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Apple IIs: The Education Advantage

inCider

The Apple II Journal

A CWC/I Publication
USA $2.95/Canada $3.95
November 1985

LANs:

Make The Right Connections

Inside:

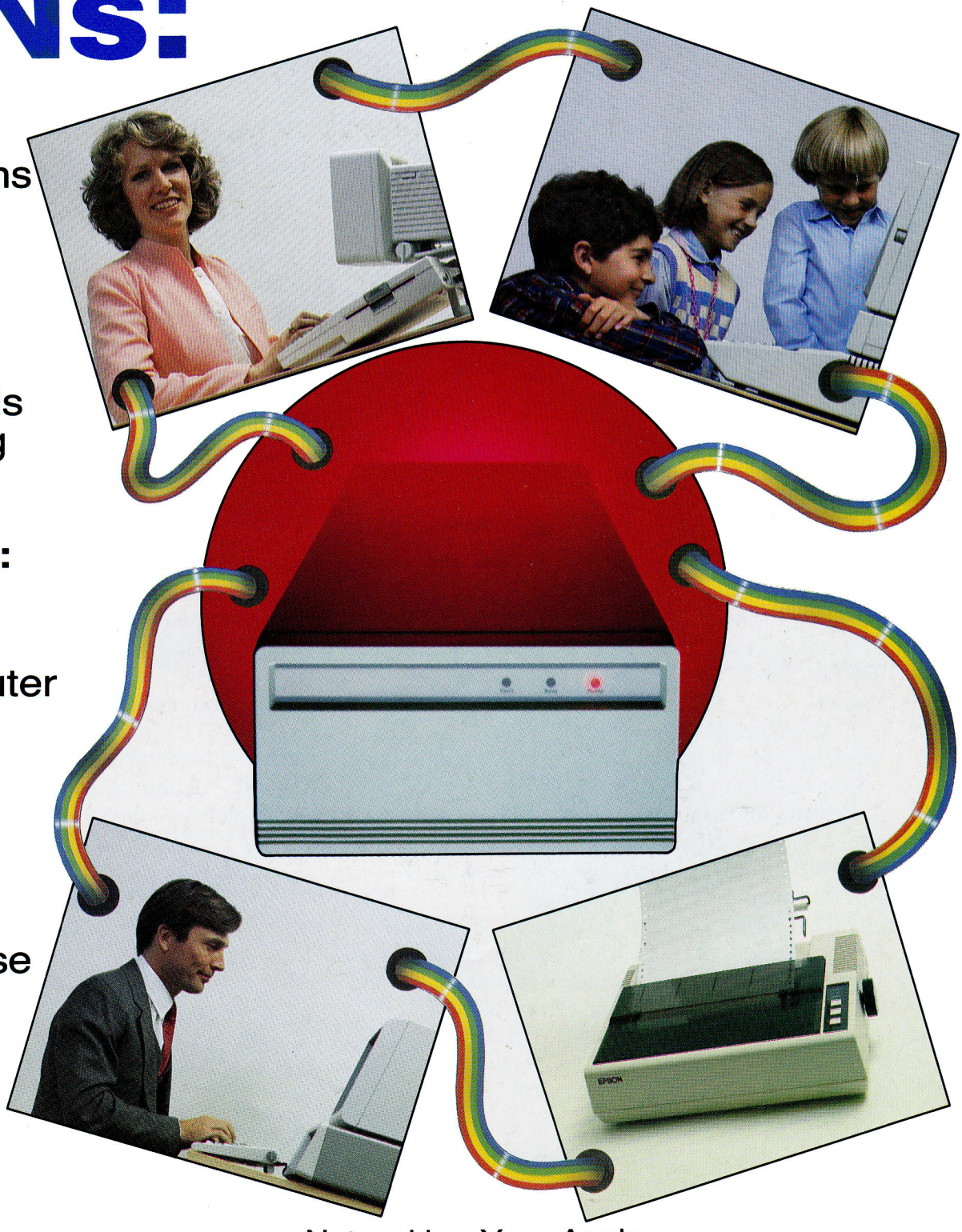
Super Programs To Get Kids Computing

Reader Poll:

How Do You Stand On Computer Literacy?

Editors' Choice:

The X-10 Powerhouse



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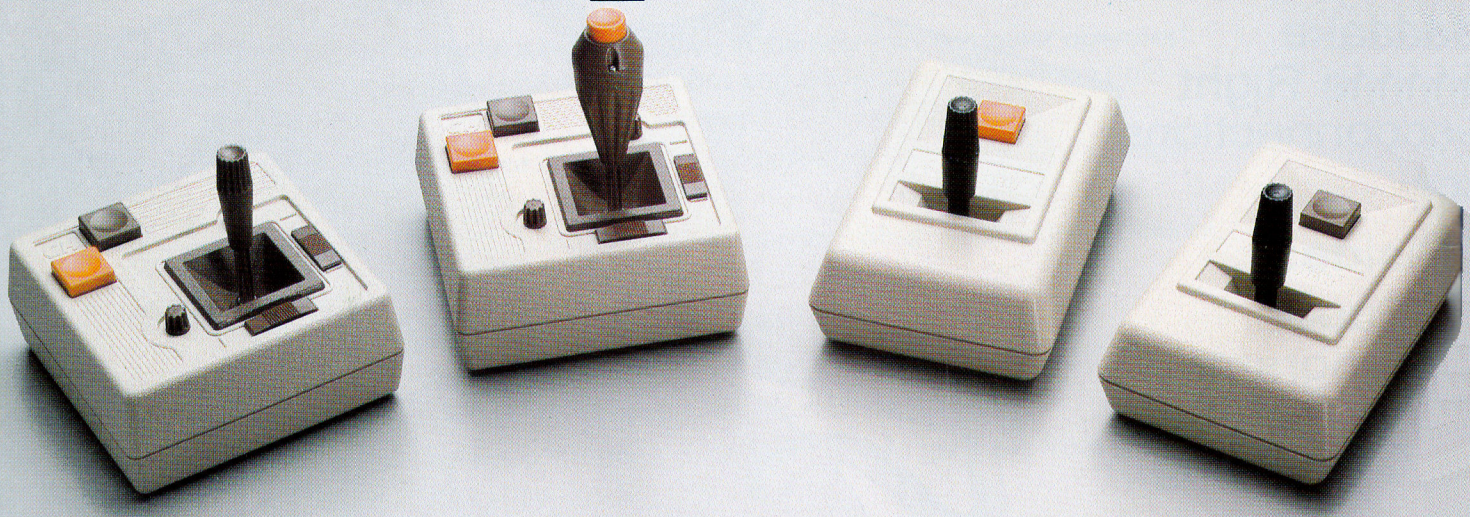
Networking Your Apple

Superior firepower



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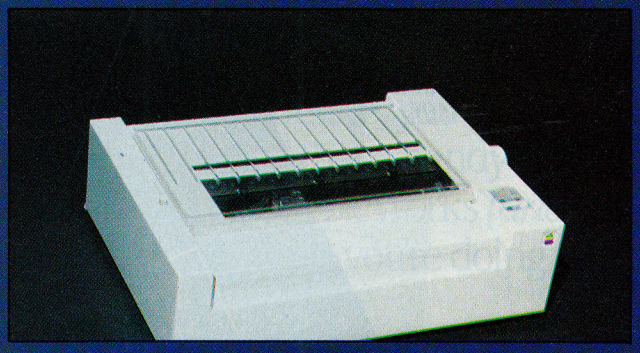
THE RIGHT CONNECTIONS

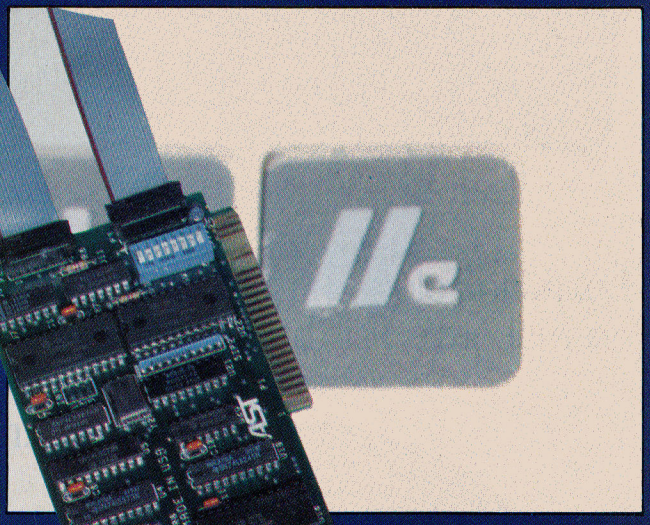


Printer serial port

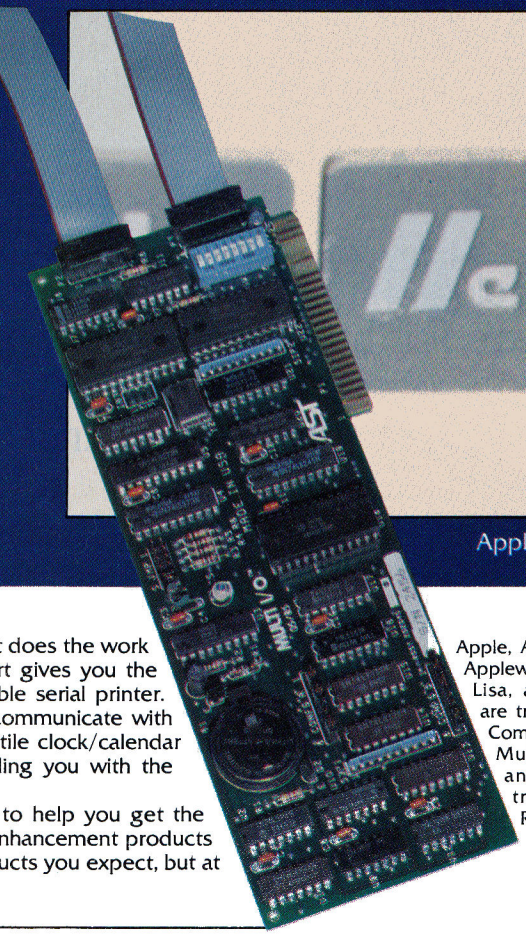
Modem serial port

Clock/Calendar

Software Utilities



Apple IIe compatible



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At AST we are consistently providing the right connections to help you get the most out of your personal computer. We set the standard for enhancement products for personal computers by bringing you the type of quality products you expect, but at a very cost effective price.

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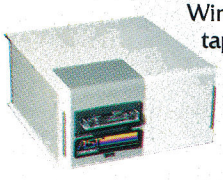
MicroStar™ is the 10 MB hard disk and tape backup (opt.) system that provides the right connection between the Apple IIe and dependable 3.5" Winchester Disk/Cartridge tape mass storage.



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Only Pinpoint adds pictures to any AppleWorks document. So you can create party invitations that are truly exciting. Even if the weather isn't.

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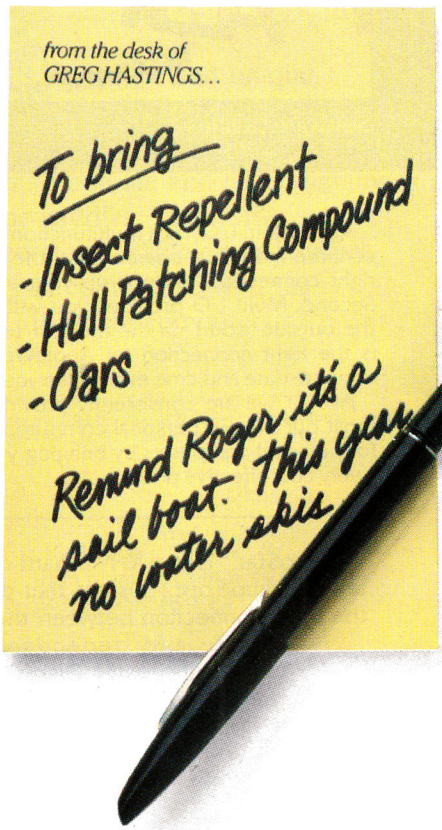
Don't spend hours addressing envelopes and misspelling names. Pinpoint picks up names and addresses from invitations (or any documents) and drops them, letter perfect, onto envelopes. Even if you don't always spell those tongue-twisting names right, at least you'll be consistent.

Impress a friend with a personal invitation. It's easy. The automatic dialer finds phone numbers displayed anywhere on the screen, not just in special files.

And it re-dials busy numbers automatically. So you're next in line as soon as your friend's broker hangs up.

Jot down important thoughts whenever they strike. The note pad is perfect for reminding you of things you can't do without. Or things you can.



Accessories. $69.

Nine accessories to be precise. And in no time, they'll be so much a part of your AppleWorks routine, you'll think of them as built-in, not added-on. Why?

For openers, these handy desktop timesavers "pop-up" via windows from inside AppleWorks *(and most other ProDOS programs).* So you can stop what you're doing to jot down a note, address a letter, or call a friend.

You can even figure out some figures with our calculator. Tap data bases or other computers through our communications window. Even whip out short memos, forms and labels with our line-at-a-time typewriter. And then continue AppleWorks without missing a beat. Or a byte.

What's more, Pinpoint's as easy to use as AppleWorks itself. Same commands. Same hardware.

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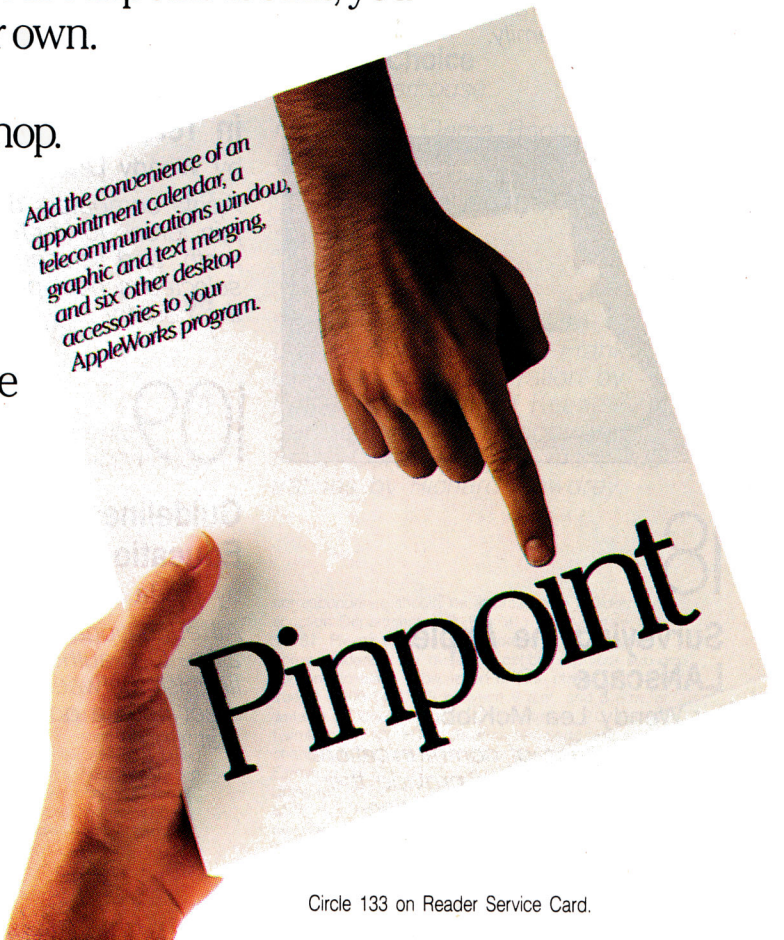
Then visit your local computer shop.

Or call (415) 530-1726 for a dealer near you. *(Dealers. Please call First Software (800) 343-1290 or Softsel (800) 645-7778.)*

You'll see that Pinpoint does more than give AppleWorks a handful of accessories.

It gives AppleWorks the works.



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Circle 133 on Reader Service Card.

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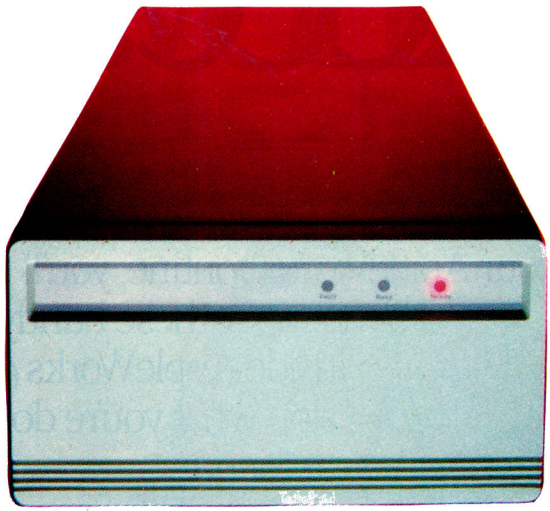

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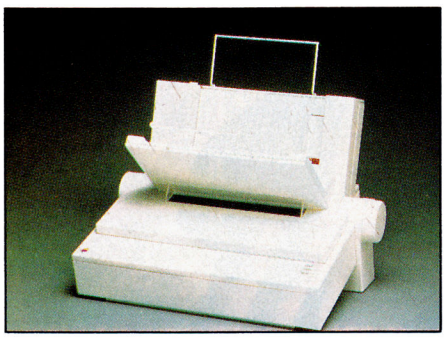

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ABC

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EDITORIAL

Preparing for the Revolution

by Susan Gubernat

One of the least spectacular of 20th century "revolutions" in education fizzled out while some of us were in grammar school: the introduction of televised lessons into the curriculum. Remember?

Despite the brouhaha that accompanied the installation of a TV in every classroom—in ours, placed high up on a platform in a corner where sticky fingers could never reach the channel flipper—even we kids knew it wouldn't work. We could glean from skeptical teachers and doubting parents that nobody quite believed in the medium's message.

TV was a diversion. How could we take it all that seriously? The window shades would be pulled down at odd intervals during the day—to heighten the contrast. The teacher faded into the background and we'd watch someone on screen perform a science experiment. Or we'd hold a one-sided Spanish conversation with the language teacher on the tube.

Ultimately, there was little accountability—jargon that entered the education field only with the competency-mindedness of the 80's. We all knew that "real" work happened once the window shades slapped back up into place.

Now we can hear a reprise of the promises once made about television surrounding the educational potential of the microcomputer—and with even more urgency. After all, we're entering the Information Age wherein ability to manipulate data files will be equated with power. Parents often base their plans to purchase a home computer not on perceived current need but out of fear that their children will be left behind in the computer revolution.

What we need, on the other hand, are teachers, parents, members of the community at large, who together help make informed decisions about computer purchases, who serve as resources for one another, who turn to the computer not out of panic or with unrealistic expectations, but with clearly defined goals and projects for computer use in the schools.

We know that the mere introduction of new technology into the home or the classroom doesn't automatically transform learning. Yet, at the same time, a simple analogy made between television (or other audio-visual stimuli) and microcomputers is not a fair one. What are the differences?

The nature of the computer is interactive, involving a rhythm of give and take, even the illusion of dialogue between mind and machine. But drill and practice software that turns the computer into a mere scorekeeper, the child into the perennial test-taker, makes the computer a monolith possessing the "right" answers. More creative uses of the microcomputer transform it into a tutor whose prompting can cajole even the reluctant learner, in spite of himself or herself.

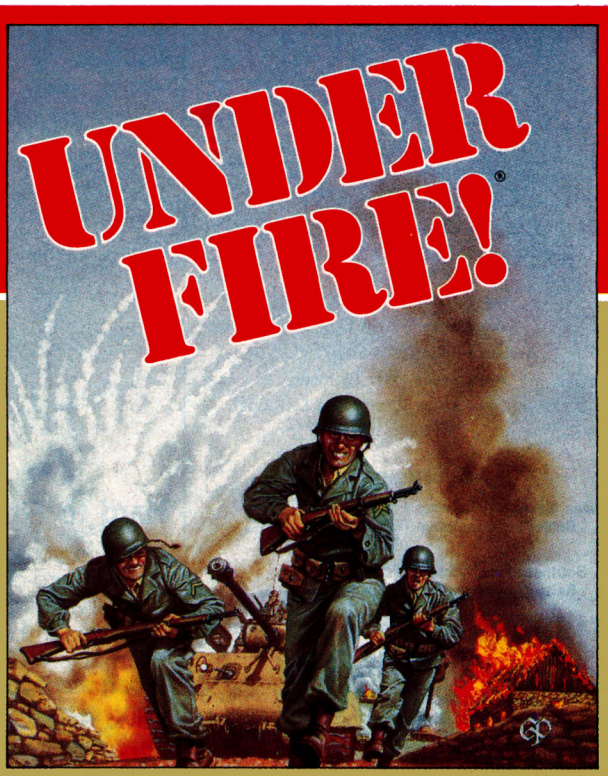
The power of the computer diffuses power throughout the classroom—and beyond.

But merely plunking a system down in front of those who didn't help decide its feasibility, its purposes, its applications, is often counterproductive. Budget allocations for teacher training to implement computers across the curriculum—and not just in a programming context—are as necessary as the original equipment allocations.

Meanwhile, for today's educator, Apples are a secure buy. Not only are the folks at Apple fond of jesting that "no teacher has ever been fired for buying an Apple" but also educators themselves perceive that the machine has served them well and will continue to do so. IBM and other manufacturers greedily eyeing the education market have not only the clout of a huge Apple II software library to contend with but also the perception and experience of influential educators like LeRoy Finkle, a member of the board of Computer Using Educators. He went so far as to tell us recently that "I can do everything I need to do on an Apple II with 64K."

In a market distinguished more and more by clanging bells and shrill whistles, we find that a reassuring testimonial. ■

UNDER FIRE!®



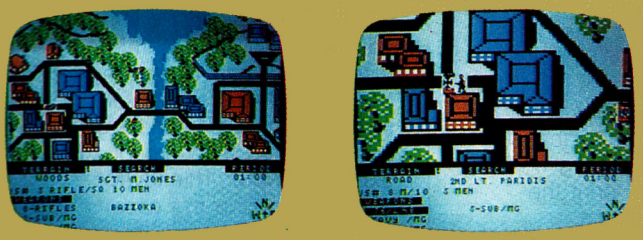
It was quiet under the blistering Russian sun except for the rumble of gunfire off through the hills. Through his binoculars, the Soviet lieutenant could see the road leading into the dacha. The hedge blocked his view of most of the ground, and nothing could be seen moving among the second story windows.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

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

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

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

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



Strategic and Tactical Maps.

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

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

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

A Wargame Construction Set!

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

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

$59.95

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Apple® II family of computers (II+, IIe, or IIc), 64K
One disk drive
Joystick required for II+; optional for IIe and IIc
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TIME SCALE: varies.
MAP SCALE: From 12 meters/position to 72 meters.
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Hard to Find

Could you give me some information on hard-disk drives that are compatible with the Apple //c? I'm interested in buying one, but I haven't been able to find any that will work with my //c.

David Seidel
2877 Cedar Canyon Court
Atlanta, GA 30345

The Quark QC10 hard-disk drive is the only one we know of that is compatible with the //c. For our reviewer's opinion of the QC10, check the July 1985 issue, page 82, and in "Hard-Driving Disks," September 1985, see p. 33. —eds.

B-B-BBS Anxiety

I haven't worked up the courage to call *inCider*'s BBS yet. I'd like to, but I'm not certain I can handle it. I've called a few of our local systems, and they vary from one to the other. I find myself frequently relying on the help keys, and I often print the menus for future reference.

You could provide a service to those not too proficient in telecommunication by giving us an idea of what to expect when we call your BBS. You could print the menu and a few hints in a future issue. That might be just the thing to give me—and others who may need it—the confidence to begin using the system. It would also be helpful to know before dialing just what programs are available for downloading. Perhaps you could devote a little magazine space each month to new features on the system.

I am a true *inCider* fan. I appreciate the fact that you have remained faithful to Apple II owners. Right now, I'm subscribing to three computer magazines. When my subscriptions run out, I'll renew only *inCider*.

Rita Wax
7401 Sabal Drive
Miami Lakes, FL 33014

Relax, Rita. Don't be afraid to call the BBS—just follow the prompts. Our BBS is very user-friendly, and it's online 24 hours a day. The number, for any telecommunicators who want to reach out and touch inCider, *is (603) 924-9801. —eds.*

Apple Affinity

If Apple Computer is to continue making a profit, it needs a better answer to the question "Why buy Apple?" than yours. In the July 1985 Letters column [p. 8], you told Robert Alekshun that "people buy a computer for the machine, not the company." You may want to get your readers' opinions on that.

When I bought my first and only computer last year, I chose the Apple //e—because of the company. The machine seemed overpriced (and still does), but I was impressed by the same factor you emphasized—the company had a record of support for older hardware. This loyalty to users has continued in the case of updates for the Mac and Lisa, as well as the //e, and that policy is in welcome contrast to that of other manufacturers.

Before Alekshun abandons Apple hardware, he might ask which companies have a better record of support for their machines. Like him, I've been unhappy with software from Apple, but the solution to that problem is to buy applications from other publishers. You can update or replace a program much less expensively than a computer.

Even if it is overpriced, when my simple, rugged, reliable //e stops working, I'll probably be ready for a //x, whatever that may be.

Ronald Counsell
603 East 34th Street
Baltimore, MD 21218

Power Supply for Sale

I have a tip to pass on to other Apple users who purchased a Sider 10-megabyte hard disk from First Class Peripherals. [See *inCider*'s review of The Sider in the April 1985 issue, p. 93, and Editors' Choice, May 1985, p. 128.]

If your system repeatedly crashes after a period of time, you may have a power problem. I connected the hard disk with no problems. Everything worked okay for 75 minutes—then the system crashed. I reset it, but it crashed again after only a few seconds. After the system cooled, it crashed again after 75 minutes.

I'm using the hard disk with a 128K Apple //e with the following equipment: extended 80-column card in the auxiliary slot; PCPI Applicard with CP/M 2.2 in slot 4; RS-232 card in slot 1; generic Super Serial card in slot 2; DuoDisk in slot 6; Sider hard disk in slot 7; and a cooling fan.

I ordered from Jameco Electronics a larger power supply ($59.95), which was advertised in the *Computer Shopper News* as having sufficient power for four disk drives. The system hasn't crashed since. I've used it for five hours at a time without crashing.

Anyone want to buy an original Apple //e power supply?

Surry P. Everett
Logman, SHAPE
APO NY 09055

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

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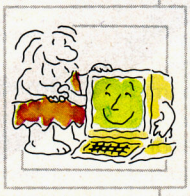

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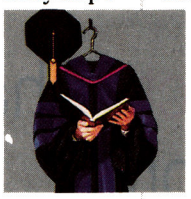

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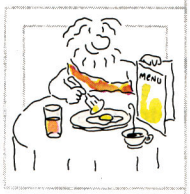

In fact, if you know how to buy breakfast, you already have the know-how you'll need to access any subject in our system. That's because it's "menu-driven," so beginners can simply read the menus (lists of options) that appear on their screens and then type in their selections.

Experts can skip the menus and just type in "GO" followed by the abbreviation for whatever topic they're after.

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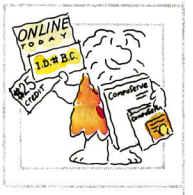

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Apple Announces New Products That Dazzle, New Enhancements That Perform

Apple Computer Inc. is now matching its lip-service support for the Apple II line with the introduction of six new peripherals in two categories: color capability and high performance. At the same time, Apple has worked closely with many third-party developers who have timed their new-software releases and updates to coincide with the new Apple hardware. (See the accompanying Product Information listing on p. 16 for names and addresses of vendors. At press time, Apple claimed that over 50 more developers were also working on products that will utilize the new disk format, RAM expansion, and/or color capability.)

According to Apple product manager Don Field, the latest high-performance products—the much-anticipated 3½-inch disk drive and a RAM (random access memory) expansion card (code-named "Slinky")—address the pressing needs of power users: more floppy-disk space and more memory. And he adds that Apple's composite color monitors for the //c and //e and new color ImageWriter printer are sure to please another important customer base—educators.

Power Up

The II RAM Expansion Card (see **Photo 1**) overcomes the memory limitations of the Apple II line and establishes a standard for third-party expanded-memory applications. It provides 256K bytes to 1 megabyte of additional RAM for use as main memory or as a self-formatting RAM disk. Built into the card is the circuitry that programs need to access this extra memory. You can use the II RAM Expansion Card in an Apple II, II Plus, or //e by plugging it into any slot except slot 3 or the //e's auxiliary slot. A 256K card is priced at about $250. Each additional 256K increment costs approximately $100.

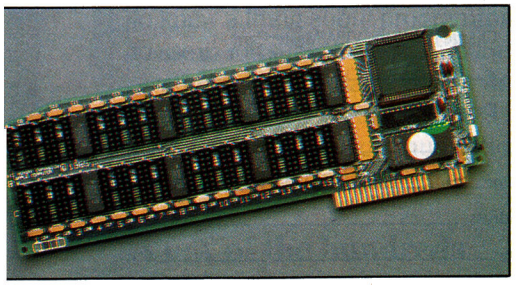


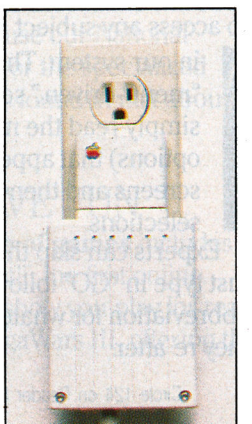
Photo 1. *The Apple II RAM Expansion Card.*

The UniDisk 3.5 (see **Photo 2**) is a double-sided version of the 3½-inch Macintosh drive. Manufactured by Sony, it has a formatted capacity of 800K bytes—nearly six times the capacity of the Disk II 5¼-inch floppy-disk drive. According to Apple, you can use the UniDisk 3.5 as your boot drive or as a secondary drive. Coupled with the introduction of the UniDisk 3.5, Quark Inc. is releasing **Catalyst 3.0**, a software package that gives the Apple II an icon-based desktop similar to the Mac's. The UniDisk 3.5, without controller, costs approximately $500.

Photo 2. *The Apple UniDisk 3.5 and ColorMonitor.*

The Apple Personal Modem (see **Photo 3**) is the third product in the High Performance line. The 300/1200-baud modem is 100 percent Hayes-compatible and 100 percent AppleModem-compatible. It is easily configured via software rather than inconvenient DIP switches, and is priced at around $400.

Photo 3. *The Apple Personal Modem.*



Color My World

The innovative ColorMonitor //e and ColorMonitor //c (see **Photo 2**), 13-inch, composite monitors, not only display color graphics, but can also display 80 columns of text in monochrome. They require no special interface devices and cost around $450 each.

The ImageWriter II (see **Photo 4**) is a 10-inch color printer with 250-character-per-second speed in draft mode (slower in correspondence and near-letter-quality modes), a 2K buffer, and its own expansion slot. The slot can hold a 32K print buffer or a card that lets you use the ImageWriter II as a print server on the AppleTalk Network currently available for the Mac. The ImageWriter II sells for about $600. The two expansion boards are priced at approximately $150 each. Another option available for the new printer is a cut-sheet feeder, retailing for about $250.

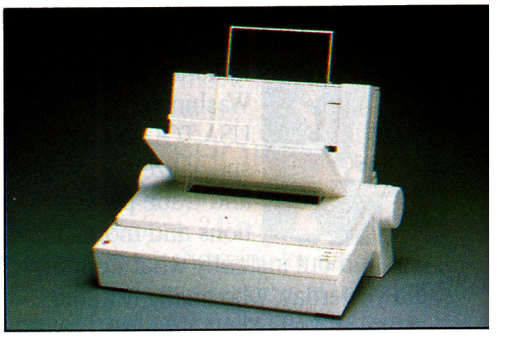


Photo 4. *The Apple ImageWriter II with sheet feeder.*

Software Conversions

"I'd like to wave a magic wand and make all disks 3½-inch *overnight*," says Roger Wagner, president of Roger Wagner Publishing and the author of *inCider*'s Right of Assembly

column. The introduction of the new hardware has produced a flurry in the software market as developers rush to upgrade existing packages and release new ones compatible with the Apple products (refer to the Product Information box on page 16). Most packages converted to 3½-inch format will now contain the programming necessary to let you take advantage of the II RAM's extra memory for data storage. Other products will now include programming that lets you use the ImageWriter II's color capabilities.

At Roger Wagner Publishing, the conversion of the mouse-driven word processor **Mouse Write** to high-performance and color standards has already been accomplished. "To the extent that third-party developers follow Apple standards, it's no problem," Wagner says. Roger Wagner products are not copy-protected—users of the "old" Mouse Write can update the package for the cost of mailing.

International Solutions will make 3½-inch disks available at the customer's request: You'll buy the 5¼-inch version at the store and exchange it for the smaller disk through the mail. International's mouse-driven spreadsheet **Mouse Calc** and its new word processor **Mouse Word** both support the Apple RAM expansion card—International put the programs' designer, Luc Barthelet, on the Concorde from Paris to Sunnyvale, California, for a quick conversion.

Pinpoint, a new desk-accessory package (notepad, calculator, appointment calendar, communications, and print utilities) for AppleWorks from Pinpoint Publishing (formerly Virtual Combinatics), works as is with the RAM board, and the company has no immediate plans for 3½-inch disks. Pinpoint is reportedly considering the smaller format for future releases.

Sorcim's **SuperCalc3a**, the most powerful spreadsheet available for the Apple II, produces graphs in living color on the new ImageWriter II and can utilize the II RAM's memory. Sorcim will continue to pack 5¼-inch disks, but consumers can switch to 3½-inch format through a mail-exchange setup if they prefer.

Quicken personal-accounting software, from Intuit, will be available in both 3½-inch and 5¼-inch formats. Manzainita sidestepped the obstacle of disk format neatly—its new business-accounting package, **BusinessWorks**, will be available only in a 3½-inch version. The increased storage capacity of the 3½-inch disk makes that format the only choice for memory-hungry AppleWorks work-alikes like BusinessWorks. Both BusinessWorks and Quicken work with Apple's RAM card.

Dazzling Graphics

Software Publishing offers new ProDOS versions of **PFS:File**, **Report**, **Graph**, **Write**, and **Plan**, its integrated series of business-software programs. The company plans to begin shipping 3½-inch and 5¼-inch disks this month. You'll buy both and return one to complete the product warranty. Users of the current 5¼-inch Pascal editions of the PFS line can obtain 3½-inch ProDOS versions at nominal cost. PFS:Graph supports Apple's color ImageWriter II. All updated PFS programs can use the II RAM Expansion.

Broderbund's graphics program **Dazzle Draw** really will dazzle you now—Broderbund says a new version will print color pictures on the ImageWriter II. The company suggests you store images on 3½-inch disks and use a 5¼-inch floppy for the program itself.

All those StickyBears will soon stroll off your monitor and onto your paper. Weekly Reader is offering a new **StickyBear Printer** program for the ImageWriter II to complement its series of children's learning-skills programs. **Blazing Paddles**, drawing software from Baudville, and Mindscape's **ColorMe**, a children's graphics program, will support the ImageWriter II, as well.

A Challenge for Software Development

The 3½-inch disk looks as if it's here to stay. Color printing seems only natural. Third-party software developers have a new standard to follow in expanded RAM. Apple's new peripherals are technologically exciting—but that's just the beginning. Apple has given program designers a new challenge—we'll watch them work their magic.■

Editor's note: This special report was compiled and written by inCider *staff members Wendy Lea McKibbin, Bob Ryan, Paul Statt, and Susan Gubernat. It is based on an early look at the Apple products mentioned herein and on information supplied to us by Apple and by third-party developers, and in no way constitutes an endorsement or product assessment.* inCider *will review the new products in upcoming issues.*

A New Standard?

With the introduction of the II RAM Expansion Card, Apple has established a hardware standard for third-party software developers writing memory-intensive applications for the Apple II. I expect this will have a negative impact on sales of current memory-expansion boards for the Apple, such as Applied Engineering's Ramworks, Checkmate Technology's MultiRam, and Legend Industries' E' Card, that are incompatible with the II RAM Expansion Card. Third-party manufacturers introduced these boards to fulfill a demand that Apple, in its preoccupation with the Macintosh, had failed to satisfy.

In an upcoming issue, *inCider* will compare Apple's expansion card with the most popular third-party memory cards to help you select the board that best meets your needs.□ **—R.R.**

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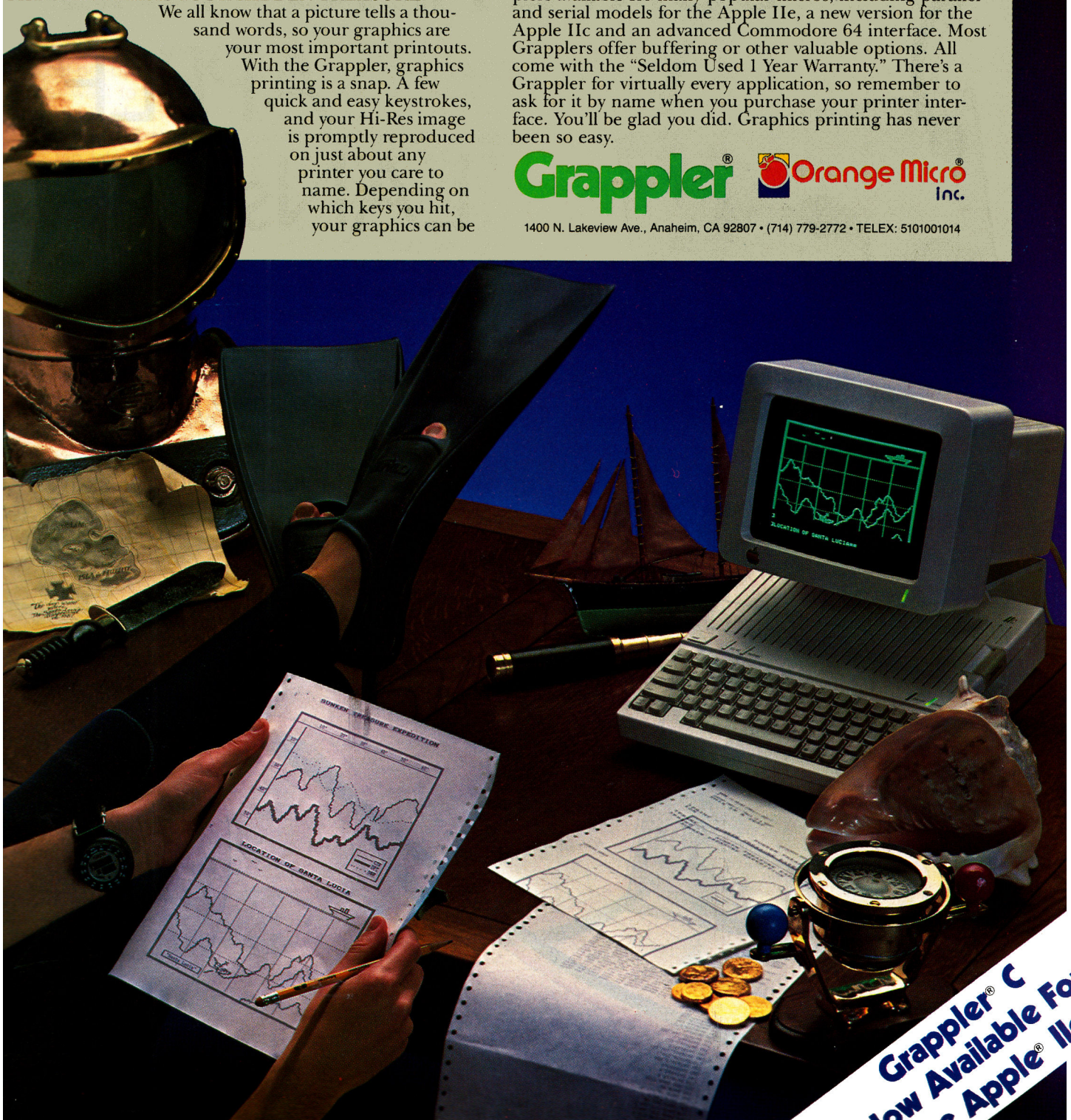
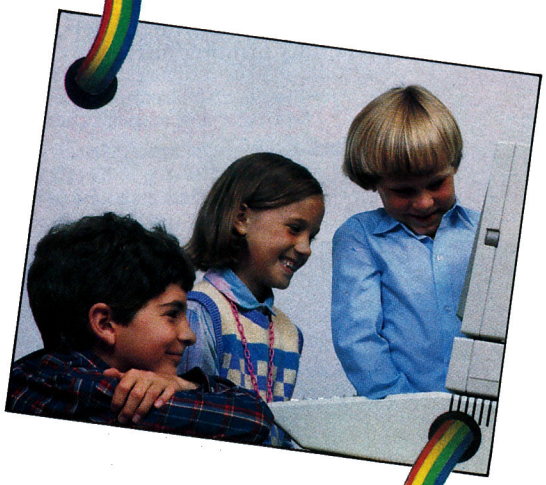
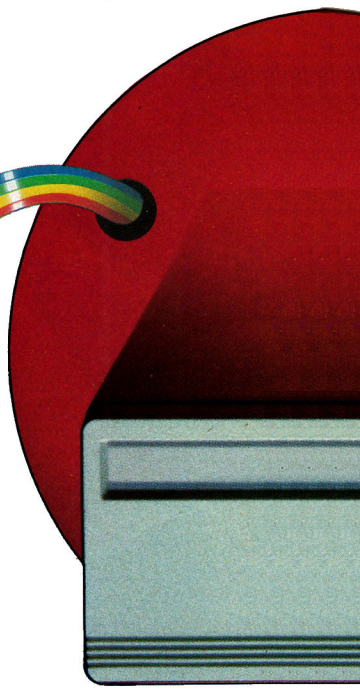


SURVEYING THE APPLE LANscape

Get a perspective on how schools and businesses are using local area networks (LANs) to swap data and share peripherals.

by Wendy Lea McKibbin, *inCider* staff





Do you have to buy multiple copies of software programs for 45 students? Is this depleting your educator's budget? Is the crowd around the printer—not to mention the noise—disrupting the classroom or the office? Must several people in your small office store data on a more efficient basis (cost-per-byte) than a floppy-disk drive allows? Do you want to transfer your Apple //e file to a fellow worker's Macintosh? Must your Apple //e, Macintosh, and IBM PC share the same printer? Would you like to tap into the corporate or university mainframe regularly for important information to prepare a report?

The foregoing laundry list of questions suggests the primary advantages of installing a local area network (LAN) in your classroom or office: Networking avoids duplication of resources and data bases, and, depending on its type, can diminish the compatibility gulf between systems from different manufacturers. Networks provide for cost-efficient sharing of expensive hard disks, printers, and modems. Some LANs provide "vertical" compatibility as well, opening up lines of communication between personal computers and mainframes or other networks.

Regardless of their type or configuration, most LANs consist of certain basic components, beginning with a mass-storage device or Winchester hard-

disk drive and a back-up storage system, such as streaming tape. Next, the file server, a special-purpose computer that functions as a policeman, governs the flow of traffic and the use of shared peripherals, and an interconnect cable physically connects the computers together, often using intermediary electrical devices called "hubs." Then there are the personal computers themselves, each of which requires a special adapter card or printed circuit board installed so it can interact with the network. Last and most importantly is the software, which makes the sharing of data and resources possible.

For purposes of discussion and comparison, I will differentiate LANs along four basic lines: transmission techniques, topology, access methods, and sophistication in providing "extras" such as network management or protocol conversions to support internetworking.

The Anatomy of a LAN

Three media on the market today—twisted copper wire or twisted-pair, coaxial cable, and fiber optic—transmit data in local area networks. Twisted-pair, which is nothing more than common telephone wire, is the least expensive and the easiest to install. Coaxial cable, of which there are two types—broad band and baseband—is the next most expensive choice and requires professional installation. However, it provides better noise immunity than twisted-pair and has a wider variety of choices, such as the option of teflon coating to meet fire-code restrictions.

Fiber-optic cable is the newest medium on the market and the one with the highest price tag. While not yet cost-effective, fiber-optic cable is extremely durable and almost impossible to tap surreptitiously, thus giving it high marks for security. DataPro, a research firm in Delran, New Jersey, anticipates fiber optics will ultimately become the least expensive cable option due to the abundance of natural silicon and eventually, the more extensive use for telephone applications.

Today's networks use three topologies: the "bus," the "ring," and the "star." Topology is simply the network configuration—the way in which the nodes (junction points within the network) relate physically and logically to one another.

A prime example of the bus topology is AppleTalk, which originally bore the name "Apple Bus" before someone at Apple Computer decided the product would be more marketable with a "less technical" name. Personal computers in a bus configuration are arranged along a single line of cable extendable at one end (see the accompanying **Figure**). A variation on the bus topology is the "tree," in which the cable branches at one or both ends, although only one transmission path is available between any two nodes.

The ring is a circular arrangement wherein the signal passes from one personal computer to the other, until it has returned to the original station, thereby making a complete circle. The bus and the ring are the most widely used configurations in the United States.

A less common topology is the star arrangement. Here, a central station connects directly to each node and all signals must pass through the central system.

The third major element of a LAN, its access method, more than any other single factor determines the efficiency of a network. Access methods, the way in which a network controls traffic, fall into two general categories: random access and deterministic control. In a random-access or "contention" setting, each station can transmit at will, but first listens for traffic before sending out its signal. The most widely used type of random access is the Carrier Sense Multiple Access (CSMA) method. Occasionally, two stations using this access method send out signals simultaneously, so the signals collide. To counteract this weakness, you may install a Collision Detection (CSMA/CD) or Collision Avoidance (CSMA/CA) mechanism.

CSMA networks perform best when handling sporadic traffic and tend to degrade as the number of stations on the network increases, thus making the likelihood of a collision greater. CSMA performance also deteriorates as the physical length of the network increases, because it's more difficult for far-away stations to detect and avoid collisions.

By contrast, networks that use deterministic access methods can easily handle heavy, consistent traffic, and, depending on their type, may be able to support stations separated by sizable distances. The best example of this access method is "token passing"—a "token" or special bit pattern passed from station to station in an orderly fashion gives one station at a time the right to be master of the network.

The master sends out its traffic, then relinquishes control to a new governor by sending the control packet to the next node in line. Since each node has a unique address, the control can be passed sequentially from unit to unit. If the master hears no activity on the network within a certain amount of time, it then passes control to the unit with the next highest address.

The access methods discussed thus far address the two most basic network services, namely the physical layer and the data-link layer where messages are sent and acknowledged. Some vendors offer higher-level services as well, such as software-based network management and access to mainframes or other networks.

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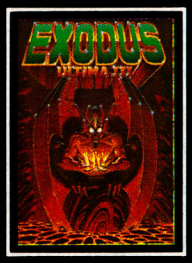

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Choices for the Apple User

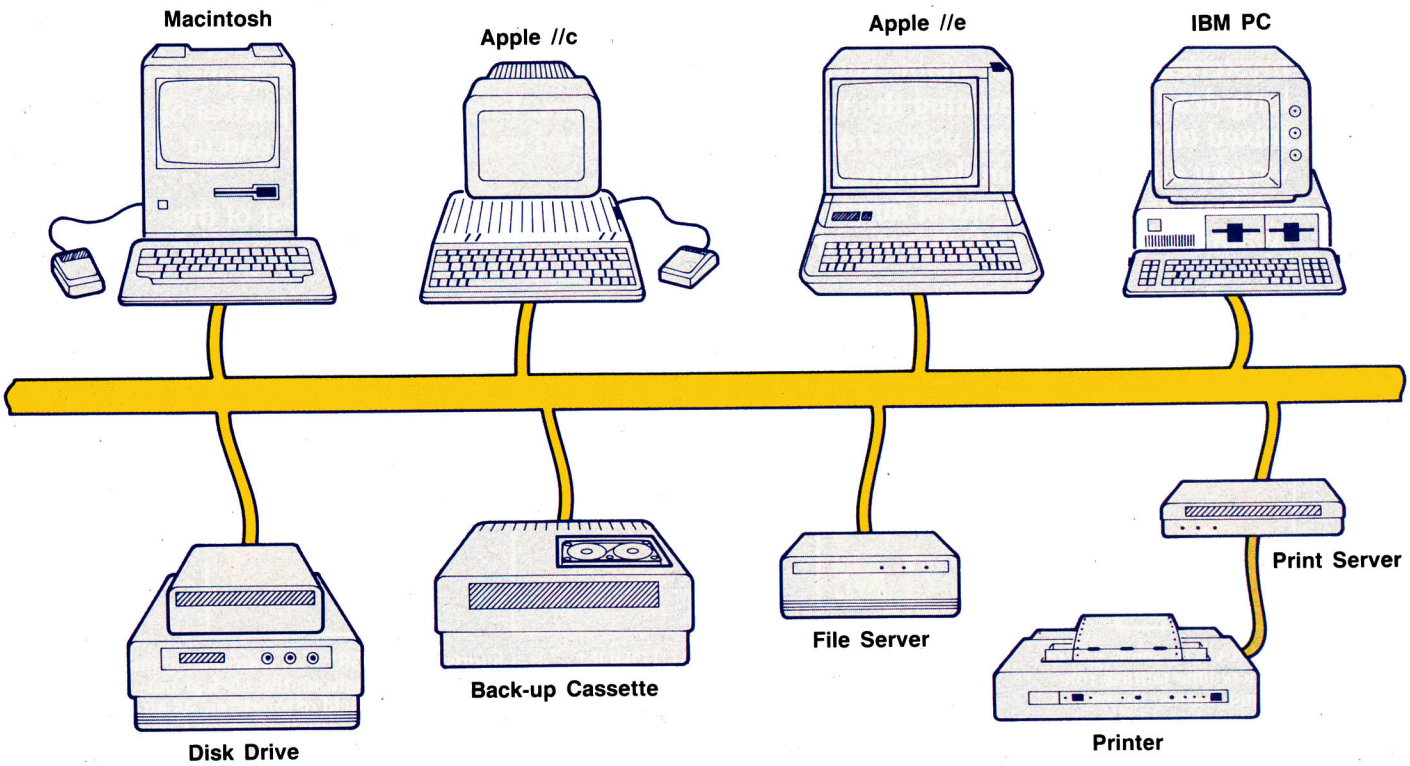
Three local area network products—the Nestar PLAN Series, the Corvus Omninet, and the Sunol Sun Net—are currently available for Apple II and /// computers. Still to come is the long-awaited adapter card for the Apple II that will give it a place on AppleTalk—an event company sources say will happen at least by July 1986, if not by January. Finally, a product called "TOPS" from the little-known Centram Systems in Berkeley, California, will soon be compatible with the II series.

The Nestar LAN is the most expensive system of the ones mentioned above, but also the one that allows for the most personal computers per network and the longest distances between workstations, according to systems specialist Scott Haugdahl of Architecture Technology Corporation in Minneapolis. Haugdahl notes that the Nestar LAN allows for up to four miles (22,000 feet) between PCs, as compared to competitive brands' 1000 to 4000 feet for the entire network. The network has a tree topology and can transmit data at the rate of 2.5 megabits per second. Furthermore, both the PLAN 3000 and 4000 file servers can support a maximum capacity of 255 stations, although typically the PLAN 4000 supports from ten to 100 users and the PLAN 3000 from five to 15 systems. Both file servers support Apple II's and ///'s and the IBM PC and compatibles. An Apple on a Nestar LAN can function as a workstation, terminal, or printer server.

A single PLAN 4000 file server costs $24,000, provides 548 megabytes of storage, and has a built-in (45–60 megabyte) streaming-tape back-up unit. Storage capacity has no ceiling, however, since the LAN can support multiple file servers. The PLAN 3000 file server, priced at $15,000, includes the same tape back-up features and up to 56 megabytes (formatted) of storage space. Both file servers support DOS, Apple Pascal, and CP/M for the Apple II; SOS for the Apple ///; and all versions of PC DOS and UCSD p-system for the IBM PC group of products.

The Nestar LAN is well-suited (though not confined) to the Fortune-500 market because of its compatibility with the IBM mainframe world, its high-quality file servers, its durable and costly coaxial and fiber-optic cable, and its offering of higher-level services. For example, to communicate with other networks and with IBM and IBM-compatible mainframes,

Figure. An example of a bus topology, the most common topology in LANs.



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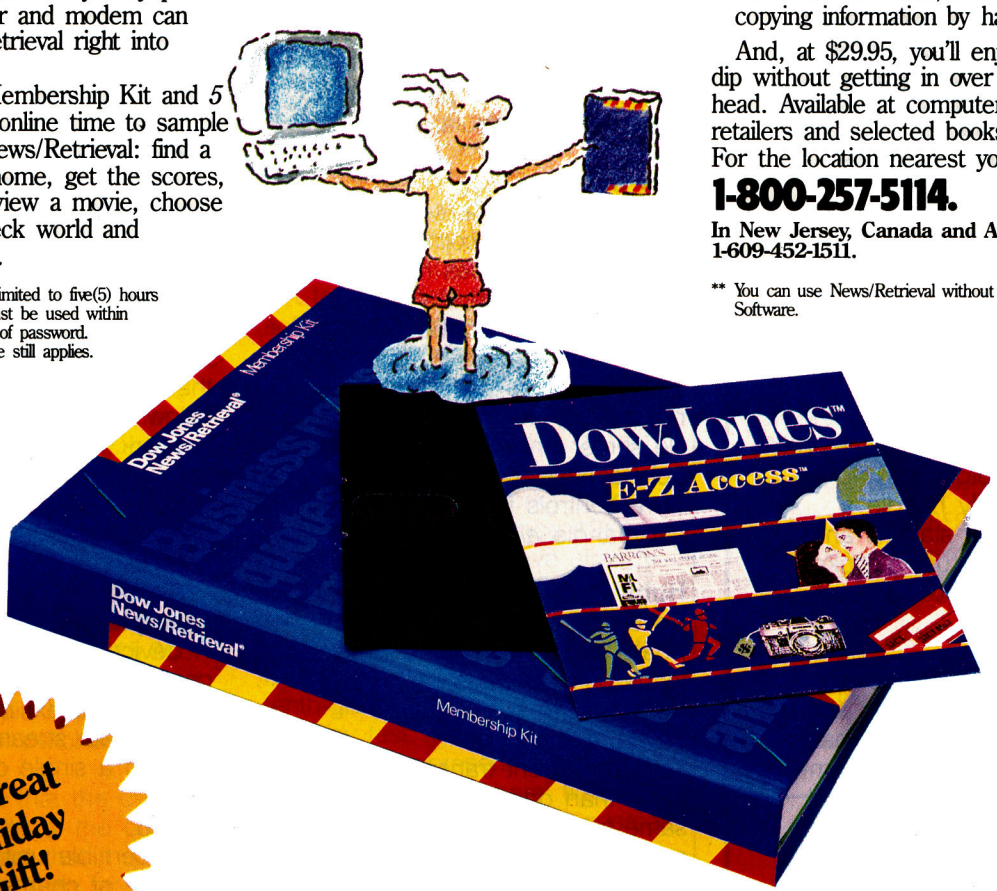

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the Nestar LAN supports asynchronous, bisynchronous, and SDLC (SNA) protocols. The important point to keep in mind is that Nestar does not position itself as an Apple LAN vendor, but merely provides that compatibility for its IBM customers.

Both Nestar and Corvus provide Apple owners with LANs capable of communicating with the corporate mainframe. Sunol does not.

The Leader in Education

Apple and Corvus individually and collectively lead the field in education (see the sidebar "Networking in Education" accompanying this article). And, more often than not, they team up in the classroom. For example, a survey conducted by the UNICOM Software Development Group found that 95 percent of the Corvus networks in education use Apple computers. The list of educational institutions using Omninet is extensive, and includes entire school districts like the Indianapolis Public School System and all schools in West Virginia, as well as prominent universities such as Stanford, Yale, and MIT.

Like Apple, Corvus caters to the special needs of the educational buyer, including the often stringent budgetary requirements that surround public money. The company offers its customers in education a

LANs Glossary

Contention Setting (Random Access)
A condition in a network in which two or more locations try to transmit on a multiplex channel at the same time. If the channel is not free, the requesting terminal has to queue (wait in line for the attention of the processor). The queue is solved either on a first-come, first-served basis or on a prearranged sequence. Smaller networks with less travel distance over the network mainly use this setting.

Deterministic Access
In a network using this method, you set up protocols in advance that easily handle a large number of stations and transmissions by using "token passing."

Disk Server
A programmable device that enables multiple users to share the same hard disk. It remains under the control of the computer's operating system and has a restricted command list. Disk servers *physically* divide a hard disk into partitions or volumes so that each user has his or her own hard disk or shared workspace. As a tool for the client computer, a disk server requires a printer server in order to handle printing traffic.

Fiber-Optic Cable
A transmission cable using small-diameter glass fibers through which light is transmitted. Modulating this light transfers information, and light-sensitive semiconductor devices detect these modulated signals.

File Server
In a network, a file server is an intelligent, highly sophisticated device that provides high-level services. A software shell over the DOS creates subdirectories of workspace on a hard disk. The user gains access to the network by individual files. The file server on a LAN is in control because the server software controls file allocation and can handle *all* print traffic.

Hubs
An electrical socket in a plugboard into which you can insert leads or plug wires.

Multiplexing
The concurrent transmission of more than one signal at the same time over a single route or channel in a network.

Node
A junction point within a network.

Protocol
Hardware and software interfaces within a computer that let the computer transmit over a communication network and collectively form a communication language.

Protocol Conversions
Specific sequences of signals in data exchange that ensure that the two communicating devices can recognize each other's signals and that the transmitted and received information is not "garbage." Protocol determines the pattern flow data bits will follow and how devices on the network will cooperate in their communication. Protocols in networks also verify that the user has authority to use the network.

Quadplexer
A device in a network that combines two or more signals (as in multiplex) into one high-speed data stream for transmission on a single channel.

Token
A discernible unit in a sequence of characters. Tokens are used to transfer control of the network bus from one node to another.

—Dawn Matthews
***inCider* staff**

Networking in Education

If Marie Sikora had known what she was getting into when she volunteered to set up a computer laboratory for 750 elementary-school children, she might have run "very fast in the opposite direction."

"I had many sleepless nights three years ago, when I was trying to learn about hard-disk technology and figure out how to make the network software function properly," says Sikora, the Computer Laboratory Resource Teacher at Bachrodt Elementary School in San Jose, California. "I didn't find Corvus that easy to learn."

She ultimately found her answers by seeking out higher-level technical resources within the school district, and today she's a satisfied veteran. Sikora found that networking avoids the problem of having small children handle the floppy disks. And, after three years of pounding by enthusiastic fingers, the computers are still intact, too, and functioning perfectly.

The school uses its 25 Apple II computers linked together with Omninet to provide drill and practice in math, reading, and language. Students aged 5 through 12 visit the lab twice a week to reinforce skills taught in the classroom, says Sikora. The lab uses software from the Minnesota Education Consortium, Sunburst, Random House, Soft Swap, and a number of other vendors. The entire setup represents a $15,000 investment, although the prices of Corvus and Apple have dropped since the school purchased its equipment.

Sikora reports that the children like the informality of the computer and the fact that it is non-judgmental. "They do far more drill and practice at the keyboard than they would with pen and paper," she notes.

A Southern Leader

Ninety miles from New Orleans in Harrison County, Mississippi, 5000 high-school and secondary-school students exhibit a similar enthusiasm for computer-assisted instruction. The school district has installed 339 Apple II's at its ten schools in networks of seven to 46 systems. The equipment is part of a program to develop computer-literacy skills in every student in the district, says school district superintendent Henry Arledge.

Arledge maintains that Harrison County is one of the leading school districts in the Deep South for computer-literacy training—a claim supported by the size of its installation and the daily exposure to computing offered to each child. Last year, the Apple-Corvus networks were used for mathematics training, and each student was required to spend 20 minutes a day, five days a week, at the keyboard. In the 1985–1986 school year, the district will expand the program to include reading training. Other plans for the new school year include a greater effort to "correlate textbook and software objectives," Arledge says. He explains that the school district is also developing its own software, so that eventually the entire school system can be networked to the main office.

Although the networks have been in place only since 1984, Arledge says there have already been tangible results. For example, one eighth-grade class that used the systems for mathematics drill and practice scored at the tenth-grade level on a state competency test. The LAN-based activities also represent a significant savings of the teachers' time, since teacher's aides can oversee the laboratory activities, thus freeing the instructors for other tasks.

It's not hard to push technology on the kids, Arledge says. It's hard to keep them out of the computer rooms. "All in all, we think it's the best money we ever spent."□ **—W.L.M.**

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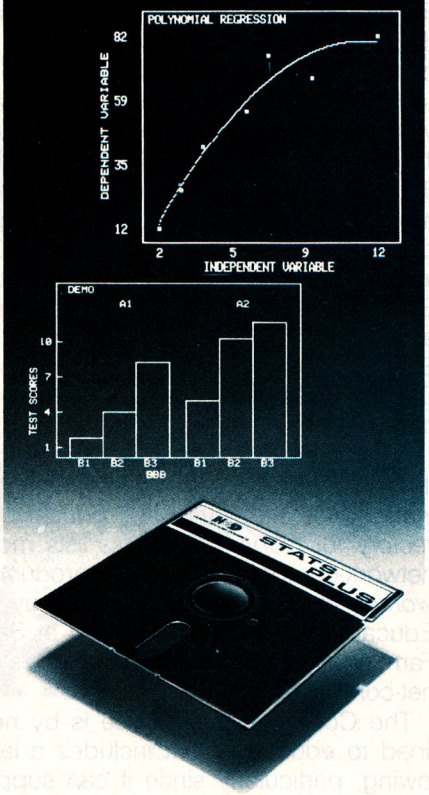

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wide range of support services through its dealer network, such as on-site service agreements, extended warranties, and product-exchange agreements. For a price, teachers can obtain additional support and in-service training from their local dealer.

Perhaps the most attractive feature about the Corvus network, as far as educators are concerned, is its cost-effectiveness. An educator discount of up to 33 percent is available for purchases of $50,000 or more, although a generous 25 percent discount is offered for purchases exceeding $1000. The educator's price list shows an 11-megabyte OmniDrive Starter Kit costing $1995, the Printer Server priced at $990, and The Bank storage unit at $2195. School superintendent Henry Arledge of Harrison County, Mississippi, calls it "the best buy on the market."

An attraction that runs a close second to cost is the large selection of software that runs on the network. For example, *Swift's Educational Software Directory for Corvus Networks* lists more than 800 network-compatible software products. *The Networker,* the quarterly publication by Corvus' National Educational End User's Group at San Juan College, Farmington, New Mexico, publishes additional Omninet-compatible software listings.

The Corvus installed base is by no means confined to education, but includes a large business following, particularly since it can support SNA gateways to the mainframe environment. Among its business-based customers are Bank of America, Bloomingdale's, Citibank, Chase Manhattan, Dean Witter Reynolds, Hannover Insurance, Holiday Inn, and Merrill Lynch.

A Simple, Modular Network

Omninet is a twisted-pair, CSMA/CA bus network that can extend up to 4000 feet. Because the network uses twisted-pair wire and snap-together tap boxes, the company claims it's "as easy to install as a stereo system." Corvus reports that the average business network supports from five to ten computers, and the typical educational network supports from 12 to 15 systems, although technically Omninet can support up to 60 personal computers per network or 64 network nodes (computers plus peripherals). Omninet supports the Apple II's and ///'s, the Macintosh, the IBM PC and several of its compatibles, the Corvus Concept, the DEC Rainbow, the TI Professional, and the Zenith 100 and 150.

For mass storage, Corvus offers the OmniDrive Winchester Disk with up to 126 megabytes of storage. Omninet can handle a maximum of eight OmniDrives per network to provide a total of 1000 megabytes or 500,000 text pages of mass storage per single installation. For back-up, there's The Bank, a 200-megabyte random-access device with removable tape cartridges, and The Mirror, a low-cost alternative to The Bank that interfaces to a video cassette recorder. The Mirror can provide 73 megabytes of storage per two-hour video cassette.

Corvus addresses the issue of disk access with a built-in disk server in OmniDrive, instead of a separate file-server unit. The disk server manages user requests to load, save, or read programs and to use the printer.

The Corvus Printer Server picks up print requests from the disk server and holds them until the printer is ready. The Printer Server can direct the activities of up to three printers at one time, thus eliminating the need to have a dedicated personal computer to handle this task.

The "Sun Net" Solution

The third networking alternative on the market for Apple II and /// owners is the Sun Net LAN from Sunol Systems in Pleasanton, California. Sunol, one of the first companies to market an alternative file server and network for the Macintosh, provides an economical flat-ribbon cable network that can support II's and ///'s and almost 20 other microcomputers.

The Sun Net LAN supports ProDOS, DOS 3.3, CP/M, and Pascal 1.2 for the Apple and a variety of other operating systems for the IBM PC and compatibles. At the heart of the system is the Sun*Disk Universal Networking Mass Storage System, which acts as a disk server and can be linked to up to five quadplexers to support a maximum of 16 users per network. However, you can also network Sun Net to other LANs, including AppleTalk, IBM PC Net, Ethernet, and PC Net from Orchid Technology, so they can simultaneously share the same Sunol disk drive.

The Sun*Disk is available in formatted usable storage capacities of 10, 16, 25, 44, 68, 92, and 110 megabytes, and can be purchased with the Sun*Safe option, a built-in, integral, random-access back-up tape drive. You can achieve maximum storage capacity by linking four drives together. The Sun*Disk with tape back-up starts at $3345 for the 10-megabyte model and reaches as high as $8345 for the 110-megabyte unit.

More Options on the Way

Centram Systems West, a start-up company in Berkeley, California, will be marketing TOPS, the Transcendental Network, through computer stores by the end of the year. The network is 100 percent compatible with AppleTalk Personal Network protocols and cabling. Company president Nat Goldhaber explains that the CSMA/CA network has a distributed-server architecture that can turn any computer on the network (that has a hard disk) into both a server device and a workstation. Thus TOPS will en-

Continued on p. 30.

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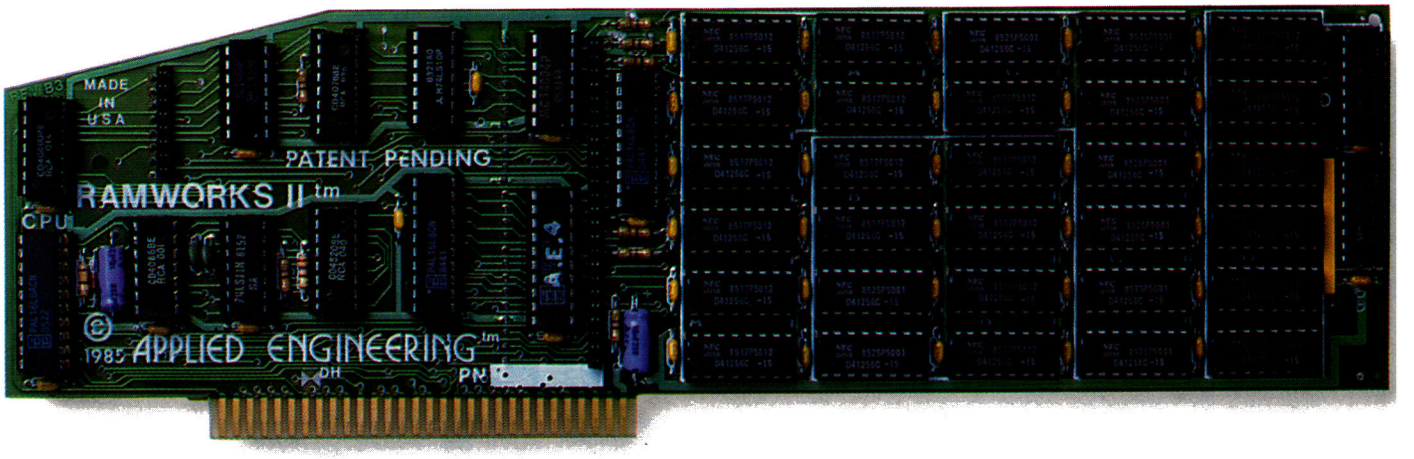

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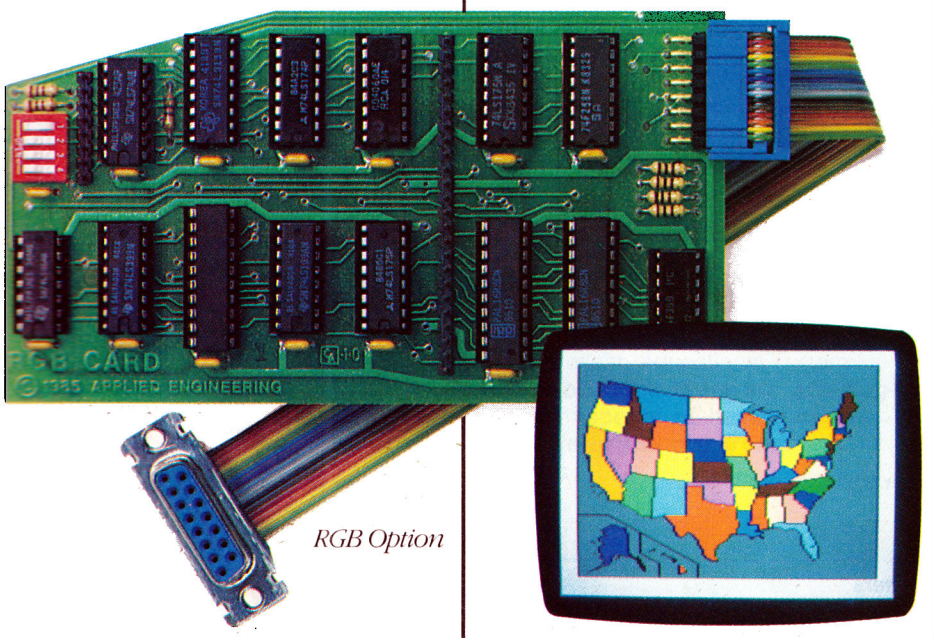
of RamWorks II memory. And speaking of more memory, RamWorks II has a memory expansion connector on board so a low profile (no slot 1 interference) memory expansion card can add another 512K or 2 MEG of memory.

Should you ever run low on memory with RamWorks II (unlikely) you can add these expander cards to your RamWorks II at any time. And of course, these expander cards are compatible with original RamWorks too.

It's In Color.

The same slot that's used for memory expansion is also the slot that's used for RGB color display. RamWorks II lets you decide later to add RGB color. For only $129, an RGB option can be added to RamWorks II to give you double high resolution color graphics and 80 column text. All with razor sharp, vivid brilliance that's unsurpassed in the industry. The RGB option does not waste another valuable slot, but rather plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and attaches to any Apple compatible monitor. And remember. You can order the RGB



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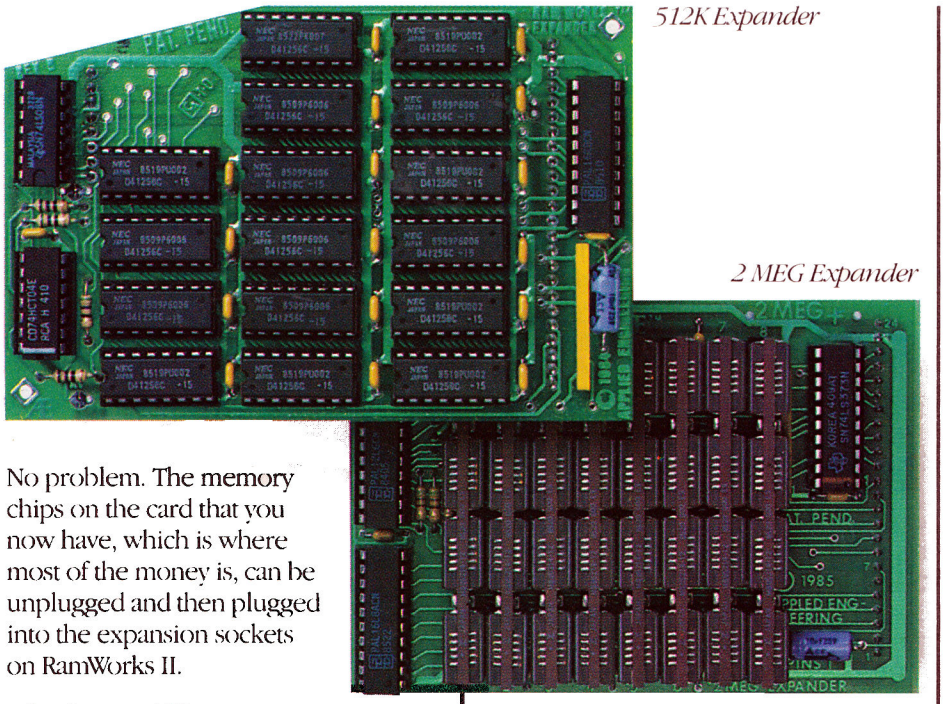

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Continued from p. 26.

able an Apple II with an external hard drive, a Macintosh installed with Hyperdrive, or an IBM AT (or all three) to work as the network's file server.

The other distinctive feature about TOPS is its interoperating system capabilities. A user can access files on dissimilar systems without closing out the file he or she is currently working on. And, the user can use the accessed files as if they were internal to his or her own machine.

For example, a Macintosh user running Lotus Development Corporation's Jazz can use files created by Lotus 1-2-3 on a remote IBM XT. Goldhaber explains that the TOPS software translates the requests of a given operating system into generic requests it recognizes on remote target machines.

At the moment, TOPS is targeted for the Macintosh, IBM PC, and compatibles, and for CP/M 80, UNIX, and other operating systems. Although in its current form the product doesn't support the Apple II series, Goldhaber says this will change by the end of the year, even if Centram has to develop its own adapter card.

TOPS and AppleTalk could be available for the Apple II at roughly the same time, thus opening up some extremely cost-effective solutions to networking the Apple.

A Rule of Thumb for Shopping

It's difficult to compare LAN costs because storage and performance factors vary considerably from vendor to vendor. Furthermore, the cost per workstation of tapping into an existing LAN is quite unlike the cost per workstation of installing a new LAN, which may incur "hidden costs" such as cabling, technical training, and software modification. And, as the market develops, costs tend to drop, thus adding a new twist to pricing estimates.

Some rules of thumb, however, still apply to the LAN market. In general, you can expect to pay more for the products with the greatest speed and performance capabilities and the highest level of network services. Thus, a network with vertical compatibility that communicates with an IBM mainframe is likely to be more costly than a simple, flat-ribbon-cable LAN that can talk only to other personal computers.

It's also a safe bet that customized systems and software will have a higher price tag than off-the-shelf products. The newer the technology, the more it will cost to use. A good example of this is fiber-optic cable, which is considerably more expensive than the widely used twisted-pair wiring.

There's a bright side to the task of shopping for a local area network, if you use an Apple II or Apple /// system. Unlike the hapless IBM PC user who has a score of products to wade through and evaluate, the II operator has a fairly limited selection to choose from, hence a simpler job—at least for the moment. A new marketing emphasis by Apple on the II series, should it appear, and AppleTalk compatibility may expand the networking horizons for Apple II owners in the future.■

Vendor Information for Local Area Networks

Centram Systems West
2372 Ellsworth Avenue
Berkeley, CA 94704
(415) 644-8244

Reader Service Number 302

Corvus National Educational End-Users Group (CNEEUG)
(publisher of *The Networker*)
4601 College Boulevard
Farmington, NM 87401
(505) 326-3311

Reader Service Number 303

Corvus Systems
2100 Corvus Drive
San Jose, CA 95124
(408) 559-7000

Reader Service Number 304

DataPro Research Corporation
1805 Underwood Boulevard
Delran, NJ 08075
(609) 764-0100

Reader Service Number 305

Nestar Systems
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Palo Alto, CA 94303
(415) 493-2223

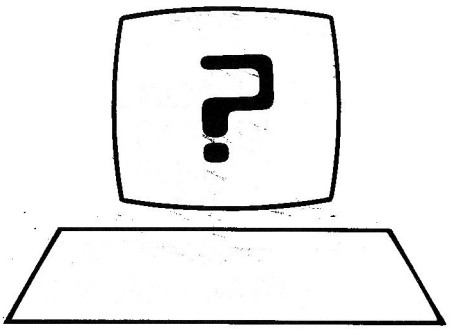
Reader Service Number 306

Sunol Systems
P.O. Box 1777
1187 Quarry Lane
Pleasanton, CA 94566
(415) 484-3322

Reader Service Number 307

BACKTALK

The Classroom Computer Battle



"Computer literacy" is one of the latest buzzwords circulating through academic corridors. People bandy the term without batting an eyelash—and without knowing what it really means.

Two philosophies of computer literacy exist. Some maintain that computer literacy involves teaching the theory, application, and mechanics of the technology: binary data, memory capacity, architecture, input, output. Others equate the term with implementing the technology to teach course curricula and improve reading and writing skills.

Advancing the Technology

According to this school of thought, improving computer technology supersedes all other applications. The processes that make a computer "think" constitute the content of course instruction. Students fill their notebooks with flow charts, binary code, and technical terminology.

Advocates believe it's important to teach computer theory and advance the principles of the technology.

For the Sake of Learning

Members of the other camp, followers of computer-aided instruction, see the computer as a teaching tool—like the blackboard or television set—used to promote learning among students. Teachers use the computer to help convey concepts in courses such as math, science, English, and social studies. The applications are limitless, given the creative possibilities the computer provides. Computer literacy, to these people, means using the computer to teach students how to think better.

It's Your Turn

How do you define computer literacy? Let us know. Use your modem and call our bulletin-board system at (603) 924-9801, to answer our survey on computer literacy. The procedure is easy. Once on the BBS, you'll see a menu of supported commands. Type in POLL after the command prompt and the survey will appear.

If you don't have a modem, simply complete the questionnaire below and mail it to BackTalk, *inCider*, 80 Pine Street, Peterborough, NH 03458.

Please send us your responses—by modem or mail—before November 15, 1985. We'll publish the results in the January 1986 issue.■

1) Do you think children should use computers in school?
a) yes
b) no

2) Are you a (check all that apply):
a) teacher
b) student
c) parent

3) If you think children should use computers in school, what applications should be taught (check all that apply)?
a) hands-on applications (such as word processing and simple data-base use)
b) programming courses
c) computer-aided instruction in daily academic subjects

4) Why do you think it's important for children to learn about computers in school?
a) to provide the training ground needed to advance the nation's computer technology
b) to help develop and refine students' thinking skills
c) to introduce students to basic computer theory and prepare them for future jobs

5) Computers in the classroom:
a) can never take the place of teachers
b) enhance children's educational experience
c) threaten the structure of the American educational system

6) Do you think there are any negative aspects of having computers in the classroom?
a) yes
b) no

7) If yes, do you think computers will:
a) decrease student-teacher interaction
b) stifle students' creative thought
c) encourage students to break into the national security system

8) I define computer literacy as...

MANAGING YOUR CHECKBOOK?
MANAGING YOUR BUDGET?
MANAGING YOUR BILLS?
MANAGING YOUR CASH FLOW?
MANAGING YOUR TAXES?
MANAGING YOUR INSURANCE?
MANAGING YOUR STOCKS?
MANAGING YOUR BONDS?
MANAGING YOUR REAL ESTATE?
MANAGING YOUR TAX SHELTERS?
MANAGING YOUR SAVINGS?
MANAGING YOUR MORTGAGE?
MANAGING YOUR AUTO LOAN?
MANAGING YOUR RETIREMENT?
MANAGING YOUR CALENDAR?
MANAGING YOUR CHARGE ACCOUNTS?
MANAGING YOUR CAPITAL GAINS?
MANAGING YOUR ANNUITIES?
MANAGING YOUR APPOINTMENTS?
MANAGING YOUR DIVIDENDS?
MANAGING YOUR INTEREST?
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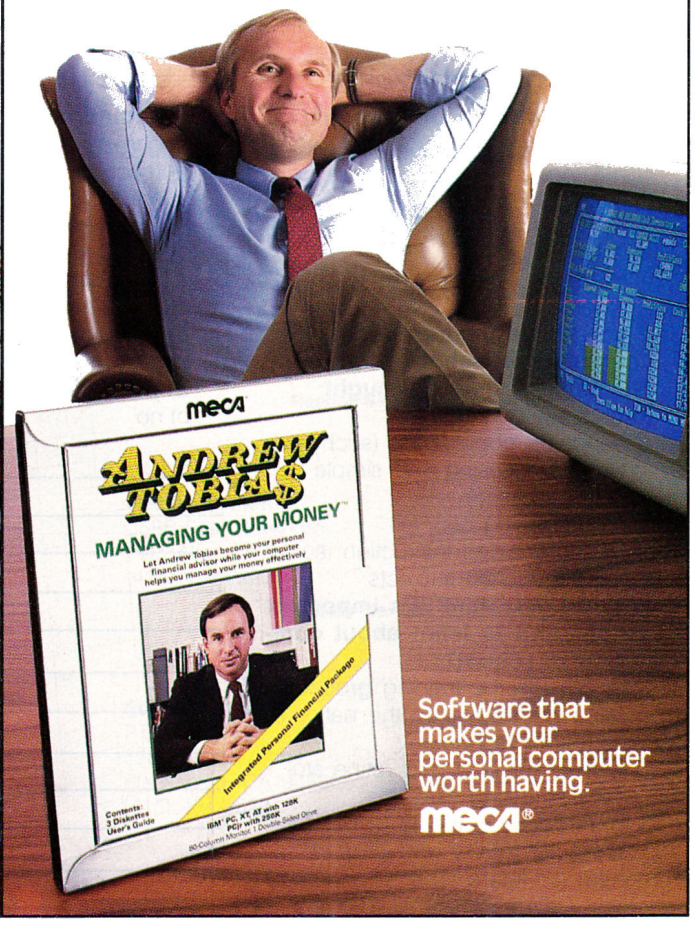

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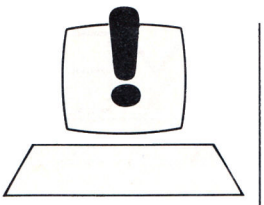
BACKTALK

Honor Among Thieves



People are talking. . .about software piracy. A few months ago, we asked what you thought about software piracy—copying copyright-protected programs. (See BackTalk, September 1985, p. 42.) The topic hit home—and the software library—for many of you, and provoked some interesting comments. Not to mention that a few of you proud, defiant souls noted that you sent your survey responses on pirated word-processing programs.

Of those responding to the survey, 58 percent indicated that they thought software piracy is an acceptable practice. The reason: Software is too expensive.

"Prices for software packages these days are ridiculous. I'd gladly buy 'legal' copies of software from manufacturers if they were closer to the $10 to $15 range. Software companies need to realize that they are no longer selling their products to the rich. Today, the middle class can afford computers but still can't afford the software."

"As a software pirate, I see nothing wrong with piracy at all. Sure, there are moral implications, but software companies harbor a feeling of distrust toward the consumer. Pirates resent that. My friends and I aren't into pirating for profit; we're defying the establishment and bringing attention to a problem."

Closing In

Although our survey gives pirates the upperhand, they shouldn't get too comfortable. Forty-one percent don't condone piracy.

"It's unfortunate, but there are far too many businessmen whose integrity falls far below that of an alley cat in heat."

"Anyone who doesn't understand that software piracy is the theft of intellectual property is mentally deficient. Those who understand but choose to commit this criminal act are common thieves."

"Would you steal a Porsche because it's too expensive, and you can't afford it? The only reasons pirates do what they do is because they think they can't be caught."

"A pirate doesn't have to be brave or strong. He can copy disks in the quiet of his own home with relatively little chance of being caught. It's like the drug addict shooting up in his own kitchen. He doesn't care what damage he does, he just does it."

"There is no difference between piracy and stealing. I can't see any difference between piracy and an employee of mine walking out with a tape—a potential sale has been lost!"

But Then Again. . .

Despite a vocal minority condemning software piracy, 68 percent of the respondents admitted that they owned illegal copies of copyrighted programs. Most made the copies themselves or received them from friends at no charge. And the majority (64 percent) said they have never refused to buy a program because it was copy-protected.

As many survey participants remarked, software piracy isn't a black-and-white issue. The gray areas leave room for those swaying between the extremes.

"I don't think programs should be copied except for back-up purposes. At school, however, the budget prevents buying separate programs for each computer. We have no choice but to copy."

Keep in mind that one study can't provide the detailed investigation required for in-depth research. But what it does offer is an idea of what you think about the topic: Software piracy (a.k.a. copying copyright-protected programs) is acceptable when done for your own use and not for profit. ■

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PASCAL PRIMER

Facts on Filer: Part 1

by Tom Swan

Apple Pascal is more than a programming language—it's a programmer's toolbox, complete with editor, linker, assembler, and Pascal compiler. In this four-part series, I'll take a close look at one of Apple Pascal's most useful tools, the Filer.

The Filer is a special program for manipulating files such as SYSTEM .WRK.TEXT, or peripherals like PRINTER: and CONSOLE:. For example, the Filer transfers, removes, examines, and changes files. It also lists directories, verifies disk blocks, and investigates the peripheral devices in your computer. **Table 1** lists the Filer commands I'll cover this month.

One useful tool of the Pascal trade, the Filer, helps you manipulate your files and peripherals.

Starting the Filer

To start the Filer, type F from the main Pascal command line. The screen will display one of the menus shown in the **Figure**, depending on whether or not you have an 80-column display. (The top menu is for an 80-column display; the abbreviated menu below it is the normal display.) To switch from one display to the other, follow the instructions in the accompanying sidebar.

File Names

An Apple Pascal file name has three parts—volume, name, and extension. *Volume* tells you the file's location, *name* identifies it, and *extension* indicates the file's contents. An example of a complete file name is APPLE1:MYPROG.TEXT—the volume is APPLE1:, the name MYPROG, and the extension .TEXT.

Volume names, up to seven characters long, end in colons and refer to peripheral devices. For example, APPLE1: and APPLE2: are the volume names of those disks (also referred to as units 4 and 5). To use the unit numbers in a volume specification, precede them with a number sign: Volume #6: is just another way of writing PRINTER:.

Extensions begin with periods, and are usually four characters long. Examples include .TEXT for text files, .DATA for data files, and .CODE for program code files. You can also have shorter or longer extensions, as in SYSTEM.LIBRARY and NEW .MISCINFO, or none at all.

File and volume names must begin with a letter, but can contain digits and punctuation. Together with its extension, a file name may not exceed 15 characters. Adding a volume specification and colon makes 23 characters, the maximum file-name length.

Block Versus Character Devices

Some volumes, such as PRINTER: and CONSOLE:, are character devices—they handle input and output one character at a time. Others, like disk drives #4: and #5:, are block-structured—they handle input and output one block, usually 512 bytes, at a time.

The Filer sometimes expects you to specify a character device, and at other times, a block-structured volume. If, for example, you try to list a directory of the PRINTER:, you'll see the following error message indicating that only blocked volumes have directories:

```
Unblkv vol, File/(blkd vol) expected
```

Wild Cards

By inserting wild-card characters into file names, you can operate on all files sharing common volumes, names, or extensions. **Table 2** explains the five wild-card characters the Filer understands.

As an example of the use of wild cards, start the Filer, then put disk APPLE3: into any drive. Type T to select the T(ransfer operation, then duplicate the following dialogue:

```
Transfer what file? APPLE3:?.TEXT
To where? CONSOLE:
```

Table 1. Filer commands covered in this month's column.

General-Purpose Commands

C(hange	Changes file or volume name
R(emove	Removes a file
T(ransfer	Transfers file or copies blocks

System Commands

D(ate	Sets the system date
P(refix	Changes default disk drive
Q(uit	Returns to command level

Figure. Although this figure shows both parts of the Filer's menu line, you'll see only one at a time on your display. Type ? to switch from one line to the other. To select a command, type its first letter. The number in brackets shows the Apple Pascal version number.

```
Filer: G(et, S(ave, W(hat, N(ew, L(dir, R(em,
C(hng, T(rans, D(ata, Q(uit [1.2]
Filer: B(ad-blks, E(xt-dir, K(rnch, M(ake,
P(refix, V(ols, X(amine, Z(ero [1.2]


Filer: G, S, N, L, R, C, T, D, Q [1.2]
Filer: W, B, E, K, M, P, V, X, Z [1.2]
```

Let's compare Apples™ to Apples™.

An Apple IIc

An Apple IIc with Z-RAM

The Apple IIc on the right works exactly the same as the Apple IIc on the left. Almost. The Apple on the right has a powerful memory expansion coprocessing card called Z-RAM. From Applied Engineering. Which means the Apple on the right can completely load AppleWorks into RAM—and then run it up to thirty times faster than the Apple on the left.

Z-RAM also acts as a solid-state disk drive. Which means the Apple on the right will load and store programs up to 30 times faster. And, our included RAM disk is compatible with Applesoft, PRO-DOS, DOS 3.3, PASCAL and CP/M.

Turbo Charged AppleWorks.

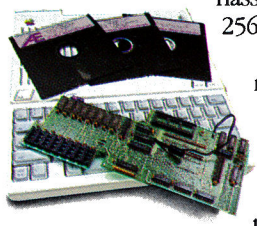
Even a 256K Z-RAM can completely load AppleWorks into RAM. With Z-RAM, the moment your fingers touch the keyboard AppleWorks responds. A 256K Z-RAM lets your IIc run AppleWorks up to 30 times faster, increases available desktop to 229K and maximum number of records from 1,350 to over 16,000, doubles the number of lines allowed in the word processor, provides a print spooler, and auto-segments large files so they can be saved on two or more disks. A 512K Z-RAM boosts AppleWorks desktop to an incredible 413K.

Take a closer look.

There's more. Z-RAM has a built-in high speed Z-80B microprocessor that allows you to run CP/M programs. Which means you now have access to the single largest body of software in existence, including popular packages like WordStar, dBase II, Turbo PASCAL and Microsoft BASIC.

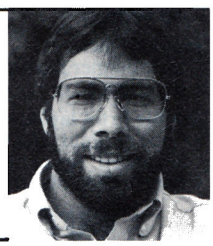
And still more. Z-RAM is compatible with all IIc software and hardware, installs easily in just ten minutes with a screwdriver (slightly longer without), is available with 256K or 512K of additional memory (a 256K Z-RAM can be upgraded to 512K at any time). Z-RAM is easily handled by the IIc power supply with our patent pending power saving design.

The only thing better than that would be a recommendation from Steve Wozniak.



"I recommend Applied Engineering products wholeheartedly." (Of course, Steve's IIc has a Z-RAM installed.)

Steve Wozniak, the creator of Apple Computer.



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PASCAL PRIMER

Table 2. Wild-card characters.

Wild Card	Description
*	The current root volume, usually the boot disk. If you booted with APPLE1:, the file name *SYSTEM.LIBRARY locates the library file on that volume.
:	The prefixed volume as set by the P(refix command. If you set the prefix to APPLE3:, you can use the file name :TEST.TEXT rather than APPLE3:TEST.TEXT.
=	Matches any character(s) here. The file name #5:=.TEXT means "all volume #5: files ending in .TEXT."
?	Matches any character(s) here and prompts before completing the operation. If you enter #4:?.CODE to delete files, the Filer prompts you before it deletes each .CODE file on volume #4:.
$	Uses the same name for the destination file as the source. If you're transferring files, typing #4:=.TEXT,#5:$ means "transfer all .TEXT files from volume #4: to volume #5: and give them all the same names and extensions."

The question mark in APPLE3:?.TEXT indicates your intention to display all APPLE3: files ending in .TEXT. It also tells the Filer to prompt you before each transfer. To each of those prompts, press the Y key to view a file, the N or return key to proceed to the next one, or the escape key to cancel the transfer command and return to the Filer menu. Control-S starts and stops scrolling.

Source and Destination Files

The T(ransfer and C(hange commands require two file names—a source and a destination. If you enter the source alone, the Filer asks for the destination. Or, you can enter both at the same time. To see an example, type T; then at the prompt, type APPLE3:=.TEXT,PRINTER: to transfer all .TEXT files on volume APPLE3: to your printer (assuming you have one). Use a question mark instead of an equals sign if you want the Filer to prompt you before transferring.

When both the source and destination are disk files, if one has a wild-card character, then so must the other. If you want to change all volume #5: files ending in .TEXT to .BACK, for instance, type C and then answer the prompts as follows:

```
Change what file? =.TEXT
Change to what? =.BACK
```

If you forget the equals sign in the destination file, the Filer gives you the error:

```
Bad form (Wild <to> Non-Wild) card
```

Now, if you've been following along, use the same method to change all .BACK files back to .TEXT.

The Filer Commands

In the descriptions that follow, <file> means any file specification, which might include a volume, name, and extension; <vol> means any volume alone; and a vertical bar | means "or."

If you get into trouble while using a command, pressing the escape and return keys should bring you back to the Filer menu. Avoid pressing control-reset; because many commands affect the disk directory, interrupting an operation by resetting can easily destroy all data on a disk.

C(hange

Type C to change file or disk-volume names. Type in the old name, press the return key, then type the new name. Or, type both names separated by a comma, as the format below shows:

```
<old-file>,<new-file>
| <old-vol>,<new-vol>
```

If the change succeeds, you'll see the message:

```
<old-name> --> <new-name>
```

To rename a volume, enter new and old volume names ending in colons. The formatter program gives newly formatted disks the name BLANK:, so you should always change these names. To do that, type C and enter BLANK:, MYDISK: at the prompt.

Never insert two disk volumes of the same name at the same time. The Filer might mix the two directories and destroy data in files. If you ever receive the message "Warning units 4 & 5 have the same name," immediately change one of the duplicate volume names to something else.

R(emove

The R(emove command removes a specified file <file> from a disk directory. The Filer shows you all af-

fected files before actually removing them. If you enter the specification =.TEXT, you might see the following list:

```
APPLE2:MYPROG.TEXT    --> removed
APPLE2:DEMO.TEXT      --> removed
APPLE2:TESTS.TEXT     --> removed
Update directory ?
```

Answer Y to remove the named files permanently. Pressing the N, return, or escape key cancels the removal and makes no changes in the disk directory.

If you want the Filer to prompt you before each removal, use a question-mark wild card. If you enter *?.CODE to remove code files on the root volume, for example, you can answer Y or N to the Filer prompts:

```
Remove APPLE0:TEST.CODE ? Y
Remove APPLE0:SYSTEM.WRK.CODE ? N
Update directory ?
```

If you answer Y, the Filer removes TEST.CODE, but leaves SYSTEM.WRK .CODE undisturbed—a recommended practice. Directly removing work file SYSTEM.WRK.TEXT or SYSTEM.WRK .CODE mildly confuses Apple Pascal. Instead, use the N(ew command to clear old work files.

T(ransfer

Type T to transfer either files or entire volumes from one location to another.

```
<file-source>,<file-destination>
' <vol-source>,<vol-destination>
```

Use a dollar-sign wild card to give the destination file the same name as the source. For example, to transfer the graphics demo program from APPLE3: to your boot disk, enter:

```
APPLE3:GRAPHDEMO.CODE,*$
```

By specifying volume names or numbers, you can also copy entire disks. Format the destination disk before transferring. To copy APPLE2: to a blank disk in volume #5:, enter APPLE2:, #5: at the prompt.

The Filer asks if you want to transfer 280 blocks, the normal size of an Apple disk. Answer Y. Advanced users can answer N, then specify a different number of blocks to transfer. Experimenting is risky, though; you can easily lose files.

Next, the Filer asks if you want to destroy the directory of the destination disk. Answer N to cancel the transfer, or Y to proceed.

If you have only a single disk drive, the Filer asks you to insert one vol-

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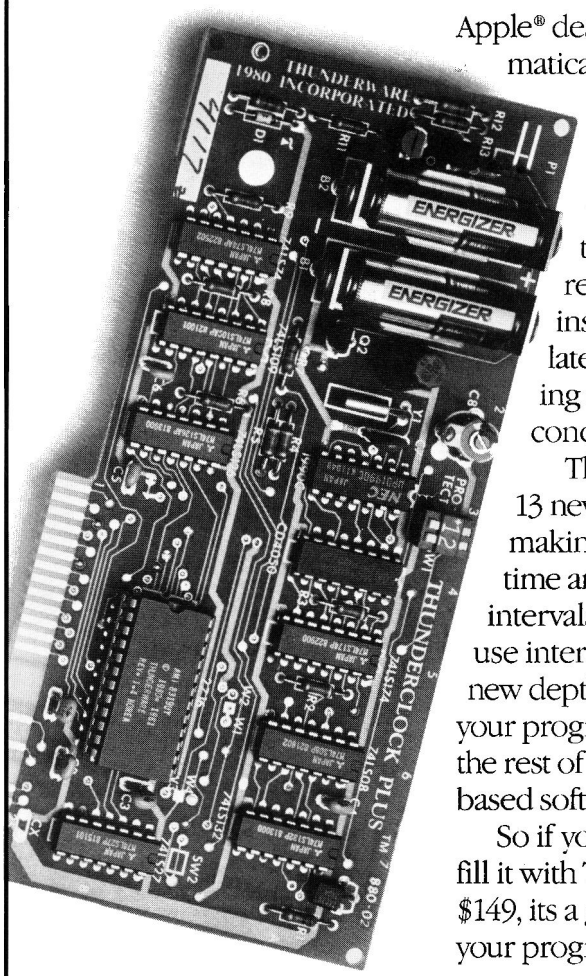

Thunderclock comes with a one-year warranty. On-board batteries keep it running accurately for up to four years before simple battery replacement.

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ume after the other. Just follow the messages on your display. If you have more than one drive, you'll see the messages only if you transfer to and from the same drive.

D(ate

Type D to set the system date. The Filer stores the date in a file's directory whenever a program writes to or creates a file. Whenever you boot to Apple Pascal, the Filer shows the date it recorded on your boot disk the last time you changed it.

The following lines show how to change the date from 1-Nov-85 to 2-Nov-85:

```
Date set: <1..31>-<Jan..Dec>-<00..99>
Today is 1-Nov-85
New date ? 2
The date is 2-Nov-85
```

If you don't want to change the date, just press the return key instead of typing a new date. To save typing, enter only the portion of the date that changes. The examples in **Table 3** show different ways to enter dates.

Table 3. Entering dates.

Current Date	Enter	New Date
1-Nov-85	5	5-Nov-85
5-Nov-85	-Dec	5-Dec-85
5-Dec-85	--64	5-Dec-64
5-Dec-64	15-Jan	15-Jan-64
15-Jan-64	1-Nov-85	1-Nov-85

P(refix

Unless you specify a volume name or number, the Filer looks for files in the prefixed volume. After you boot the disk, your boot disk's name becomes the prefix. To change the prefix, type P and enter a different volume name.

A lone colon references the prefixed volume. To transfer APPLE3:GRAPHDEMO.TEXT to APPLE2:, first set the prefix to APPLE2:. Next, insert APPLE3: and type T to T(ransfer. Then, type the following data at their respective prompts:

```
Transfer what file?
APPLE3:GRAPHDEMO.TEXT
To where? :$
```

The characters :$ mean "to the prefixed volume, under the same file name." To discover the current prefix setting, type P and a colon. The Filer then tells you the volume name.

Q(uit

Type Q to quit the Filer and return to Apple Pascal's main command menu. Because of the way Apple Pascal keeps portions of itself on disk, if you type Q without your original boot disk in #4: (drive 1), you'll see the message, "Put in APPLE1:" (assuming of course, you booted with APPLE1:).

Apple Pascal 1.2 then pauses for you to insert APPLE1: and press the return key. Earlier versions of Apple Pascal, however, repeatedly check for the root volume. If that happens, you can insert APPLE1: even though the disk-drive light is on. Normally, you shouldn't open drive doors while the disk is spinning, but in this case, there's no alternative except rebooting.

Next Month

Next month, I'll show you how to use more commands in the Filer, and how to write your own programs to access disk files.■

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

Abbreviated or Descriptive Display

1) Run the SETUP utility program. Insert disk APPLE3:, press the X key to execute a file, and type APPLE3:SETUP. Single-disk-drive users should transfer SETUP.CODE from APPLE3: to APPLE0:, then execute APPLE0:SETUP.
2) From the CHANGE: menu, type C to select operation C(HANGE.
3) Type S to select operation S(INGLE, then type SCREEN WIDTH to display the screen-width information.
4) Type Y to change a value, then enter 80 for a full Filer menu, or 79 for the abbreviated version. It doesn't matter how many columns your display actually has.
5) After you enter a value, SETUP displays the new setting and asks if you want to change it. Press the N key to keep that setting and return to the CHANGE menu, or press the exclamation mark to ignore any change you made.
6) Type Q to quit changing and bring up the QUIT: menu.
7) Type M to make your changes effective in M(EMORY, then D to create file NEW.MISCINFO on your boot disk. To make Pascal recognize your changes the next time you boot, change that file to SYSTEM.MISCINFO.
8) When you're done, press the E key to E(XIT the SETUP program. Your changes take effect immediately if you've updated them to memory.□ **—T.S.**

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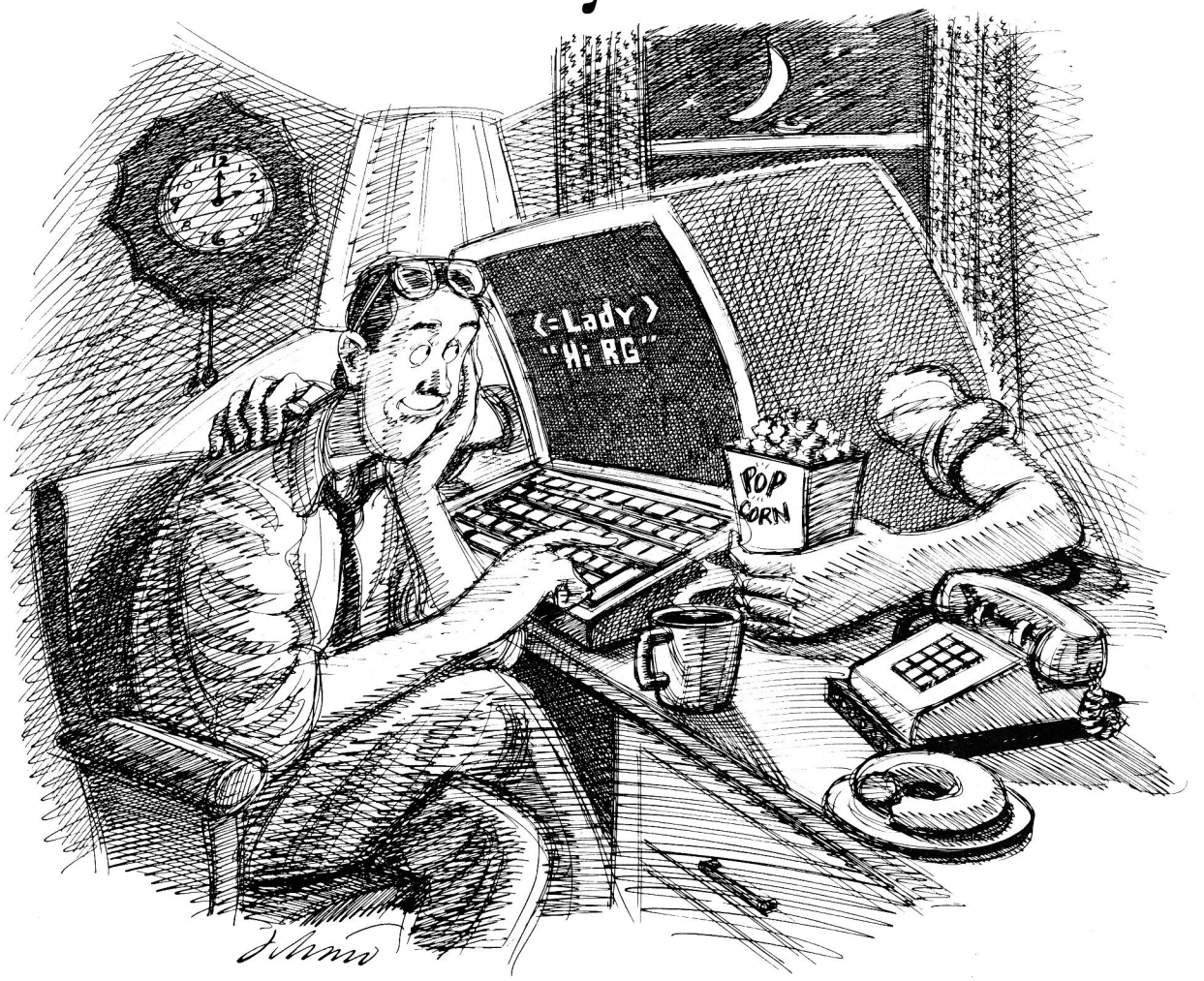

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HINTS/TECHNIQUES

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

Routine Maintenance

by Dan G. McCartney

You may want more flexibility with data input than the BASIC GET and INPUT commands offer. The routines presented here provide simple alternatives.

If you have an Apple-compatible 80-column card in your computer, GET doesn't recognize the escape key (ASCII 27) as a possible keyboard response when that card is active (see "80-Column Escapism" in the October 1985 Ask *inCider*). The reason is that when you press any key except the escape key, its high bit is set, adding 128 to the ASCII code. The routine in **Listing 1** remedies this problem.

When you use the GET and INPUT commands, the delimiter to indicate the end of string input is the return key (141), so you are unable to include carriage returns in your string. The routine in **Listing 2**, however, lets you designate your own delimiter—the delete key (255) is a good alternative (line 41100).

Although the INPUT command displays characters on screen as you type them, the GET command doesn't. If you add the following line to **Listing 2**, your program will print those string characters (the semicolon at the end of the line suppresses the carriage return):

```
41080 PRINT A$;
```

Additionally, you can display control characters on screen without fouling up the display by adding the line below:

```
41070 IF A < 160 THEN INVERSE:PRINT
      CHR$(A+64);:NORMAL:GOTO
      41100
```

Finally, you can add a cursor:

```
30010 PRINT "_ ";CHR$(8)CHR$(8);:
      REM Again note the final
      semicolon
```

Listing 3 is a skeletal program demonstrating the use of these routines. The program ends if you press the escape key or if your string input (N or n) indicates that you do not want to continue. Otherwise, the program prints your input.

One drawback to using the string-input routine is that you have to specify unusable characters. For example, you might want to add a line to eliminate control-U since it turns off the 80-column card. Also, if you want to backspace (← or control-H) to correct mistakes, you should insert a line similar to the following:

```
41060 IF A = 136 THEN S$ = LEFT$
      (S$,LEN(S$) - 1): PRINT A$;:
      GOTO 41000 :REM Don't forget
      the semicolon
```

Another problem is that string input is rather slow if your program is long, since the routines are in Applesoft BASIC. The routines are there if you need them, though, and the advantage of having an additional technique in your programming repertoire will outweigh any minor difficulties.■

Write to Dan G. McCartney at 3010 Turner Avenue, Roslyn, PA 19001.

Listing 1. Escape-key solution.

```
30000  REM "GET" ROUTINE WITH "ESC" POSSIBLE
30020 A = PEEK (49152)
30040  IF A = 27 THEN A$ = CHR$ (A): RETURN
30060  IF A < 128 THEN 30020
30080 A$ = CHR$ (A - 128): POKE 49168,0
30100  RETURN
```

Listing 2. Delimiter designation.

```
40000 S$ = CHR$(13)
41000  GOSUB 30000
41050  IF A = 27 THEN POP: GOTO 120: REM or to wherever you want to ESCAPE
41100  IF A < > 255 THEN S$ = S$ + A$: GOTO 41000
41200  PRINT : RETURN
```

Listing 3. Sample program.

```
100  PRINT "DO YOU WANT TO CONTINUE? ";: REM GET A RESPONSE
110  GOSUB 30000: PRINT A$
120  IF A = 27 THEN PRINT "Escape is activated": END
130  IF A$ = "N" OR A$ = "n" THEN END
140  IF A$ < > "Y" AND A$ < > "y" THEN PRINT CHR$ (7): GOTO 110
150  REM INPUT A STRING
160  GOSUB 40000
170 P$ = S$
180  PRINT P$
190  GOTO 100
```

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Programming Above HGR

by Richard Putt

A long program that uses high-resolution graphics often spills over into memory space reserved for the hi-res graphics display. Free memory space (where the computer places a program) begins at memory location $801, and hi-res graphics page 1, at memory location $2000—allowing a total of only 6K bytes in which to program. (A program occupying about 24 sectors on a disk can easily fill this space.) Lines at the end of the program consequently vanish when you run the program, because the HGR command clears whatever resides in the graphics-screen area.

Using HGR2—the second page of hi-res graphics, which occupies memory locations $4000–$5FFF—instead gives you 14K bytes for your program. This graphics page, though, lacks the split-screen ability of page-1 graphics, which lets you have four lines of text at the bottom of the screen.

Table. Monitor procedure to move the beginning of free memory from $801 to $4001.

Prompt	Type In	Meaning
]	CALL – 151	To enter the Monitor
*	67:01 40	Pointer to start of program
*	4000:00	
*	3D0G	Return to BASIC
]	NEW	Reset other pointers

Listing 4. *From a text file, enter the following program to move the beginning of free memory from $801 to $4001.*

```
10 D$ = CHR$(4)
20 PRINT D$ "OPEN HI.START"
30 PRINT D$ "WRITE HI.START"
40 PRINT "CALL - 151"
50 PRINT "67:01 40"
60 PRINT "4000:00"
70 PRINT "3D0G"
80 PRINT "NEW"
90 PRINT D$ "CLOSE HI.START"
```

A better solution (one that lets you use HGR and its text window) is to move the starting location of your program from $801 to $4001, the location just above the HGR screen. You can do this directly from the Monitor by following the procedure in the **Table**, or by EXECing a text file after you enter **Listing 4** presented here.

After you run **Listing 4**, catalog your disk. This writes a text file called HI.START on the disk. The command EXEC HI.START executes the commands stored in this text file, enabling your program to occupy the space above the hi-res screen. ■

Write to Richard Putt at 113 Harrisburg Pike, Dillsburg, PA 17019.

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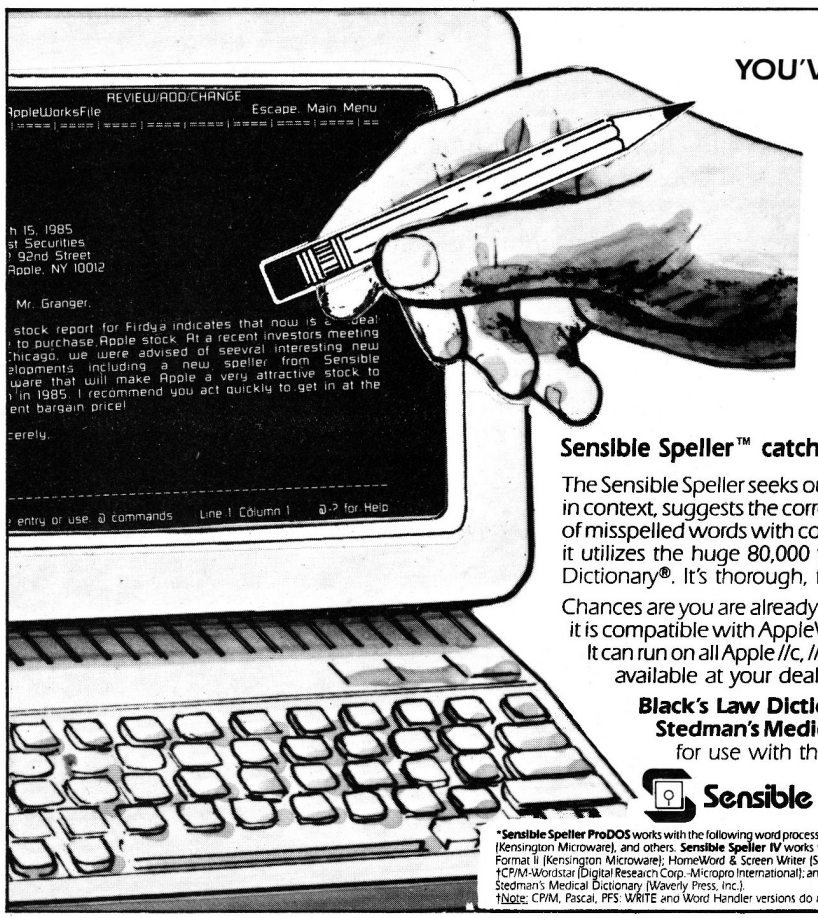

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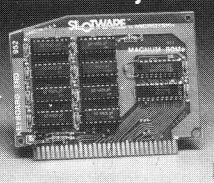

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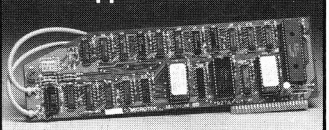

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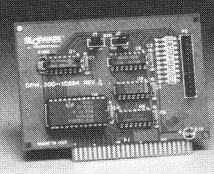

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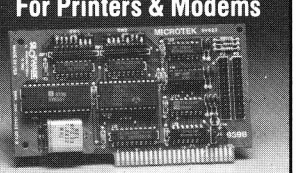

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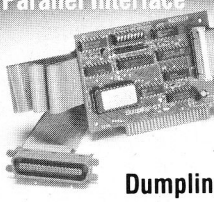

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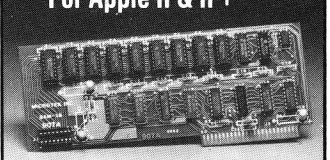

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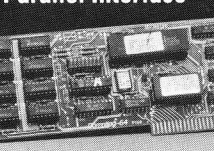

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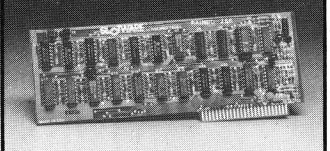

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APPLE CLINIC

by Jim Sather

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

Selectric Interface

In your March column, you indicated you use a converted IBM Selectric typewriter as a printer. Will you tell me how you adapted it and if you find it satisfactory? The dot-matrix and daisy-wheel printers I've tested to date are unsuitable for printing multiple copies on NCR paper. It would be wonderful to do invoicing on an Apple-compatible printer with the impact pressure I need.

A final question: Dare I hope that the commands directing your Selectric are similar to those for Epson MX/FX?

Peter R. Lippman
Katonah, NY

Boy, the mention of a Selectric connected to my Apple sure caused a few readers to perk up. I thought my Selectric was one of my many dinosaurs, but apparently some people would like to have a dinosaur just like mine. Unfortunately, I can't tell all my would-be fellow cavemen how I adapted a Selectric to the Apple because I didn't do it—a small San Diego company specializing in such things did. For about $500, SSI Electronics sold me a used IBM 1980 buffered terminal, overhauled it, and added its own solenoid power supply and Apple interface card with onboard firmware. It was a good buy.

You can't buy an IBM like mine from SSI Electronics anymore—the company went out of business. After all, who would buy a used mechanical monster when a new mechanical pussycat (a daisy-wheel printer) can do almost the same thing for the same price? True, a number of persons and companies needing the superior text quality of IBM Selectric printouts would be willing to pay the price of slow speed and occasional servicing, but there weren't enough to keep SSI in business.

One problem in discussing Apple/Selectric interfaces is that people refer to every IBM typing machine with a type-ball print mechanism as a "selectric." That class of IBM Selectric typewriter, which has no control-input connection of any sort, is difficult to interface to a computer. IBM electronic typewriter models 50, 60, 65, 75, 85, and 95, however, have both a Selectric-like print mechanism and a control-input jack. Applied Creative Technologies makes the ETI² interface box, which lets a computer control these typewriter models via an RS-232 or Centronics parallel port.

Another alternative is to obtain a surplus Selectric designed for use as a data terminal, like my 1980. George Young's book, The Selectric Interface, A Hands-on Approach *($12.97, 1982, Wayne Green Publications), provides a guide for interfacing computers to Model 2740 and 2980 Selectrics and to the Dura 1041 tape punch/reader. Charles Behrens' "Apple to Selectric for 83 Cents" (*Kilobaud Microcomputing, *August 1981, p. 95) shows an Apple game I/O interface circuit and 6502 drivers for a Selectric terminal with RS-232 interface built in. Mr. Behrens' terminal is a Selectric-like Carterfone S15B Data Terminal.*

All this information is admittedly sketchy, but the interfacing process is complicated. Interfacing Selectrics to computers never graduated from being a hobbyist undertaking. Even if you know where to buy an interfaced Selectric off the shelf, you'd better have a little hacker in you if you want to take on this project.

Is my Selectric interface Epson MX/FX-compatible? No way. My interface is custom-designed for an IBM terminal with no "ready to receive" feedback from the terminal to the interface card. Its firmware driver has idiosyncrasies like timed loops for timing out carriage returns and tabs. I should think, though, that a table-top interface like the ETI² would work with just about any Centronics parallel or RS-232 serial Apple interface card.

Am I satisfied with my Selectric as a printer? Not really. It's too slow, noisy, and mechanically complex. I'd rather have an upper-level daisy-wheel printer. My needs are modest, though, compared to those of companies that must print high-quality text in triplicate. I advise them to get an impact dot-matrix printer with a near-letter-quality mode and fake it. If that quality is insufficient, they can use a daisy-wheel printer or computer-interfaced daisy-wheel typewriter and a photocopier.

80-Column Control From BASIC

One day, while experimenting with my Apple //c, I discovered I could use the //c's second character set by printing flashing characters with the 80-column card deactivated, then pressing escape-4 or escape-8 to activate the card without clearing the screen. I'd like to use the second character set within my BASIC programs to get effects like those of AppleWorks or the System Utilities program. The only way I can use the 80-column card within BASIC is with a PR#3 command, but it clears the screen. PRINT CHR$(27);"8" just doesn't work. How can I use the second character set within BASIC?

Juan S. Lach
Mexico City, Mexico

You confuse me a little when you talk about a second character set, Juan. Do you mean the mousetext? In any case, the escape-4 and escape-8 commands won't work in a

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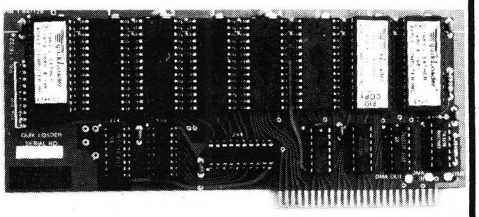


designed by Jim Sather

- **Instantly** loads DOS.
- **Instantly** loads programs.
- Stores up to 512K of programs on **EPROM.**
- Stores and catalogs up to 255 programs.
- Directions included to load your own software (requires **EPROM** programmer card).
- Plugs into any slot of the APPLE][+ or //e.
- Uses standard 27 series **EPROM**s up to 27512.
- Allows turnkey operation.
- Commercial programs available.
- Includes **DOS, FID, COPYA,** and Integer.

The benefits of **quikLoader**™ start when you turn on the computer. Standard DOS is *instantly* loaded . You may then catalog the programs available on the card by pressing **Q-reset**. Typing the index letter that appears on the left of the program name causes that program to be *immediately* loaded. We start your library of programs with the most popular utilities on **EPROM**, **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 powering on.

Saving your own programs onto **EPROM** (**E**raseable **P**rogrammable **R**ead **O**nly **M**emory) is easily done, using a seperate **EPROM** programer, (such as the **PROmGRAMER**™). For APPLESOFT™, Integer, or single machine language files, no programming knowledge is necessary. You will need experience if you want to save copy-protected or complex programs. The amount of experience necessary depends on the complexity of the program.

SYSTEM REQUIREMENTS

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

$179.50

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.

PROmGRAMER

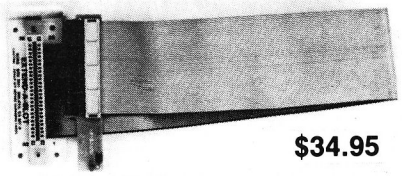
designed by Bob Brice — software by Bob Sander-Cederlof

The PROmGRAMER™ will read or program any of the standard single voltage 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.
- Choice of standard or fast programming algorithms.
- Disk-based software allows easy customization of software
- Source code included.
- Complete instructions for loading **PROmGRAMER** software into **quikLoader™.**

$149.50

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.

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.

SWITCH-A-SLOT

$179.50

designed by Joy George

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.

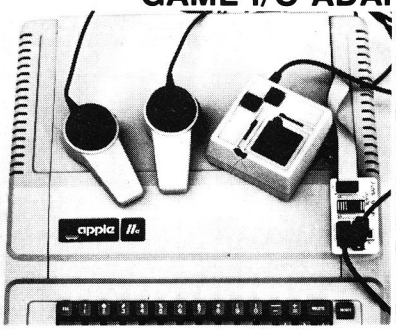
This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

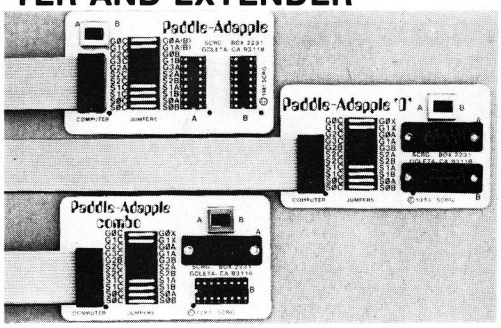
- User selects desired card by front panel rotary switch.
- Plugs into any peripheral slot
- Saves wear and tear on delicate connectors.
- 18" cable connects SWITCH-A-SLOT to computer.
- Resistive terminations for better response.

SWITCH-A-SLOT and EXTEND-A-SLOT work well with most 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. We cannot guarantee that these products will work with a particular system. We do have a money-back guarantee if it does not work for you.

Paddle-Adapple

GAME I/O ADAPTER AND EXTENDER





- Works with all APPLE™ compatible joysticks, paddles, and most other I/O devices.
- Select one of two devices or...
- Use two joysticks simultaneously
- Suggested for **One-on-One**™, **Archon**™, etc.
- Unique "JUMPERS" socket allows you to configure to meet your needs.
- Plugs into internal 16-pin game I/O port.
- Small and compact. Adhers to computer with supplied foam tape.
- All strobes, annunciators and power available on all 16 pin sockets.
- Supplied with 18" cable. **$29.95**

The **PADDLE-ADAPPLE** has two 16-pin sockets.

The **PADDLE-ADAPPLE 'D'** has two 'D' sub-miniature connectors.

The **PADDLE-ADAPPLE COMBO** has one 16-pin socket, and one sub-miniature connector.

NEW PRODUCTS

SLOT 3 CLOCK

Designed by Chuck Shaffer

for APPLE //e

- Fully supports **PRODOS**™. •APPLESOFT™ compatible.
- Designed for slot 3 (usually otherwise unusable).
- Time and date-stamp files under PRODOS.
- Long-life lithium battery included.
- Installation software included. **$79.50**

DUAL KEYBOARD ADAPTER

For Apple][and][+ only.

Allows the use of the built-in keyboard or external keyboard with no switching necessary. **$39.50**

//c keypad

This kit will give you an "embedded" keypad within your built-in keyboard. You may instantly switch between the keypad or the standard keyboard. **CAUTION** – Requires dis-assembly of the computer, and expert de-soldering and soldering ability. **$29.95**

OTHER PRODUCTS

D MANUAL CONTROLLER: Gives complete control over the $CØØØ through $CØFF range in hardware. Think of it as a hardware switch for soft switches. 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, A.S.K., 10-KEY, HEXADECIMAL KEYPAD, etc. **$49.50**

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, (in back of the computer), 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 CØ4Ø strobe, such as the POWER PAD™. Please note that the //c does not support 2-joystick games.

$14.95

16-9 Adapter

For Apple][+ or //e

This product permits the use of all 9-pin game I/O devices with the APPLE][+. By plugging this adapter into the internal 16-pin connector, you can plug in any 9-pin game game device, such as paddles, joysticks, KOALA PAD™, Muppet Learning Keys™, etc. **$14.95**

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PRINT statement because keyboard-input routines, not video-output routines, interpret them. The near-equivalent video-output commands are control-Q and control-R—PRINT CHR$(17) and PRINT CHR$(18). Unfortunately, these commands work only if you previously activate the enhanced-video firmware with PR#3. Once the enhanced-video firmware is active, you can use control-Q and control-R to switch between 40- and 80-column display without erasing the screen.

To use mousetext from a BASIC program, activate the enhanced-video firmware via PR#3, then activate or deactivate mousetext printing via PRINT CHR$(27) or PRINT CHR$(24), respectively. With mousetext activated, when you print inverse uppercase characters or the symbols @[\]^_, mousetext appears on screen. Alternately, you can set the ALTCHAR soft switch (POKE – 16369,0), then POKE mousetext ASCII (values 64–95) directly into text-display memory (locations 1024–2039). The accompanying ***Program listing*** *illustrates the printing of mousetext from a BASIC program and gives the mousetext/character equivalents. This program will run on an Apple //c or an Apple //e with enhanced firmware.*

Program listing. *Printing mousetext.*

```
10 PRINT CHR$(4); "PR#3"
20 INVERSE
30 A$ = "@ABCDEFGHIJKLMNOPQRS
   TUVWXYZ[\]^_"
40 PRINT CHR$(27);A$
50 PRINT CHR$(24);A$
```

Apple //e Enhancement

An acquaintance told me I need an Apple Super Serial interface card if I want any printer to work with an enhanced Apple //e. I'd like to know if this is true or not. I recently bought a second Apple //e with the enhancement feature to use only as a back-up system. I want to run all my software and hardware configurations on either system. I sincerely hope this is not going to be another nightmare like AppleWorks' not being able to use non-Apple products.

Robert P. Johnson
Twin Lakes, WI

Any printer-interface card that works with the old Apple //e firmware will work in an enhanced Apple //e. Nothing in Apple //e firmware or hardware mandates the use of a Super Serial card. Of course, it's always possible you'll encounter software that supports only a limited number of interface cards and printers.

I don't foresee many compatibility problems in store for those persons who own enhanced Apple //e's. Rather, owners of Apple II's, II Pluses, II compatibles, and unenhanced //e's may discover that some software written for the //c and enhanced //e won't work in their systems. I should think, however, that most software will continue to be written for all Apple II family computers. 65C02 code is a little more efficient than 6502 code, and mousetext is nice, but software publishers aren't likely to restrict the size of their market for reasons as minor as these.

Applesoft in Early Apple II

I have an early Apple II (serial number 244) and have been running an Applesoft firmware card in slot zero. I approached my local authorized dealers about switching the chips from the firmware card to the motherboard to free slot zero, but they both backed off. If I knew what went where, I could save a 120-mile round trip. Is there a source I can turn to?

I would also like to know if I can install an Autostart ROM and a Dan Paymar Lower Case 1 chip in my machine.

Tom Hudgins
Galion, OH

You can transfer the Applesoft chips from the firmware card to the motherboard. Just make sure to transfer the chips to the correct sockets. The chip from the D0 socket on the firmware card goes to the D0 socket on the motherboard, and the same goes for the D8, E0, E8, F0, and F8 sockets.

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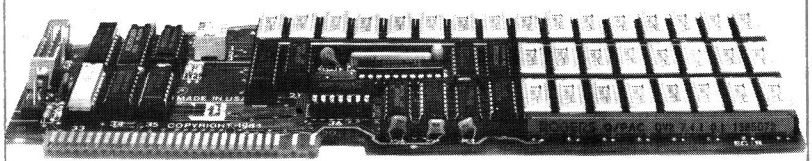
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Circle 28 on Reader Service Card.

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The Autostart ROM will work in any Apple II or II Plus motherboard. Install it in the F8 socket. The Dan Paymar lowercase adapter comes in two versions—one for early motherboards and one for revision 7 and later motherboards. You need the one for early motherboards, but I'm not sure which one you have now. For the straight story on lowercase adapters, call or write Dan Paymar, 91 Pioneer Place, Durango, CO 81301, (303) 259-3598.

AppleWorks on Franklin

In the March 1985 Apple Clinic, you stated that AppleWorks won't work properly in a Franklin ACE computer. I'd like to inform you that Videx Corporation now makes a pre-boot disk called AppleWorks Modifier that allows use of AppleWorks on an Apple II or II Plus. Despite the usual "ProDOS doesn't load on a Franklin" speech I got when I phoned Videx, I decided to buy its modifier disk. I can pass along instructions I believe will let you use AppleWorks on a Franklin ACE 1000 or 1200. Videx's literature currently mentions only the Apple products and new keyboard commands to replace the //e and //c keys. I've found that the following booting procedures and keyboard substitutions will work on my ACE 1000 with Franklin's own ACE-80 80-column card.

Start by booting the AppleWorks Modifier disk. Disk booting will proceed for a while, then abort because ProDOS version 1.0.1 doesn't boot on a Franklin. When the loading stops suddenly and the screen and keyboard freeze, hit the reset button. You'll hear two beeps from the speaker and get an asterisk on the screen. First, type 265B:EA EA and press the return key. Next, type 2000G and press the return key again to continue the boot procedure. Then, follow the instructions displayed on screen.

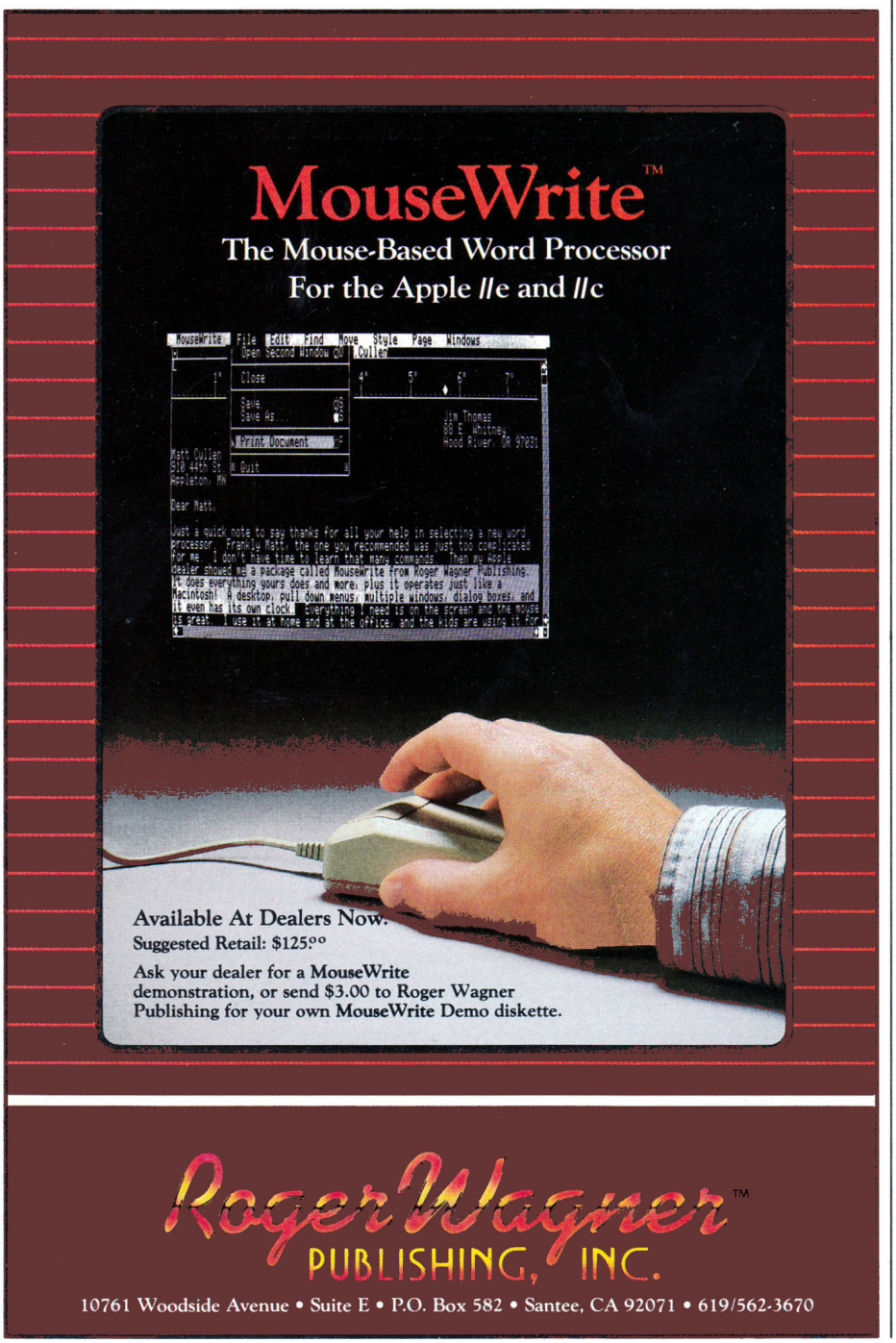
The accompanying **Table** shows some necessary Franklin keyboard substitutions. In addition, if you have trouble with the @ symbol in the AppleWorks spreadsheet formulas, toggle the caps-lock function with control-C. Videx also recommends its own Videoterm or Ultraterm 80-column cards, which both work well in the Franklin, but I've had no trouble with my ACE-80 card and AppleWorks so far.

Table. Keyboard substitutions for AppleWorks on Franklin.

Apple //e or //c	Franklin
Caps lock	Control-C
Open apple	Control-A
Delete	Control-left arrow
Up arrow	Control-K
Down arrow	Control-J

Since I don't have much experience with AppleWorks, I can't guarantee these are all the substitutions needed, but I believe the modifier disk and my ProDOS version 1.0.1 booting procedure will let Franklin users get started with AppleWorks. Maybe someday Videx will use new versions of ProDOS that will load properly on a Franklin and include keyboard changes in its literature, as well.

Rick Replogle
New Enterprise, PA



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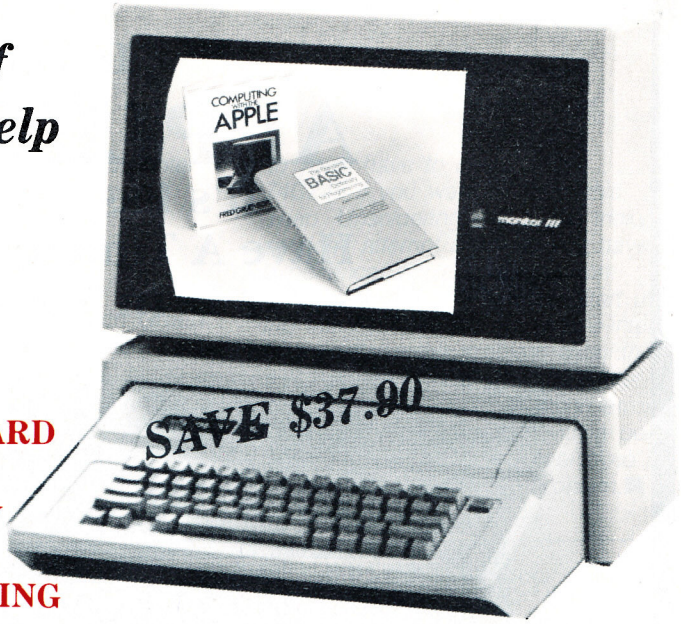

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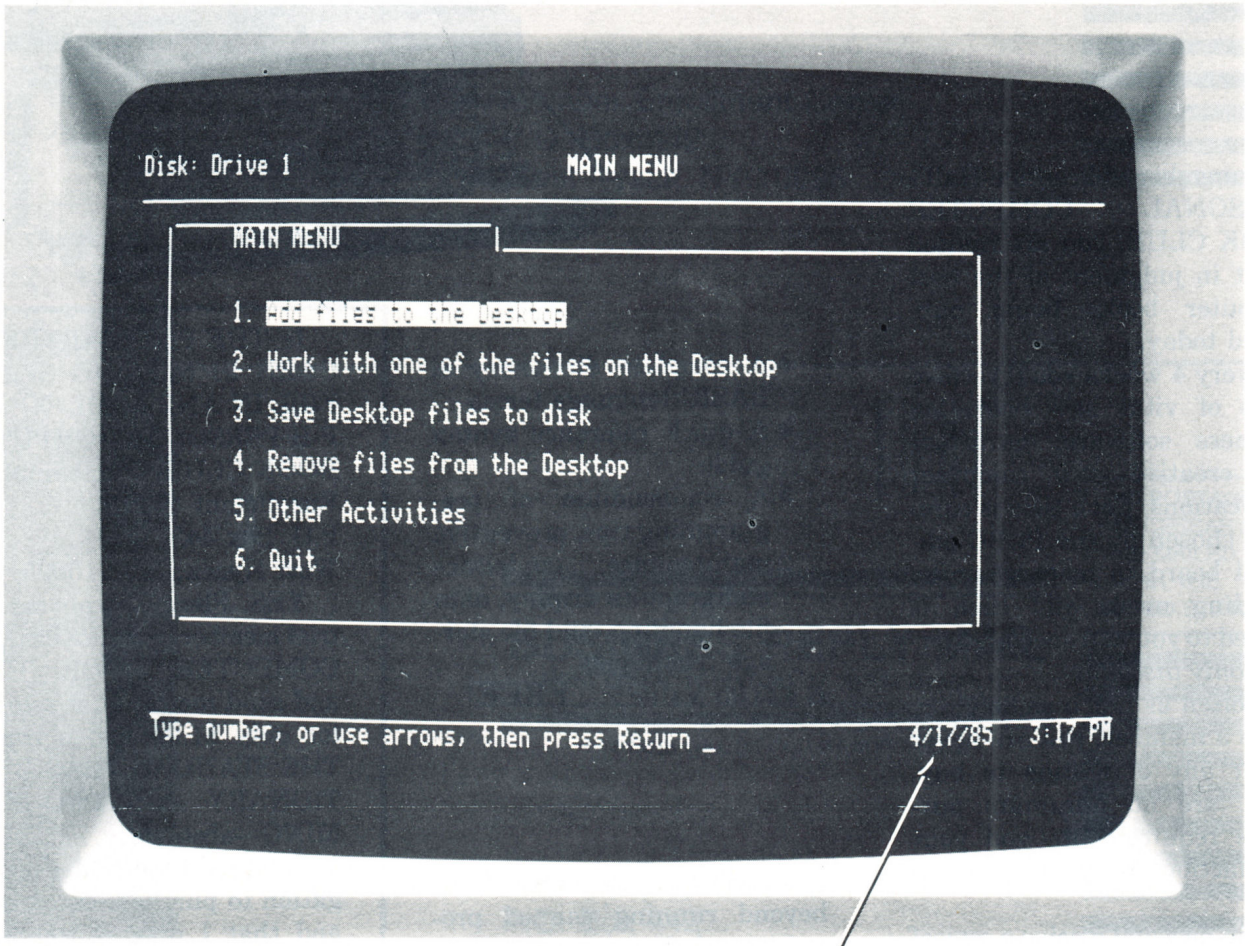

Just Look Right Here

Only the Timemaster H.O. displays the date and time on the Appleworks screen.* If you don't have a Timemaster H.O., you'll just get the help key reminder. The Timemaster H.O. will also automatically time and date stamp your files on disk. And don't forget, the Timemaster H.O. has all the features of all the competition combined, including year, leap year (not just in PRO-DOS), month, date, day, hours, minutes, seconds and milliseconds. The Timemaster H.O. is compatible with PRO-DOS, DOS 3.3, PASCAL and CP/M. And the Timemaster H.O. automatically emulates all other clock cards so you won't have any compatibility problems because the Timemaster H.O. works with ANY program that reads ANY clock.

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Thanks for all the information, Rick. It looks pretty good. Readers should note that the September 1985 Apple Clinic procedure for patching ProDOS to work with Apple compatibles will probably work on the Videx AppleWorks Modifier disk. Be sure to work with a backup instead of your original disk.

New Minute Manual

Jim Pirisino, the minute-manual guy, recently sent me a copy of his latest book, Minute Manual for the Dot Matrix Printer. *It looks like a good book for persons seeking basic information about dot-matrix printers, particularly Epson, Okidata, Gemini, Prowriter, NEC, and Apple dot-matrix printers.*

This manual has many nice features, but the one that caught my eye was a benchmark test on the true printing speed of various printers. The test consisted of printing a 26,332-character Apple Writer file on an Apple //e with Grappler Plus interface (or Apple //c with serial interface in the case of the Apple ImageWriter) with 1-inch page margins on all sides. Mr. Pirisino's test results show the characters-per-second (cps) ratings various manufacturers claim are totally unreliable guides to printing speed. One particularly surprising result is that the 120-cps ImageWriter has a higher practical printing speed than the 160-cps Epson FX-80.

The book's strengths include comparative information about the printers covered and clear descriptions of modern dot-matrix-printer features. Weaknesses include lack of specific information about printers other than those mentioned above. Panasonic and Canon are two neglected printer manufacturers that come to mind.

More Mouse and Switch-A-Slot

Southern California Research Group got back to me concerning the mouse/Switch-A-Slot compatibility problem James W. Patton brought up in September. It seems the problem goes away if you replace the 74C245 on the mouse-interface card with a 74LS245. The chip is not socketed, so you'll have to unsolder the 74C245 if you want to make this swap. Unsoldering DIP ICs is tricky, so don't attempt it unless you have experience with a soldering iron.

Apple told SCRG it would start using the 74LS245 on the mouse-interface card, so the problem shouldn't exist with newly manufactured interface cards. This isn't a design error; Apple is just cooperating with a peripheral manufacturer to overcome an unforeseen compatibility problem.■

Product Information

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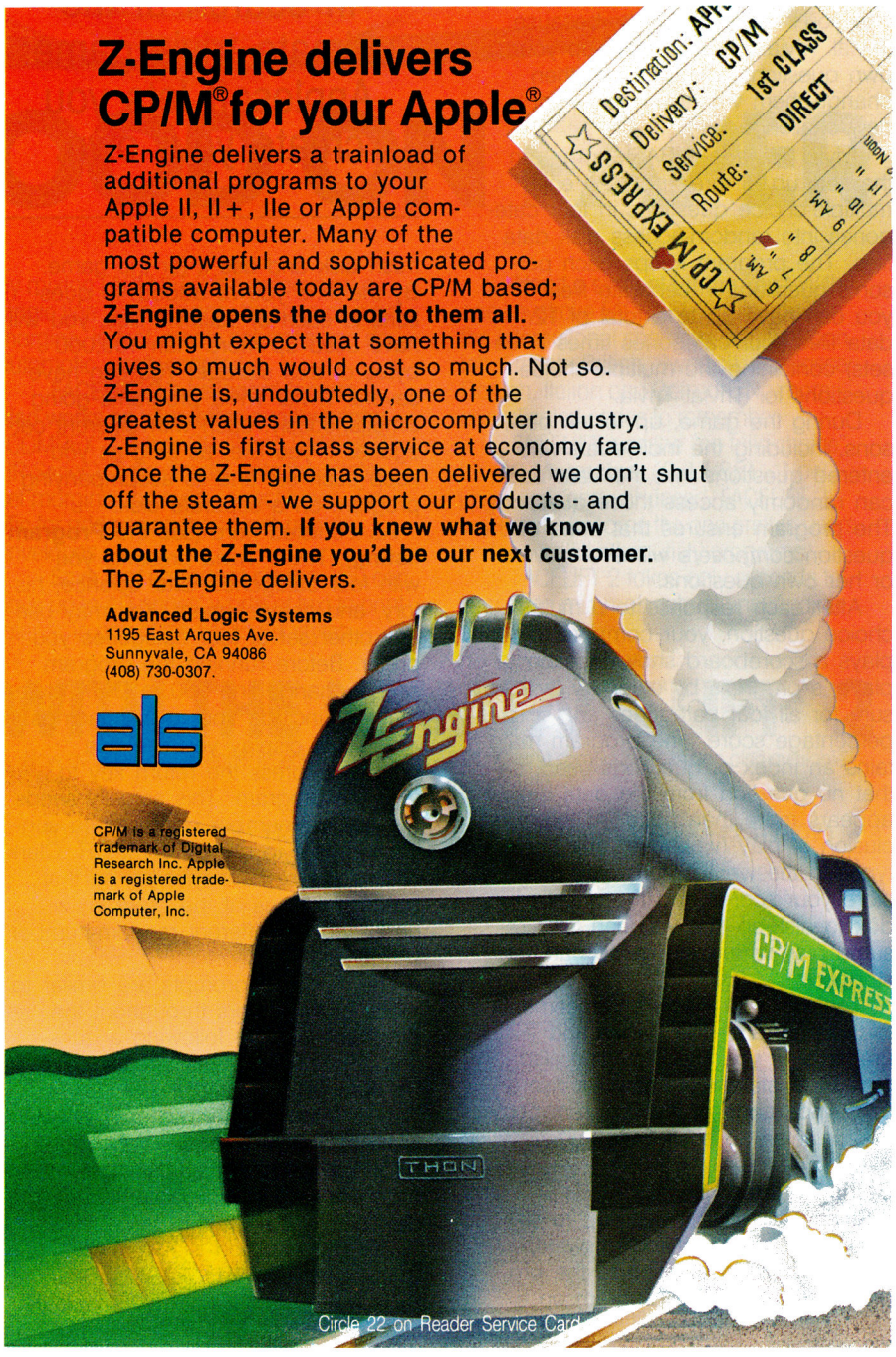


APPLESOFT ADVISER

Trivial Trivia: Part 1

by Dan Bishop

Hooked on trivia games? Here's one you'll never outgrow—because Trivial Trivia lets you make up your own questions and answers, then change them whenever you want a new challenge.

Trivial Trivia is a BASIC program that lets up to three persons enter multiple-choice questions in four categories into random-access disk data files. The program keeps each person's questions in separate files. Thus you can have up to a total of 12 data files (four categories times three sets) containing the multiple-choice questions for Trivial Trivia.

During the game, up to ten persons, including the individuals who entered questions into the data base, can randomly access those questions. The program ensures that none of the question composers will ever get his or her own questions.

After each response to a multiple-choice question, your computer displays a scoreboard showing each player's progress by category, with a sum for all four categories and a total percentage score. The program maintains an index of questions used, so that no question from the data base appears more than once. At the conclusion of play (whenever any player types in the word STOP), you can store your scores and the question index to disk so that you can later resume play where the game had stopped.

You can add visual enhancements to the program—title pages and graphics—if you like. You can also omit REM statements at your discretion, since none of the program commands refers to such lines.

In search of the ultimate trivia game: Applesoft lets you create your own.

Getting Started

Since Trivial Trivia uses up to 14 data files (questions and answers, plus statistics) in addition to the program itself, save the program on a fresh disk and use it for the game. By the time you've added 40 questions to each of 12 trivia files, you will have used up more than 130,000 bytes of disk storage. You can have several Trivial Trivia programs going simultaneously, each with different categories if you like, as long as you keep each set and its accompanying program on a separate disk.

As it's listed here (see the **Program listing**), Trivial Trivia presents you with four categories: arts, science, history, and entertainment. You may use any other set of four categories you prefer. Before running the program simply change line 900, a DATA statement, to include your own headings.

The first display you see is a prompt to press the return key to start the program. This actually seeds the random-number generator (a suggestion sent to me by James R. Clark of Bridgeville, Pennsylvania) so that successive runs of the program will be based on different random-number sequences.

The next two prompts are similar to many of the others throughout the program—a (Y/N) following a question. (Type Y for "yes," N for "no." Be sure your caps-lock key is *on*.) The only other entry the program will allow at a (Y/N) prompt is the word STOP (all caps), which makes the program save intermediate results to disk before it ends the game.

The first question is ARE YOU CONTINUING WITH A GAME ALREADY IN PROGRESS FOR WHICH SCORES HAVE BEEN SAVED TO DISK? (Y/N). If you told your computer to save scores at the end of your previous session of Trivial Trivia and now want to continue the game with your old scores and question index, type Y.

If you answer N, the second question appears: DO YOU ALREADY HAVE SOME QUESTIONS IN YOUR DISK DATA FILES? (Y/N). You should answer N to this question only if you're starting with a fresh disk that has no trivia questions in its data base yet, or if you want to erase all current trivia questions and start again from scratch.

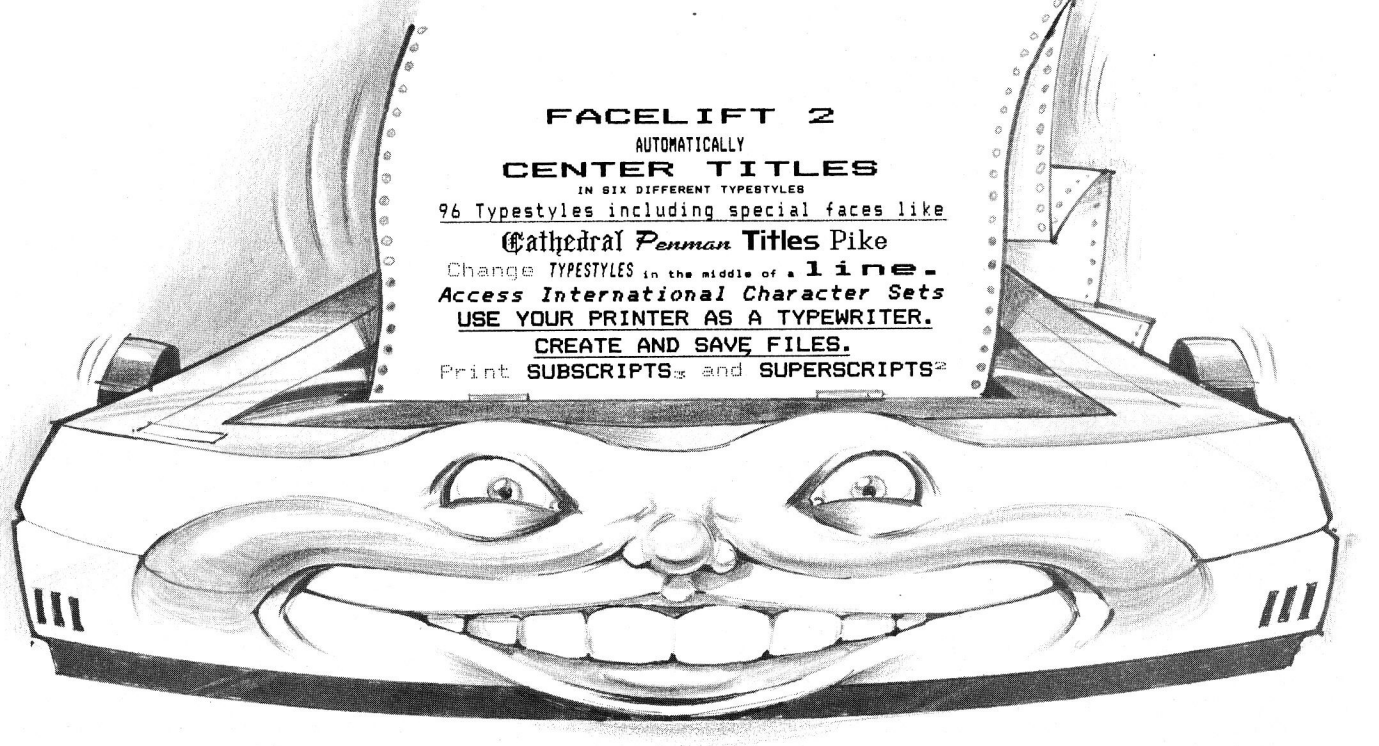
Your computer next displays the message: LOADING INDEX. ONE MOMENT, PLEASE! After a short pause, the program's master menu appears. This menu gives you three options: 1 allows you to enter questions into the data base or edit your questions; 2 begins the game; and 3 ends the program. Select an option by typing the appropriate number.

The program then reminds you that you may type the word STOP to end the game at any time, and asks you to press the return key again to continue.

Entering Trivia

IN THIS MODE, YOU MAY ENTER TRIVIA QUESTIONS, MULTIPLE CHOICE ANSWERS, AND A SINGLE CHARACTER IDENTIFYING THE CORRECT ANSWER. THIS PROGRAM SETS UP THREE DISTINCT SETS OF QUESTIONS FOR EACH CATEGORY. THIS ALLOWS YOU TO ENTER QUESTIONS AND STILL PLAY THE GAME USING QUESTIONS ENTERED BY SOMEONE ELSE. SELECT A NUMBER (1-3) TO INDICATE THE SET OF QUESTIONS THAT WILL CONTAIN YOUR CONTRIBUTIONS.

When you see this message, you're off and running. Enter a number from 1 to 3. This will be your identifying number when you're playing the



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Program listing. *Trivial Trivia.*

```
1  REM TRIVIAL TRIVIA
2  REM BY DAN BISHOP
3  REM     APPLESOFT ADVISER
4  REM     INCIDER – NOV 1985
5  HOME : PRINT "PRESS <RETURN> TO START."
10 X = RND (1): IF PEEK ( – 16384) < 128 THEN 10
15  POKE – 16368,0: GOSUB 100: HOME : PRINT "LOADING INDEX.     ONE
    MOMENT, PLEASE!"
20  IF SR$ = "N" AND DR$ = "N" THEN GOSUB 400: GOTO 35
25  IF SR$ = "N" THEN GOSUB 9700: GOSUB 420: GOTO 35
30  GOSUB 9500
35  GOSUB 1000
40  IF SF = 0 THEN GOTO 70
45  GOSUB 600: HOME : PRINT "DO YOU WISH TO SAVE THESE SCORES IN"
50  PRINT "ORDER TO CONTINUE THE GAME LATER? (Y/N)";
55  INPUT R$: IF R$ < > "Y" AND R$ < > "N" THEN 45
60  HOME : PRINT "SAVING INDEX ARRAY.     ONE MOMENT..."
65  IF R$ = "Y" THEN GOSUB 9200: GOTO 75
70  GOSUB 9400
75  END
91  REM
92  REM *********************
93  REM ROUTINE TO INITIALIZE
94  REM PROGRAM VARIABLES
95  REM *********************
96  REM
100  DIM NM$(10),SC(10,4,1),F$(4,3),QA(4,3,47),Q$(8)
105 Q$ = "                                                    ": REM 35 BLANKS
110 IO$(0) = "WRITE "
115 IO$(1) = "READ "
120 D$ = CHR$ (4)
125 L$ = "= = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
    = = = = ": REM 39 ='S
130 QT = 0
135  HOME : PRINT "ARE YOU CONTINUING WITH A GAME ALREADY     IN
    PROGRESS FOR WHICH SCORES HAVE     BEEN SAVED TO DISK? (Y/N) ";
140 YN = 1: GOSUB 230: IF QT = 1 THEN 135
145 SR$ = R$
150  IF SR$ = "Y" THEN DR$ = "Y": GOTO 170
155  HOME : PRINT "DO YOU ALREADY HAVE SOME QUESTIONS IN     YOUR DISK
    DATA FILES? (Y/N) ";
160 YN = 1: GOSUB 230: IF QT = 1 THEN 155
165 DR$ = R$
170  FOR I = 1 TO 4
175  READ F$(I,0)
180  FOR J = 1 TO 3:F$(I,J) = F$(I,0) + STR$ (J): NEXT J
185  NEXT I
190  RETURN
191  REM
192  REM *********************
193  REM COMMONLY USED SUB-
194  REM ROUTINES
195  REM *********************
196  REM
200  HTAB 1: VTAB 22
205  PRINT "INVALID ENTRY. ";
210  PRINT "PRESS <RETURN>."
215  INPUT Z$: IF Z$ = "STOP" THEN 40
220  RETURN
230 R$ = "":QT = 0: INPUT R$
235  IF R$ = "STOP" THEN 40
240  IF YN = 1 THEN S = 0:L = 0
245  IF YN = 1 AND R$ < > "Y" AND R$ < > "N" THEN 260
250 R = VAL (R$)
255  IF R > = S AND R < = L THEN 265
260  PRINT : GOSUB 200:QT = 1
265 YN = 0: RETURN
391  REM
```

Listing continued.

game—be sure the other individuals entering questions choose different numbers, as the computer uses them to keep track of who you are and the question sets that contain your trivia. If you follow these rules, the game will never ask you one of your own questions.

After entering your identifying number, you will see the Add Trivia menu, again with three options. The first lets you add new trivia questions; the second lets you edit an existing question; the third returns control to the previous menu (described above).

As soon as you enter your selection, the list of categories appears. You must decide under which of the four categories you'd like to save that question. Enter a number (1–4) to indicate your choice.

Entering questions involves a two-part process. First the program prompts you to type in a question three lines long, with no more than 35 characters per line. (You must use three lines, even if one or two are totally blank.) Press the return key either at the end of each line you type in, or by itself for a blank line. If your line contains a comma, enclose that line in quotation marks.

After entering the third line, you will see another prompt: IS THIS QUESTION OK? (Y/N). If you respond with N, the question-entry process will start over from the top.

The second data-entry step calls for you to type in five multiple-choice answers, with no more than 25 characters in each. Follow the same rules as outlined above. A true/false question requires actual entries only in the first two lines; respond to the remaining three lines by pressing the return key.

The program then asks you to enter the number of the answer line containing the correct response. Type in a number (1–5). The program then displays the entire question, with answers, in addition to the prompt ARE YOU SATISFIED WITH THESE ANSWERS? (Y/N). Check the display carefully. If you answer N, the second data-entry step will begin again, allowing you to reenter the five answer choices.

Note that the top line of the display shows the actual record number that will contain the question. You must give your computer this reference number whenever you want to alter your entry at some later date. (You should also record the number for future reference.)

Listing continued.

```
392  REM ******************
393  REM INITIALIZING INDEX
394  REM FOR NEW TRIVIA SET
395  REM &/OR NEW GAME
396  REM ******************
397  REM
400  FOR J = 1 TO 4
405  FOR K = 1 TO 3
410 QA(J,K,0) = 0
415  NEXT K,J
420  FOR I = 1 TO 47
425  FOR J = 1 TO 4
430  FOR K = 1 TO 3
435 QA(J,K,I) = 0
440  NEXT K,J,I
445  IF SR$ = "Y" THEN 470
450  FOR J = 1 TO 4
455  FOR K = 1 TO 3
460 QA(J,K,41) = QA(J,K,0)
465  NEXT K,J
470  RETURN
591  REM
592  REM ******************
593  REM     SCOREBOARD
594  REM     DISPLAY
595  REM ******************
596  REM
600  HOME
605  PRINT "TRIVIAL TRIVIA SCOREBOARD (#RT/#TRIED)
610  PRINT TAB( 12);: FOR I = 1 TO 4
615  PRINT " " LEFT$ (F$(I,0) + Q$,6);
620  NEXT I
625  PRINT
630  IF NP < 10 THEN PRINT L$
635  FOR I = 1 TO NP:RT = 0:PT = 0
640  PRINT NM$(I);: FOR J = 0 TO 3
645  PRINT TAB( 14 + 7 * J);SC(I,J + 1,0);
650  PRINT TAB( 16 + 7 * J)"/"SC(I,J + 1,1);
655 PT = PT + SC(I,J + 1,1)
660 RT = RT + SC(I,J + 1,0)
665  NEXT J: PRINT
670  PRINT " "RT"/"PT;
675  IF PT < > 0 THEN PT = INT (1000 * (RT / PT) + .5) / 10
680  PRINT " "PT"%"
685  NEXT I: IF NP < 9 THEN PRINT L$
690  GOSUB 210:SF = 1
695  RETURN
891  REM
892  REM ********************
893  REM FOUR CATEGORY NAMES
895  REM AS DATA ELEMENTS
896  REM ********************
897  REM
900  DATA ARTS, SCIENCE, HISTORY, ENTERTAINMENT
991  REM
992  REM ************************
993  REM ROUTINE FOR MASTER
994  REM MENU DISPLAY AND
995  REM OPTION SELECTION
996  REM ************************
997  REM
1000 QT = 0: HOME
1005  PRINT "     TRIVIAL TRIVIA"
1010  PRINT L$
1015  PRINT : PRINT "     <1> ENTER DATA"
1020  PRINT "     <2> PLAY TRIVIAL TRIVIA"
1025  PRINT "     <3> END THE PROGRAM"
1030  PRINT L$
1035  PRINT "     SELECTION: ";
1040 S = 1:L = 3: GOSUB 230
1045  IF QT = 1 THEN 1000
```

Listing continued.

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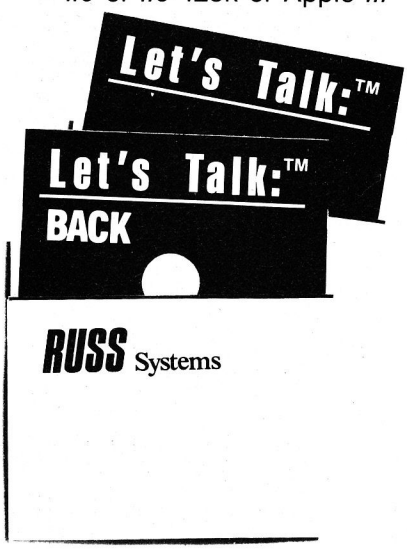

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Listing continued.

```
1050 M = R
1055  PRINT : PRINT "TO END THE PROGRAM AT ANY TIME,"
1060  PRINT "     ENTER THE WORD     STOP ."
1065  GOSUB 210:R$ = Z$:S = 0: GOSUB 235
1070  IF QT = 1 THEN 1055
1075  ON M GOSUB 2000,7000
1080  IF M = 3 THEN 1090
1085  GOTO 1000
1090  RETURN
1991  REM
1992  REM     ******************
1993  REM     TRIVIA QUESTION
1994  REM     DATA ENTRY ROUTINE
1995  REM     ******************
1996  REM
1997  REM
2000  HOME
2005  PRINT "IN THIS MODE, YOU MAY ENTER TRIVIA     QUESTIONS, MULTIPLE
      CHOICE ANSWERS, AND"
2010  PRINT "A SINGLE CHARACTER IDENTIFYING THE     CORRECT ANSWER."
2015  PRINT
2020  PRINT "THIS PROGRAM SETS UP THREE DISTINCT SETS"
2025  PRINT "OF QUESTIONS FOR EACH CATEGORY. THIS"
2030  PRINT "ALLOWS YOU TO ENTER QUESTIONS AND STILL PLAY THE GAME
      USING QUESTIONS ENTERED"
2035  PRINT "BY SOMEONE ELSE."
2040  PRINT : PRINT "SELECT A NUMBER (1-3) TO INDICATE THE"
2045  PRINT "SET OF QUESTIONS THAT WILL CONTAIN YOUR"
2050  PRINT "CONTRIBUTIONS. ";
2055 S = 1:L = 3: GOSUB 230: IF QT = 1 THEN 2000
2060 SN = R
2065  HOME : PRINT " <1> ADD NEW TRIVIA QUESTION TO SET "SN"."
2070  PRINT " <2> CHANGE TRIVIA QUESTION IN SET "SN"."
2075  PRINT " <3> END THIS PART OF THE PROGRAM."
2080  PRINT L$: PRINT "     SELECTION (OR STOP) ... ";
2085 S = 1:L = 3: GOSUB 230
2090  IF QT = 1 THEN 2065
2095  ON R GOSUB 2200,2400,2105
2100  GOTO 2065
2105  POP : RETURN
2141  REM
2142  REM ********************
2143  REM CATEGORY LISTING
2144  REM     DISPLAY
2145  REM ********************
2146  REM
2150  PRINT L$: PRINT "CATEGORIES: ";
2155  FOR I = 1 TO 4: PRINT TAB( 15);I". "F$(I,0): NEXT I
2160  PRINT L$: PRINT "     WHICH CATEGORY: ";
2165 S = 1:L = 4: GOSUB 230: IF QT = 1 THEN 2150
2170 CN = R: RETURN
2191  REM
2192  REM     ********************
2193  REM ROUTINE FOR INPUT
2194  REM OF QUESTION/ANSWER
2195  REM LINES.
2196  REM     ********************
2197  REM
2200  HOME : PRINT "ADD QUESTION MODE"
2205  GOSUB 2150
2210  PRINT L$
2215  PRINT "YOUR QUESTION MAY HAVE 3 LINES, WITH 35 CHARACTERS
      IN EACH LINE:"
2220  PRINT "PUT QUOTES AROUND ANY LINE THAT CONTAINS A COMMA."
2225  PRINT
2230  FOR I = 1 TO 3: PRINT "L"I": ";:Q$(I) = ""
2235  INPUT Q$(I):Q$(I) = LEFT$ (Q$(I) + Q$,35)
2240  NEXT I: IF CQ = 1 THEN RETURN
2245  HOME :RN = QA(CN,SN,0) + 1: GOSUB 2600
2250  PRINT : PRINT "IS THIS QUESTION OK? (Y/N) ";
2255 YN = 1: GOSUB 230: IF QT = 1 THEN 2250
```

Listing continued.

After you've indicated you're satisfied with the question and answers displayed, the program asks you to wait a moment while it stores the data to disk. The program then returns to the Add Trivia menu.

When you've finished adding your questions for this session, type in STOP to end the program. At this point another person may run the program and enter his or her questions. You may return to the Add Trivia mode at any time to make further additions to your list of questions.

Playing the Game

Selecting option 2 from the master menu begins the actual game. The program first asks you to type in each player's name (it keeps only the first ten characters), then an identification number. Players who have not entered questions into the data base should choose numbers between 4 and 10. Those who have composed questions should use the same identification number they chose when typing in questions.

After you've entered names of all players the program displays the list of names, with the question WHO'S UP? (NUMBER, PLEASE). . . . When you type in your number Trivial Trivia displays the list of categories, and asks you to select one. Your computer then generates two random numbers, uses them to select a question from the data base, and displays the question on screen. Respond to the multiple-choice question by entering a number (1–5). The computer evaluates your response and announces whether it is correct or not, then asks you to press the return key. The program then displays the Trivial Trivia Scoreboard, showing everyone's score for each category, along with a total and the percentage of correct answers for each player. Press the return key to continue the game and generate another WHO'S UP question.

If you run out of questions in a specific category, the message SORRY, NO MORE QUESTIONS ARE AVAILABLE IN THIS CATEGORY appears. This message does not necessarily mean that another player will be unable to find questions in that category. The trivia questions you entered into that category of the data base are unavailable to you, but all the other players can access them.

To end the game, type in STOP. The program displays the scoreboard once more, then asks DO YOU WISH

Listing continued.

```
2260  IF R$ = "N" THEN 2200
2265  HOME : GOSUB 2600
2270  PRINT "YOU MAY HAVE 5 ANSWER CHOICES, WITH 25"
2275  PRINT "     CHARACTERS IN EACH."
2280  FOR I = 1 TO 5
2285  PRINT "     ANS. "I": ";:Q$(I + 3) = ""
2290  INPUT Q$(I + 3):Q$(I + 3) = LEFT$ (Q$(I + 3) + Q$,25)
2295  NEXT I
2300  PRINT L$
2305  PRINT "ENTER THE NUMBER (1 - 5) FOR THE CORRECT ANSWER. ";
2310 S = 1:L = 5: GOSUB 230: IF QT = 1 THEN 2300
2315 A$ = R$
2320  HOME : GOSUB 2600: GOSUB 2650
2325  PRINT "CORRECT ANS: "Q$(3 + VAL (A$)): PRINT L$
2330  PRINT "ARE YOU SATISFIED WITH THESE ANSWERS? (Y/N) ";
2335 YN = 1: GOSUB 230: IF QT = 1 THEN 2330
2340  IF R$ = "N" THEN 2265
2345  IF CQ THEN RETURN
2350 QA(CN,SN,0) = QA(CN,SN,0) + 1
2355 QA(CN,SN,41) = QA(CN,SN,0)
2360 RN = QA(CN,SN,0)
2365  PRINT "ONE MOMENT, PLEASE...": GOSUB 9100
2370  GOSUB 9400
2375  RETURN
2391  REM
2392  REM ****************
2393  REM ROUTINE FOR
2394  REM CHANGING A TRIVIA
2395  REM QUESTION
2396  REM ****************
2397  REM
2400  HOME : GOSUB 2150: PRINT "CHANGE QUESTION MODE"
2405  PRINT : PRINT "TO CHANGE A TRIVIA QUESTION, YOU MUST"
2410  PRINT "KNOW THAT QUESTION'S DATABASE NUMBER."
2415  PRINT "ENTER THE NUMBER (BETWEEN 0 AND "QA(CN,SN,0)"): ";
2420 S = 0:L = QA(CN,SN,0): GOSUB 230: IF QT = 1 THEN 2400
2425 RN = R: IF RN = 0 THEN 2595
2430  GOSUB 9000
2435  HOME : GOSUB 2600: GOSUB 2650
2440  PRINT "IS THIS THE QUESTION YOU WISH TO"
2445  PRINT "CHANGE? (Y/N) ";
2450 YN = 1: GOSUB 230: IF QT = 1 THEN 2435
2455  IF R$ = "N" THEN 2400
2460  PRINT : PRINT "IS THE QUESTION PART OK? (Y/N) ";
2465 YN = 1: GOSUB 230: IF QT = 1 THEN 2460
2470 CQ = 0: IF R$ = "Y" THEN 2500
2475 CQ = 1: HOME : GOSUB 2210
2480  HOME : GOSUB 2600
2485  PRINT : PRINT "IS THIS QUESTION OK? (Y/N) ";
2490 YN = 1: GOSUB 230: IF QT = 1 THEN 2480
2495  IF R$ = "N" THEN 2475
2500  HOME : GOSUB 2600: GOSUB 2650
2505  PRINT : PRINT "ARE THE ANSWER CHOICES OK? (Y/N) ";
2510 YN = 1: GOSUB 230: IF QT = 1 THEN 2500
2515 CQ = 0: IF R$ = "Y" THEN 2550
2520 CQ = 1: GOSUB 2270
2525  GOTO 2590
2550  HOME : GOSUB 2600: GOSUB 2650
2555  PRINT "CORRECT ANS: "Q$(3 + VAL (A$)): PRINT L$
2560  PRINT "IS THE ANSWER SELECTION CORRECT? (Y/N) ";
2565 YN = 1: GOSUB 230: IF QT = 1 THEN 2550
2570  IF R$ = "Y" THEN 2590
2575  PRINT "ENTER A NUMBER (1 - 5) FOR THE CORRECT ANSWER ... ";
2580 S = 1:L = 5: GOSUB 230: IF QT = 1 THEN 2575
2585 A$ = R$: GOTO 2550
2590 CQ = 0: GOSUB 9100
2595  RETURN
2596  REM ********************
2597  REM TRIVIA QUESTION
2598  REM DISPLAY
2599  REM ********************
```

Listing continued.

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Listing continued.

```
2600  PRINT "CATEGORY: "F$(CN,0)" (SET "SN") #"RN
2605  PRINT L$
2610  FOR I = 1 TO 3
2615  PRINT Q$(I)
2620  NEXT I
2625  PRINT L$
2630  RETURN
2641  REM
2642  REM ****************
2643  REM     TRIVIA ANSWER
2644  REM     MULTIPLE CHOICES
2645  REM     DISPLAY
2646  REM ****************
2647  REM
2650  FOR I = 1 TO 5
2655  PRINT TAB( 10);I". ";
2660  PRINT Q$(I + 3)
2665  NEXT I
2670  PRINT L$
2675  RETURN
4991  REM
4992  REM ****************
4993  REM INPUT ROUTINE FOR
4994  REM PLAYER'S NAMES/#'S
4995  REM ****************
4996  REM
5000  HOME : IF SR$ = "Y" THEN 5110
5005 NP = 1:Z$ = "FIRST"
5010  FOR I = 1 TO 10: HOME
5015  PRINT "PLEASE ENTER THE NAME OF THE "Z$
5020  PRINT " PLAYER... ";:S = 0:L = 0: GOSUB 230
5025 NM$ = LEFT$ (R$ + Q$,10)
5030  PRINT : PRINT "NOW SELECT A NUMBER BETWEEN 1 AND 10."
5035  PRINT "DO NOT USE SOMEONE ELSE'S NUMBER."
5040  PRINT "IF YOU ENTERED TRIVIA QUESTIONS TO ONE"
5045  PRINT "OF THE DATA SETS, USE THE SAME NUMBER"
5050  PRINT "(1 - 3) HERE."
5055  PRINT
5060  PRINT "IF YOU DID NOT ENTER TRIVIA QUESTIONS,"
5065  PRINT "USE A NUMBER FROM 4 THROUGH 10."
5070  PRINT : PRINT "ENTER YOUR PLAYER NUMBER... ";
5075 S = 1:L = 10: GOSUB 230: IF QT = 1 THEN 5015
5080 PN = R:NM$(PN) = NM$: IF PN > NP THEN NP = PN
5085  PRINT : PRINT "IS THERE ANOTHER PLAYER? (Y/N) ";
5090 YN = 1: GOSUB 230: IF QT = 1 THEN 5085
5095  IF R$ = "N" THEN I = 10
5100 Z$ = "NEXT"
5105  NEXT I
5110  RETURN
5991  REM
5992  REM ******************
5993  REM ROUTINE TO GET NEXT
5994  REM PLAYER'S ID AND
5995  REM ******************
5996  REM
6000  HOME
6005  FOR I = 1 TO NP
6010  PRINT I;". ";NM$(I)
6015  NEXT I: PRINT L$
6020  PRINT "WHO'S UP? (NUMBER, PLEASE)...";
6025 S = 1:L = 10: GOSUB 230
6030  IF QT = 1 THEN 6000
6035 PN = R
6040  HOME
6045  GOSUB 2150
6050  RETURN
6991  REM
6992  REM ******************
6993  REM ROUTINE FOR TRIVIA
6994  REM QUESTION SELECTION,
6995  REM DISPLAY & RESPONSE
```

Listing continued.

TO SAVE THESE SCORES IN ORDER TO CONTINUE THE GAME LATER? (Y/N). The questions themselves will remain in the disk data files, no matter what you do here. This question refers only to the players' names, their scores, and the question index that keeps track of the questions you've already used. Type Y if you intend to resume this game later.

Editing Trivia Questions

If you select option 1 from the main menu to "enter data" and option 2 from the Add Trivia menu to "change trivia," the program will ask you to type in the data-base record number of the question you want to edit. The prompt tells you the maximum number you can enter (corresponding, of course, to the total number of questions in that set). If you enter a zero, the program cycles back to the Add Trivia menu.

Once you have entered an acceptable number, the program you've specified displays the question and asks you if that's the question you want. An N response takes you back to type in another record number. Y cycles you through the question-entry sequence, followed by the answer-entry sequence, with the prompts discussed above.

Conclusion

Applications for the program presented here extend well beyond trivia games. Teachers can use the program for drill or exams (since the program tallies and displays scores), with the questions entered by either teacher or students. Since the program keeps score for each player by category, the teacher can use an appropriate choice of questions to diagnose which of four areas may require further study. Another possibility lies in psychotherapy. Two persons can use the game in an encounter session by entering personal questions and examining the answers as a basis for discussion.

Next month I'll provide detailed information on program operation, including a hierarchy diagram, list of variables, file-structure diagrams, and a few flow charts for some of the less obvious subroutines in Trivial Trivia. I'll emphasize random-access disk I/O—and with 14 random-access data files, Trivial Trivia may not be so trivial after all.■

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

Listing continued.

```
 6996  REM EVALUATION.
 6997  REM ******************
 6998  REM
 7000  HOME
 7005  GOSUB 5000
 7010  GOSUB 6000
 7015 SN = INT ( RND (1) * 3 + 1)
 7020  IF PN = SN THEN 7015
 7025 CT = 0: FOR I = 1 TO 3
 7030  IF QA(CN,I,41) = 0 OR I = PN THEN CT = CT + 1
 7035  NEXT I: IF CT = 3 THEN GOSUB 7500: HOME : GOTO 7010
 7040  IF QA(CN,SN,41) = 0 THEN 7015
 7045 RN = INT ( RND (1) * QA(CN,SN,0) + 1)
 7050  IF QA(CN,SN,RN) = 0 THEN 7065
 7055 RN = RN + 1: IF RN > QA(CN,SN,0) THEN RN = 1
 7060  GOTO 7050
 7065  GOSUB 9000
 7070  HOME : GOSUB 2600: GOSUB 2650
 7075  PRINT "     YOUR ANSWER? (1 - 5) ";
 7080 S = 1:L = 5: GOSUB 230: IF QT = 1 THEN 7070
 7085 SC(PN,CN,1) = SC(PN,CN,1) + 1
 7090 QA(CN,SN,41) = QA(CN,SN,41) - 1
 7095 QA(CN,SN,RN) = 1
 7100  IF R$ = A$ THEN SC(PN,CN,0) = SC(PN,CN,0) + 1: GOTO 7120
 7105  PRINT "WRONG. THE CORRECT ANSWER IS"
 7110  PRINT "     ";Q$(3 + VAL (A$))
 7115  GOTO 7125
 7120  PRINT "CORRECT!"
 7125  GOSUB 210
 7130  GOSUB 600: GOTO 7010
 7500  PRINT : PRINT L$
 7505  PRINT "SORRY, NO MORE QUESTIONS ARE AVAILABLE IN THIS CATEGORY."
 7510  PRINT L$
 7515  GOSUB 210
 7520  RETURN
 8991  REM
 8992  REM ********************
 8993  REM     ROUTINE TO RETRIEVE
 8994  REM     DATA FROM DISK AND
 8995  REM     PREPARE IT FOR USE
 8996  REM     BY PROGRAM.
 8997  REM ********************
 8998  REM
 8999  REM
 9000 IO = 1
 9005 F$ = F$(CN,SN)
 9010  GOSUB 9900
 9015  FOR I = 1 TO 3
 9020 Q$(I) = MID$ (XT$,1 + 35 * (I - 1),35)
 9025  NEXT I
 9030  FOR I = 1 TO 5
 9035 Q$(I + 3) = MID$ (XT$,106 + 25 * (I - 1),25)
 9040  NEXT I
 9045 A$ = MID$ (XT$,231,1)
 9050  RETURN
 9091  REM
 9092  REM *********************
 9093  REM ROUTINE TO PREPARE
 9094  REM DATA FOR DISK STORAGE
 9095  REM AND SAVE IT TO DISK
 9096  REM *********************
 9097  REM
 9100 IO = 0
 9105 F$ = F$(CN,SN)
 9110 XT$ = ""
 9115  FOR I = 1 TO 8
 9120 XT$ = XT$ + Q$(I)
 9125 Q$(I) = ""
 9130  NEXT I
```

Listing continued on p. 62.

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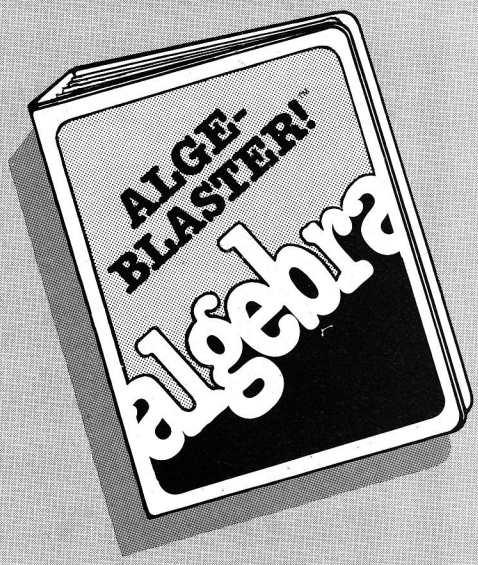

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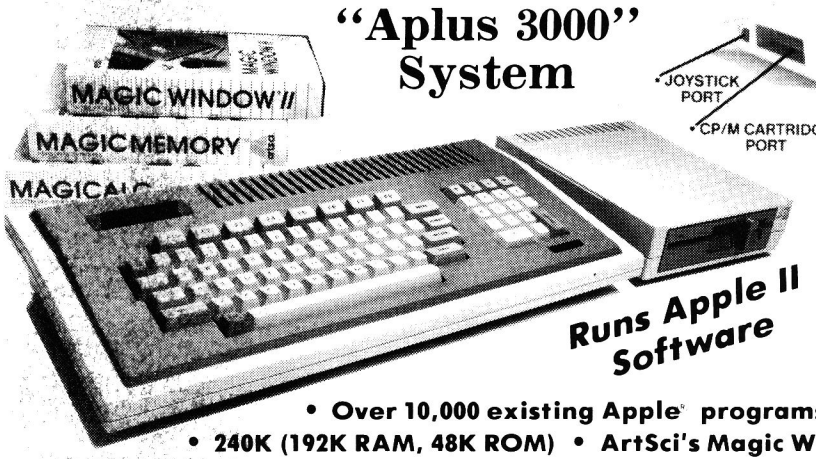

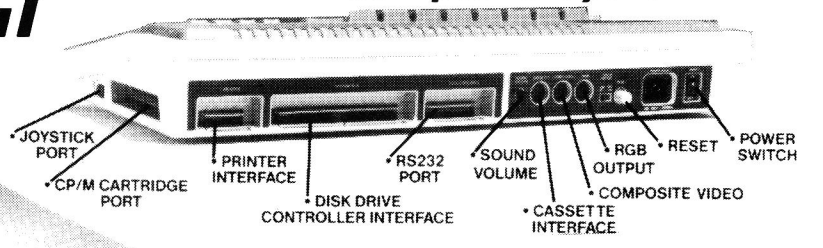

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Composite Video	**Yes**	Yes	Yes
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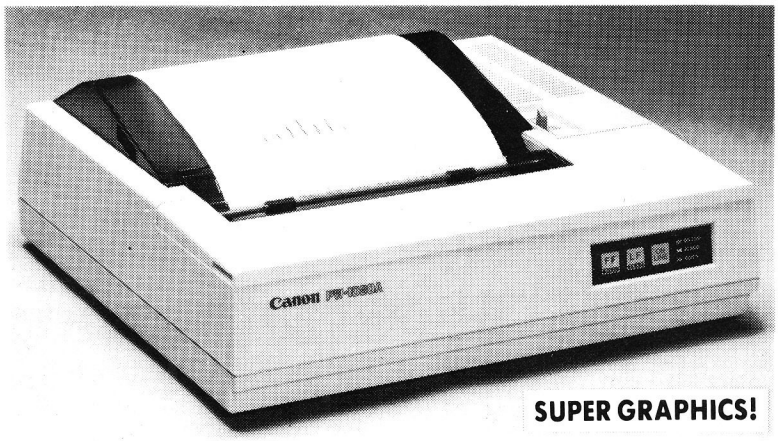

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Graphic Mode — Unidirectional

Print Head Life
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Printing Characters
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NLQ 23 x 18 dot matrix
Character size: 2 x 2.42 mm (standard)
Character set: Full ASCII character set (96), 32 special European characters

Down Loading
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Image Data: Vertical 8, 9 and/or 16 dot
Resolution: Horizontal 60 dots/inch
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Ink Ribbon Cartridge
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Maximum Number of Characters

Standard:	10	cpi	80 cpl
Enlarged:	5	cpi	40 cpl
Condensed:	17.1	cpi	136 cpl
Condensed enlarged:	8.5	cpi	68 cpl
Elite:	12	cpi	96 cpl
Elite enlarged:	6	cpi	48 cpl
NLQ pica:	10	cpi	80 cpl
NLQ pica enlarged:	5	cpi	40 cpl

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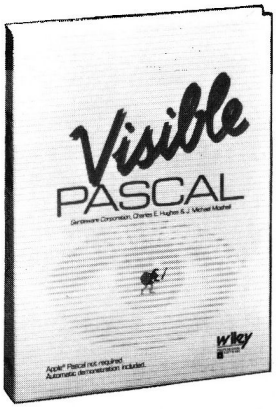

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Listing continued from p. 59.

```
9135 XT$ = XT$ + A$
9140 A$ = " "
9145  GOSUB 9900
9150  RETURN
9191  REM
9192  REM
9193  REM **********************
9194  REM     ROUTINE FOR SAVING
9195  REM     QUESTION INDEX ARRAY
9196  REM     AND SCORES TO DISK
9197  REM **********************
9198  REM
9199  REM
9200 IO = 0
9205 F$ = "TRIVIA QUESTION INDEX"
9210  FOR I = 1 TO 6
9215 XT$ = ""
9220  FOR J = 0 TO 7
9225  FOR K = 1 TO 4
9230  FOR L = 1 TO 3
9235 Z$ = STR$ (QA(K,L,J + 8 * (I - 1))) + "     "
9240  IF ASC ( LEFT$ (Z$,1)) < 48 THEN Z$ = MID$ (Z$,2,2)
9245 Z$ = LEFT$ (Z$,2)
9250 XT$ = XT$ + Z$
9255  NEXT L,K,J
9260 RN = I: GOSUB 9900
9265  NEXT I
9270 F$ = "TRIVIA SCOREBOARD ARRAY"
9275  FOR I = 1 TO 2
9280 XT$ = LEFT$ ( STR$ (NP) + "     ",4)
9285  FOR J = 1 TO 5:XT$ = XT$ + NM$(J + 5 * (I - 1))
9290  FOR K = 1 TO 4
9295  FOR L = 0 TO 1
9300 XT$ = XT$ + LEFT$ ( STR$ (SC(J + 5 * (I - 1),K,L))
     + " ",4)
9305  NEXT L,K,J
9310 RN = I: GOSUB 9900
9315  NEXT I
9320  RETURN
9391  REM
9392  REM ********************
9393  REM ROUTINE TO SAVE
9394  REM ONLY FIRST INDEX
9395  REM BLOCK TO DISK
9396  REM ********************
9397  REM
9400 IO = 0
9405 F$ = "TRIVIA QUESTION INDEX"
9410 I = 1:XT$ = ""
9415  FOR K = 1 TO 4
9420  FOR L = 1 TO 3
9425 Z$ = STR$ (QA(K,L,0)) + "     "
9430  IF ASC ( LEFT$ (Z$,1)) < 48 THEN Z$ = MID$ (Z$,2,2)
9435 Z$ = LEFT$ (Z$,2)
9440 XT$ = XT$ + Z$
9445  NEXT L,K
9450 RN = 1: GOSUB 9900
9455  RETURN
9491  REM
9492  REM ***********************
9493  REM ROUTINE TO RETRIEVE
9494  REM QUESTION INDEX ARRAY
9495  REM AND OLD SCORES
9496  REM FROM DISK
9497  REM **********************
9498  REM
```

Listing continued.

Listing continued.

```
9500 IO = 1
9505 F$ = "TRIVIA QUESTION INDEX"
9510  FOR I = 1 TO 6
9515 RN = I: GOSUB 9900
9520  FOR J = 0 TO 7
9525  FOR K = 1 TO 4
9530  FOR L = 1 TO 3
9535 QA(K,L,J + 8 * (I - 1)) = VAL ( MID$ (XT$,1 + 2 * (L - 1)
     + 6 * (K - 1) + 24 * J,2))
9540  NEXT L,K,J
9545  NEXT I
9550 F$ = "TRIVIA SCOREBOARD ARRAY"
9555  FOR I = 1 TO 2
9560 RN = I: GOSUB 9900
9565 NP = VAL ( LEFT$ (XT$,4))
9570  FOR J = 1 TO 5
9575 NM$(J + 5 * (I - 1)) = MID$ (XT$,5 + 42 * (J - 1),10)
9580  FOR K = 1 TO 4
9585  FOR L = 0 TO 1
9590 SC(J + 5 * (I - 1),K,L) = VAL ( MID$ (XT$,15 + 42 * (J - 1)
     + 8 * (K - 1) + 4 * L,4))
9595  NEXT L,K,J
9600  NEXT I
9605  RETURN
9691  REM
9692  REM **********************
9693  REM ROUTINE TO RETRIEVE
9694  REM ONLY FIRST BLOCK OF
9695  REM INDEX ARRAY FROM
9696  REM DISK
9697  REM **********************
9698  REM
9700 IO = 1
9705 F$ = "TRIVIA QUESTION INDEX"
9710 I = 1
9715 RN = 1: GOSUB 9900
9720  FOR K = 1 TO 4
9725  FOR L = 1 TO 3
9730 QA(K,L,0) = VAL ( MID$ (XT$,1 + 2 * (L - 1) + 6 * (K - 1),2))
9735  NEXT L
9740  NEXT K
9750  RETURN
9891  REM
9892  REM
9893  REM     **********************
9894  REM     ROUTINE TO HANDLE ALL
9895  REM     RANDOM ACCESS DISK
9896  REM     I/O PROCEDURES.
9897  REM     **********************
9898  REM
9899  REM
9900  PRINT D$ + "OPEN " + F$ + ",L232"
9910  ONERR GOTO 9960
9920  PRINT D$ + IO$(IO) + F$ + ",R" + STR$ (RN)
9930  IF IO = 1 THEN INPUT XT$
9935  IF IO = 0 THEN PRINT XT$
9940  PRINT D$ + "CLOSE ": PRINT
9950  RETURN
9960  PRINT D$ + "CLOSE"
9970  PRINT : PRINT "RECORD "RN" DOESN'T YET EXIST"
9980  PRINT " IN THIS FILE. PRESS <RETURN>...";
9990  INPUT X$: POKE 216,0: GOTO 1000
```

Editor's Note: In lines 9900, 9920, 9940 and 9960, some systems may require semicolons instead of plus signs.

End of listing.

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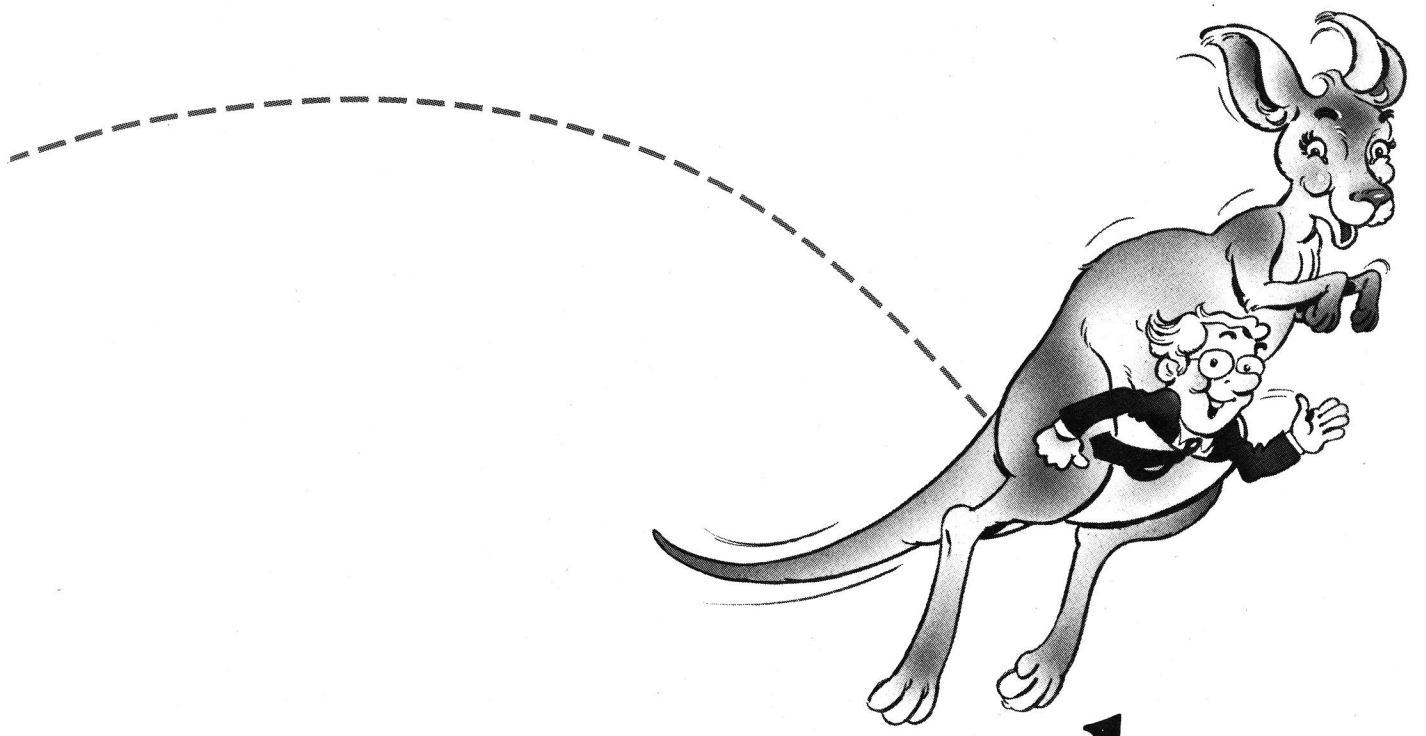

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RIGHT OF ASSEMBLY

The Basics of Assembly

by Roger Wagner

Welcome back! Last month I offered a general overview of computer languages and some of the fundamental differences between Applesoft and machine language. In addition, I presented a collection of simple machine-language CALLs you can use from within your own programs to extend the usual capabilities of Applesoft.

If you haven't already decided to do so, I recommend you keep back issues of this column as references, since I will, from time to time, refer to material presented in them. If you missed the last one, though, don't worry—the best is yet to come.

Before you begin to program, build a framework of assembly-language fundamentals—hex numbers, assemblers, the Monitor, and more.

PEEKs, POKEs, and CALLs

To refresh your memory, recall that in machine language a "program" consists of a series of numbers stored in successive memory locations. The 6502 microprocessor "runs" a machine-language program by scanning this series of numbers and performing various operations depending on the value it finds in each successive memory location.

Applesoft BASIC includes several commands that let it deal with individual memory locations and run machine-language subroutines from within any Applesoft program. The Applesoft command POKE, for instance, stores a value in the range of zero to 255 in a given memory location. The command PEEK lets you examine any memory location to see the number value already stored there.

Another command, CALL, directs the 6502 to start running a machine-language program at a specified address. When the computer encounters the machine-language equivalent of a RETURN, program control returns to the next statement in the Applesoft program.

A Test Program

To see how a BASIC program can create and then run a short machine-language program, enter the lines of BASIC in **Listing 1**. When you run this program, the screen should clear and the letter A appear in the center of the screen. The simple explanation of how this program works is to say that the 6502 microprocessor in your Apple understands the number series 169,193,141,188,5,96 to mean "print the letter A in the middle of the screen."

You can probably guess that 96 is the number code equivalent to BASIC's RETURN command. You could look in a technical reference manual to determine the meaning behind the other values, but an easier way exists—use the built-in *Monitor* present in every Apple II computer. For many microcomputers, the word "Monitor" means a sort of mini-language used at the machine level to make life easier when dealing with machine-language programs and data.

Listing 1. A BASIC program that creates and runs a machine-language program.

```
10 HOME
20 POKE 768,169:POKE 769,193
30 POKE 770,141:POKE 771,188:POKE
   772,5
40 POKE 773,96
50 CALL 768
```

To enter the Monitor voluntarily, type in CALL -151 and press the return key. The Applesoft prompt (]) should change to an asterisk (*), which indicates you are officially "in" the Monitor—that is, the computer no longer recognizes Applesoft commands; it recognizes Monitor commands instead. You can try typing PRINT at this point to confirm this (your computer should just beep at you), but don't try typing anything else randomly just yet.

One of the initial uses of the Monitor lies in its ability to show you the contents of a range of memory locations. To examine the part of memory that holds the machine-language program POKEd into memory, type in 300.305 and press the return key.

The screen should display:

```
300- A9 C1 8D BC 05 60
```

At this point, you may justifiably say, "Wait a minute! These don't look like the same numbers my BASIC program used, and I thought it started at location 768, not 300."

You're almost right. The numbers don't look the same, but believe it or not, they do represent those values.

Hexes and Other Curses

In explaining the numbering systems computers use, people who write books and columns on machine-language programming just love to start talking about how we count by sets of ten because we have ten fingers. Ten is called the *base* of our numbering system because it's the foundation for the way we count out a quantity of some item.

Regardless of why you think we count by tens, it's true that, in a mathematical sense, the base for a counting system can be any number

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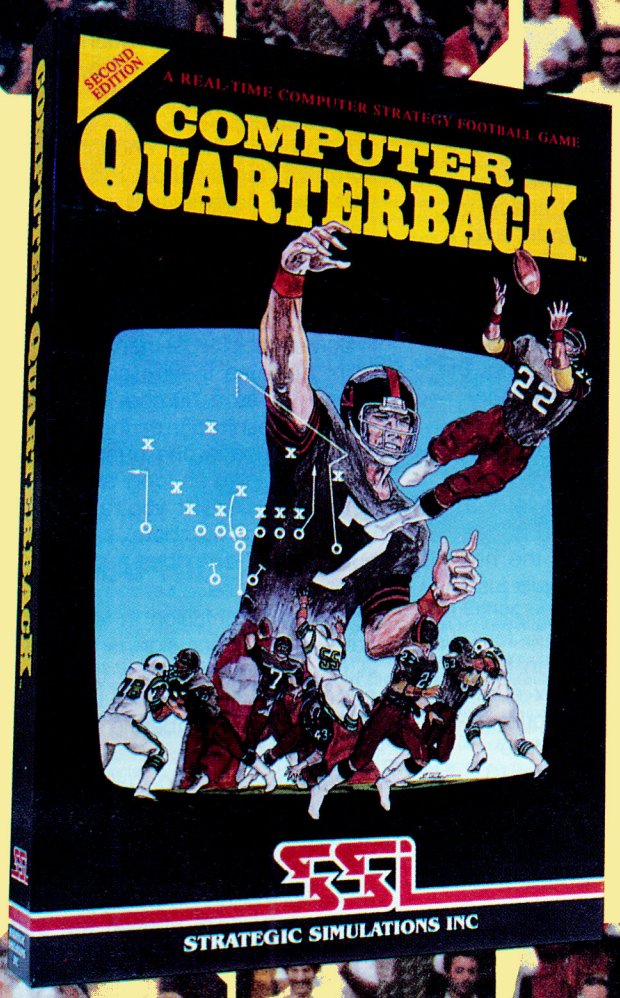

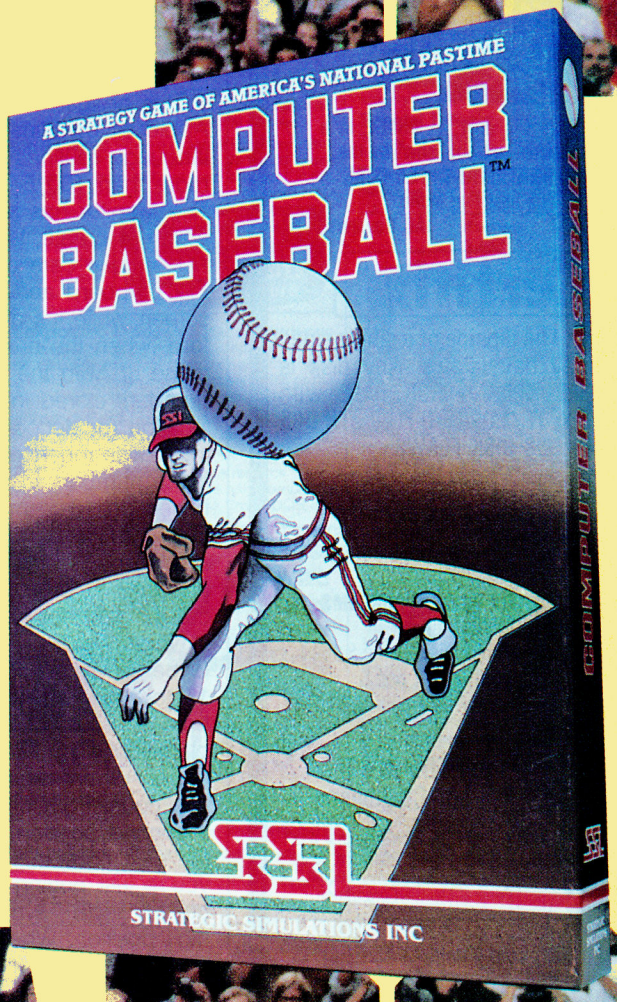

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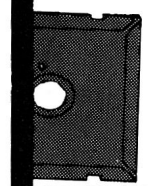

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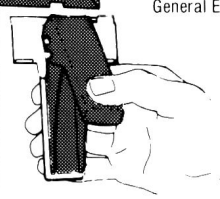

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RIGHT OF ASSEMBLY

you want. In the computer, for various electrical and logical reasons I won't bore you with here (I've always hated tutorials that made me wade through a lot of number theory just to write a little program), your Apple computer likes to count by twos at the machine level of operation.

This brings me back to the Monitor. Applesoft contains 12K of machine-language routines to support the more than 100 BASIC commands. The Monitor has just 2K of space in which to create its commands, and it has to take care of things like reading the keyboard and managing the screen while it's at it, as well. Therefore, when the creators of Applesoft came up with the routines to print the numbers stored in a given memory location (or decode numbers you type in), it was much easier to deal with these numbers in a number system based on 16 (a multiple of two) than in a system based on ten. This base-16 number system is called the hexadecimal system. (Most people just call it "hex" for short.)

Now it really isn't necessary for you to be an expert in counting in base 16 to be able to use the hex numbers on your screen, but a brief explanation will make things a little easier. When counting in base 10, you count from one to nine, then use a second position (for the 1) to create the next number (10). In a sense, you're just putting a limit on the number of "legal" symbols for a given digit position. When counting from ten to 99, you again limit yourself to the digits one through nine, and thus have to move to 100 for the value after 99.

The people who made up the counting system for hex numbers just said, "Hey, when we get to nine, why not keep going with some new symbols?" When you count in hex, you start as you did before—from zero to nine—but, when you get to the number to follow nine, you just use a few letters of the alphabet—A to F.

Allowing letters up to the letter F lets you count to what would normally be 15 using just one digit position (or should we now call it a "hexit"?). Well, in any case, when you continue, you do what you did in base 10—namely, add a one to the left to mark a set of 16, and keep counting:

F, 10, 11, 12, . . .

And, as before, when you use up the characters on the right again, you repeat the pattern:

18, 19, 1A, 1B, 1C, 1D, 1E, 1F, 20, 21, 22, . . .

Now remember, don't get worried about being a math whiz at this point. All you need to do is believe that the symbol 1B is as legitimate a way of writing some number quantity as 27 is. In fact, in this case they're equivalent (1B [hex] = 1 × 16 + 11 = 27 [decimal]).

If you count high enough in hex numbers, the symbols run out again, and you'll have to add another number position:

98, 99, 9A, 9B, 9C, 9D, 9E, 9F, A0, A1, A2, . . ., F8, F9, FA, FB, FC, FD, FE, FF, 100, 101, 102, . . .

Some people get nervous at this point because they're not used to saying 1A as a number (it works in hotels, doesn't it?), or they're not sure that 100 means one hundred anymore. Actually, as long as the other person knows that you're talking hex addresses or numbers, saying one hundred, or even bee-hundred (for B00) is just fine.

To avoid confusion in written text, however, a dollar sign is usually put in front of hex numbers (for example, $B00), so someone can tell at a glance which numbering system you're using.

Well now, back to that list of numbers you were looking at in the Monitor:

300- A9 C1 8D BC 05 60

To verify these numbers quickly, let's look at a few. To convert the 300, you need to know that the third number position must be multiplied by 256 to convert it to base 10: 3 × 256 = 768. Yep, that's your starting address.

For the A9, remember that A comes after 9 in the hex counting system. That means A is just like a regular 10: 10 × 16 + 9 = 169. That checks with the first number POKEd into memory on line 20 of your BASIC program. The 05 near the end is easy. The 60 at the very end checks out with 6 × 16 = 96, the value I said tells the 6502 to return from the program.

POKEs, PEEKs, and CALLs in the Monitor

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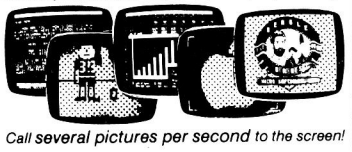

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```
10 PRINT CHR$(21): COLOR=2:
   FOR X=0 TO 39 STEP 2: FOR Y=1
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   X+Z,Y: NEXT Y,X
20 POKE 37,255
```

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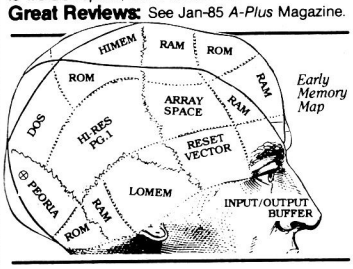

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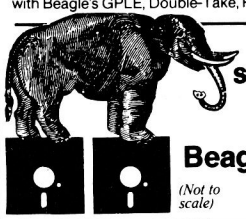

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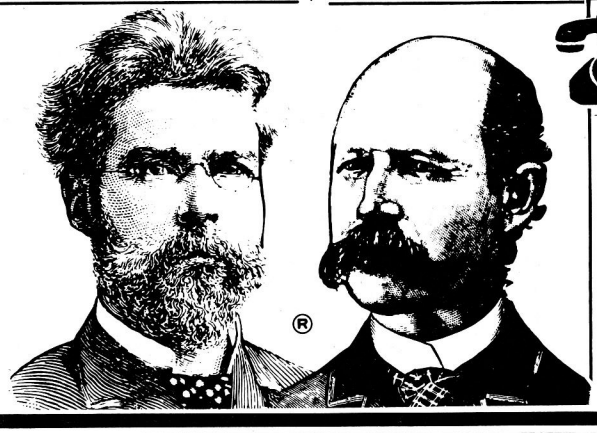

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memory location—type in the addresses separated by a period and press the return key. If you want to look at just a single location, type in a single hex address. For example, to examine location $300, you can type 300 and press the return key.

The screen should print:

```
300- A9
```

Note that the Monitor doesn't display a dollar sign; it expects only hex values, so a dollar sign isn't needed.

If you want to print several different locations, separate each address value by a space. For example, type in 300 302 304 and press the return key.

The screen should print:

```
300- A9
302- 8D
304- 05
```

To do the equivalent of BASIC's POKE, type the address followed by a colon. For example, to change location $301, type in 301: C2 and press the return key. Now type 301 and press the return key.

Listing 2. Assembly-language program. The first column shows memory addresses; the second, object code; the third, source code.

```
0300-    A9 C2       LDA #$C2
0302-    8D BC 05    STA $05BC
0305-    60          RTS
0306-    ??
0307-    ??
0308-    ??
```

The screen should print:

```
301- C2
```

The value has been changed!

Now what about the equivalent of a CALL statement? In the Monitor, all commands are single letters rather than complete words, and they follow the address of interest. To run your program from the Monitor, type in 300G and press the return key. (Can we do away with this reminder now?)

The letter B should now appear in the center of your screen. (Remember, you did change the program.) The letter G following the address 300 stands for Go and tells the Monitor to run a machine-language program at the specified address.

The Monitor LIST Command

You're probably thinking by now that if you have to deal entirely with numbers to do machine-language programming, it's going to get tiresome very fast—and you're right.

To list a machine-language program, the monitor has a nifty command. Type in 300L.

Wow! The screen should now list 20 lines of strange stuff that looks something like **Listing 2**.

L is the Monitor LIST command; it tells the Monitor to display the contents of memory. Since I'm using the term "assembly language" for the first time, you might well ask what the difference is between machine language and assembly language.

Well, once upon a time, people programmed computers by entering pure numbers to tell the microprocessor what to do for a given program. (That's probably where programming got a bad name in the first place.) Then one day, someone said, "Why don't we make up letter codes for these commands, and let the computer figure out the right numbers to use?" And they did.

Since programmers were very memory-conscious at the time (the computer's memory, not theirs—in 1978 16K of RAM for an Apple cost $300), they used *mnemonics*, short abbreviations for words. Actually, a mnemonic is an abbreviation that sounds like the words for which it stands.

Thus, at address $305, you see that the Monitor has translated the $60 to RTS—ReTurn from Subroutine. When creating a program, it's a lot easier to remember RTS than $60.

A program that takes a list of mnemonic codes and translates them into the proper series of numbers in memory is called an *assembler*. The listing the programmer types in is the *source listing*; it corresponds to the text in the rightmost column of the Monitor listing.

The numbers the assembler puts into memory are the *object code*; they correspond to the numbers in the columns shown in **Listing 2**. The numbers at the far left are the addresses of the numbers that make up the object code, and are displayed for convenience only.

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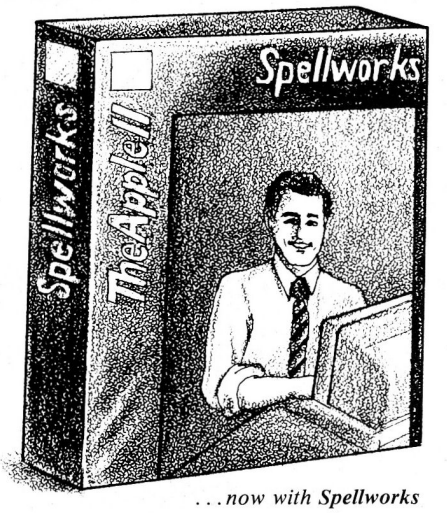

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program, you are loading or saving just that series of numbers that makes up the object code for a machine-language program.

In the technical sense, then, assembly language is the programming of the computer by typing in the mnemonic codes, which an assembler then *assembles*, or translates into numbers. Machine-language programming is putting pure numbers directly into memory without the aid of an assembler. The end result is the same, though—a machine-language program.

As it happens, most people use the two terms as they use "porpoise" and "dolphin." The words really mean two different things, but in general conversation it's not that important (my apologies to marine biologists).

Nobody really directly writes machine-language programs of any size anymore (an assembler is the only way to go—imagine writing BASIC by POKEing each value into memory), but many people use the terms machine-language programming and assembly-language programming interchangeably.

The Accumulator

Now, back to the program in progress. In **Listing 2**, the first pair of numbers in memory is translated as LDA #$C2. LDA is a mnemonic that stands for "LoaD Accumulator." The *accumulator* is rather like the 6502's very own memory location, set apart from the other 64K of memory addresses. The accumulator is called a *register* and is used as a temporary location to hold various number values.

In this example, LDA #$C2 tells the 6502 to load the accumulator with the value $C2. The number sign (#) indicates that the actual value $C2 is to be used. If the number sign had been omitted, the 6502 would instead look at *location* $C2 and take the content of that location and put it into the accumulator. In this program, though, the value $C2 corresponds to the letter B, the specific value you want to use.

The program lists the next 3 bytes as STA $05BC and tells the 6502 to store the contents of the accumulator in memory location $5BC. STA stands for "STore Accumulator."

Memory location $5BC is a part of the range of memory the computer uses to make up the text-screen display. By altering any location in this memory range, you can make any character appear on the screen.

Conclusions

Of all the columns that will make up this series, this one by itself probably has the largest number of new ideas you'll ever come across at once. In this single column, you've learned about hex numbering, assemblers, the Monitor, Monitor commands, the 6502 accumulator register, and more.

In learning any new subject, one of the most important steps is to build a framework into which you can incorporate each new fact. This column has provided the key elements that will make up that framework for future discussions. It's a lot to comprehend all at once, and you shouldn't worry if it seems a little much right now. As you go on, the pieces will fit together better all the time.

For now, you may want to list different parts of memory to see what kinds of program instructions you can find. The area from $D000 to $FFFF is quite interesting. Other areas may list as question marks. This means that the computer cannot interpret the numbers there as a 6502 program. This makes sense, though. When you turn on the computer, a lot of memory starts out with somewhat random values. In addition, the data an Applesoft program stores as variables, for example, is just that—data. Data does not a program make, and the Monitor LIST command doesn't list that data in any intelligible way. Feel free to explore, though; you'll become comfortable with the Monitor and start to see patterns in the way things work.

In the meantime, you may want to start looking around for information on a good assembler. In my next column, I'll discuss the "mini-assembler" available on most Apples. But, within another month, you'll need a more powerful assembler to enter the listings presented in this column. Next month, I'll also give some tips on what to look for in an assembler, and a list of commonly available products. ■

Roger Wagner is the author of Assembly Line: the Book *and is president of Roger Wagner Publishing, the publisher of Merlin and Merlin Pro assemblers. Write to Roger at Roger Wagner Publishing, 10761 Woodside Avenue, Suite E, P.O. Box 582, Santee, CA 92071.*

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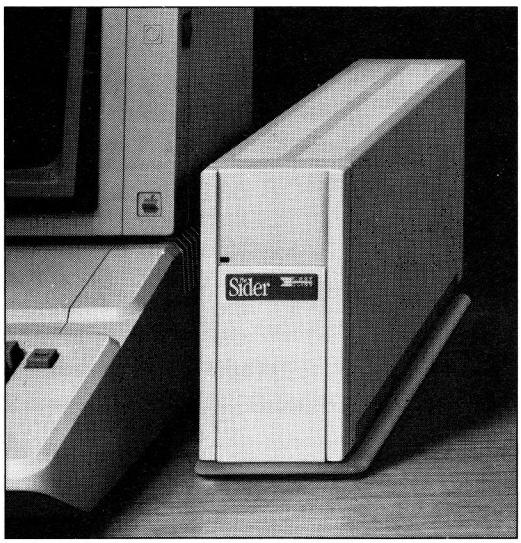

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The din won't remind you of the print shop—it's a quiet machine. The folks at Juki might claim that the decibel level never exceeds 63, but you might just listen more carefully to the casual conversation you can share while the 6300 runs.

The 6300 is as quick out of the box as it is in the printing race. It takes less than an hour to unpack the machine, put in the 96-character daisy wheel and the cartridge-type Diablo ribbon, and print your first page. The *User's Manual* clearly tells you how to set up the printer—a nice gesture by Juki, if a bit unrealistic, since the instructions are tucked inside the printer. Removal or replacement of ribbons or daisy wheels is really a snap—welcome to the modular world.

Only Diamonds Are Forever

Rumor has it that Juki printers last forever, and the Model 6300 appears likely to linger until it becomes as archaic as the Underwood. It weighs almost 31 pounds and sports only a couple of moving parts. Our review model survived the attack of an errant Irish editor on an oversized bicycle; yours should make it handily through the minor abuse of resumés and newsletters.

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Four membrane switches on the front panel control the Model 6300: Stop/Continue, Page Feed, Top of Form, and Line Feed. When you stop to change a ribbon or print wheel, the printhead automatically returns to the line at which you quit. It's a thinking printer in more than its bidirectional and logic-seeking speed. The DIP switches are inside, but they're easy to find and manipulate.

Classic Reading

Thankfully, the Juki 6300 *User's Manual* is as far behind the times as the printer: Instructions are in plain English, diagrams are simple and straightforward, and the illustrations and directions actually collaborate to ease installation and speed repair.

One chapter describes the interfacing, configuration, and installation procedures required for six different computers. Chapter 6, "The Model 6300 and Your Apple II Plus, //e, and //c," offers help with Apple Writer II, WordStar, VisiCalc, SuperCalc2, AppleWorks, and Bank Street Writer. The Apple

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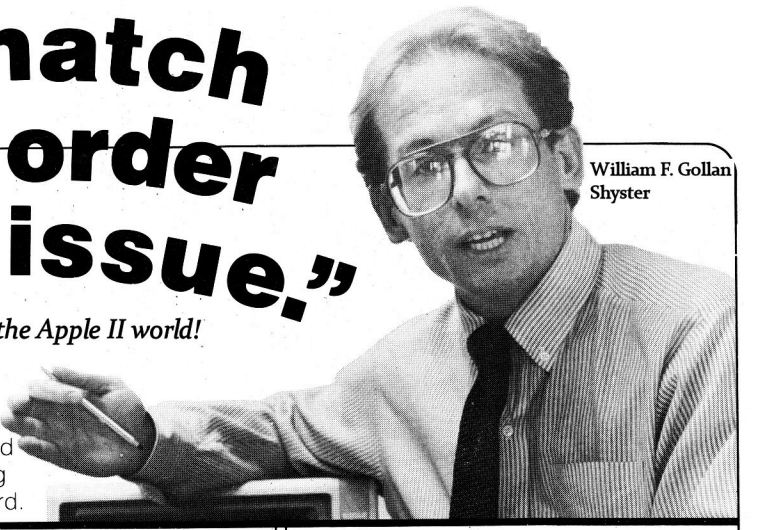

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REVIEWS

Writer II configuration, for example, is as simple as setting print destinations and a carriage return. The Model 6300 also allows for special features, such as bold and shadow print, underscoring, subscripts, and superscripts, that Apple Writer lacks.

Passing the Buck

Juki lags in support. The company suggests you take your problems to a local user group or back to your dealer. User groups are a great resource, but wouldn't you worry if Chrysler told you to join AAA or to call Ralph Nader when your Charger couldn't? The Juki staff in New Jersey is fine and friendly, but customer support isn't a priority—taking orders is.

A Juki printer breaks down less often than a Charger, though, and your warranty will cover parts and labor for one year. The word at Juki is that more servicepeople are in training, but if you live outside a major metropolitan area, as many old-fashioned people do, you'll need to do some shipping when something fails. But failure isn't likely.

A printer that costs $995 isn't cheap. You're paying the equivalent of a //c price tag to write resumés that make you look as if you know how to type, or to compose love letters that don't look ghost-written—by R2-D2. The Model 6300 outperforms its little sibling 6000 (see *inCider*'s review, October 1985, p. 82) at three times the speed, twice the number of options—and three times the cost. It adds up—but if you insist on antiquated correspondence, why not do it with some style?■

Paul Statt
inCider *staff*

B/Graph

Batteries Included
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Canada L4B 1B5

Presentation Graphics
Any Apple II
$39.95

★★	Ease of set-up
★	Ease of use
★	Documentation
★★★★	Support
★★	Overall

The art of computerized presentation graphics has taken quantum strides in recent years. A typical presentation-graphics package now includes a range of graph types (usually line, scatter, bar, pie, and high charts) you can reproduce over an equally diverse and useful range of styles (stacked, mixed, and exploded). Add the ability to enter customized titles, axis labels, and legends, to name any other features you'd need. Does B/Graph measure up to

these standards? B/Graph does include these capabilities, but a certain lack of flexibility in their application may frustrate you in your efforts to use the program.

B/Graph is written in modules. The primary module is the graphing-entry section, which gives you a choice of line, point, or bar charts for the data you've typed in. I made the mistake of first running Apple Writer without shutting down my //e afterward for 30 seconds, as the manual recommends. Rebooting the B/Graph program disk worked fine until the chart appeared: the program printed an unrecognizable glob on the screen instead of a line graph.

The data entry itself is more important. You can enter two main titles, but the program limits them to 20 characters each. You can label individual datum, but each label can be no longer than eight characters. You must be very careful not to make a mistake. Pressing the left-arrow key with the cursor in the first character position in any field sends it to the left corner of the next line—totally disjointed from the field you're entering.

B/Graph can handle up to 100 data points per category (or factor, according to the manual), but you can only enter three categories per graph. Furthermore, B/Graph won't accept more data elements for the second or third categories than you've already entered for the first. Even updating the information can't increase the amount.

In contrast to this lack of flexibility, B/Graph can import data from DIF or ASCII files—an excellent feature not found in many charting programs. When I finished entering the data, I found the graphs actually looked quite nice, even though text appeared in 40-column mode. I discovered I could fill a line graph with one keystroke, turning it into an area chart, or switch to another type of graph just as easily. Unfortunately, the legend identifying the key functions was remanded to a previous screen—out of sight when I needed it.

Additional modules plot your data in pie-chart format and perform statistical functions, all efficiently executed. The program performs correctly, and when you deal with the data in pre-existing graph files, you avoid the entry limitations.

One of B/Graph's more striking features is its slide-show capability. With very little effort, I organized picture files of my graphs into a continuous "slide" display on the screen. My only objection to this feature is that the program's authors decided to call it "imaging," a term not normally used to describe this type of work.

In fact, that same practice accounts for about 30 percent of my objections to B/Graph. The program calls scatter graphs "point" graphs, because the "S" on the menu stands for segmented bar charts (which are actually stacked bar charts). Those words aren't necessarily wrong, but they're not the usual terms for those types of graphs.

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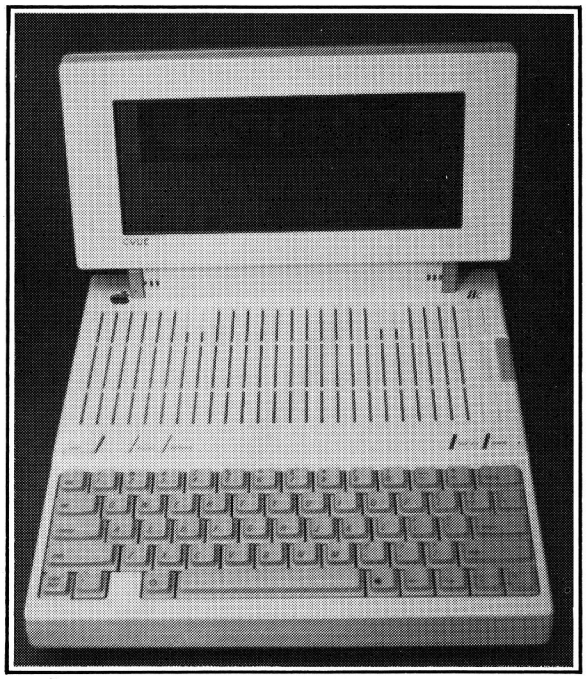

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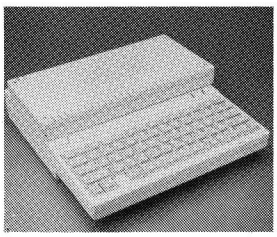

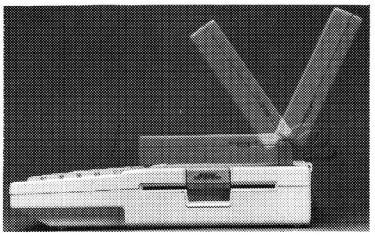

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Compounding that problem are three other factors: B/Graph's inability to accept lowercase input; its support of only five basic types of printers through only three interface cards (Pkaso, Grappler, and Apple Dumpling); and its lack of support of any plotter (even though the Hewlett-Packard 7470A is almost a standard for charting). The manual still recommends the program for home and business use, despite all that.

B/Graph would have made a big splash in 1982. I'm certain the authors' background in APL (A Programming Language), statistics, and Atari programming are responsible for both the high points and low points of the program.

One line from the manual sums things up: "Use of a printer is optional." I can only reply, "I'll send you a chart of prospective B/Graph sales as soon as I clear up one small problem. While you can plug a monitor in at your office, I'm still looking for an 1100-mile extension cord for my Apple's video jack."■

Bill O'Brien
Fort Lee, NJ

Keyboarding Alpha-Pac

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Typing instruction
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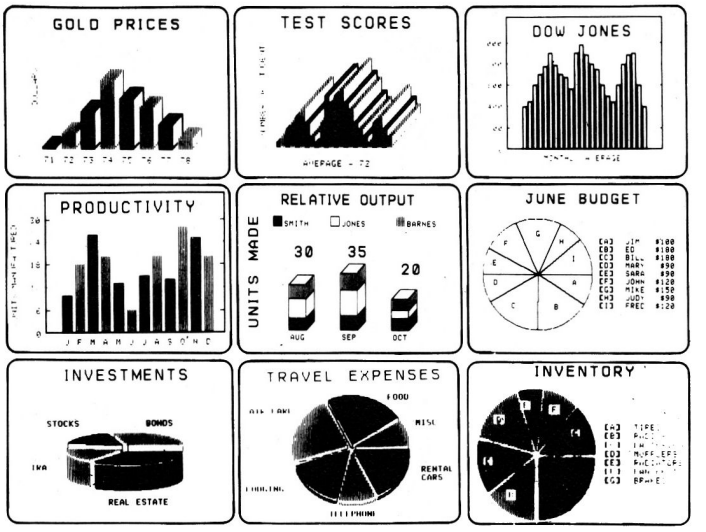
★★★ Ease of set-up
★★★ Ease of use
★★★ Documentation
★★★ Support
★★★★ Overall

Anyone who's taken a typing class knows the quick brown fox jumped over the lazy dog, but many other people—including some long-time computer users—don't understand where to find home row. Although several computer "games" provide typing drills, few programs actually teach novices how to type. Keyboarding Alpha-Pac successfully tackles the task by avoiding the inherent pitfalls often found in these programs. Its graphics and animation are unobtrusive and attractive—without any gimmickry.

The program opens with written instructions followed by a graphics demonstration showing the correct way to sit at a desk and keyboard. The first lesson introduces you to the home-row keys (A, S, D, F, G, H, J, K, L, and semicolon) and the space bar. Although most of the lesson material follows in logical sequence, the program doesn't tell you about the significance of the return key until several min-

AlphaChart!



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A slide projector, for orchestrating automated, stand-alone screen presentations of a series of charts, timed and sequenced by the user. This program alone is worth the cost of the disk. It can be used with any graphics files created with any program.

A graphics editor, for alteration and embellishment of charts. Besides standard point-by-point sketching, built-in structures permit push-button creation of circles, rectangles, lines, shape-table shapes, and exotic woven plaid patterns. If you wish to add clarifying text to the charts, you may type on the screen in several different letter font styles. For the artist, the graphics editor can also be used to sketch any imaginable scene from scratch.

A shape table editor, for creating special shapes for your charts. These shapes can also be used for animation in your programs! A sample animation program shows how to do it.

AlphaChart! includes a screen-dump program for printing your charts on paper. AlphaChart! is more! Just read what these people have to say about it...

"I noticed the advertisements for Spectral Graphics' AlphaChart! program and figured that, with a money-back guarantee, I would try it. Boy, am I glad I did! This is a fantastic program. You can master its many varied capabilities in less time that it would take to describe them. I would recommend it to everyone, even if you have absolutely no need for a graphing program. It's just fun to play with." **S.A. Smith, San Bernadino, Calif... letter to SOFTALK, June, 1984, page 14.**

"The software does much more than the advertisement suggests. Without question, this is among the best buys in software that I have ever come across, and certainly among the best written. It is extraordinarily easy to use, very well thought out, and priced to kill your competition (which I wish you every success in doing)." **Anthony J. Scriffignano, North Caldwell, New Jersey.**

"I have long been distressed by the lack of software available in the scientific academic community. At last there is a simple yet robust graphics program applicable for our purposes: AlphaChart!, by Spectral Graphics Software. Business folks and scientists alike will really appreciate how user-friendly it is; I was able to produce my first three-dimensional, multi-colored, labeled bar graph within five minutes of booting the disk-without reading my documentation. I would have had to pay a scientific illustrator much more than the whole program costs just to produce that one graph....you can't do without this gem." **John B. Iverson, Richmond, Indiana...letter to SOFTALK, April, 1984, page 23.**

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utes after it's mentioned. This oversight isn't characteristic of the rest of the program, however. Keyboarding Alpha-Pac's written documentation, a four-page leaflet, is short, but adequate, given the program's clear on-screen self-documentation.

After you boot the program, a handful of text screens with diagrams appear. Press the return key to move past each screen, but don't go too fast—the program doesn't separate the instructions from the introduction with any graphics or machine-language barrier. Keyboarding Alpha-Pac doesn't have a looping feature, so you must determine when you've mastered the keystrokes in each lesson.

Keyboarding Alpha-Pac comes on two disks containing nine lessons each. Lessons cover proper typing posture, basic key-strike and reach techniques, left and right shift keys, and letter, numerical, and punctuation placement. The program also includes review lessons.

Each lesson begins with a demonstration of the finger action necessary to strike specific keys. A smoothly animated drawing demonstrates the required keystroke. Keyboarding Alpha-Pac doesn't contain graphics for the sake of graphics; rather, it's a rare example of what well-handled graphics can do for an educational program.

Keyboarding Alpha-Pac's key-teaching sequence lets you type words and simple sentences early in the lessons and provides motivation for young learners. The first 15 lessons emphasize accuracy, and the program won't let you continue until you press the correct keys. In the last three lessons, the emphasis shifts to speed. Like the key sequence and the helpful graphics, this logical progression reflects the common sense behind the program.

Keyboarding Alpha-Pac calculates gross number of words per minute from your speed tests. You can select individual lessons from the menu and practice those that give you difficulty.

I have just one complaint. South-Western Publishing doesn't publish its back-up policy, and there is no mention of replacement costs. Although the disks are write-protected, it isn't too difficult to make a copy with an off-the-shelf product.

The bottom line? Keyboarding Alpha-Pac works, it's thorough and well presented, and it's an excellent way—whether you're a beginner or seasoned computer user—to learn at your own pace how to type quickly and accurately. ■

E.R. Campbell
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Editor's note: South-Western Publishing now offers a back-up and replacement disk for $15.

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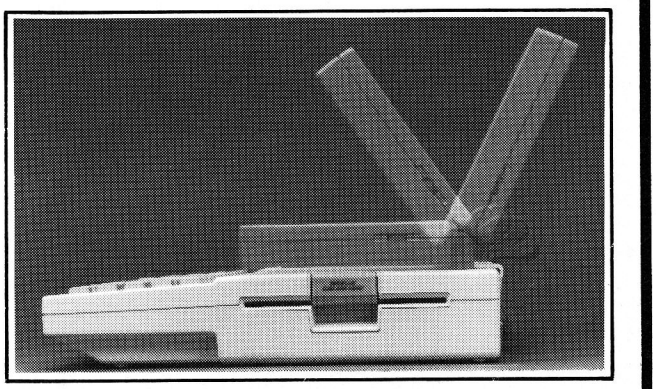

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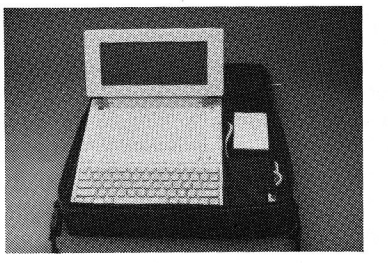

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★★★ Ease of set-up
★★★★ Ease of use
★★★ Documentation
★★★★ Support
★★★★ Overall

When it comes to program-execution speed, Applesoft BASIC is usually quite slow. Compilers speed up your efforts considerably, but machine language is really the only way to go. MerlinPro, an assembler package using ProDOS, is an updated version of Roger Wagner Publishing's Merlin MacroAssembler program. The revisions utilize the enhancements offered by ProDOS and the //e and //c with 128K.

Besides the MerlinPro assembler, Wagner has also issued three "Toolboxes" for Applesoft programmers, with a fourth coming soon. These packages are for the "lazy," "smart," or "efficient" programmer (take your pick) who not only doesn't like "reinventing the wheel" each time he or she sits down to write a program, but who also wants to tack a couple of machine-language routines onto his or her Applesoft program.

The Magic of MerlinPro

MerlinPro is capable of generating code for the 6502, 6502B, 65C02, and the 65802 "superchip," as well. The non-copy-protected program comes on three sides of two double-sided disks—one side for Merlin under ProDOS, one for Merlin under DOS 3.3, and one for a disassembler.

MerlinPro contains four interwoven, integrated modules. The first is called the Executive mode. It's the system's overseer, controlling all I/O and file-management functions, including saving and loading source and object code to disk and memory, and maintaining any text files you generate.

The second module is a text editor you can use to write source code. It uses more than 40 text-formatting and editing functions that make writing acceptable code easier. While you can use other text editors (such as WordStar, The Write Choice, or Screenwriter II) to write your source code, I found the process just as easy with MerlinPro's editing

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REVIEWS

mode. It even automatically generates spacing and tabs for final assembly, a task that can be quite difficult with other programs. The text editor also includes insertion, deletion, and global search-and-replace routines.

The third module is the assembler, which transforms source code into object code. Besides the standard 6502 op (operation) codes, Merlin recognizes 50 pseudo-op codes, including the "Sweet 16" assembler codes. A "linker" program allows the assembly of very large programs, while maintaining an efficient pace. It also lets you tack on previously defined library routines, so you don't have to rewrite them or produce relocatable code.

The disassembler creates Merlin-like source-code files from any machine-language program, and a "complete" listing of Applesoft BASIC object code. Printing this program burns up a lot of paper and about three hours of time.

MerlinPro supports both 40- and 80-column video modes, as well as upper- and lowercase differentiation. The program modules are menu-driven and easy to use, once you know what you're doing. In assembling some small programs, I found Merlin to be well error-trapped and forgiving. It prompts you for corrections and gives you the location of the error and a clue to its nature. The assembly is tolerably fast, and whenever you endanger your source code, Merlin lets you know about it in ample time to avoid disaster.

Tools for Programming

The Wizard's Toolbox is the first of the Toolbox series. It consists of about 30 subroutines, called commands. These are general-purpose items, and include such things as a music-programming utility, a print-using command, a number of different high-speed I/O routines, some fast graphics-loading routines, shape-table commands, array searches, and GOTO/GOSUB routines.

The Database Toolbox contains more than 40 subroutines for data and array manipulation, including variables and strings, which allow you to perform fast sorts and searches and quicker read/write functions. (A few routines are included in both the Wizard's Toolbox and the Database Toolbox.)

The third package currently available is the Chart 'n Graph Toolbox, with 40 more options. This package sets up graphics interfaces and routines that let Applesoft programs plot pie, bar, or stacked charts, set up pull-down windows, split programs around Apple's hi-res pages, and draw 3-D graphs. They can also help you define labels; set up axes, tick marks, and grids; then plot and print your data. One side of the Toolbox disk handles standard hi-res capabilities, and the other takes care of Apple's double-hi-res mode.

Operation

The three Toolboxes are similar in operation. The machine-language subroutines are embedded as user-named Applesoft commands by using the Ampersand hook. The programs automatically add the necessary linking line to your BASIC program from the "workbench." Once the toolbox makes the link, the subroutines are simple to use. Each of the Toolbox programs also has a demo illustrating the function of each command. All commands seem to perform properly, except for one in the Wizard's Toolbox: Hitting the space bar increases the size (scaling) of a shape and is supposed to return it to its original state, but the latter function doesn't work efficiently.

Probably the worst thing about the Toolboxes is that the programs let you add unnecessary commands to your programs. Most of the Toolbox commands function equally well in either a ProDOS or a DOS 3.3 environment. Those that cannot are indicated as such.

Conclusions

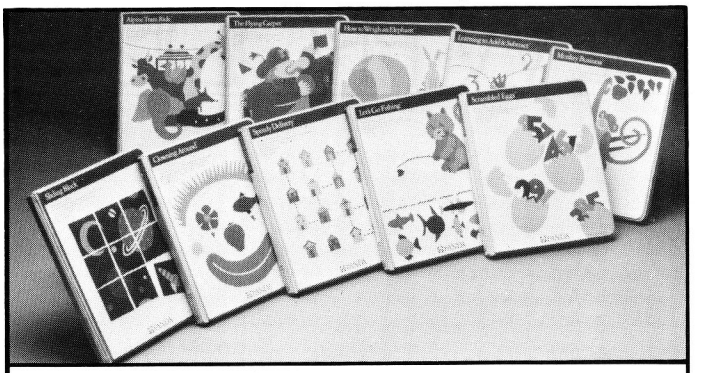
None of the programs are copy-protected, and you can list all of them. You can even have some fun looking at subroutines with the disassembler.

The documentation for all the Toolbox packages is good. There are some typos, but none appear to be serious. Each volume explains the content of the program and the command syntaxes involved. They're not light reading, however, as they all deal with machine language, Apple machine hardware, and memory mapping.

The programs come with a 30-day money-back guarantee. Trial-size Toolboxes are available for the skeptics among you—but using any of them should soon convert you to a full-fledged Toolbox programmer. ■

Doug Landin-Young
Fresno, CA

Editor's note: Roger Wagner of Roger Wagner Publishing reports that a fourth programmer's kit, the Video Toolbox, is now available for $39.95. Watch for an upcoming review in inCider. *He was also quick to point out that "the only redundancies are in the demos" where we found routines included in both the Wizard's and the Database Toolboxes. He does not claim that his docs are "light reading," but does insist that "you certainly don't need to know machine language or the Apple's interior design to use the Toolboxes."*



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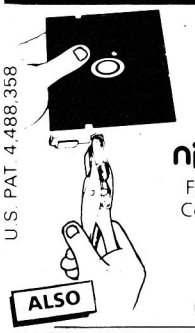

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Voice Master: voice synthesis and recognition all in one.

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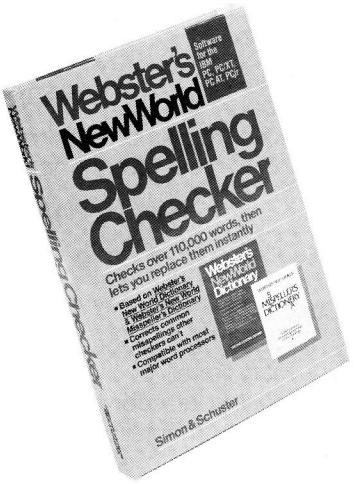
Movable Feast

ZBasic 3.0 uses the same programming commands on any computer—your code is completely portable. The IBM PC series, TRS-80 series, Macintosh, CP/M, and Apple II series of microcomputers share the same ZBasic syntax—if you learn ZBasic once, you'll never need to relearn it for another machine. ZBasic also has device-independent graphics commands, 54-digit numeric accuracy, a built-in interactive editor and compiler, a choice of alphanumeric labels or line numbers, and speed the developer says beats Turbo Pascal. ZBasic is available from Zedcor, 3438 North Country Club, Tucson, AZ 85716, (602) 795-6800. For more information circle number 356 on the Reader Service card.



Wait a Spell

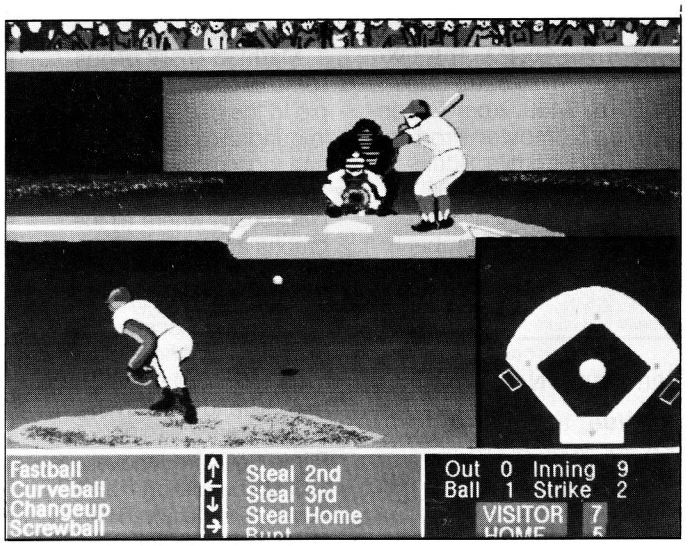
Webster's New World Spelling Checker uses a data base of more than 110,000 words to correct simple misspellings, double-typed words, and run-on words. The dictionary data base isn't troubled by hyphens, apostrophes, or contractions. It will find the correct spelling of a word even if you can only spell it the wrong way. The New World Spelling Checker is based on *Webster's Misspeller's Dictionary* and *New World Dictionary*. A New World Word Processor and New World Electronic Thesaurus are in the works. The New World Spelling Checker costs $59.95, from Simon & Schuster Electronic Publishing, 1230 Avenue of the Americas, New York, NY 10020, (212) 245-6400. For more information circle number 362 on the Reader Service card.

Quick Accounts

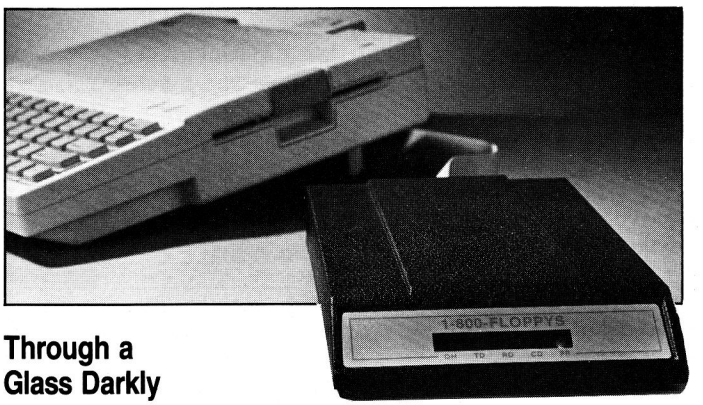
Quicken checking and finance software for the //c and //e lets you transfer data from your budget accounts into AppleWorks spreadsheets; you'll avoid typing rows and columns of figures twice. Quicken pays your bills (with your money), keeps track of expenses, and balances your bank statement. Quicken automates the procedure that's the heart of most small businesses: balancing the check register. Quicken fits AppleWorks neatly, sharing keystroke commands, file-card menus, as well as help screens and on-screen prompts. Quicken is priced at $79, from Intuit, 540 University Avenue, Palo Alto, CA 94301, (415) 322-0573. For more information circle number 361 on the Reader Service card.

No Rainouts

You can play **Hardball** any time of the year—and watch the game as if it were on TV. Three-dimensional graphics puts you in centerfield to eye the pitcher and batter, or behind the plate to stare down the right- or left-field alley. The pitcher's repertoire includes fast balls, curve balls, screwballs, changeups, and sinkers. Managers call for bunts and stolen bases, make substitutions and position the fielders. The game is joystick-controlled, combining graphics, animation, and strategy in a simulation that rivals the televised event, for $34.95, from Accolade, 20863 Stevens Creek Boulevard, Cupertino, CA 95014, (408) 446-5757. For more information circle number 358 on the Reader Service card.



Batter's up and playing Hardball.



Dial 1-800-FLOPPYS: $99 brings more than a modem.

Through a Glass Darkly

Compu-Lenz reduces monitor glare while doubling CRT character size. It's a combination Fresnel lens, glare filter, and universal holder you can use with any monitor. Attachment is a snap, and the Compu-Lenz adjusts to your personal needs. The suggested retail price is $149.95 from Compu-Lenz, 220 Commerce Avenue, Port Richey, FL 33568, (813) 842-3231. For more information circle number 369 on the Reader Service card.

Secret Sharer

Apple Secrets can help you streamline your program design, speed up Applesoft, create special graphics effects, control DOS, and have more fun with the II series. The book contains more than 75 programs. If you hate to type, a disk is available. The softcover book with wire binding costs $19.95; with the disk, $29.95, from Nibble Publications, MicroSPARC, 45 Winthrop Street, Concord, MA 01742, (617) 371-1660. For more information circle number 365 on the Reader Service card.

Home Modem

The **Smart Communications System** starts making sense: Instead of sprinting between store and computer as you discover you need a modem, software, and special cables to go on line, you bring the whole package home at once. You need nothing but a telephone—the Smart Communications System includes all the hardware and software, a one-year warranty, a toll-free technical-support line, a user manual, free NewsNet time, membership in the Delphi on-line information service (see "Demystifying Delphi" in the June 1985 issue of *inCider*, pp. 26–30), and a free Apple Bulletin Board System. The cost is $99. If you don't believe it, call 1-800-FLOPPYS, 22255 Greenfield Road, Southfield, MI 48075, (800) 356-7797. For more information circle number 352 on the Reader Service card.

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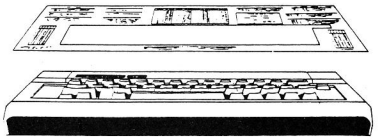

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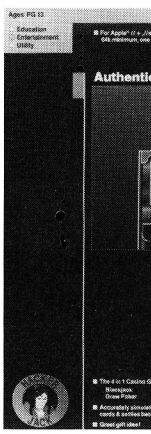

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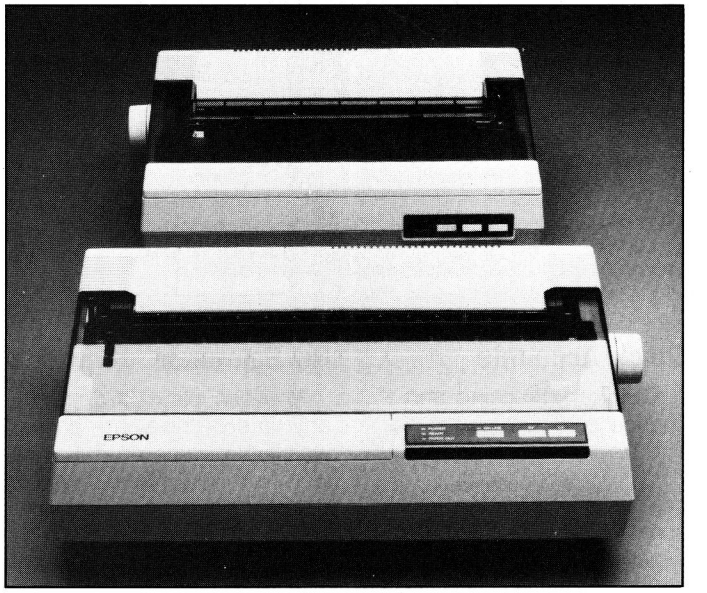

The Epson DX-10 and DX-20 bring letter quality home.

Coming Up Daisies

Epson DX-10 and **DX-20 Daisywheel Printers** bring letter-quality printing home and to work. The 82-column DX-10 prints at 10 characters per second and features friction paper feed, bidirectional logic-seeking, and a parallel interface. The DX-20, a 110-column daisywheel printer, provides 20 cps and a 1K buffer, as well as all the features of the DX-10. An all-purpose Diablo interface—RS-232C, IEEE-488, and parallel—and an optional keyboard that turns your printer into a typewriter broaden the appeal of the DX-20. The DX-10 is priced at $299, the DX-20 at $459, from Epson America Computer Products, 2780 Lomita Boulevard, Torrance, CA 90505, (213) 539-9140. For more information circle number 350 on the Reader Service card.

Seen and Not Seen

C-Vue, a flat-panel display for your Apple //c, connects directly to the top of the wee computer and folds down out of use, making your transportable practically portable. Resolution is 80 characters by 24 lines, including graphics display. Adjust the screen angle for easy viewing, or use the contrast control. The C-Vue weighs only 2 pounds, 4 ounces, and tucks snugly into a carrying case with your //c. It sells for $5252, from SWI International Systems, East Gray Road, Suite 2, Scottsdale, AZ 85260, (602) 998-3986. For more information circle number 353 on the Reader Service card.

Lab Duty

Mathlab finally brings some of the power of the Apple to the classroom. Lessons in quadratics, linear functions, and logarithms come to life on the monitor—imagine a blackboard where all the graphs are perfect. Teachers can make transparencies for classrooms where not every student has a computer. As a graphics learning tool and math trainer, Mathlab brings real value to the II in the classroom for $49.95 from Prime Software Innovations, 10502 Foundation Road, Austin, TX 78750, (512) 258-3819. For more information circle number 364 on the Reader Service card.

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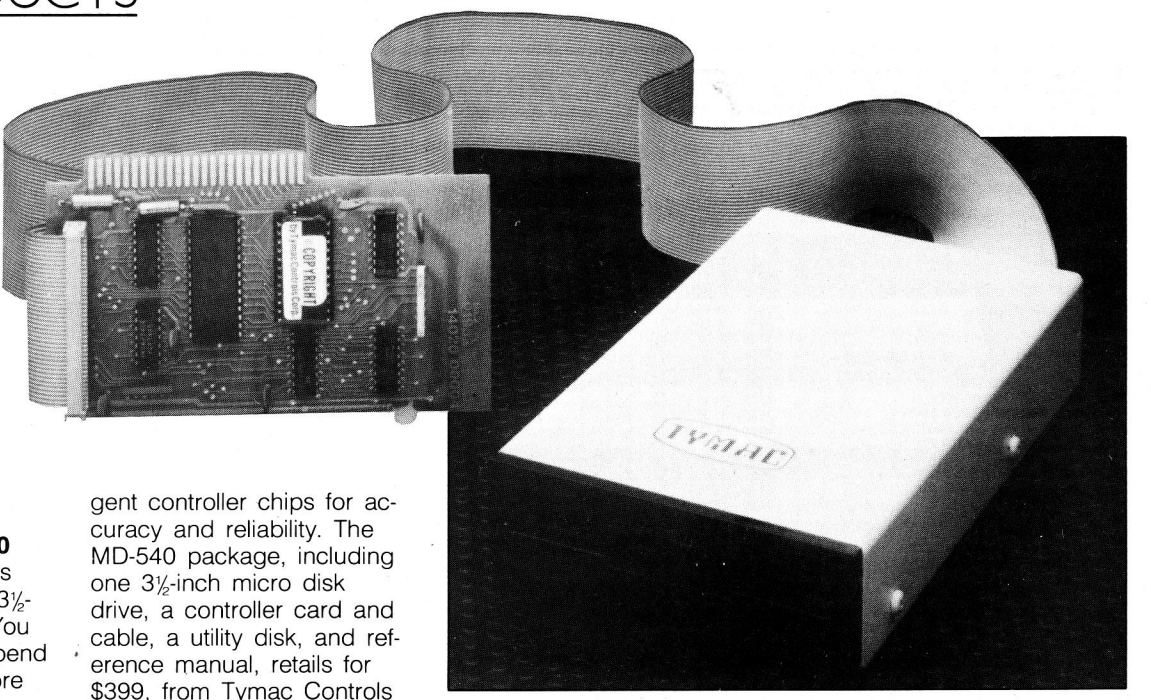
Circle 81 on Reader Service Card.



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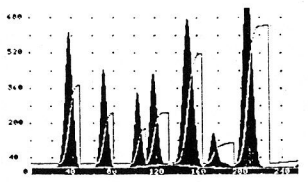

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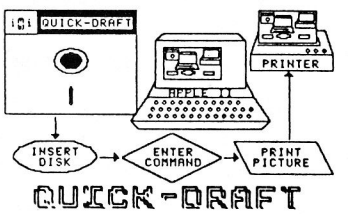

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Product Updates

● Amdek dealers will soon be packaging the RGB monitors Color 500, Color 600, and Color 700 with a Video-7 V-Color RGB card for the Apple //e and //c. Prices range from $699 to $898 for monitor and card.

● The Apple //e-compatible data-storage subsystems from TeamMate now operate under the DOS 3.3, Pascal, and CP/M operating systems, as well as the original ProDOS. The new software utility comes with Model 2203, 2206, 2210, 2213, and 2232 storage systems. Prices of this line are unchanged or decreased.

● The IIc System Clock from Applied Engineering looks a lot like the Time Trax Clock from Creative Peripherals Unlimited because it's the same unit. AE promises better software and a lower price.

● Look for Max-816, an expansion card that brings a 4-MHz 65816 chip and 256K of RAM to your Apple II, from Micro Magic of Millersville, Maryland.

● *inCider* regrets that we'll have to "wait 'til next year" for the Apple version of APBA Major League Baseball from Random House.

● Cauzin Systems of Stamford, Connecticut, has shown us an optical scanner that can read BASIC code from a piece of paper that wouldn't even make a good bookmark—a neat new device.

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Gone With the Garbage

Dear *inCider*:

I've been working on a program that uses a number of variables, and it's quite long. Lately, my program has been "disappearing." How can I keep this from happening?

Mark Jenison
Box 206
Randall, IA 50231

Dear Mark:

Welcome to the wonderful world of Applesoft "garbage collection." Your problem results from Applesoft's dynamic string allocation. Simply put, your Apple doesn't store the contents of string variables in a fixed location. Instead, whenever you create or assign a string in a program, Applesoft creates a new string in memory and merely updates the pointers to the new string. Consequently, the old values of your strings are bypassed, not overwritten. They continue to take up valuable memory space. Eventually, as you create and alter strings, you run out of memory, and Applesoft initiates its garbage-collection routine, which cleans out all the old strings.

The trouble with Applesoft garbage collection is that it's very slow. It seems to take forever to finish the job. One way to avoid the long, tedious routine is to force Applesoft into garbage collection by sprinkling a number of X=FRE(0) statements around your program. These statements break garbage collection into manageable chunks.

If you use ProDOS, a much faster alternative is available. Just use the statement PRINT CHR$(4);"FRE" to clear out old strings fast. And remember that you can also find a good garbage-collection routine for DOS 3.3 Applesoft in the public domain.

Enhancement Blues

Dear *inCider*:

I have switched from an Apple II Plus to an enhanced //e. The VisiCalc program (identification number 218-B0-AP2) that worked so well with the old machine (with a Videx Videoterm 80-column card and a pre-boot) comes up showing MouseText characters as column headings, instead of the familiar A, B, C, and so on. The program also worked very nicely with the "old" (unenhanced) //e. Now with the 65C02 chip, how do I get rid of the MouseText and regain the usual column headings?

Peggy Brooks
626 Oakmont Drive
Asheboro, NC 27203

Dear Peggy:

The problem is not with the 65C02 chip, but the character-generator ROM that's part of the //e enhancement package. Your version of VisiCalc was produced when the MouseText characters were just a gleam in some software engineer's eye. There's nothing you can do about them, short of replacing your current character-generator ROM with an old one, or upgrading your VisiCalc package with a newer one. You may have trouble finding such an upgrade, though, since Lotus Development, the owners of VisiCalc, stopped producing the program last spring.

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Circle 103 on Reader Service Card.

CORRECTIONS

In "Hard-Driving Disks" (September 1985), the reference to floppy-disk speed is incorrect as it appears on p. 25. The sentence should read, ". . . a hard disk can spin ten times faster than a floppy—3000 rpm versus 300 rpm. . .."

In the September 1985 Apple Clinic, spaces were inadvertently omitted from the patch in Figure 2 (p. 66). The amended figure appears below:

Figure 2. Patch to make ProDOS 1.0.1 boot on Franklin.

```
Track/Sector—ByteChange
$1/$C—$B4  $AE $B3 $FB to
  $A2 $EA $EA
$1/$9—$59  $69 $0B $D0 $03 to
  $69 $0B $EA $EA
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Those interested in Ruby the Scene Machine (New Software, August 1985, p. 80), should contact CompuTeach Products at HRM Software, 175 Tompkins Avenue, Pleasantville, NY 10570, (914) 769-7496.

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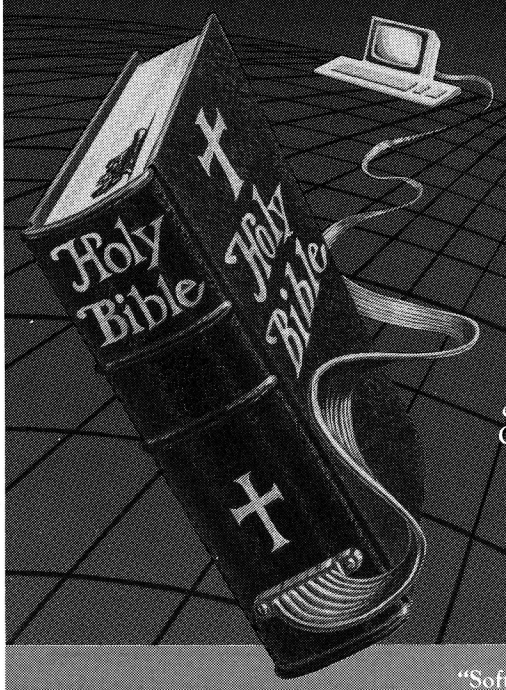

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Circle 35 on Reader Service Card.

ASK INCIDER

on my //e with Applied Engineering's Z-80 Plus card, CP/M 4.0, and an Epson FX-80 printer. The program works fine, except that I can get only 80-column output from my printer, not the 132-column output the program requires. Is there a way to format my CP/M program to print 132 columns of type?

Ed Snyder
16032 Mariner Drive
Huntington Beach, CA 90264

Dear Ed:

I've never used Peachtree's Inventory System, so I don't know if you can modify the program to get 132 columns on your printer. I don't think you need to alter the software, though. You just need a pre-boot that will put your printer into 132-column mode before you boot CP/M.

First, boot a DOS 3.3 disk. Then turn on your printer, and, assuming your printer is connected to slot 1, type in PR#1. Finally, type in the following two lines from the keyboard:

```
PRINT CHR$(27);"P"
PRINT CHR$(15)
```

Remove the DOS disk and boot CP/M. Your printer will now work in condensed mode until you send it new control codes, or until you turn it off.

Voluminous Changes

Dear *inCider*:

Can you recommend a quick method for changing the volume number of a DOS 3.3 disk once the disk has been formatted and filled with files?

John M. Klein
4023 Oxhill Road
Spring, TX 77388

Dear John:

I suggest you use a byte-zap utility to change the volume number of the disk. The volume number is contained on track 17 ($11), sector zero, byte 06.■

CORRECTION

Sorry, wrong number. The correct telephone number for Easynet, an on-line service mentioned in DataGram (September 1985, p. 125), is (215) 664-6972.

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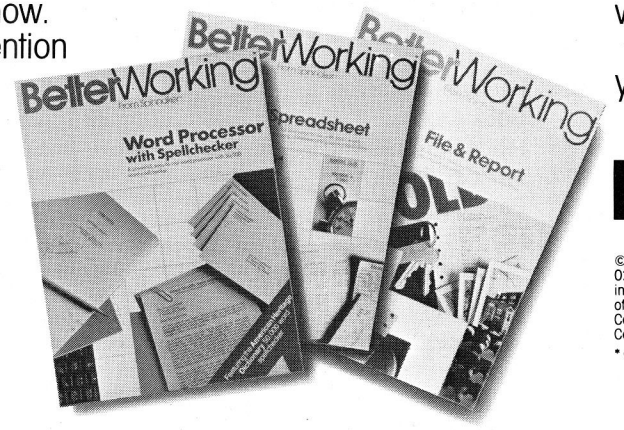

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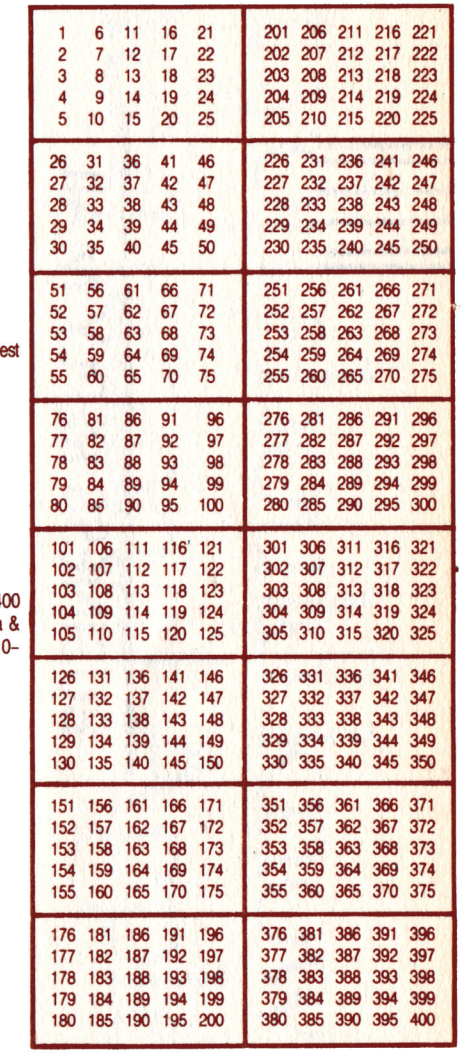

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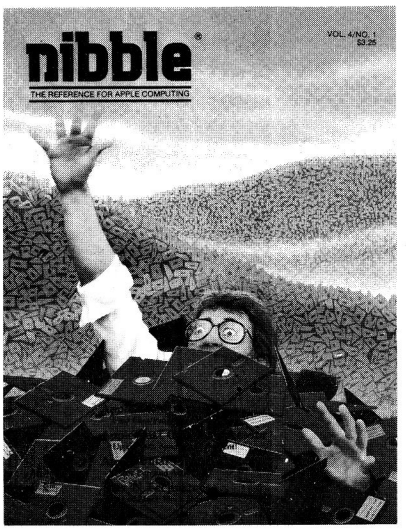

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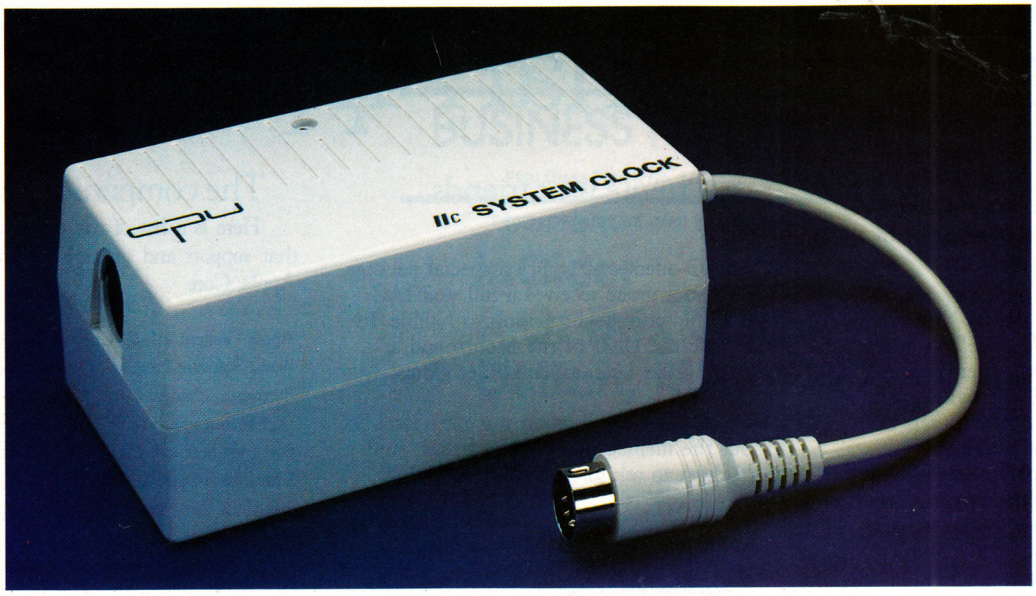

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Apples in Class: The Latest in Team Teaching

From elementary school to high school, Apple computers are taking on a variety of innovative roles in education.

by Wendy Lea McKibbin, *inCider* staff

In an isolated ranching community of 300 in Wilsall, Montana, the English teacher for the 38 high-school students has found that the computer "opens kids up to writing." Joanne Tulonen has also found a way to break through the cultural and social isolation geography would suggest. She is one of four rural teachers scattered across the country who is tied into an experimental computer network with the Bread Loaf School of English in Vermont.

- High in the Smoky Mountains of North Carolina, the science class of a small community high school gathers local biological samples and exchanges them for specimens gathered by a coastal school in the same state. Students mail photos and samples back and forth and share their research findings through a network of 60 rural schools tied into the University of Western North Carolina.
- Elementary students at the Hennigan School in Boston enjoy a privilege that may some day be standard for American children: Every child has a computer that is exclusively his or hers at home and at school. The school is the site for an educational-research project called "Head Light" whose purpose is to find the best use of technology in the classroom.
- Fourth- through sixth-grade students and their teachers in the Florida Keys are creating a marine-ecology data base that will form the basis for research projects and new curricula in science classes. Students will use database, word-processing, and spreadsheet applications to present the results of their investigations and experiments.

These snapshots of the new American classroom hint at a force that is transforming the face and form of education in the United States. Dr. Stephen Marcus, a member of the Advisory Board of the Apple Education Affairs program, notes that at least 20 states have now mandated the instructional use of computers in the classroom. And computer-literacy courses are only a small part of this new thrust. More often than not, educators are interested in using computers as productivity tools for students and for themselves, as evidenced by the popularity of AppleWorks (an integrated software package) and Apple Writer (a word-processing package) in this market. At the creative forefront, some teachers are using the microcomputer to improve students' logic, develop problem-solving talents, and to sharpen thinking skills.

While the spiral notebook and the blackboard are in no immediate danger of extinction, computers are gradually penetrating

"At Apple, we take education seriously," Ambron says. "Technology is a learning aid that can augment what is going on in the academic environment."

elementary, junior high, and high schools, from coast to coast. In 1984 alone, Indianapolis bought 400 microcomputers as part of a comprehensive computer-instruction strategy; Tennessee purchased more than 5200 Apple //e systems for its 1984–1985 school year; and the Los Angeles Unified School District contracted to buy 6000 computers over a three-year period. At the head of the pack are Houston, Boston, and Broward County in Florida where the ratio of students to computers is 25 to one.

Talmis Research in New York estimates that the installed base of computers in K–12 classrooms topped one million during the last school year and will continue to expand rapidly through 1990. Currently, at least 50 to 60 percent of the systems used are Apple products, followed by Commodore, Radio Shack, and IBM.

"I think we're on the verge of something very, very exciting in education," says Sue Ann Ambron, education marketing manager for Apple Computer. "We're going to see a new wave of technology within the classroom and outside it as four separate industries—computers, communications, television, and publishing—begin to merge in the form of integrated products."

Only the Best

Ambron indicates that technology can provide much-needed succor to learning disciplines.

"We spend a lot of money on education in this country, but we are beset with problems," she observes. "Many of our teachers are frustrated by the mounting pressures of limited funds, teacher shortages, low student scores nationwide, and increasing public scrutiny."

She rolls off a list of additional ills: A 1983 report shows that 23 million American adults are functionally illiterate; the educational skills of graduating high-school seniors lag behind those of their parents; American students spend less time in the classroom than their foreign counterparts; and studies estimate that for the 12,000 hours our children spend in school, they squander another 15,000 hours in front of the television set.

"At Apple, we take education seriously," Ambron says. "Technology is a learning aid that can augment what is going on in the academic environment."

One of Apple's projects, the Apple Education Affairs Grant Program, encourages the pairing of colleges and universities with local high schools to reformulate teaching methods.

Wheels for the Mind

Coined "wheels for the mind" by co-founder Steven Jobs, the Apple grant program has helped move the computer from rudimentary computer-literacy applications to more innovative realms. Writing, math, biology, chemistry, and geometry teachers have developed project proposals Apple has matched with equipment and software grants—usually 30 systems per grant.

In most cases, at least one university and two schools participate in the project. The grantees must conduct their research during an allotted time and report their findings.

For example, Heritage College in Toppenish, Washington, pooled its resources with two nearby schools to help improve the English of native American and Hispanic students through word processing. Many of the students at the college are high-school dropouts or graduates who are returning to school to learn better job skills. Some are migrant farm workers.

The program studies the ways in which the computer can enhance the quality and amount of writing performed by students from several ethnic backgrounds, explains Dr. Richard Sawrey, grant director of the Toppenish campus.

"In a rural area where there are many nonnative English speakers, the tendency is to be laconic and to have a narrow range of expression," Sawrey says. "One of the greater difficulties for these students is the mechanical process of writing—particularly penmanship."

According to Sawrey, the keyboard provides a great boost to the writing process. He says students can write five times faster with the computer. They can also edit their papers more easily and accurately.

Beyond the Word

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"LaVelle envisions a laboratory of computer-based workstations with sensors for temperature readings, video cameras, speech-synthesis capabilities, and transducers."

computer not only as a writing tool, but as a vehicle for cooperative learning. The class is one of three groups studied by the St. Louis Park School District and the Center for Cooperative Learning at the University of Minnesota under an Apple grant.

Dr. Roger T. Johnson from the Center for Cooperative Learning explains that his research examines student-to-student interaction and the conditions under which students learn best.

"The computer fits naturally with the concept of cooperative learning," Johnson says, "because it's one of the places where teachers intuitively put people in small clusters to work together. Children and adults like to talk to each other and work together when mastering the system."

In the senior composition class, students work in pairs and use word processing to learn how to write. First, students talk over writing assignments with a partner. Each partner asks the other questions, some provided by the teacher, some of his or her own composition. The partner then prepares a story outline for the student, based on the questions and answers.

Each student researches his or her own topic, but meets again with the partner to begin writing. "This helps them get over the blank screen," Johnson says. After they write the stories, partners swap their work and edit each other's copy.

Johnson is encouraged by team writing's positive effects—increased motivation from peer pressure and shared responsibility for work—that make composition less threatening.

Scientific Notation

The University of Southern Colorado has teamed with Pueblo Central High School for a program called Changing Attitudes in Science. Director James LaVelle intends to take the tedium out of teaching science—a task accomplished more easily with the computer, he contends, because it lets students concentrate on scientific thinking instead of data collection. The system relieves drudgery and helps the student and teacher focus on critical thought processes.

Through the program, a bulletin-board system linked the college and high school so that they could share new findings, ideas, and events in biology. LaVelle has also organized a summer workshop for teachers from both educational institutions to provide a forum for developing a more integrated science curriculum.

Both institutions use AppleWorks. LaVelle explains you can use the spreadsheet to study air pollution, the data base to search for local flora and fauna, and word processing to write up the results of experiments. More advanced students write their own programs to test theories and record results. LaVelle envisions a laboratory of computer-based workstations with sensors for temperature readings, video cameras, speech-synthesis capabilities, and transducers. He says he also hopes to see a nationwide biology network established.

"This [network] would give country schools the same advantages as the biggest urban schools and would provide a tremendous reservoir of ideas and resources for all science educators," LaVelle says.

Mathematical Theory

Math educators, too, entertain tantalizing visions of how computer technology can open new vistas of thought to the student. Researchers Susan Paalz Scally and John Olive of Emory University in Atlanta are using the computer to develop the mathematical reasoning skills of ninth-grade geometry students.

The Apple grant project directed by Scally and Olive uses Apple Logo to help students at three area high schools grasp the intricacies of geometric relationships. For an hour each day, using Turtle geometry, 150 students examine relationships such as rotations, translations, ratios, proportions, and scalings. Students work in pairs to solve problems, discuss solutions, and explore "what-if" thinking.

The program follows these students through tenth-grade geometry and compares their test scores with those of a control group that hasn't participated in the Logo project. Although the final test results haven't been tallied, Olive says he and Scally have witnessed improvement in students' abstract thinking.

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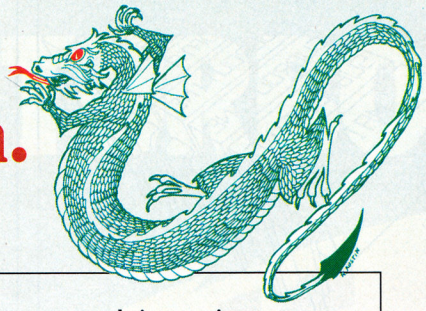

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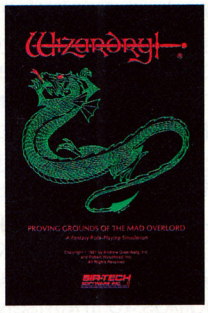

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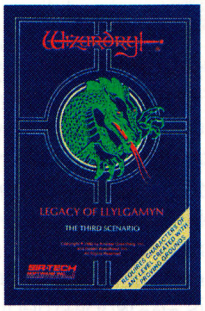

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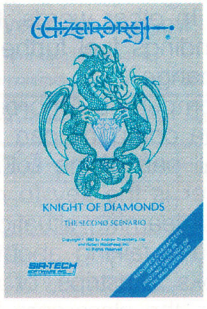

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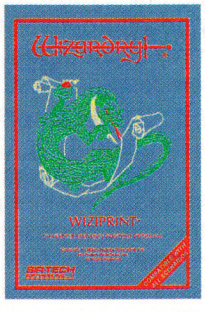

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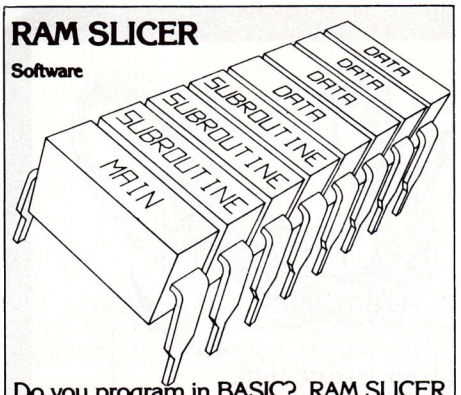

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"The teacher is the key to making a successful learning situation, whether you're talking about computers, books, filmstrips, or anything else in the classroom."

A Perfect Marriage

Geometry students at the Emory University project use off-the-shelf software and books, but many educators see a need for better program quality and an increased quantity of well-tailored, substantive software. Apple is encouraging a marriage between major educational publishers who know the pedagogy and software developers who have the technical expertise to deliver quality products.

Last year, Apple asked the technology group of the Houston Independent School District to develop a reading program for grades K–2 that would be marketed by a major software publisher. According to Dr. Patricia Sturdivant, associate superintendent for technology, the program is a "whole-media solution" that combines textbook, workbook, and computer. Sturdivant's group project individualizes the learning process and uses speech-synthesis technology as a source of reinforcement for the child.

"We're excited about our collaboration with Apple and about the market possibilities of this new reading program," Sturdivant says. "We've also developed ancillary training materials for the teacher."

The Great Debate

No one in the educational field disputes the difficulty of delivering a comprehensive solution to the academic world's computer questions. But some educators doubt the wisdom of having computers in the classroom at all. In the *Teacher's College Record*, Editor Douglas Sloan writes that the growing criticism of computer-assisted instruction is justified "because professional educators have been conspicuously uncritical of computers and prone to jump on any passing bandwagon."

In response, Dr. Stephen Marcus of the University of California at Santa Barbara suggests teachers refrain from condoning or denouncing computer-assisted instruction. He upholds a more practical approach: Examine the situation while you mull over three basic questions. Marcus explains, "Educators should first ask themselves what they've been doing with computers that they find exciting. Then they should ask, so what? What are the consequences of those findings to themselves and their students? And finally, now what? In other words, how can their findings fuel further action and change?"

Apple Computer's Ambron admits that the company can supply only a small part of the solution. "The teacher is the key to making a successful learning situation, whether you're talking about computers, books, filmstrips, or anything else in the classroom."

Apple's strategy, according to Ambron, is to let teachers shape the form of technology in the classroom, "to work with the school districts, share their plans, and understand their requirements." It's not up to Apple to decide what the schools need, she concludes. The teachers have the last word.■

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Maximum scientific digits of accuracy. (COS, SIN, ATN, LOG, EXP etc.)	6 to 54 selectable by the user	11 Binary BCD N/A	16	16	6
Device Indpdnt Graphics (same CMDS all graphic modes and computers)	•	N/A	N/A	N/A	N/A
SAME File commands all computers?	•	N/A	N/A	N/A	N/A
STRUCTURED: Labels, Functions, LONG IF etc.	•	•	N/A	•	N/A
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Sieve benchmark (Byte January 1983, 10 iter's)	13.7 sec.	14.1 sec.	14.9 sec.	261 sec.	2190 sec.
Shell-Metzner SORT (Sybex-BASIC for Scientist's and Eng. 2,000 5 char. strings)	19 sec.	28 sec.	71 sec.	194 sec.	2700 sec.
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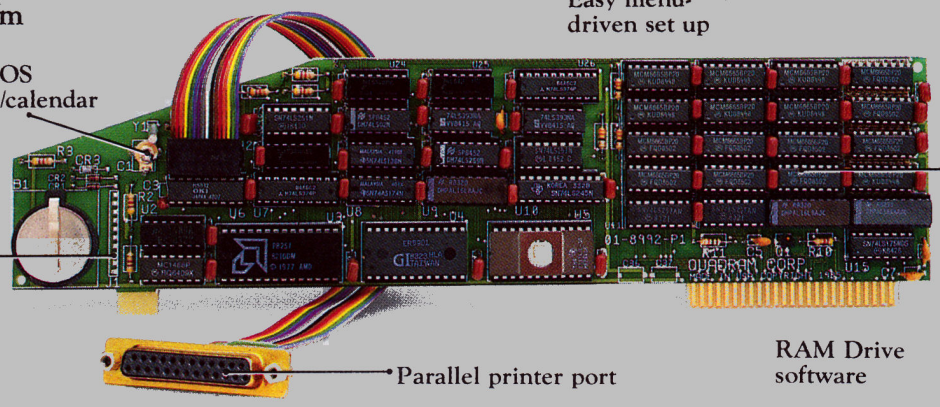

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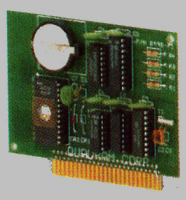

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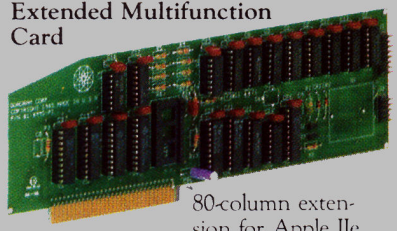

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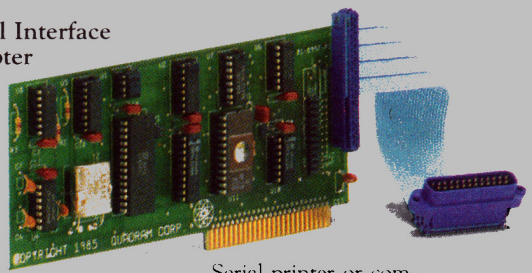

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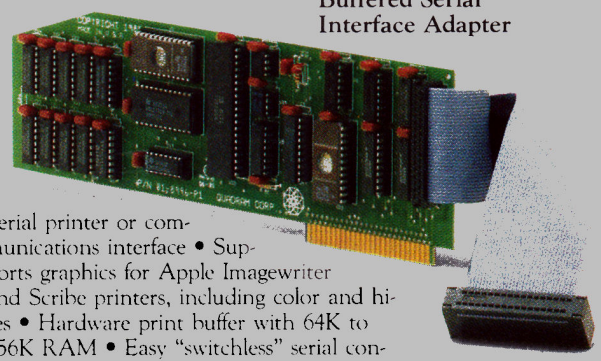

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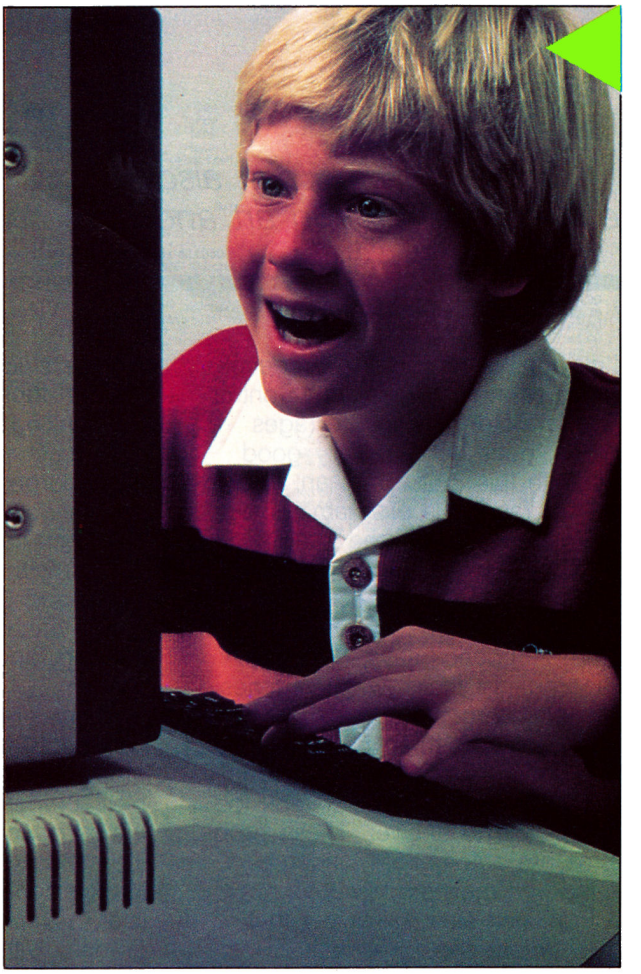

Guidelines for Buying Educational Software

Some so-called educational software packages are more educational than others. inCider *presents some rules of thumb for parents and teachers who are developing software libraries.*

by Linda Gail Christie

Teachers and parents alike need software that will help youngsters learn basic educational skills. Deciding which programs best teach these skills, though, is not an easy task. What program characteristics can help you provide a unique classroom or home environment? What can the computer do that the teacher, mom, or dad cannot do? What can good software add to the educational experience?

In a videotape on buying educational software (recently produced for the Education Service Center of the Tulsa Public Schools, Tulsa, Oklahoma), Cathy Frederick, a computer-lab teacher, divided educational software into three categories:

1) programs that provide drill and practice in basic skills, such as reading, spelling, and arithmetic;

2) programs such as simulation games, adventure games, and interactive fiction that teach thinking and problem-solving skills;

3) programs that provide an opportunity to develop creativity in fields like art and music.

Drill and Practice

Computers can promote learning by providing drill and practice exercises that reduce boredom and stimulate a child's interest. For example, a math-flashcard program or a typing-instruction package can accomplish a great deal while the teacher or parent attends to more demanding tasks. And a software tutor is tireless. If the student gets stuck or repeatedly misses a question, the program can offer help routines. Prompts can also serve to speed up the slow student. For instance, if the objective is to solve math problems within ten seconds, the computer may count off the seconds or beep to warn that time is running out.

Variety within a drill package is an important consideration. "Drill and practice programs must fit the curriculum," Frederick says. "The best ones can be tailored to the lessons the youngster is studying." Spellicopter, from DesignWare (ages 6–12), for example, allows the teacher to type in and save spelling lists. Spellicopter shows them to the student and presents fill-in-the-blank sentences. For example, if one of the spelling words is dog, the sentence could read, "The _____ ate his bone."

"Drill and practice software must not only teach relevant material, but also engage the student—it must be reinforcing and motivating," Frederick advises. The youngster needs to know whether an answer is right or wrong, and the program must encourage him or her to continue

Portions of this article appeared previously in the May '84 issue of jr *magazine (CW Communications/Peterborough).*

"Creative software can also enhance projects in art and music."

"playing." According to Frederick, Basic Number Facts, from Control Data's Plato Courseware (ages 7–10), does an especially good job with this. Set up as an automobile race, this program allows the youngster to name his or her own racecar.

"However, instead of racing against some preset standard or time," Frederick says, "students race against their own best times. After three races, a graphics demonstration tells them how they did. The program also reviews the problems they missed or took too much time to answer. These problems are automatically incorporated into the next lesson."

Frederick also points out that the student should be able to control the speed at which the program runs: "Too slow and they get bored, too fast and they get frustrated." Reader Rabbit, from The Learning Company (ages 6–8), allows students to work at their own pace to learn vowels and consonants.

Drill and practice programs should also be easy to use without a great deal of adult supervision. Frederick especially likes the Sticky Bear Opposites program from Weekly Reader (ages 3–6), which teaches concepts like near/far and top/bottom. "Even a three-year-old can use these programs, because you need to use only three keys including the space bar," she notes.

Thinking Skills and Problem Solving

If the computer can free the student from tedious paperwork that doesn't contribute directly to the learning process, more time will be available for preparation, understanding, and fun. The teacher, as well as the student, benefits. The right software can help the instructor focus on the skill being taught instead of diverting the student's time and energy toward unproductive areas.

"Thinking and problem-solving programs should have a well-defined purpose, and the instructions should be clear and logical," Frederick says. The Learning Company's Bumble Games (ages 6–10) and Bumble Plot (ages 8–12) teach ordering, logical thinking, and the use of grids and arrays.

"Grids and arrays are especially useful for learning how to do graphics programming on the Apple," Frederick observes. "Before the introduction of computers into the schools, we didn't even try to teach geometric coordinates until later in the elementary-school grades. With these programs, however, even third-graders can learn matrix concepts."

The same principle—focusing on the skill, not the "busy work"—can be applied to courses in which students must compute reports, analyze statistics, and predict performance. Punching numbers into a calculator, plugging numbers into formulas, and preparing charts are not valuable learning experiences in themselves. Computer-processed data yield more information about a problem in much less time with no errors.

Frederick's favorite simulation game is The Factory (ages 10–15) from Sunburst. This game has three types of machines—a hole punch, a device to rotate the part you're making, and a machine that draws stripes. In one mode, you try to duplicate a part the computer has made. In another mode, you can make your own part and challenge someone else to duplicate it. "Kids really like this award-winning program," Frederick says. "Without realizing it, they are building, thinking, solving problems, and developing matching skills."

One of the more interesting aspects of the potential impact of good software on a child's education is a program's ability to teach decision making. An elementary version of this technique is found in adventure games and interactive fiction. The program presents the youngster with a set of circumstances, and he or she must make a choice among actions to proceed to the next scene. By simulating a situation and letting the student make decisions, suffer the consequences, and reap the rewards, these types of programs capitalize on the unique interactive capabilities of computers to teach children the skills of logical thinking.

The Oregon Trail, an adventure game from the Minnesota Educational Computer Consortium (ages 8–13), is one of five simulations in a software package called Elementary Volume Six Social Studies. "The Oregon Trail fits in especially well with our fifth-grade social-studies unit on American history," Frederick comments. "The students follow the same journey as the explorers, and must make decisions about buying provisions and so forth. If they don't buy enough ammunition, they can't shoot enough game to eat, and they starve. If they don't buy enough clothes to stay warm, they freeze in the mountains. The kids learn a lot while they are having fun."

Creativity with Computers

Creative software can also enhance projects in the arts, such as drawing pictures and writing music. "A creative program should stimulate students to try something new," Frederick asserts. "They should be able to learn from their mistakes and be free to experiment."

KoalaPad+, a touch tablet with drawing and graphics software from Koala Technologies Corporation (ages 6–adult), provides an easy-to-use computer painting program. The youngster uses the KoalaPad to draw lines, circles, rectangles, and freehand drawings in the same way an engineer would use a computer-aided-design (CAD) system. By selecting different shapes, colors, and textures from the Micro Illustrator

Continued on p. 114.

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HR-35	685.00
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LQ-1500 Prices!	Call
Juki 6100P	369.00
6300P	689.00
Mannessman Tally	
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KXP-1091	245.00
KXP-1092	365.00
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Micro Sci A2 Full Height	159.00
A5 Slimline / /e	159.00
A5 Slimline / /c	165.00
Micro Sci C2 Controller	49.00
Mitac AD-3C Slimline / /e or / /c	129.00
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QC-10 Hard Disk / /e, / /c or Mac	999.00
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Shipping Charges: Software—$2.50 Minimum charge U.S. Mainland. With C.O.D. shipments add an additional $1.90 U.S. postal, APO, and FPO add 3% ($5.00 Min.). Alaska or Hawaii add 6% ($10.00 Min.). Canadian orders add 10% ($15.00 Min.). Foreign Orders except Canada—Add 18% ($25.00 Min.).

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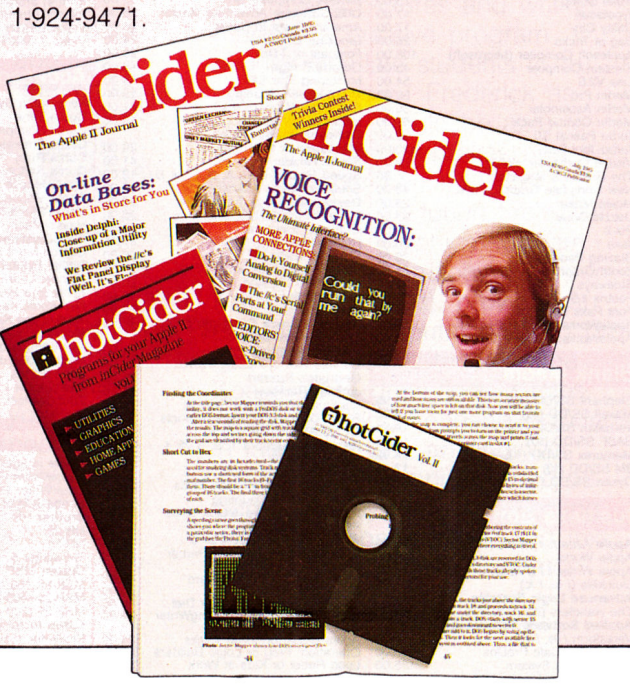

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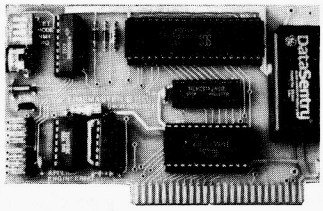
TIMEMASTER II H.O.™



- Absolutely, positively, totally PRO-DOS and DOS 3.3 compatible.
- Time in hours, minutes, seconds and milliseconds (the ONLY PRO-DOS compatible card with millisecond capability).
- 24 hour military format or 12 hour with AM/PM format.
- Date with year, month, day of week and leap year.
- Eight software controlled interrupts so you can run two programs at the same time (many examples are included).
- The only card recognized by both the DOS 3.3 and PRO-DOS versions of Apple Writer IIe.
- Appleworks will now time and date stamp all your data automatically.
- The only clock card that will display the time and date on the Appleworks screen.
- Compatible with ALL of Apple's languages. Many sample programs for machine code, Applesoft, CP/M and Pascal on 2 disks.
- On-board timer lets you time any interval up to 48 days long down to the nearest millisecond.
- Auto-recharging nickle-cadmium battery will last over 20 years.
- Two BSR/serial ports for future expansion.

	PRO-DOS COMPATIBLE	INCLUDES DOS DATER	MILLISECOND TIME	YEAR DATA	LARGEST SAMPLE SOFTWARE	REMOTE SET PORT	BSR PORT	EMULATES ALL OTHER CLOCKS
H.O	YES	YES	YES	YES	YES	YES	YES	YES
BRAND A	NO	NO	YES	NO	NO	NO	NO	NO
BRAND C	NO	NO	NO	NO	NO	NO	NO	NO
BRAND M	NO	NO	NO	NO	NO	NO	NO	NO
BRANDP	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	YES	NO	NO

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

REMOTE CONTROL

Our BSR X-10 interface option for the H.O. allows you to remotely control up to 16 lights and electrical appliances through your BSR X-X-10 home control system in your home or office. You're already wired because a BSR system sends its signals over regular 120 volt wiring. That means you can control any electrical device in your home or office without additional wiring.

CLOCK PRICE $129.00 **BSR Option (may be added later) $49.00**

VIEWMASTER 80™

There used to be about a dozen 80 column cards for the Apple. Now there is only ONE.

- TOTALLY Videx Compatible.
- Perfect for any APPLE II, II+ or IIe.
- 80 characters by 24 lines, with a sharp 7x9 dot matrix.
- On-board 40/80 soft video switch with manual 40 column override.
- Fully compatible with ALL Apple languages and software—there are NO exceptions.
- Low power consumption through the use of CMOS devices.
- All connections are made with standard video connections.
- Both upper and lower characters are standard, with true descenders.
- All new design (using a new Microprocessor-based C.R.T. controller) for a beautiful razor sharp display.
- The VIEWMASTER incorporates all the features of all other 80 column cards, plus many new improvements.

	PRICE	BUILT-IN SOFTSWITCH	LOW POWER DESIGN	80 COLUMN HOME	7X9 DOT MATRIX	LIGHT PEN INPUTS	40 COLUMN OVERRIDE	INVERSE CHARACTERS
VIEWMASTER	139	YES	YES	YES	YES	YES	YES	YES
SUPRTERM	MORE	NO	NO	NO	NO	NO	YES	YES
WIZARD 80	MORE	NO	NO	NO	YES	NO	YES	YES
VISION 80	MORE	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	NO	NO	NO	NO	YES	YES
VIEWMAX 80	MORE	YES	NO	NO	YES	NO	NO	YES
SMARTERM	MORE	YES	NO	NO	NO	YES	YES	NO
VIDEOTERM	MORE	NO	YES	NO	YES	YES	NO	YES

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

PRICE $139.00

Z-80 PLUS™
Now Includes New 4.0™ Software

Enter the CP/M world with the new Z-80 Plus card from Applied Engineering and introduce your Apple to thousands of new programs. Only the Z-80 Plus comes standard with the new 4.0 software, the most advanced system for running CP/M programs ever. Only CP/AM 4.0™ has advanced features like built-in disk emulation for popular memory expansion boards (those made by Apple and Applied Engineering and others) to give you a faster system with more storage. You also get menu driven utilities that are much easier to use than the older CP/M utilities so you can get down to all that great CP/M software faster. The Z-80 Plus runs older CP/M programs too, down to Version 1.6 (2.2 is the most popular). With the Z-80 Plus you can run the largest body of software in existence, and the Z-80+ is the only card on the market capable of accessing more than 64K in an Apple IIe. If you have an extended 80 column card, all 128K is usable, and if you have Ramworks, up to 1088K is available to CP/M. And each Z-80+ includes our CP/M Ram Drive software, enabling IIe owners to use an extended 80 column card, or a Ramworks card as an ultra-fast Ram disk enabling CP/M software to run 10 to 20 times faster. So fast acting software like WordStar, and dBASE II become virtually instantaneous! Simply plug the Z-80 Plus into any slot in your Apple. You'll have two computers in one and the advantages of both, all at an unbelievably low price.

- TOTALLY compatible with ALL CP/M software.
- Fully compatible with most hard disks including the Sider and Corvus.
- The only Z-80 card with a special 2K "CP/M detector" chip.
- Fully compatible with microsoft disks (no pre-boot required).
- Specifically designed for high speed operation in the Apple IIe (runs just as fast in the II+ and Franklin).
- Runs WordStar, dBASE II, Turbo Pascal, Fortran-80, Peachtree and ALL other CP/M software with no pre-boot.
- A semi-custom I.C. and low parts count allows the Z-80 Plus to fly through CP/M programs at a very low power level. (We use the Z-80B at a fast 4MHZ.)
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"Word processors give youngsters the freedom to concentrate on content."

Continued from p.110.

program, the student can draw both simple and complex pictures.

Broderbund's Print Shop (ages 6–adult) lets you design your own greeting cards and print them with a graphics printer. The reading level is third grade, so a young child will need some assistance.

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Any child who has acquired basic writing skills can learn to use a word processor like Homeword, from Sierra On-Line (ages 8–adult). Icon menus guide even low-level readers through filing, printing, and formatting operations. Word processors, much more than printing with paper and pencil, give youngsters the freedom to concentrate on content. For example, writing term papers by hand is quite time-consuming. If the youngster is practicing handwriting skills, longhand is essential, but if he or she is learning how to express ideas or write a science-project report, paper and pencil are a waste of time and energy. "Kids are more willing to edit on a computer than they are on paper," Frederick also points out. "They are free to go back and edit their work without having to rewrite the entire piece."

Song Writer, from Scarborough Systems (ages 8–adult), is a "music processor." This program does for music what a word processor does for writing—and more. The screen presents an animated hole-punched piano roll that looks like a keyboard. "You can write your own tunes or edit any of the 20 stored compositions and make them go faster or more slowly," Frederick says. "Hearing the computer play your composition right after you write it is quite an experience, even for adults." One bonus is that you don't need to learn how to play an instrument to write music.

Selecting Your Educational Software

Above all, educational software should meet the goals of the course by teaching the skills children need. But teachers and parents need to examine those goals closely and to consider new ones relative to the power and flexibility computerized instruction offers. Is the goal to develop hand-eye coordination or to create a picture? To practice handwriting or to write a report? To learn to memorize or to solve a math problem? To learn drafting skills or to design a structure? To manipulate numbers by hand or to predict performance based on past experience? To learn to operate a computer or to learn to think?

Once you identify your goals,

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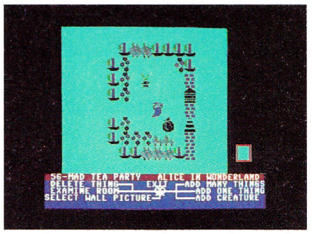
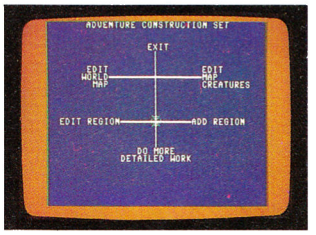


Or make your own parts from scratch. Draw 'em. Give 'em properties. Go for it!



ACS is menu driven. It works with a positive "stick shift" controller. Easy as pie!

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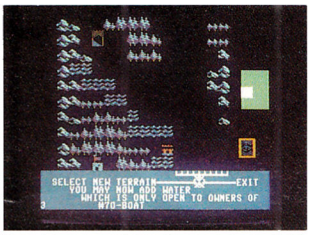
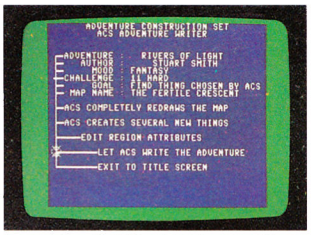
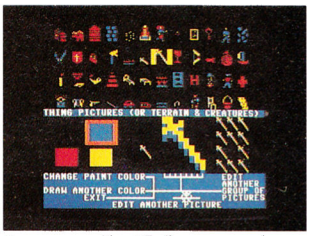


Mountains, oceans, forests & etc. are pre-built. Or make your own landscapes. You're the boss!

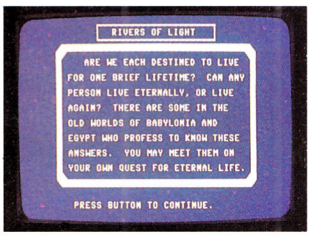


Amazing fact #1: ACS makes adventures (& finishes parts of yours) by itself. This is No Lie!

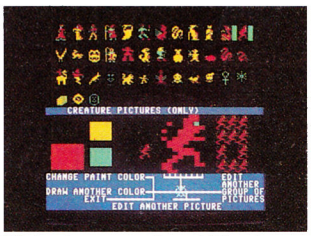
Music modules & sound effects included. Score your adventures like movies. Be a maestro!



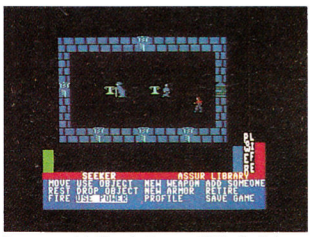
No arms control here! Endless weapons of your design. (Endless armor & cures, fortunately.)



Complete, top-notch epic adventure included: *Rivers of Light* by Stuart Smith, author of *Ali Baba!*

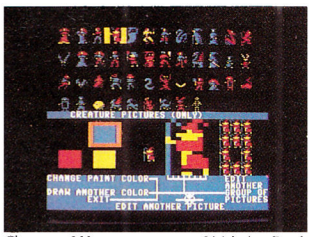


500 obnoxious creatures thrown in! Or make your own. Point 'em at the population! See their priorities!

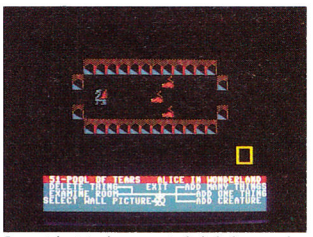


You get magic! 31 variations on 15 Big Spells! You get technology. You get religion. All right!

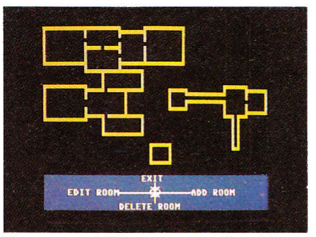
Amazing fact #2: ACS integrates text and graphics. All other products wimp out in this regard.



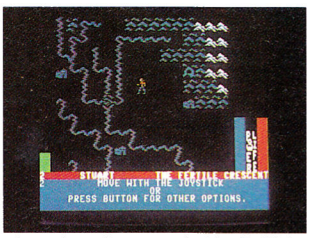
Characters? How many you want? Make 'em. Break 'em. Cast them into the world without a dime!



7 tutorial mini-adventures included! Generously survivable for those tentative first timers!



Design up to 15 different regions with 16 different rooms in each one. Space out!



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Resources for Educational Software

Books and Directories

Almost Free Computer Stuff for Kids. Linda Gail Christie and Gary J. Bullard, Plume/New American Library, 1633 Broadway, New York, NY 10019, $9.95. Lists a number of publishers of inexpensive educational software and on-line bulletin boards.

Free Software for Your Apple. Enrich/Ohaus, 2325 Paragon Drive, San Jose, CA 95131, $8.95. Provides a quick orientation to on-line bulletin-board systems. Lists phone numbers and the focus of a number of bulletin boards containing public-domain programs you can download.

Book of Apple Software. Arrays Inc., The Book Division, 11223 South Hindry Avenue, Los Angeles, CA 90045, $19.95. Contains lengthy reviews and performance ratings on 600 Apple programs.

Blue Book for the Apple. WIDL Video, 8135 North Monticello, Skokie, IL 60076, $24.95. Lists 4600 programs in 62 categories. Contains product descriptions from manufacturers and no evaluative comments.

Bowker/Bantam 1985 Complete Sourcebook of Personal Computing. R.R. Bowker, 205 East 42nd Street, New York, NY 10017, $18.95. Lists 3400 software programs arranged by category. Annotations are ten to 20 words and provide no analysis or in-depth description.

On-Line Data Bases

International Software Database. A computerized on-line service provided by the commercial information services Dialog and Knowledge Index (Dialog Information Services, 3460 Hillview Avenue, Palo Alto, CA 94304, 800-227-1927, or 800-982-5838 in CA). The data base contains nearly 20,000 entries and is updated monthly. Citations include annotations, computer compatibility, category, and ordering information.

Resources in Computer Education (RICE). Contains approximately 3000 software citations and reviews of educational courseware for elementary and secondary schools. Provides detailed evaluations, including instructional techniques, instructional objectives, and hardware-system requirements. Northwest Regional Educational Laboratory, 300 S.W. Sixth Avenue, Portland, OR 97204. Available on line through the information services BRS and BRS/After Dark (Bibliographic Research Service, 1200 Route 7, Latham, NY 12110, 800-833-4707).□

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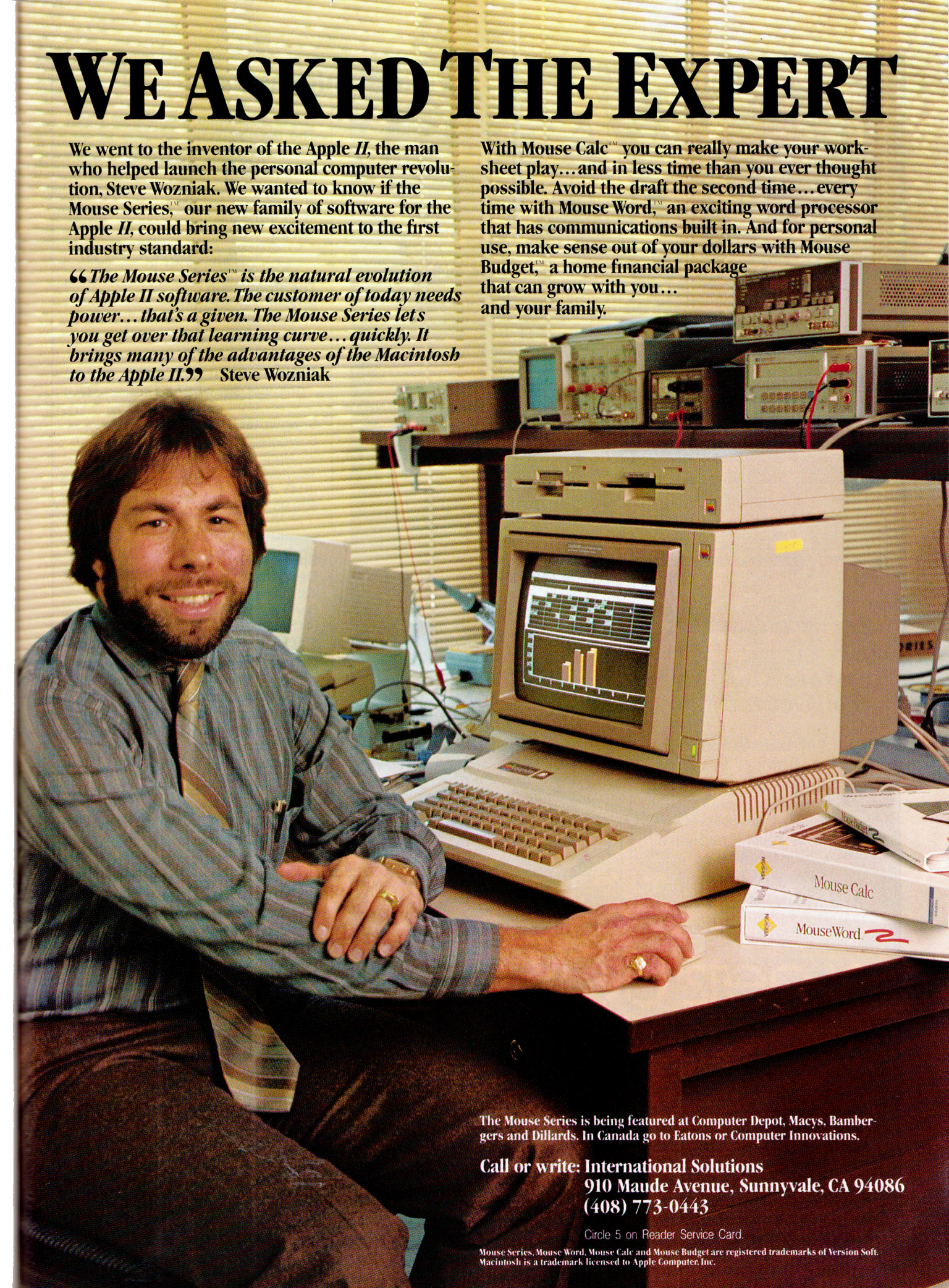

The Mouse Series is being featured at Computer Depot, Macys, Bambergers and Dillards. In Canada go to Eatons or Computer Innovations.

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The Print Shop
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Reader Service Number 341

you're ready to find the software that will accomplish the task. And the added flexibility of being able to custom-design lessons and adjust speed levels makes a program even more valuable.

Software should follow sound educational principles. Lessons should consist of smoothly sequenced, self-contained modules. Instructions should be clear and consistent. The reading level should match the level of the student doing the lesson—otherwise, the child will require adult supervision.

Responses should be simple—preferably multiple-choice, or limited to a few keys. The program should lock out extraneous keys so that inadvertent key pressing won't crash the program.

The software should record the student's answers and report his or her progress. With the proper programming, the student knows right away if he or she answered the problem correctly or not. A smiling clown or a cute tune keeps youngsters focused on the task. And the program can keep a record of performance to help the instructor design a course of study relevant to a student's needs. To improve, the student

needs to shoot against a previous high score or proceed to a more difficult level.

Keep students' preferences in mind, as well. "Sometimes the software description seems to fit your criteria perfectly," Frederick says. "The kids, however, may or may not like it. Until you see that the kids like it, don't buy it."

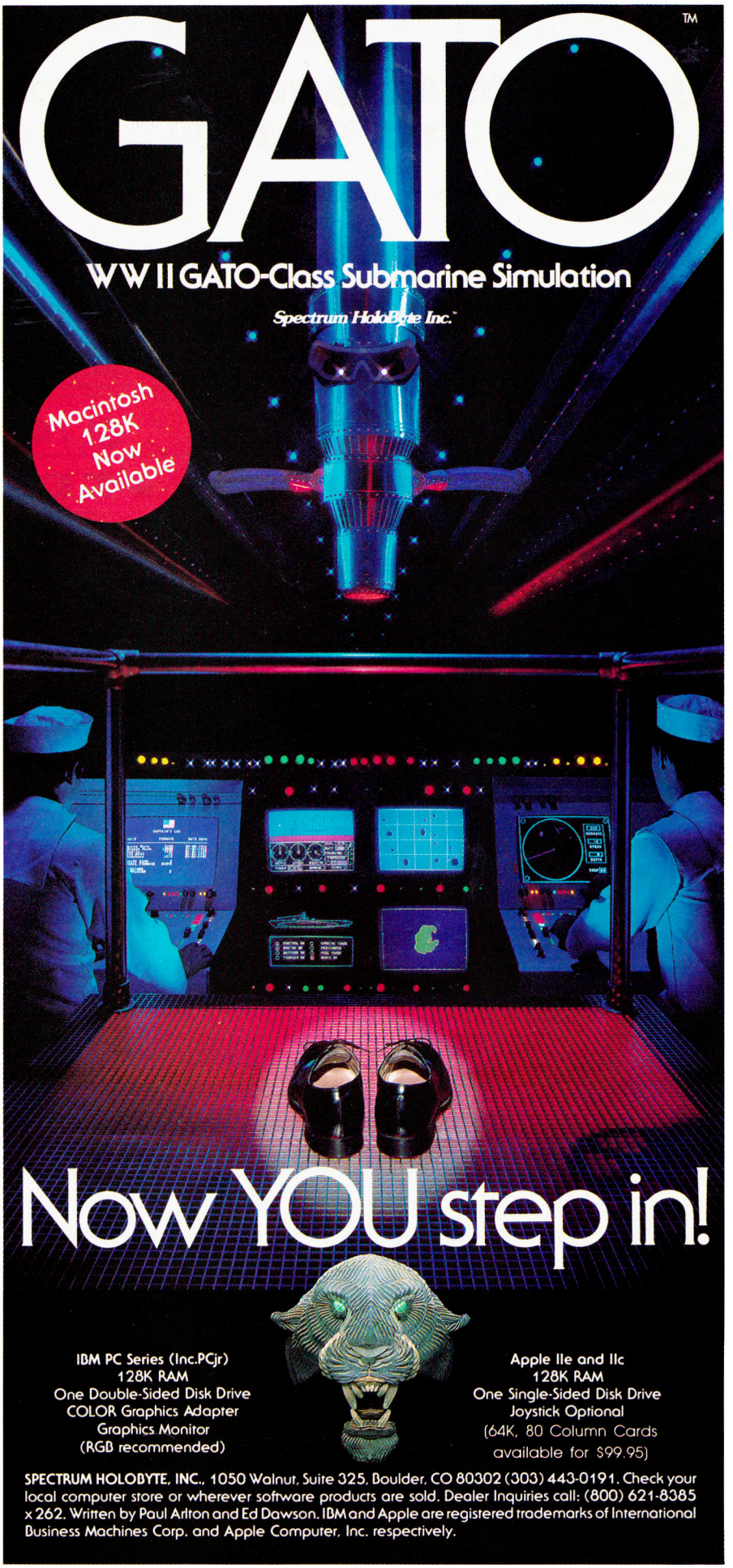
Most distributors can provide review copies of programs to educators. You can also ask a local dealer to let you borrow software or try it out before you buy. Don't rely on your judgment alone—see if the kids use it, if it holds their attention, if they can read the instructions, and if they are learning from it what you want.

Magazine reviews provide some of the best information about educational software. They are generally unbiased, and may offer descriptions of how programs work, as well as their pros and cons. Many state department-of-education offices publish newsletters reviewing software for teachers. Parents can often get excellent advice from teachers about programs that will benefit their children.

"I tend to stick with software manufacturers that produce consistently high-quality products," Frederick adds. "I'm especially impressed with The Learning Company and Sunburst."

You can also find listings and reviews of educational software products in books and directories. (See the accompanying sidebar.) Not every piece of software can meet all of your requirements—or the restrictions of your budget. Determine the features that are most critical for your needs, seek them out, buy the software, and let the kids learn with it.■

Linda Gail Christie is the author of a number of books and articles on computing and its applications, including The ABCs of Microcomputing *(with Jess Curry, Jr., Prentice-Hall, 1983), the* Encyclopedia of Microcomputer Terminology *(with John Christie, Prentice-Hall, 1984),* Almost Free Computer Stuff for Kids *(New American Library, 1984), and* The Simon and Schuster Guide to Computer Peripherals *(Simon and Schuster, 1985). Write to her at 5536 East 11th Street, Tulsa, OK 74112.*



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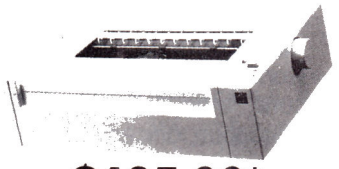

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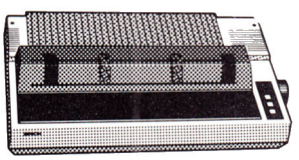

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Community Consensus: Computers in Education

Planning computer use in the schools is everyone's responsibility. Joe Nathan suggests a blueprint from a model plan for computer education in Minnesota.

by Joe Nathan

Technology revolutions have also failed to touch the schools largely because purchases have preceded planning.
—Ernest Boyer, former U.S. Commissioner of Education

In 1984, the National School Boards Association report found that 86 percent of the public-school districts surveyed had no policies or guidelines about what they would do with the computers they were rushing to purchase. While recommending caution in interpreting the study results, the association says, "The findings do provide a general overview of what is happening in one of our nation's school districts." The question is, is this wise? Is it acceptable? Don't effective organizations try to develop policies and guidelines first, then carry them out? Yes, they do. And any effective use of computers in our schools will come only from following carefully formulated, creative policies.

An example of such policymaking is the Technology and Educational Improvement Act, adopted in 1982 by the Minnesota legislature. One national school expert calls the Minnesota program "a model piece of legislation—one of the best I've seen." Though it's not perfect, the Minnesota plan provides some guidance in thinking about how a district or state ought to plan for the use of computers and other advanced technology in its schools.

Technology Utilization: The Community Level

Specifically, the act requires each of Minnesota's school districts to develop a written "technology-utilization plan." This plan must be written in conjunction with a local advisory committee composed of parents, community members, and faculty. Each school district can apply for financial aid to develop the plan. The technology plan for each district must meet several criteria that are intended to encourage cooperation and community involvement. The plan must show:

- how the district determined its needs and what it found;
- how the district will use technology to provide educational opportunities for people of all ages, including women, minorities, and the disabled living in the district;
- what the district's goals are for implementing technology in management and instruction;
- how the district plans to meet those goals;
- how technology will be integrated into the district's community-education program;
- how the district will evaluate its efforts in technology;

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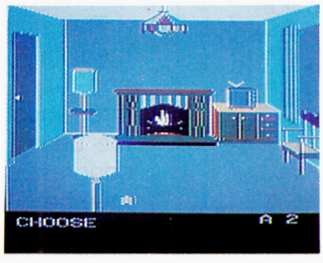

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"The first major problem concerned politics, that constant companion of reform."

- how it will report results to the community;
- evidence that the plan was developed in consultation with a state-mandated, local curriculum-advisory committee; and
- an indication that the plan will be reviewed each year and that needed revisions will be made.

Each district must submit its plan to the Minnesota Department of Education for approval. Then the fun begins. Enough money has been allocated so that every district with an approved plan will receive $1 per student for staff training and another $1.60 per student to be applied toward the purchase of software on the education department's list of "high-quality software." The district may use state funds to pay no more than 50 percent of the cost of software on this list.

Before being listed, software is reviewed by five people. Three are classroom teachers, one is an expert on computers, and the last is the state education department's specialist on the curriculum area the software deals with (that is, English, science, or mathematics). Rankings are given in three areas: instructional characteristics, content characteristics, and technical characteristics. Software must receive at least 70 percent of the total possible points from the five reviewers in order to be placed on the approved list. As of early 1985, the education department had prepared three lists of high-quality software.

The process of submitting software to the education department for review is simple. A disk and any accompanying material are simply sent to Dr. Gilbert Valdez at the Minnesota Department of Education in St. Paul. Valdez is the manager of the section responsible for integrating technology into the curriculum of the state's schools.

The state's list will benefit school districts. In many instances, school districts have found it difficult to obtain review copies of new software products or to develop expertise in evaluating software. The state's list can serve as a buying guide for such districts. The plan is to update the list every six months.

Although districts may purchase software not included on the list, they will have to find other funds to pay for such products. Under this act, state funds can be used only for software on the department's approved list.

Another portion of the bill provided about $1.25 million to be shared by eight to ten model districts around the state. Those chosen sites received money to develop the most advanced, most exciting programs imaginable. About $300,000 has been allocated to allow other educators to visit these sites.

Teacher Training

A key part of Minnesota's plan provides funds for training teachers. (The actual act was developed with a great deal of participation from Minnesota educators.) The Minnesota Educational Computing Corporation (MECC) received money to work with school districts around the state. Some of MECC's staff are former teachers, and others on the staff have been working closely with teachers for more than a decade. In providing funds to MECC, the legislature recognized that training would have to be provided by people familiar with the practical as well as the theoretical aspects of using computers in schools.

Both state and local officials say that the most effective training for teachers was conducted by people who are or have been teachers. Their experience gives the trainers credibility with other teachers and enables them to answer specific questions and provide creditable advice about implementing the plan.

Observers of the Minnesota plan hope that schools will be open to extremely creative and unusual applications of advanced technology. Clearly, the act places extraordinary opportunities and responsibilities in the hands of local districts.

Overall, both the education department and local school officials are pleased with the law. Elmer Koch, a curriculum generalist for the Minneapolis public schools says he's "very optimistic about the law's potential." Charles Lund, assistant director of math, science, and technology for the St. Paul public schools, agrees, calling it "a great opportunity to develop strong, effective programs."

The Problems of Implementation

However, Minnesota's plan did run into several problems during its first year of implementation. Since learning from other people's mistakes is as valuable as learning from their successes, let's look briefly at a couple of the problems.

The first major one concerned politics, that constant companion of reform. Fifty proposals were submitted to the Department of Education in response to its request for eight to ten exemplary technology-demonstration sites. The department carefully reviewed proposals, using a statewide task force of educators. They ranked the proposals and then made recommendations to the State Board of Education, which made the final selection.

The state board's decisions immediately created both "sound and fury." Instead of funding the three most highly rated proposals, the board picked proposals from congressional districts in which its members lived. One of the funded projects was ranked 33rd, another 40th. Two different evaluation systems apparently were being used—the state department ranked on the basis of quality, the board selected on the basis of geographic distribution. Some board members felt that several of

the highly rated districts already had an advantage: They were suburban communities with considerable sophistication about computers and other advanced technology. These board members wanted to spread the state's dollars around more extensively than funding the highest-ranking proposals would permit.

The board of education came under a great deal of criticism. Deciding that the board's decisions couldn't be reversed, the legislature allocated more funds for another group of exemplary projects, including the four most highly ranked projects that had not been funded.

A second problem was the list of state-approved software. Some people felt it was inappropriate for the state department to act as a "censor" for local districts, telling them what they could purchase with state funds. And the daily introduction of new software creates an ongoing dispute for state-approved lists. Teachers have expressed frustration with the state's slow process of reviewing software. For example, outstanding software for problem solving had been identified and submitted to the state. However, six months later, the software still had not been reviewed.

Interestingly enough, after considering the possibility of a similar kind of state-approved software list, California decided not to establish one. Leroy Finkel, Instructional Computing Coordinator for the San Mateo Office of Education and author of 14 books about computing, had several objections to such lists. "They are always out of date and they are too limiting," he says. Instead, he urges states to create criteria by which educators can judge software.

A third problem with Minnesota's plan concerns a fundamental problem in public education: the difficulty of getting educators to learn from each other. Recently, the state education department sponsored a two-day workshop in the Minneapolis-St. Paul area that featured each of the exemplary technology-demonstration projects and provided teachers with an opportunity to learn from people from throughout the state. Yet, despite extensive publicity, many of

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"The most important lesson from the past is that the people working directly with kids must have opportunities to experiment, create, and share with others."

the area districts, including some of the state's largest, did not send any representatives.

Ed Mako, a teacher from Lakeville, Minnesota, who is pioneering the use of word processing in high schools, offers another example. An article about Mako's work and research appeared in the Minnesota Department of Education's monthly newspaper, more than 50,000 copies of which are distributed to educators throughout the state. But only eight individuals and two of the state's 435 school districts asked him for more information. And not a single university professor wrote—not one.

The Keys to Success

Even though there are problems with Minnesota's plan, at least that state has a plan—a concrete policy to follow to implement the use of computers in school districts. Every other state needs one, too. As someone once said, "When you don't know where you are going, any path will take you there."

There are a number of characteristics common to the successful plans I've examined. Successful plans:

- provide training by highly qualified, skillful instructors—the instructors must know a good deal about the day-to-day challenges instructors face;
- increase parental and community knowledge about the appropriate use of computers—these should include programs at schools and, if at all possible, opportunities to use computers in homes and community centers;
- assist and encourage female, handicapped, and minority youngsters to use computers;
- are flexible enough to make revisions as new technological and software breakthroughs appear;
- define the criteria that educators should use to evaluate software;
- provide opportunities for outstanding educators to spend part of their time working with students, part of it training others, and part of it working with universities and corporations to develop new technologies and applications;
- fund research only if it involves partnerships between schools and universities and/or corporations;
- recognize the need for nontraditional models for youth—it's important for both young men and young women to see women and people of color teaching courses where computers are used;
- create opportunities for young people to visit and learn from organizations where various advanced technologies are being used—internships and apprenticeships should be widely available;
- recognize the significant differences between metropolitan and "outstate" schools, with special consideration given to adapting programs and projects to meet needs and build on strengths of rural areas;
- use mobile classrooms with advanced technology to work with communities and educators in remote parts of the state;
- review school policies and procedures in light of the availability of home computers;
- provide cooperative training programs involving outstanding classroom teachers and universities.

Summing up, it's worth noting that the president of the American Association for the Advancement of Science testified at a congressional hearing on June 5, 1984, and recommended the creation of a Council for the Use of Computers in Education to oversee the planning and to advise Congress and the appropriate federal and state agencies. He urged that the federal government fund an independent corporation to design, build, and maintain a modern educational telecommunications system linking schools and colleges with sources of creative audiovisual learning materials. He said there are many creative people who can produce good instructional materials: "They are located in universities, museums, public-television stations, government agencies, profit-making and nonprofit organizations."

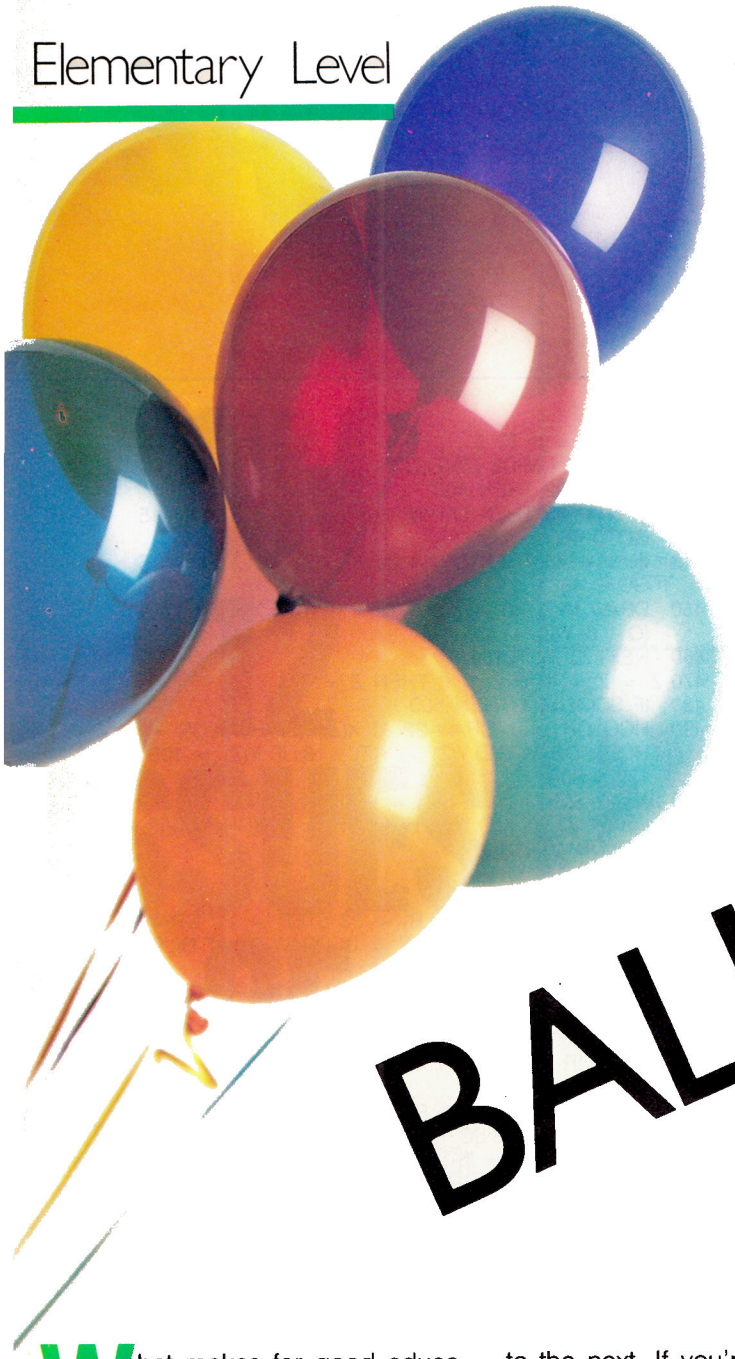
But aren't there any capable people in schools? When does the voice of the creative teacher get heard? Where is the insistence that research projects be operated cooperatively between school districts and universities? Where is the demand that teachers have opportunities to learn from fellow teachers, rather than spend more time in outdated, irrelevant university courses?

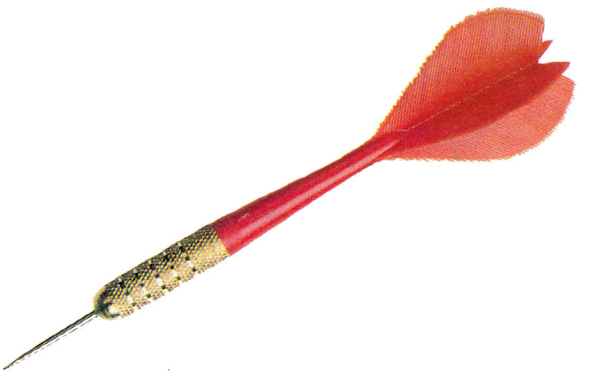
The real lessons of the past are not simply that planning and training must precede the introduction of technology. Plans can be liberating or limiting. Training can be challenging or choking. The demands for planning and training often assume that national-office administrators have some greater wisdom—some keener insight into truth. It just isn't so.

The most important lesson from the past is that the people working directly with kids must have opportunities to experiment, create, and share with others. Not all of their ideas will be good—the best teachers eagerly acknowledge that they have much to learn. But progress requires partnerships. It can't be the anointed telling the dummies how to do it. Partnerships require mutual respect, and the sharing of opportunities and resources. ■

Joe Nathan is a research-and-development fellow with Public School Incentives, St. Paul, Minnesota. Selected one of "75 outstanding young education leaders for the 1980's," he holds a Ph.D. in educational administration from the University of Minnesota. He is the author of Free to Teach: Achieving Equity and Excellence in Schools *(Pilgrim Press, 1983).*

Elementary Level





Balloons makes learning arithmetic fun.

BALLOONS

by Steven Roth

What makes for good educational software? Most teachers and parents agree that a program should teach children a skill, while maintaining their interest with action, sound, and color. Balloons, a BASIC program presented here (**Listing 1**), combines all of these ingredients to create an exciting game—with several levels of difficulty—that can improve a child's math skills.

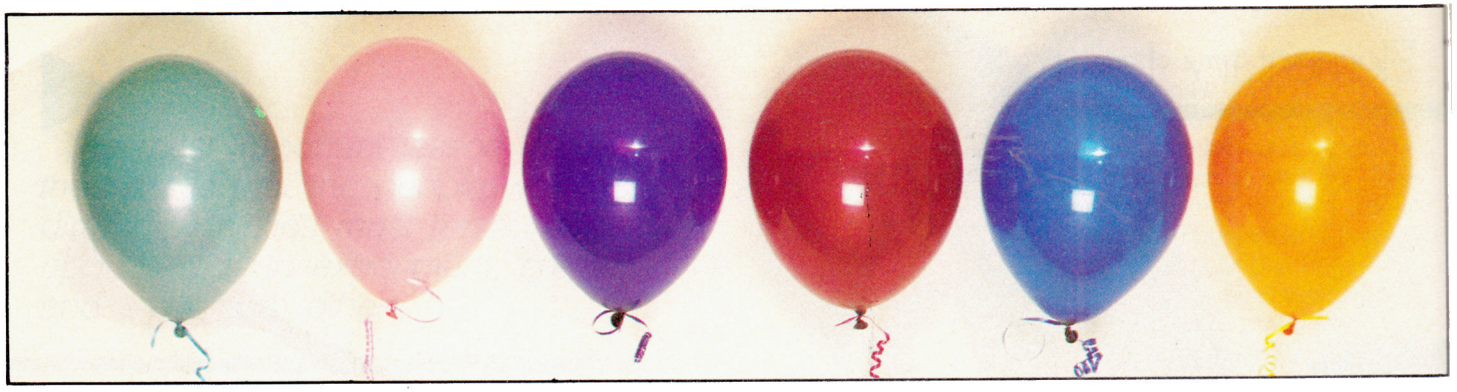
Balloons begins with a series of six balloons lined up across the top of the screen; inside each is a math problem. Below them is a dart you can move horizontally with your Apple's left- and right-arrow keys. When you type in the correct answer to a problem, the dart pops the balloon and you can move on to the next. If you're wrong, your computer beeps and gives you another chance. The program awards 100 points for each right answer and subtracts ten from your score for each mistake. The balloons drift toward the bottom of the screen during play, so you have to answer the problems quickly, too. If a balloon hits the ground, you lose 500 points and must repeat the level. When you've popped all six balloons, the program increases the level of difficulty by one.

To enter the program, type in **Listing 1** (remember to press the return key after each line). When you're finished, type SAVE BALLOONS. Now type CALL -151 and press the return key; type in the shape table in **Listing 2**. Check to make sure you've entered each number correctly—the balloons may be lopsided if you haven't. When you're finished, type BSAVE BALLOON.SHAPES,A$6000,L$305.

Type RUN to bring the instructions up on the screen. Answer the two questions that appear, then press any key to begin the game.

Balloons not only develops your child's math skills, it lets him or her have fun with arithmetic at the same time. The game will hold your child's interest—and that's the key to learning. ■

Write to Steven Roth at 1218 Beechwood Lane, Menasha, WI 54952.



Listing 1. Balloons.

```
10  TEXT : HOME : GOSUB 620
20  PRINT CHR$ (4);"BLOAD BALLOON.SHAPES"
25  GOSUB 680
30 B = 0: DIM X(6),Y(6),S(6),D(6),AS(6),SD(6),HC(6),Z$(6)
40  FOR X = 1 TO 6: READ CSR(X): NEXT X: DATA 7,13,19,
    24,30,35
50  FOR X = 770 TO 790: READ Y: POKE X,Y: NEXT X:
    DATA 173,48,192,136,208,5,206,1,3,240,9,202,208,245,
    174,0,3,76,2,3,96
60  POKE - 16368,0: POKE 232,0: POKE 233,96:
    POKE 230,32
70 BL = 6: FOR Z = 1 TO 6
80  IF YN$ = "N" THEN HC(Z) = 3: GOTO 100
90 HC(Z) = INT ( RND (1) * 5) + 1: IF HC(Z) = 3 OR
   HC(Z) = 4 THEN 90
100 SD(Z) = 0:X(Z) = (Z - 1) * 42 + 30:Y(Z) =
    INT ( RND (1) * 10) + 5
110 S(Z) = INT ( RND (1) * 8) + 1:D(Z) = 30 + ((Z - 1) *
    42): GOSUB 360: NEXT Z
120  CALL 62450: HGR : HCOLOR = 3: SCALE = 1:
     ROT = 0: HPLOT 0,0 TO 279,0 TO 279,159 TO 0,159 TO
     0,1 TO 278,1 TO 278,158 TO 1,158 TO 1,1
130  FOR Z = 1 TO 6: HCOLOR = HC(Z): DRAW 22
     AT X(Z),Y(Z): HCOLOR = 3: XDRAW S(Z): GOSUB 400:
     NEXT Z
140 S = 1:LR = 1: XDRAW 21 AT D(LR),145: GOSUB 760
150 Z = 1: GOTO 470
160  FOR T = 1 TO 15:C = PEEK ( - 16384):
     IF C < 128 THEN GOSUB 300: NEXT T: RETURN
170  POKE - 16368,0
180 C = C - 128
190  IF C = 32 THEN Q$ = "": HOME : GOTO 160
200  IF C = 8 THEN HCOLOR = 0: XDRAW 21 AT D(LR),
     145: HCOLOR = 3:LR = LR - 1: IF LR = 0
     THEN LR = 6
210  IF C = 8 THEN XDRAW 21 AT D(LR),145:T = 12:
     HOME :Q$ = "": RETURN
220  IF C = 21 THEN HCOLOR = 0: XDRAW 21 AT D(LR),
     145: HCOLOR = 3:LR = LR + 1: IF LR = 7
     THEN LR = 1
230  IF C = 21 THEN XDRAW 21 AT D(LR),145:T = 12:
     HOME :Q$ = "": RETURN
240  IF SD(LR) = 1 THEN NEXT T: RETURN
250 Q$ = Q$ + CHR$ (C): VTAB 22: CALL - 868:
    HTAB CSR(LR) - LEN (Q$): PRINT Q$
260  GOSUB 300: IF LEN (Q$) > 4 THEN Q$ = "": HOME
270  IF LEN (Q$) < > L THEN NEXT T: RETURN
280 SC = SC - 10: IF SC < 0 THEN SC = 0
290  POKE 768,255: POKE 769,25: CALL 770: GOSUB 760:
     HOME :Q$ = "": NEXT T: RETURN
300 V1 = VAL ( LEFT$ (Z$(LR),2)) - VAL ( RIGHT$ (Z$(LR),2))
310 V2 = VAL ( LEFT$ (Z$(LR),2)) + VAL ( RIGHT$ (Z$(LR),2))
320  IF AS(LR) = 1 AND VAL (Q$) = V1 THEN 540
330  IF AS(LR) = 0 AND VAL (Q$) = V2 THEN 540
340 L = LEN ( STR$ (V2)): IF AS(LR) = 1 THEN L =
    LEN ( STR$ (V1))
350  RETURN
360 AS(Z) = 1: IF RND (1) > .5 THEN AS(Z) = 0
370 Z1 = INT ( RND (1) * (2 * LEVEL + 1)) + 1:Z2 =
    INT ( RND (1) * (2 * LEVEL + 1)) + 1
380  IF Z1 < Z2 OR Z1 = Z2 OR Z1 > 99 OR Z2 > 99
     THEN 370
390 Z$(Z) = RIGHT$ (" " + STR$ (Z1),2) + MID$ ("+-",AS(Z)
    + 1,1) + LEFT$ ( STR$ (Z2) + " ",2): RETURN
400  FOR Q = 1 TO 5
410 N = ASC ( MID$ (Z$(Z),Q,1))
420  IF N = 32 THEN 460
430  IF N = 43 THEN DRAW 19 AT X(Z) + 1,Y(Z) + 15:
     GOTO 460
440  IF N = 45 THEN DRAW 20 AT X(Z) + 1,Y(Z) + 15:
     GOTO 460
450  DRAW N - 40 + (10 * (N = 48)) AT X(Z) - 17 +
     (Q * 6),Y(Z) + 15
460  NEXT Q: RETURN
470 Z = Z + 1: IF Z > 6 THEN Z = 1
480  IF SD(Z) = 1 THEN 520
490  HCOLOR = 0: DRAW 22 AT X(Z),Y(Z): HCOLOR =
     HC(Z): DRAW S(Z):Y(Z) = Y(Z) + 8: IF Y(Z) > 108
     THEN 800
500 S(Z) = S(Z) + 1: IF S(Z) = 9 THEN S(Z) = 1
510  DRAW 22 AT X(Z),Y(Z): HCOLOR = 3: XDRAW S(Z):
     GOSUB 400
520  GOSUB 160
530  GOTO 470
540  FOR Y1 = 134 TO Y(LR) + 33 STEP - 11: DRAW
     21 AT D(LR),Y1: HCOLOR = 0: DRAW 21 AT D(LR),Y1 +
     11: HCOLOR = 3: NEXT Y1
550  POKE 768,150: POKE 769,2: CALL 770: POKE 768,
     152: POKE 769,2: CALL 770: POKE 768,150:
     POKE 769,2: CALL 770
560  HCOLOR = 0: DRAW 21 AT D(LR),Y1: DRAW 21 AT
     D(LR),Y1 + 11
570  DRAW 22 AT X(LR),Y(LR): DRAW S(LR): DRAW 22 AT
     X(LR),Y(LR) + 8:SC = SC + 100
580 B = B + 1:BL = BL - 1: GOSUB 760: IF BL = 0
    THEN 770
590  XDRAW 21 AT D(LR),145:Y(LR) = 10: POP : POP
600  HOME : HCOLOR = 3:Q$ = "":SD(LR) = 1
610  GOTO 470
620  VTAB 2: HTAB 16: INVERSE : PRINT "BALLOONS":
     NORMAL
630  VTAB 6: HTAB 5: PRINT "TYPE THE ANSWER TO THE
     EQUATION": HTAB 5: PRINT "IN THE BALLOON
     ABOVE THE DART."
640  VTAB 10: HTAB 18: PRINT "KEYS": PRINT : PRINT
650  HTAB 5: PRINT "<- -";: HTAB 20: PRINT "MOVE
     DART LEFT": PRINT
660  HTAB 5: PRINT "- ->";: HTAB 20: PRINT "MOVE
     DART RIGHT": PRINT
670  HTAB 5: PRINT "SPACE";: HTAB 20: PRINT "RE-ENTER
     THE NUMBER"
675  RETURN
680  VTAB 23: HTAB 2: PRINT "DO YOU HAVE A COLOR
     MONITOR? (Y/N): ";: GET YN$
690  IF YN$ < > "Y" AND YN$ < > "N" THEN QQ =
     PEEK ( - 16336) + PEEK ( - 16336): GOTO 680
700  VTAB 23: HTAB 1: CALL - 868: HTAB 7: INPUT
     "START ON WHICH LEVEL? (1-50): ";LV$
710 LEVEL = VAL (LV$): IF LEVEL < 1 THEN LEVEL = 1
720  IF LEVEL > 50 THEN LEVEL = 50
730  VTAB 23: CALL - 868: HTAB 5: PRINT "<<< PRESS
     ANY KEY TO BEGIN >>>": POKE - 16368,0
740 Z = PEEK ( - 16384): IF Z > 127 THEN HOME :
    RETURN
750  GOTO 740
760  POKE 35,24: VTAB 22: CALL - 958: VTAB 23:
     PRINT "BALLOONS: ";B;: HTAB 16: PRINT "SCORE: ";
     SC;: HTAB 30: PRINT "LEVEL: ";LEVEL: POKE 35,22:
     RETURN
```

Listing continued.

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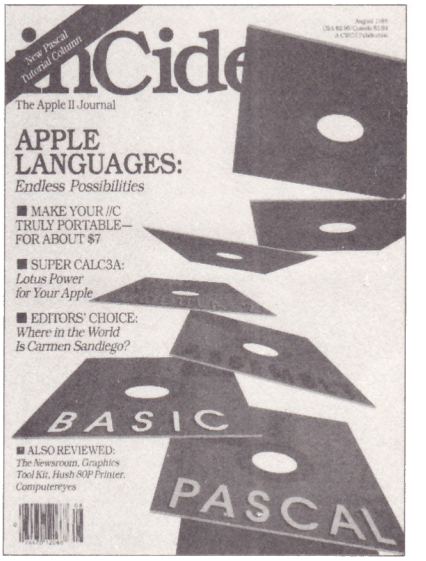

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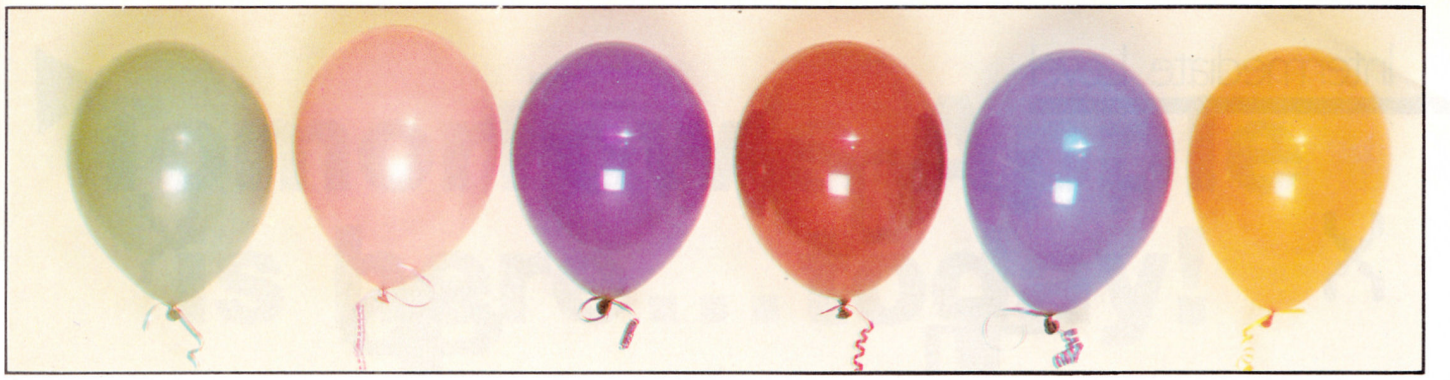

Listing continued.

```
770  TEXT : HOME : VTAB 10: HTAB 11: INVERSE :
     PRINT "LEVEL ";LEVEL;" COMPLETED": NORMAL :
     FOR ZZ = 1 TO 50: POKE 768,ZZ: POKE 769,2:
     CALL 770: NEXT ZZ: FOR ZZ = 50 TO 1 STEP - 1:
     POKE 768,ZZ: POKE 769,2: CALL 770: NEXT ZZ
780 LEVEL = LEVEL + 1: IF LEVEL > 50 THEN LEVEL = 50
790  FOR ZZ = 1 TO 500: NEXT ZZ: POP : POP :Q$ = "":
     GOTO 70
800  FOR ZZ = 1 TO 10: HCOLOR = HC(Z) * (ZZ / 2 =
     INT (ZZ / 2)): DRAW 22 AT X(Z),Y(Z): HCOLOR = 3:
     DRAW S(Z)
810 QQ = PEEK ( - 16336): NEXT ZZ:LR = Z:SC =
    SC - 500
820  IF SC < 0 THEN SC = 0
830  GOSUB 760: GOTO 70
```

End of listing.

***Listing 2.** Shape table for Balloons game.*

```
6000- 16 00 2E 00 35 00 3E 00
6008- 45 00 4E 00 55 00 5E 00
6010- 65 00 8D 00 9B 00 AB 00
6018- BA 00 CA 00 DC 00 EC 00
6020- FB 00 10 01 20 01 31 01
6028- 3C 01 45 01 5B 01 F6 76
6030- 76 76 F6 36 00 36 0E 36
6038- 0E 36 1E 36 06 00 36 36
6040- 36 36 36 36 00 36 1E 36
6048- 1E 36 0E 36 06 00 76 F6
6050- F6 F6 76 36 00 36 1E 36
6058- 1E 36 0E 36 06 00 36 36
6060- 36 36 36 36 00 36 0E 36
6068- 0E 36 1E 36 06 00 28 00
6070- 2A 28 AD F6 BF 17 2E 2D
6078- 2D 00 28 AD F6 BF 17 2E
6080- 2D 2D 00 2A 28 AD F6 BF
6088- 17 2E 2D 2D 00 09 3E 0E
6090- 36 BE 2D 4D C0 C1 C1 C1
6098- C1 01 00 2A 28 AD F6 BF
60A0- 17 2E 2D 6D C0 C1 C1 C1
60A8- C1 01 00 2D 2D F6 3E 9F
60B0- 72 2D C5 21 0D C0 C1 C1
60B8- 01 00 49 3E 17 0D FE 33
60C0- 2D 35 2E C0 69 C0 C1 C1
60C8- 01 00 2D 2D DE 1B 2E 2D
60D0- DE 13 72 2D C5 21 6C C0
60D8- C1 01 00 00 09 2D DE BB
60E0- 36 76 2D C5 21 1C 3F 4C
60E8- 49 C0 01 00 2D 2D F6 1E
60F0- 1E 36 4D 09 C0 C1 C1 C1
60F8- C1 01 00 29 AD DF 33 0E
6100- 2D C5 A9 1A DF 33 0E 2D
6108- C5 69 C0 C1 C1 C1 01 00
6110- 29 AD DF 33 96 2A 2D 28
6118- 20 3F 67 09 0D C0 01 00
6120- 32 36 76 2D C5 F9 C3 29
6128- 28 B0 21 24 DF 28 6D 01
6130- 00 92 B5 21 24 AC 2A 0D
6138- C0 C1 01 00 92 2D 2D 0D
6140- C0 C1 01 00 FF 49 36 15
6148- 3F 2E 35 3F 2E AD 3F 3F
6150- 17 2D 2D 2D 1E FF 77 0D
6158- 05 00 80 2D 2D 2D 4D 3A
6160- 3F 3F 3F 3F 3F FF 2A 2D
6168- 2D 2D 2D 2D 2D 2D 6D 3A
6170- 3F 3F 3F 3F 3F 3F 3F 3F
6178- 3F BF 2D 2D 2D 2D 2D 2D
6180- 2D 2D 2D 2D 2D 8D 3F 3F
6188- 3F 3F 3F 3F 3F 3F 3F 3F
6190- 3F 3F 3F 17 2D 2D 2D 2D
6198- 2D 2D 2D 2D 2D 2D 2D 2D
61A0- 2D 2D 15 3F 3F 3F 3F 3F
61A8- 3F 3F 3F 3F 3F 3F 3F 3F
61B0- 3F 3F 17 2D 2D 2D 2D 2D
61B8- 2D 2D 2D 2D 2D 2D 2D 2D
61C0- 2D 2D 2D 3E 3F 3F 3F 3F
61C8- 3F 3F 3F 3F 3F 3F 3F 3F
61D0- 3F 3F 3F BF 2D 2D 2D 2D
61D8- 2D 2D 2D 2D 2D 2D 2D 2D
61E0- 2D 2D 2D 2D 2D 3E 3F 3F
61E8- 3F 3F 3F 3F 3F 3F 3F 3F
61F0- 3F 3F 3F 3F 3F 3F 37 2D
61F8- 2D 2D 2D 2D 2D 2D 2D 2D
6200- 2D 2D 2D 2D 2D 2D 2D 2D
6208- 15 3F 3F 3F 3F 3F 3F 3F
6210- 3F 3F 3F 3F 3F 3F 3F 3F
6218- 3F 3F 3F 2E 35 3F 17 2D
6220- 35 3F 37 2D 35 3F 37 2D
6228- 35 3E 3C 36 2D 2D 2D 2D
6230- 2D 2D 2D 2D 2D 2D 2D 2D
6238- 2D 2D 2D 2D 2D 2D 3C 27
6240- 2D C5 39 3F 2C 2D 3C 3F
6248- 2C 2D 3C 3F 24 35 25 8D
6250- 92 92 93 DA 3F 3F 3F 3F
6258- 3F 3F 3F 3F 3F 3F 3F 3F
6260- 3F 3F 3F 3F 3F 2E 2D 2D
6268- 2D 2D 2D 2D 2D 2D 2D 2D
6270- 2D 2D 2D 2D 2D 2D 35 3F
6278- 3F 3F 3F 3F 3F 3F 3F 3F
6280- 3F 3F 3F 3F 3F 3F 3F 3F
6288- 0E 2D 2D 2D 2D 2D 2D 2D
6290- 2D 2D 2D 2D 2D 2D 2D 2D
6298- 2D 3E 3F 3F 3F 3F 3F 3F
62A0- 3F 3F 3F 3F 3F 3F 3F 3F
62A8- 3F 77 2D 2D 2D 2D 2D 2D
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62C8- 0E 2D 2D 2D 2D 2D 2D 2D
62D0- 2D 2D 2D 2D 2D 2D DE 3F
62D8- 3F 3F 3F 3F 3F 3F 3F 3F
62E0- 3F 3F 0E 2D 2D 2D 2D 2D
62E8- 2D 2D 2D 2D 2D DE 3F 3F
62F0- 3F 3F 3F 3F 3F 3F 4E 2D
62F8- 2D 2D 2D 2D 2D DE 3B 3F
6300- 3F 3F 4A 09 00
```

MOVING PICTURES

Put some action into your Apple with BASIC graphics animation.

by James H. Wiebe

The focus of any programming course should be learning to use a computer language to solve *relevant* problems. Income taxes and business applications may be appropriate for adults, but they don't fall into the sphere of interest of the typical sixth- or ninth-grader. Graphics, however, fascinates students, and much of a beginning BASIC course can be organized around graphics activities. Even the most reluctant learner enjoys drawing on the screen, especially when the pictures include color and movement. You can introduce graphics animation to students early on and, as their programming expertise grows, make the level of animation more complex and challenging.

Keyboard characters or low-resolution graphics created with PRINT statements produce simple, fixed designs. Graphics animation, though—moving abstract designs or cartoons around the screen—presents a new challenge, as it requires you to use more complex BASIC programming concepts and statements.

Animation programming falls into four categories. Moving an entire picture vertically on screen entails the simplest programming technique. With more advanced programming methods, you can move a picture in other directions. A third type of animation involves motion in only one portion of the picture. Finally, *interactive* graphics animation lets you control the movement of the shape from the keyboard.

Vertical Animation

One way to move pictures on your screen is to add new lines at the bottom with PRINT statements. When the cursor reaches the bottom of the screen, the computer clears the screen and reprints each line one position up. **Listing 1** demonstrates this with a rocket blasting off. The PRINT statements in lines 30–70 draw the rocket near the bottom of the screen; the remaining PRINT statements (lines 80–290—you need 22 of them) add blank lines at the end of the program to move the rocket up and off the screen.

The problem with using PRINT statements for animation is that the figure moves so fast you can hardly see it. To slow it down, you need *delay loops*—loops that pause program execution. The following routine is a delay loop that takes about a second to execute on the Apple:

```
65 FOR Z = 1 TO 700
67 NEXT Z
```

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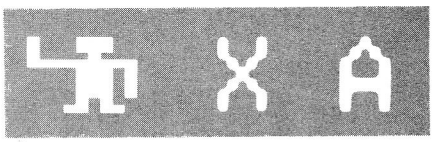


Keep in mind that you should usually write delay loops on one line for brevity and clarity:

```
65 FOR Z = 1 TO 700 : NEXT Z
```

After you insert delay loops between the blank PRINT lines in your rocket program, the rocket moves more slowly up the screen. To shorten your program, you can put the PRINT statements and the delay loops into a FOR. . .NEXT loop (see lines 80–110 of **Listing 2**, the completed program).

Try the following suggestions to better simulate a space shuttle:

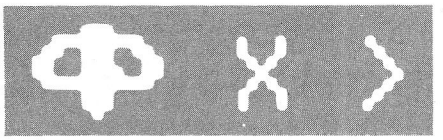
Listing 1. Moving a rocket using PRINT statements.

```
10  HOME
20  VTAB 20
30  PRINT "        ^"
40  PRINT "       A A"
50  PRINT "     A     A"
60  PRINT "     |     |"
70  PRINT "<-W-W->"
80  PRINT
.
.
.
290  PRINT
```

1) Make the rocket more elaborate.
2) Add a smoke-and-vapor trail.
3) Start the rocket slowly at blast-off, then show it accelerating, followed by the vapor trail.
4) If you used several delay loops and PRINT statements, condense them into a single delay loop, with a variable counter embedded inside another loop that controls the length of the delay loop. (Here's a hint. Your delay loop should resemble the line: 75 FOR Z = 1 TO M: NEXT M.)

Horizontal Animation

To move a shape horizontally across the screen, you must continually draw (print) the picture, erase it (clear the screen), then redraw it slightly to the right or left. Use delay loops to increase the duration of your picture on the screen—the shorter the delay loop, the faster your picture will move. As an example, **Listing 3**



Listing 2. Complete rocket program.

```
10  HOME
20  VTAB 20
30  PRINT "        A"
40  PRINT "       A A"
50  PRINT "      A   A"
60  PRINT "      I   I"
70  PRINT "<-W-W->"
80  FOR P = 1 TO 25
90  PRINT
100  FOR Z = 1 TO 700: NEXT Z
110  NEXT P
```

moves an X across the screen from left to right.

To make a more realistic picture move across the screen, use a series of PRINT TAB lines containing the shape you want to animate. **Listing 4**, for example, shows a car moving across the screen.

Once you've mastered these two programs, try the following:

1) Make an X move down the right side of the screen, then across the screen from right to left, and finally diagonally from lower left to upper right.
2) Repeat the above exercise using a more elaborate shape.
3) Show a race car moving around the screen, negotiating turns.

Listing 3. Moving X.

```
10  FOR M = 1 TO 39
20  HOME
30  PRINT TAB( M)"X"
40  FOR Z = 1 TO 350: NEXT Z
50  NEXT M
60  END
```

Using keyboard characters to create graphics produces an annoying flashing effect as the shape moves across the screen, especially if the figure is almost as tall as the screen. Lo-res or hi-res graphics can partially solve this problem. **Listing 5** illustrates this using Apple lo-res graphics mode. First plot your shape in the desired color (COLOR = 13), then use a delay loop to hold it on the screen. Next, plot the shape in the same color as the back-

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ground (COLOR = 0). Finally, plot the shape in the new position in its original color, and repeat this process. (Notice that lines 50–80 and 110–140 in **Listing 5** are identical. You can remove them from the main program and place them in a subroutine.)

Before you teach students to create moving graphics with PLOT, HLIN, and VLIN statements, have them draw stationary graphics with these statements, using only numerical values (PLOT 5,5). Set up grid paper to correspond to the screen display—40 by 40 or 260 by 160, depending on the graphics mode—and draw the figures you want to program. Then, making sure you understand the principles involved, write a program that moves your figure across the screen. **Listing 6**, the simplest form of that type of program, moves a single square

Listing 4. Moving a car horizontally.

```
10  FOR X = 1 TO 25
20  HOME
30  VTAB 12
40  PRINT TAB(X) "      XXXXXX"
50  PRINT TAB(X) "      I     I"
60  PRINT TAB(X) "XXXXXXXXXXXX"
70  PRINT TAB(X) "XXXXXXXXXXXX>"
80  PRINT TAB(X) "      0     0"
90  FOR Z = 1 TO 250: NEXT Z
100  NEXT X
110  END
```

Listing 5. Car in lo-res graphics.

```
10  GR
20  HOME
30  FOR X = 1 TO 35
40  COLOR = 13
50  HLIN X,(X + 2) AT 10
60  HLIN (X - 1),(X + 3) AT 11
70  HLIN (X - 1),(X + 3) AT 12
80  PLOT X,13: PLOT (X + 2),13
90  FOR Z = 1 TO 250: NEXT Z
100  COLOR = 0
110  HLIN X,(X + 2) AT 10
120  HLIN (X - 1),(X + 3) AT 11
130  HLIN (X - 1),(X + 3) AT 12
140  PLOT X,13: PLOT (X + 2),13
150  NEXT X
160  END
```


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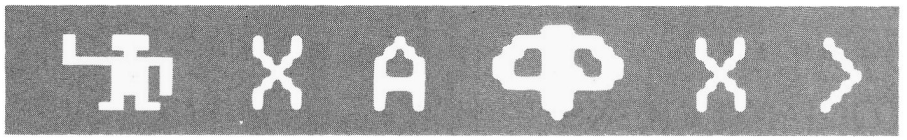

Listing 6. Moving square.

```
10  GR
20  FOR M = 1 TO 39
30  COLOR = 15
40  GOSUB 100
50  FOR Z = 1 TO 250: NEXT Z
60  COLOR = 0
70  GOSUB 100
80  NEXT M
90  END
100  PLOT M,20
110  RETURN
```

Listing 7. Person waving.

```
10  HOME
20  GR
30  COLOR = 15
40  HLIN 20,22 AT 10
50  HLIN 20,22 AT 11
60  PLOT 21,12
70  HLIN 16,24 AT 13
80  HLIN 20,22 AT 14: PLOT 24,14
90  HLIN 20,22 AT 15: PLOT 24,15
100  HLIN 20,22 AT 16: PLOT 24,16
110  HLIN 20,22 AT 17: PLOT 24,17
120  PLOT 20,18: PLOT 22,18
130  HLIN 19,20 AT 19: HLIN 22,23 AT 19
140  REM DRAW OUTSTRETCHED ARM
150  FOR X = 1 TO 25
160  COLOR = 15
170  HLIN 13,15 AT 13
180  FOR Q = 1 TO 200: NEXT Q
190  REM DELETE ARM
200  COLOR = 0
210  HLIN 13,15 AT 13
220  REM DRAW ARM IN NEW POSITION
230  COLOR = 15
240  PLOT 16,10: PLOT 16,11: PLOT 16,12
250  FOR Q = 1 TO 200: NEXT Q
260  REM DELETE ARM
270  COLOR = 0
280  PLOT 16,10: PLOT 16,11: PLOT 16,12
290  NEXT X
300  END
```

across the screen. There is no delay loop after line 70 because you want to delay the computer only while the shape is on the screen. (The GOSUBs indicate that the program uses subroutines.)

Partial Animation

To animate only part of a picture, first print the entire shape or scene as you want it to appear and insert a delay loop. Then print everything you want to move in the background color. Next, print these portions in their normal colors in new positions and insert another timing loop. Continue this process. **Listing 7** illustrates these procedures with a lo-res picture of a person waving. Now try some of the following procedures:

1) Make the person wave in three positions.
2) Create a face that winks.
3) Make the face smile and wink.
4) Show a person running. Include trees and other scenery in the background.
5) Show a dog chasing a cat across a lawn and up a tree.

Interactive Animation

A final enhancement of graphics animation lets you move shapes while the program is in operation (as in a video game) using designated keys on the keyboard. The computer prints the shape in a fixed or random location (PLOT X,Y) and moves that shape

Listing 8. Moving a rectangle using keyboard control.

```
10  HGR
20 X = 20:Y = 100
30  HCOLOR = 7: GOSUB 1000: REM PUT SHAPE ON SCREEN
40  GET A$
50  IF A$ = "H" THEN GOSUB 500: GOTO 30
60  END
500  REM DELETE SHAPE AND REDRAW IN NEW LOCATION
510  HCOLOR = 0: GOSUB 1000: REM ERASE SHAPE
520 X = X + 2: REM CHANGE POSITION TO RIGHT
530  HCOLOR = 7: GOSUB 1000: REM PRINT SHAPE
540  RETURN
1000  REM DRAW RECTANGLE
1010  HPLOT X,Y TO X,Y - 5 TO X + 5,Y - 5 TO X + 5,Y TO X,Y
1020  RETURN
```


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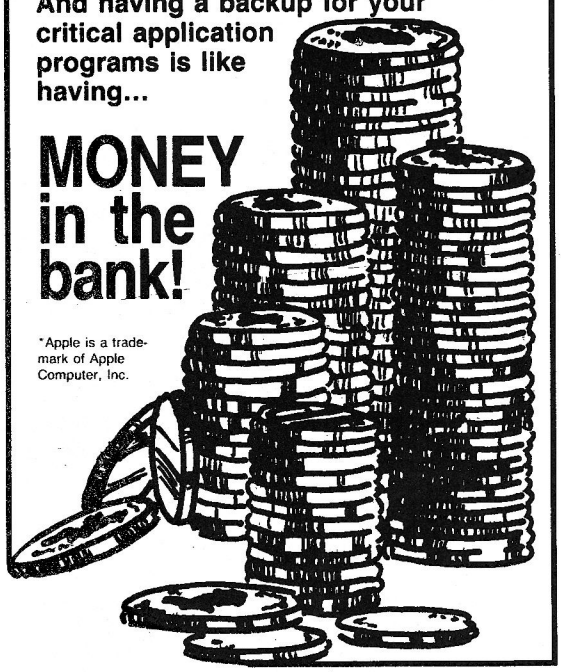

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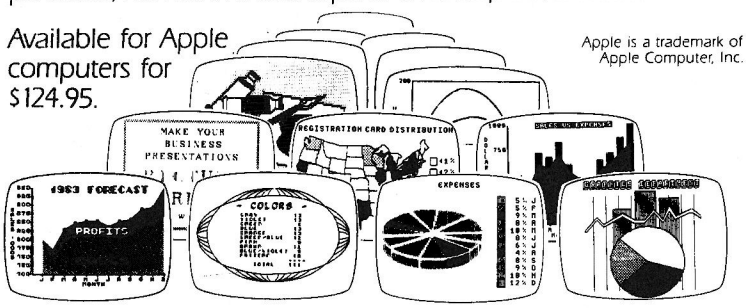

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(erases and redraws it) only when it receives input from the keyboard. (Use the GET statement in your program rather than the INPUT statement to allow for single-character input without pressing the return key.) Depending on the key you press, the statements PLOT X+1,Y, PLOT X-1,Y, PLOT X,Y+1, and PLOT X,Y-1 move your shape right, left, up, or down, respectively, to its new location. The computer follows this procedure for each subsequent key press.

Listing 8 illustrates this procedure. Each time you press the H key, the program deletes a hi-res rectangle and then redraws it two spaces to the right. The program ends when you press any other key.

Listing 9, Spider and Fly, is a video game simple enough for a beginning BASIC programmer to understand. The keys immediately around the G key (the bell key on the II Plus) serve as game controls; the F key moves the spider to the left, the T key up, the H key to the right, and the B key down. Lines 150–180 won't let the spider move off the screen; lines 250–280 serve the same function for the fly.

When you understand how **Listing 9** works, try some of the following:

1) Change subroutines 500 and 600 so that the game becomes "Cat and Mouse."
2) Make the spider or the fly move faster.
3) Make the spider go around obstacles to get to the fly.
4) Design your own video game.

For the enthusiastic programming student, the fundamentals presented here can lead to more sophisticated video games, geometric designs, and illustrated stories—and hours of enjoyment at the keyboard for Apple fans of all ages. ■

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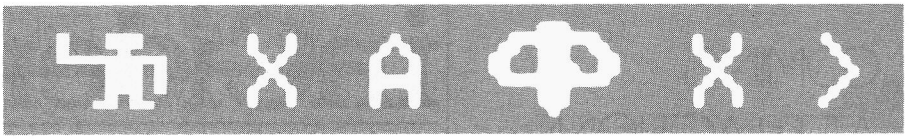

Listing 9. Spider and Fly.

```
10  REM SPIDER AND FLY
20  HGR
30 HCOLOR = 7
40 M = 50:N = 50
50 X = 140:Y = 100
60 A = 0
70  GOSUB 500: GOSUB 600
80  HOME
85  VTAB 22
90  PRINT "TRY TO CATCH THE FLY"
95  FOR QQ = 1 TO 3000: NEXT QQ
100  PRINT "'T' MOVES THE SPIDER UP, 'F' LEFT,"
110  PRINT "'H' RIGHT AND 'B' DOWN"
130  VTAB 1: HTAB 1: GET Z$
135  HCOLOR = 0
140  GOSUB 600: HCOLOR = 7
150  IF Z$ = "F" AND X > 10 THEN X = X - 3
160  IF Z$ = "T" AND Y > 10 THEN Y = Y - 3
170  IF Z$ = "H" AND X < 250 THEN X = X + 3
180  IF Z$ = "B" AND Y < 150 THEN Y = Y + 3
190  GOSUB 600
200 A = A + 1
210  IF (X = M - 3 OR X = M - 2 OR X = M - 1 OR X = M OR X = M + 1 OR
     X = M + 2 OR X = M + 3) AND (Y = N - 3 OR Y = N - 2 OR Y = N - 1
     OR Y = N OR Y = N + 1 OR Y = N + 2 OR Y = N + 3) THEN GOTO 400
220  HCOLOR = 0: GOSUB 500
230  HCOLOR = 7
240 Q = INT (4 * RND (1)) + 1
250  IF Q = 1 AND M < 254 THEN M = M + 3
260  IF Q = 2 AND M > 7 THEN M = M - 3
270  IF Q = 3 AND M < 153 THEN N = N + 3
280  IF Q = 4 AND M > 7 THEN N = N - 3
290  GOSUB 500
300  GOTO 130
400  HOME : VTAB 22: FLASH
410  PRINT "YOU CAUGHT THE FLY! GAME OVER"
415  FOR QQ = 1 TO 3000: NEXT QQ
420  PRINT "IT TOOK YOU ";A;" MOVES"
430  PRINT "TO CATCH THE FLY"
440  FOR QQ = 1 TO 3000: NEXT QQ
450  NORMAL
460  END
499  REM DRAW FLY
500  HPLOT M,N TO M - 1,N + 2 TO M - 4,N + 2 TO M - 6,N TO M - 4,N - 2 TO
     M - 2,N - 2 TO M,N
510  HPLOT M,N TO M + 2,N + 2 TO M + 4,N + 2 TO M + 6,N TO M + 4,N - 2 TO
     M + 2,N - 2 TO M,N
520  HPLOT M,N - 3 TO M,N + 5
530  HPLOT M - 1,N - 3 TO M - 1,N + 4
540  HPLOT M + 1,N - 3 TO M + 1,N + 4
550  RETURN
600  REM DRAW SPIDER
610  HPLOT X - 2,Y - 3 TO X + 2,Y - 3
620  HPLOT X - 3,Y - 2 TO X + 3,Y - 2
630  HPLOT X - 4,Y - 1 TO X + 4,Y - 1
640  HPLOT X - 5,Y TO X + 5,Y
650  HPLOT X - 4,Y + 1 TO X + 4,Y + 1
660  HPLOT X - 3,Y + 2 TO X + 3,Y + 2
670  HPLOT X - 2,Y + 3 TO X + 2,Y + 3
680  HPLOT X + 2,Y - 3 TO X + 5,Y - 6 TO X + 8,Y - 6
690  HPLOT X + 4,Y - 1 TO X + 7,Y - 3 TO X + 10,Y - 1
700  HPLOT X + 4,Y + 1 TO X + 7,Y + 1 TO X + 9,Y + 5
710  HPLOT X + 2,Y + 3 TO X + 4,Y + 8
720  HPLOT X - 2,Y - 3 TO X - 5,Y - 6 TO X - 8,Y - 6
730  HPLOT X - 4,Y - 1 TO X - 7,Y - 3 TO X - 10,Y - 1
740  HPLOT X - 4,Y + 1 TO X - 7,Y + 1 TO X - 6,Y + 5
750  HPLOT X - 2,Y + 3 TO X - 4,Y + 8
760  RETURN
```


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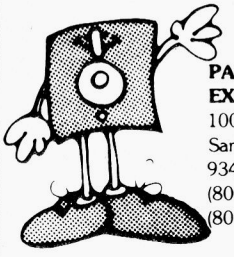

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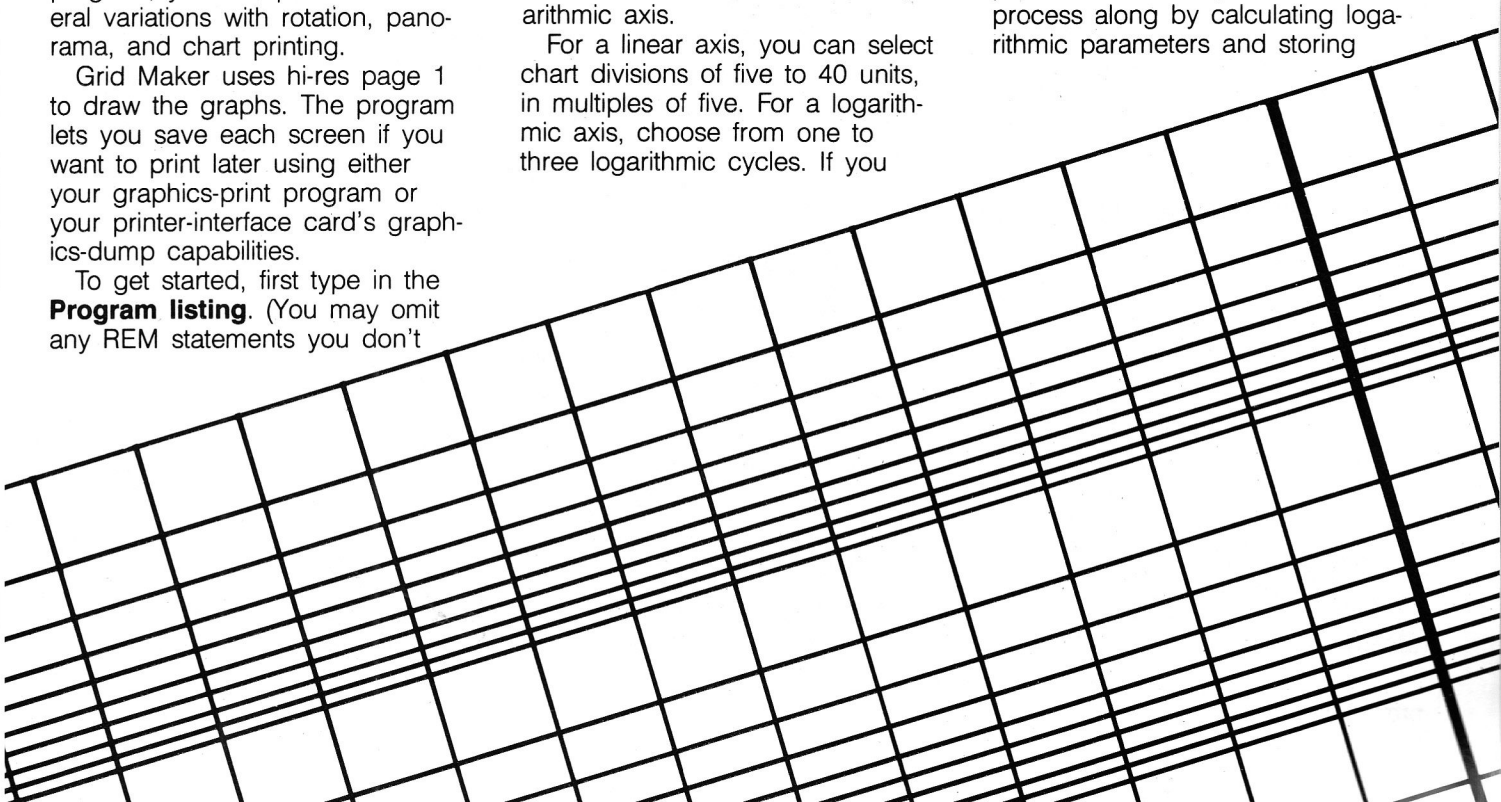
For a linear axis, you can select chart divisions of five to 40 units, in multiples of five. For a logarithmic axis, choose from one to three logarithmic cycles. If you have more cycles than that, you'll lose too much resolution.

Be Creative

Once you choose your axis, linear or logarithmic, determine its limits as defined by the program's prompts. Grid Maker next asks you whether you want to print the graph you just defined. A negative response returns you to the beginning of the program, while a positive answer starts the plotting.

The program draws logarithmic cycles more slowly than linear plots. Line 530 helps move the process along by calculating logarithmic parameters and storing



them in array I%( ) in lines 610 and 620. (See the **Table** for a complete line description.)

You can watch the plotting as you create the graph. Note that in lines 610 and 620 the plotted log points extend from I%(2) to I%(10), because the tenth point is the same as the first point of the next cycle. For the first cycle, a border equals the first position, 0; this saves replotting an entire line for each cycle and speeds up the drawing.

When the program completes the plotting, it asks if you want to save the graph to disk. You can also request a catalog of the disk by typing C or c after the prompt. You then return to the beginning of the program; only after you set the graph's axes can you exit the program. Simply press the Q key after the prompt DRAW GRAPH PAPER (Y/N/Quit). (Of course, you can exit the program at any time by pressing the reset key.)

Table. GRID.MAKER program-line description.

Lines	Description
10–50	Clear screen and set values of variables
60–70	Print program heading
90–110	Draw demo graph
130–320	Select x/y coordinates and limits
340–360	Draw graph decision or quit
380–400	Set hi-res graphics mode and draw border
420–480	Set axis variables based on previous choices
500–510	Linear-plot routines
530	Precalculates logarithmic plotting positions
550	Plotting routine for two-log cycles
570	Plotting routine for three-log cycles
580	Plotting routine for one-log cycle
600–620	Log-plotting subroutine
630	Adds text to graphics page
660–740	Saves picture to disk routine
750	Text-centering routine

Graphic Examples

Figures 1, **2**, and **3** show three ways to design your graph paper. Each was produced using a graphics-printer interface (Grappler-compatible) and GRAF-PAK, a print-graphics system.

Voilà! One more useful utility—one that really gets the job done—graces your library shelves. Now where did you put that report?■

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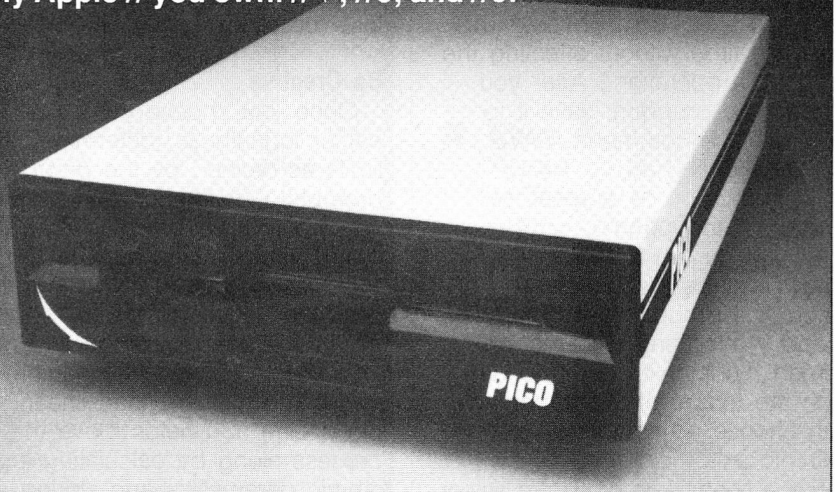

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Figure 1. Two-cycle semi-log paper.

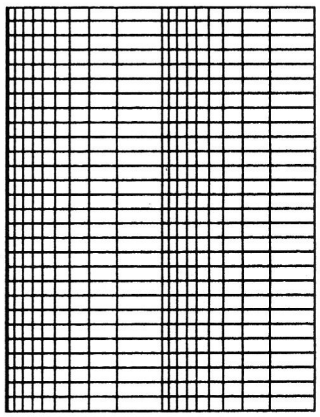


Figure 2. Linear-strip chart.

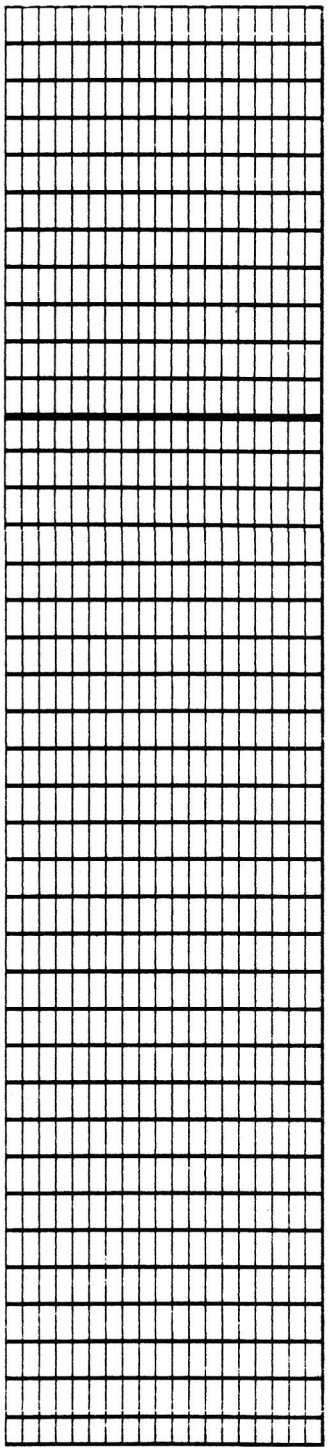
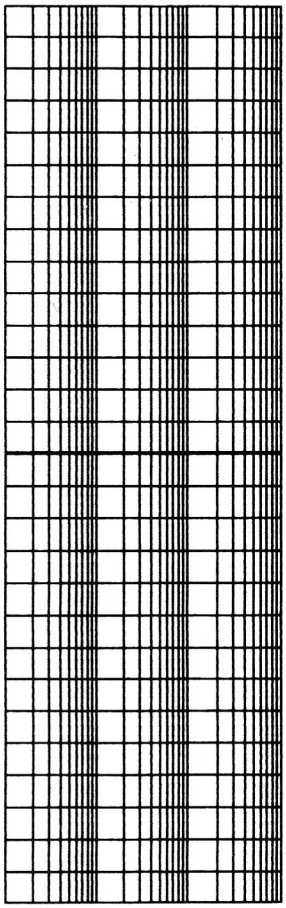


Figure 3. Three-cycle semi-log strip chart.



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WordStar (V3.33) is a truly professional word processing system with more work-saving features than any other word processing software. It takes the time and drudgery out of revising and retyping! Features like column move and horizontal scrolling make tabular formats simple. And as your needs grow, *WordStar* will grow along with you.

Mailmerge (V3.3) makes mailing labels and form letters quick and easy; *SpellStar* (V3.3) allows for easy spelling checking and eliminates laborious proofreading. *StarIndex* (V1.0) creates a table of contents and an alphabetical index.

WordStar comes complete with an easy-to-understand user's manual, training guide, reference card, and keytop labels.

InfoStar (V1.02), made up of both *DataStar* (V1.41) and *ReportStar* (V1.02), is one of the most advanced data base management systems available for the Apple. *InfoStar* doesn't expect you to write in code, it simply asks you what you want to do by listing a number of choices—all in plain English! *InfoStar* can turn your Apple into an order entry system, electronic filing system, or an information report writer. Plus, it works together with *WordStar* and *CalcStar* (V1.2) (the electronic spreadsheet program) so you can create complete business reports!

The Hardware

StarCard (PCPI) is a printed circuit board with Z-80B microprocessor. It runs at 6MHz (3 times faster than the Apple microprocessor) and has its own 64K of RAM. *StarCard* does not use the Apple's memory for program execution.

StarCard works only in the Apple II, II Plus, and IIe (pre-installed for the Apple //e or II Plus). *StarCard* will also use the Apple's graphics ability to produce a 70-column screen if you don't have an 80-column card.

You *must* have an 80-column card to use *DataStar* or *ReportStar*. *WordStar*, however, can run in 70. We will be happy to supply you with an 80-column card for only $39.95, shipping included. Please ask for it.

Run Apple DOS or CP/M

If you boot with an Apple DOS disk, your Apple will run under Apple DOS. If you boot with the *StarCard*'s CP/M disk, your Apple will run under CP/M. You don't have to remove the *StarCard*. . .you can also use the 64K RAM on the *StarCard* as a disk drive when you're using Apple DOS. Since the normal Apple drives are only 141K, this capability furnishes you with approximately half of a disk drive.

Full CP/M System

StarCard uses the standard CP/M 2.2 and has all the usual CP/M utilities.

SYSGEN and FORMAT have been combined into a special utility called COPYFRMT to make them easier to use.

tained in the INSTALL utility. Use the Apple RAM as a printer buffer so you can continue working while your file is being printed! You can even define your own functions for different keys and transfer Apple DOS files to CP/M. . . or vice versa.

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Program listing. GRID.MAKER.

```
10  TEXT : HOME
20 E = 2.30258509: REM NATURAL TO
   BASE 10 CONVERSION FACTOR
30  HCOLOR = 3: REM WHITE
40  FOR I = 1 TO 40:L$ = L$ + "=":
    NEXT
50 X$(1) = "LIN":X$(2) = "LOG"
60  VTAB 2:X$ = "** GRID MAKER **":
    GOSUB 750: PRINT :X$ = " BY
    MARK R. CRAVEN ": GOSUB 750:
    PRINT : PRINT L$
70  PRINT : POKE 34,6: REM FREEZE
    WINDOW
80  REM DRAW AXES
90  FOR I = 7 TO 14: VTAB I: HTAB 15:
    PRINT CHR$ (124);: NEXT : FOR I =
    1 TO 14: PRINT CHR$ (95);: NEXT
100  VTAB 11: HTAB 12: PRINT "Y";:
     VTAB 15: HTAB 22: PRINT "X";
110  PRINT : PRINT L$: POKE 34,17
120  REM CHOOSE TYPE OF 'X' AXIS
130  VTAB 18: HTAB 1: PRINT "'X'
     COORDINATE IS 1) LINEAR 2)
     LOG";:
140  POKE - 16368,0
150  GET X$: IF X$ < "1" OR X$ >
     "2" THEN 130
160  POKE 34,1: VTAB 15: HTAB 24:
     PRINT "= " + X$( VAL (X$))
170  IF X$ = "2" THEN 220
180  REM SET LINEAR DIVISIONS
190  VTAB 19: HTAB 1: PRINT " # OF
     DIVISIONS (5 - 40 BY 5'S )";:
     INPUT "";DV$(1): FOR I = 5 TO 40
     STEP 5: IF VAL (DV$(1)) = I
     THEN 240: REM GET Y 'TYPE'
200  NEXT : GOTO 190
210  REM SET LOG CYCLES
220  VTAB 19: HTAB 1: PRINT " # OF
     LOG CYCLES (1 - 3) ";: POKE
     - 16368,0: GET C$(1): IF C$(1) <
     "1" OR C$(1) > "3" THEN 220
230  POKE 34,17
240  VTAB 21: HTAB 1: PRINT "'Y'
     COORDINATE IS 1) LINEAR
     2) LOG";
250  POKE - 16368,0
260  GET Y$: IF Y$ < "1" OR Y$ >
     "2" THEN 240
270  POKE 34,1: VTAB 11: HTAB 6:
     PRINT X$( VAL (Y$)) + " ="
280  IF Y$ = "2" THEN 320
290  VTAB 22: HTAB 1: PRINT " # OF
     DIVISIONS (5 - 40 BY 5'S )";:
     INPUT "";DV$(2): FOR I = 5 TO
     40 STEP 5: IF VAL (DV$(2)) = I
     THEN 340: REM GET Y 'TYPE'
300  NEXT : GOTO 290
310  POKE 34,17
320  VTAB 22: HTAB 1: PRINT " # OF
     LOG CYCLES (1 - 3) ";: POKE
     - 16368,0: GET C$(2): IF C$(2) <
     "1" OR C$(2) > "3" THEN 320
330  REM DRAW OR QUIT
340  HOME : VTAB 10: PRINT "DRAW
     GRAPH PAPER (Y/N/Quit) ?";: POKE
     - 16368,0: GET G$
350  IF G$ = "Q" OR G$ = CHR$ (113)
     THEN TEXT : HOME : END
360  IF G$ < > "Y" AND G$ < >
     CHR$ (121) THEN RUN
370  REM DO GRAPHICS PART
380  TEXT : HOME : HGR : POKE
     - 16302,0: REM FULL SCREEN
390  GOTO 400
400  HPLOT 0,0 TO 279,0 TO 279,191
     TO 0,191 TO 0,0
410  REM SET 'X' AXIS VARIABLES
420 X = VAL (X$):C = VAL (C$(1)):DV =
    VAL (DV$(1)):Z1 = 279:Z2 = 191
430  ON X GOSUB 500,530
440  REM SET 'Y' AXIS VARIABLES
450 Y = VAL (Y$):C = VAL (C$(2)):DV =
    VAL (DV$(2)):Z1 = 191:Z2 = 279
460 X = 0:L = 0
470  ON Y GOSUB 510,530
480  GOTO 630
490  REM LINEAR SETUPS
500  FOR I = 0 TO Z1 STEP DV: FOR
     J = 0 TO Z2: HPLOT I,J: NEXT :
     NEXT : RETURN
510  FOR J = 0 TO Z1 STEP DV: FOR
     I = 0 TO Z2: HPLOT I,J: NEXT :
     NEXT : RETURN
520  REM CALCULATE LOG INTERVALS
530  FOR I = 1 TO 10:I%(I) = Z1 *
     ( LOG (I) / E) / C: NEXT
540  REM 2 CYCLES
550  IF C = 2 THEN GOSUB 600:L =
     I%(10): GOSUB 600: RETURN
560  REM 3 CYCLES
570  IF C = 3 THEN GOSUB 600:L =
     I%(10): GOSUB 600:L =
     2 * Z1 / 3: GOSUB 600: RETURN
580  GOSUB 600: RETURN
590  REM IF X AXIS IS LOG, REVERSE
     AXES
600  IF X = 2 THEN 620
610  FOR I = 2 TO 10: FOR J = 0 TO
     Z2: HPLOT J,Z1 - (I%(I) + L):
     NEXT : NEXT : RETURN
620  FOR J = 2 TO 10: FOR I = 0 TO
     Z2: HPLOT I%(J) + L,I: NEXT :
     NEXT : RETURN
630  POKE - 16301,0: HOME
640  REM SAVE PICTURE?
650  VTAB 21
660  PRINT "SAVE THIS GRAPH
     (Y/N) ?";: GET G$: POKE
     - 16368,0
670  IF G$ = "Y" OR G$ = CHR$ (121)
     THEN 700
680  IF G$ = "N" OR G$ = CHR$ (110)
     THEN RUN
690  GOTO 630
700  PRINT : PRINT "ENTER NAME OR
     < C > FOR CATALOG "
710  INPUT "ENTER NAME - - > ";N$
720  IF N$ = "C" OR N$ = CHR$ (99)
     THEN TEXT : PRINT CHR$ (4)
     "CATALOG": PRINT : PRINT
     "PRESS ANY KEY TO
     CONTINUE...";: POKE - 16368,0:
     GET G$: CALL - 3100: GOTO 630
730  PRINT : PRINT : PRINT
740  PRINT CHR$ (4);"BSAVE ";N$;
     ",A$2000,L$2000": RUN
750  PRINT TAB( 20 - LEN (X$) / 2);X$:
     RETURN
```


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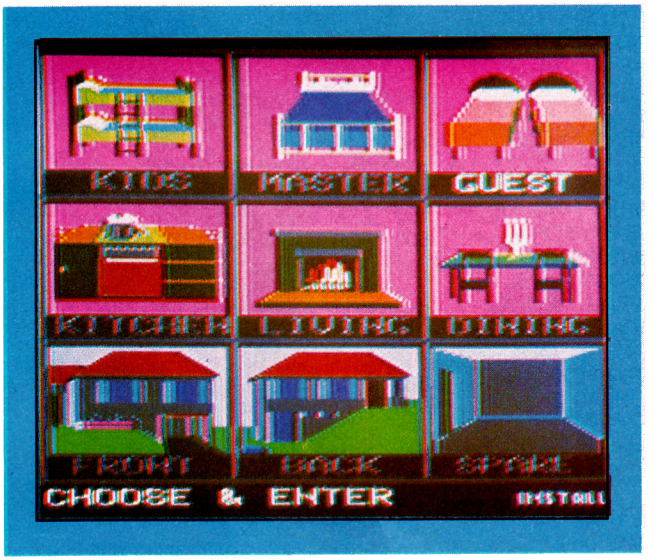
EDITORS' CHOICE

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 feel is a significant addition to the Apple II family of products.*

Home sweet home—it's where most of you keep your Apple //c's. But your Apple helps you with the housekeeping about as much as the family mutt. So after the recipe file and games for the babysitter, what can you do with a home computer? X-10 (USA)'s Powerhouse home controller has the answer—and gives the words "home computer" a whole new meaning.

The X-10 Powerhouse doesn't just work with your computer; it transforms your house into a powerful peripheral. The idea is simple: Program your //c to turn the lights (or other electrical devices) on and off according to a schedule you set up. And the execution is simple: Your //c downloads signals through the X-10 interface into the wiring of your house. You needn't be an electrician to put the home controller together; you don't even need to know how to program.

You just plug your electrical equipment—lamp, toaster, or a second computer—into a special module that plugs into a wall outlet. The X-10 interface unit connects to your //c's port 2. (A //e version, requiring an Extended 80-Column Card, is in the works and should be ready in December '85.) Boot the software and you'll see a hi-res dollhouse representing your castle, apartment, or office. With joystick, mouse, or keyboard, you stroll from room to room and set timers for as many as 128 "events" (such as a radio turning on or a dryer starting up). Your home is ready. Pull out the Powerhouse disk and go on to your spreadsheets or Captain Goodnight. The interface clock keeps on ticking—and the setup is simple.



The X-10 Powerhouse: a home controller that's efficient and easy to install.

But the possibilities are far from simple. Brew coffee every morning before dawn. Make "lights out" more than an idle threat to the youngsters at ten on school nights. Imagine a romantic evening—music at the perfect moment, lights turned down low. Simulate boarders who inhabit your house while you're on vacation—let them sneak into the kitchen for midnight munching by turning a light on for ten minutes and then off, or make them spend Friday evenings with *Miami Vice*. While they're "watching," you can have your VCR keep you up to date on fashions and felonies.

"There's nothing like it on the Apple market," says Review Editor Paul Statt. "Housekeepers and home-ec majors have been awaiting the 'Home of Tomorrow' since the '39 World's Fair. We are the Jetsons, now. The price is right ($125 for the controller, $25 for the software), and Powerhouse modules are available at Sears. This one is for everybody who has a computer and is wondering what to do now."

Bob Ryan, *inCider*'s Technical Editor, praised the X-10 software: "It's not copy-protected, and X-10 (USA) urges consumers to share—as long as everybody pays for an interface. You can program the interface yourself if you want to."

Editor in Chief Susan Gubernat played with the Powerhouse and thought it was pretty neat: "We enjoyed the chance to control our world a little more than usual at *inCider*. The design staff found coffee waiting for them when they arrived at the office early one morning, courtesy of the Powerhouse unit working according to schedule. We refrained from dimming the lights over their drafting tables, but such pranks are imaginable." She had one small gripe, though: "Powerhouse doesn't do windows."

The X-10 Powerhouse interface with //c software costs $150; modules for lamps, small appliances, and wall switches are $20 each. Unless you live like J.R. Ewing, the 128-event limit shouldn't put a crimp in your control. (If you do live in Dallas, buy two and hire a comptroller for the second.) Modules for 220-volt appliances, like washers and dryers, sell for $25 (15 amp) and $30 (20 amp). A telephone responder is $75, a burglar alarm $50, and a thermostat $50. Other modules are also available. Powerhouse is manufactured by X-10 (USA), 185A Legrand Avenue, Northvale, NJ 07647.■

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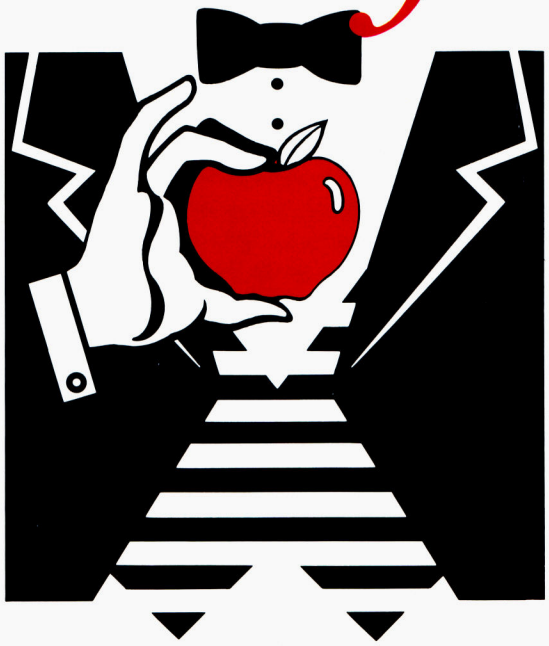

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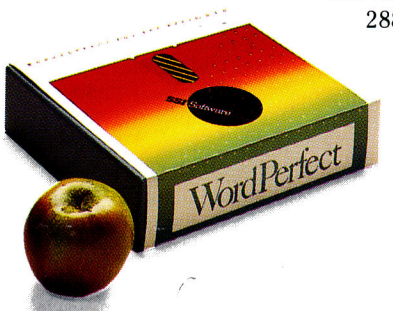

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