCider* BBS as an example, you would dial (603) 924-9801. When you hear the steady whistle of the other computer's signal, flip the hand switch to O to originate the call, press the return key twice, and hang up the phone.

The BBS prompts you to enter your name, address, and phone number. It then asks you if you are a first-time caller. Type Y and hit return. The BBS displays the time (Eastern Standard) and the number of your call. Then it logs you in, prints a welcome message, displays a short explanation of the system function, and, finally, displays the prompt line:

FUNCTION:

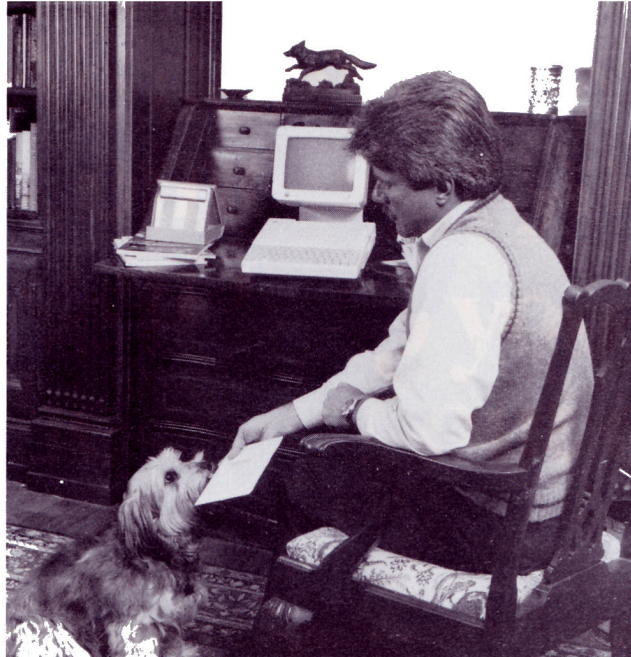
(A,B,C,D,E,G,H,K,L,N,Q,R,S,T,V,W,X, DOWNLOAD,NEWS,?)?

With the bulletin-board software *inCider* uses, the letters in the prompt line correspond to the functions the board can perform. If you want a brief description of the function, enter ?. For more detailed information, enter H.

As an example, assume that you want to see if there are any interesting

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(Add \$12.00 per year in foreign countries, except Canada and APO)

Name _____

Address _____

City _____ State _____ Zip _____

Payment enclosed (please make checks payable to SOFTYME).

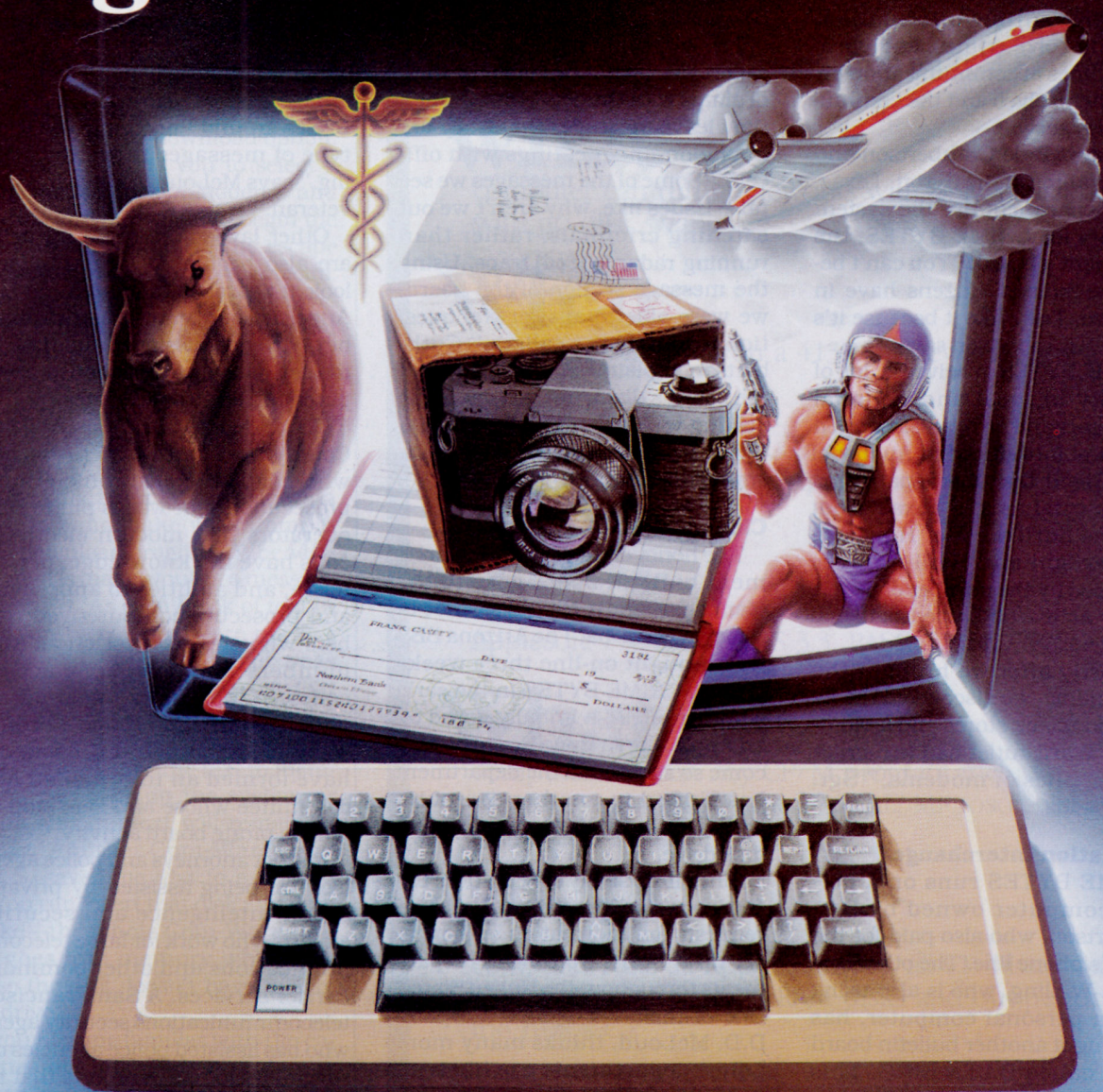
Visa MasterCard Acct. No. _____

Signature _____ Exp. Date _____

Send to: **SOFTYME • Dept. IN-05, PO Box 299 • Newport, RI 02840**

SOFTYME is the registered trademark of Viking Data Base Technologies, Inc. Apple is the registered trademark of Apple Computer, Inc. SOFTYME uses DOS 3.3 and runs on Apple II+, IIe and IIc.

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CompuServe puts a world of information, communications, and entertainment at your fingertips.

CompuServe is the easy to use videotex service designed for the personal computer user and managed by the communications professionals who provide business information services to over one fourth of the Fortune 500 companies.

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800-848-8199 In Ohio Call 614-457-0802
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Circle 124 on Reader Service Card.

On-line Cops

Although the idea of a police department BBS is new (in 1984 there were only two in the continental United States), it's an idea that makes sense to many police agencies. Throughout the U.S., police departments are beginning to look at bulletin boards as effective vehicles for disseminating crime-prevention information, helping to solve crimes, and opening new lines of communication between themselves and the communities they serve.

Sergeants Dale Cuthbertson and Choya Walling of the Byron, Texas, Police Department are the system operators for CRIME BYTES, the department's board. "You can't believe the interest citizens have in our board. They like it because it's helpful," Cuthbertson says.

CRIME BYTES received a lot of publicity in local and regional newspapers and on television when it was first introduced in August of 1984. Given that the department serves a rural area of Texas about 90 miles northwest of Houston, Cuthbertson and Walling were "surprised by the number of people in their area who owned personal computers."

"Shortly after we brought the board on-line, we discovered the local Radio Shack stores and a Montgomery Ward outlet had to reorder their supplies of modems," Sgt. Walling adds.

Information Interchange

CRIME BYTES runs on a personal computer owned by Sgt. Cuthbertson, who also paid for the system's phone line. The other sysop, Sgt. Walling, who is also using his own personal computer, has just brought another bulletin board on-line called DATA LINC. This board serves a different audience—other police departments that want to exchange information on crime prevention.

Both boards incorporate a feature called "offensive word look up" that prevents callers from leaving more obvious four- and five-letter words. "If the board detects the beginnings of an offensive word, the caller is immediately disconnect-

ed," Cuthbertson reports.

Walling and Cuthbertson report CRIME BYTES also incorporates a confidential section where callers can leave messages to the department about unsolved crimes. The department's detectives are currently working on four cases based on confidential tips left on CRIME BYTES.

The sergeants have also noticed callers are less intimidated in their dealings with the department when they leave messages than they are in one-on-one meetings with officers. "Some of the messages we see raise issues like, why aren't we out catching criminals, rather than running radar [speed] traps. Using the message section of the board, we were able to answer the question to satisfy the callers," Cuthbertson explains. A direct result of the board's dialogue on radar is the posting of a daily message that lists the streets where police radar cruisers are operating.

Cleaner Boards

The honor of the first law-enforcement bulletin board goes to the Maricopa County Sheriff's Office in Phoenix, Arizona. The Arizona BBS was brought on-line three weeks prior to CRIME BYTES in the early summer of 1984. Initially based on an Apple, the Arizona Board has become so successful the department has shifted to another computer with a built-in 10-megabyte hard-disk drive.

Since its first day of operation, the Maricopa department has received requests for information on how to set up a board from other departments throughout the United States. One of their two sysops, Corporal D.D. McCloud, thinks many more police departments are likely to bring their own systems on-line in 1985.

Operated as a public service, the Arizona sheriff department's board carries crime-prevention information, offers a public-message section, and also provides daily national weather data obtained from the National Oceanic and Atmospheric Administration.

The presence of a police-operated

BBS in Phoenix has prompted some local sysops to clean up their boards. Since beginning its electronic message service, the Maricopa County Sheriff's Department has participated in several bulletin board busts.

"Law enforcement is becoming more aware of computer and electronic crime, particularly the need to control pirate bulletin boards [within their jurisdiction]. As police officers, we occasionally log onto BBSes around Phoenix to see what type of messages they are carrying," says McCloud, a 19-year police veteran.

Other law-enforcement agencies are also beginning to take a long look at boards in their areas. In Los Angeles County, two district attorneys are now assigned full-time to investigate and prosecute computer and electronic crimes.

Clifton Garrett, the Los Angeles County Assistant District Attorney who heads the electronic-crimes prosecution unit warns pirate BBS operators that modern electronic cops have the knowledge, persistence, and abilities to apprehend and prosecute computerized robbers who steal or post credit-card numbers and telephone-access codes. Additionally, McCloud reports that in and around Phoenix some of the local-board operators have formed an informal ad hoc committee whose aim is to stop or reduce pirate board activity.

District attorneys and police agencies are being assisted by private-sector intelligence and security experts who work for large telecommunications and other common-carrier services. A San Francisco telecommunications security agent who has assisted police agencies on several major cases reports that he and members of his department regularly log onto suspected pirate boards in an effort to collect evidence of illegal activity. The agent, who declines to be identified, reports the courts are beginning to understand the gravity of computer crimes and are now willing to pass out more severe sentences to operators of pirate boards. □

—Jim Forbes

item 3, PERSONAL COMPUTING. This brings you to an interior page, with a list of personal computing services. Select item 5, COMMUNICATIONS FORUMS (the SIGs). From the next menu, select item 3, the MAUG (Micronet Apple Users' Group).

After you become a MAUG member, read the bulletins; then hit the return key to proceed to the main SIG menu. Select item 4, the DATA LIBRARY, to download a file. From the menu, select a category that interests you. After a pause another menu appears that lets you pull up a directory of files, browse through the files and read them, upload into the data base, and download into your own memory.

Once you've chosen a title from the directory, select the download option. The system prompts you to select a transfer mode (I use X-Modem), and then waits for your signal to begin the transfer. At this point, hit the escape key. The Com-Ware menu reappears. You are still on-line with CompuServe. Hitting F brings up the Hi-Speed Transfer menu, with the following choices:

(T) TRANSMIT DATA FROM MEMORY
(R) RECEIVE DATA FROM MEMORY
(ESC) ABORT

Press R. This automatically starts a routine to handshake with CompuServe's download program. When the connection is made, you get a message confirming it. As each block of text or data is received, Com-Ware notifies you on-screen. When the full text has been captured, you get a message that the transmission is over and go automatically into terminal mode.

Now that you have the text in memory, you can start on the system or hang up and the text will remain in memory. Another Com-Ware command, S, saves the text to a scratch disk. You can insert that disk any time you like—the whole Com-Ware program goes into memory when you boot, so the disk doesn't have to stay in the drive.

As you become familiar with the capabilities of your modem and your software, you'll learn to do more and more interesting things. Decide what you want from telecommunications, what features you need in a modem and software, and what you can afford. Then get the modem and program that are right for you and get on-line. ■

Brian J. Murphy is a nationally syndicated columnist who has written widely about telecommunications. Write to him at inCider, 80 Pine Street, Peterborough, NH 03458.



What

computer has more memory than an IBM P.C.?

What

computer can run Appleworks with only 1 disk drive with no disk swapping?

What

computer will give you a 413K Appleworks desktop?

What

computer will accelerate Appleworks 4 to 10 times?

What

computer has 4 built-in RAM disks for use with Applesoft, Pro-DOS, DOS 3.3, PASCAL and CP/M?

What

computer can run any CP/M program including Wordstar, dBASEII, Turbo PASCAL, Microsoft Basic, Cobol and Fortran?

What

computer runs all Apple software, all CP/M software, has 640K of memory, 4 RAM disks and out performs the IBM P.C.?

**ANSWER
ON
NEXT
PAGE**

A Glossary of Telecommunications Terms

ASCII and EBCDIC

Two of the formats available for communicating characters so they are read the same way at both ends. ASCII (pronounced as-key) uses 7 bits for a character and EBCDIC (pronounced eb-sid-ik) uses 8.

Asynch and Bisynch

Two alternative systems for computers to determine where data "words" in a communication start and stop. In asynchronous transmissions, the computers mark the intervals with an agreed-upon symbol; in bisynchronous, the two computers synchronize their internal clocks and use the beats to mark the intervals.

Baud

Often referred to as a measure of the speed (bits per second) with which a modem sends and receives data, baud is really a phone company term for the number of symbols (or changes of state in a carrier tone) per second that a phone line carries. "Bits per second" is more accurately the information transfer rate between a modem and a terminal or computer. If the computers at both ends of a hookup aren't talking at the same speed, either nothing happens or garbage is transmitted.

Bulletin Board System (BBS)

A microcomputer system equipped with a modem and the necessary software to answer phone calls from other computers. Once connected, the software lets callers leave and retrieve messages, download data and programs, and read information of special interest.

Carrier

The standard fixed-frequency, fixed-amplitude signal (a single, continuous tone) that a modem uses to communicate. The first thing a modem hears when it answers the phone, the carrier is the signal that communication can start. With acoustic modems, you plug in the handset when you hear the signal. If you see NO CARRIER on your screen, either the other computer didn't answer, the modem wasn't on, or one of you hung up.

Communications Program

A program necessary for handling the complex activities involved in

telecommunication. The programs at each end need not be the same, although several on the market are designed for specific situations (like Apple-to-IBM or Apple-to-CP/M) and come in matched pairs to assure trouble-free passage of data. Some manufacturers offer (either as an extra or included in the price) a custom package for their modem that sends out characters correctly coded.

Data Bits

The form that the streams of characters representing the message takes. For an orderly transmission, each end of the communication should have the same settings.

Start Bits. One or 2 bits that indicate that the bits immediately following are data.

Stop Bits. One or more bits that mark the end of the data.

Parity Bits. Used for error checking. Either even or odd parity can be set. With even parity, if the number of ones in the transmitted byte isn't even, the final bit becomes a one, forcing the byte to have an even number of ones. If the receiving computer sees a byte without an even number of ones, it knows that the byte wasn't sent correctly.

Downloading

Retrieving data or programs from another computer, such as a BBS. You usually download to a printer or disk.

Duplex

Full-Duplex. A communications mode that lets data pass in both directions at once. It's useful if you're sending a lot of numerical data that must be extremely accurate. The receiving computer checks back during transmission to see that the data is right, without interrupting the flow of incoming bits.

Half-Duplex (or Simplex). A bidirectional transmission, but only one way at a time. There are periodic pauses as the accuracy of the transmission is checked.

Handshaking

Establishing a link between two devices. Telecommunications handshaking synchronizes the two computers so that the data they transmit and receive isn't garbled.

Interface

Hardware that connects a computer with a peripheral.

Serial. A communications path that sends data from the computer one bit at a time. All communication over modems is done serially.

Parallel. Multiple paths used simultaneously to send and receive 8 bits of data at a time.

LOGON or log on

The procedure for accessing another computer. This can be simply hitting the space bar (saying, in effect, "I am here") or a complicated sequence of identification codes, account numbers, and passwords. To eliminate unauthorized use of its computers, some installations are equipped with special modems that will accept your ID, hang up, and then automatically call back the phone number on file for your ID to make sure you are the caller.

Modem

A device that lets digital devices (like computers) communicate over everyday phone lines.

Originate Mode and Answer Mode

To start any transmission, one modem must be in originate mode and the other in answer mode. Generally, if you're calling out, you'll be in originate mode, and a computer standing by to receive will be in answer mode.

Protocol

The rules governing how data is transmitted. These rules must be agreed on at both ends of the communication.

RS-232

A standard that defines the signals on the pins of the communications or serial port on your computer. For example, a computer can "listen" to a "send" pin. The modem manages these designations.

Special Interest Group (SIG)

A part of a BBS reserved for people with a common interest, like adventure gaming or the Macintosh.

System Operator (SYSOP)

The person who operates and (usually) owns the BBS.

Uploading

Sending a file to another computer.

The Apple IIc with Z-RAM



Applied Engineering and Apple computer have teamed up to take your IIc to new heights.

Applied Engineering's Z-RAM card for the IIc is available with 256K or 512K of additional memory and a powerful Z-80 microprocessor for running CP/M software.

Z-RAM fits neatly inside the IIc. Installation is easy, clear instructions show you how. You'll need a screwdriver and about 10 minutes (if you can change a light bulb you can install Z-RAM).

Z-RAM and Appleworks will knock your socks off.

A 256K Z-RAM will give you a 229K available desktop and Appleworks will be completely loaded into memory. Appleworks will now run about 10 times faster in your IIc with 1 disk drive than in other IIc's with two disk drives. A 512K Z-RAM will give you a 413K available desktop. A 256K Z-RAM can be upgraded to 512K at a later date when your needs grow.

Z-RAM is also a high speed solid state disk drive. With Z-RAM your programs will load and save over 20 times faster. Z-RAM's RAM disk is compatible with Applesoft, Pro-DOS, DOS 3.3, PASCAL and CP/M. And with Z-RAM you can copy a disk in one pass. Just insert the original, remove the original, insert blank disk! That's it! Z-RAM is another disk drive, only 20 times faster, 4 times larger capacity, and no whirring, clicking or waiting!

But before you start panting over all that extra memory, don't forget that the Z-RAM card has a built-in high speed Z-80 processor chip that allows you to run CP/M programs like Wordstar, dBASE II, Turbo PASCAL, Microsoft BASIC, FORTRAN and COBOL and over 3,000 other CP/M programs. So Z-RAM not only makes Apple programs run better and faster, it lets you run MORE programs.

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So the next time somebody asks you why you didn't get an IBM P.C. tell him you bought a IIc because the IBM didn't have enough memory and was too slow and couldn't run CP/M software. And tell him you made it past the 8th grade.

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APPLIED ENGINEERING

Seven Reasons Why Your Business Needs Telecommunications

C by Archie Mason

omputing can be a lonely business. In communion with only a flickering screen, the operator ignores the external world as machine and fingers quietly interact. Not so with telecommunications, however, where the outside world lies on the other side of that computer screen. And nowhere is telecommunications more significant than in business. Not only big corporations with big phone bills (and big pocketbooks), but most every business person today can benefit from telecommunications applications. Consider some of the ways your business might get on-line.

● *Electronic Mail.* Computers are replacing paper and eliminating office functions related to paper handling, such as photocopying, distribution, and filing. People type memos into computers, and the computer takes care of the rest—calling the recipient, downloading the personalized memo, and getting a date-stamped acknowledgement. Eventually, the computer even returns the reply by the same automatic means—all without a single piece of hard copy.

● *Mainframe Data Exchange.* As an aid to everyday work, desktop micros can access, interact with, and add to the vast store of information contained in mainframes.

● *Information Retrieval.* Formerly, if you wanted to know the history of

If you don't take advantage of telecommunications, chances are your competitors will.

dollar-versus-pound transactions for 20 years, or the fuel-consumption figures in Lower Slobovia, or the track record for left-handed pitchers in rainy weather, you had to access library or company records, or write or phone several different sources. Not any more. For a nominal fee, you can access data bases of all descriptions, from *The New York Times* back-issue library to the Nuclear Energy Agency Data Bank. Call up, log on, ask your question, and download the reply to your disk or printer for more leisurely perusal later. And information services, like CompuServe and The Source, supply thousands of subscribers with special services of myriad kinds day or night. (In this issue, Data-Gram by Matthew Lesko examines some on-line services.)

● *Bulletin Boards.* Generally for hobbyists or special-interest groups (although there are several industry-specific boards), a bulletin board is a computer system dedicated to answering one (or sometimes several) in-

coming telephone lines. Some offer message services where any caller can type in (post) or read and reply to bulletins, just like on the public bulletin board in your local supermarket.

Many bulletin boards are free; others have a joining charge or even scales of charges for different levels of access or service. Fundamentally, bulletin boards have no connect-time charge, but, since they rarely have toll-free numbers or special local-connect numbers, you must pay for the phone call. (See Brian Murphy's article, "How to Use a Modem: Getting Your Apple On-line," on p. 14 for more on bulletin boards.)

● *Telephone Management.* Unless you subscribe to one of the voice messaging services (like VMX, in Richardson, Texas), you probably spend a lot of time trying to contact people unsuccessfully by phone. With a modem and a micro, the contact can be automatic and the message left in full, ready to be answered in the same way. Just like the "obsolete" answering machine,

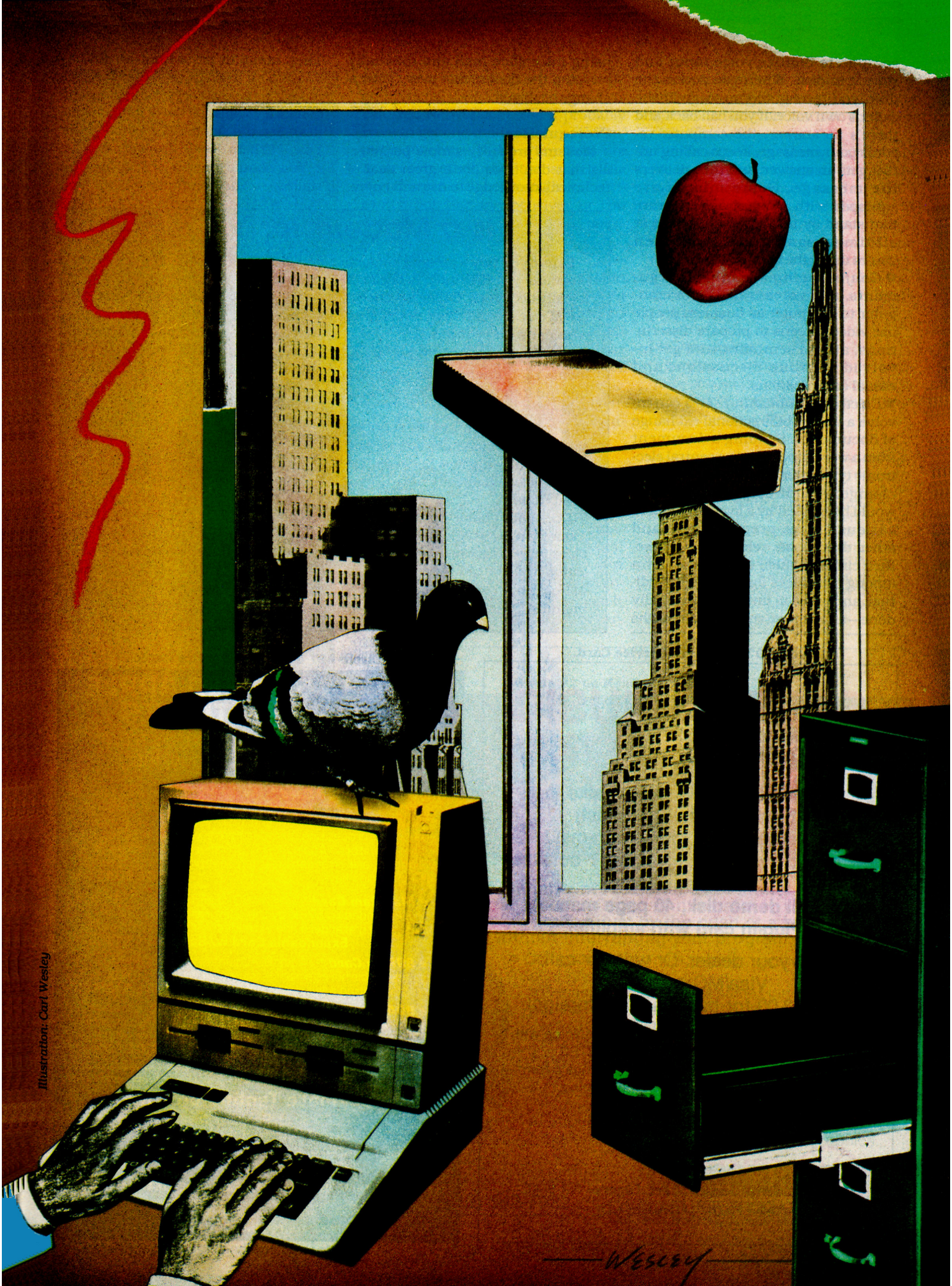


Illustration: Carl Wesley

WESLEY

computers digitize voice input and store it to disk. When you access the disk, you receive the message in the caller's own voice. If you call back and there's no answer, the computer records *your* message, keeps calling until it gets an answer, and then delivers the message. Some micros are equipped with a board and software that stand by to answer the phone at all times (sometimes even when you're using the computer).

● **Conferencing.** Opinions, arguments, and votes travel from computer to computer as business people use video screens to prepare dissertations, attend seminars, and get involved in group discussions and casual conversations.

● **Electronic Publishing.** This can involve a uni- or bidirectional exchange of documents. Sending a document from a word processor to a central electronic typesetter is a unidirectional exchange. A bidirectional exchange would be typified by a legal firm where various offices prepare briefs and other documents relevant to a case, then circulate them in electronic form among the offices for comment, addition, and revision until they are finally done—a task that could take months

using interoffice mail and manually retyping the documents every time a change occurred.

Prerequisites

Modems are fairly simple peripherals that don't require a great deal of technical knowledge to use and enjoy.

They range in price from as little as \$350 to an average of about \$695 (although some can cost several thousand dollars if you buy all the bells and whistles). See the sidebar "Is a Modem for You?" to help decide if you need one.

You should have a special line installed, so the computer has its own

Is a Modem for You?

Before you buy a modem for your business, you first have to decide if it really needs one. Below is a checklist of questions to ask yourself in considering this question.

- 1) Do you frequently have documents that others in the organization must comment upon, revise, or amend?
- 2) Do memos, financial reports, sales figures, customer orders, and other documents flow between several offices that already have microcomputers?
- 3) Does your business spend a lot of money on overnight package services when response to communication must be quick?
- 4) Does your company have several buildings, making it necessary to

travel between them frequently to exchange verbal or written views?

- 5) Do you wait for printouts or reports from a mainframe, then key that data into a spreadsheet or some other program, and finally key revised figures back into the mainframe—or any part of this process?
- 6) Do you spend a lot of time and money hiring people to provide you with data that is available in various computer data bases?

If any of your answers were "yes," you may benefit from telecommunications. Compare the initial costs with the savings of time and money to be generated from faster and more accurate communications, and you may decide that you need at least one modem. □

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Local-Area Networks

Essentially, a LAN is a closed network that lets you communicate intensively within one location (which might be a floor in an office building, the whole building, or even an office complex). One of several different standards (Ethernet, for example) can govern a LAN's operation. Generally speaking, these standards are incompatible: It's quite expensive and difficult for them to communicate with one another.

A wire or cable defines the geography of the LAN. When computers and other devices are hooked onto this cable, they can exchange data; share data bases and resources like printers, plotters, and modems; and more. Uses of LANs fall into two major categories. One is sharing data, documents, or common work activities around a central data base, as in several machines accessing a company's main data base to do inventory control, billing, or accounts payable. The other is sharing expensive resources or peripherals—printers, plotters, laser typesetters, modems, hard disk drives and other mass-storage devices—among many users. Instead of equipping each microcomputer with its own printer, a print server on a LAN can manage an entire department's printer needs. The print server directs a task to the specified type of printer, whether it be letter-quality, dot-matrix, draft-quality, or several printers all at once.

Installing a LAN involves more than merely adding a modem and learning a communications software package. There are questions of architecture, installation, and training of operators to be addressed, as well. □

extension—or better yet, a dedicated outside line. Plugging an auto-dial modem into a regular phone line may interfere with the transmission when a call comes in over that line. A "data grade" line connection is better than a "voice grade," and only a little more expensive.

Broadly speaking, modems cannot

easily be shared except with elaborate equipment. (See the sidebar on "Local-Area Networks.") You'll probably have to get one modem for each computer involved. If the computers are near each other, you can switch the serial connection through a multi-switch box (not inexpensive), or you can physically plug and unplug as required.

In the same way that some businesses restrict long-distance calls to specific phones, it's a good idea to question whether every computer in the office should have outside communication. There's a temptation for employees to spend time reading free bulletin boards, or consulting stock-quote services, or even playing adventure games on the services—at company expense.

Modem Acquisition

When deciding which modem and software to get, you should first consider with whom are you going to communicate. If it will be with external computers, you must make certain that your modem and software can accommodate their requirements, such as baud rate and ASCII/EBCDIC char-

acter configuration. If your communications are going to be primarily internal, then you can set your own standards.

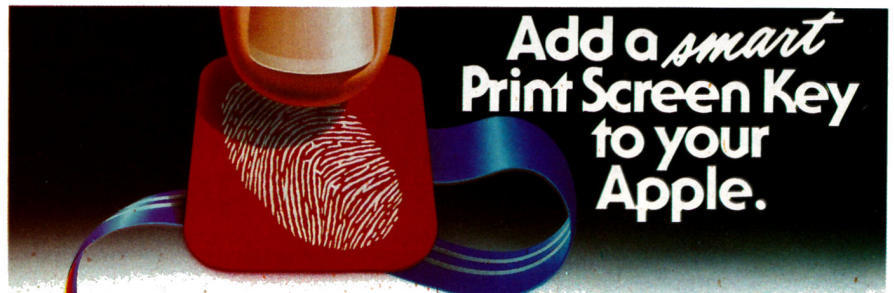
If it's necessary that your communications network be on stand-by for incoming calls, you'll need an auto-answer capability. Additionally, if your outbound calls are heavy, auto-dial saves many keystrokes. If you need various baud capabilities, then you must buy a programmable modem, which can handle multiple baud rates.

In Conclusion

Business communications isn't quite so lonely after all. In fact, business people spend most of their time communicating. ■

Archie Mason and co-workers use computer communications in publishing two newsletters. Editing, writing, and revising material are all done in their individual homes, and the final copy is sent to a master machine in Archie's home. From there, it is sent out to be typeset. For more information on business communications, write to Archie at InterCalc Spreadsheet Users' Group, P.O. Box 4289, Stamford, CT 06907.

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A Concise Guide to Popular Modems

Manufacturer	Model	Cost	Baud Rate	Auto Dial/ Auto Answer	Type*	Has Terminal Program
Anchor Automation 6913 Valjean Avenue Van Nuys, CA 91406 (818) 997-6493	Volksmodem	\$ 80	300	No	E	No
	Volksmodem 12	\$299	300/1200	Yes	E	No
	Signalman Express	\$439	300/1200	Yes	E	No
Apple Computer 20525 Mariani Avenue Cupertino, CA 95014 (408) 996-1010	Apple Modem 300	\$225	300	Yes	E	Yes
	Apple Modem 1200	\$495	300/1200	Yes	E	Yes
Hayes Microcomputer Products 5923 Peachtree Industrial Boulevard Norcross, GA 30092 (404) 449-8792	Smartmodem 300	\$289	300	Yes	E	No
	Smartmodem 1200	\$599	300/1200	Yes	E	No
	Micromodem IIe	\$329	300	Yes	I	Yes
Microcom 1400A Providence Highway Norwood, MA 02062 (800) 322-3722	Era 2	\$499	300/1200	Yes	I	Yes
Novation 18664 Oxnard Street Tarzana, CA 91356 (800) 423-5419	J-Cat	\$149	300	No	E	No
	Apple-Cat II	\$319	300	Yes	I	Yes
	212 Apple-Cat II	\$595	300/1200	Yes	I	Yes
	Smart-Cat	\$595	300/1200	Yes	E	No
Prometheus Products 45277 Fremont Boulevard Fremont, CA 94538 (415) 490-2370	Promodem 1200	\$495	300/1200	Yes	E	No
	Promodem 1200A	\$449	300/1200	Yes	I	Yes
Racal-Vadic 1525 McCarthy Boulevard Milpitas, CA 95035 (408) 744-0810	Maxwell 300V	\$295	300	Yes	E	No
	Maxwell 1200V	\$549	300/1200	Yes	E	No
Transend 2190 Paragon Drive San Jose, CA 95131 (408) 946-7400	AMC-300	\$275	300	No	I	No
	Easy Com/Easy Go	\$574	300/1200	Yes	E	Yes
U.S. Robotics 1123 West Washington Boulevard Chicago, IL 60607 (312) 733-0497	Password 300	\$199	300	Yes	E	No
	Password	\$449	300/1200	Yes	E	No
Zoom Telephonics 207 South Street Boston, MA 02111 (800) 631-3116	Networker	\$129	300	No	I	Yes
	Zoom/Modem IIe	\$179	300	Yes	I	Yes

* Types:

Internal: Modem on card that fits slot—Apple II, II Plus, and IIe

External: Modem stands alone and requires serial input—Apple IIc or serial card

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plished with the guidance of real fighter pilots, and includes seven different combat missions, four skill levels, and an infinite number of exciting scenarios. F-15 will thrill and challenge you and give you the chance to prove you have the "Right Stuff" of an EAGLE fighter pilot!!

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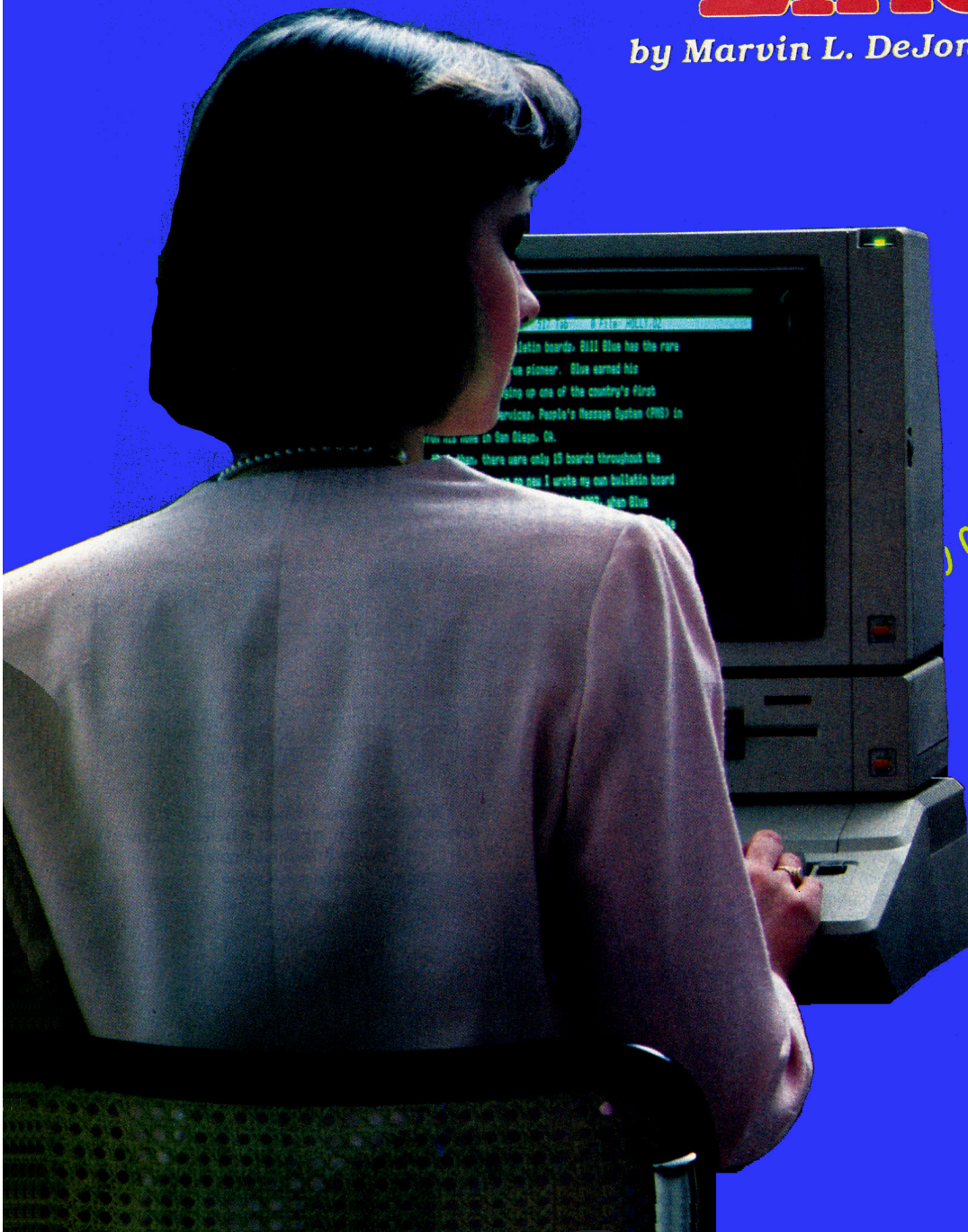
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Private Lines

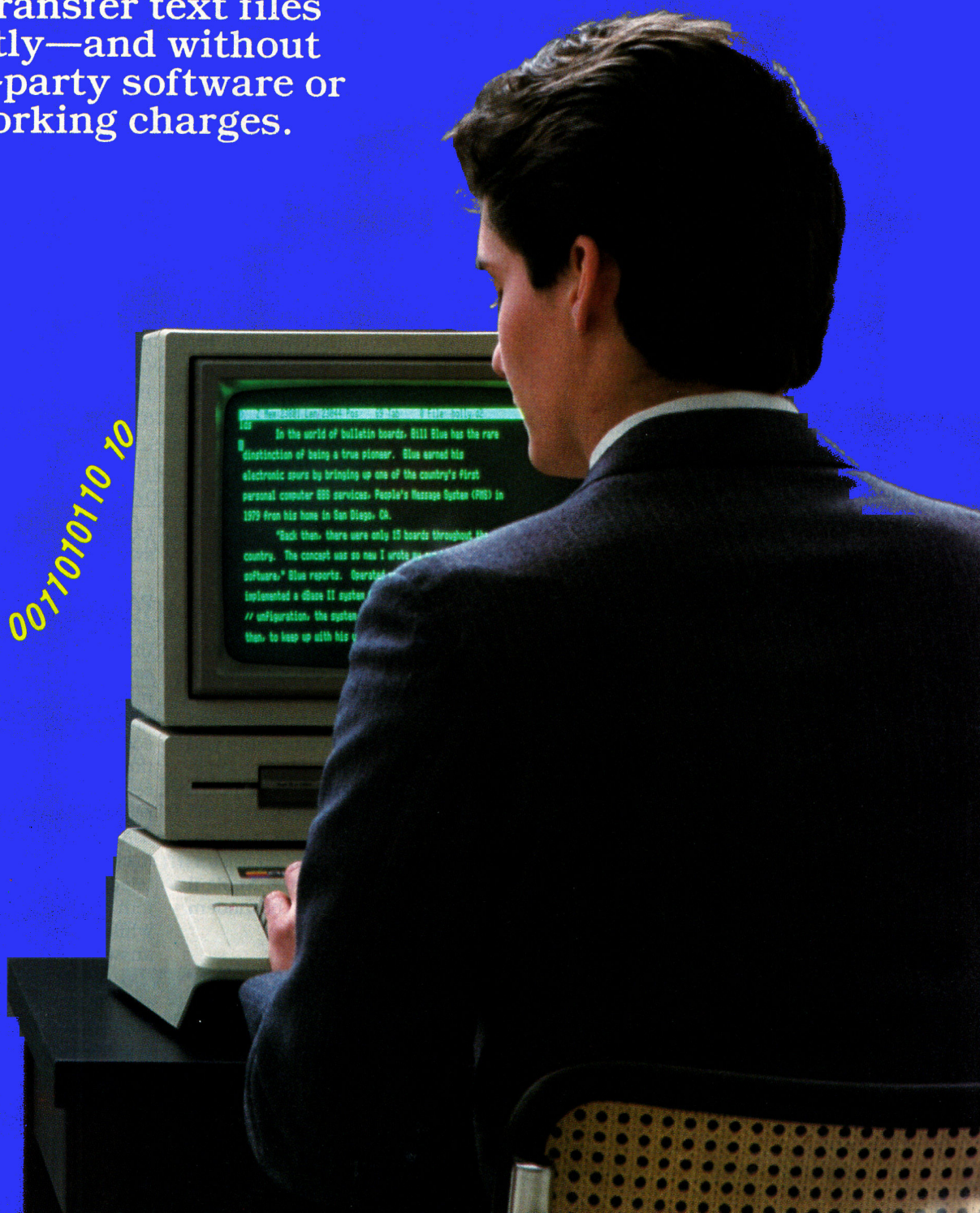
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the longest distance
between two Apples when
you transfer text files
directly—and without
third-party software or
networking charges.

0010110110 0111010010 0011010110 10



There's a crowd, or can be, especially with telecommunications. Newcomers automatically associate telecommunications with subscriptions to on-line services like The Source or Compu-Serve, as well as with sophisticated modem software. However, if your telecomputing applications simply involve transferring information between two points, you can probably avoid the complications and expense of these entanglements. Simple programs such as I present here are adequate to transfer text files, as well as Applesoft programs and short binary files (which are easily converted to text files), from one Apple II to another. With additional programs, you can create text files from the keyboard and read them on the monitor.

This article assumes you have either a Hayes Micromodem II or //e direct-connect modem or a California Computer Systems 7710 asynchronous-serial interface card connected to a modem of your choice. However, you can easily modify the programs to suit other types of hardware. Both the Hayes and CCS equipment use the 6850 ACIA (asynchronous communications interface adapter), an integrated circuit that outputs a byte of data as a serial bit stream, adding the start, parity, and stop bits. The 6850 ACIA also converts an incoming serial bit stream into a byte of data and sets flags to indicate errors. The 6850 ACIA registers are accessed at the same addresses regardless of whether you use the Micromodem or the CCS 7710.

The Micromodem is a direct-connect modem—it contains everything you need to connect your computer to the telephone system. You just insert one end of the modem cable into your telephone jack and fit the circuit board into one of the Apple II's peripheral card slots.

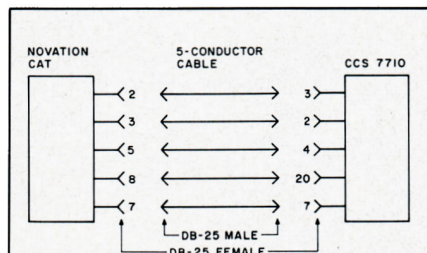


Figure. Schematic diagram of the interface between the Novation Cat acoustic-coupled modem and the California Computer Systems 7710 asynchronous-serial interface board.

Listing 1. BASIC text communication program.

```

5 REM MICROMODEM II OR CCS 7710 TEXT COMMUNICATION PROGRAM
10 GOTO 450
15 REM RESTORE INPUT VECTOR
20 PRINT D$;"IN#0" : RETURN
25 REM RESTORE OUTPUT VECTOR
30 PRINT D$;"PR#0" : RETURN
35 REM SELECT SERIAL INPUT
40 POKE KLSW,90 : POKE KHSW,3 : CALL 1002 : RETURN
45 REM SELECT SERIAL OUTPUT
50 POKE CLSW,116 : POKE CHSW,3 : CALL 1002 : RETURN
100 ONERR GOTO 190
110 GOSUB 30 : GOSUB 40
120 GET A$: IF A$ < > CHR$(6) THEN 120
130 PRINT " " : GOSUB 50 : GOSUB 20
140 PRINT D$;"READ";FILE$
150 A$ = ""
160 GET B$ : A$ = A$ + B$
170 IF B$ < > CHR$(13) THEN 160
180 PRINT " ";A$ : GOTO 110
190 PRINT D$;"CLOSE";FILE$ : GOSUB 30
200 POKE 216,0 : PRINT "FILE HAS BEEN SENT."
210 POKE 69,3 : CALL 882
220 GOTO 510
300 Z = FRE (0) : GOSUB 30 : GOSUB 40
305 POKE 69,6 : CALL 882
310 A$ = ""
320 GET B$ : IF B$ = CHR$(3) THEN 370
330 A$ = A$ + B$ : IF B$ < > CHR$(13) THEN 320
350 PRINT " ";D$;"WRITE";FILE$
360 PRINT A$ : GOTO 300
370 PRINT " " : GOSUB 20
380 PRINT D$;"CLOSE";FILE$
390 PRINT "FILE CLOSED."
400 GOTO 510
440 REM INITIALIZATION SEQUENCE
450 CLEAR : D$ = CHR$(4)
460 CLSW = 54 : CHSW = 55 : KLSW = 56 : KHSW = 57
470 PRINT "INPUT THE SLOT NUMBER OF THE SERIAL INTERFACE."
480 INPUT S : POKE 255,S : HOME
490 PRINT D$;"BLOAD TERMINAL ROUTINES 1.0.OBJ0"
491 MODEM = - 16251 + 16 * S
492 POKE MODEM,143 : REM MODEM IN ORIGINATE MODE,300 B/S.
493 REM REPLACE WITH "POKE MODEM,139" FOR ANSWER MODE,300 B/S.
494 REM OMIT LINES 491 - 494 FOR CCS 7710 SERIAL I/O BOARD.
500 CALL 768 : REM CALL MACHINE LANGUAGE TERMINAL ROUTINE
510 POKE 10,0 : CALL 802
520 PRINT "INPUT THE FILE NAME"
530 INPUT FILE$
540 PRINT D$;"OPEN";FILE$
550 IF PEEK (10) = 0 THEN 100
560 GOTO 300 : REM RECEIVE A FILE

```

The CCS 7710, on the other hand, is a serial I/O board that must be connected to a separate modem. I used a Novation Cat acoustic-coupled modem. The **Figure** illustrates the connections between these two devices. Since the modem and the board both have female DB-25 connectors, you'll need two male DB-25 connectors and a five-wire cable. (The connectors and the wire to make the cable are available at Radio Shack stores.) The board performs the serial/parallel and parallel/serial conversions, and it transforms the TTL (transistor-transistor-logic) level signals inside the Apple II to the RS-232C logic levels the modem requires.

The Main Programs

The BASIC program in **Listing 1** BLOADs and CALLs the machine-language routines in **Listing 2**. Begin by examining lines 491-494, and make the appropriate modifications to suit your situation. Usually, the telephone caller chooses the originate mode and

the receiving party chooses the answer mode.

Next, change the PHA and BNE PAUSE instructions in lines 39 and 40 of **Listing 2** to NOP instructions—three \$EA op-codes. If you want more sophisticated operation in an echoplex mode, one party can reinsert the PHA and BNE PAUSE. (If both parties echo codes, you'll see some fast, furious action, but not much information will be sent.) Finally, SAVE and BSAVE the modified listings.

After you install the hardware and load the programs, one computer user telephones the other. The caller's system should be in the originate mode, while the answerer's should be in the answer mode. A user with a Novation Cat needs to place the mechanical switch located on the modem in the appropriate position. With the Micromodem, the modem-control word determines the mode. (Refer to lines 491-493 in **Listing 1**.) When the originator's modem sends a carrier tone, the answerer runs his or her program.

TRY BEFORE YOU BUY

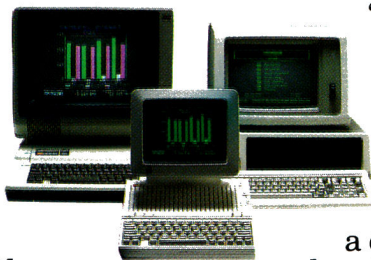
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**"Micromodem
owners can
transfer text files
without a third-
party network."**

After some initialization instructions are executed, both computer systems behave like terminals. Lines 30-58 in **Listing 2** are responsible for the actual communication over the telephone lines. Because the programs communicate text files from disk to disk, when the users are done "chatting" on the keyboard and monitor, the operator who will send the file presses control-S to exit the terminal mode. Then the BASIC program execution continues on line 520.

Both parties receive a prompt to input a file name. (They can be different names.) Each system opens a file, but after line 550 each party will operate from a different part of the BASIC program. The sending party will use lines 100-210; the receiving party will use lines 300-400.

When the receiving party enters a file name, the program sends an ACK (acknowledge) character, which signals to the sending party that the receiver is ready for the file. The sender's program then sends the file in strings separated by CR (carriage return) characters. After each CR, the program waits for an ACK character before it sends another string. This way the programs remain synchronized.

When the entire file has been transferred, the sender's program issues an ETX (end of text) character to alert the receiver's program that text transmission has concluded. Both programs then close their files and return each party to the terminal mode for any further remarks or to transfer another file. Remember that the person who sends the file must press control-S, and the person who receives the file should be careful not to enter a locked file name or one of a different file type.

The only tricky parts of the BASIC program involve switching the input/output vectors of the Apple II, depending on where the information is supposed to be obtained or sent, and using the GET instruction in the Apple II DOS environment. For example, information obtained from the disk with the GET instruction on line 160 requires local input, hence the GOSUB 20 instruction on line 130. After the
36 inCider May 1985

Listing 2. Machine-language terminal routines to accompany Listing 1.

```

SOURCE FILE: TERMINAL ROUTINES 1.0
0000:      1 ;THIS PROGRAM ASSUMES THE HAYES MICROMODEM OR THE
0000:      2 ;CCS 7710 CARD IS IN A CARD SLOT.
C000:      3 KYBD EQU $C000 ;APPLE KEYBOARD ADDRESS
C010:      4 STRB EQU $C010 ;KEYBOARD STROBE CLEAR.
C086:      5 CR EQU $C086 ;6850 ACIA CONTROL REGISTER.
C086:      6 STATUS EQU $C086 ;6850 ACIA STATUS REGISTER.
C087:      7 DATA EQU $C087 ;6850 ACIA DATA REGISTER.
FDFO:      8 COUT1 EQU $FDFO ;MONITOR OUTPUT ROUTINE.
000A:      9 FLAG EQU $0A ;FLAG LOCATION.
----- NEXT OBJECT FILE NAME IS TERMINAL ROUTINES 1.0.OBJO
0300:      10 ORG $0300
0300:A9 00 12 LDA #$00 ;CLEAR FLAG LOCATION.
0302:85 0A 13 STA FLAG
0304:A5 FF 14 LDA $FF ;GET SLOT NUMBER FROM MEMORY.
0306:0A 15 ASL A ;SHIFT IT INTO HIGH ORDER NIBBLE.
0307:0A 16 ASL A
0308:0A 17 ASL A
0309:0A 18 ASL A
030A:A8 19 TAY ;PUT IT INTO Y REGISTER.
030B:84 FE 20 STY $FE ;SAVE SLOT INDEX HERE.
030D:A9 03 21 LDA #$03 ;RESET 6850 ACIA.
030F:99 86 CO 22 STA CR,Y
0312:A9 15 23 LDA #$15 ;SET PROTOCOL: 8 BITS,
0314:99 86 CO 24 STA CR,Y ;NO PARITY, ONE STOP BIT.
0317:B9 87 CO 25 WAIT LDA DATA,Y ;READ AND DISCARD DATA.
031A:B9 86 CO 26 LDA STATUS,Y ;ARE CTS AND DCD SIGNALS
031D:29 0C 27 AND #$0C ;PRESENT?
031F:D0 F6 28 BNE WAIT ;NO, WAIT HERE.
0321:60 29 RTS ;RETURN FROM INITIALIZATION.
0322:A4 FE 30 LDY $FE ;GET SLOT INDEX.
0324:B9 86 CO 31 LOOP LDA STATUS,Y ;YES, IS RECEIVER READY?
0327:29 01 32 AND #01
0329:F0 0F 33 BEQ TRANS ;NO, TRY THE TRANSMITTER.
032B:B9 87 CO 34 LDA DATA,Y ;YES, GET THE DATA.
032E:09 80 35 ORA #$80 ;SET HIGH BIT.
0330:C9 93 36 CMP #$93 ;IS IT "CTRL S"?
0332:F0 23 37 BEQ SEND ;BRANCH TO FILE SEND ROUTINE.
0334:20 F0 FD 38 JSR COUT1 ;OUTPUT THE CHARACTER.
0337:48 39 PHA ;IF YOU DO NOT WISH TO
0338:D0 40 BNE PAUSE ;ECHO CHARACTERS, REPLACE
033A: 41 ;LINES 39 AND 40 WITH THREE "NOP"
033A: 42 ;INSTRUCTIONS, OP CODE = $EA.
033A:AD 00 CO 43 TRANS LDA KYBD ;READ THE KEYBOARD.
033D:10 E5 44 BPL LOOP ;NO DATA, SO LOOP BACK.
033F:48 45 PHA ;SAVE THE CHARACTER.
0340:8D 10 CO 46 STA STRB ;CLEAR THE KEYBOARD STROBE.
0343:20 F0 FD 47 JSR COUT1 ;REPLACE WITH THREE "NOP"
0346: 48 ;INSTRUCTIONS IF OTHER TERMINAL ECHOES.
0346:B9 86 CO 49 PAUSE LDA STATUS,Y ;IS TRANSMITTER READY?
0349:29 02 50 AND #02 ;PAUSE UNTIL IT IS.
034B:F0 F9 51 BEQ PAUSE
034D:68 52 PLA ;GET CHARACTER FROM STACK.
034E:99 87 CO 53 STA DATA,Y ;OUTPUT IT TO THE ACIA.
0351:C9 93 54 CMP #$93 ;WAS "CTRL S" SENT?
0353:F0 04 55 BEQ PAST
0355:D0 CD 56 BNE LOOP ;GO BACK FOR MORE.
0357:C6 0A 57 SEND DEC FLAG ;SET FLAG.
0359:60 58 PAST RTS
035A: 60 ;SERIAL INPUT ROUTINE
035A:84 47 61 STY $47 ;SAVE Y HERE.
035C:A4 FE 62 LDY $FE ;GET SLOT INDEX.
035E:A9 01 63 HOLD LDA #$01 ;MAKE A MASK.
0360:39 86 CO 64 AND CR,Y ;RECEIVER FULL?
0363:F0 F9 65 BEQ HOLD ;NO, WAIT FOR IT TO FILL.
0365:B9 87 CO 66 LDA DATA,Y ;READ THE ACIA.
0368:48 67 PHA ;SAVE CHARACTER ON THE STACK.
0369:09 80 68 ORA #$80 ;SET BIT SEVEN FOR APPLE.
036B:20 F0 FD 69 JSR COUT1 ;OUTPUT THE RESULT TO THE SCREEN.
036E:68 70 PLA ;FETCH CHARACTER FROM THE STACK.
036F:A4 47 71 LDY $47
0371:60 72 RTS
0372: 74 ;SERIAL OUTPUT ROUTINE
0372:A5 45 75 LDA $45 ;USED TO SEND "ACK".
0374:84 47 76 STY $47 ;SAVE Y.
0376:A4 FE 77 LDY $FE ;GET SLOT INDEX.
0378:48 78 PHA ;SAVE CHARACTER ON THE STACK.
0379:A9 02 79 LOAF LDA #02 ;MAKE A MASK.
037B:39 86 CO 80 AND CR,Y ;TRANSMITTER EMPTY?
037E:F0 F9 81 BEQ LOAF ;NO, WAIT UNTIL IT IS.
0380:68 82 PLA ;YES, THEN GET CHARACTER
0381:99 87 CO 83 STA DATA,Y ;AND SEND IT OUT.
0384:20 F0 FD 84 JSR COUT1 ;ALSO SEND DATA TO SCREEN.
0387:A4 47 85 LDY $47 ;FETCH Y BACK.
0389:60 86 RTS

```

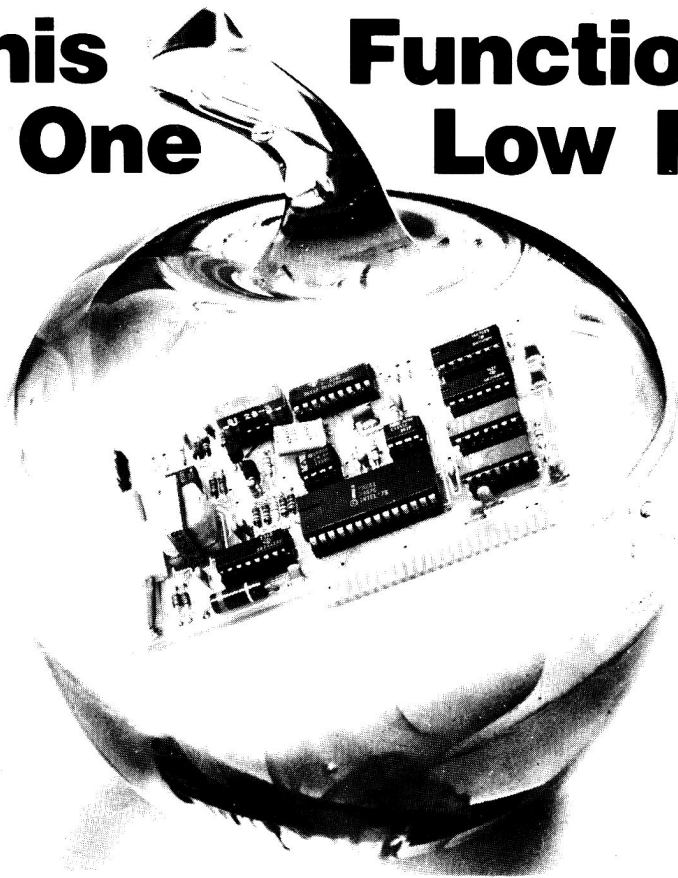
*** SUCCESSFUL ASSEMBLY: NO ERRORS

information is sent, the output vector is switched to local output with the GOSUB 30 instruction on line 190. (For a more thorough understanding of these principles, study *The DOS Manual* and the *Apple II Reference Manual*.)

File-Conversion Programs

I have included some accessory programs to give the **Listing 1-Listing 2** combination more utility. Two of these mini-programs appear in **Listing 3**. The first lets you write a text file, such as a letter, from the keyboard.

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Listing 3. Programs for writing a text file from the keyboard and sending it to another Apple, and for receiving the text file and displaying it on the monitor.

```

5 REM MAKE TEXT FILE FROM THE KEYBOARD.
10 CLEAR : D$ = CHR$(4) : PRINT "INPUT THE FILE NAME."
20 INPUT FILE$
25 HOME : PRINT D$;"OPEN";FILE$
30 PRINT D$;"DELETE";FILE$
40 PRINT D$;"OPEN";FILE$
50 Z = FRE(0) : A$ = ""
60 GET B$ : PRINT B$;
70 IF B$ = CHR$(3) THEN 130
80 A$ = A$ + B$
85 IF B$ = CHR$(13) THEN 100
90 GOTO 60
100 PRINT D$;"WRITE";FILE$
120 PRINT A$; : GOTO 50
130 PRINT D$;"CLOSE";FILE$
140 END
200 REM READ TEXT FILE ON THE VIDEO MONITOR.
210 CLEAR : D$ = CHR$(4) : PRINT "INPUT THE FILE NAME."
215 INPUT FILE$
220 HOME
230 PRINT D$;"OPEN";FILE$
240 PRINT D$;"READ";FILE$
245 ONERR GOTO 300
250 A$ = ""
260 GET B$ : A$ = A$ + B$
270 IF B$ < > CHR$(13) THEN 260
280 PRINT " ";A$; : GOTO 250
300 PRINT D$;"PR#0"
305 PRINT : PRINT "FILE HAS BEEN READ."
310 PRINT CHR$(13);D$;"CLOSE";FILE$
320 END

```

Listing 4. Program that converts an Applesoft program listing into a text file for transmission.

```

1 REM APPLESOFT-TO-TEXT FILE CONVERTER
2 PRINT "INPUT THE FILE NAME"
3 INPUT F$ : D$ = CHR$(4)
4 PRINT D$;"OPEN";F$ : PRINT D$;"WRITE";F$ : LIST 5,2000
: PRINT D$;"CLOSE";F$ : END

```

Listing 5. Programs for converting a binary file to an ASCII (text) file for transmission, and for converting the file back again after it has been received.

```

5 REM THIS ROUTINE CONVERTS THE NUMBERS IN A BINARY FILE TO
ASCII CHARACTERS AND STORES THEM IN A TEXT FILE.
6 REM PROGRAM ASSUMES COMPUTER IS 48K APPLE II.
10 CLEAR : D$ = CHR$(4) : PRINT "INPUT THE FILE NAME."
20 INPUT FILE$
30 PRINT D$;"BLOAD";FILE$
40 FILE$ = "T-" + FILE$
50 ADDR = PEEK(43634) + 256 * PEEK(43635)
60 LGTH = PEEK(43616) + 256 * PEEK(43617)
70 PRINT D$;"OPEN";FILE$
80 PRINT D$;"DELETE";FILE$
90 PRINT D$;"OPEN";FILE$
100 PRINT D$;"WRITE";FILE$
110 PRINT STR$(ADDR) : PRINT STR$(LGTH)
120 FOR J = 0 TO LGTH - 1
130 Y = PEEK(J + ADDR)
140 PRINT STR$(Y)
150 NEXT J
160 PRINT D$;"CLOSE";FILE$
170 END

5 REM THIS ROUTINE TAKES A TEXT FILE MADE BY THE PROGRAM
LISTED ABOVE AND CONVERTS IT INTO A BINARY FILE.
6 REM PROGRAM ASSUMES THE COMPUTER IS 48K APPLE II
10 CLEAR : D$ = CHR$(4) : PRINT "INPUT THE FILE NAME."
15 INPUT FILE$
20 HOME
30 PRINT D$;"OPEN";FILE$
40 PRINT D$;"READ";FILE$
45 ONERR GOTO 150
50 A$ = ""
60 GET B$ : A$ = A$ + B$
70 IF B$ < > CHR$(13) THEN 60
80 ADDR = VAL(A$);A$ = ""
90 GET B$ : A$ = A$ + B$
100 IF B$ < > CHR$(13) THEN 90
110 LGTH = VAL(A$)
115 J = 0
120 Z = FRE(0) : A$ = ""
125 GET B$ : A$ = A$ + B$
130 IF B$ < > CHR$(13) THEN 125
140 POKE ADDR + J, VAL(A$) : J = J + 1 : GOTO 120
150 PRINT CHR$(13);D$;"CLOSE";FILE$
160 PRINT ADDR, LGTH
180 POKE 216,0
190 Z = LEN(FILE$) : Z = Z - 2 : FILE$ = RIGHT$(FILE$,Z)
195 PRINT FILE$
200 PRINT D$;"BSAVE";FILE$;",";A$;ADDR;",";L$;LGTH
210 END

```

and then send it with the programs in Listing 1 and Listing 2. The second program in Listing 3 reads a text file, such as the letter, and displays the contents on the monitor. These programs are designed to work in concert.

The program in Listing 4 converts an Applesoft program in memory to a text file, which can then be communicated to another party with the programs in Listings 1 and 2. Simply enter Listing 4 into memory along with the Applesoft program you want to save as a text file. Assume your Applesoft program is located between lines 5 and 2000. When you run Listing 4, it will LIST your Applesoft program into a text file. You can retrieve it and place it back into memory with the EXEC command.

The programs in Listing 5 transmit a not-too-long binary file. The first takes the binary file and converts the decimal representation of the numbers into ASCII codes, which can be saved as a text file. The starting address and the length of the binary file are saved first, and then the contents of the file are converted. Notice the STR\$(var) instruction, and be aware that the text file could be up to three times as long as the binary file. This isn't an efficient way to handle binary files, but it works nicely for short ones.

At the receiving end, the text file is converted back to binary by the second program in Listing 5. The ASCII code is read and turned back into decimal numbers with the VAL(svar) instruction. It is stored in memory, and later the contents of memory are stored as a binary file. The starting address and the length of the file are read from the first two numbers in the file.

These two programs are designed to work together. For example, the first program in Listing 5 adds the characters "T-" to the name of the binary file to form the name of the text file. The second program deletes the "T-" to revert to the binary-file name. These two programs work well if you send short binary files like the machine-language program in Listing 1.

These programs permit Apple II owners who have a Micromodem or a CCS 7710 to communicate text files without a third-party telecomputing network or fancy software. Now you can easily exchange programs or forward your Great American novel directly from your word processor to your editor. ■

Write to Marvin L. DeJong at the Department of Mathematics-Physics, The School of the Ozarks, Point Lookout, MO 65726.

Using ProDOS

Part 3

Command Performance

by Lee Swoboda

This article continues a six-part series on ProDOS, Apple's new disk operating system (DOS). In Part 2 (see the April issue of *inCider*), I described how to use ProDOS from its built-in menus. In Parts 3 and 4 I'll examine the ProDOS commands, most often with hands-on examples of the command included. If you want to follow the examples, make a fresh copy of the ProDOS User's Disk or the System Utilities disk using the disk copying instructions in Part 2 of this series.

ProDOS Commands

In the discussions of the ProDOS commands in the sidebar, the commands themselves appear in the headers in uppercase letters. Information you, the user, must provide is in lowercase. Optional parameters appear in italics. In all cases, quotes mean computer output and no-quotes means user input.

Most ProDOS commands can be

Get hands-on experience with ProDOS commands in both immediate and deferred modes.

used two ways. You can type the command directly from the Applesoft prompt (the immediate mode), or you may use it from within a BASIC program (the deferred mode). In the deferred mode, ProDOS follows the DOS 3.3 convention that requires DOS commands in a BASIC program to be used in a PRINT statement and include a control-D (ASCII 4).

For example, if you want to delete a file from the immediate mode, type DE-

LETE and the appropriate pathname following the Applesoft prompt and press the return key. If you want your program to delete a file from the deferred mode, insert the following line in your Applesoft program with the appropriate line number and filename:

```
999 PRINT CHR$(4);"DELETE filename"
```

The CHR\$(4) (ASCII 4) tells the computer that this is a ProDOS command, so the computer relinquishes control to ProDOS. The data between the quotes is then passed from Applesoft to ProDOS.

I will provide examples for using commands in both the immediate and deferred modes. If I show an example for only one mode, the command can be used only in that mode or is rarely used in the omitted mode.

In DOS 3.3, the computer "remembers" which disk drive it is using—the "current drive." If you want to switch to a different disk drive in DOS 3.3, you must tell the computer which one by

Table 1. A comparative listing of ProDOS and DOS 3.3 commands—those that function similarly under both operating systems; those that appear in DOS 3.3 but not in ProDOS; and those that appear in DOS 3.3 and have been improved in ProDOS.

Similar	Not in ProDOS	Improved in ProDOS	
LOCK	FP	CATALOG	CLOSE
UNLOCK	INT	RUN	POSITION
LOAD	INIT	APPEND	READ
SAVE	MON	BLOAD	WRITE
RENAME	NOMON	BRUN	IN#
DELETE	MAXFILES	BSAVE	PR#
EXEC	VERIFY	OPEN	

Table 2. Comparison of ProDOS and DOS 3.3 command formats. *Italic portions are optional; all the rest are mandatory.*

ProDOS Command Format	DOS Command Format
BLOAD <i>pathname</i> <i>,An,Bn,Ln,Txxx,Sn,Dn</i>	BLOAD filename, <i>An,Sn,Dn,Vn</i>
BLOAD <i>pathname</i> <i>,An,Bn,En,Txxx,Sn,Dn</i>	
BRUN <i>pathname,An,Bn,Ln,Sn,Dn</i>	BRUN filename, <i>An,Sn,Dn,Vn</i>
BRUN <i>pathname,An,Bn,En,Sn,Dn</i>	
BSAVE <i>pathname,An,Ln</i> <i>,Bn,Txxx,Sn,Dn</i>	BSAVE filename, <i>An,Ln,Sn,Dn,Vn</i>
BSAVE <i>pathname,An,En</i> <i>,Bn,Txxx,Sn,Dn</i>	
CAT <i>pathname,Sn,Dn</i>	---
CATALOG <i>pathname,Sn,Dn</i>	CATALOG, <i>Sn,Dn</i>
CHAIN <i>pathname,@n,Sn,Dn</i>	---
CLOSE <i>pathname</i>	CLOSE <i>filename,Sn,Dn</i>
CREATE <i>pathname,Txxx,Sn,Dn</i>	---
DELETE <i>pathname,Sn,Dn</i>	DELETE filename, <i>Sn,Dn,Vn</i>
EXEC <i>pathname,Fn,Sn,Dn</i>	EXEC filename, <i>Rn,Sn,Dn,Vn</i>
EXEC <i>pathname,Rn,Sn,Dn</i>	
FLUSH <i>pathname,Sn,Dn</i>	---
FRE	---
IN# <i>n</i>	IN# <i>n</i>
IN# <i>An</i>	
LOAD <i>pathname,Sn,Dn</i>	LOAD filename, <i>Sn,Dn,Vn</i>
LOCK <i>pathname,Sn,Dn</i>	LOCK filename, <i>Sn,Dn,Vn</i>
POSITION <i>pathname,Fn</i>	POSITION filename, <i>Rn</i>
POSITION <i>pathname,Rn</i>	
PREFIX <i>pathname,Sn,Dn</i>	---
PR# <i>n</i>	PR# <i>n</i>
PR# <i>An</i>	
PR# <i>n,An</i>	
RENAME <i>path.1,path.2,Sn,Dn</i>	RENAME file 1,file 2, <i>Sn,Dn,Vn</i>
RESTORE <i>pathname,Sn,Dn</i>	---
RUN <i>pathname,@n,Sn,Dn</i>	RUN filename, <i>Sn,Dn,Vn</i>
SAVE <i>pathname,Sn,Dn</i>	SAVE filename, <i>Sn,Dn,Vn</i>
STORE <i>pathname,Sn,Dn</i>	---
UNLOCK <i>pathname,Sn,Dn</i> <i>-pathname,Sn,Dn</i>	UNLOCK filename, <i>Sn,Dn,Vn</i>

..... Sequential Text File Commands	
APPEND <i>pathname,Txxx,Sn,Dn</i>	APPEND filename, <i>Sn,Dn,Vn</i>
OPEN <i>pathname,Txxx,Sn,Dn</i>	OPEN filename, <i>Sn,Dn,Vn</i>
READ <i>pathname,Fn,Bn</i>	READ filename, <i>Bn</i>
WRITE <i>pathname,Fn,Bn</i>	WRITE filename, <i>Bn</i>
..... Random-Access Text File Commands	
APPEND <i>pathname,Ln,Sn,Dn</i>	---
OPEN <i>pathname,Ln,Sn,Dn</i>	OPEN filename, <i>Ln,Sn,Dn,Vn</i>
READ <i>pathname,Rn,Fn,Bn</i>	READ filename, <i>Rn,Bn</i>
WRITE <i>pathname,Rn,Fn,Bn</i>	WRITE filename, <i>Rn,Bn</i>

specifying the *slot* and *drive* parameters. In ProDOS, the *volume name* tells the computer which disk to use. When you type a pathname, the computer looks at each disk drive until it finds the disk with that name. (The computer “remembers” the name of any disk it has looked at, so it can return to that disk again without having to search.) In ProDOS the *slot* and *drive* numbers of a disk are superfluous. However, Apple has retained the *slot* and *drive* numbers as optional parameters in ProDOS commands, probably as a concession to compatibility with DOS 3.3. We won’t discuss the use of *slot* and *drive* parameters because ProDOS doesn’t need them.

You probably realize by now that DOS 3.3 and ProDOS are significantly different. Some DOS 3.3 commands are the same in ProDOS, but many are different. Even for those that are the same, you must observe ProDOS pathname conventions. For example, the format of the SAVE command in DOS 3.3 is:

SAVE filename,*Sn,Dn*

where the *slot* (*Sn*) and *drive* (*Dn*) numbers shown in italics are optional. In ProDOS, the format of the SAVE command is similar:

SAVE *pathname,Sn,Dn*

where the *slot* and *drive* numbers are optional. The filename must follow the DOS 3.3 rules for filenames and the *pathname* must follow the ProDOS rules for pathnames, which I discussed in Part 1.

Commands Similar in ProDOS and DOS 3.3

Seven ProDOS and DOS 3.3 commands are similar, except for the *pathname* distinction. They are listed in **Table 1**. Since the primary purpose of this series is to highlight the differences between DOS 3.3 and ProDOS, I’ll discuss the uses of these common commands only briefly.

If you intend to follow the hands-on section with the description of each command, start your ProDOS User’s Disk and type B from the main menu to go to the Applesoft BASIC prompt (>). If you are using ProDOS on a //c, boot the System Utilities disk and type 9 to exit System Utilities.

Table 2 summarizes the format of each ProDOS command and that of the equivalent command in DOS 3.3. The values following the command are parameters that amplify the command. **Table 3** defines these parameters and lists the range of their values. Parameters in italics are optional. Some com-

mands have more than one format. The headers in the sidebar duplicate the command format in **Table 2**.

Deleted Commands

Not all ProDOS commands are similar to DOS 3.3. In fact, seven DOS 3.3 commands are not even available in ProDOS. You'll find them in **Table 1** also. If you are interested in the reasons Apple deleted these commands, see pages 201-202 of *BASIC Programming with ProDOS*.

Improved Commands

Apple improved 13 DOS 3.3 commands when they wrote ProDOS. Refer again to **Table 1**. You may still use all 13 the same way you did in DOS 3.3, but each has additional features that either enhance their usefulness or

correct deficiencies in DOS 3.3. Part 4 of "The Compleat Text File Primer" in the June 1984 issue of *inCider* covered the file-access commands, beginning with APPEND, in more detail. Also refer to *BASIC Programming with ProDOS*.

In Part 3, we have studied the commands ProDOS shares with DOS 3.3. In Part 4, we will examine the new commands Apple has added to ProDOS. See you next month! ■

Lee Swoboda can't answer all questions individually. However, if the answer is not lengthy and you include a stamped, self-addressed envelope, he'll do his best to respond. Answers to other questions will appear in future articles or the inCider Letters column. Lee Swoboda's address is Padapple Computer Consulting, 1451 NE Paulson Road, Poulsbo, WA 98370.

Table 3. Comparison of ProDOS and DOS 3.3 command optional parameters.

Description	Syntax	Range of n	
		ProDOS	DOS
Slot number	.Sn	1 to 7	1 to 7
Drive number	.Dn	1 or 2	1 or 2
Field number	.Fn	0 to 65535	n/a
Record number	.Rn	0 to 65535*	0 to 32767
Number of bytes	.Bn	0 to 65534**	0 to 32767
Address in RAM	.An	0 to 65535	0 to 65535
Length in bytes	.Ln	1 to 65535	0 to 32767
End address in RAM	.En	1 to 65535	n/a
At line number	.@n	0 to 65535	n/a
Slot number***	n	0 to 7	0 to 7
File type	Txxx	see Table 4	n/a

- * Rn is limited to 16 megabytes divided by record length (L) or 65535, whichever is smaller.
- ** Bn is limited to one less than the record length (L - 1) or 65534, whichever is smaller.
- *** Used in the IN# and PR# commands.

Table 4. Comparison of ProDOS and DOS 3.3 file types.

Contents of File	ProDOS Type	DOS Type
Sequential text	TXT	T
Random access text	TXT	T
Binary	BIN	B
Applesoft BASIC program	BAS	A
Relocatable file	REL	R
Integer BASIC program	INT*	I
Integer BASIC variables	INV*	-
Directory	DIR	-
Applesoft variables	VAR	-
User defined	\$F1 to \$F8	-
ProDOS system file	SYS	-
ProDOS added command file	CMD	-
ProDOS reserved	\$F9	-
ProDOS reserved	\$C0 to \$EF	-
Typeless file	\$00	-
Bad block file	BAD	-

* Not executable under ProDOS

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Commands Common to DOS 3.3 and ProDOS

APPEND *pathname, Txxx, Sn, Dn* (sequential)
APPEND *pathname, Ln, Sn, Dn* (random access)

ProDOS examples:

```
APPEND /PETS/DOGS/DACHSHUND  
999 PRINT D$;"APPEND /PETS/DOGS/DOBERMAN,L37"
```

The DOS 3.3 APPEND command attaches new records to the end of sequential text files only. The ProDOS version attaches data to the end of any file type. If you don't specify the file type, the computer will assume a sequential-access text file. If you are appending a random-access text file, you must specify the length parameter so the computer will know how long to make each record it is adding.

The DOS 3.3 APPEND command has to load the entire text file into memory before it can append new data. This means DOS 3.3 APPEND has no speed advantage over reading a file record-by-record. The ProDOS APPEND command goes directly to the end of the file to add new records. This increases the speed of appending records significantly.

BLOAD *pathname, An, Bn, Ln, Txxx, Sn, Dn*
BLOAD *pathname, An, Bn, En, Txxx, Sn, Dn*

ProDOS examples:

```
BLOAD SAMPLE,A$300,E$31B  
999 PRINT D$;"BLOAD SAMPLE,A768,L23"
```

The BLOAD command loads, but does not execute, a binary file. The ProDOS version has three improvements from DOS 3.3:

- The BLOAD command will load the binary image (the way it appears in the computer's memory) of any file by specifying a type parameter. If you don't specify a type, the computer assumes a BIN file (see **Table 4**). In DOS 3.3, the only file you can BLOAD is a B-type (binary) file.
- The BLOAD command loads part of a binary file by specifying either the starting-address and length parameters or end-address parameters. If you don't specify these values, the computer will load the entire binary file in the location from which it was originally BSAVED.
- The BLOAD command allows you to define the file by either the length or the end address. DOS 3.3 allows only the starting address and length parameters to define a binary file.

BRUN *pathname, An, Bn, Ln, Sn, Dn*
BRUN *pathname, An, Bn, En, Sn, Dn*

ProDOS examples:

```
BRUN /MAIN.DISK/SAMPLE  
999 PRINT D$;"BRUN /MAIN.DISK/SAMPLE"
```

The ProDOS BRUN command loads and executes a binary (machine-language) program. Like BLOAD, BRUN can execute only part of a binary program. It has the same parameter options as the BLOAD command, except the type parameter. Unlike BLOAD, BRUN will execute only actual machine-language programs.

BSAVE *pathname, An, Ln, Bn, Txxx, Sn, Dn*
BSAVE *pathname, An, En, Bn, Txxx, Sn, Dn*

ProDOS examples:

```
BSAVE SAMPLE,A$300,L$1B  
999 PRINT D$;"BSAVE SAMPLE,A768,E785"
```

The BSAVE command transfers the binary image of memory to the disk. The conditions and parameters are the same as for the BLOAD command.

CATALOG *pathname, Sn, Dn*

CATALOG is similar to CAT, except that CATALOG prints 80 columns of information instead of the 40 columns CAT prints. CATALOG provides the following information for each file in the pathname:

- Write-protect status
- Filename
- File type (see **Table 4**)
- Number of 512-byte disk blocks the file occupies
- Date and time the file was last modified
- Date the file was created
- The ENDFILE value of the file (the amount of disk space it takes)
- The file SUBTYPE (the memory address from which a BIN [binary] file was saved or the size of each element in a TXT [text] file)

If you have a 40-column screen, the computer will display the information on two lines per file. If you have an 80-column display card, the information will fit on one line. ProDOS doesn't switch the display to the 80-column mode; you have to do that yourself. (Type PR#3 and press the return key. To return to the 40-column mode, press open apple-control-reset on the Apple //e or control-reset on the II Plus.)

CLOSE *pathname*

ProDOS examples:

```
CLOSE  
CLOSE /PETS/DOGS/DACHSHUND  
999 PRINT D$;"CLOSE /PETS/DOGS/DACHSHUND"
```

The syntax of the CLOSE command is the same as in DOS 3.3. The command will close the file with the specified pathname. If you do not specify a pathname, the computer will close all open files. This is true in both DOS 3.3 and ProDOS.

ProDOS does not automatically close all open files when the program ends, as DOS 3.3 does. In ProDOS, you *must* close all open files before you exit a BASIC program. ProDOS flushes the file buffers of unwritten data when you close a file, so this requirement to close all open files is a precaution to assure all data is saved.

DELETE *pathname, Sn, Dn*

ProDOS examples:

```
DELETE /PETS/DOGS/DACHSHUND  
999 PRINT D$;"DELETE /PETS/DOGS/DACHSHUND"
```

The DELETE command removes the specified file's listing from the disk directory so the computer "forgets" the file is there. However, it does not actually

continued

destroy the information in the file.

Because DOS 3.3 has only one level of directory organization, the DELETE command erases only files. The DELETE command in ProDOS will erase files or subdirectories (DIR files). However, to protect the user, ProDOS automatically locks DIR files, so you cannot delete a subdirectory while it contains any files. You must delete all the files in the subdirectory first.

Hands on:

From the BASIC prompt, type DELETE MOIRE.PATTERN and press return. When the disk drive stops running, type CAT and press return. The list of files now contains only "MOIRE".

EXEC pathname,Fn,Sn,Dn
EXEC pathname,Rn,Sn,Dn

ProDOS examples:

```
EXEC SAMPLE,F3
999 PRINT D$;"EXEC SAMPLE"
```

The EXEC command loads a sequential text file from disk to the computer and executes the file as a BASIC program. Obviously, the records in the EXEC file must be in the same format as a line in an Applesoft program or a ProDOS command.

Discussing the use of the EXEC command is beyond the scope of this series. If you want more information, see Chapter 8 of the *BASIC Programming with ProDOS* manual, which is included with the ProDOS BASIC Programmer's Kit (Apple product A202037).

IN#n, IN#An, PR#n, PR#An, and PR#n,An

ProDOS example:

```
999 PRINT D$;"PR#1"
```

The IN# and PR# commands control the peripheral slot from which the computer will receive input (IN#) or to which it will send output (PR#). In DOS 3.3 you can reference only peripheral slots 0-7. In ProDOS you can also use IN# and PR# to reference machine-language routines in memory. For example, the command PR# A\$300 sends output to a machine-language program at memory address 300 (hexadecimal).

LOAD pathname,Sn,Dn

ProDOS example:

```
LOAD /PETS/DOGS/DACHSHUND
```

The LOAD command moves a BASIC program from disk to memory, but does not start the program running. This command is useful when you are writing BASIC programs. It allows you to load an incomplete program. LOAD works only with Applesoft BASIC files.

Hands on:

From the BASIC prompt, type LOAD MOIRE and press return. The computer will load the program into memory, but not execute it. List the program (type LIST and press return) to prove to yourself the computer did load the program from disk.

LOCK pathname,Sn,Dn
UNLOCK pathname,Sn,Dn

ProDOS examples:

```
LOCK /PETS/DOGS/DACHSHUND
```

```
999 PRINT D$;"UNLOCK /PETS/DOGS/DACHSHUND"
```

The LOCK command allows you to protect any file from deletion. UNLOCK removes the protection.

Hands on:

From the Applesoft BASIC prompt (I), type CAT and press return. (I'll discuss the CAT command later in this series.) The computer will list the files on the User's Disk on the video screen. Note that all the file listings have an asterisk (*) in the left column. This means they are all locked so you cannot modify them. Now type UNLOCK MOIRE (you don't need the volume name because the prefix is "/USERS.DISK/" already) and press return. When the disk drive goes off, type CAT again. This time the file "MOIRE" doesn't have an asterisk. You may lock "MOIRE" again by typing LOCK MOIRE, but don't actually do it because we need it unlocked for some later examples.

OPEN pathname,Txxx,Sn,Dn (sequential)
OPEN pathname,Ln,Sn,Dn (random access)

ProDOS examples:

```
999 PRINT D$;"OPEN /PETS/DOGS/DACHSHUND"
999 PRINT D$;"OPEN /PETS/DOGS/DACHSHUND,L34"
```

The OPEN command sets up a space (buffer) in memory to temporarily store data coming from or going to a file on disk. In DOS 3.3 you can open only a text file. In ProDOS you can open any file by specifying the type parameter. If you don't specify a file type, the computer will assume a text file. The length parameter is mandatory to specify for random-access text files when you first create the files. Unlike DOS 3.3, you cannot READ from or WRITE to an unopened file. Because ProDOS doesn't set up a file buffer until it opens a file, you must open a file before you read or write.

The OPEN command opens both sequential and random-access text files. Unless you specify an L (record length) parameter when you open a random-access text file, ProDOS will assume the record length is the same as when you created the file.

POSITION pathname,Fn
POSITION pathname,Rn

ProDOS example:

```
998 PRINT D$;"OPEN /PETS/DOGS/DACHSHUND"
999 PRINT D$;"POSITION /PETS/DOGS/DACHSHUND,R13"
```

The POSITION command moves you to a specified record number in a file without having to READ the preceding records. Since the R and F parameters (record and field parameters, see **Table 3**) for the READ and WRITE commands serve exactly the same function as the POSITION command, the POSITION command is superfluous. Apple included it in ProDOS to maintain compatibility with DOS 3.3.

READ pathname,Fn,Bn (sequential)
READ pathname,Rn,Fn,Bn (random access)

ProDOS example:

```
998 PRINT D$;"OPEN /PETS/DOGS/DACHSHUND"
999 PRINT D$;"READ /PETS/DOGS/DACHSHUND,F13"
```

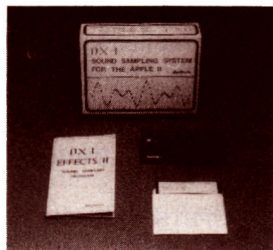
The READ command allows you to access the information in either a sequential or random-access text

continued

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Commands continued

(TXT) file (using the INPUT command). If you are accessing a random-access text file, the R parameter is mandatory.

The ProDOS READ command adds the R, F, and B parameters to allow you to start reading the file at a particular record, field, or byte within a record. This option makes the POSITION command superfluous.

RENAME *pathname.1,pathname.2,Sn,Dn*

ProDOS example:

```
RENAME DOGS/DACHSHUND.DOGS/WEENIE.DOG
```

The RENAME command allows you to change the name of a file. You cannot use RENAME to move files between directories or subdirectories. Therefore, *pathname.1* and *pathname.2* must have the same prefix; only the filename can be different. You cannot rename a locked file.

Hands on:

From the BASIC prompt, type RENAME MOIRE.1, MOIRE.PATTERN and press return. When the disk drive stops running, type CAT and press return. The computer will display a list of files that includes "MOIRE" and "MOIRE.PATTERN", but not "MOIRE.1".

RUN *pathname,@n,Sn,Dn*

ProDOS examples:

```
RUN /PETS/DOGS/DACHSHUND
```

```
999 PRINT D$;"RUN /PETS/DOGS/DACHSHUND"
```

The RUN command loads and executes a BASIC program. The ProDOS RUN command allows you to specify a line number where program execution will begin. If you do not specify a line number, execution begins at the first line.

SAVE *pathname,Sn,Dn*

ProDOS example:

```
SAVE /PETS/DOGS/DACHSHUND
```

The SAVE command transfers the current Apple-soft program from memory to disk. It overwrites any existing program with the same pathname. You cannot SAVE a program if a locked file of the same name already exists.

Hands on:

From the BASIC prompt, type SAVE MOIRE.1 and press return. When the disk drive stops running, type CAT and press return. The computer will list the files on the User's Disk, now including both "MOIRE" and "MOIRE.1".

WRITE *pathname,Fn,Bn (sequential)*

WRITE *pathname,Rn,Fn,Bn (random access)*

ProDOS example:

```
998 PRINT D$;"OPEN /PETS/DOGS/DACHSHUND"
```

```
999 PRINT D$;"WRITE /PETS/DOGS/DACHSHUND"
```

The WRITE command prepares a text (TXT) file to save information in. In ProDOS, the WRITE command, like the READ command, allows you to specify the record number, field number, and byte where you want to begin. If you don't specify these parameters, the computer will start writing at the beginning of the file.

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by **Kerry Lanz and Bob Ryan,**
inCider staff

Man your battle stations! An unidentified fleet is on the horizon, heading your way, so prepare to engage the enemy—via your modem. Battleship, also known as Salvo, is an old pencil-and-paper game. Recent generations are more familiar with the game in its plastic attaché-case format. Now, the computer version is yours for the typing. Warm up your modem, call a friend, and steady your sea legs.

Modem Battleship operates on the Hayes Micromodem and Micromodem //e. Since these are the most popular Apple modems, other manufacturers work hard to ensure that their modems are Hayes-compatible. If your modem isn't a Micromodem or a com-

patible, you may have to modify some of the Hayes-specific program lines (see the sidebar on page 52). You can also modify the program so that two computers joined by a serial connection can run it. Depending on the computers' serial cards, you may require a null-modem to connect them.

Situation Briefing

Budget cuts being what they are, your navy consists of just four ships. But then, it's only a 10-by-10-square ocean. Your sub and your destroyer occupy two squares each. The cruiser uses three squares. Your flagship, a full battleship, needs four squares.

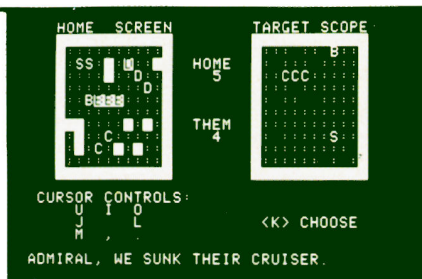
You and your opponent position your fleets on home grids, then take

Listing 1. Modem Battleship.

```

10 REM *****
12 REM *   MODEM BATTLESHIP   *
14 REM *****
15 REM
16 REM       BY
17 REM
18 REM       KERRY J. LANZ
19 REM       ROBERT M. RYAN
20 REM
50 GOSUB 4000: REM INITIALIZE
60 GOSUB 3000: REM RESET GAME
70 GOSUB 2000: REM PLACE SHIPS
80 GOTO 1000: REM PLAY GAME
97 REM
98 REM       CHECK INPUT
99 REM
100 K = 0:ER = 0:XNU = XOLD:YNU = YOLD
105 IF K$ = "J" THEN XNU = XOLD - 1: GOTO 155
110 IF K$ = "L" THEN XNU = XOLD + 1: GOTO 155
115 IF K$ = "I" THEN YNU = YOLD - 1: GOTO 155
120 IF K$ = "." THEN YNU = YOLD + 1: GOTO 155
125 IF K$ = "U" THEN YNU = YOLD - 1:XNU = XOLD - 1: GOTO 155
130 IF K$ = "D" THEN YNU = YOLD + 1:XNU = XOLD + 1: GOTO 155
135 IF K$ = "M" THEN YNU = YOLD + 1:XNU = XOLD - 1: GOTO 155
140 IF K$ = "O" THEN YNU = YOLD - 1:XNU = XOLD + 1: GOTO 155
145 IF K$ = "K" THEN K = 1: RETURN
150 ER = 1: RETURN
155 IF XNU < 1 OR XNU > 10 THEN ER = 1: RETURN
160 IF YNU < 1 OR YNU > 10 THEN ER = 1: RETURN
165 RETURN
197 REM
198 REM       PROMPT LINE
199 REM
200 VTAB 20: HTAB 1: CALL - 868: RETURN
247 REM
248 REM       PAUSE
249 REM
250 FOR RR = 1 TO 1500: NEXT : RETURN
297 REM
298 REM       AIM SHOT
299 REM
300 HTAB XOLD + RIGHT: VTAB YOLD + MAR
305 POKE KB,0: GET K$: GOSUB 100: IF ER THEN 305
310 IF YOU(XNU,YNU) THEN K = 0
315 IF K THEN 325
320 XOLD = XNU:YOLD = YNU: GOTO 300
325 PRINT CHR$(AST); CHR$(7)
330 RETURN
397 REM
398 REM       FIRE ON ENEMY
399 REM
400 GOSUB 200: INVERSE : PRINT "FIRE!": NORMAL
405 PRINT D$;"PR#";SLOT$: PRINT FLAG$;
410 VTAB 21: PRINT XNU; CHR$(44);YNU
415 PRINT D$;"PR#0"
420 VTAB 21: CALL - 868
425 PRINT D$;"IN#";SLOT$
430 VTAB 21: INPUT "";SHIP
435 PRINT D$;"IN#0"
440 VTAB 21: CALL - 868
445 GOSUB 200: PRINT "ADMIRAL, WE ";
450 IF SHIP = 32 THEN PRINT "MISSED."
455 IF SHIP = 66 AND BB = 3 THEN PRINT "SUNK THEIR BATTLESHIP."
"
460 IF SHIP = 66 AND BB < 3 THEN PRINT "HIT THEIR BATTLESHIP."
:BB = BB + 1
465 IF SHIP = 67 AND CA = 2 THEN PRINT "SUNK THEIR CRUISER."
470 IF SHIP = 67 AND CA < 2 THEN PRINT "HIT THEIR CRUISER.":CA
= CA + 1
475 IF SHIP = 68 AND DD = 1 THEN PRINT "SUNK THEIR DESTROYER."
480 IF SHIP = 68 AND DD < 1 THEN PRINT "HIT THEIR DESTROYER.":
DD = DD + 1
485 IF SHIP = 83 AND SS = 1 THEN PRINT "SUNK THEIR SUBMARINE."
490 IF SHIP = 83 AND SS < 1 THEN PRINT "HIT THEIR SUBMARINE.":
SS = SS + 1
495 GOSUB 250: RETURN
597 REM
598 REM       RECEIVE SHOT
599 REM

```



potshots at each other. You can't place more than one ship on a square, and ships must be placed within the grid's boundaries. The object is to find and destroy the enemy's fleet before the dastardly sea dogs sink your ships.

For instructions on how to type in and save Modem Battleship (Listing 1) and Sound (Listing 2), see *inCider's Beginner's Cookbook* on page 110. Sound should be saved as follows: BSAVE SOUND,A\$300,L\$73. The sound effects are from Don Fudge's column (Fudge It!, September 1984, p. 109).

General Quarters

At the title page, tell the program where your modem is connected—usually it's slot 2. Then indicate if you're originating the call or answering it. If you originate the call, enter the phone number as you would for any terminal program. Make sure your opponent is ready to receive the call, and be prepared for battle.

Upon contact, your opponent will make a snide remark about how you'll have to swim home, then wait while you, the call originator, position your navy. Move the flashing cursor around your home screen with the keys that surround the K key. When it has reached the desired location, press K to mark your ship's position at that square. (The computer keeps track of which ship you're positioning.) From this point, use the same cursor keys to set your ship's direction horizontally, vertically, or diagonally.

After your opponent deploys a navy, battle is joined. You go first, lobbing a salvo of three shells toward one of your opponent's ships. The cursor now specifies the location of a target. Move it the same way as before, using your sailor's intuition to guess where the enemy's ships are. When the cursor reaches the square you want, press K to fire the shells. You can shoot at any particular square only once. The variable SALVO controls how many shots each side receives (as defined in line 4005). Try experimenting with other values for a faster or slower game.

Game play alternates between the two players until someone's fleet is sunk. The winner has the privilege of challenging the loser to another match. The loser gets to arrange ships and take shots first.

Debugging and the Single Computer

How do you debug a game that needs two computers to play? After all,

Listing continued.

the best of us make errors when we type in listings. First, RUN the game as if you were playing a real opponent. At the title page, indicate where your modem is connected and choose to answer a call. Press the return key twice to display the game screen.

The prompt will tell you to wait while your opponent sets up a navy. Press the escape key here. While the program waits for data from the modem, it refuses most input from the keyboard, but the escape character serves as a flag to tell the program to start accepting data. In other words, when you hit the escape key here, it becomes your turn. Arrange the four ships on your home screen just as you would for a real game.

At the INCOMING prompt, hit the escape key again. Then type two numbers from 1 to 10, separated by a comma. Finally, press the return key. That is:

ESCAPE 7,3 RETURN

The program will think your opponent fired a shot seven squares to the right and three squares down. Do this three times to simulate a volley of three shots from a modem opponent.

At the FIRE prompt, use the target cursor as you would during game play. The program will wait to see what you hit. Type 32, the code for empty ocean, and press the return key. If you prefer to hit ships, enter the number from line 4015 that corresponds to the ship you want. You get three shots before the opposition takes over again.

Alternate until you're satisfied that there are no typing errors. You may want to complete at least one game to test the end-game sequence. Then you're ready for a telecommunicated naval confrontation. ■

Listing 2. Sound for Modem Battleship.

```

0300- A9 00 85 FF A9 FF 85 FE
0308- A9 00 8D 30 C0 EE 30 C0
0310- CE 30 C0 A0 05 A6 FF CA
0318- D0 FD 88 F0 03 4C 15 03
0320- C6 FE F0 05 E6 FF 4C 08
0328- 03 60 A9 07 85 06 A0 00
0330- A9 09 85 FE A9 00 8D 30
0338- C0 EE 30 C0 CE 30 C0 A2
0340- FF CA D0 FD A2 FF CA D0
0348- FD A2 FF CA D0 FD B6 21
0350- C8 CA D0 FD B6 21 CA D0
0358- FD B6 21 CA D0 FD B6 21
0360- CA D0 FD C6 FE F0 03 4C
0368- 34 03 A9 45 20 A8 FC C6
0370- 06 D0 BD 60

```

Listing continued.

```

600 GOSUB 200: FLASH : PRINT "INCOMING!!!": NORMAL
605 PRINT D$;"IN#";SLOT%
610 GET K$: IF K$ < > FLAG$ THEN 610
615 VTAB 21: INPUT "";X,Y
620 PRINT D$;"IN#0"
625 VTAB 21: CALL - 868
630 SHIP = ME(X,Y): IF SHIP = DOTS THEN SHIP = 32
635 CALL 768
640 IF SHIP < > 32 THEN CALL 810: CALL 810
645 GOSUB 200: PRINT "ADMIRAL, THEY ";
650 IF SHIP = 32 THEN PRINT "MISSED."
655 IF SHIP = 66 THEN PRINT "HIT OUR BATTLESHIP."
660 IF SHIP = 67 THEN PRINT "HIT OUR CRUISER."
665 IF SHIP = 68 THEN PRINT "HIT OUR DESTROYER."
670 IF SHIP = 83 THEN PRINT "HIT OUR SUBMARINE."
675 PRINT D$;"PR#";SLOT%
680 PRINT SHIP: PRINT D$;"PR#0"
685 VTAB 21: CALL - 868
690 GOSUB 250: RETURN
897 REM
898 REM PLACE 1 SHIP
899 REM
900 HTAB XOLD + LEFT: VTAB YOLD + MAR
905 PRINT CHR$( PLUS);: HTAB XOLD + LEFT
910 POKE KB,0: GET K$: GOSUB 100: IF ER THEN 900
915 IF ME(XOLD,YOLD) < > DOTS THEN K = 0
920 IF K THEN LX = XOLD:LY = YOLD: GOTO 935
925 PRINT CHR$( ME(XOLD,YOLD));
930 XOLD = XNU:YOLD = YNU: GOTO 900
935 GOSUB 200: PRINT "WHICH DIRECTION? ";
940 POKE KB,0: GET K$: FOR X = 2 TO Y: GOSUB 100
945 IF ME(XNU,YNU) < > DOTS THEN ER = 1
950 IF ER THEN X = Y
955 XOLD = XNU:YOLD = YNU: NEXT
960 XOLD = LX:YOLD = LY: IF ER THEN 935
965 FOR X = 1 TO Y: GOSUB 100:ME(XOLD,YOLD) = SHIP
970 HTAB XOLD + LEFT: VTAB YOLD + MAR
975 PRINT CHR$( SHIP): GOSUB 100
980 XOLD = XNU:YOLD = YNU: NEXT
985 XOLD = LX:YOLD = LY: RETURN
997 REM
998 REM MY TURN
999 REM
1000 IF NOT ME THEN 1500
1005 XOLD = 5:YOLD = 5:ME = 0
1010 FOR TT = 1 TO SALVO
1015 GOSUB 200: PRINT "FIRE SHOT #";TT;" OF ";SALVO
1020 GOSUB 300: REM AIM SHOT
1025 GOSUB 400: REM FIRE SHOT
1030 HTAB XOLD + RIGHT: VTAB YOLD + MAR
1035 IF SHIP = DOTS THEN SHIP = 32
1040 PRINT CHR$( SHIP)
1045 YOU(XOLD,YOLD) = 1
1050 IF SHIP < > 32 THEN S1 = S1 + 1
1055 HTAB 19: VTAB 5: PRINT SPC( S1 < 10);S1
1060 IF S1 > 10 THEN 1100
1065 NEXT TT: GOTO 1000
1097 REM
1098 REM I WIN
1099 REM
1100 GOSUB 200: PRINT "WELL DONE. YOU WIN."
1105 PRINT "PRESS ANY KEY TO PLAY AGAIN."
1110 PRINT "PRESS <Q> TO QUIT. ";
1115 POKE KB,0: GET K$
1120 IF K$ = "Q" THEN 1180
1125 POKE 34,20: HOME : TEXT
1130 GOSUB 200: PRINT "MESSAGE TO THE OTHER SIDE:"
1135 PRINT D$;"PR#";SLOT%
1140 PRINT FLAG$;
1145 VTAB 22: PRINT "ANOTHER ROUND? (Y/N)"
1150 PRINT D$;"PR#0": PRINT D$;"IN#";SLOT%
1155 GET K$: IF K$ < > FLAG$ THEN 1155
1160 VTAB 22: INPUT "";MESSAGE$
1165 PRINT D$;"IN#0"
1170 IF LEFT$( MESSAGE$,1) = "N" THEN PRINT D$;"PR#";SLOT%: GOTO
4840
1175 GOSUB 250: GOTO 60
1180 PRINT : VTAB 20: PRINT D$;"PR#";SLOT%
1185 PRINT FLAG$;
1190 VTAB 22: PRINT "I MUST RETIRE IN GLORY. FAREWELL."
1195 GOTO 4840
1497 REM

```

Listing continued.

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Listing continued.

```

1498 REM YOUR TURN
1499 REM
1500 ME = 1: FOR TT = 1 TO SALVO
1505 GOSUB 600: REM RECEIVE SHOT
1510 HTAB X + LEFT: VTAB Y + MAR
1515 IF SHIP = DOTS THEN SHIP = 32
1520 INVERSE : PRINT CHR$(SHIP): NORMAL
1525 IF SHIP < > 32 THEN S2 = S2 + 1
1530 HTAB 19: VTAB 10: PRINT SPC( S2 < 10);S2
1535 IF S2 > 10 THEN 1600
1540 NEXT TT: GOTO 1000
1597 REM
1598 REM YOU WIN
1599 REM
1600 GOSUB 200: PRINT "TOO BAD! YOUR OPPONENT WINS!"
1605 PRINT "MESSAGE COMING FROM THE OTHER SIDE..."
1610 PRINT D$;"IN#";SLOT%
1615 GET K$: IF K$ < > FLAG$ THEN 1615
1620 VTAB 22: INPUT " ";MESSAGE$
1625 PRINT D$;"IN#0"
1630 IF LEFT$( MESSAGE$,1) = "I" THEN PRINT D$;"PR#";SLOT%: GOTO
4840
1635 VTAB 22: HTAB 22: GET K$: PRINT
1640 IF K$ < > "Y" THEN 1665
1645 PRINT D$;"PR#";SLOT%
1650 PRINT FLAG$;
1655 VTAB 22: PRINT "SCURVY DOG...I ACCEPT!"
1660 PRINT D$;"PR#0": GOSUB 250: GOTO 60
1665 PRINT D$;"PR#";SLOT%
1670 PRINT FLAG$;
1675 VTAB 22: PRINT "NOT THIS TIME. BUT WE WILL MEET AGAIN."
1680 GOTO 4840
1997 REM
1998 REM PLACE SHIPS
1999 REM
2000 IF ME THEN 2025
2005 GOSUB 200: INVERSE : PRINT "YOUR OPPONENT IS DEPLOYING A F
LEET.": NORMAL
2010 PRINT D$;"IN#";SLOT%
2015 GET K$: IF K$ < > FLAG$ THEN 2015
2020 PRINT : PRINT D$;"IN#0"
2025 XOLD = 5:YOLD = 5: GOSUB 200
2030 SHIP = S:Y = 2: PRINT CHR$( 7);
2035 PRINT "POSITION YOUR SUB, 2 SQUARES."
2040 GOSUB 900: GOSUB 200
2045 SHIP = D:Y = 2: PRINT CHR$( 7);
2050 PRINT "POSITION A DESTROYER, 2 SQUARES."
2055 GOSUB 900: GOSUB 200
2060 SHIP = C:Y = 3: PRINT CHR$( 7);
2065 PRINT "NOW YOUR CRUISER, 3 SQUARES."
2070 GOSUB 900: GOSUB 200
2075 SHIP = B:Y = 4: PRINT CHR$( 7);
2080 PRINT "FINALLY, A BATTLESHIP--4 SPACES."
2085 GOSUB 900: GOSUB 200: PRINT CHR$( 7);
2090 PRINT "POSITIONS CORRECT (Y/N)? ";
2095 POKE KB,0: GET K$: IF K$ = "N" THEN GOSUB 3000: GOTO 2025
2100 PRINT : PRINT D$;"PR#";SLOT%
2105 PRINT FLAG$: PRINT D$"PR#0"
2110 IF NOT ME THEN RETURN
2115 GOSUB 200: INVERSE : PRINT "YOUR OPPONENT IS DEPLOYING A N
AVY.": NORMAL
2120 PRINT D$;"IN#";SLOT%
2125 GET K$: IF K$ < > FLAG$ THEN 2125
2130 RETURN
2997 REM
2998 REM RESET GAME
2999 REM
3000 HOME
3005 HTAB 4: PRINT "HOME SCREEN";
3010 HTAB 24: PRINT "TARGET SCOPE"
3015 HTAB 4: INVERSE : PRINT SPC( 12);
3020 HTAB 24: PRINT SPC( 12)
3025 FOR X = 0 TO 10: HTAB 4: PRINT " ";
3030 HTAB 15: PRINT " ";: HTAB 24: PRINT " ";
3035 HTAB 35: PRINT " ": NEXT
3040 HTAB 4: PRINT SPC( 12);
3045 HTAB 24: PRINT SPC( 12): NORMAL
3050 FOR X = 1 TO 10: FOR Y = 1 TO 10
3055 VTAB Y + MAR
3060 HTAB X + 4: PRINT " ";
3065 HTAB X + 24: PRINT " ";
    
```

Listing continued.

Listing continued.

```
3070 ME(X,Y) = DOTS:YOU(X,Y) = 0
3075 NEXT : PRINT : NEXT : PRINT : PRINT
3080 PRINT " CURSOR CONTROLS:"
3085 PRINT "   U I O"
3090 PRINT "   J L ";
3095 PRINT "   <K> CHOOSE"
3100 PRINT "   M , ."
3105 HTAB 18: VTAB 4: PRINT "HOME"
3110 HTAB 18: VTAB 9: PRINT "THEM"
3115 S1 = 0:S2 = 0: REM RESET SCORES
3120 BB = 0:CA = 0:SS = 0:DD = 0
3125 RETURN
3997 REM
3998 REM INITIALIZE
3999 REM
4000 DIM ME(11,11),YOU(10,10)
4005 SALVO = 3
4010 REM SHIP'S ASCII'S
4015 B = 66:C = 67:D = 68:S = 83
4020 REM OTHER ASCII'S
4025 AST = 42:PLUS = 43:DOTS = 58
4030 KB = - 16368: REM KEYBOARD
4035 MAR = 2:LEFT = 4:RIGHT = 24: REM MARGINS
4040 D$ = CHR$(4)
4045 REM LOAD SOUND ROUTINES
4050 PRINT D$;"BLOAD SOUND"
4055 FLAG$ = CHR$(27)
4497 REM
4498 REM TITLE PAGE
4499 REM
4500 HOME : VTAB 2: HTAB 11
4505 PRINT "MODEM BATTLESHIP"
4510 VTAB 4: HTAB 17
4515 PRINT "FROM": VTAB 6: HTAB 11
4520 PRINT "INCIDER MAGAZINE"
4525 HTAB 11: PRINT "===== "
4530 VTAB 11: PRINT "WHAT SLOT OR PORT IS YOUR MODEM": PRINT "C
CONNECTED TO (1-7)? ";
4535 GET SLOT%: PRINT SLOT%
4540 IF SLOT% < 1 OR SLOT% > 7 THEN 4530
4545 PRINT : PRINT "WILL YOU BE..."
4550 PRINT " (O)RIGINATING THE CALL."
4555 PRINT " (A)NSWERING THE CALL."
4560 VTAB 18: HTAB 20: GET K$: PRINT
4565 IF K$ = "O" THEN 4800
4570 IF K$ = "A" THEN 5000
4575 GOTO 4560
4797 REM
4798 REM ORIGINATE CALL
4799 REM
4800 HOME :ME = 1
4805 INPUT "ENTER THE PHONE NUMBER: ";NUMBER$
4810 REM YOU CAN DEFINE NUMBER$ HERE
4815 PRINT D$;"PR#";SLOT%: REM MODEM ON
4820 PRINT CHR$(17);NUMBER$: REM DIAL NUMBER
4825 IF PEEK(1656 + SLOT%) > 127 THEN PRINT : GOTO 4855
4830 PRINT "NO CARRIER": PRINT "TRY AGAIN (Y/N)?"
4835 GET K$: IF K$ = "Y" THEN 4800
4840 PRINT : PRINT CHR$(26): REM HANG UP
4845 PRINT D$;"PR#0": REM DISCONNECT MODEM
4850 END
4855 PRINT : PRINT D$;"PR#0"
4860 PRINT D$;"IN#";SLOT%
4865 INPUT "";MESSAGE$: REM GET CHALLENGE
4870 PRINT D$;"IN#0"
4875 GOSUB 250: RETURN
4997 REM
4998 REM ANSWER CALL
4999 REM
5000 HOME : VTAB 5
5005 PRINT "MAKE SURE YOUR MODEM IS CONNECTED."
5010 PRINT "PRESS ANY KEY WHEN YOU ARE READY."
5015 HTAB 20: GET K$: PRINT
5020 PRINT "WAITING FOR THE PHONE CALL..."
5025 PRINT D$;"IN#";SLOT%
5030 GET K$: IF K$ < > CHR$(13) THEN 5030
5035 PRINT : PRINT D$;"IN#0"
5040 PRINT D$;"PR#";SLOT%
5045 VTAB 20: PRINT "HELLO ADMIRAL. READY FOR A SWIM?"
5050 PRINT D$;"PR#0"
5055 GOSUB 250: RETURN
```

End of listing.

\$50

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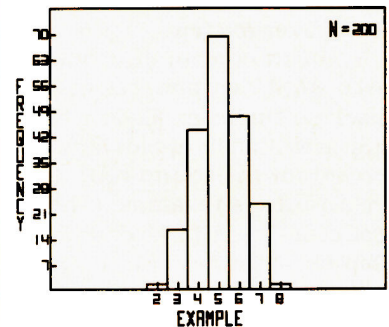
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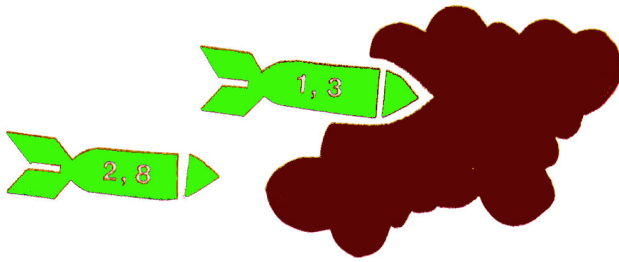
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Program Your Modem

The modem is probably the most misunderstood peripheral in a microcomputer system. Users almost invariably shy away from writing modem-control programs, even though controlling a modem is easier than sending control codes to a printer. They rely instead on sophisticated (and expensive) software packages. If you like the do-it-yourself approach, however, then see how easy programming your modem can be.

Mind Over Modem

You can control your modem from BASIC without resorting to machine language. Modem Battleship is written in Applesoft BASIC, except for the sound routine, so we'll use it as an example. (The control codes used in Modem Battleship are for the Hayes Micromodem II. If your modem isn't a Hayes or a Hayes-compatible, you may have to substitute codes that your modem will understand.)

The *Hayes Programmer's Guide* provides some valuable program excerpts. It also discusses the Terminal Mode and Remote Console Mode in detail. What it fails to clarify is that you can treat your modem as a simple input/output device without accessing these firmware modes.

To do this, when you want to send data from your program to another computer, you generally designate the modem as your output device with a `PRINT CHR$(4); "PR#2"`, assuming your modem is attached to slot 2 (or port 2 on the //c). Then, until you issue a `PRINT CHR$(4); "PR#0"`, your `PRINT` statements will print to the modem and, consequently, send data to the

computer you're hooked up to. That computer, of course, must be ready to receive this data.

To receive data from another computer, you must designate the modem as your input device. `PRINT CHR$(4); "IN#2"` will do the trick. Your `INPUT` and `GET` statements will then look to the modem for data until you issue a `PRINT CHR$(4); "IN#0"`. Aside from a few specifics, this is all you need to know to adapt programs to use your modem.

The Specifics

For Micromodems, the specifics aren't very complicated. Line 4820 of Modem Battleship (**Listing 1**) demonstrates how to initiate a pulse-dial phone call. Put the phone number into a string variable (line 4805), then designate the modem for output (line 4815) and send the number to the modem, preceded by a control-Q (line 4820). Line 4825 will check to see if a connection has been made. If your modem isn't a Micromodem, read your manual to see how to detect a connection. Once the program detects a connection, the modem can be accessed for input and output using the `IN#` and `PR#` commands.

Answering a call with the Hayes is also simple. First, choose the modem for input (line 5025), then wait for a carriage return (line 5030). When a connection is made, the Micromodem will automatically send the necessary carriage return. Detection of this carriage return (line 5030) allows the program to continue.

If you write a program like Modem Battleship, be certain that the originating computer's version is

synchronized with the receiving computer's version. In other words, the program must ensure that when your computer is ready to send data, the other computer is ready to receive it.

In Modem Battleship, this is done in two ways. In some instances, a delay loop (line 250) is accessed before output is sent over the modem. This gives the receiving computer time to reach the corresponding input routine. The second method involves one computer sending a flag when it's ready to receive data (line 610). The other computer waits for this flag before it transmits (line 405). For the most part, you must ensure that the receiving computer's program has arrived at an `INPUT` statement before the sending computer arrives at the corresponding `PRINT` statement.

Until you're familiar with your modem's operation, don't designate the modem for input and output simultaneously, since this puts the modem into Remote Console mode. In fact, avoid both Terminal and Remote Console modes until you develop some expertise. In Modem Battleship, the modem is never designated as the input and output device at the same time.

Thank-You for Calling

To end a connection, send a control-Z to the modem (line 4840). After hanging up, once again direct output to your monitor (line 4845).

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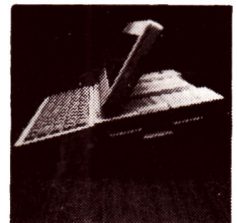
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Détente with Your Apple

No matter how hard you tried or how long you labored at it, you could do nothing with your Apple if it didn't understand you. Communication, both locally at your computer, and from a distance via phone lines, depends on language. Any dialogue requires mutual agreement on the way things are said. And as you'll see, attempting détente with your Apple strictly on its terms would not be to your advantage.

Mutual Understanding

As human language evolved, so did counting systems. In our case, it's base 10 or the decimal system. You may give little thought to these numbers simply because you use them so often. For example, the number "100" is a quantity, but what does it *mean*?

Our decimal system depends on positional notation to describe a given quantity in terms of individual digits and groups of a predefined size (the place value or position). Corresponding with our fingers are ten digits—the numbers zero to nine. For any number, the rightmost position always has a value of one. Each successive position is ten times larger than the one to its right. So 324 translates into four ones (4) plus two tens (20) plus three tens of tens (300).

To avoid the litany of the tens, we simplified the wording. The one's

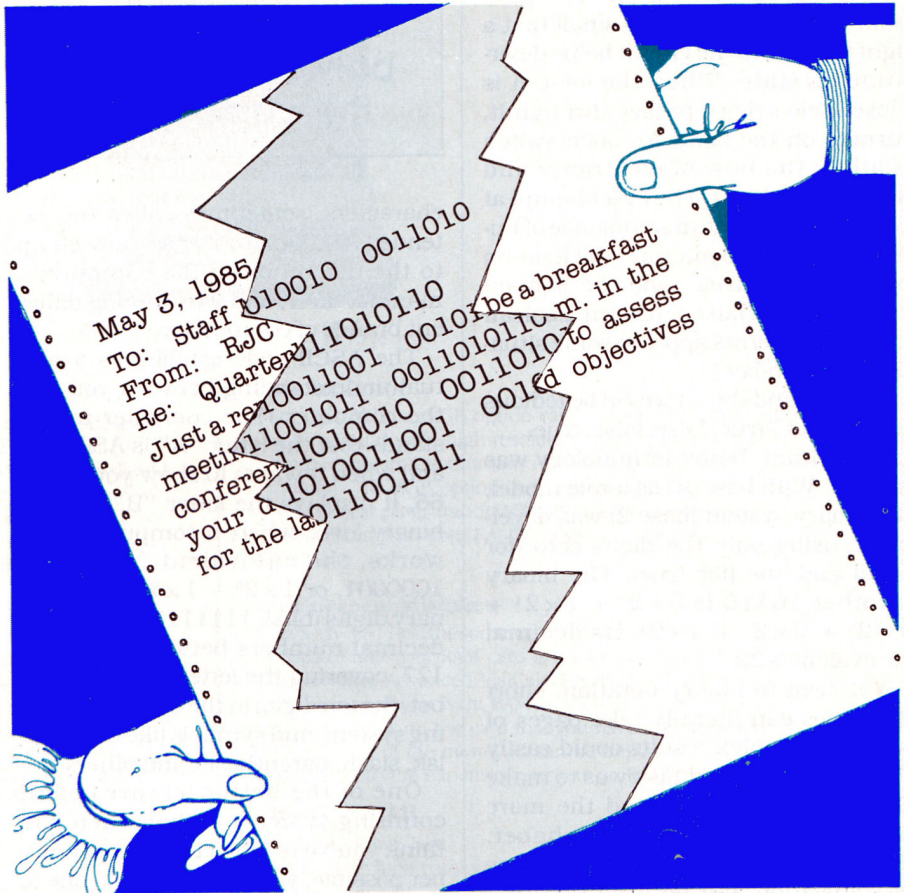


Illustration: Richard Cowdrey

place became 10^0 (ten to the power of zero). Any number taken to the power of zero equals one; so, any digit in the unit's place is multiplied by one. Each additional position is raised to one higher power: The ten's position, 10^1 (ten to the power of one or ten to the first power) is ten times one; 10^2 (ten to the second power or ten squared) is ten times ten; and so the progression goes. Looking at 324 from this perspective, you can solve it through simple math: $4 \times 10^0 + 2 \times 10^1 + 3 \times 10^2$ or $4 \times 1 + 2 \times 10 + 3 \times 100$. Unfortunately, no one has yet developed a computer with ten fingers.

Machine Language and Binary

Once the computer was created, the first order of the day was to develop a viable way for people to have meaningful dialogues with it. This didn't prove as difficult as it might seem, although

Communicating with your computer, and others, requires protocols and some "mutual understanding."

by Bill O'Brien

the explanation is somewhat involved.

Internally, the integrated circuits (IC's) of a computer act as switches with either an "on" or an "off" position. The switches are so small that a light wired into the circuit helps determine its state. When the switch is closed, electricity passes through it, turning on the light. An open switch inhibits the flow of electricity and keeps the light off. The first attempt at converting this into a semblance of human logic was to interpret the light-on condition as "true" and the light-off condition as "false." (Called Boolean logic, these terms apply to some situations even today.)

Understandably, it would be tedious to write out "true, false, true. . ." *ad infinitum*. Better terminology was needed. With base 10 as a role model, the binary system (base 2) was developed, using only the digits zero (for false) and one (for true). The binary number 10110 is $0 \times 2^0 + 1 \times 2^1 + 1 \times 2^2 + 0 \times 2^3 + 1 \times 2^4$. Its decimal equivalent is 22.

Yet even in binary notation, short dialogues can literally take pages of writing; complex results could easily fill a book. The next task was to make the computer understand the more common symbols of our alphabet. The solution involved several layers of translation and no little bit of ingenuity.

ASCII and Binary

When inputting information, you have to consider the needs of the computer, and that sometimes entails a little extra activity on your part. Computers lack the conventions that to their manual predecessors, typewriters, were just mechanical reactions—backspacing, moving forward, rolling the platen back and forth, returning at the end of a line. In addition, the English language itself has approximately 96 recognizable symbols, including the space character.

These characters and controls, combined with some additional characters, total 128; developing a common language just meant assigning each symbol and control character to one of the numbers between zero and 127. In the United States, we call this system the American Standard Code for Information Interchange (ASCII). The assigned codes of another 128 special

**"The ASCII code
establishes a mutual
understanding
between you and
the computer."**

characters, sometimes called the extended ASCII character set, are left up to the discretion of the computer's manufacturer, and vary among different brands of computers.

The ASCII code establishes a mutual understanding between you and the computer. The computer understands that the letter "A" is ASCII 65, and when it wants to show you ASCII 66, it displays the letter "B." On the binary level, where a computer really works, the equivalent for "A" is 1000001, or $1 \times 2^0 + 1 \times 2^6$. Seven binary digits (bits), 1111111, can handle decimal numbers between zero and 127, covering the letters of the alphabet, the ten digits in the decimal counting system, and symbols like the asterisk, slash, parenthesis, and others.

One of the better features of all counting systems is that when you think you've reached the largest number possible, you need only add one to increase it. In binary, to cover all 256 possibilities (zero through 255), you need 8 bits (11111111), the largest possible binary number an 8-bit processor like the Apple's 6502 can understand. Now, armed with all of this information, you can begin to communicate with your computer.

The Wired Nation

Computers can broaden our communications ability over distances. But they can't do the job by themselves. They need additional software and hardware to help with the process. Even when two computers "talk," using the same "language," they still need a pre-arranged agreement about how things will be spoken. One particular aspect of making two computers understandable opens up a whole can of worms: It's called word length.

Modems and Errors

To a computer, a byte is a collection of 8 bits that correspond to an ASCII

character code for a letter, number, or symbol. When that character is sent from computer to computer, it changes. In fact, it collects at least 2 more bits, making a total of 10 or more.

At least one of the additional bits, called the start bit, is used to tell the receiving computer's software that it should look for a word *now*. Another, fittingly called the stop bit, indicates the end of the word. That leaves 8 bits for the word itself—but not exactly.

Even if yours is the best phone line in the world for your purposes, it may not be adequate for your computer's messages. Since a computer deals with base 2 (binary), when it talks to another computer, it transmits either a one or a zero for each bit, usually by changing the voltage on the transmission line from +12 volts (for one) to -12 volts (for zero) and back again as needed (via the RS-232).

If you were plugged directly into another computer, the software could easily translate this change. But phone lines don't deal with voltages; they want sounds. A *modem* translates the computer's electrical signals into two tones on the sending end (*modulator*) and back into voltage on the receiving side (*demodulator*). If your telephone line isn't quiet (and how many really are?), the tones can become garbled. Ones can turn into zeroes and vice versa.

Parity

Almost all communications software has a simple error-checking scheme called parity. Before you begin transmission, the software on each side must be told if it should use even or odd parity checking. The sending computer looks at each character before it's transmitted, checking to see if the ASCII code for that character (in binary form) has an even or an odd number of ones. Then comes the tricky part.

If you specify even parity, and the ASCII character has an odd number of ones, the software makes the eighth bit a one to achieve an even number of ones. If it already has an even number, it makes (or leaves) the eighth bit a zero. Odd parity checking works in reverse.

If the computer on the receiving side detects an even number of ones under even parity, or an odd number under

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odd parity, it assumes that everything is all right. There are some occasions when that won't be correct, but it's rare that 2 bits switched in transmission still maintain the proper parity for the byte.

When it detects a parity error, the software doesn't print the character it received. After all, it isn't really sure what it should be. Rather, to alert you to the error, it inserts a special character of its own in place of the unrecognizable one. Most software uses the asterisk (*).

Error Checking and the Eighth Bit

Parity checking is fairly accurate. To work correctly, it uses the eighth bit of each character to get an odd or even number of bits. So as not to scramble your message, you must describe each character in no more than 7 bits. With parity, you can't send data that's been stored in extended format because it uses 8 bits; you can only send ASCII (also called text) data.

That leaves a problem for binary files and AppleSoft programs that are also stored in tokenized binary format: They need 8 bits. Happily, most of the better communications programs include an additional error-checking system for 8-bit data transfer. It's called the XMODEM, or Christensen, protocol. This system sends a series of transmissions until the entire file is transferred. Each "packet" of information is timed and rechecked to assure accuracy.

Baud Rates

Your Apple can converse at presettable speeds between 110 and 9600 baud. If you're wired directly to another computer, you usually can use the highest speed, but a modem is slower.

Most lower-priced modems operate at 300 baud. Now, 1200 baud is becoming popular, and a smattering of 2400-baud modems is beginning to appear. Needless to say, as the speed increases, so does the price.

Phone lines also affect the speed at which you can transmit data. In most areas, 2400 baud is about the highest speed they can handle before they garble information. If you want your Apple to talk faster than that, you'll need a dedicated phone line. The local Bell

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literally runs a private line between the two destinations. It's an expensive proposition, but it enables you to communicate at high speeds without worrying about poor line conditions.

Modem Types

Modems come in two general varieties: onboard and outboard. Onboard (also called "board" or "plug-in") modems plug into an available slot inside the Apple. They're powered by the computer, and the only external connection they require is to the phone line.

Outboard modems are free-standing devices that have their own power supply and connect to the computer via its serial port. You need this type of modem if you own an Apple //c or want to share a modem between an Apple //e and //c.

Some outboard modems connect to the phone line through an acoustic coupler, a pair of rubber cups, usually mounted on top of the modem, into which the handset of the phone fits. The rubber insulates the phone from much of the background noise in the room, but if there's a lot of noise, the acoustic cups won't eliminate it all.

For this reason, and because many modern phones don't fit into the couplers, suppliers make direct-connect modems, which plug into the serial port on one end and directly into the phone jack on the other. (Onboard modems are also direct-connect, of course, but they're not referred to that way.)

Modems have another distinguishing feature—some are smarter than others. Smart modems come with capabilities far beyond those of their less-witty brethren. They can dial your phone in either pulse or tone, and answer it, waiting a predetermined number of rings before they connect. They also can use both 1200 and 300 baud, usually switching automatically be-

tween the two, depending on the speed of the incoming signal.

Terminal Emulators

Terminal emulators are the programs that let your computer transmit and receive data over phone lines. (The term is a throwback to when mainframe terminals alone used modems.) Terminal emulators for your Apple run the gamut of intelligence levels, although none, yet, let you use the computer as a computer while you're on-line. Here are some high points to watch for when you're shopping.

Multiple baud-rate capability is important for versatility. You might want to connect to a modem that runs at a different rate, or directly to another computer. The absolute minimum you'll need for screen control is the standard teletype (TTY) protocol that prints line-after-line of text with carriage returns and line feeds. You'll probably also want the DEC VT-52/VT-100 screen control codes standardized by ANSI (the American National Standards Institute).

Any communications program for a computer should support data or program file transfers, including parity error-checking for text files. Refuse a program that doesn't include the XMODEM protocol for binary files, as well.

If you're looking for a communication system for your Apple, purchase the modem and software at the same time to ensure compatibility between the software's commands and the modem's ability to understand them. The Hayes modem commands have become a standard for communications software.

What's Next?

If you don't know someone else with an Apple and modem, there are other things you can do with your modem and software. What started out as a way for companies to capitalize on their spare mainframe time has turned into the blossoming world of computerized services. You can tap into news reports, stock quotes, information-retrieval systems, shop-at-home services, and even "talk" to other computerists. (See Data-Gram, the new *inCider* column about on-line services by Matthew Lesko.)

There is also an ever-growing num-

ber of personal-computer "bulletin boards" (BBSes), operated by individuals and computer clubs for their friends and members. (See Brian Murphy's article, "How to Use a Modem" on p. 14, and check into *inCider's* BBS at (603) 924-9801.) Most of the time, bulletin boards are open to anyone who has a modem and the correct number to dial. Some big-time services, however, require that you pay a membership fee. Their phone numbers change too quickly to publish a comprehensive list, but Apple user groups usually have a fairly current list. To get it, though, you must join the pay service.

VanLove's Software Directory is one alternate source for such a list. You have to buy the directory to get it, but you're getting one of the most comprehensive source books available for Apple software. They throw the BBS list in as an extra.

What's Best?

Sorry, but there isn't a "best" here. There's no best modem, no best telecommunications service, no best ter-

minimal-emulation software. If you want to auto-dial, get a smart modem and software that supports it; if you want stock reports, get them from Dow Jones; if you want the UPI news service, try The Source; if you want shop-at-home services, look through CompuServe. There are as many "if's" as in a spreadsheet.

Armed with the information and tips I've included in this article, sit down and figure out what features you'll need. Then go out and find the products that can provide them.

LATE-BREAKING NEWS

For quite some time, I've been using a communications program called *Softerm 2* on my Apple//e. Among its other features, the program reads, writes, and formats CP/M, DOS, and Pascal disks. On the darker side, it requires an interface card—which, unfortunately, my slotless //c won't accept—that serves as its copy protection, adds function keys, and holds additional program instructions.

Softronics has now released an Ap-

ple //c-compatible version of this program. It uses the apple keys for functions, has added the code that was in ROM to the program itself, and can address the //c's 128K of RAM. I assume that it's also ProDOS compatible, but the gentleman at Softronics didn't mention that. An upgrade will cost you \$100.

That presents a rather large problem for me. Essentially, they've made their product more //e-//c compatible—not as a favor to me, but to keep the program marketable. For that privilege, I'm expected to pay an additional \$100 for the program if I decide to sell my //e and keep the //c.

Keep in mind that you're listening to my own rationale. You must judge for yourself whether or not the upgrade cost is reasonable. I'd like to find out, from as many of you as possible, what your thoughts are on that type of policy. I'll print as many responses as room permits in a future column. ■

Write to Bill O'Brien at P.O. Box 1010A, Fort Lee, NJ 07024. Or call him up on CompuServe. His user ID is 74216,1215.

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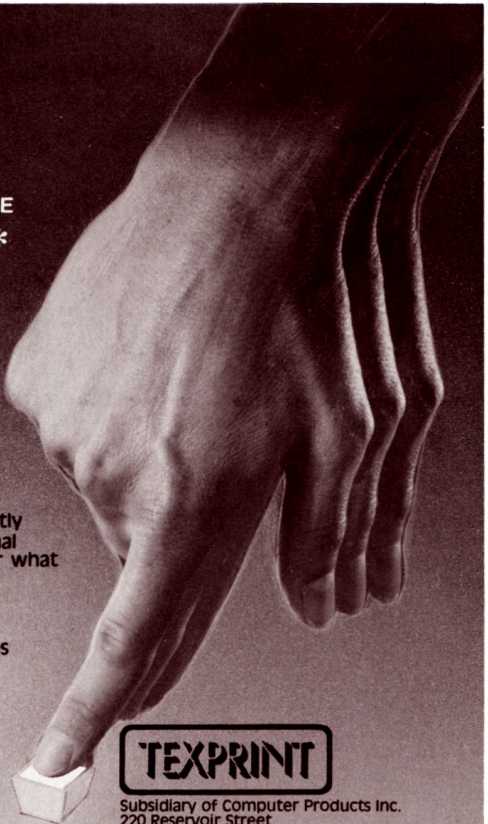
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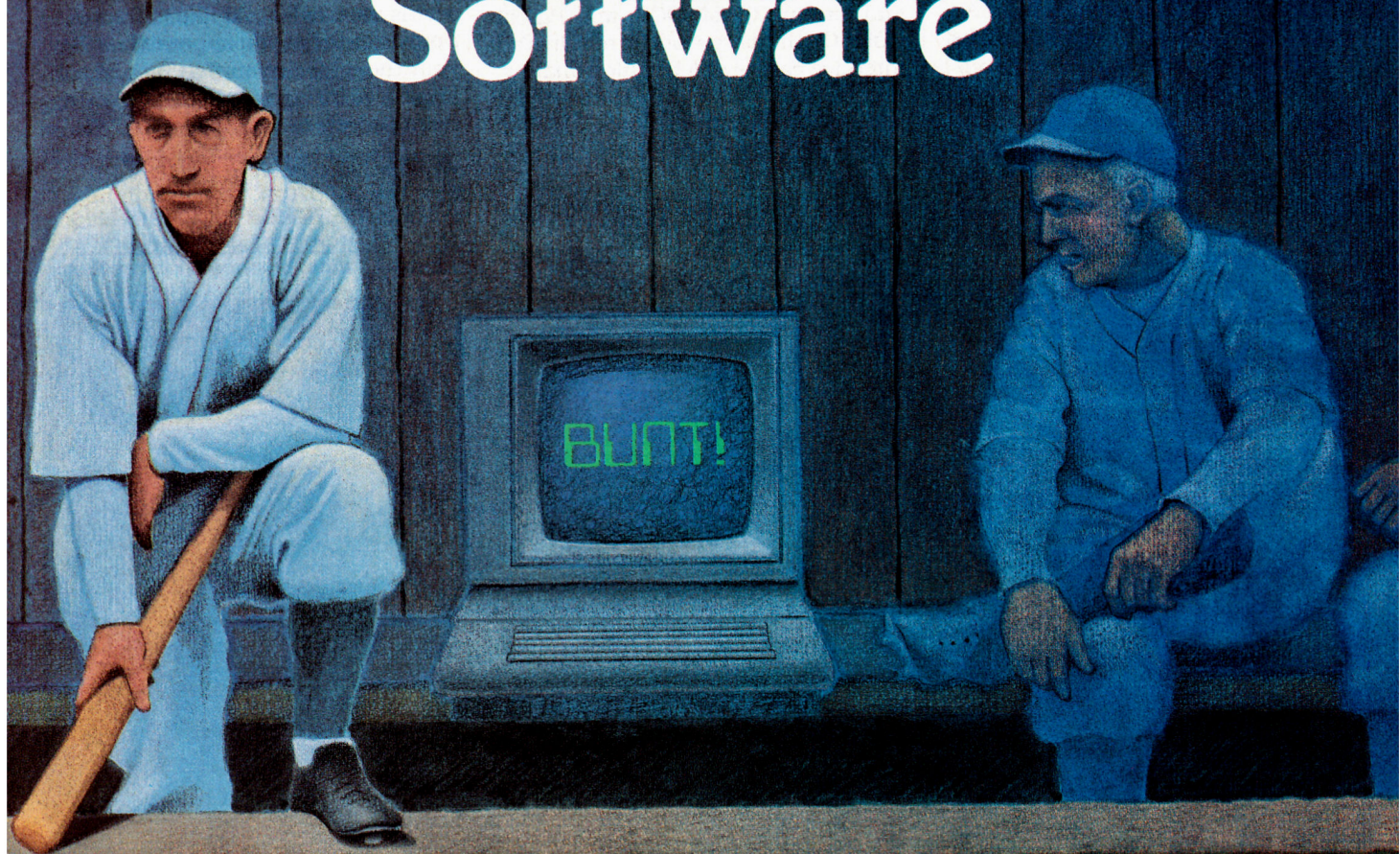
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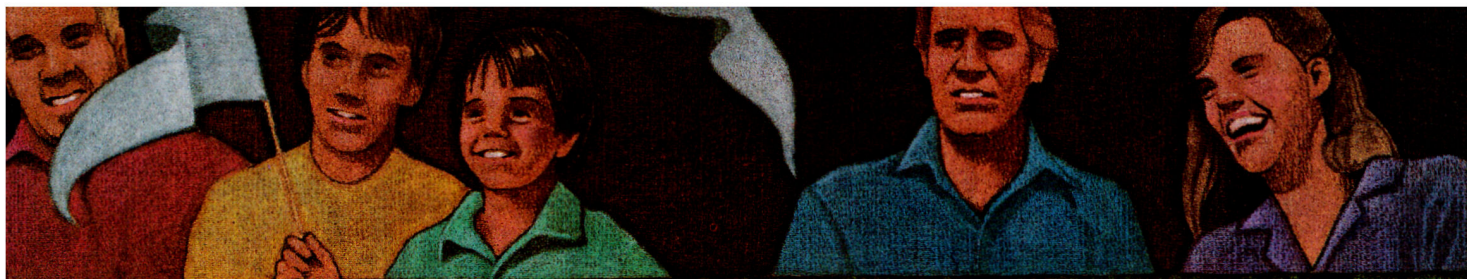
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Hardball Software



For that championship season, major leaguers will be relying on their Apples and EDGE 1.000—statistical software for playing hardball.



W by Jeffrey Angus

When Earl Weaver, contemporary baseball's most successful manager, retired recently from the Baltimore Orioles, he left two legacies: the Orioles' winning tradition and an intricate system of statistics to help make game decisions. Now, at least three major-league baseball teams are using computer technology to out-Weaver Weaver. They can deliver in

minutes what took the venerable Oriole endless hours of pencil- and index-card tabulation. These baseball clubs rely on a custom-designed computer system called EDGE 1.000 from Pacific Select. The system runs on an Apple II with three disk drives and a small Silentype printer. Data from a team's most recent homestand or road trip is stored on disks, but the main data files are located on a DEC minicomputer

accessed by the Apple through a telephone connection.

The EDGE 1.000 system includes two data bases, Scout and Playball, that can be bought separately or together. Scout contains information on every major and minor league player in the country; Playball is an event data base that records play action, such as pitches, hits, and outs. EDGE 1.000 tracks the performance of each

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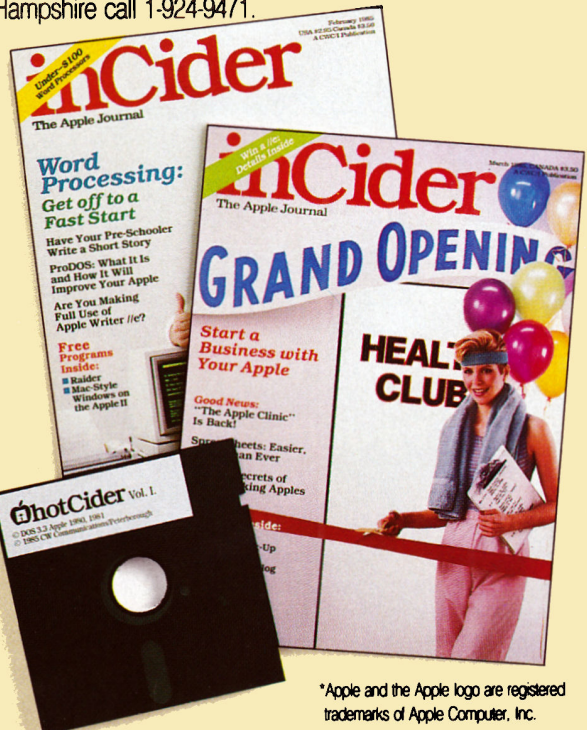
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player on a team, and documents how opposing players have fared against the team. A computer operator watches a game and compiles the information as each event happens.

Weaver kept similar statistics on index cards. He constantly fiddled with figures and devoted large amounts of his—and his coaches'—time to his passion for data. While other teams wanted to adopt Weaver's approach, they didn't want to invest the massive amount of time and effort. They decided to go with an "analytical engine."

The Oakland A's and the Chicago White Sox were the first teams to invest in EDGE 1.000. Why these teams? Possibly because both were acquired by new owners and were looking for a pennant season after a period of below-championship performance. The fact that Steve Boros of the A's and Tony LaRussa of the White Sox are highly educated managers who feel comfortable with computer technology probably had something to do with it, too.

LaRussa uses the system to predict which of his hitters will do well against an opponent, what types of pitches his hurlers should throw, and where to position his fielders. There does seem to be a correlation between EDGE 1.000 and the success of the White Sox; the team advanced to the 1983 American League playoffs—its first time since the divisional system was devised in the mid-1960s.

Covering All the Bases

At its inception, the capabilities of EDGE 1.000 were limited because the computer people who operated it and entered the data during games lacked an intimate knowledge of baseball. When the New York Yankees adopted the system in 1983, they wanted an operator who was familiar with EDGE 1.000's detailed features, but who also was a baseball insider. They found the ideal operator in Doug Melvin, their batting-practice pitcher. Melvin's pitching experience enabled him to identify, from the press box where the Apple was located, types of pitches as well as where they crossed the plate.

Melvin enters approximately 500 facts per game into the system, which breaks down each Yankee player's performance into 18 categories for the season, month, current trip, last ten games, and last five games. EDGE 1.000 actually tabulates more information than most baseball teams need, so Yankee personnel must sift through the data and separate the useful data from the irrelevant.

The Sultan of Stats

The whiz behind EDGE 1.000, Dr. Richard Cramer, isn't just another Apple programming guru with a passing interest in baseball.

An organic chemist who uses computers in his work for pharmaceutical firms, Cramer is also a member of the Society for American Baseball Research (SABR). Another study, considered a landmark statistical work, brought him recognition outside the chemistry field when it was summarized in

The Hidden Game of Baseball, by John Thorn and Pete Palmer.

Cramer never worshipped computers. "Numbers. . . I was always interested in them," he says. "I first used [computers] in graduate school, and to me they were just immense beasts in the basement. But my love for baseball got me into computing. I played APBA, a tabletop baseball simulation, and I soon realized that whatever I could do with the dice, the machines could do far more quickly."

Cramer conceptualized EDGE 1.000, but the idea didn't develop into a concrete project until he met Matt Levin, the force behind Pacific Select, a sports consulting firm in San Francisco. "Matt had a way to make the vision possible," Cramer notes. "Matt does consulting for leagues and franchises. He also had a contract with the Oakland A's to study and work with their game broadcast efforts."

Cramer quickly shares the credit for EDGE 1.000 with Apple Computer as well as Pacific Select. "EDGE 1.000 also became possible because of Apple," he says. "Their products gave us the power to do the work with a machine we could transport. I remember going to their tiny offices in Cupertino in the

spring of '81. The product managers for both the Apple II and Apple III were there. I was pretty sure we should try to use the III, but after

they heard what we were planning to do, they convinced us to use the II. They gave us the equipment in exchange for the publicity.

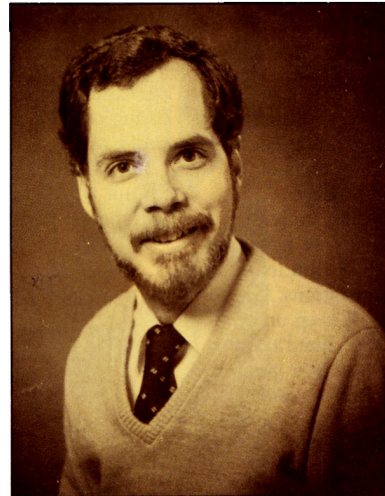
"We sold our first system to the [Oakland] A's," Cramer notes. "When the announcers first saw it, they said they wished it would drop through the floor and disappear forever. By the end of the season, they came to like it."

Now, one quarter of the major-league baseball teams use EDGE 1.000. And according to Cramer, the system has had a tremendous impact on these organizations.

"Look at the last baseball winter meetings [in December of 1984]. There were 40 players who changed teams, and 26 of them were with teams that use EDGE," Cramer states.

Cramer indicates that the teams using EDGE 1.000 are more likely to make confident moves when player contracts, trades, and sales occur. Such teams also tend to take concrete actions and avoid procrastination.

EDGE 1.000's developer doesn't plan to revamp the system's structure, because teams are adapting it to fit their needs. "We're not going to do anything much to EDGE 1.000," he said. "Teams can buy just one of the two [data bases] if they want. We may also try to work out ways to make the operation of EDGE cheaper. A team's time-sharing charges (the cost of using the remote computer and the telephone charges) run about \$20,000 a year now. [But] the system is good as it is." □



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"It's not just a tool for game decisions, either," Melvin says. "The programmer developed a number of models to evaluate the relative offensive production of players using statistics you could have only if you kept close track with this system or something like it. The runs-per-game formula keeps track of hitters closely enough to value each plate appearance depending on the situation.

"It's really more of a management tool than a field tool. When salary talks happen, it's likely we can use the statistics to get a more accurate picture of a player's worth," Melvin explains. "And we can use the information to help pick players who would do well in our stadium. Because we chart the location of each hit, we can tell which players are going to hit the best in Yankee Stadium."

Melvin is already looking beyond the system's immediate reports. He envisions using EDGE 1.000's image-grid display to set up the best defensive placement of fielders. He says he wants to conduct retrospective studies of the advantages of playing first and third basemen close to the foul lines during late innings, and thereby answer Howard Cosell's favorite question: "Just how much does playing the infield in raise a hitter's batting average?"

Old-Time Baseball

With or without the computer, most managers don't bother with the extensive statistics-gathering procedure that Earl Weaver advocated. The baseball business continues to live and breathe largely by its old saws and superstitions. But to the computer enthusiast, the perspective offered by EDGE 1.000 is an exciting, refreshing discovery. So while Earl Weaver tends his tomato plants, Doug Melvin and the up-and-coming Weavers are pulling old-generation baseball into the electronic age. ■

Jeffrey Angus resides at 4616 Meridian Avenue N., Seattle, WA 98103.

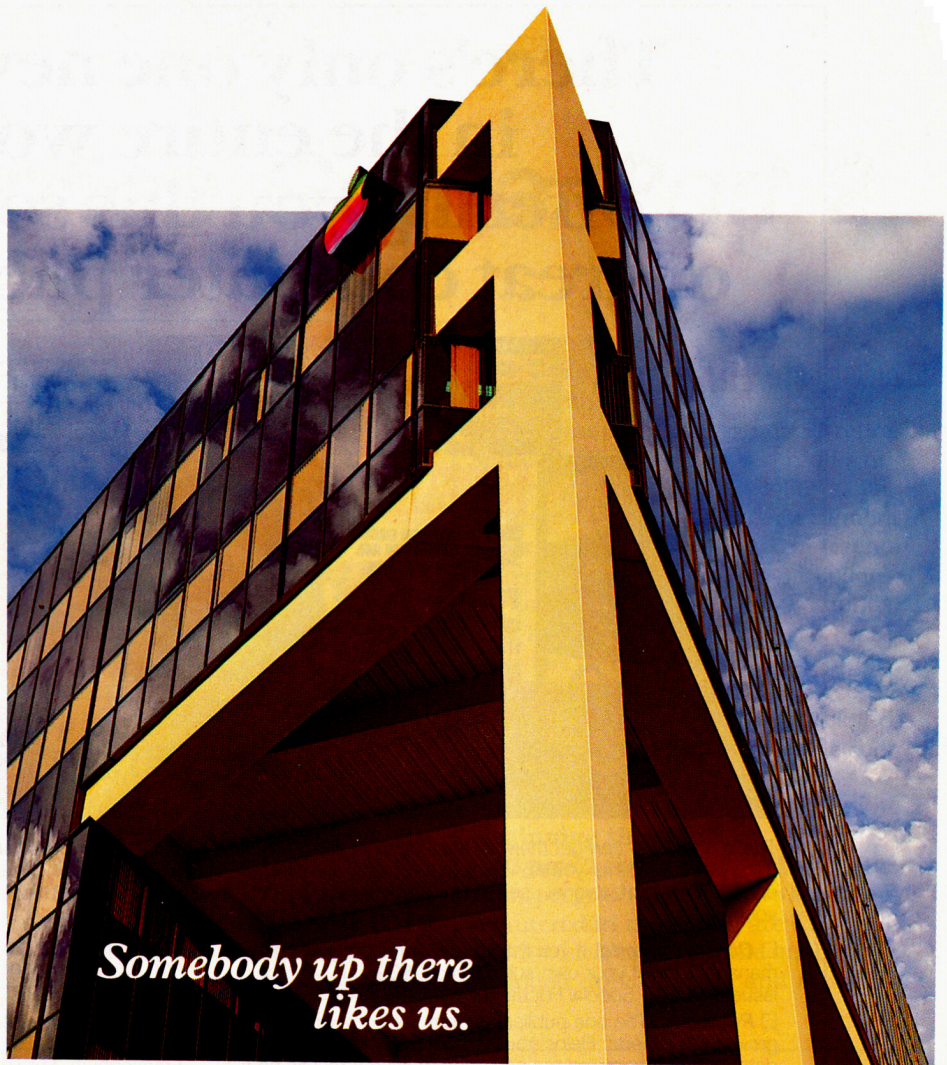
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EDGE 1.000

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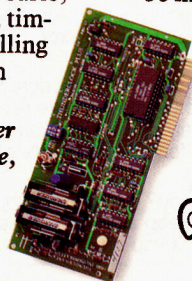


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The Simulation Game: Part 2

In last month's column I began describing how to develop a computer simulation, using the solitaire game called *Idiot's Delight* as an example. I described in detail the initial design of the program and of the data structures used to represent the shuffled-card deck. This month, after a short review, I'll present the remainder of the program, including the subroutines needed to handle the play of the game and the video display.

Review

Idiot's Delight is a simple game of solitaire that uses a standard 52-card deck and treats aces high. The game is played by shuffling the deck and dealing four cards face up in a horizontal row on the table. The face-up cards are called the "tableau," and form the base of four stacks of cards that will build up as each new hand is played.

As you play, you check the top card in each of the four stacks for two or more of the same suit. When such a condition exists, you remove all but the highest of those cards, then treat the new set of top cards in a similar manner. This cycle continues until all four top cards have different suits.

When one of the columns becomes empty due to removal of low-ranking cards, any of the three remaining top cards can go into the vacant spot. This action, of course, reveals a new top card, and the game cycles back for removal of like-suited cards.

When no further cards can be removed or moved, you deal four more cards from the deck face-up on top of the four stacks. The game continues until all 52 cards have been dealt. You win if the four aces are the only cards left in the tableau after all 52 cards have been played.

Type in and play *Idiot's Delight*, then create your own Apple solitaire game.

Figure 1 shows the hierarchy diagram that identifies the functional units, or modules, needed to simulate *Idiot's Delight* with a computer program. The **Program listing** contains the entire program, including the main program and the two subroutines for creating the card deck (lines 1050-1065) and for shuffling the deck and coding the cards (lines 1100-

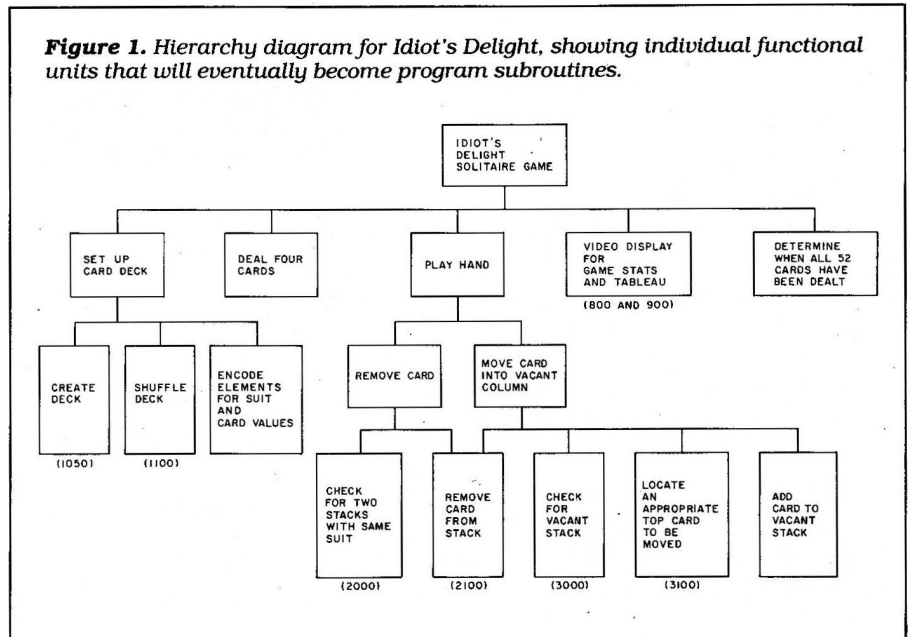
1150) that were discussed in detail in last month's column.

The shuffled deck, which is represented by the SD() array, contains numeric elements coded as follows. The rightmost single digit in each element has a value from 1 to 4 and represents that element's suit. A 1 means spades, a 2 hearts, a 3 clubs, and a 4 diamonds. The leftmost one or two digits represent the card's face value, ranging from 2 to 14, with 14 being an ace, 13 a king, 12 a queen, and 11 a jack. So, for example, the value 133 is the code for the king of clubs.

Beginning the Game

Figure 2 shows the flowchart for the main program. The first two arrays encountered in the listing are CD() and SD(), which represent the unshuffled, uncoded deck of cards and the shuf-

Figure 1. Hierarchy diagram for *Idiot's Delight*, showing individual functional units that will eventually become program subroutines.



by Dan Bishop

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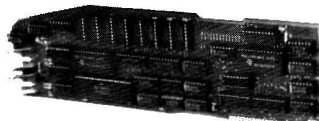
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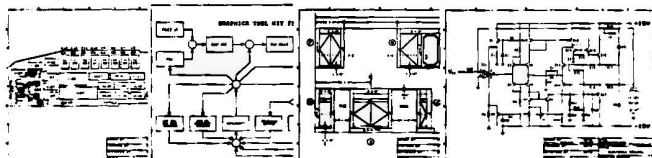
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fied, coded deck. A third array, PD(i,j), represents the tableau. Since the tableau is two-dimensional, so is this array. Element i in PD(i,j) can have values from 0 to 13, and element j can have values from 0 to 4. The zero value for j is not used by the program, but the zero value for i is the card counter for that stack. Thus, PD(0,1) contains the number of cards in stack 1, PD(0,2) the number of cards in stack 2, and so on.

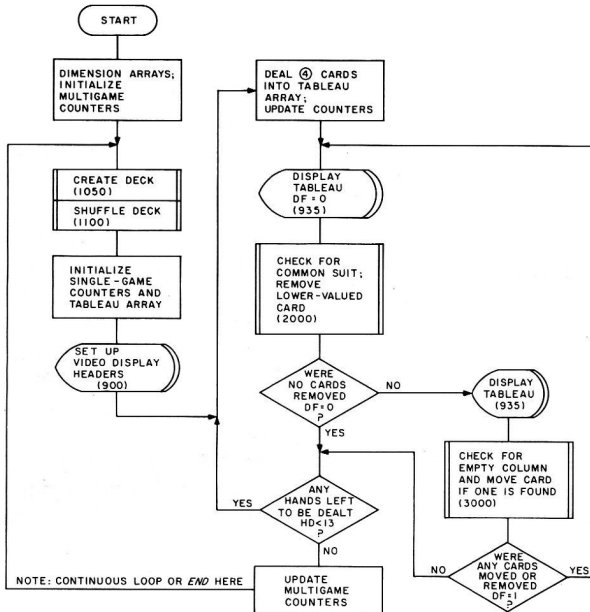
Each deal of four cards is called a hand, and HD keeps track of the hand number, starting at one. The value of HD also correlates with the value of i in PD(i,j). In other words, when a hand is dealt, the four cards go into PD(HD,J), with J varying from 1 to 4. When a card is removed from a stack, all of the card values below are moved upwards, so the top card of the Jth stack is always PD(HD,J).

This arrangement makes comparing top cards simple, but requires an adjustment before displaying the tableau so the screen will more closely represent an actual game tableau. If the tableau were displayed as in PD(i,j), the bottom cards of stacks of different height would appear at different levels on the screen, whereas, of course, with real cards the top cards would be at different levels. The adjustment is done in the subroutine beginning at line 800. A second two-dimensional array, PE(i,j), is adopted to contain the tableau for display. Both PE() and PD() contain the same card elements in the same stacks, the difference being that the bottom card in each stack in PE() is in PE(1,J).

Program execution begins by dimensioning the four arrays and initializing the multi-game counters. As with many simulations, *Idiot's Delight* is designed to run continuously, playing game after game and accumulating statistics. To stop the program, you have to press the reset key (or control-reset). Each time a game finishes, GN, representing the number of completed games, is incremented by 1, and CN, the grand total of cards remaining at the end of all games played, is incremented by the number of cards just left on the table, CT. BN gets a new value if CT has a lower value than the present BN, so BN reflects the score of the best game played to date. Finally, GW keeps track of the number of games won, and is incre-



Figure 2. Flowchart for the main program sequence in *Idiot's Delight*. Note the similarity between the sequence of instructions in the flowchart and the text description of the actual game in the article.




Program listing. *The complete Idiot's Delight.*

```

1 REM FOUR CARD SOLITAIRE
2 REM PROGRAM BY DAN BISHOP / CUSTOM COMP
3 REM
4 REM **** VARIABLES USED ****
5 REM GN-GAMES COMPLETED
6 REM CN-CARDS LEFT, ALL GAMES
7 REM BN-BEST GAME CARD COUNT
8 REM GW-GAMES WON
9 REM CR-CARDS REMOVED
10 REM CT-CARDS LEFT ON TABLE
11 REM CD-CARDS DEALT
12 REM HD-HAND NUMBER
13 REM CD()-UNSHUFFLED DECK
14 REM SD()-SHUFFLED DECK
15 REM PD()-TABLEAU ARRAY
16 REM PE()-REARRANGED TABLEAU
17 REM ARRAY FOR DISPLAY
18 REM DF-FLAG FOR CARD MVMNT
19 REM I,J,K, KK-LOOP COUNTERS
20 REM & SUBSCRIPTS
95 REM
96 REM *****
97 REM MAIN PROGRAM SEQUENCE
98 REM *****
99 REM
100 DIM CD(52),SD(52),PD(13,4),PE(13,4)
109 REM INITIALIZE MULTIGAME VARIABLES
110 GN = 0:CN = 0:BN = 52:GW = 0
119 REM CREATE NEW DECK
120 GOSUB 1050
129 REM SHUFFLE DECK
130 GOSUB 1100
139 REM INITIALIZE COUNTERS
    
```

Listing continued on p. 74.

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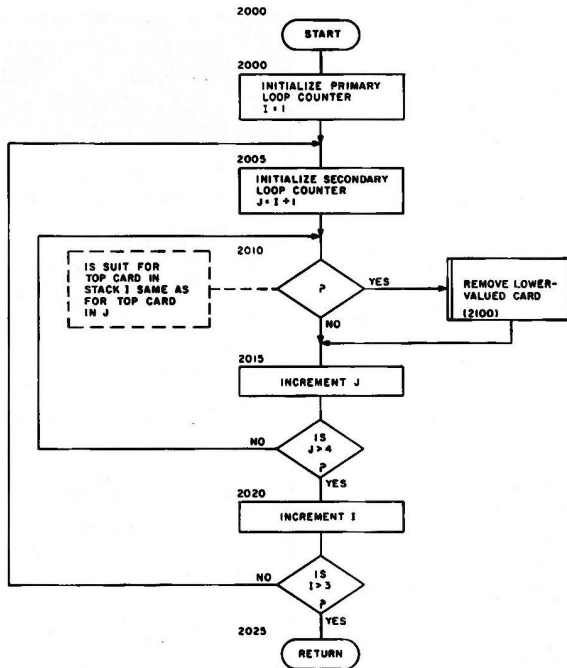
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Figure 3. Flowchart for the subroutine that determines if two stacks are topped by cards of the same suit (line 2000).



mented only if CT has a value of 4 at the end of a game.

Each of these four multi-game counters is initialized in line 110 at the beginning of the program, and incremented appropriately in lines 220-230 at the end of the main program before looping back to begin another game.

You are now ready to play a game of *Idiot's Delight*. You must first create a card deck (line 120), shuffle it and code the cards (line 130), and initialize the individual-game counters: CD (cards dealt), CR (cards removed), CT (cards left in the tableau), and HD (hand number). All four are initialized to zero in line 140. Then the PD() array is filled with zeroes in line 150, and the video display headings are printed on the screen (line 160).

The first hand is dealt (starting at line 200) by incrementing the hand number, HD, selecting four cards from the shuffled deck, SD(), and placing them into the four stacks, PD(HD,1), PD(HD,2), PD(HD,3), and PD(HD,4). The stack counters PD(0,1), PD(0,2), and so on, are incremented by 1, and

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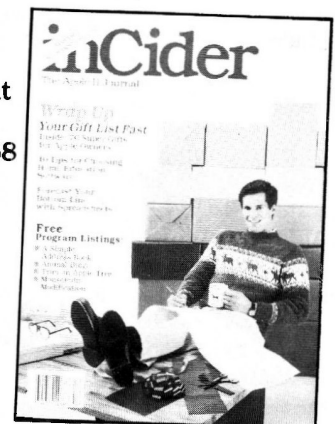
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the cards dealt, CD, and cards on the table, CT, are incremented by 4. The new tableau appears and play begins.

Checking for Card Removal

Since the program has a modular structure (subroutines carry out the elements of play), it needs a flag variable to indicate if card movement occurred during execution of a subroutine. I used DF (initially set to zero). The subroutines set DF to 1 if a card is moved; a non-zero value after a return from a subroutine means a move was made and the evaluation process must recur with the new set of top cards.

The main program sets DF to zero, then proceeds to the subroutine at line 2000 to check the four top cards for two of the same suit. It does this by comparing the rightmost digit in the top card of the two stacks in question, PD(HD,J) and PD(HD,I). Note the two nested loops for this routine. The outer loop, I, ranges from 1 to 3; the inner loop, J, from I + 1 to 4. Thus, when I is 1, the first stack is compared to the second, third, and fourth stacks to see

Figure 4. Flowchart for the card-removal subroutine (line 2100).

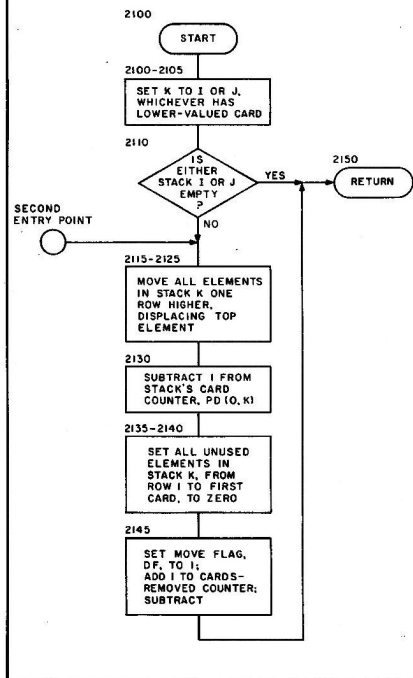
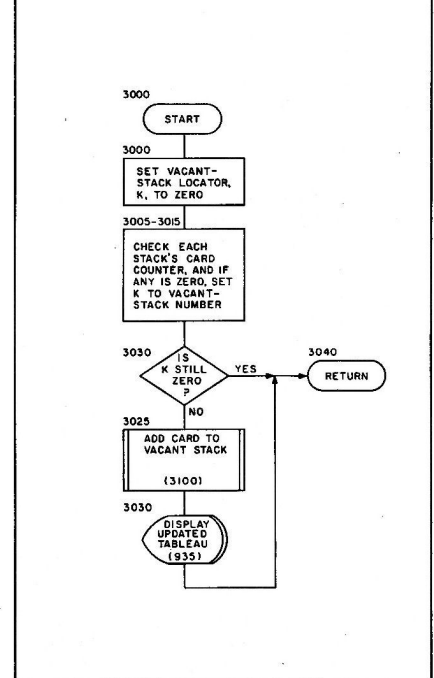


Figure 5. Flowchart for the subroutine that checks for vacant stacks (line 3000).

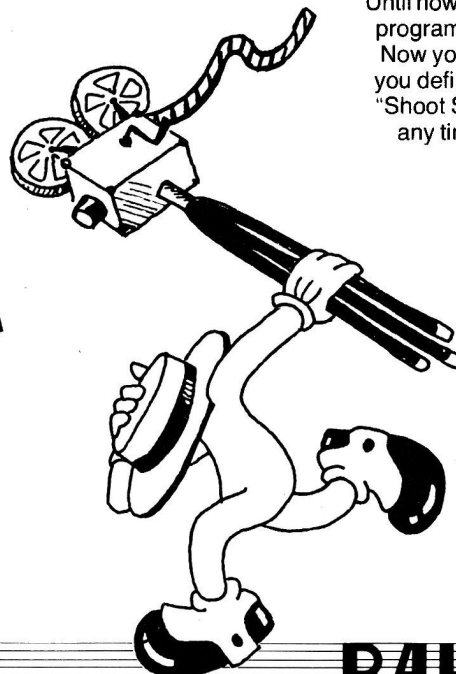
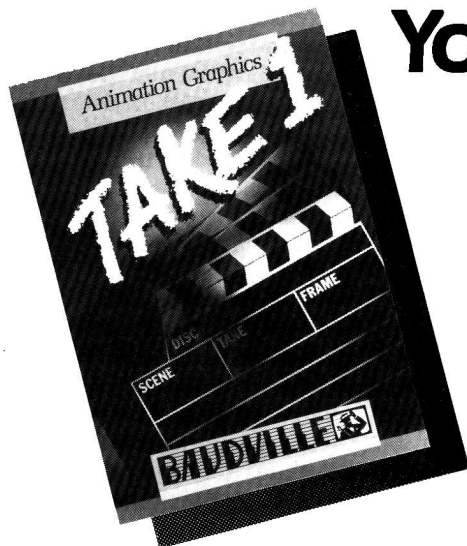


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Listing continued from p. 71.

```

.140 CD = 0:CR = 0:CT = 0:HD = 0
.149 REM ZERO TABLEAU ARRAY
.150 FOR I = 0 TO 13: FOR J = 1 TO 4:PD(I,J)
    = 0: NEXT J,I
.159 REM SETUP VIDEO DISPLAY
.160 GOSUB 900
.199 REM PLAY NEXT HAND (HD)
.200 HD = HD + 1
.209 REM DEAL FOUR CARDS
.210 FOR J = 1 TO 4
.220 CD = CD + 1
.230 PD(HD,J) = SD(CD)
.240 PD(0,J) = PD(0,J) + 1
.250 NEXT J
.260 CT = CT + 4
.269 REM DISPLAY TABLEAU
.270 GOSUB 935
.278 REM CHECK FOR COMMON SUIT
.279 REM AND REMOVE LOWEST CARD
.280 DF = 0: GOSUB 2000
.290 IF DF = 0 THEN 330
.299 REM DISPLAY TABLEAU
.300 GOSUB 935
.308 REM CHECK FOR VACANT STACK
.309 REM MOVE CARD IF VACANT
.310 GOSUB 3000
.318 REM IF ANY CARDS MOVED,
.319 REM REPEAT CYCLE
.320 GOTO 280
.328 REM IF ANY CARDS LEFT,
.329 REM DEAL ANOTHER HAND
.330 IF HD < 13 THEN 200
.339 REM UPDATE MULTIGAME COUNTERS
.340 GN = GN + 1:CN = CN + CT
.350 IF CT < BN THEN BN = CT
.360 IF CT = 4 THEN GW = GW + 1
.369 REM CYCLE FOR ANOTHER GAME
.370 GOTO 120
.371 REM LEAVE LINE 370 OUT IF
.372 REM YOU WANT ONLY ONE GAME
.380 END
.790 REM
.791 REM *****
.792 REM SUBR.TO READJUST ARRAY
.793 REM FOR DISPLAY PURPOSES
.794 REM PE(I,J) IS ADJUSTED.
.795 REM *****
.796 REM
.799 REM ZERO DISPLAY ARRAY
.800 FOR J = 1 TO 4: FOR I = 1 TO 13:PE(I,J)
    = 0: NEXT I,J
.802 REM MOVE CARDS BY STACK
.803 REM TO ROW 1 OF PE() ARRAY
.805 FOR J = 1 TO 4
.810 K = 0
.815 FOR I = 1 TO 13
.820 IF PD(I,J) = 0 THEN 835
.825 K = K + 1
.830 PE(K,J) = PD(I,J)
.835 NEXT I
.840 NEXT J
.845 RETURN
.890 REM
.891 REM *****
.892 REM SUBRT. TO DISPLAY
.893 REM HEADERS AND TABLEAU
.894 REM *****
.895 REM
.899 REM MULTIGAME COUNTERS
.900 HOME

```

Listing continued on p. 77.

if any top cards have the same suit. When I is 2, the second stack is compared to just the third and fourth, and when I is 3, the third stack is compared only with the fourth.

If two stacks, I and J, do have top cards of the same suit, the subroutine at line 2100 removes the lower-valued card. Note that by setting up the codes for cards as described earlier, the entire code can be used for comparisons without interference from the suit values. That is, if a queen of spades is being compared to a five of spades, the codes involved are 121 and 51, and obviously the 51 should be removed.

K is assigned the stack number of the lower-valued card and a check occurs to make sure the stacks being compared are not empty. Then the top card in the K'th stack is removed by moving all cards below it up one notch in the array, subtracting 1 from that stack's card count, and filling in all underlying array elements with zero. Of course, DF is now set to 1 to indicate that a move has happened, the cards-on-table counter, CT, is decreased by one, and the cards-removed counter, CR, is incremented.

Figures 3 and 4 show the flowcharts for these two subroutines. Note that there is an additional entry point into the card-removal subroutine used by the sequence that moves a card into a vacant row. This is because, in moving a card to a different row, the card must be removed from the original row. The same segment of code can accomplish both tasks.

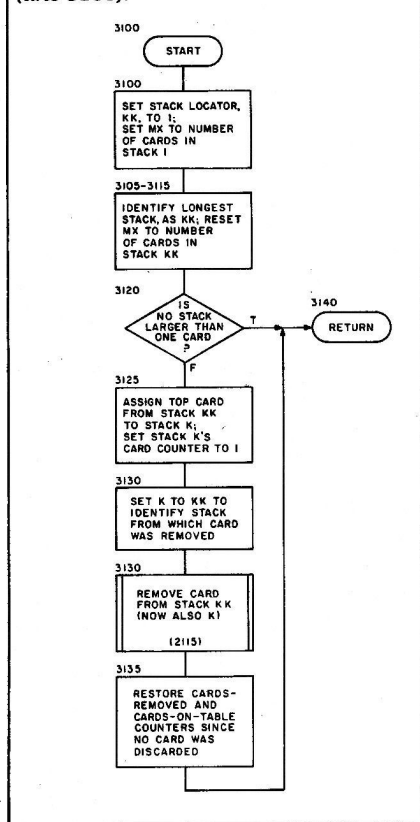
The main program checks the value of DF as soon as this subroutine is done. If it is still zero, no moves have been made, and if there are still cards to be dealt, four new ones are placed on top of the stacks and a new round of evaluations begins.

If DF has a value of 1, the main program updates the video display (line 300) and then checks the tableau for vacant stacks. On return from that subroutine, the program loops back to redisplay the tableau, resets DF to zero, and begins the top-card-evaluation routine again.

Filling Vacant Stacks

The call for subroutine 3000 (Figure 5) to check for a vacant stack occurs only if the value of DF is set to 1 after the card-removal subroutine,

Figure 6. Flowchart for the subroutine that moves a card into a vacant stack (line 3100).

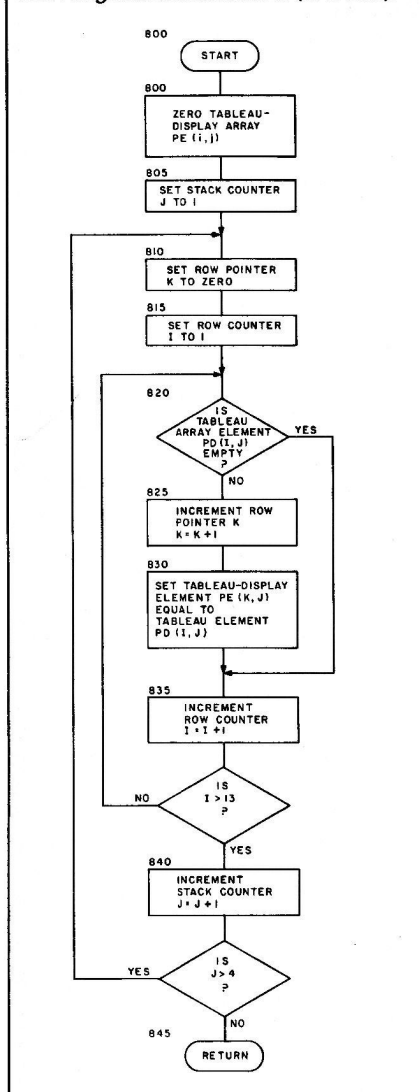


since the only way a stack could be vacant is if a card has been removed. This short subroutine sets a flag value, K, to zero, then checks the card counters for each of the four rows, PD(0,1), PD(0,2), and so on, to see if any hold a zero. If any do, K is set to the stack number and the card-moving subroutine at line 3100 is called. If the value for K is still zero after all four stacks have been checked, then there are no vacancies and the subroutine terminates.

If a vacant stack is found, subroutine 3100 (Figure 6) fills the hole. From the game description at the beginning of the article, you probably discerned that this is the only place for an intelligent decision in *Idiot's Delight*. A human player can look at the tableau as a whole and decide which of the three top cards to move to most benefit the outcome of the game. The computer, on the other hand, needs a specific criterion for selecting the card, and the outcome of the game could well depend on how carefully this criterion is designed.

The program as is contains the simplest selection criterion, and probably

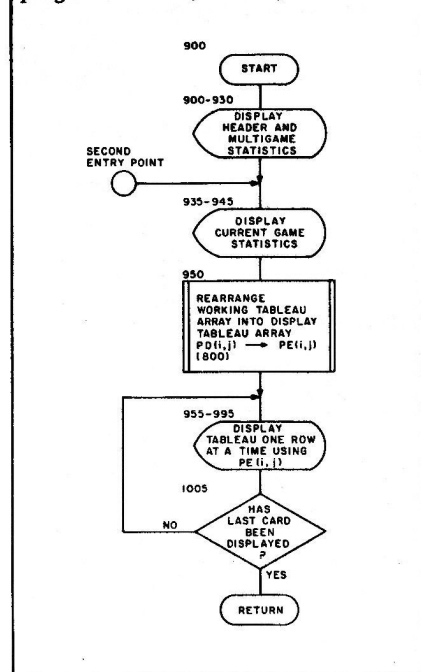
Figure 7. Flowchart for the tableau-rearrangement subroutine (line 800).



one of the worst as well. The computer just selects the card on top of the tallest stack, with no attempt to determine whether another move might be better. However, you can try out a variety of alternative criteria. For example, if the top card on one stack is a five of clubs, and beneath that card lies the six of clubs, it would be well to move the five because it could be eliminated from the tableau as soon as the six was exposed. Running the program overnight for each criterion would produce statistics that would suggest which criterion is best.

Try devising a substitute subroutine such as I've described. When you compare results from running the original

Figure 8. Flowchart for the video-display subroutine (line 900).



version and your revision, you may be surprised.

The subroutine at 3100 sets KK equal to stack 1 and MX to the number of cards in stack 1. Then each of the remaining stacks that has more than one card is checked to see if it is larger than stack 1. If so, both KK and MX are reset to the appropriate values for that stack for comparison with the remaining stacks. A final check makes sure that stack KK has more than 1 card, and if it does, its top card is moved to stack K, the vacant stack. The stack counter for stack K is then set to 1, K is redefined to identify the stack from which the card was removed, and the card-removal subroutine (lines 2100-2150) removes the top card. Finally, since the card-removal subroutine updates both CT and CR as though the card were completely gone from the tableau, the subroutine at 3100 must restore both CT and CR to their original values before returning to the main program.

The Video Display

The video-display routine actually consists of two subroutines. As mentioned earlier, the tableau array, PD(), is arranged so the top card for each stack is at the same row level, HD. This simplifies card comparisons and removals. However, when you play with real cards, those at the bottom of each

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stack are in the same row (row 1) and the top cards are in any row, depending on the number of cards in that stack.

The subroutine at 800 sets up a second tableau array, PE(), for use in the video display. This subroutine first initializes all elements in PE() to zero, then fills each column from the bottom with cards from the same stack in PD(). In PE(), however, the blanks are placed in the upper rows, rather than in the lower rows.

The subroutine that actually displays PE() begins at line 950 and goes through the array displaying one row at a time until there are no cards left. If an array element is zero, it produces a string of blanks; if the element is not zero, its integer value divided by 10 is assigned to R. This will be a number between 2 and 14, corresponding to the card's face value. If R is less than 11, its value is displayed directly. Otherwise it is translated into a J, Q, K, or A. Then a hyphen is added to the display, followed by an S, H, C, or D, depending on whether the rightmost digit in the PE() element is a 1, 2, 3, or 4.

Figures 7 and 8 provide the flowcharts for these two subroutines. Note the use of semicolons in the PRINT commands in these subroutines to produce continuous printing across a single row. Also note the single PRINT command in line 1000 that is outside of the J loop and forces a line feed so the next row of cards can be displayed.

Conclusion

Although there are no amazing graphics in this Idiot's Delight simulation, you could easily add them by replacing the subroutine at 900 with one of your choice. As mentioned earlier, you can also alter the card-moving criterion by changing the subroutine at line 3100. In both cases, the rest of the program remains unchanged.

There are many other solitaire games you could simulate on your Apple, and designing appropriate data structures to represent the different tableau layouts could be extremely helpful in developing your programming skills. I encourage you to write some solitaire programs of your own. After all, computers get bored, too. ■

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

Listing continued from p. 74.

```

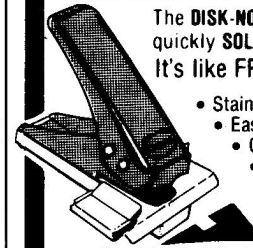
- 905 PRINT " *** FOUR CARD SOLITAIRE ***"
- 910 PRINT "=====
=====
- 920 PRINT "GAMES COMPLETED: "GN" GAMES WO
N: "GW
- 925 PRINT " BEST GAME: "BN" CARDS; AVE
: "(GN > 0) * INT ((CN / (GN + .000001
)) * 100 + .01) / 100
- 930 PRINT "=====
=====
- 934 REM THIS GAME'S STATS
- 935 VTAB 6: PRINT "GAME #: "GN + 1" CAR
DS DEALT: "CD
- 940 PRINT " CARDS DISCARDED: "CR" CARDS
LEFT: "CT
- 945 PRINT "-----
-----"
- 949 REM CURRENT TABLEAU
- 950 GOSUB 800: FOR I = 1 TO 13
- 955 PRINT TAB( 5)" ";
- 960 FOR J = 1 TO 4
- 965 IF PE(I,J) = 0 THEN PRINT " ";: GOTO
995
- 970 R = INT (PE(I,J) / 10)
- 973 REM DISPLAY CARD VALUE IF
- 974 REM BETWEEN 2 AND 2
- 975 IF R < 11 THEN PRINT RIGHT$ (" " + STR$
(R),2);"-";: GOTO 985
- 978 REM DISPLAY CARD VALUE IF
- 979 REM J,Q,K OR A
- 980 PRINT MID$ ("JQKA",R - 10,1) "-";
- 984 REM CALC. & DISPLAY SUIT
- 985 R = PE(I,J) - INT (PE(I,J) / 10 + .001)
* 10
- 990 PRINT MID$ ("SHCD",R,1);" ";
- 995 NEXT J
- 1000 PRINT
- 1004 REM HAS TOP ROW BEEN REACHED?
- 1005 IF I > PD(0,1) AND I > PD(0,2) AND I >
PD(0,3) AND I > PD(0,4) THEN I = 13
- 1010 NEXT I
- 1015 RETURN
- 1044 REM
- 1045 REM *****
- 1046 REM SUBROUTINE TO CREATE
- 1047 REM UNSHUFFLED DECK
- 1048 REM *****
- 1049 REM
- 1050 FOR I = 1 TO 52
- 1055 CD(I) = I
- 1060 NEXT I
- 1065 RETURN
- 1094 REM
- 1095 REM *****
- 1096 REM CREATE SHUFFLED DECK
- 1097 REM WITH CARD VALUES
- 1098 REM *****
- 1099 REM
- 1100 HOME : PRINT "SHUFFLING": FOR I = 1 TO
52
- 1105 II = INT ( RND (1) * 52 + 1)
- 1110 IF CD(II) < > 0 THEN GOTO 1130
- 1115 II = II + 1
- 1120 IF II > 52 THEN II = 1
- 1125 GOTO 1110
- 1130 CX = INT ((CD(II) / 13 - INT (CD(II) /
13)) * 13.001) + 2
- 1135 SD(I) = 10 * CX + ( INT ((CD(II) - 1) /
13) + 1)

```

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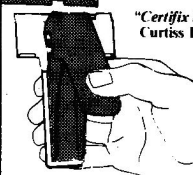
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Listing continued.

```

. 1140 CD(II) = 0
. 1145 NEXT I
. 1150 RETURN
. 1994 REM
. 1995 REM *****
. 1996 REM CHECK FOR 2 STACKS
. 1997 REM WITH SAME SUIT ON TOP
. 1998 REM *****
. 1999 REM
. 2000 FOR I = 1 TO 3
. 2005 FOR J = I + 1 TO 4
. 2010 IF VAL ( RIGHTS ( STR$ ( PD(HD,I) ), 1 ) )
= VAL ( RIGHTS ( STR$ ( PD(HD,J) ), 1 ) ) THEN
GOSUB 2100
. 2015 NEXT J
. 2020 NEXT I
. 2025 RETURN
. 2093 REM
. 2094 REM *****
. 2095 REM REMOVE LOWEST CARD
. 2096 REM OF DUPLICATE SUIT
. 2097 REM FROM STACK
. 2098 REM *****
. 2099 REM
. 2100 IF PD(HD,I) < PD(HD,J) THEN K = I: GOTO
2110
. 2105 K = J
. 2110 IF PD(HD,I) = 0 OR PD(HD,J) = 0 THEN 2
150
. 2115 FOR KK = HD TO 1 STEP - 1
. 2120 PD(KK,K) = PD(KK - 1,K)
. 2125 NEXT KK
. 2130 PD(0,K) = PD(0,K) - 1
. 2135 FOR KK = 1 TO HD - PD(0,K)
. 2140 PD(KK,K) = 0: NEXT KK
. 2145 DF = 1: CR = CR + 1: CT = CT - 1
. 2150 RETURN
. 2994 REM
. 2995 REM *****
. 2996 REM FIND EMPTY STACK
. 2997 REM AND MOVE CARD TO IT
. 2998 REM *****
. 2999 REM
. 3000 K = 0
. 3005 FOR J = 1 TO 4
. 3010 IF PD(0,J) = 0 THEN K = J: J = 4
. 3015 NEXT J
. 3020 IF K = 0 THEN 3040
. 3025 GOSUB 3100
. 3030 GOSUB 935
. 3035 IF K = 1 AND (MX = 1 OR MX = 0) THEN 3
040
. 3040 RETURN
. 3095 REM
. 3096 REM *****
. 3097 REM SUBR. TO FIND AND
. 3098 REM FILL VACANT STACK
. 3099 REM *****
3100 KK = 1: MX = PD(0,1)
3105 FOR J = 2 TO 4
3110 IF PD(0,J) > 1 AND PD(0,J) > MX THEN K
K = J: MX = PD(0,J)
3115 NEXT J
3120 IF KK = 1 AND (MX = 1 OR MX = 0) THEN
3140
3125 PD(HD,K) = PD(HD,KK): PD(0,K) = 1
3130 K = KK: GOSUB 2115
3135 CT = CT + 1: CR = CR - 1
3140 RETURN
    
```

End of listing.

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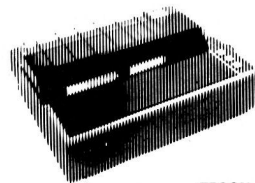
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If you have a question, our technical editor has the answer. Send your queries about Apple computing to Bob Ryan, Ask inCider, 80 Pine Street, Peterborough, NH 03458.

Peelings Appeal

Dear inCider:

Can you tell me when *Peelings II* ceased publication? They owe me issues for 1984. My letters get no response, so I assume that they've been shaken out of the market.

Pauli K. Heikkinen, MD
Liisank.25 A 13
SF-28100 Pori 10
Finland

Dear Pauli:

Peelings II ceased publication last summer. The last issue inCider received was Vol. 5, No. 2. *Peelings* will be missed.

Testing 1, 2, 3...

Dear inCider:

I'm an Apple //c owner. Can I do a self-test on the //c that is equivalent to the solid apple-control-reset on the //e?

Brian Duggan
El Cerrito, CA

Dear Brian:

The short answer is no, but here's why. The diagnostic self-test built into the //e is stored in the monitor ROM, in the address space normally reserved for use by the ROMs of peripheral cards in slots 1, 2, 4, 5, 6, and 7 (\$C100-\$C2FF and \$C400-\$C7FF). When you put a card into a slot, the card gets 256 bytes of address space which are usually used to load the card's firmware when it's activated. The //c doesn't have slots, but it emulates the way the //e uses slots. Consequently, the //c must have the instructions to support ac-

tivating its ports in the same address space that //e cards use. This means the self-test had to come out of the //c ROMs, and firmware to support the ports that emulate slots 1, 2, 4, and 6 had to go in. The need to put this firmware into the monitor ROMs effectively eliminated the self-test from the //c.

Getting Along

Dear inCider:

First, how compatible is ProDOS with DOS 3.3, if at all? Will my DOS 3.3-initialized disks operate on a ProDOS system? And what about my DOS 3.3 Apple Writer?

Second, if I hook up a //e to my color television set via an RF modulator, will the computer send color to the TV? I see that one needs an 80-column text/Apple Color Card to hook up the Apple to the Apple Color Monitor 100. I'd like to have color, but I'm not prepared to spend \$300 for a good color monitor.

William L. Bird
799 Aipo Street
Honolulu, HI 96825

Dear William:

DOS 3.3 and ProDOS are totally incompatible. You can't run a ProDOS application on a machine that has been booted with DOS 3.3. Likewise, you can't run a DOS 3.3 application on a machine booted with ProDOS. You can't read or write to a data disk that was created under one operating system with a program running under the other. You get the idea: DOS and ProDOS are like oil and water—they don't mix.

It's possible, however, to convert files from DOS to ProDOS and back, using the utilities that Apple supplies with ProDOS. Applesoft files are converted easily, but may require modifications in order to run under both systems. Integer BASIC files are also easily converted, but won't run

under ProDOS. Sequential text files are convertible; random-access text files aren't. Binary files are a hit-or-miss proposition.

The important thing to remember is that DOS 3.3 and ProDOS are software systems. They can run on the same hardware system (but not at the same time), and they don't change the hardware. So you don't have to worry whether your DOS 3.3 disks will run if you buy ProDOS. When you need DOS, you boot DOS; when you need ProDOS, you boot ProDOS.

Regarding your second question, you'll definitely receive color output if you hook your Apple to a color television via an RF modulator. Every Apple II has color capability built in. You need a special card to use the Monitor 100 because it only accepts RGB signals, and your Apple, as is, produces a composite video signal. RGB is more precise than composite, resulting in greater resolution to the point where an RGB color monitor can display 80 columns of text. If you try to display 80 columns of text on your color television, you'll find it unreadable. Your television is just fine, however, for graphics and games.

Blue Apples

Dear inCider:

I've heard that Apple Computer recently came out with a chip that lets the Apple //e read IBM 13-sector software. Could you please elaborate? I think it's called the Rana 80862.

Steve Goldberg
1001 Physical Sciences Road #7412
Irvine, CA 92715

Dear Steve:

You refer to the Rana 8086/2. It isn't a chip, but a box that connects to the Apple //e with a special interface card. The Rana box contains what amounts to an IBM-PC compat-

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ible computer, with an 8086 micro-processor, the 16-bit version of the PC's 8-bit 8088. It also has a graphics controller card, two disk controllers (one Apple, one MS-DOS), and two double-sided disk drives. The box effectively lets you run IBM-PC software on your Apple. When not running MS-DOS, you can use the two drives under ProDOS.

I've seen the Rana 8086/2 demonstrated at many industry shows, but I've yet to get my hands on one so I can't comment on its performance or compatibility with the IBM-PC.

For more information, you should contact Rana Systems, 21300 Superior Street, Chatsworth, CA 91311, (818) 709-5484.

Frequent Problem

Dear inCider:

I own an Apple IIe and I have a problem. I set up my computer in a very convenient spot, but when it's operating, it garbles the TV reception. I can't use the computer when someone wants to watch TV.

I called the store where I bought the computer and they had no idea of what to do. I called another computer outlet and they suggested I put aluminum foil between my TV and computer. I covered the area around the computer with foil, but that was no help. I used an extension cord to plug the computer into an outlet far away from the TV, but that made no difference.

Do you know what causes this and what I can do to stop the interference?

Marilu O'Malley
P.O. Box 52
Lander, WY 82520

Dear Marilu:

Since it's an electrical device, your computer emits energy in the form of radio waves. As an electro-mechanical device, your disk drive puts out even greater amounts of radio energy. Your TV picks up these waves easily and they can make watching the set a real trial.

The Apple Reference Manual for the IIe suggests ways to deal with RF (radio frequency) interference. For example, you could disconnect each peripheral device, one at a time, from

your computer to see if a particular one is causing the interference. If you isolate the culprit, you can try to find specially shielded cable for it.

If you can't isolate a "noisy" peripheral, Apple recommends that you try the following:

- Turn your TV antenna.
- Move your computer to a different direction from the TV.
- Move your computer farther away from the TV.
- Plug your computer into an outlet on a different circuit from the TV. (You've already tried this.)
- Consider installing a rooftop antenna with coaxial cable.

Apple also recommends that you write to the U.S. Government Printing Office, Washington, DC 20402, for the booklet "How to Identify and Resolve Radio-TV Interference Problems," stock number 004-000-00345-4.

My Kingdom for a Return

Dear inCider:

I've been writing a program that jumps between accessing text files and writing to the printer. Unfortunately, I have a problem that has me on the verge of writing a hate letter to Apple Computer. Once the printer has been accessed (through a PR#1) and then disconnected (through a PR#0), the computer ignores the first set of DOS commands that comes up. I've tried everything, including putting a PRINT CHR\$(4) in front of any command using a PR#.

Robert Bartholemew
217 Des Bois Road
Rosemere, Quebec
Canada J7A 1S4

Dear Robert:

As a long-time Applesoft programmer, a little bell went off in my head when you said "the computer ignores the first set of DOS commands." I'm sure every Applesoft programmer has encountered—or will encounter—this little problem.

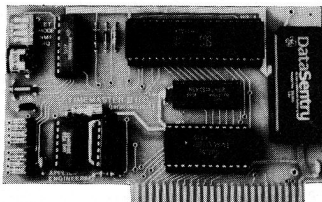
Applesoft requires any DOS command used from within a program to be preceded by a control-D, which is equivalent to CHR\$(4). This is clear to everyone. What is not clear is that in order for Applesoft to recognize a

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BRAND C	NO	NO	NO	NO	NO	NO	NO	NO
BRAND M	NO	NO	NO	NO	NO	NO	NO	NO
BRAND P	YES	YES	NO	YES	NO	NO	NO	NO
BRAND S	NO	NO	NO	YES	NO	NO	NO	NO
BRAND T	YES	NO	NO	NO	NO	NO	YES	NO

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WIZARD 80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION 80	MORE	YES	YES	NO	NO	NO	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX 80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
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command as a DOS command, one other requirement must be met: The current cursor position must be in the extreme left-hand column.

When you use a PRINT or INPUT statement that ends with a semi-colon or a comma, the statement doesn't generate a carriage return which would send the cursor to the left-hand column. GET statements also fail to return the cursor. Any HTAB (other than HTAB 1) leaves the cursor hanging, too.

You must ensure that a carriage return immediately precedes all DOS commands. One way to do this is to define D\$ as: D\$ = CHR\$(13) + CHR\$(4). This may mess up some of your screen or printer formats, but it will ensure that your DOS commands are always executed.

Poking Around

Dear inCider:

How do I get a catalog from my HELLO program or make catalog choices from the HELLO program? Also, how do I disable control-reset and the LIST command?

Willis Gordon

P.O. Box 747

Dodge City, KS 67801

Dear Willis:

There are many utility programs you can install as the HELLO program on your disks that will let you make selections from the disk catalog. One that comes to mind is Hello Menu by Paul Van Bloem, which was published in last month's inCider ("Select-a-File," p. 26).

It's easy to disable the control-reset and the LIST command. From the Beagle Bros "Peeks, Pokes and Pointers" chart, which hangs in reverence over my desk, I see that POKE 1010,102: POKE 1011,213: POKE 1012,112 executes the RUN command whenever you hit control-reset. You can disable the LIST command with a POKE 214,255. This treats any typed-in command as a RUN. By the way, Beagle Bros supplies the "Peeks, Pokes and Pointers" chart as a bonus in some of their software packages. You can contact Beagle Bros at (619) 296-6400. ■

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In 1946 ENIAC was the scientific marvel of the day. This computer weighed 30 tons, stood two stories high, covered 15,000 square feet, and cost \$486,840.22 in 1946 dollars. Today a \$2,000 kneetop portable can add and subtract more than 20 times faster. And, by 1990, the average digital watch will have as much computing power as ENIAC.

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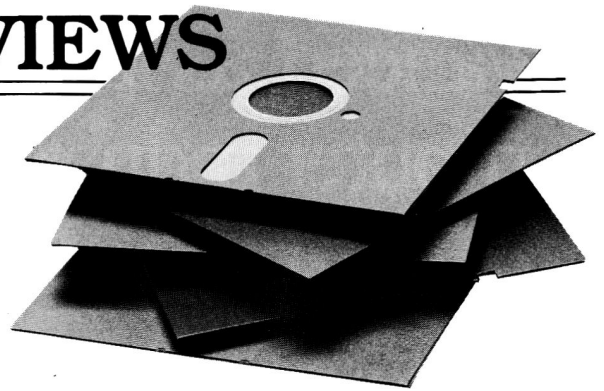
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SOFTWARE REVIEWS



inCider's Ratings

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

Robot Odyssey I

The Learning Company

545 Middlefield Road
Suite 170
Menlo Park, CA 94025

Logic adventure
Any Apple II, 64K
\$49.95

★★★

Given the choice between playing an adventure game and learning about electrical engineering, digital logic, and circuit design, which would a typical teenager choose? Before you answer, consider Robot Odyssey I, an educational program that introduces students to the concepts involved in creating computer hardware. It teaches them how to break a task into smaller pieces, build a model, simulate an event, look for multiple solutions, and debug solutions, all under the guise of a robot adventure.

The program has three parts: Robot Tutorials (Robot Anatomy, Toolkit, and Chip Design), Innovation Lab, and Robotropolis. Begin with the tutorials, because they explain the ins and outs of assembling, programming, and testing your robots. The format of the tutorials enables you to move readily

back to unclear areas or quickly skim over those you find easy.

Robot Anatomy begins with the basic movement commands, demonstrates energy sources, and describes the available robot parts. You'll learn that robots can contain (among other things) a battery, thrusters, bumpers, antennae, grabbers, and eyes. A system of nodes, gates (AND, OR, XOR, and NOT), and flipflops can be built into integrated chips. Chips may be nested within other chips to create sophisticated logic hierarchies. You'll find the parts needed to assemble circuits in the Toolkit.

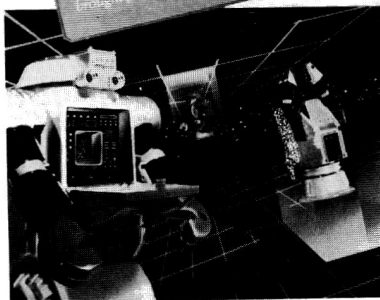
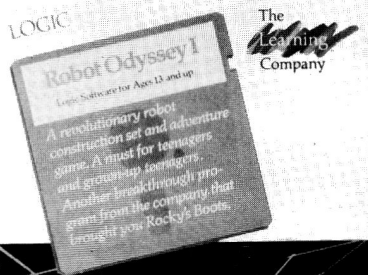
The Innovation Lab contains a maze that may be easily altered to test robot combinations before you put them out into the cold, cruel world of Robotropolis. Three robots in the Innovation Lab are yours to program and test.

Robotropolis is an underground city populated by robots. You are trapped within the city and must build and

program your own robots to help you maneuver through the city's five levels, each fraught with more puzzles and obstacles than the last. The levels include The City Sewer, The Subway, The Town, The Master Control Center, and The Skyways. A special set of clues for each level appears on the screen if you press the ? key. The manual includes a three-dimensional map of the city sewer to get you started. While in Robotropolis or the Innovation Lab, you can save your place on disk and return later.

Robot Odyssey I's activities should appeal to many interests and abilities. The graphics, sound, and color are effective, and program operations are illustrated well in the manual and tutorials. The Learning Company has created a program that effectively teaches the fundamentals of digital logic and circuit design. ■

**Leslie Schmeltz
Bettendorf, IA**



Megaworks

Megahauss

5703 Oberlin Drive
San Diego, CA 92121

Spelling checker and mail merge
Requires AppleWorks
Apple //e or //c, 128K
\$149.95

★★★

Megaworks, a sophisticated spelling-checker/mail-merge package, fills in AppleWorks' gaps with admirable skill. The package includes a program disk, a dictionary disk, and an examples disk; the latter, with the

user's manual, comprises a thorough and easily used tutorial package.

Both subsections of Megaworks are patterned after AppleWorks, using menus extensively and effectively conveying a feeling of familiarity with the program to put you at ease from the start. Designed to work on one- or two-drive systems, Megaworks requires a minimum number of swaps when used with one drive, making working with a single drive only a minor nuisance.

Spelling Checker

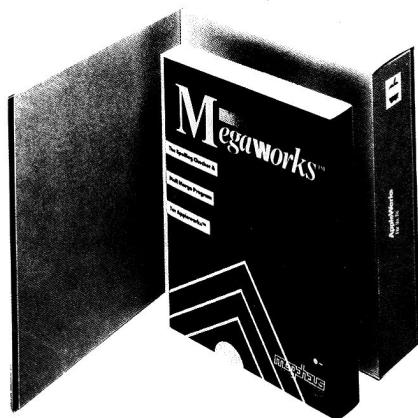
Although not a truly integrated speller—you cannot access the spelling program while working on a document—the spelling checker is a versatile program with considerable power. From an ever-present menu, the program provides five single-key options for handling misspelled or unrecognized words. After you load a file into the spelling program, a split screen displays the text on the top half, highlighting misspelled words within that text; the menu options appear on the lower half of the screen. This setup lets you see how the misspelled words are used in context and effectively forces a thorough proofreading by requiring you to reread the text.

The screen shows the total number of words in the document, a running total of the words looked up, and the number of unrecognized words found. A benchmark test on 1384 words took slightly less than five minutes to load, count, and check. Of the total word count, Megaworks found 99 that were unrecognizable. I was able to correct these words and add them to the dictionary, and then save the corrected file, all in six minutes.

The dictionary consists of 40,000 words and lets you add up to 10,000 more. However, you cannot access the dictionary independently of your document. While this doesn't reduce the efficiency of the program, it limits the uses of the large word base contained in Megaworks.

Mail Merge

In its simplest form, Megaworks' mail merge requires you to create a form letter with embedded codes signifying "personalized" information—name, address, and so on. Then, using the AppleWorks word processor, you create a separate file of these codes and



the information to replace them when the merge occurs.

Megaworks' documentation does a good job of pointing out shortcuts for creating lists—using AppleWorks' COPY and PASTE commands, for example, to create a blank template. With Megaworks, you can also use boilerplating—creating and merging entire paragraphs.

Using the mail-merge program with an AppleWorks data base is more complex. You must follow an entailed nine-step procedure. While the steps themselves aren't overly complicated, they do require repeated use before the procedure becomes comfortable. You need to set up the data base only once to use it with Megaworks; the resulting flexibility makes your initial effort worthwhile.

Once you're ready to merge information into a prepared form letter, the process is easy. Again using a split-screen format, Megaworks displays the document and the list, letting you visually verify that you've selected the correct list to merge with the correct letter. Upon completion of the merge, Megaworks saves the new letter under a selected filename for future printing.

If Megaworks has trouble matching an item from the list with an item in the letter, it pauses to let you enter the information from the computer. Pressing the return key continues the merge. Or, if you have only a few letters, you can create "dummy" lists, containing blank field names, and have Megaworks pause at each designated position so you can type in the appropriate data from the keyboard.

Conclusion

Megaworks is a strong package overall. The deficient areas are more a

bother than a flaw. The price may seem steep; however, several similar programs on the market that are slightly less costly don't offer Megaworks' mail-merging capabilities. ■

James Trunzo
Leechburg, PA

Your Personal Net Worth

Scarborough System

25 North Broadway
Tarrytown, NY 10591

Money management
Any Apple II, 64K
\$79.95

★★★

Personal computers, you were once told, were going to make it a snap to keep track of your money. Well, they're not perfect, but when used with tools like Your Personal Net Worth, it's possible to do a good job—provided you devote some time to organizing your affairs. If you do this, the programs in Your Personal Net Worth are easy to use and can provide you with a comprehensive picture of your financial status.

Organization is the key word. Although Net Worth minimizes accounting terminology (and the manual concisely defines those that are used), only you know where your money comes from and where it goes. As the manual points out, spend some time with paper and pencil first, sketching out the various categories of income, expense, asset, and liability that are relevant to your own situation.

These categories, or accounts, form the framework for many money-management operations: establishing a budget, tracking income and expenses, recording stock transactions, and preparing reports. To get you started, a Chart of Accounts file furnished on one of Net Worth's two disks provides 65 of the accounts most often needed. You should make copies of this data disk, and then use Net Worth's Accounts routine to change the working disks to reflect your own situation.

Deleting accounts you don't need is worthwhile. The standard set occupies about 20 percent of the available memory in a 64K Apple, so you can trade unneeded accounts for data-stor-

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age capacity. On the other hand, you can set up a maximum of 350 accounts if you need that many.

The other disk contains the programs themselves, all of which are loaded into RAM at one time, so only a single drive is necessary. This disk is copy-protected. If you damage it, warranty registration entitles you to replace it for \$5 plus the disk itself. It would be better, though, if registered owners could get back-ups *before* a powerline glitch or other disaster puts them out of action.

You have to set up the Chart of Accounts only the first time you use the package. Other set-up chores consist of entering opening balances and establishing a budget if desired.

After that, regular operation is a matter of entering each bank deposit, payment, purchase, or other transaction into one of seven temporary account journals; displaying or editing the journals if necessary; and posting their contents to permanent files. Most actions require only a keystroke or two, and control-L displays a help screen at most points in the program.

When journals are posted, Net Worth automatically updates all account balances, tax records, bank-account-reconciliation files, and transaction-history files. After that, you can call for a number of reports: four different styles of income statement, a net worth statement, a transaction history between two specified dates, a special

credit-card report, and a listing of unposted entries in all journals.

The 130-page manual (including a glossary and index) thoroughly describes examples of all the package's operations, with numerous illustrations of video screens, some awaiting data input and others showing the results of the program's calculations. There is some duplication in the set-up instructions since Commodore and Atari versions are also available, but this should cause no difficulty.

My major suggestion for improvement of the manual would be to integrate the various functions—setting up the Chart of Accounts, entering opening balances, entering and posting transactions, and printing reports—by relating each step to the affairs of a hypothetical household. That would make it easier for the novice to see how the entire system works.

Your Personal Net Worth is definitely a household-finance package; the accounting practices employed make the product inappropriate for business use. It comes in one of the classiest packages around. An excerpted edition of a Sylvia Porter book is included, as is an order form for printer-ready checks designed to be prepared by the package's payment journals. The hard plastic box converts to an easel to support a summary card, which depicts relations between the system's many menus and explains every part of a typical Make Entries screen. To top it all off, an Eisenhower silver dollar is cemented to the outside of the card. This program definitely puts you ahead of the game from the very beginning. ■

Scott Norman
Framingham, MA

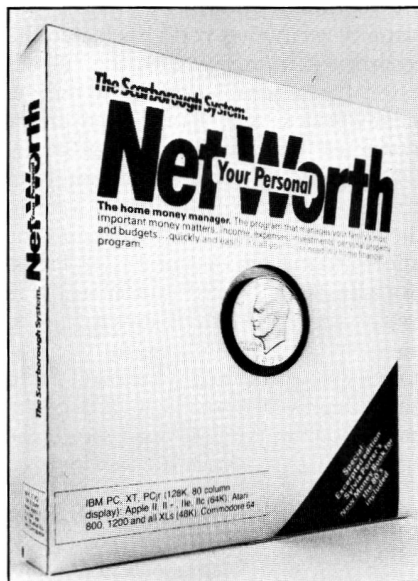
Coast-to-Coast America

CBS Software
One Fawcett Place
Greenwich, CT 06836

Home education
Any Apple II, 48K
\$49.95



Coast-to-Coast America is a set of five interactive activities designed to build and reinforce your



knowledge of United States geography. All the activities are based on a map of the United States, or some portion thereof, that is displayed in excellent graphics on the screen. A color monitor, although not necessary, greatly enhances the quality of the graphics.

Coast-to-Coast uses random generation in creating and sequencing all its activities and in its reinforcing and error messages to the user. The program is highly interactive throughout and absolutely user-controlled, and it offers optional sound.

The heart of Coast-to-Coast is a data base that holds the graphics representation and location of every state, its post-office abbreviation, its capital, its year of statehood, its major industry, and its nickname. In the activity called "State Facts," you can call up from the data base all the information about a single state or see a single field, such as state capital, for a group of states. In "State Quiz," you must first identify a state from its picture, then answer a series of multiple-choice questions.

The remaining three activities are interactive games. In "Mystery State," the computer randomly picks a state that you must pinpoint from directional clues. The game is scored by the number of tries it takes to pinpoint the state. In "State Shoot," you must calculate the relative distance (as time) to a state, then "shoot" it with a moving arrow and identify it.

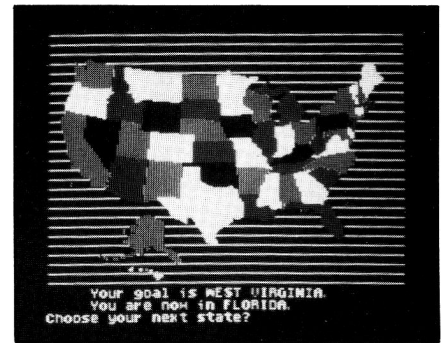
"Across the USA" asks the user to chart a route from one state to another through bordering states. It can be played at three levels of difficulty. At the most difficult level the user must chart a route without seeing the United States map.

Coast-to-Coast comes with a keyboard overlay that makes all responses possible with a single keystroke. The written documentation is excellent, giving clear instructions for the use of the entire program as well as the individual activities. The documentation also includes more information about the states, such as a capsule history for each and sources for additional information.

Coast-to-Coast is captivating for the full range (age 8 to adult) of its intended audience, although it will be most val-

uable, I believe, for intermediate level elementary school students. It offers a graphic and interactive experience with United States geography that is not available in other media. It also develops and reinforces skills and concepts, including problem solving, map space relationships, and state facts. It is an excellent source for reinforcement and enrichment in both the home and classroom. ■

**Karen Swan
Wilton, CT**



Have fun with geography in Coast-to-Coast America.

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Greg Glau of InCider says: "Borrowing money is no problem with the loan analysis section to guide you. Work Force II is easy to understand and operate. It's an honest value..." June 1984

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BRaille-EDIT

Raised Dot Computing

408 South Baldwin Street
Madison, WI 53703

Word processor for the visually
handicapped

Any 64K Apple
\$300

★★★

Environments where the sighted and the blind work together require special considerations. BRAILLE-EDIT is a word processor that meets this need by enabling the sighted and the visually impaired to "read" each other's documents. Although not as sophisticated as other word processors, BRAILLE-EDIT lets the blind person produce clean documents without assistance, and make braille or "spoken" translations of any Apple DOS text file from a sighted person's disk. Thanks to BRAILLE-EDIT, it's also possible to run typed or typeset material through an optical scanner, then send it to an Apple and a braille printer, or to a high-quality speech synthesizer, such as Digital Equipment Corporation's DECTalk.

You use BRAILLE-EDIT with a voice synthesizer so you can write and correct as you type by listening to characters, words, phrases, sentences, and paragraphs. There is no need to agonize over the work's appearance. Embedded formatting commands take care of that.

BRAILLE-EDIT's storage system is character-oriented; each file consists of a long string of characters. Large files, called chapters, can contain more than 30 pages of text. Each page holds up to 4096 characters and you can merge, cut, and rearrange pages within chapters. You can also merge and split chapters, and copy and move files.

Braille Translations

Braille format differs sharply from conventional printed material, but BRAILLE-EDIT admirably handles print-to-braille and braille-to-print translation. A powerful global replace feature takes care of most formatting problems, so files can be reformatted without retyping them.

BRAILLE-EDIT also lets you transform the Apple keyboard into an electronic braillewriter, with six designated keys for the braille cell and dot combinations. Then, instead of using automatic print-to-braille translation, you can produce braille manually. When you're done, sighted transcribers can view the braille on screen, then translate it into print for proofreading. For sighted people, the program features five screen display formats: normal, high-resolution, wide (with an 80-column card), large-print, and braille-dot pattern.

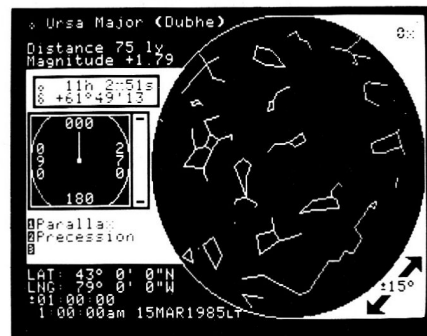
Documentation

A tutorial and a detailed interfacing manual comprise the program's documentation. These manuals are available in paper braille, braille cassette, print, disk, and audio cassette. A free year's subscription to a monthly newsletter on computer applications for the blind and updated information on BRAILLE-EDIT come with the package.

The program is by no means perfect. Manipulating files is sometimes more difficult than with other word processors. Moving text within pages, for example, can be awkward. Before you move material, you must indicate the cursor positions of the first and last characters. It would be easier to mark the beginning and end of text blocks. Another drawback is that only a character count, not a word count, is built in. The program could also use a spelling checker.

Despite these relatively minor shortcomings, BRAILLE-EDIT is a step in the right direction toward word processing for the blind. ■

Daveed Mandell
Berkeley, CA



The spring sky as seen in The Observatory.

The Observatory

Lightspeed Software

2124 Kittredge Street
Suite 185

Berkeley, CA 94704

Astronomy simulation
Apple II Plus or //e, 64K

\$125

★★

Keep your head in the clouds with The Observatory, a computer simulation of the sky as seen through a telescope. With this program, you'll see stars, constellations, planets, moons, and other celestial objects just as you'd see them from any specified point on the earth, at any time in any year until 10,000 A.D. An inexpensive alternative to a planetarium field trip, The Observatory is a good educational tool for schools or public libraries. Unfortunately, those who are more than casually interested in astronomy will find it has serious shortcomings, amplified by the program's high price.

The Observatory offers many features and displays approximately 310 stars and another 110 celestial bodies (the sun and moon, a quasar, the moons of Jupiter, Halley's comet, and the Messier objects) on the computer screen. It is easy to use, with most options activated and deactivated by a single keystroke. More than 40 control options include moving forward or backward in time, rotating the display, zooming in to magnify up to 512 times, centering and tracking an object, displaying constellation outlines, and creating crude graphics representations of eclipses.

A search option offers two modes: a search of the sky already on-screen, or a "forced search" that shifts the display to find an object off the current screen. The choice of object for the search is presented in a novel hierarchy of menus. A "question the cursor" option tells you what celestial object is under the cursor (once you center the object) and gives its exact location in either right ascension/declination or altitude/azimuth notation.

The Observatory offers an easy way to tour the sky—but there are shortcomings. Calculations can take up to

two-and-a-half minutes, even though it's a machine-language program, and centering an object can be frustratingly difficult. The graphics are disappointing, and a total of 420 celestial objects is pitifully small when you consider the multitude that populates the sky. Also, some of the features simply aren't appropriate for most people who will be using the program. Anyone who needs to correct for geocentric parallax, precession, and perturbation is too advanced for a program of this level of sophistication.

The Observatory would make a good tool for teaching the basics of astronomy in high schools, junior colleges, and libraries. It can spice up a potentially dry topic with a visual and interactive flair that charts and books can't offer. On the other hand, if you're an aspiring stargazer or a parent with children who have a serious interest in the heavens, you'd be better off buying a good star atlas and saving your money for a telescope, because The Observatory will soon grow old for you.

Lightspeed has attempted a task that is too great. The result is a well-designed, smooth program that has too many black holes. ■

**Guy Wright
Temple, NH**

Story Tree

Scholastic

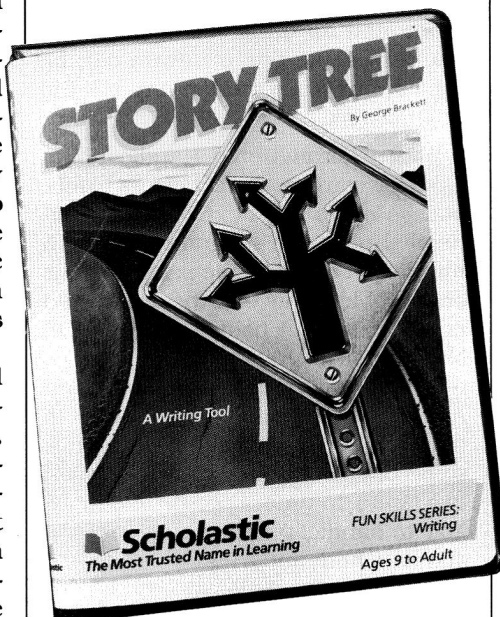
730 Broadway
New York, NY 10003

Children's story-writer
\$39.95

★★★

Story Tree, developed by George Brackett, is billed as "the do-it-yourself interactive story maker." Through creating branching stories, you or your child can use this intriguing and instructive software package to enhance communication skills.

The program comes with a master disk and a story disk, and a thorough handbook. Insert the master disk and the program presents you with the Story Tree menu comprising four activity areas: reading a story, working on a story, printing a story, or doing disk work, each with its own sub-menu.



The reading category contains Magic Marigold Mine (an adventure story), The Checkmate Mystery (a detective story), Bigfoot ("fact or fiction" interactive article), Book Browser (bibliographical information), and any of your own writing that you've saved (poems, quizzes, guessing games, house maps). Working on a story lets you begin a new story or edit an existing selection by adding or changing pages. You can also print any Story Tree story. The final menu helps you organize your collection by copying a story, erasing it, changing the title, or formatting a new disk to store the story on.

With Story Tree, you can write two kinds of stories: "Super Stories" and regular stories. In addition, through a

unique quality of Story Tree, branching, you can write a story page by page or have it unfold from page one. The three branching possibilities are fascinating and all but demand experimentation and originality: You can *continue* from page to page as in an ordinary story; give the reader a *choice*, branching the story to a different page; or make the story branch by *chance*, going to one page sometimes and to another page the rest of the time. The Super Stories contain all three branching links, while the regular stories present only the continue and choice possibilities.

The invaluable 48-page handbook is a step-by-step guide to this multi-faceted story maker. The manual begins by telling you what equipment is necessary and how to load the program. Then, it patiently explains how to read and write Story Tree stories; how to complete the branching pages; how to use the Story Tree word processor and print a story; how to copy, erase, and rename a story; and how to avoid problems with the program. The author thoughtfully includes a 19-page tutorial section that tells how to write your first story. The manual concludes with an index and a Special Keys section.

As many of my students have testified, Story Tree makes English and reading classes "fun," "exciting," and a "challenge"—words I haven't heard for too long a time. (A school addition is also available for \$59.95. It comes with two master disks and two story disks, as well as a user's handbook and a comprehensive teacher's guide.) ■

**Gerald Robinson
Windham, NH**

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Thoroughbred Handicapping System

PDS Sports

P.O. Box E

Torrance, CA 90507

Horse-race handicapper

\$129.95

★★

Win, place, or show? Thoroughbred Handicapping System takes some confusion out of playing the ponies and narrows down the field.

Once you enter variables from the Racing Form, the program outputs a power-rating number for each horse to your screen or printer. Given the data, the winner should be among the three horses with the highest ratings. But those who don't know the difference between a gelding and a filly must look elsewhere for advice.

The package includes a disk, a 15-

page manual, software registration card, instructions to back up the program, and an order blank for a \$40 back-up disk. The program can be copied, but won't run on any but the original disk.

With Thoroughbred Handicapping System, you can correct errors before you go on to the next program segment. I used the program within 15 minutes of opening the package. The only problem was that the disk would not boot itself. I booted up my DOS Master disk and entered RUN HELLO, which got me right into the program. At first it took me about three hours to handicap a full card of races. After some practice, I finished in less than two hours. In time, a person should be able to handicap a full day of races in about an hour and a half.

Although sold separately, PDS Sports' jockey-rating program and trainer-rating program complement the Thoroughbred Handicapping System, which asks if you're using these selected programs. The program then

asks for the race number, distance, and purse amount. As the handicapper, you enter the horse's name and 11 other variables. After entering the last horse, press zero and each horse's power rating will be printed out to the screen or to the printer.

Thoroughbred Handicapping System assigns a 1, 2, or 3 as a variable that corresponds to the race track you're handicapping. Different tracks from around the country are listed in the manual and given one of these variables. To test the program, I chose Belmont, Bay Meadows, and Pomona, which are rated 1, 2, and 3, respectively.

On a "bad" day at the track, the test picked the winner in the win-place-show categories in only one out of nine races. But on a "good" day, it pulled a high of eight out of nine. When I combined the three tracks rated, I found the winner to be among the top three selections in 59 percent of the races. These figures suggest that Thoroughbred Handicapping System would make a good tool for the serious handicapper.

The program's author, Steve Arthur, says that one profitable method is to bet on the horse with the biggest overlay from the top three selections, except in maiden races with first-time starters. But I can assure you that using this method consistently is a sure way to lose your shirt.

Though for the track regular, Thoroughbred Handicapping System can be a useful tool, since it's on the right track but needs guidance. Other variables, now missing in the system, would let the handicapper control options and assign their own values. Thoroughbred Handicapping System doesn't provide any way for the handicapper to store information about the races he handicaps. Once a race has been rated, the only record is a printed copy of the power rating assigned by the program. Variables not used include the type of race (claiming, allowance, and stakes), age, and weights.

On the other hand, I did put my money where my mouth is. I came out with a small profit after two visits to the track using this software and a little horse sense. ■

Tom Dennis
Livermore, CA

Circle 354 on Reader Service Card.

Replace that
graphic "artist"
with a complete

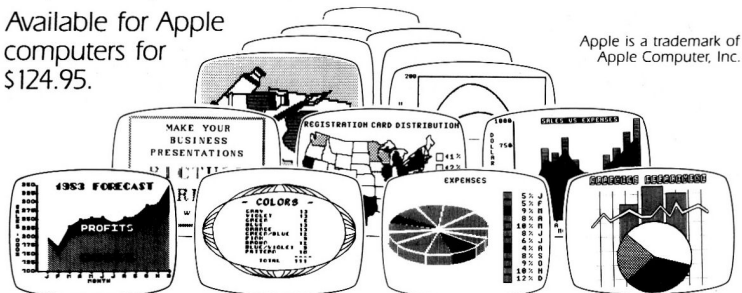


Graphics Department™

Some software packages only do charts, others only do lettering, or only "slide" showing. The menu-driven Graphics Department program combines all of these and more into one package.

Build any type of graph; add titles and other lettering; draw ellipses, points, lines, rectangles; "paint" in 100 colors; present a "slide show"; even manage your library of picture data. The Graphics Department has modules to do it all!

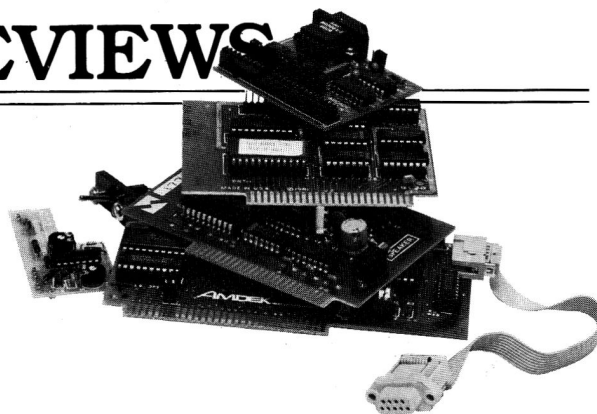
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HARDWARE REVIEWS



inCider's Ratings

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

Tera-drive

Elcon Research

520 Fifth Avenue
New York, NY 10036

High-capacity floppy disk drive
Apple II Plus or //e
\$995 for one drive
\$1595 for two drives

★★★

The new Tera-drive disk system, available in single- and dual-drive versions, can be described as a semi-hard disk. It uses floppy disks, but gives you something of the speed and storage capacity of a hard disk in that each of its disks can hold a bit more than 1 megabyte of information. The unit seems reliable and works well, but is hampered by an incomplete manual where even things like file names don't match what's on the disks.

To achieve the high storage capability and to enable your files and programs to work with a Tera-drive, you must transfer them to special cobalt-coated disks. This isn't a major problem for data files or BASIC programs since Tera-drive comes with a special version of FID (called SID) that handles this transfer quite nicely. Tera-drive

even includes a CP/M disk and a Pascal master disk, so you can auto-boot in the Pascal language or the CP/M operating system. (You need a Z80 card for CP/M.) I found I could load BASIC programs from my normal Apple Disk II drive and access and use random-access text files on the Tera-drive disks without any difficulty.

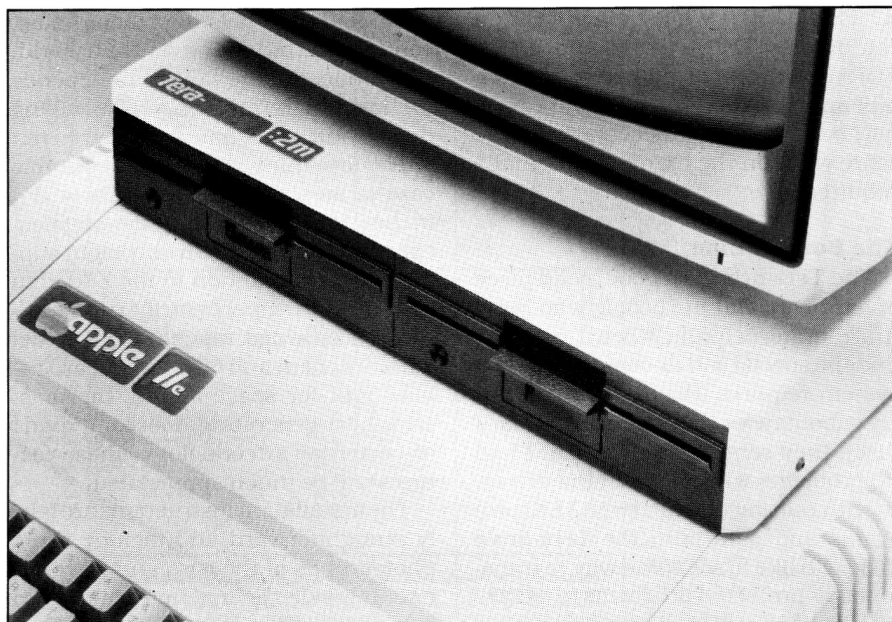
However, since the system can't read your standard disks, you can't use copy-protected programs without possibly illegal "special procedures" that the manual mentions but doesn't describe. You can boot off the slot where your standard Apple disk drive resides after you install a Tera-drive, but not all programs let you designate another slot location where your data can go. Where commercial software is involved, the Tera-drive package is

more functional for CP/M-based systems, as that software isn't copy-protected.

All that aside, the Tera-drive works well, and loads your files about twice as fast as standard Apple DOS. File saving time seems about the same. The well-made box that holds the slim-line drive(s) is rugged and fits right under your monitor, and the ribbon cable is long enough if you put the unit right on top of your Apple.

Tera-drive also includes some disk operating system utilities that expand the capabilities of DOS 3.3—from the standard capacity of 140,000 bytes of data per disk to as high as one million characters of information. The package also provides for date coding of your files.

The Tera-drive can go in any slot,



The Tera-drive high-capacity disk drive fits snugly on the Apple //e and II Plus.

but the instructions recommend either slot 6 or 7, with your present Apple Disk II controller installed in the next lower slot (since your Apple will boot from the highest slot number where there's a disk drive).

A Poor Manual

I'm naturally suspicious of any hardware manual that tells you how to run the system before it tells you how to install it, and that's just what the Tera-drive documentation does. The manual's 29 pages are obviously written for folks deep into programming, without much regard for the average user who simply wants more storage space for files. There's nothing wrong with this approach, and perhaps the Tera-drive people are aiming at the standard BASIC programmer market. But the manual would be better, and the market larger, if the system made the whole process easy for the average user.

The manual does cover all the bases for each operating system/language (DOS, Pascal, and CP/M) the package supports. I wasn't thrilled to read about programs (like the copy program DDCOPY and the machine-language address program FDBLADDR) that simply don't exist on the disk—a matter of printing the documentation and then changing the software, I guess. It is also annoying that the manual calls the disk formatting program TERAFORMAT and a copy utility TERACOPY, while both appear on the disk as TERA COPY and TERA FORMAT. None of this is overly serious and you'll be able to figure it all out, but it seems unnecessary; a little more work on the manual is all that's required.

The Bottom Line

The Tera-drive is a good, solid piece of hardware and the people who build it are quite helpful: When I couldn't find the special cobalt-coated disks the system requires (they're supposed to cost about twice the price of a standard disk), they sent some right out. I had no problems with either of the drives, or with putting my current BASIC programs and data onto the Tera-drive disks. I'd like to see some way to transfer copy-protected programs to its special disks, but if you can live within that limitation, it makes more sense to

"Each of Tera-drive's floppy disks acts like a hard disk and can hold more than one megabyte of information."

buy a Tera-drive than that second Disk II you were planning on. ■

**Gregory R. Glau
Prescott, AZ**

Z-Engine

Advanced Logic Systems

1195 East Arques Avenue
Sunnyvale, CA 94086

CP/M card
Apple II Plus, //e
\$199

★ ★

The Z-Engine, a bare-bones, Z80 coprocessor card for the Apple II, II Plus, or //e, gives these machines access to the existing library of CP/M software. The relatively moderate price reflects a no-frills approach that's attractive if you want exposure to the CP/M world at a reasonable price. Yet, while the card itself functions well, the documentation fails to present an acceptable introduction to that world. The product's true value thus depends on how much research you're willing to do to fill in the many gaps left here.

The first thing you notice about this card is its size. Measuring about 3⁷/₈ inches across, it's easily the smallest card in my Apple. With only eight support chips in addition to the Z80 chip itself, the card necessarily runs cooler. In a crowded machine like mine, where modem and 80-column card cables fight for space among the massive, heat-generating, foot-long cards of yesterday's technology, these features will be much appreciated.

The installation instructions are fairly straightforward and include three photographs of the card and its destination inside the machine, taking up four pages in the manual. I found that installation was simple and its expla-

nation clearly and adequately described.

The package includes version 2.2 of the CP/M operating system, along with several useful utilities for copying files, formatting and copying CP/M disks, and a program that will install version 3.01 of WordStar. (I couldn't test the latter program since, like anyone else purchasing WordStar these days, I own version 3.31.) All its other utilities function as I've come to expect them to after having worked with CP/M for several years. But the typical user of this product will probably be someone who's never seen a CP/M prompt before, and for him or her I worry. ALS seems to have taken the wrong direction in providing a manual that contains ten or more pages of technical programming information, yet little help to the first-time CP/M user.

The user's manual is a 5-by-8-inch, 35-page paperback. The text is tiny and utilitarian, apparently the output of an ordinary daisy-wheel printer run with WordStar. This is in keeping with the economical nature of the product, however, and doesn't really bother me. Unfortunately, the manual's contents *do*. The manual concedes its own shortcomings by immediately referring the user to three of the standard works on CP/M for what it calls "more detailed information." After counting four times that the manual told me to look at someone else's documentation, I stopped counting. Suffice it to say that you had better stock yourself with some of the after-market publications on CP/M if you have any intention of using this product.

In general I found the card's performance quite satisfactory. The card I reviewed contained a Z80-B processor, a slightly faster version of the venerable Z80-A, and it was impressive in its execution speed. I have only favorable impressions of the hardware.

The ALS Z-Engine is a high-performance peripheral that lets you fully experience the world of Apple CP/M software at a reasonable investment. The true value of the purchase, however, must be weighed against the time and energy spent trying to answer the many questions left wholly unanswered by the embarrassingly inadequate documentation. ■

**Robert Perez
San Jose, CA**

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Apple //e

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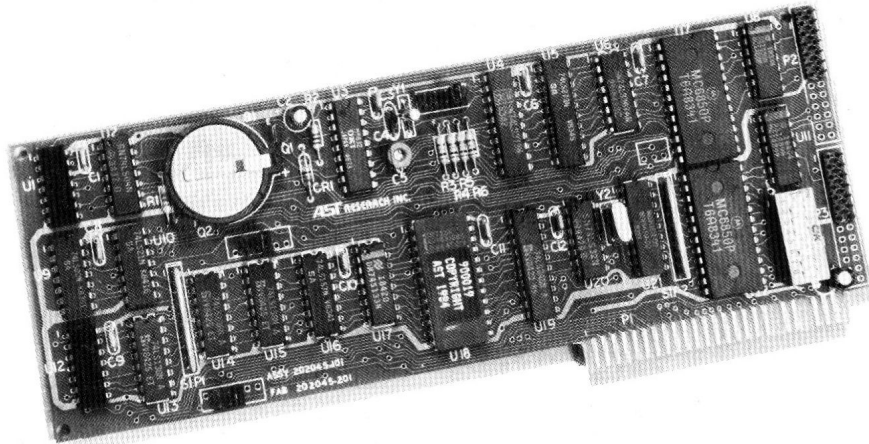


Instead of buying a serial card for your printer, another serial communications card for your external modem, and a clock card to date-stamp your ProDOS files, you can buy the all-in-one Multi I/O card from AST Research and save \$150–\$250. And you'll not only save money; you'll decrease demand on your Apple's power supply as well, creating less heat inside your machine.

The Multi I/O card plugs into slot 1, 2, 3, 4, or 7; then, setting configuration blocks on the card fools your Apple into thinking there are three separate cards mapped to three slots, with each "card" providing a different function. The configuration possibilities include a printer in slot 1 or 2, a modem in slot 2 or 3, and the clock in slot 4 or 7. With an 80-column card in slot 3, your choices are more limited—the clock in slot 4 or 7 is your only option.

In a typical configuration, the Multi I/O card, in slot 1, provides a serial RS-232C interface for your printer. Slots 2 and 4 are empty, but your external modem connected to the card functions as though it's in slot 2, and software to provide time/date functions accesses slot 4. Notice that you don't gain (or lose) any extra slots by installing this board; functions that the board emulates require that those slots be vacant.

Another handy feature is that you can disable any one or two of the board's functions. If, for example, you already have a modem, you can disable the communication port and use the card for a serial printer and clock only. Your modem will function normally. When enabled, you can configure the modem with transmission rates from 50 to 19,200 baud on both serial ports; and word length, stop bits, and parity can be set through software. Terminal operation controls full/half duplex.



Multi I/O includes clock, printer port, and modem port.

One of the nicest features of the card is the range of software with which it will run. Included in the package is a list of hardware and software AST claims they tested and found to be operable with the I/O board. The card operates under DOS 3.3, ProDOS, and CP/M (with a CP/M card), as well as from within Apple's Pascal environment (although AST's documentation failed to mention this latter fact).

Other features include demonstration software to dump a text file or graphics screen to the printer, set and read the clock, dial a telephone, and more. The package comes with an adequate 30-page manual.

Testings

I tested the printer function of Multi I/O with an ImageWriter dot-matrix printer and a DaisyWriter daisy-wheel printer. I encountered no problem in running the programs on AST's list, but some that weren't listed turned up a few peculiarities. Beagle Bros' Triple-Dump, for example, comes with configuration instructions only for the SSM-AIO or the CCS 7710A serial card, and the carriage return delay increased to one second with Triple-Dump to print the double hi-res screen in expanded mode. An Applesoft program using TAB in a simple print-using routine failed to provide the necessary spaces between columns, although it ran fine with both Apple's parallel and super-serial cards. Apple's MousePaint looked for a super-serial card and failed to print its graphics to the ImageWriter.

Only four acceptable modems were mentioned on AST's list—the Hayes

300 and 1200 Smartmodems and Novation's Autocat and Smartcat. I tested the Multi I/O card with the Hayes 1200 and found no problems. Using this card, the computer also functioned well as a dumb terminal connected directly to another computer. Several other terminal programs worked well, although Apple's Access// will operate only with their own super-serial card.

Multi I/O clock emulation uses the same protocol as ThunderClock, so it's compatible with Mountain Computer's old clock card as well as with the newer timekeepers. A lithium battery runs the clock when the power is off. The clock is easy to set and read from BASIC, and worked well with all of the programs I tested except Write Away. This word processor/terminal program uses a clock card in its terminal mode to dial or send at a specified time. It works fine with ThunderClock, but failed to notice Multi I/O.

The decision to purchase AST's Multi I/O card, in my opinion, depends on your current setup and finances. If you now lack cards for all three functions and will be using the card with pre-tested hardware and software, then Multi I/O will definitely be a good investment. If, on the other hand, you already have one or two of the functions that Multi I/O provides, you should add to your system with special purpose cards and pass up Multi I/O. If money is of little concern, buy a couple of Apple's super-serial cards and ThunderClock. You'll find their total compatibility with "everything" very reassuring. ■

Art Ude
Stoddard, NH

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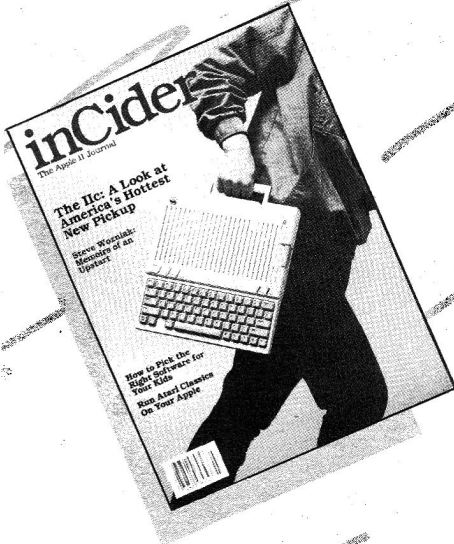
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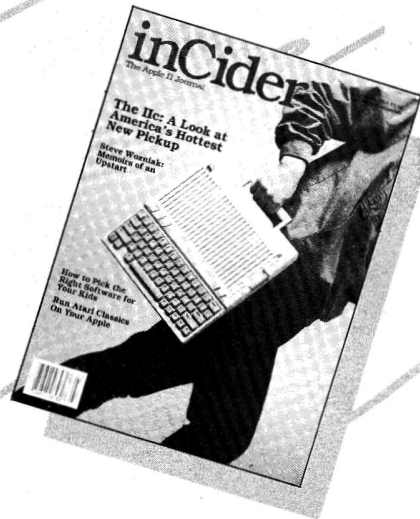
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APPLE EXTRACT

A reprise of the reviews that have appeared in inCider in the last three months. Prices subject to change without notice.

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

Software

Blazing Paddles Take 1

★★★★
Baudville
1001 Medical Park Drive, S.E.
Grand Rapids, MI 49506
Graphics, April '85.

Blazing Paddles is a drawing program that includes clip-art files. Take 1 lets you animate your graphics creations. Blazing Paddles—\$50, Take 1—\$60.

Dollars and Sense

★★★★★
Monogram
8295 South La Cienega
Boulevard
Inglewood, CA 90301
Personal finance, April '85.

A superb personal/small business money-management program. Requires a //c or a 128K //e. \$100.

First Base Software

★★★★★
McGraw-Hill Book Company
1221 Avenue of the Americas
New York, NY 10020
Data-base management,
March '85.

A series of 12 CP/M packages for home and business that deliver a great deal of value. Home programs—\$29.95, business programs—\$49.95.

Gelfing Adventure

★★★
Sierra On-Line
P.O. Box 485
Coarsegold, CA 93614
Adventure game,
February '85.

An illustrated adventure based upon the movie *Dark Crystal*. It is designed for young players. \$50.

Graphics Exhibitor, Programmer's Tool Kit

★★★★★
Koala Technologies
3100 Patrick Henry Drive
Santa Clara, CA 95052
Graphics, March '85.

Expand the capabilities of your KoalaPad. The Graphics Exhibitor lets you edit, print, and exhibit pictures. The Programmer's Tool Kit lets you incorporate the KoalaPad into your programs. \$39.95 each.

Halley's Comet

★★★
American Only
13361 Frati Lane
Sebastopol, CA 95472
Home/hobby, April '85.

A program that provides graphics and text information about the return of Halley's Comet in 1986. Of limited use to the serious observer. \$49.95.

The Incredible Laboratory

★★★★★
Sunburst Communications
39 Washington Avenue
Pleasantville, NY 10570
Education, April '85.

An educational game package that develops problem-solving skills. A winner. \$55.

Investor's Workshop

★★★★★
Dow Jones & Company
P.O. Box 300
Princeton, NJ 08540
Personal finance,
February '85.

This program manages your portfolio, charts stocks, and (with a modem) lets you download information from Dow Jones News/Retrieval. A great value. \$149.

Jane

★★★
Arktronics
113 South Fourth Avenue
Ann Arbor, MI 48104
Business, February '85.

Jane combines a word processor, a minuscule spreadsheet, and a simplified list manager in one package. \$179 (\$295 with custom //e mouse).

Magic Office System

★★★
Artsci
5547 Satsuma Avenue
North Hollywood, CA 91601
Business, March '85.

A word processor, spelling checker, spreadsheet, and graphing program on one disk. The degree of integration is low. \$295.

Management Diagnostic Series

★
Thoughtware
2699 South Bayshore Drive
Coconut Grove, FL 33133
Training, February '85.

Ten multiple-disk volumes help you evaluate and train management personnel. Painfully slow. \$350–\$450 per volume.

Merry Canned Nightmares and Dreams

★★★
Peachtree Software
3445 Peachtree Road, N.E.
Atlanta, GA 30326
Education, March '85.

This multi-player adventure game helps develop goal-setting, problem-solving, and logic skills. \$49.

Mind Prober

★
Human Edge Software
2445 Faber Place
Palo Alto, CA 94303
Personal, April '85.

This program tells you what you already know about other people. Somewhat entertaining, but ultimately useless. \$49.95.

Murder on the Zinderneuf

★★★★★
Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
Game, April '85.

In this game, you take the part of a famous detective and try to solve a murder before your airship lands in New York. A challenge to your deductive faculties. \$40.

Olin in Emerald

★★★
Adventure International
P.O. Box 3435
Longwood, FL 32750
Adventure game, March '85.

For ages 9 to 14, this game has some educational value, but is essentially an uncomplicated illustrated adventure. \$19.95.

Polywriter

★★★★★
Passport Designs
625 Miramontes Street
Half Moon Bay, CA 94019
Utility, March '85.

This music "word processor" greatly simplifies composition. Requires an interface to a music synthesizer. \$299.

ProfitTaker

★★★★★
Investment Growth Corp.
1430 West Busch Boulevard
Tampa, FL 33612
Business, February '85.

A sophisticated software package designed to aid the serious commodities investor. \$795 (\$895 for hard-disk version).

Ramdrive e/c

★★★
Precision Software
6514 North Fresno Street
Milwaukee, WI 53224
Utility, April '85.

A software package that lets owners of 128K Apples use the upper 64K of memory as a RAM disk. \$29.95.

Snoopy's Skywriter Scrambler

★★★
Random House Software
201 East 50th Street
New York, NY 10022
Education, March '85.

An entertaining game that tests your vocabulary, rather than trying to expand it. \$39.95.

Spell It!

★★★
Davidson & Associates
6069 Groveoak Place
Rancho Palos Verdes, CA 90274

Education, February '85.
Four modules provide an exciting way to practice spelling for students of all ages. \$49.95.

Superbase

★★★
Precision Software
3003 Summer Street
Stamford, CT 06905
Business, March '85.

A sophisticated, feature-laden data-base manager. Its file size is limited by the size of your disk. \$149.

Value/Screen

★★★
Value Line
711 Third Avenue
New York, NY 10017
Stock analysis, April '85.

An excellent program for helping you make investment decisions. \$95.

Hardware

Calmpute

★★★
HesWare
150 North Hill Drive
Brisbane, CA 94005
Biofeedback monitor,
February '85.

A system that lets you monitor (and try to consciously control) your stress level as indicated by galvanic skin response. \$99.95.

The Digital Paintbrush

★★★
Computer Colorworks
3030 Bridgeway
Sausalito, CA 94965
Graphics, February '85.

This unique graphics-hardware system is both powerful and affordable. It also lets you draw on a remote Apple via modems. \$299.

Lg-1500

★★★
Epson America
3415 Kashiwa Street
Torrance, CA 90505
Printer, March '85.

Though dot-matrix, this wide-body printer delivers genuine letter quality at 67 cps, 200 cps in draft mode, and graphics. \$1495.

Muppet Learning Keys

★★★
Koala Technologies
3100 Patrick Henry Drive
Santa Clara, CA 95052
Keyboard, April '85.

A membrane keyboard for preschoolers who are confounded by the layout of the Apple keyboard. The supplied software is limited. \$79.95.

Personal Speech System

★★★
Votrax
500 Stephenson Highway
Troy, MI 48084
Speech synthesizer,
February '85.

This is an excellent speech synthesizer for your Apple. It doesn't, however, come with software. \$299.

Relax

★★★
Synapse Software
5221 Central Avenue
Richmond, CA 94804
Biofeedback monitor,
March '85.

If you're bothered by stress, Relax could be just what the doctor ordered. \$139.95.

Scribe Printer

★★★
Apple Computer
20525 Mariani Avenue
Cupertino, CA 95014
Printer, March '85.

A non-impact, dot-matrix printer that connects directly to the //c. It consumes ribbon at an alarming rate. \$299.

The Sider

★★★
First Class Peripherals
P.O. Box 6187
Lehigh Valley, PA 18001
Hard disk, April '85.

This 10-megabyte hard disk provides outstanding performance at a very reasonable price. It runs under all major Apple II operating systems. \$695.

SpecDemon

★★★
McT
1745 21st Street
Santa Monica, CA 90404
Coprocessor, April '85.

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Publications

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Rumford, RI 02916

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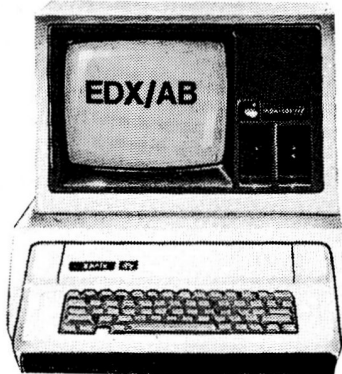
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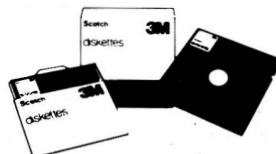


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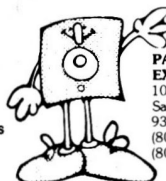
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Spreadsheet for Kids

Grolier has introduced a spreadsheet specially designed for children aged 12 and older. **EduCalc** (\$45) offers built-in tutorials and easy-to-understand prompts. Templates (for student activities, math, science, and sports) will also be available. Contact Grolier Electronic Publishing, 95 Madison Avenue, New York, NY 10016, or check number 473 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.

Mister Rogers and Dr. Seuss

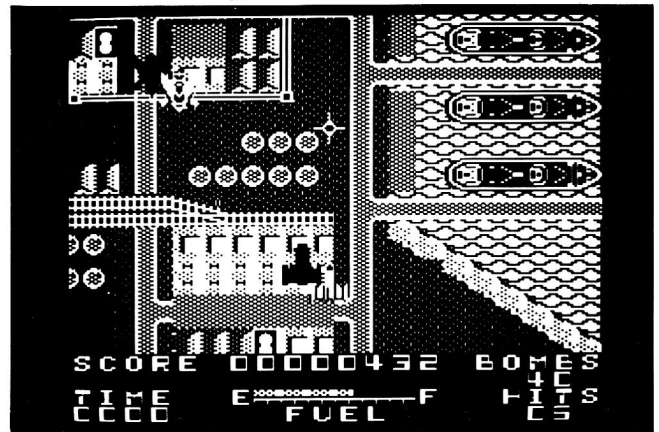
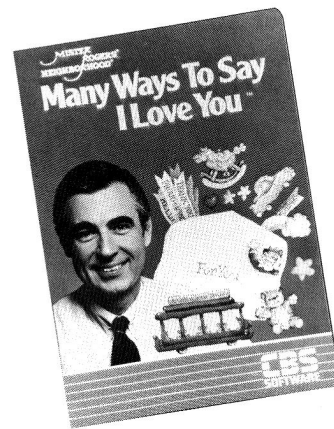
Emmy-winning Fred Rogers has developed **Many Ways to Say I Love You** (\$29.95), a graphics system to help children create their own greeting cards. Everything is menu-driven, using icons and a library of shapes and designs. The **Dr. Seuss Fix-Up the Mix-Up Puzzler** (\$29.95) features favorite Dr. Seuss characters (including the Cat in the Hat) in scrambled scenes. When children unscramble the pieces, the picture comes to life through animation. These run on any Apple II with 48K and are from CBS Software, One Fawcett Place, Greenwich, CT 06836. Use Reader Service number 482.

Arcade Trio

Three different arcade games combine in **Situation: Critical**. Dodge robots while exploring an underground maze, and navigate your way through a hazardous cavern. Finally, pilot your fighter on a bombing simulation as enemy planes try to shoot you from the skies. **Situation** costs \$31.95 and is compatible with any 48K Apple II. Sign up with Prism Software, 26600 Southfield Road, Lathrup Village, MI 48076, or circle Reader Service number 484.

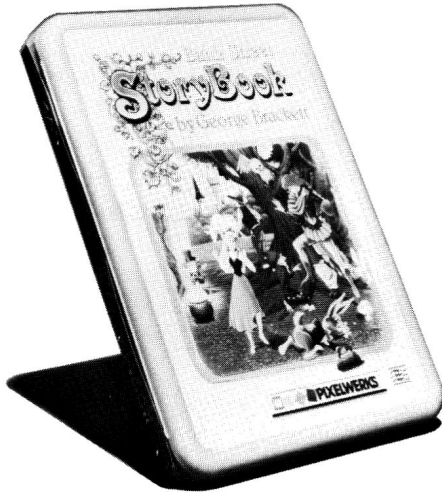


Softerm brings terminal emulation to the Apple //c.



Low-level bombing run from Situation: Critical.

edited by Kerry J. Lanz



StoryBook lets children illustrate and animate their stories.

Mindscape's Latest

The Halley Project (\$44.95) simulates navigation through our solar system. Write and illustrate your own book with animated graphics through **Bank Street StoryBook** (\$39.95). Priced at \$29.95, both **Castle Clobber** (a

simple adventure game) and **Subtraction Fair** (math games) help youngsters learn with a home computer. All these products work on any 48K Apple II and come from Mindscape, 3444 Dundee Road, Northbrook, IL 60062. Check off Reader Service number 479.

Complete Billing

The **Versatile Billing System** (\$295) takes care of billing, figuring job costs, and generating reports. You can enter costs by job or by operation and analyze a job at any time. When the job is done, you can print bills and reports. VBS is compatible with any Apple II and comes from Versatile Business Systems, P.O. Box 270, Sioux Narrows, Ontario, Canada POX 1N0. Use Reader Service number 486.

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ment with a full range of investment choices—stocks, bonds, real estate, and commodities. Your tutors are any 48K Apple II and a Squire from Blue Chip Software, 6744 Eton Avenue, Canoga Park, CA 91303. Use Reader Service number 481.

Computer Astronomy

Astrostell turns your monitor into a planetarium. Priced at \$31.95 for any 64K Apple II, Astrostell shows you 88 constellations and many deep sky objects—galaxies, nebula, and star clusters. Based on your time and location the program shows all the constellations that are visible to you. Look into details from Zephyr Services, 306 South Homewood Avenue, Pittsburgh, PA 15208. Reader Service number is 485.

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No matter how much work you've put into that report, no matter how accurate your references and sound your conclusions, a single spelling mistake can destroy its credibility.

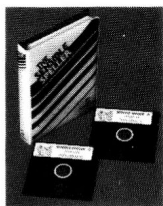
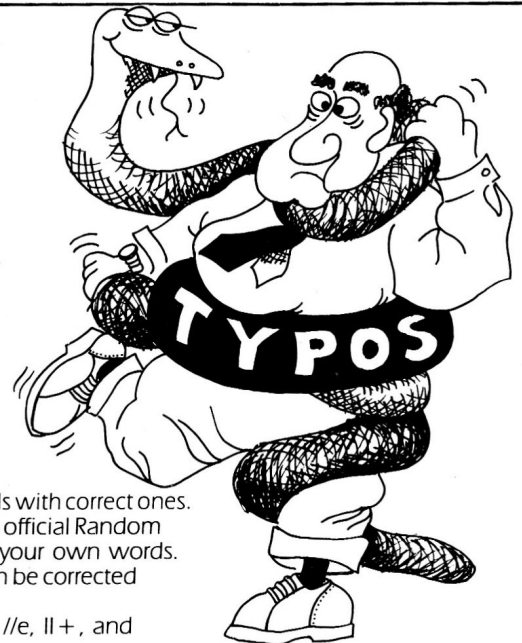
HOW CAN YOU GUARD AGAINST THIS? Simply check your paper with **Sensible Speller™**, the software program that is a virtual electronic dictionary. With tireless, efficient detachment, it will catch mistakes you would not notice. It will in fact display misspelled words in context, suggest the correct spelling, and allow immediate replacement of misspelled words with correct ones.

WHAT IS THE SIZE OF SENSIBLE SPELLER'S VOCABULARY? All 80,000 words of the official Random House Dictionary. And there's enough room left on disk to add thousands of your own words.

HOW LONG DOES IT TAKE TO USE SENSIBLE SPELLER? A ten-page document can be corrected in one or two minutes.

ON WHAT COMPUTERS CAN YOU RUN SENSIBLE SPELLER? On all Apple IIc, IIe, II+, and Apple-compatible computers.

WHERE MAY SENSIBLE SPELLER BE PURCHASED? It is available at your dealer for \$125 in either the "IV" or ProDOS version.* It may also be ordered direct, enclosing \$1.25 for shipping. Visa/MasterCard/Check/COD welcome.



Sensible Speller™ is a product of



Sensible Software, Inc.®

210 S. Woodward, Suite 229, Birmingham, MI 48011
(313) 258-5566

*It works with all the following word processors, with owners of trademarks indicated in parentheses: AppleWorks & Apple-Writer, all versions (Apple Computer, Inc.); Bank Street Writer (Brodebund); Format II (Kensington Microware); HomeWord & Screen Writer (Sierra On-Line Inc.); Word Handler (Silicon Valley Systems); CP/M-Wordstar (Digital Research Corp.-Micropro International); PFS WRITE (Software Publishing, Inc.); and others. All features are not available with CP/M, PFS WRITE & Word Handler.

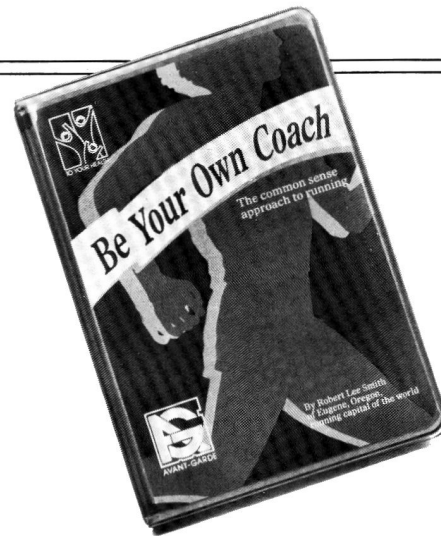
New from MicroLab

Take a **Journey to the Caverns of Doom** (\$40 and available in five languages) in a hi-res adventure where you use icons to make your moves.

HomeWriter (word processor) and **HomeFiler** (data base) are easy to use, have a self-teaching demo, and are priced at \$50. **Assistant Coach** (\$35) calculates all the statistics a basketball coach could want. The **Classroom Administration System** (\$300) helps teachers write tests, analyze results, and maintain class records. These products are designed for any Apple II with at least 48K and come from MicroLab, 2699 Skokie Valley Road, Highland Park, IL 60035. Use number 472 on the Reader Service card.

New 65C02 Assembler

Enter the fast-paced world of Apple 6502 assembly language with the **System M2000** (\$69.95) machine-language development system with text editor, macro assembler, debugger, and manual. **MicolMon** (\$29.95) is a debugging program that helps you trace your machine-language programs during execution. Both work on any Apple II and accept the 27 additional instructions available with the new 65C02 chip that comes in the Apple IIc. These products are produced by Micol Systems, 100 Graydon Hall Drive, Suite 2301, Don Mills, Ontario, Canada M3A 3A9. Micol has 65C02 chips for older Apple II's. Check number 477 on the Reader Service card.



Design a complete program with *Be Your Own Coach*.

Home Software from Avant-Garde

For \$79.95, you can **Be Your Own Coach** and plan a training program for runners at any level of experience. **An Apple a Day** (\$79.95) helps you build and maintain health records for the whole fam-

ily. Children manage a make-believe store to learn math skills by ringing up **The Magic Cash Register** (\$34.95). These programs work on any 48K Apple II and come from Avant-Garde Publishing, P.O. Box 30160, Eugene, OR 97403. Circle Reader Service number 480.

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

12 BIT, 16 CHANNEL, PROGRAMMABLE GAIN A/D

- All new 1984 design incorporates the latest in state-of-art I.C. technologies.
- Complete 12 bit A/D converter, with an accuracy of 0.02%!
- 16 single ended channels (single ended means that your signals are measured against the Apple's GND.) or 8 differential channels. Most all the signals you will measure are single ended.
- 9 software programmable full scale ranges, any of the 16 channels can have any range at any time. Under program control, you can select any of the following ranges: ± 10 volts, $\pm 5V$, $\pm 2.5V$, $\pm 1.0V$, $\pm 500MV$, $\pm 250MV$, $\pm 100MV$, $\pm 50MV$, or $\pm 25MV$.
- Very fast conversion (25 micro seconds).
- Analog input resistance greater than 1,000,000 ohms.
- Laser-trimmed scaling resistors.
- Low power consumption through the use of CMOS devices.
- The user connector has +12 and -12 volts on it so you can power your sensors.
- Only elementary programming is required to use the A/D.
- The entire system is on one standard size plug in card that fits neatly inside the Apple.
- System includes sample programs on disk.

PRICE \$319

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

A/D & D/A

A/D & D/A Features:

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

A/D SPECIFICATIONS

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

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

D/A SPECIFICATIONS

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

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

PRICE \$199

SIGNAL CONDITIONER

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

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

FEATURES

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

PRICE \$79

I/O 32

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

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

The I/O manual includes many programs for inputs and outputs.

Some applications include:

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

PRICE \$89

Please see our other full page ad in this magazine for information on Applied Engineering's Timemaster Clock Card and other products for the Apple. Our boards are far superior to most of the consumer electronics made today. All I.C.'s are in high quality sockets with mil-spec. components used throughout. P.C. boards are glass-epoxy with gold contacts. Made in America to be the best in the world. All products compatible with Apple II and //e.

Applied Engineering's products are fully tested with complete documentation and available for immediate delivery. All products are guaranteed with a no hassle three year warranty.

Texas Residents Add 5% Sales Tax
Add \$10.00 If Outside U.S.A.

Send Check or Money Order to:
APPLIED ENGINEERING
P.O. Box 798
Carrollton, TX 75006

Call (214) 492-2027
7 a.m. to 11 p.m. 7 days a week
MasterCard, Visa & C.O.D. Welcome
No extra charge for credit cards

NEW PRODUCTS



Portable Power

The **Prairie Power System** (\$269.95) gives your Apple //c eight hours of portable power. With a lightweight rechargeable battery, the system comes in a soft-sided Cordura briefcase and weighs 20 pounds, including the computer. There is room for a modem and other accessories, like the flat-panel //c screen. This product is from Prairie Power Systems, 768 Twelve Oaks Center, 15500 Wayzata Boulevard, Wayzata, MN 55391. Mark number 463 on the Reader Service card.

Gandalf 2400 Modem

A new entry in the world of 2400-baud modems is the Gandalf **SAM 224** (\$795), designed to meet the demands of business telecommunications. Through an RS-232 interface, SAM provides high speed and reliability with auto-answer and auto-dial service. For complete technical details, contact Gandalf Data, 1019 South Noel, Wheeling, IL 60090, or mark number 466 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.

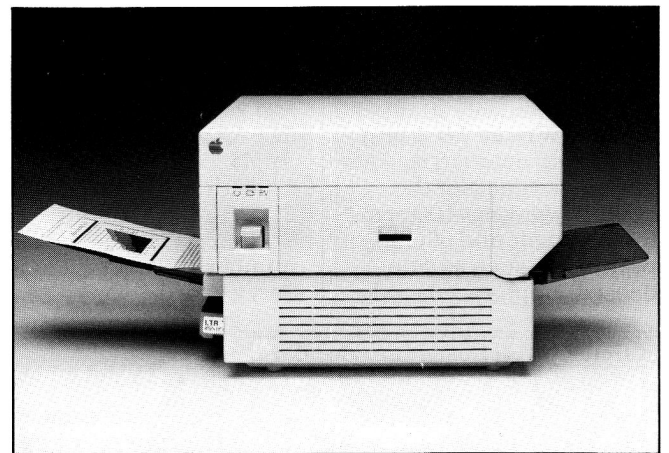
Apple's Laser Printer

Apple has introduced the **LaserWriter**, their new high-resolution laser printer capable of typeset-quality text and art-department-quality graphics. It has both an RS-232 port and a port for AppleTalk, the Macintosh networking system. A built-in program emulates the Diablo 630 daisy-wheel printer for word-processing tasks. LaserWriter prints up to eight pages per minute and retails for \$6995. For full details, see your local Apple dealer or write Apple Computer, 20525 Mariani Avenue, Cupertino, CA 95014. Use Reader Service card number 460.

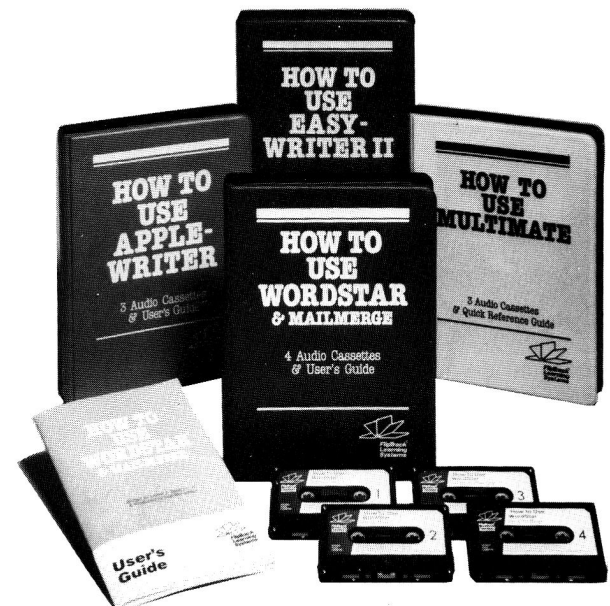
Word-Processor Tutorials

Become a pro on leading word processors with **FlipTrack** cassette tapes. Three cassettes each (\$57) make up the course for Apple Writer, EasyWriter II, or MultiMate. WordStar needs four cassettes for \$75. The cassettes guide you step-by-step as you learn the program on your computer. You need the word processor, your Apple, and a cassette player. Contact FlipTrack Learning Systems, 999 Main Street, Suite 200, Glen Ellyn, IL 60137, or check Reader Service number 456.

Your Apple //c travels with Prairie Power.



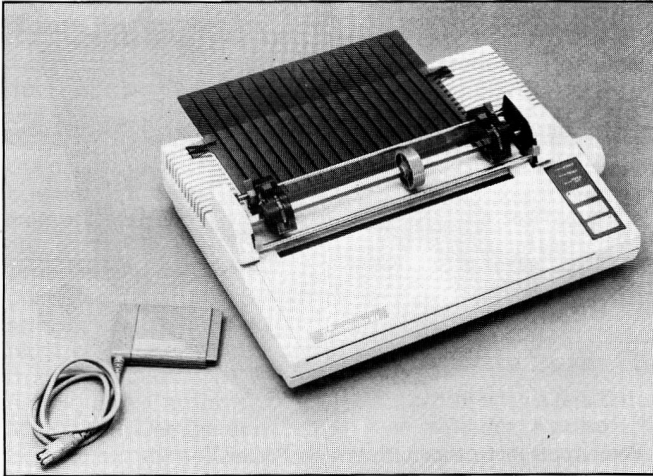
The Apple LaserWriter high-resolution laser printer.



FlipTrack's word-processor tutorials.

edited by Kerry J. Lantz

NEW PRODUCTS



Epson's HomeWriter 10, a utility printer for the home.

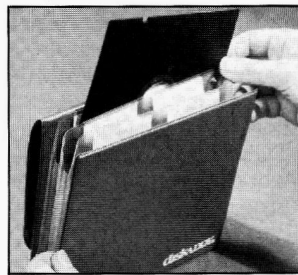
Epson HomeWriter

HomeWriter 10 is an 80-column dot-matrix printer designed for the home. It works at 100 cps in draft mode and offers print styles such as condensed, emphasized, and

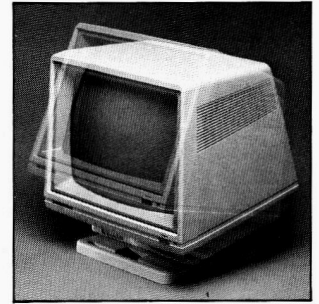
near letter-quality. The printer is priced at \$269, and you need a \$60 interface for your particular Apple. HomeWriter comes from Epson America, 2780 Lomita Boulevard, Torrance, CA 90505. Mark number 458 on the Reader Service card.

Disk Defense

Protect your disks with a **Diskaddy** storage system, designed to transport disks safely in a briefcase or luggage. The accordion-style construction expands according to the number of disks you are carrying. Prices range from \$7.99 for six disks, to \$14.99 for 22 disks. Contact MB International, 4322 Date Street, La Mesa, CA 92041, or circle number 459 on our Reader Service card.



Diskaddy protects your disks.



The Suncom Monitor Stand angles for a good position.

Tilting at Monitors

The heavy-duty **Suncom Monitor Stand** (\$26.95) holds a 14-inch TV set or monitor at the best tilt for your use. The polyurethane-cushioned metal base can swivel through 360 degrees and tilt up and down 12½ degrees. This accessory is produced by Suncom, 260 Holbrook Drive, Wheeling, IL 60090. The Reader Service number is 464.

Circle 264 on Reader Service Card.

BACK UP YOUR DISKS

NOW AVAILABLE AT YOUR LOCAL COMPUTER STORE

ESSENTIAL DATA DUPLICATOR III™

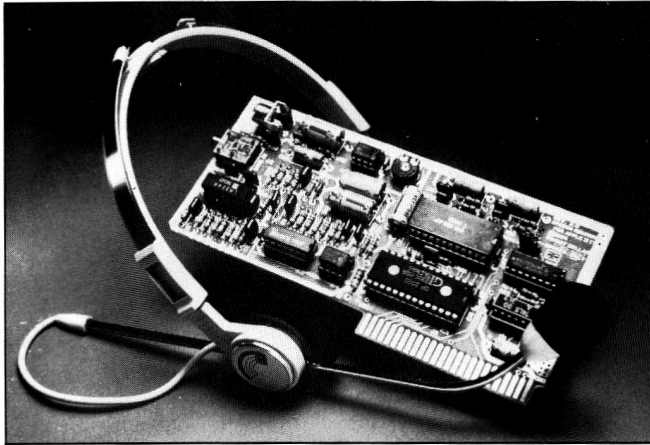
EDD runs on Apple II, II plus, IIe, IIc and Apple III (in emulation mode) using one or two disk drives.

EDD allows you to easily and quickly make back up copies of your "uncopyable" Apple disks. ■ Since EDD has been preset to copy the widest range of copy-protections possible, you just simply boot up EDD, put the disk you want to copy in one disk drive and a blank disk in the other (EDD will work using one drive "so") and in about 2 ½ minutes a copy is made. ■ Unlike the "copy-cards" which only copy "single load" programs, EDD copies the entire disk. This would be similar to hooking up two cassette recorders, playing from one, and recording to the other. ■ We have even included an option so you can check the speed of your disk drives because drive speeds running fast or slow can damage disks and cause other problems. ■ We publish EDD program lists (information about copy-protected disks) every couple of months, which EDD owners can receive. The current list is included with the purchase of EDD. ■ The bottom line is this; if EDD can't copy it, chances are nothing will.

\$79.95 Ask for EDD at your local computer store, or, to order direct; send \$79.95 plus \$2 shipping (\$5 foreign). Mastercard/Visa accepted. Prepayment required.

UTILICO MICROWARE
3377 Solano Ave., Suite #352
Napa, CA 94558 (707) 257-2420

Warning: EDD is sold for the sole purpose of making archival copies ONLY.



Add voice control with the Lis'Ner 1000.

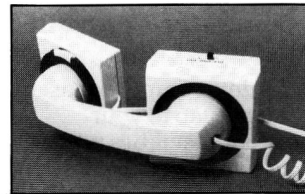
Voice Control

Micromint's **Lis'Ner 1000** brings voice recognition and synthesis to your Apple. Based on the SP1000 LPC chip, Lis'Ner hears your commands and sends characters to the keyboard input as if they

had been typed. The card fits into a slot in your Apple II Plus or //e and costs \$189. For \$259, you get enhanced synthesizer ability. For full details, contact Micromint, 561 Willow Avenue, Cedarhurst, NY 11516. Use Reader Service number 451.

Portable Modem Coupler

The **CompanionPAC** is a portable acoustic coupler for use when direct connection of your modem is not possible. If you're on the road or if your present phone does not allow direct connection of a modem, just put CompanionPAC (\$79) between a phone and your modem. Get information from CTS Datacomm, 6900 Shady Oak Road, Eden Prairie, MN 55344. Mark number 452 on the Reader Service card.



CompanionPAC lets your modem use any phone.

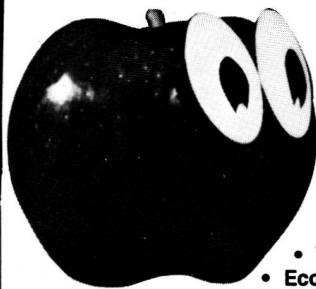
Clean Up Your Act

The **Dot Matrix Cleaning Kit** (\$24.95) contains everything you need for complete cleaning and care of all types of printers. Monitors and disk drives get the same coverage in the **Heads and Screen Cleaning Kit** (\$26.95). There is even a version of Heads and Screens for the new 3½-inch drives (\$29.95). Get full details from Texwipe, P.O. Box 308, Upper Saddle River, NJ 07458. Use number 454 on the Reader Service card.

Static Buster

Static electricity can french-fry your chips. Keep the cooking in your kitchen with a **Chateau Computer-Grade Carpet**. This cut-pile, woven-synthetic carpet comes in a variety of colors and

Circle 204 on Reader Service Card.



LET YOUR APPLE SEE THE WORLD!

The DS-65 Digisector® opens up a whole new world for your Apple II. Your computer can now be a part of the action, taking pictures to amuse your friends, watching your house while you're away, taking computer portraits . . . the applications abound! The DS-65 is a random access video digitizer. It converts a TV camera's output into digital information your computer can process. The DS-65 features:

- **High Resolution** — a 256 × 256 picture element scan
- **Precision** — 64 levels of grey scale
- **Versatility** — Accepts either NTSC or industrial video input
- **Economy** — A professional tool priced for the hobbyist

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

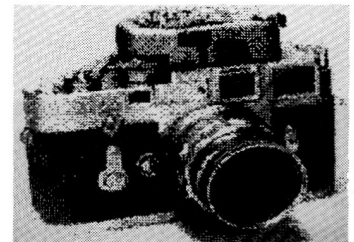
- Full screen scans directly to Apple Hi-Res screen
- Easy random access digitizing by Basic programs
- Line-scan digitizing for reading charts or tracking objects
- Utility functions for clearing and copying the Hi-Res screen

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

ADDITIONAL SOFTWARE FOR THE DS-65

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

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



HI-RES PICTURE USING THE DS-65 AND PICTURE SCANNER SOFTWARE

THE **MICRO WORKS**

Now for IBM PC!

California Residents add 6% Tax

Mastercard/Visa Accepted

P.O. BOX 1110 DEL MAR, CA 92014 619-942-2400

*Paper Tiger is a trademark of Integral Data Systems, Inc.

NEW PRODUCTS

helps to dissipate static electricity buildup. The smallest is 3 by 5 feet for \$120. For more information, contact Charleswater Products, 93 Border Street, West Newton, MA 02165, or mark Reader Service number 457.

Personal Robot

Androbot improves on the turtle with **F.R.E.D.**, a Friendly Robotic Educational Device that moves and draws in any direction. FRED can be controlled by a hand-held communicator or can be programmed in Apple Logo on your II Plus or //e. For \$499, FRED comes to your home, and \$79 extends your Apple Logo to control him. Write to FRED care of Androbot, 550 Charcot Avenue, San Jose, CA 95131, or circle Reader Service number 455.

Braille Printer

Visualtek has started marketing the **MBOSS-1** braille printer, capable of a speed of 10 cps. This table-top braille embosser connects to your Apple through an RS-232 or Centronics-style interface and is compatible with any word processor. The list price of \$3225 includes installation and training. Product information (available in braille) comes from Visualtek, 1610 26th Street, Santa Monica, CA 90404. Use Reader Service number 468.

Computer-Controlled Science Lab

Add a computer-based science lab to your school's facilities with the **Micro-Research Laboratory** (\$915). The analog-to-digital interface connects your Apple II Plus or



Easily installed Add-A-Pad offers smooth data entry.

//e to a wide range of sensors. Software handles sophisticated graphing and data analysis. Get technical details from L & M Research, 1151 Cheshire, Casper, WY 82609. Use number 467 on the Reader Service card.

Disk Labelers

Two new markers are designed especially for use with computer disks. **Diskcribe** writes directly on the disk sleeve in silver or gold (\$2.50 each). The **Label Pen** (\$1) comes in three colors and is designed for slick-finished disk labels. Both feature quick-drying, permanent ink and are produced by the Sanford Corporation, 2740 Washington Boulevard, Bellwood, IL 60104. Mark number 450 on the Reader Service card.



Diskcribe labels right on the disk sleeve.

Circle 12 on Reader Service Card.

The ADALAB™
Data Acquisition System For Laboratories

Costs Less Than **\$2300***

● **ADALAB™** data acquisition system interfaces with virtually any lab instrument using a recorder or meter, including GC and HPLC systems, spectrophotometers, pH meters, process control apparatus, thermocouples, etc. Thousands of scientists use IMI products worldwide!

● **Lab Data Manager™** software (\$250) facilitates single or multi-channel acquisition, storage, display and chart recorder style output of lab instrument data.

*\$2290 price includes 64K APPLE IIe, disk drive with controller, 12" monitor; dot matrix printer with interface; IMI ADALAB™ interface card.

\$495 ADALAB™ INTERFACE CARD (available separately)



includes 12-bit A/D, 12-bit D/A, 8 digital sense inputs, 8 digital control outputs, 32 bit real-time clock, two 16-bit timers plus QUICK I/O data acquisition software that works within easy-to-use BASIC.

Call, write or telex IMI for complete details!

†Trademark of Apple Computer, Inc.



INTERACTIVE MICROWARE, INC.
P.O. Box 139, Dept. 52 Telex: 705250
State College, PA 16804 (814) 238-8294

Keypad for Your //e

Add a numeric keypad to your Apple //e with **Add-A-Pad**, priced at \$79.95. Easily installed, the pad has 24 keys of functions and digits to streamline data entry for spreadsheet and accounting programs. It comes from Computer Accents, P.O. Box 5307, Kingwood, TX 77325. Circle number 465 on our Reader Service card.

Disk Security

Protect your computerized records from theft or loss with **Disk-Safe**. Each Disk-Safe protects 100 disks in a heavy, 18-gauge steel lock-box that can be secured to a desk, cart, or wall. Get details from Omni Tech, 1455 North Barker Road, Brookfield, WI 53005. Circle number 453 on the Reader Service card.

SCRG PRODUCTS FOR THE APPLE COMPUTER

SWITCH-A-SLOT



\$179.50

The **SWITCH-A-SLOT** is an expansion chassis, which allows the user to plug in up to four peripheral cards at one time. One of these cards is selected for use, and only that card draws power.

This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

- Allows up to four peripheral cards to be plugged into one peripheral slot.
- User selects desired card by front panel rotary switch.
- Only selected card draws power.
- Plugs into any peripheral slot.
- Saves wear and tear on delicate connectors.
- 18" cable connects Switch-a-slot to computer.

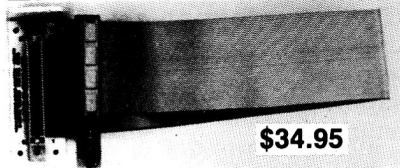
New—resistive terminations for better response



SWITCH-A-SLOT and **EXTEND-A-SLOT** work well with all slow to medium speed cards, such as Modems, Printers, Clock, 80 Column, Music, etc. They are not recommended for high speed data transfer devices such as disk drive controllers, alternate processor, and memory cards. These products may be incompatible with some alternate processor cards.



EXTEND-A-SLOT



\$34.95

The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability.

The perfect accessory for:

Owners of large numbers of I/O expansion cards—keep your frequently used cards installed. Use the **EXTEND-A-SLOT** for the others.

Technicians—easy access to test points on accessory cards under actual operating conditions.

Experimenters—make easy changes to cards while card is installed.

EASY TO USE—just plug it in as you would any expansion card, then plug your card in. When you want to change cards, do it easily outside the computer, without the wear and tear on the computer expansion slot.

OTHER PRODUCTS

D Manual controller. Gives complete control over the \$C000 through \$C0FF range in hardware. Can be switched while program is running. \$89.50.

MAGIC KEYBOARD (for] or][* only). Re-encodes the keyboard to give alternate keyboards, such as DVORAK, ASK, 10-KEY, HEXIDECIMAL KEYPAD, etc. \$49.50.

Available at your local dealer or direct from:
So. Calif Research Group

P.O. Box 593-R
Moorpark, CA 93021
(805) 529-2082

TELEX 658340 ATTN: SCRG
Answer Back INTERTEL INC
VISA, MASTERCARD accepted

Add \$2.50 for shipping. Outside U.S. and Canada, \$5.00, for surface, \$10.00 Air; except Switch-A-Slot, \$25.00 Air.

SIX MONTH WARRANTY TEN DAY RETURN PRIVILEGE TOLL-FREE ORDER LINES

in CA (800) 821-0774
(800) 635-8310

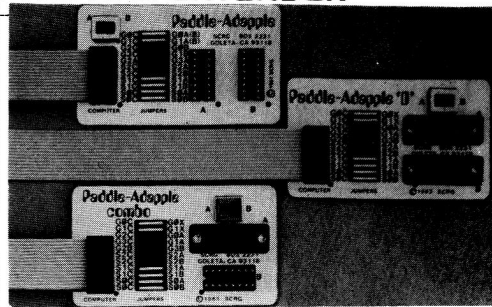
all other states (including AK, HI, VI & PR)
Information & technical questions: (805) 529-2082

Paddle-Adapple GAME I/O ADAPTER AND EXTENDER



- Works with all Apple compatible joysticks, paddles and other I/O devices.
- Select one of two devices or . . .
- Use 4 paddles simultaneously.
- Unique "Jumpers" socket allows you to configure to meet your needs.
- BPI™ users can have BPI™ device and paddles plugged in simultaneously. (**Paddle-Adapple** and **Paddle-Adapple Combo** only).
- Gives you four push-button inputs.
- Supports shift key modification.
- Exchange X & Y joystick axis.
- Small and compact — adheres to computer with supplied foam tape.
- All Strobes, annunciators and power available on all 16 pin connectors.
- Supplied with 18" cable.

\$29.95



The **Paddle-Adapple** has two 16 pin sockets. The **Paddle-Adapple "D"** works with the subminiature D connectors.

The **Paddle-Adapple Combo** has one 16 pin socket and one subminiature D connector.

NEW 9-16 Adapter

For Apple //e and //c

This product permits the use of most 16-pin I/O devices with the APPLE //c or //e. By plugging this adapter into the sub-miniature 'D' connector, you can plug in a 16-pin device, such as the **Paddle-Adapple**, paddles, joystick, **KOALA PAD™**, etc. The only limitations are those devices that use the annunciators or the C040 strobe, such as the **POWER PAD™**. Please note that the //c does not support four joystick inputs.

\$14.95



We start your library of programs with the most popular utilities on the card, **FID** and **COPYA**. Now, if you have to copy a disk, you don't have to search for the master disk. You can start copying within 3 seconds after turning on the computer.

We are currently licensed to sell several very popular programs on EPROM. **DOUBLE—TAKE** by BEAGLE BROS., and **COPY][PLUS** by CENTRAL POINT SOFTWARE. The introductory price for **DOUBLE—TAKE** is \$45.00. This includes the program exactly the same as you would buy it at your dealer for \$34.95 (including disk and documentation), and a programmed 27128 EPROM (worth about \$25.00). **COPY][PLUS** cost \$65.00. This includes the original program (worth \$39.95) and two programmed 27128's.

Other programs available directly from us or the publishers are, **BARKOVITCH I/O TRACER** and **SINGLE STEP TRACE**, **MICRO/TYPOGRAPHER** from **TIDBIT SOFTWARE**, **ECHO** speech synthesizer software from **STREET ELECTRONICS**, and **MERLIN** assembler, from **ROGER WAGNER PUBLISHING**. More commercial programs are now in the works.

MEMORY CAPACITY

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

INCREASED DISK CAPACITY

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

ABOUT THE DESIGNER

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

SYSTEM REQUIREMENTS

The **quikLoader** plugs into any slot of the APPLE][+ or //e. If used in a][+, a slightly modified 16K memory card is required in slot 0. A disk drive is required to save data.

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

\$179.50

PROMGRAMER™

The **PROMGRAMER** will read or program any of the standard single-volt EPROMs from the 2708 to the 27512. Features include:

- Slot independent operation for the APPLE // family of computers.
- Zero insertion force sockets accepts 24 or 28 pin devices.
- Disk based software allows easy customization of software.
- Complete instructions for loading software into **quikLoader**.

\$149.50

Beginner's Cookbook

(or)

How to Type in inCider Program Listings

The purpose of these pages is to give beginners the know-how they need to type in and enjoy the programs inCider publishes. It presents information in recipe form, with the number of potentially confusing explanations kept to a minimum.

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. To type in and run inCider's programs, just follow the specific instructions for your computer-operating system combination.

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 to create a startup disk.

ProDOS, version 1.0.2—Apple //c

- 1) Put your System Utilities disk into the internal drive.
- 2) Turn on your monitor or TV set.
- 3) Turn on your computer.
- 4) After the disk-use light goes out and the main System Utilities menu appears, type 6 and hit return.
- 5) At each of the next two menus, type 1 and hit the return key.
- 6) Accept the default volume name by pressing the return key.
- 7) Remove the System Utilities disk from the internal drive.
- 8) Insert the blank, unformatted disk into the drive and hit the return key.
- 9) After about 30 seconds, the message "Formatting. . .Done!" will appear. Hit the escape key.

Although formatted, the disk needs two files—PRODOS and BASIC.SYSTEM, both on the System Utilities disk—to be useful as a place to store programs. To copy them to your programs disk, continue with

the following instructions:

- 10) Type 1 and hit the return key. (Do this three times.)
- 11) Remove your programs disk from the drive and insert the System Utilities disk.
- 12) Type S and hit the return key.
- 13) Press the down-arrow key until PRODOS is highlighted.
- 14) Hit the right-arrow key.
- 15) Hit the down-arrow key until the brackets surround the words BASIC.SYSTEM.
- 16) Hit the right-arrow key, then press the return key.
- 17) When prompted, remove the System Utilities disk and insert your programs disk (the destination disk). Then hit the return key.
- 18) When prompted, remove the programs disk and insert the System Utilities disk (the source disk). Again, hit the return key.
- 19) When prompted, remove the System Utilities disk and insert your programs disk. Hit the return key.
- 20) The message "Copying PRODOS. . .Done!" will appear, followed by "Copying BASIC.SYSTEM. . . ." When prompted, remove the programs disk and insert System Utilities. After that, hit the return key.
- 21) When prompted, remove the System Utilities disk and insert your programs disk. Hit the return key.
- 22) When copying is done, remove the disk, label it "inCider programs disk #1," and turn your computer off.

Note: You can avoid disk swapping if you have an external drive, but, for the sake of uniformity, that method isn't shown here. See page 20 of the *System Utilities Manual*.

ProDOS, version 1.0.1—Apple //e or II Plus with 64K RAM

- 1) Insert the ProDOS User's Disk into drive 1.
- 2) Turn on your monitor or TV set.
- 3) Turn on your computer.

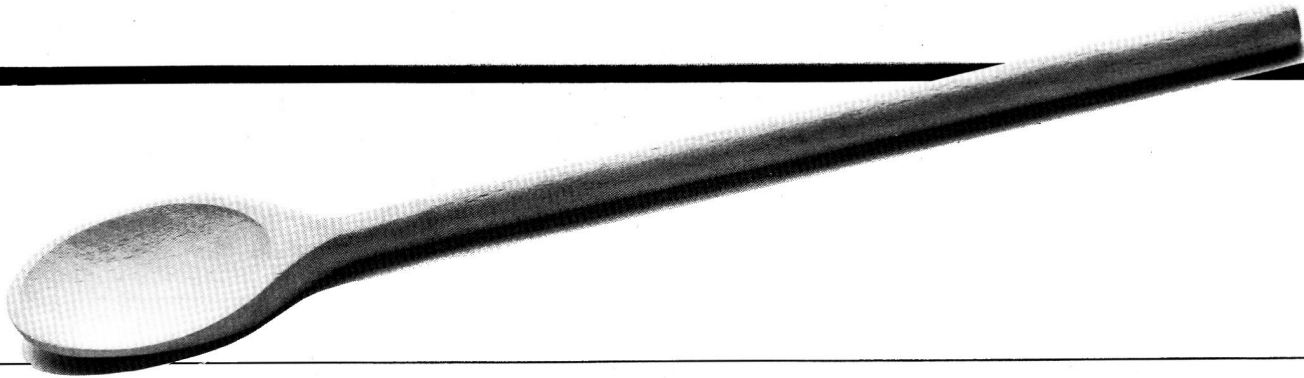
- 4) When the first menu comes up (after the disk stops working), hit the F key.
- 5) At the next menu, tap the V key.
- 6) Hit the F key, then press the return key twice.
- 7) Remove the User's Disk.
- 8) Insert a blank, unformatted disk into drive 1 and hit the return key.
- 9) When formatting is complete, hit the escape key twice.

You now have to copy PRODOS and BASIC.SYSTEM onto your newly formatted disk. To do so, follow these instructions. You should be at the Filer menu.

- 10) Hit the F key, then hit the C key.
- 11) Type PRODOS and hit return.
- 12) Type /BLANK00/PRODOS and hit the return key.
- 13) Remove the formatted disk (your programs disk) from drive 1.
- 14) Insert the User's Disk into drive 1. Now hit the return key.
- 15) At the prompt, remove the User's Disk (the source disk) and insert your programs disk (the destination disk) into drive 1. Hit the return key.

Note: If you have a two-drive system, drive 2 will spin for a while before you get the prompt to insert the destination disk. If you want to take advantage of your second drive in the copying process, see page 80 of the *ProDOS User's Manual*.

- 16) When you see the "Copy Complete" message, type in BASIC.SYSTEM and press the return key.
- 17) Type in /BLANK00/BASIC.SYSTEM and hit the return key.
- 18) Remove your programs disk from the drive and insert the User's Disk. Now hit the return key.
- 19) At the prompt, remove the User's Disk and insert your programs disk. Hit the return key.
- 20) When copying is complete, remove the programs disk, label it



"inCider programs disk #1," and turn off your computer.

DOS 3.3—Apple II Series

- 1) Insert the DOS 3.3 System Master disk into drive 1.
- 2) Turn on your monitor or TV and your computer.
- 3) If you have a //e, make sure the caps lock key is down.
- 4) When the disk stops and the Applesoft prompt "]" appears, type in NEW and hit the return key.
- 5) Type in 10 HOME and hit return.
- 6) Remove the System Master disk from drive 1 and insert a blank, unformatted disk there.
- 7) Type in INIT HELLO and press the return key.
- 8) When the disk stops working and the cursor appears, remove the disk from the drive, label it "inCider programs disk #1," and turn your computer off.

TYPING IN APPLESOFT BASIC PROGRAMS

Instructions for typing in BASIC programs can't be as detailed as the instructions for formatting a disk because every program is different. In general, however, you should follow the guidelines given below.

- 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 prompt "]" appears near the upper-left corner of the screen. At this point, type in NEW and press return.
- 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 return.

- 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 filename (where filename is the name of the program) and press return.

- Since the program is still in (RAM) 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 filename 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.

- To check your typing before you save the listing, type in the starting address of the program and hit the return key. Hitting it again produces the rest of the first program line on the screen. Subsequent returns make additional program lines appear for your inspection. If any line requires changing, just retype that line, being sure to include the address, and using a colon in place of the minus sign.

- Once the entire listing is correct, you have to save it. First, type in 3DOG and hit the return key to return to the Applesoft prompt.

- Now type BSAVE filename.Aa,Ll (where a is the starting address of the routine and l is the length). If these are hexadecimal instead of decimal values, then 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*. Consult your manuals for more detailed information. ■

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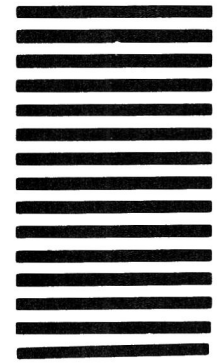
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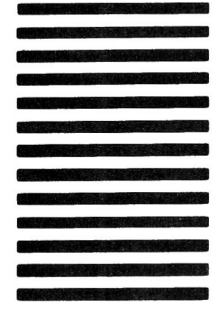
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Game Ratings



With this column, the *Warden* comes out from behind his mosquito netting. Disguised as a mild-mannered civil servant, Brian J. Murphy has managed the *Game Reserve* for the past ten episodes. Brian is a regular contributor to all major computer magazines, a nationally syndicated columnist, and author of the gaming book *Sorcerers & Soldiers*.

Each month Brian will review, in his own inimitable style, six to eight of the most recent Apple games to hit the market. Look here for inCider's scoop on the latest in computer fun.

The Hitchhiker's Guide to the Galaxy



Infocom
55 Wheeler Street
Cambridge, MA 02138
\$39.95
Any Apple II, 48K

Is *Hitchhiker's Guide to the Galaxy* the best game ever produced by Infocom? While not as challenging or difficult as some of their offerings, it is their most entertaining, funny,

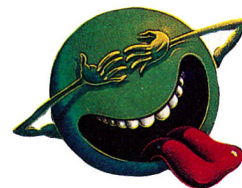
and devious. And that is no small achievement.

Hitchhiker's Guide to the Galaxy is based on a four-book "trilogy" by former Monty Python gag-writer Douglas Adams. Besides being the funniest Englishman to put pen to paper since P.G. Wodehouse, he is an astute student of science fiction. His books, aside from being excessively hilarious (and astoundingly remunerative) are satires of the whole science-fiction genre.

Adams, with Steve Meretzky of Infocom, set out to write an adventure game

based on the books. They wound up writing an adventure game that is itself a satire on adventure games. It's also a satire on Adams' books, people that play games, the universe, and anything else you can think of.

I have to warn you that *Hitchhiker* is not like other Infocom adventures. Sure, it's an all-text game. Sure, the command syntax is sophisticated. The cache of what one gaming friend of mine likes to call "neat stuff" that comes with the game is even better than usual. And yes, it's tricky, difficult, challenging, en-



tertaining, and maddeningly hard to solve. But there's a twist.

You can't take *Hitchhiker* at face value. There is something odd about it. You can't always believe what it tells you. To be blunt, this game tells lies.

What do I mean by that? When another Infocom game, like one of the *Zorks*, tells you that there are exits to the north and west, and that there is a large, angry-looking animal in the room with you, you believe it, right? In *Hitchhiker's Guide*, there may in fact be only one exit and no animal at all, no matter what the screen says. And there is always the possibility of no warning when you're in terrible danger.

The result of this duplicity is unbridled hilarity. Few computer games can make me laugh out loud, but this one does. Take my advice and become Arthur Dent, an inadequately-dressed Earthman, and follow Ford Prefect (from *Betelgeuse*, a giant red star in the constellation Orion) into one improbable fix after another.

Together, Arthur and Ford escape the destruction of the Earth by Vogons, ride in the first




by **Brian J. Murphy**

starship powered by Infinite Improbability, meet Trillian, a nuclear physicist turned outer-space sex symbol, and go adventuring with Zaphod Beeblebrox, the two-headed president of the Galaxy.

Some cryptic hints for beginners: Arthur looks nice in a gown, junk mail isn't always a bad thing, and learn to enjoy Vogon poetry. Bottoms up, and good luck!

Monty Plays Scrabble


 Ritam Corporation
 P.O. Box 921
 Fairfield, IA 52556
 \$39.95
 Any Apple II, 48K

Nearly everyone who has heard of Scrabble sooner or later winds up playing it. Considerate, thoughtful Monty is here to help you with **Monty Plays Scrabble**, a full-color simulation of the board game for up to three players.

Is turning over all those tiles a bore? Monty does it automatically and assigns letters at random. If you want to cheat, Monty will oblige by letting you pick your own letters. If you're having trouble keeping

score, don't worry—Monty does that automatically and never misses, even when you land on a double-letter or triple-word. They're all right there on the hi-res Scrabble board (**Photo 1**).

Want to know if "foozque" is a word? Monty checks it against his extensive dictionary. If your Webster's disagrees with his finding, Monty will let you correct him and take the credit for the word. He'll also defer if he comes up with an illegal word and you catch him.

Finally, if there's no one else around to play with, you can always play against Monty. He's a formidable opponent, skilled on four user-selectable levels. He takes his own sweet time to find the most devastating combination of letters to lay on the maximum number of bonus squares. Thank goodness you can rush him by hitting escape.

Monty Plays Scrabble is a little gem. It is well-designed, attractive, and amazingly easy to learn. It is a very faithful simulation of the actual board game, recreating the authentic feel of a Scrabble session without any of the hassles or headaches—unless you decide not to cheat!

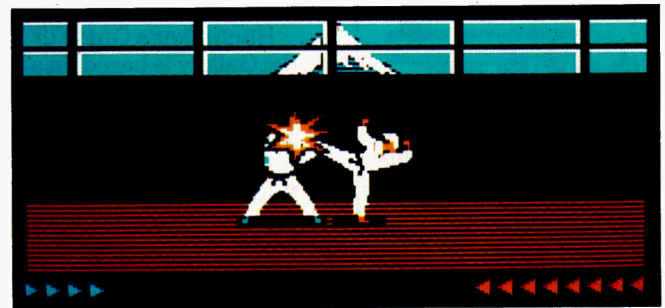



Photo 2. *Karateka* features fast, smooth animation.

Karateka


 Broderbund Software
 17 Paul Drive
 San Rafael, CA 94903
 \$34.95
 Any Apple II, 48K
 Joystick optional

Around here, Saturday is low-budget martial-arts movie day on local television. It's a day to watch actors you've never heard of kick, chop, and bludgeon the tar out of each other. The sound effects make each blow sound like an oak tree snapping in a tornado.

For martial arts realism, I prefer **Karateka**, a new hi-res arcade game from Broderbund. I'll go out on a limb and predict that by the time you read this, *Karateka* will be making the same kind of impression in the marketplace that *Choplifter* did a couple of years ago.

The premise of the game is simplicity itself. You control, with a joystick and fire buttons, the actions of a martial arts warrior who invades the palace of the evil warlord Akuma. Akuma's guards—also martial art-

ists—try to stop you. You must defeat them with kicks and chops to the head, mid-section, and legs, all the time backpedaling from their blows. Then hurry deep into the palace to rescue the Princess Mariko. Of course, to call your hero a martial arts master is premature until you master the art of computer karate.

Thanks to skillful animation, the fighting seems very real—like the basketball playing in *Electronic Arts' One-on-One*. The enemies (**Photo 2**), controlled by the computer, are good fighters who offer a spirited battle. Part of the fun is learning to adapt to their differing styles.

Visually, the game is a delight, with superbly-drawn graphics and very smooth animation. The action breaks from time to time for views of Akuma's lair and Mariko's cell. This plot exposition gives the game a movie-like quality.

Karateka is one of the few new arcade games that meets all the requirements of an increasingly sophisticated and demanding audience. The game is beautiful, technically interesting, cinematic, addictive, exciting, and very hard to win.

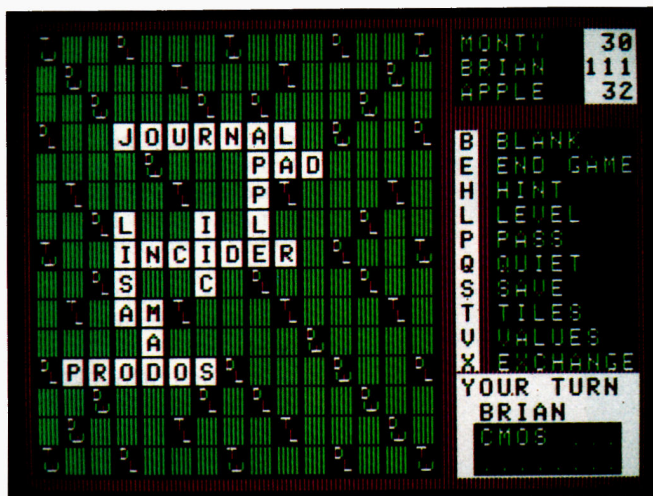


Photo 1. *Monty Plays Scrabble* any time you're ready.

Seven Cities of Gold



Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
\$40
Any Apple II, 64K
Joystick required

Electronic Arts' **Seven Cities of Gold** is a full-color, animated role-playing re-creation of the days of Columbus, Pizarro, and Cortez. The game involves locating new rivers and their sources, contacting natives, establishing forts and missions, and above all, finding gold.

You start in Europe, with a supply of gold to buy ships, food, and trade goods and to hire a crew (**Photo 3**). Each of these is important, but none more than food. Be sure to start with enough ships to carry an abundant supply, and watch consumption carefully.

Once you hit the New World (not too hard—you could run aground) the game really begins. In order to explore, you assemble a party, ration out sufficient food, and allocate goods for trade with the natives. As you explore, continue to watch your food supply, and avoid marshes and swamps that will slow your speed but not your food consumption.

When you arrive at a settlement, natives will press in from all sides. By pacing and posturing yourself correctly (and perhaps by offering gifts or performing a little technological magic—15th-century style) you can avoid a violent encounter. The chief might honor you with native bearers and food for your expedition, as well as trade gold for those glass beads you've been schlepping through the jungle. In return, you

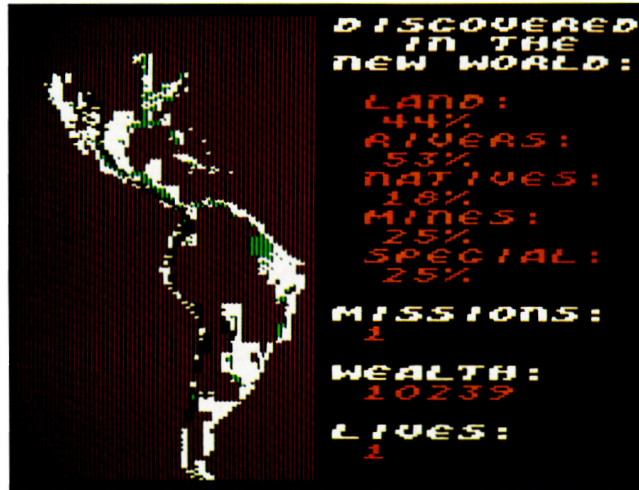


Photo 3. Expedition summary from *Seven Cities of Gold*.

can build a mission or a fort that may please the natives and will definitely make you look good to the King.

The rest of the game, after dealing with the natives, is actual exploration. You must find the mines, rivers, high mountains, great lakes, and lush forests of the New World. If you've worked things out with the natives, this kind of expedition can be virtually self-sustaining, with food to be had at native villages and towns all along the way.

Seven Cities of Gold is pure joy. On the technical end, the hi-res color graphics are excellent and remind me a little of the *Ultima* series. The animation is good, with figures responding briskly to joystick commands. As entertainment, this is a superb game with plenty of challenge and amazingly subtle nuances of play that require a high level of strategic and tactical thinking.

An attractive feature of *Seven Cities* is its ability to generate "random" new worlds to explore. Your world will be based on real principles of plate tectonics and cultural development. As thrilling as it is to relive history, it's even more fun to explore truly unknown lands.

This "entertainment" package is, without doubt, one of the best educational games I've seen. *Seven Cities of Gold* really re-creates exploration and conquest as the Spaniards must have known it more than four centuries ago. This game will engross history students from grade four on up, and will teach them more than most textbooks.

King's Quest



Sierra On-Line
P.O. Box 485
Coarsegold, CA 93614
\$49.95
Apple //c and //e, 128K,
double hi-res
Joystick recommended

It had to happen sooner or later after the Apple //c appeared—the first 128K game. It's here, and its name is **King's Quest**, a full-color, illustrated adventure from Sierra On-Line.

If your experience with Sierra is limited to games like *Cranston Manor* and *Time Zone*, the high-quality graphics and real animation of *King's Quest* will come as a pleasant surprise; they are easily

up to the industry standard. The double hi-res color is very sophisticated, with natural perspective and a clever three-dimensional effect. Animation, such as flags fluttering from castle battlements and animals moving about, is used to create ambience. It is also used at the heart of the game to control the movements of the main character, Sir Graham. He can walk in eight directions, as well as swim and jump.

For climbing, opening, examining, and so forth, you type in commands. The command syntax has been improved to meet the industry standard set by Infocom—or, shall we say, to meet that standard halfway. In previous Sierra games, typical commands looked like TALK GNOME, PUSH ROCK, and GET SACK. *Quest* will accept simple sentences like TALK TO THE GNOME, PUSH THE MOSSY ROCK, and GET THE TATTERED SACK.

As for the game itself, it's a tricky, difficult, and dangerous puzzle, with all the stumpers you expect



to encounter in a Sierra illustrated adventure. The idea is to find three magic items: a mirror, a shield, and a treasure chest. In the first few hours, I went through all the usual paces, like making a map, solving the easy puzzles, and finding a couple of significant clues. What surprised me was how far I *hadn't* gotten after all that time. *King's Quest* doesn't yield its secrets easily.

A few hints to get you started: Your character can swim (by pressing the open-apple key), but not in all waters, so beware. Read Hansel and Gretel. Don't stand in front of things that can crush you. Put away a little nest egg. Diamonds are an adventurer's best friend. The moat is there for a reason. There's a rocky way over one river.

Star Trek

◆
 Sega
 360 North Sepulveda Boulevard
 Suite 3000
 El Segundo, CA 90245
 \$35
 Any Apple II, 48K
 Joystick recommended

I wonder if I expect too much from software. After all, a mere computer game can't match the wonders of a Hollywood epic. On the other hand, at better than \$30 apiece, you're paying more for a game than for a ticket to the movie it's based on. Thus, a few well-chosen words on **Star Trek**, the Apple version of the official arcade spin-off from the TV and movie series.

Star Trek is a hard game to master, and even harder to win. You play on a three-sector screen with an overhead radar view of

nearby space, a gunsight facing forward, and a display detailing shield level, warp power, and photon torpedoes.

Using a joystick, you maneuver the Enterprise according to the overhead display, and fire torpedoes and phasers (you have unlimited phaser power) with the 0 and 1 buttons. All the while, red Klingons bore in after your star bases, and purple Klingons pursue the Enterprise. The Klingons also fly nimble anti-matter saucers that attach themselves to the Enterprise and drain her warp energy. You can restore that energy and add to your shield level and torpedo count by docking with a star base (only one docking per base).

The more Klingons you shoot down, the more the game throws at you until you encounter NOMAD. If you remember the TV episode where that robot probe appeared as the heavy, you'll recall that it's one deadly customer. You have to beat NOMAD to progress to the next, more difficult level of play.

So much for describing the action. Advertising for Star Trek represents it as a "strategic operations simulator." Baloney. There's no more strategy here than in any other space shoot-'em-up. I can think of plenty of other space games—arcade and strat-

egy—that are more exciting than this incredibly average offering.

Also, the graphics and animation are unattractive. The overhead radar display is little more than a collection of colored dots, and the gunsight display and animation fail to be convincing. Finally, the display does not appear three-dimensional, even though space is.

Enough is enough. Sega's Star Trek is a game that would not have attracted notice without its highly recognizable name. Trekkies playing this "simulation" will conclude that Sega hired Klingon programmers to write it.

Tapper

◆◆◆
 Sega
 360 North Sepulveda Boulevard
 Suite 3000
 El Segundo, CA 90245
 \$35
 Any Apple II, 48K
 Joystick recommended

If all you expect from software is a little light-hearted fun, then you won't be disappointed by another Sega offering called **Tapper**. In this home version of an arcade game, you control a minuscule bartender (**Photo 4**), who struggles to keep

up with the demands of an odd clientele.

In four different bar-rooms, you serve mugs of what I assume is root beer (not "Hires" root beer, but "hi-res," I suspect), sliding them down the bar to thirsty patrons. You lose if a patron slides an empty mug back that you fail to catch, or if patrons move to the end of the bar without receiving their frothy refreshment. Then *they* slide *you* down the bar.

My favorite part of the game is the bonus screen (**Photo 5**), dominated by a huge ad for Mountain Dew. There are six cans of soda arrayed before you, and the bartender's helper shakes up five of them. Then he switches them all around a la the old shell game. Now you must choose the unshaken can. If your choice is all wet, you will be too when you pop the lid.

No, this isn't the arcade equivalent of *War and Peace*, but it's a little off-beat and a lot of fun. The graphics are good, the play is swift and challenging, and the commercialism is outrageously overt. Tapper makes up for Star Trek, so Sega is batting .500. ■

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.



Photo 4. Customers can get pushy in Tapper.



Photo 5. Tapper updates the shell game.

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

VisiPlot Dumps

I have an Apple II Plus, an Epson MX-100 printer with Grafrax Plus, and an Apple II interface board for Epson in slot 1. I've used a friend's Visi-Trend/Plot program and am very satisfied with the charts and graphs I can create on my Apple Monitor III screen, but I'm unable to print hard copies. My friend has the same equipment I have, except his printer is supported by VisiPlot software, whereas my Epson isn't. I feel that there must be something that I can buy (short of a different printer), or something that I can do, to be able to print the VisiPlot-generated charts on my Epson. You'd be surprised at the variety of answers and reactions I've received. They've ranged from, "It can't be done," to recommendations that are incomprehensible to me or simply too expensive. Can you help me?

William L. Bull
Houston, TX

This solution may or may not be too expensive for you, but there is a class of printer interface cards that let you dump whatever is on your screen to your printer at the push of a button. Pressing the button generates a non-maskable interrupt and accomplishes the printer dump, regardless of what software is controlling the Apple at a given moment. An example of this class of interface cards is the Print-it card (\$199) from Textprint. Another is the Fingerprint card (\$149) from Thirdware Computer Products, formerly Precision Software. (See the review, inCider, October 1984, p. 131.) If that's too expensive and your main

objective is charts and graphs, maybe you should look at the \$29.95 Masterchart program from Spectral Graphics Software.

Disk Cable Clamp

I recently purchased a compatible disk drive for my Apple IIe. It didn't include a clamp that attaches the cable to the back of the computer. Is there any place where I can purchase the clamp? Thank you for your help in finding the part. Much aloha.

Dean Sumida
Kealakekua, HI

The primary function of the cable clamp is to reduce RFI (radio frequency interference) emission. The clamp isn't included with most alternate-source drives, but you can order one (Apple part number 805-0115-B) through your Apple dealer. For the clamp to be effective at reducing RFI emission, the disk cable must be shielded and have a little grounding flap near one end. You can purchase this type of cable from your dealer if your drive isn't equipped with one. Cable replacement is easily accomplished after removing the drive cover. Apple also produces a little cable clamp installation pamphlet (part number 030-0455).

65C02 in the Apple II

I've read that the 65C02 processor used in the Apple IIc is plug-compatible with earlier Apple models. I have a 65C02, but am loath to plug it into my IIe without consulting the experts prior to frying my machine. Can you tell me if it actually is plug-compatible, and what the implications of the change might be? I can imagine that it would speed up everything, including some of the games my kids like to play. This could be annoying, though, if the change had other implications not

envisioned by non-technical persons like me.

Also, how much extra memory can be added to an Apple IIe? I understand that 128K is easy. Have you done reviews of the RAM boards sold independently and the problems associated with using extra memory with a variety of software and RAM disks? If so, please send me copies of the articles. I'll be happy to find out if there is any reason to try to upgrade.

David H. Miller
Princeton, NJ

Plug your 65C02 right in there, David; it won't hurt a thing. The 65C02 is pin-compatible with the 6502, draws less power, executes more instructions in more addressing modes, and lacks some of the bugs present in a 6502. It works great in an Apple IIe, but won't automatically speed up your old programs. Your only immediate benefit will probably be a decreased load on the +5 volt power supply. (Feel for yourself, after you turn the machine off to avoid static damage; the 6502 runs much warmer to the touch than the 65C02.)

You should eventually get some added benefits from using the 65C02 in your Apple IIe. Programs that use the extended-instruction repertoire of the 65C02 occupy less space than and operate faster than equivalent 6502 programs. It's reasonable to assume that such programs will become more and more prevalent as the 65C02 gains acceptance as the Apple IIe microprocessor. Although they haven't made the official announcement as I write this, by the time this issue of inCider hits the street, it appears that Apple will be shipping new Apple IIe's installed with 65C02s.

While the 65C02 operates without a hitch in the Apple IIe, it has problems operating in an Apple II or II Plus. I believe this is because moth-

by Jim Sather

erboard RAM-read data is set up far later in relation to the 6502 PHASE 2 clock in the Apple II than in the Apple IIe. In my own experiments, two NCR and one GTE 2-MHz 65C02s wouldn't operate correctly in an Apple II with all peripheral slots occupied. However, a Rockwell 1-MHz 65C02 operates in the same machine without a hitch. This may mean only that my Rockwell chip is very tolerant, or it might mean that Rockwell 65C02s generally work better in the Apple II than NCR and GTE 65C02s do.

I make no specific recommendation for a RAM card purchase, but do offer some guidelines for evaluating a card you're thinking of purchasing. Like most hardware, RAM cards are useless without software support. Next to RAM capacity, the two most important features of a RAM card are compatibility with popular software and the quality of the software that comes with the card. A number of popular programs, including some spreadsheets, word processors, and fast disk-copying programs, search the peripheral slots for RAM cards and use them for data storage. Try to determine that such programs can actually locate the RAM card you are considering. Some RAM cards come with their own software support, such as disk emulators and fast disk-copying software. Shop around. inCider has not run any RAM-card reviews because the RAM card is a simple device that either works or it doesn't in your system. However, the ads in inCider and other computer magazines will tell you what you get with a given RAM card. For example, see page 35 of the January 1985 inCider for a descriptive ad of a good-looking RAM card.

Data Dinger

I own an Apple II Plus equipped with a 16K RAM card and a Kensington System Saver. My problem is that intermittently, while I'm in the middle of running a program, the screen will flicker briefly and strange characters appear randomly on the screen. At the same time, the keyboard either doesn't accept any response at all or, if it does, I find myself in the monitor. At that

"The key words for fixing a rickety motherboard are wiggle, flex, and dealer."

point, I have to reboot and start whatever I was working on all over again.

What is maddening is that the problem occurs inconsistently. It will sometimes happen two or three times at a sitting, and other times I can use it for weeks with no problem. Can you help me?

John Clatanoff
Andover, MA

That sounds just like my Apple II Plus, except I'm sure mine is in much worse shape. I've abused that motherboard for four years now, modifying it, plugging cards in backwards, shorting out pins while poking around with an oscilloscope probe, and just plain horsing around with it. It's now about as reliable as my 1972 Nova. And just so you don't get the wrong impression from that last statement, my wife and other sensible people wouldn't be caught dead in the Nova. Believe me, John, I know what it's like when an unreliable computer trashes your data.

I also know exactly what to do with my rickety motherboard. I'm going to set aside a weekend to do nothing but find all the bugs. I'll make the bugs appear by flexing the motherboard and wiggling the chips. I know all the places to wiggle because I wiggle them now to make it work. As I make the problems appear, I'll trace them out with an oscilloscope and multimeter and fix them. If I haven't fixed all the problems after a weekend, I'll take the motherboard to a dealer and swap it for one that works. When that weekend has come and gone, you'll read about it in this column.

In reading about my own good intentions, you should get a hint of my

recommendation for you, John. The key words are wiggle, flex, and dealer. Your problem is intermittent program crashing and its probable cause is marginal electrical contact somewhere on the motherboard or on a peripheral card. The three places where marginal electrical contact is likely to occur in an Apple II Plus are at IC pin/socket junctions, at the peripheral slots, and at the solder joints of motherboard components. Sometimes marginal contact is recurring and only a repair action, such as resoldering a poor solder joint or replacing a faulty part, can eliminate it. Other times a little educated wiggling can permanently eliminate marginal contact. So, what I think you should do, John, is get smart and start wiggling.

First, turn the computer on and remove the cover. With all metallic objects removed from your fingers, hand, and wrist, reach in and gently wiggle the peripheral cards from side to side. Don't remove or reseat peripheral cards with power applied, though. Gently flex the motherboard by applying pressure at different points. If you're rewarded with a program crash, wiggle ICs (being sure to touch the power supply first to get rid of any static charges) and peripheral cards in the area that seems to be causing the problem. Turn off the power and reseat any IC or peripheral card that you have identified as a problem. It's actually possible to permanently repair a casualty by reseating an IC, although socket replacement may well be required.

With the power cord disconnected, remove all peripheral cards and examine the contacts on their edge connectors for dirt or anything that could cause marginal contact. Cards with tin-plated contacts are much more likely to cause problems than those with gold-plated contacts. Using alcohol and cotton swabs, clean all the contacts, whether you think they're dirty or not. Avoid touching the contacts with your fingers.

With the peripheral cards still removed, use a small flat-bladed screwdriver to slightly unseat all motherboard ICs from their sockets. Just stick the screwdriver between each IC and its socket and twist the

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screwdriver a little so the IC moves just slightly. After unseating an IC, push it back in as gently as possible, so you don't flex the motherboard more than is necessary. Finally, reinstall the peripheral cards and apply power to make sure everything is in working order. Use your Apple II Plus as carefully as you did when you knew it was unreliable. If your programs still crash, take your motherboard to a dealer that employs an experienced Apple technician and make the tech earn his paycheck.

If perchance your wiggling bears fruit and you transform your data dinger into old reliable, be sure and drop a line to the Apple Clinic so other readers can share your experience. Besides, I'm going to get a free weekend one of these months, and I might need a tip or two myself.

The Cubic 99

A new computer called the Cubic 99 was recently released for sale in Singapore, and it was produced and designed by a group of Singaporeans. It's 70-80 percent Apple compatible and has many features not found in the Apple //e or //c. For example, it has built-in interfaces for a light pen, modem, graphics tablet, and others. It was selling like hot cakes in Singapore when it was exhibited at PerComp Asia '84.

What I like most are the 16 multipages of hi-res graphics and the "talking BASIC" ability. It can talk in English and Mandarin, and its graphics are superb. I really envy my friends who bought the computer. I know that the Apple //e has two pages of hi-res and would like to know if it can display multipages of hi-res by adding hardware? Also, what are the advantages or benefits of multipages of hi-res and double hi-res?

Michael Lim
Singapore

The Cubic 99 sounds like a pretty nice machine, but does 70-80 percent compatibility mean that it won't run 25 percent of the software written for the Apple //e? That would be a lot to sacrifice. In any case, it's good to hear of advanced Apple IIs

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being marketed, even if not by Apple Computer.

The advantage of multiple hi-res pages is that a number of hi-res displays can be set up and then switched in as needed by a program. An Apple II can accomplish the same thing by transferring a hi-res map to a display area (\$2000-\$3FF7 or \$4000-\$5FF7), then selecting that area for display with the PAGE1/PAGE2 soft switch. Of course, this is far slower than switching in a computer that uses multiple hi-res pages.

Circuitry in the input/output unit chip determines the areas of memory that are scanned for display in the Apple //e and //c. It would be

quite easy for Apple to redesign the IOU so that one or two of the annunciators selected between multiple display pages, but it's unlikely that Apple intends to do any such thing. If an Apple //e user wanted multiple display pages very badly and was willing to modify his computer, he could open one or more of the RA5, RA6, and RA7 inputs to the RAM chips and auxiliary slot, then install TTL circuitry that selected between multiple pages. Such circuitry would use one or two annunciators for page selection during PHASE 1 while RAS' is low. I know of no one who has attempted such a modification. Multiple hi-res pages unsupported by commercial software are probably not worth the effort involved.

KX-P1090 Printer Control

My school has an Apple //e computer and a Panasonic KX-P1090 printer. I'm a teacher and need extra-heavy print at times. Can you tell me how to make the KX-P1090 double-strike? Also, I'm looking for a program called Burgertime to run on an Apple //e. Could you tell me who makes it and the price? Thanks.

Gail Lutz
Munich, ND

The KX-P1090 has control characteristics similar to Epson printers. Please see "The Docile Printer" by James B. Munro (inCider, February 1985, p. 75) for a valuable description of printer control. After you've read the article, the information in your KX-P1090 manual should be much more meaningful. As to your specific question, the accompanying BASIC Program listing illustrates the setting and clearing of emphasis mode and double-strike mode on the KX-P1090.

Burgertime costs \$17.50 and is published by Mattel Electronics. ■

Program listing. Some printer commands for the KX-P1090.

```
10 PRINT CHR$(27);"E"; : PRINT "ESC-E SETS EMPHASIS MODE"
20 PRINT CHR$(27);"F"; : PRINT "ESC-F CLEARS EMPHASIS MODE"
30 PRINT CHR$(27);"G"; : PRINT "ESC-G SETS DOUBLE STRIKE MODE"
40 PRINT CHR$(27);"H"; : PRINT "ESC-H CLEARS DOUBLE STRIKE MODE"
```


HINTS 'N' TECHNIQUES

Apple users know that there's always an easier way to get the job done. A shortcut here, an elegant little twist there. That's what Hints 'n' Techniques is all about. It's a technical information swap for readers who want to share their programming pointers, DOS tips, hardware secrets, and all those other little 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.

Keyboard Conversions

by Moshe Braner

If you always wanted a numeric keypad, but couldn't justify the expense, Keypad offers the software solution. Since the 7, 8, and 9 keys are already next to each other, you only need to change the U key to 4, the I key to 5, and so on. While you're at it, wouldn't it be nice if you could type the +, *, and ? without using the shift key? That would make the Apple's calculator mode easier, but you might want to reassign the keys in another way. It's all a matter of character conversions. You could even do it in BASIC using the GET command, but that can be awkward and slow.

Enter Keypad, a better way to reassign keys. For comparison, IN#2 tells the Apple to take input from the interface card in slot 2, and what actually happens is that it gathers characters using the machine-language routine at hexadecimal address \$C200. Similarly, you can direct DOS to take input from any address where an appropriate machine-language routine resides.

The Keypad routine takes input from the keyboard and processes the information before passing it along to the program that requested the input.

Keypad doesn't clutter up your BASIC programs. Instead, it works in immediate mode with existing programs. When you activate Keypad, some keys will display new characters. (See the **Table** for a list of keyboard conversions.)

Keypad runs on the Apple II Plus or the //e. On the //e, as seen in the **Table**, use lowercase letters for the numeric entry. This leaves you in control of the Apple's uppercase. Also, the delete key gives a control-X, which in DOS cancels the whole line making it convenient to retype a command line.

CALL 640 activates Keypad and CALL 651 deactivates it. (See the example program in **Listing 1**.) In immediate mode, you can press control-reset to return to the normal keyboard configuration.

Technical Notes

To minimize memory conflict with existing software, Keypad is located inside the input buffer area, where input operations do not affect it as long as input lines are shorter than 128 characters. To ensure proper operation, check Keypad prior to using it, and reload it if necessary. (See line 30 in the example program; you must BRUN KEYPAD instead of BLOADing it.) It configures itself according to the computer type.

To get Keypad on your disk, follow the procedure in Beginner's Cookbook, page 110.

Alternatively, enter the BASIC program in **Listing 3** to POKE the machine-language routine when you run it.

Once Keypad is in RAM, save it on disk by typing:

```
BSAVE KEYPAD,A,$273,L,$6D
```

When you're finished, all you have to do is affix labels to the keys that have dual functions. ■

Address correspondence to Moshe Braner, 69 Ringwood Road, Freeville, NY 13068.

Table. Keyboard conversions.

II Plus Original Character	//e	Resulting Numeric
M	m	0
J	j	1
K	k	2
L	l	3
U	u	4
I	i	5
O	o	6
P	p	?
:		+
;	;	*
,	,	.
	Delete	Control-X

Listing 1. Example program.

```
5 PRINT CHR$(4);"BRUN KEYPAD"  
10 PRINT "ENTER NUMBER, USING  
USUAL KEYBOARD:"  
20 PRINT : INPUT "":A : PRINT  
30 IF PEEK(639)< >96 THEN PRINT  
CHR$(4);"BRUN KEYPAD"  
40 PRINT "ENTER USING NUMERIC  
PAD:"  
50 CALL 640 : REM KEYPAD ACTIVE  
60 PRINT : INPUT "":A : PRINT  
70 CALL 651 : REM NORMAL  
KEYBOARD
```

Listing 2. Keypad.

```
0273- AD 83 FD C9 DF  
0278- D0 05 A9 B0 8D 9F 02 60  
0280- A9 96 85 38 A9 02 85 39  
0288- 4C EA 03 A9 1B 85 38 A9  
0290- FD 85 39 4C EA 03 20 1B  
0298- FD 8C AF 02 A0 0F D9 D0  
02A0- 02 F0 05 88 10 F8 30 03  
02A8- B9 C0 02 AC AF 02 60 00  
02B0- CD CA CB CC D5 C9 CF D0  
02B8- BA BB AC 98 A1 A3 A5 C0  
02C0- B0 B1 B2 B3 B4 B5 B6 BF  
02C8- AA AB AE 98 A1 A3 A5 C0  
02D0- ED EA EB EC F5 E9 EF F0  
02D8- BB DB AC FF A1 A3 A5 C0
```




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HINTS 'N' TECHNIQUES

Listing 3. Keypad BASIC program.

```

10 FOR A = 627 TO 735
20 READ C: POKE A,C
30 NEXT
40 DATA 173,131,253,201,223,208,5,169,176,141,159,2
45 DATA 96,169,150,133,56,169,2,133,57,76,234,3
50 DATA 169,27,133,56,169,253,133,57,76,234,3,32
55 DATA 27,253,140,175,2,160,15,217,208,2,240,5
60 DATA 136,16,248,48,3,185,192,2,172,175,2,96,15,205
65 DATA 202,203,204,213,201,207,208,186,187,172,152,161
70 DATA 163,165,192,176,177,178,179,180,181,182,191,170
75 DATA 171,174,152,161,163,165,192,237,234,235,236,245
80 DATA 233,239,240,187,219,172,255,161,163,165,192
    
```

Cursor Creativity

by George Tylutki

Some programs use an underline cursor or a non-blinking cursor; others change the rate of speed at which the cursor blinks. With a few simple POKES, you can modify the Videx Videoterm cursor to do these things (and more).

The CRT controller chip on the Videoterm board has 18 registers. We're concerned only with R10 (cursor start—the top of the cursor) and R11 (cursor end—the bottom of the cursor). The cursor is nine rows high. By modifying the value in R10, you can change the vertical size of the cursor, making it shorter until it becomes an underscore, a single row of dots. Modify the value in R11 to make the cursor an overscore.

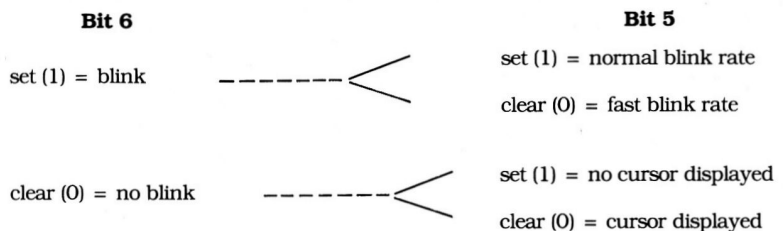
To modify the cursor, place the proper register number and row number into the appropriate memory location. Address Videoterm at 49328

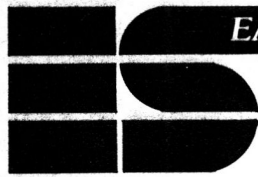
(\$COB0) if it is in slot 3, 49344 (\$COCO) for slot 4, 49630 (\$COD0) for slot 5, and so on. POKE 49328 with the register number to get the Videoterm's attention and then POKE 49329 with the value you want to place in the register.

R10 is a 7-bit register and R11 a 5-bit register. Both are write-only registers and use bits 0-4 to determine the cursor row value. Bits 5 and 6 of R10 determine whether a cursor is displayed, whether it blinks or is solid, and whether it blinks quickly or slowly. (See the **Figure**.) Thus, you can have invisible and solid cursors and two blinking speeds. Placing values from zero to eight in R10 results in non-blinking cursors; 96 to 104, normally blinking cursors; and 64 to 72, fast-blinking cursors—all of various sizes. You can place values from zero to eight in R11, but the row number in R11 should be greater than or equal to the number in R10.

POKE 49328,10 (register number) and POKE 49329,64 (value) to make a full-size, fast-blinking cursor. POKE 49328,10: POKE 49329,72 to make an underline, fast-blinking cursor. If you don't modify R10, but POKE 49328,11:

Figure. Register 10.





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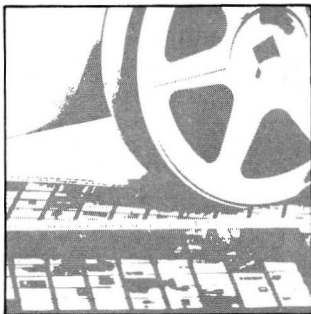
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POKE 49329,1, you will have a normally blinking overscore cursor. **Listing 4** demonstrates how to modify the two registers to produce nine different cursors.

A modified cursor stays active as long as the computer remains on, even in the monitor and after switching from 80 columns to 40 columns and back again. Pressing the reset key or issuing a PR# or IN# command won't necessarily revert the cursor to normal. If you set up a reset vector to jump to a memory location that reinitializes the Videoterm, or if PR# or IN# brings in a program that reinitializes the Videoterm, then the modified cursor is lost.

Why change the cursor? You could use one kind of cursor in the data-entry

portion of your programs and use a different cursor for the data-editing portion. You may find a smaller or non-blinking cursor more aesthetically pleasing. Changing the cursor may give you a feeling of power. Or maybe you just like to fiddle around investigating the nooks and crannies of your computer. ■

Write to George Tylutki at P.O. Box 73, La Plume, PA 18440.

Got a hint of your own? inCider would like to see it. If we can use it in Hints 'n' Techniques, we'll buy it from you. Send your tip to: inCider, 80 Pine Street, Peterborough, NH 03458.

Listing 4. Videoterm cursor modification.

```

2 REM Videoterm Cursor Modifier
3 REM G. Tylutki
4 REM
5 D$ = CHR$(13) + CHR$(4)
10 HO$ = CHR$(12): REM VIDEX HOME
15 NL$ = CHR$(14): REM VIDEX NORMAL
20 A1 = 49328:A2 = 49329: REM VIDEX ADDRESSES
25 PRINT D$;"PR#3": PRINT HO$ + NL$: PRINT : PRINT
30 PRINT TAB(30)"1--Full cursor/normal blink": PRINT
  TAB(30)"2--Full cursor/fast blink": PRINT TAB(
  30)"3--Full cursor/no blink"
35 PRINT TAB(30)"4--Underscore cursor/blink": PRINT
  TAB(30)"5--Underscore cursor/no blink": PRINT TAB(
  30)"6--Overscore cursor/blink": PRINT TAB(30)"7
  --Overscore cursor/no blink"
40 PRINT TAB(30)"8--Half-size cursor/blink": PRINT
  TAB(30)"9--Half-size cursor/no blink": PRINT TAB(
  30)"Q--QUIT"
45 PRINT : INPUT "CHOICE ? ";C$:C = VAL(C$)
50 IF C$ = "Q" THEN END
55 IF C = 1 THEN POKE A1,10: POKE A2,96: POKE A1,11:
  POKE A1,11: GOTO 25
60 IF C = 2 THEN POKE A1,10: POKE A2,64: POKE A1,11:
  POKE A2,11: GOTO 25
65 IF C = 3 THEN POKE A1,10: POKE A2,00: POKE A1,11:
  POKE A2,11: GOTO 25
70 IF C = 4 THEN POKE A1,10: POKE A2,104: POKE A1,11
  : POKE A2,11: GOTO 25
75 IF C = 5 THEN POKE A1,10: POKE A2,08: POKE A1,11:
  POKE A2,11: GOTO 25
80 IF C = 6 THEN POKE A1,10: POKE A2,96: POKE A1,11:
  POKE A2,00: GOTO 25
85 IF C = 7 THEN POKE A1,10: POKE A2,00: POKE A1,11:
  POKE A2,00: GOTO 25
90 IF C = 8 THEN POKE A1,10: POKE A2,100: POKE A1,11
  : POKE A2,11: GOTO 25
95 IF C = 9 THEN POKE A1,10: POKE A2,04: POKE A1,11:
  POKE A2,11: GOTO 25
100 PRINT CHR$(7);"CHOOSE 1 TO 9 PLEASE": FOR X = 1
  TO 2000: NEXT : GOTO 25
  
```


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Editors'

CHOICE

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

Have you ever counted to 10 million? You'll probably never have to, but thinking about it will give you an idea of how many bytes of data go into 10 megabytes. They would fill up 70 floppy disks—or one Sider hard disk, this month's Editors' Choice as the right product at the right price.

Here at *inCider*, we've found that The Sider works as advertised, delivers honest value, and is priced well below comparable products. Chuck Doherty, who reviewed The Sider for us last month, claimed that it was "one of the nicest accessories I've ever used with an Apple II." He concluded, "It has that rare combination of modest price and top-rate performance."

Deep inside The Sider is a Winchester hard disk (from Xebec Corporation), which has a proven performance record. The package, for the Apple II Plus and //e, comes with The Sider, an interface card, all necessary cables, a manual, and two double-sided floppy disks of utilities. It's the perfect companion for word processing, filing, and program developing. If you need even more space, a second Sider can easily be linked to the first. The Sider is a breeze to set up, given its 52 pages of clear, complete documentation.

Average access time for any file is 155 milliseconds. The Sider supports four of the most popular operating systems for your Apple: DOS

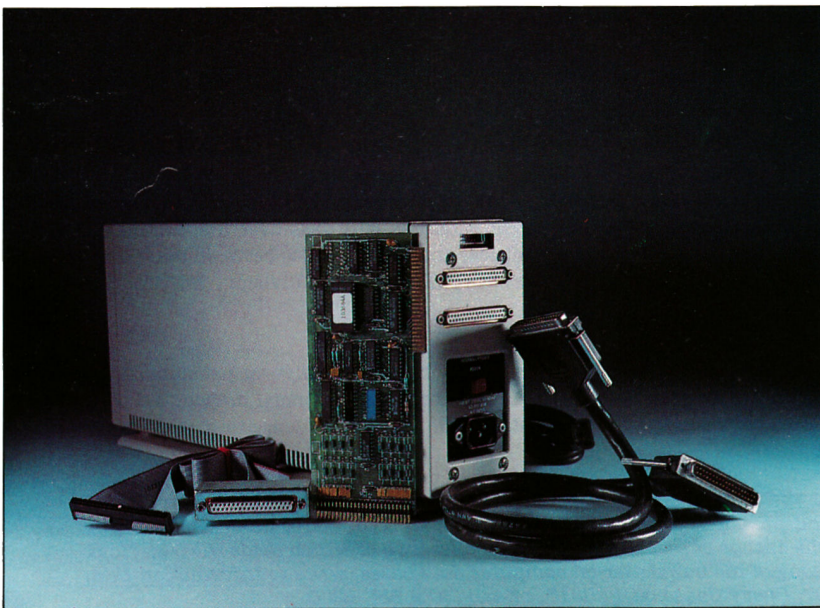
3.3, ProDOS, Pascal, and CP/M. You can divide your 10 Mbytes among the four systems according to your needs. If you have no interest in Pascal, cut back its allotted space. If most of your time is spent with AppleWorks, enlarge the ProDOS section.

Our editors are definitely impressed. "I don't have to do any more disk shuffling," notes Bob Ryan, *inCider's* technical editor. "I used to have to search through 40 to 50 disks, boot disks, and catalog them. With a hard disk, all my applications and data files are in one place."

Finally, the price—\$695—can't be beat. "Most 10-megabyte hard-disk systems cost \$1500 to \$2000, and don't deliver anywhere near the value of The Sider," New Products Editor Kerry Lanz says. "It's even priced way below many dual floppy-disk units. Compare the cost-per-byte, and The Sider is a bargain."

"Readers originally couldn't believe it," Editor in Chief Paul Quinn says. "Our market research shows they doubted they could get so much power at such a price. This will prove to be a boon to small businesses that need extra storage and are put off by the high prices of other systems. The Sider will enhance the Apple II's standing in the small-business community."

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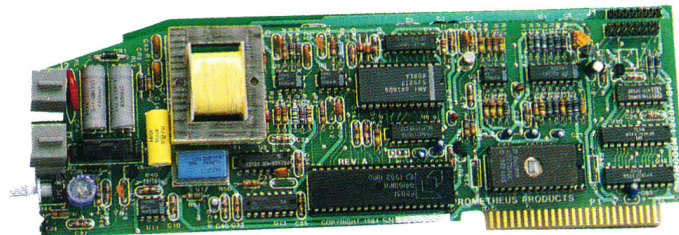
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```
○ 1) COMMUNICATIONS
○ 2) FILE TRANSFER
○ 3) OPTIONS
○ USE ESC TO EXIT
○ ENTER SELECTION
```

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

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

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