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- Seven Science Programs from Aerobic Fitness to Lab Projects
- Four Popular Multifunction Cards

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- The II Links to the Mac

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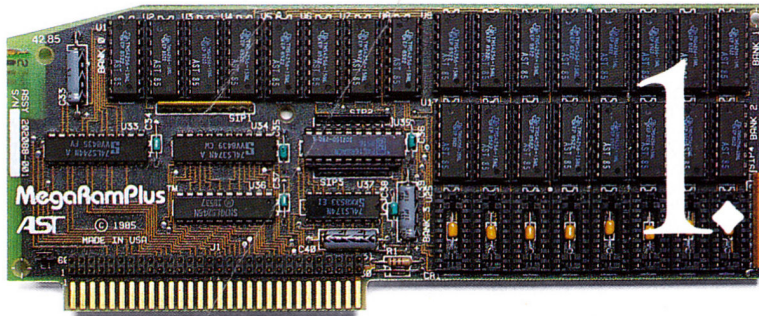
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- Applesoft Adviser: Amortization Program

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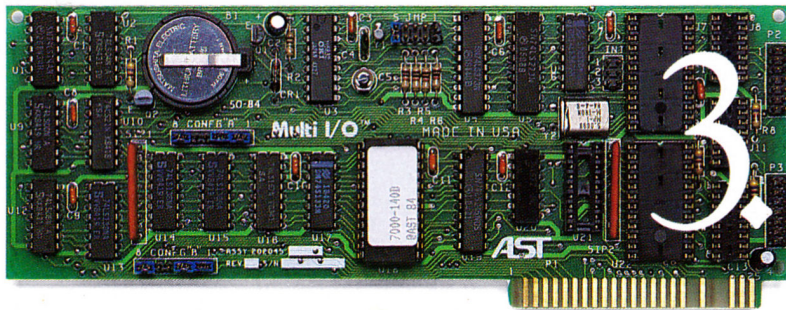
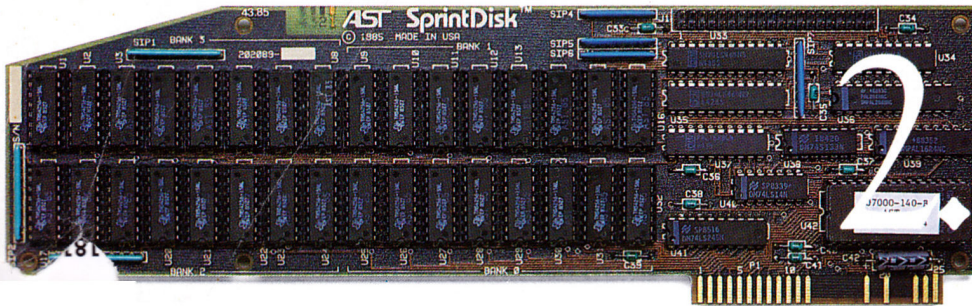
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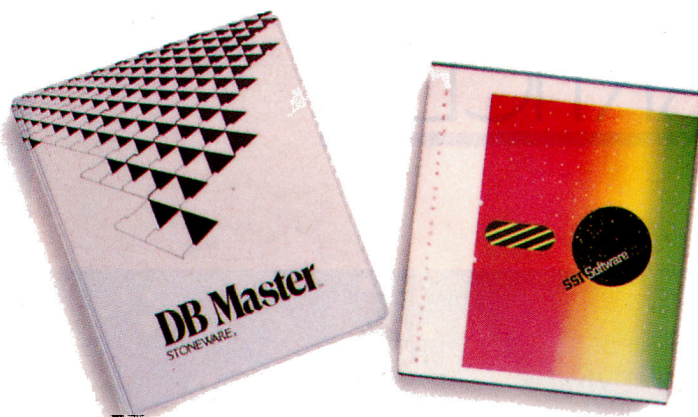
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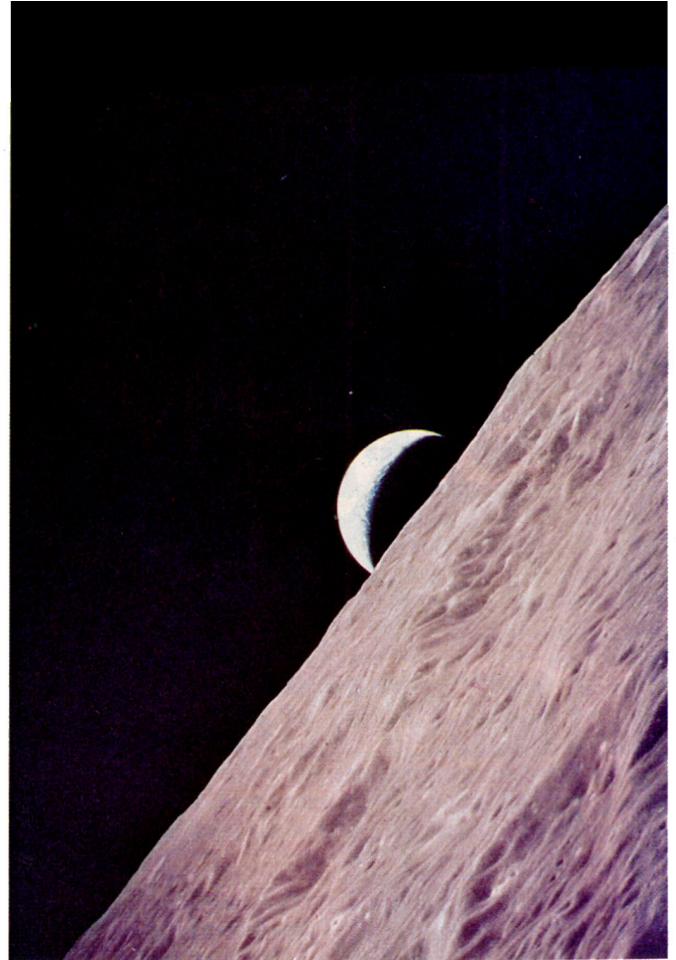
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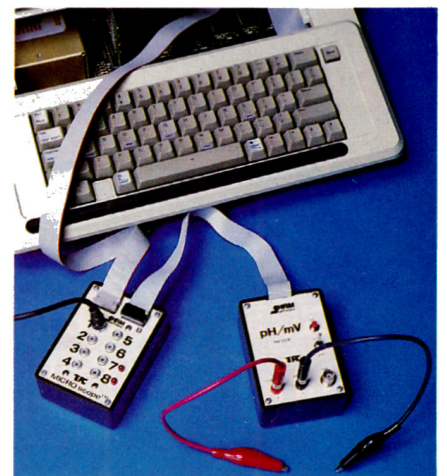
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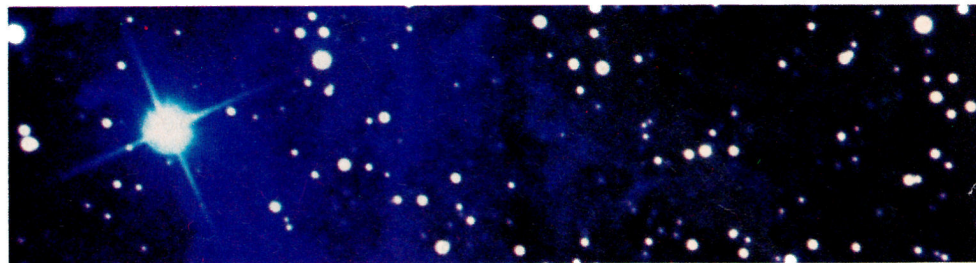
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INCIDER'S VIEW



The New II

"Big things, of the 16-bit variety, may be in store for the Apple II user this year."

by Deborah de Peyster

While at the Comdex show in Las Vegas last November we decided to figure out where Apple Computer was headed with the Apple II line. We talked with key Apple people in the education, business, and consumer markets, and we talked with third-party developers. And we came away with some pretty good ideas.

We believe a new 16-bit machine, based on the Western Digital design 65C816 microprocessor, will come from Apple this year. And we believe this computer will be positioned as the small-business machine for Apple. It will be designed to provide an easy upgrade path for current Apple IIe and IIc business users, and support the UniDisk as well as a number of small-business packages, such as BusinessWorks, the accounting system from Manzanita Software Systems, BPI General Ledger from BPI Systems, and SuperCalc3a, a powerful spreadsheet from Computer Associates. A mouse-driven version of AppleWorks, expected by mid-year, would also be a major product for this machine. We believe this new 16-bit machine will eventually support a coprocessor board with the 68000 chip. It will be the machine that finally provides a true upgrade path through the Apple line, and we also believe it will offer some connections with the IBM world.

Well, you've heard much of that before, right? Everyone has been predicting a 16-bit Apple, right? But we believe certain signals from Apple and third-party developers mean that the new system is all but ready and waiting for a decision on an introduction date. Some of the signs from Apple are its insistence that the Apple IIe is an education machine, when it's clear many users are interested in the IIe for business. Apple also insists the IIc is a consumer machine, and it's not interested in promoting its use in small business. Thus a gap in its marketing strategy is beginning to emerge, to allow for the introduction of a small-business machine.

"Hey," you say. "The Macintosh was supposed to be the small-business machine." Well, we believe that's changing, too.

Apple is concerned with the high-end overlapping of the II products and Macintosh. It

doesn't want the marketplace to position two different products in the same niche. So while pitching a company line that keeps the II family dedicated to consumers and educators, the company is positioning the Mac for specialty applications such as desktop publishing, and medium-sized businesses. (The Mac Plus has 1 megabyte of RAM, expandable to 4 megabytes, new, faster 128K ROM, and an additional high-speed peripheral port on the back—hardly the stuff of small business.) Thus again, we see a market niche begin to appear for a dedicated small-business machine.

Some new products from Apple and from third parties seem to lend credence to this hypothesis. Apple introduced the UniDisk 3.5 at \$499. Its price and high capacity lead many to feel it's designed more for business users. Thus we believe the UniDisk is really going to find its market with the next 16-bit machine. But Apple has introduced it now to start those IIe and IIc business users on the drive so that they can move more quickly to the new machine when it becomes available.

We've seen some interesting products from third-party developers, including AST Research, a widely known IBM business-products supplier (why would AST be interested in Apple unless it intended to offer some great new market potential in business?), and have heard of more to come (a 4-megabyte memory-expansion board from Checkmate Technology) that seem designed to push the Apple II user into a new category of machine.

Furthermore, final proof of a new Apple II-oriented business machine comes from Steve Wozniak himself. He left the company and sold his stock last year when it finally became clear to him that the II line, under a management team that included Steve Jobs, would not gain the company support he believed it should have. The "IIx," the 16-bit Apple II project at that time, had been killed, and "the Woz" left. But recently the Woz has once again surfaced on the financial pages—he's reportedly buying back his once-beloved Apple stock. That's the best vote of confidence that big things, of the 16-bit variety, are in store for the Apple II user this year. ■

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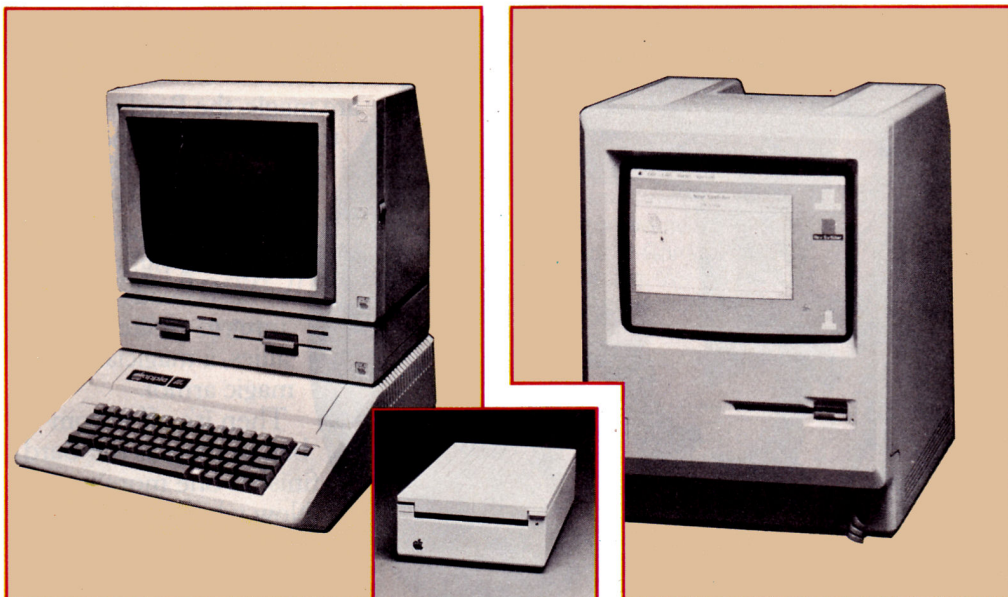


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II LINKS TO MAC



"The third-party community is gearing up to take advantage of media compatibility."

by Deborah de Peyster and Paul Statt,
inCider staff

In January, the Apple II and the Macintosh began sharing a common media format—the 3½-inch, double-sided, 800K disk drive. Now, this isn't earth-shattering news, but we feel it's an important first step for Apple, for it reaffirms Apple's previously stated commitment to develop a more common architecture between its products.

Thus the editors at *inCider* have talked with users, retailers, developers, and industry experts to find out what this first link with the new Macintosh Plus means to the Apple user.

Essentially, it will now be easier to share data and applications between the Apple II and Macintosh families. This will happen, however, only with the support of third-party products. Right now Apple has no software available, nor does it expect to make any software available in the immediate future, that would take advantage of this common media format. But an Apple insider has assured us that the commitment to provide the necessary linking software is there—it will just take time.

Emulating the II

In the meantime, the third-party community is gearing up to take advantage of the media compatibility. We know that Luc Barthelet, the Gallic genius who brought you Mouse Calc and other mouse-driven programs through International Solutions, would like to modify his successful mouse software so that the Apple II user would answer the question, "Are you reading from a ProDOS file or a Mac file?" and let the software work through either operating system. That would be wild.

A number of companies have recently introduced software emulator products that let the Macintosh run Apple II applications. Media compatibility for these developers

is a clear benefit. "The advantages of media compatibility are obvious—you don't have to move data from one disk to another. The data transfer will become much easier when lots of Apple IIs have 3½-inch drives," says Charles Dupin, president of Meacom. Meacom has a product called Mac+II 3.0, which emulates an Apple II with 128K and 80 columns on a Macintosh. Meacom also offers UniDos, an operating system that lets Apple II users put DOS 3.3 programs and data on the UniDisk 3.5.

COMPUTER:applications also has an Apple II emulator product called "II in a Mac," which creator Steve Pierce claims currently runs Apple II applications on the Mac at 35 to 40 percent of speed. The faster ROM chips in the new Macintosh Plus are expected to increase the speed of the emulating software. Other emulators have different features. We don't know of any Mac emulators for the II series—that's a tough obstacle.

A software/hardware product from Abaton Technology will get Apple II software up and running on your Mac—as long as it isn't copy protected and you've written the software yourself. It may be a neat trick for developers at \$1995, but companies like Infocom and Spinnaker have had similar technology for a while and just don't brag about it—or sell it to other developers. We don't know if any end user wants to spend that kind of cash to convert public-domain software.

The Push Toward Compatibility

The ability to share data files between the Macintosh and Apple II is appealing, however, to a number of Apple II users, because it offers greater convenience and an easier upgrade path. "Data compatibility would be exciting and would save me about three hours of work," says Tom

Continued on p. 12

Want More AppleWorks™ Power?

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

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

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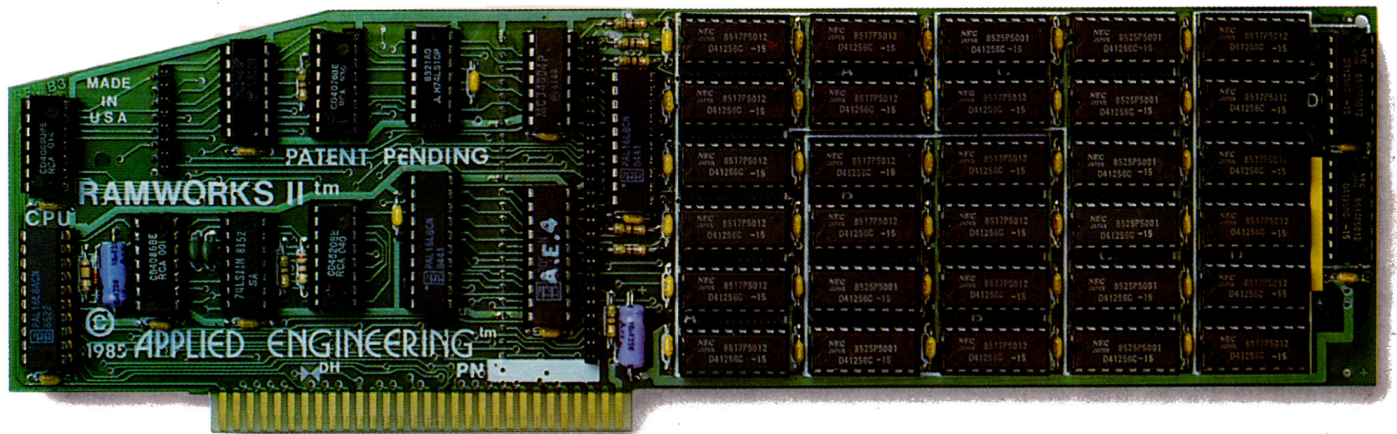
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Maximum Number of Lines in Word Processor	16,300	2250
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Auto Segments Files	YES	NO
Built-in Printer Buffer	YES	NO
Compatible With All Versions of AppleWorks	YES	NO
Displays Time & Date on AppleWorks Screen with Clock	YES	NO
Saves Slots	YES	NO
RGB Option	YES	NO
16 Bit Co-Processor Port	YES	NO
Memory Expansion Port	YES	NO
Patent Pending Power-Saving Circuit	YES	NO
80 Columns Built-in	YES	NO
CP/M RAM Disk	YES	NO
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But AppleWorks has certain internal limits, independent of available memory. Fear not. Only RamWorks II (and the original RamWorks of course) removes those limits. Only RamWorks II increases

the maximum number of records available from 1,350 to over 16 000. Only RamWorks II actually increases the number of lines permitted in the word processing mode. And only RamWorks II features a built-in printer buffer, so you no longer have to wait for your printer to stop before going back to AppleWorks (256K or larger RamWorks II required).

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

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

The Most Friendly, Most Expandable Card Available.

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

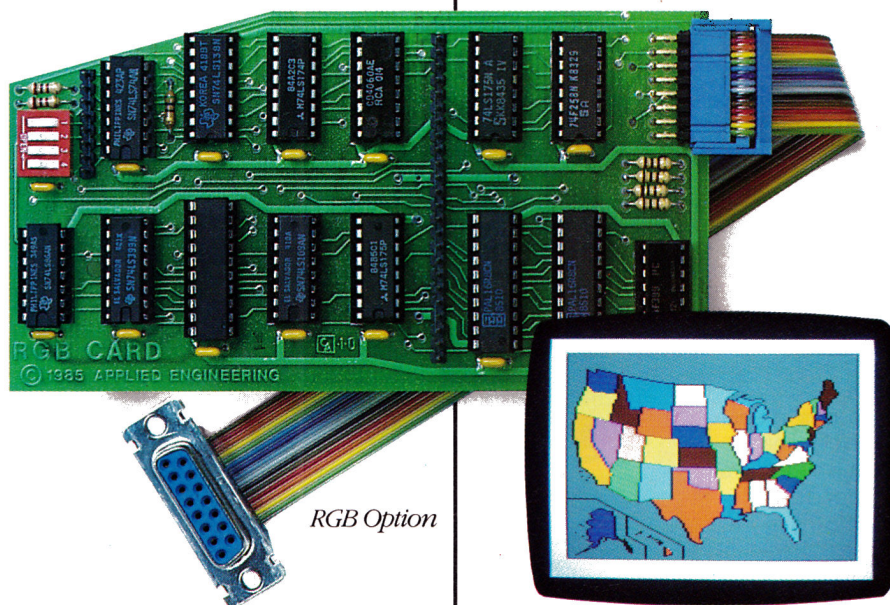
RamWorks II was designed so you could take full advantage of future developments in 16 and 32 bit microprocessors. As your needs grow, so can RamWorks II. A handy coprocessor connector allows the latest and greatest coprocessor cards to access all 3 MEG

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

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

It's In Color

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



RGB Option

the RGB option with your RamWorks II. Or add it on at a later date.

It Corrects Mistakes.

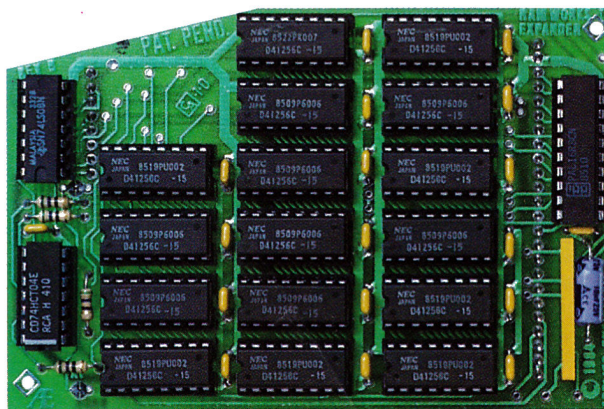
Let's say you bought some other RAM card (and that's a mistake) and your RAM card is not being recognized by AppleWorks, Advanced Visicalc, Flashcalc, Supercalc 3A, or other programs, and you want RamWorks II.

No problem. The memory chips on the card that you now have, which is where most of the money is, can be unplugged and then plugged into the expansion sockets on RamWorks II.

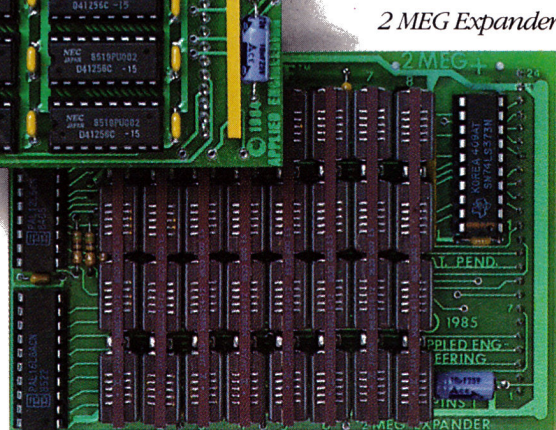
It's Got It All.

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- Super sharp 80 column text (patent pending) with or without RGB option
- Double high resolution graphics (with or without RGB option)
- Expandable up to 1 Meg (1024K) on main board

- Expandable to 3 Meg (3072K) with expander (piggyback) card
- Can use 64K or 256K RAMS in any combination
- Linear addressing coprocessor port
- Automatic AppleWorks expansion up to 2277K desktop
- Accelerates AppleWorks
- Built-in AppleWorks printer buffer
- The only large RAM card that's 100% compatible with all Iie software



512K Expander



2 MEG Expander

- RamDrive™ the ultimate disk emulation software included free
- 16 Bit option
- Compatible RGB option
- Built-in self diagnostics software
- No slot 1 interference
- Lowest power consumption (patent pending)
- Takes only one slot (auxiliary)
- Software industry standard
- Advanced Computer Aided Design
- Used by Apple Computer, Steve Wozniak and virtually all software companies
- Displays date and time on the AppleWorks screen with any PRO-DOS compatible clock
- 5 Year no hassle warranty

RamWorks II with 64K	\$ 179
RamWorks II with 256K	\$ 219
RamWorks II with 512K	\$ 269
RamWorks II with 1 MEG	\$ 389
RamWorks II with 1.5 MEG	\$ 549
RamWorks II with 3 MEG	\$1699
RGB Option (may add later)	\$ 129
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Continued from p. 8

Layton, computing coordinator at South Eugene High School in Eugene, Oregon. "Right now I'm using terminal software to port over to the Mac the stories my students have created on the II. I'd love to be able to do this more easily."

Convenience is important when an office has both an Apple II and a Macintosh under the same roof. At Roger Wagner Publishing, the sales manager uses a Macintosh, while Wagner, developer of MouseWrite, uses an Apple II. "If I want to edit what my salesman does, I have to use his Mac or type it in on my Apple II. If we could put the work on a compatible disk we could each work in our favorite environment and take it from there."

For some, the ability to exchange data files with the Mac means the ability to share Macintosh-oriented peripherals, such as the LaserWriter and higher-quality graphics. "There are certain applications—especially in graphics—where the Mac is clearly the superior machine," notes Tom Wieshaar, who publishes *Open-Apple*, a newsletter for II owners. Some good may come to the desktop publishing industry, "if you want to take Apple Writer files to the local copy shop where they have a Mac and a LaserWriter. But the best way to use a LaserWriter is with Apple Writer directly," he says.

For many users, however, the issue of data compatibility with the Macintosh is uninteresting. "I don't think data compatibility will make any difference to the Apple II user in the public-school system," remarks Dick Rickets, director of Outreach, The International Computer Council on Education, in Eugene, Oregon. "There are very few Macs in the schools and a small overlap between II and Mac owners."

The most interesting products for educators who hope to share Macs and IIs are probably Apple's Instant Pascal and Mac Pascal. Think Technologies developed both. Instant Pascal for the 128K Apple II is not compatible with Apple Pascal, but works just like Mac Pascal—down to the mouse and icon interface. Apple says the Mac belongs in the university, and the II in secondary schools, so these two Pascals link the machines for freshmen who have enough to worry about already. (Look for a review of Instant Pascal in the April 1986 *inCider*.)

A Philosophy of Integration

For many, the most important aspect of the new media link between the Macintosh Plus and the Apple II line is one of philosophy. "Apple has had the commitment for a long time to integrate the II into the Mac world. They don't want to cut off several million people who have invested in the II," observes Jonathan Rotenberg, president of the Boston Computer Society. Actual data compatibility, when it becomes a reality, would be useful only to people with specialized needs, he says.

Apple retailer Carlos Frumm, president of Northbrook Computers in Illinois, agrees that the ability to offer an upgrade path from the II is important. "Compatibility is the only reasonable way of thinking. The 800K drive, if it's common, will be a link, or an upgrade path, from one system to another. It lets me be honest with the [Apple II] customer again. You feel that you haven't left him dangling."

Users have no complaint with data compatibility, but wonder if it's important to the Apple II. "AppleWorks would be great on a Macintosh," dreams Robert Netro of North Canton, Ohio, a member of The AppleWorks User's Group. While he imagines software developers will "jump

into compatibility" over the next year and a half, for the moment his catering business is satisfied with the Apple II, AppleWorks, and just a little push from Applied Engineering.

If no one's jumping at compatibility, some users are pleased with Apple's mindset. "Mac compatibility is something the user community petitioned for at the Apple User's Conference last summer," recalls Dick Hubert, president of A.P.P.L.E. Co-op in Bellevue, Washington. "It looks like Apple is listening, and that marks a change in corporate attitudes. This is a first stab at data compatibility."

While specifics of the future are not clear, the market seems to want better links between machines. At COMPUTER:applications, developer Steve Pierce says he's working on a disk drive—5¼-inch—that will house a coprocessor or two and connect to a CPU through one of four ports—one port for the Apple II, one for the Mac, one for the IBM PC, and maybe one for the Commodore Amiga. Your disk drive will decide which operating system to use. Now that's compatibility. ■

Product Information

Abaton Transform

Abaton Technology
1526 Cloverfield Boulevard
Santa Monica, CA 90404
(818) 905-9399
\$1995

Reader Service Number 324

FirstPort

Desktop Software
244 Wall Street
Princeton, NJ 08540
(609) 924-7111
\$95 (serial connector
for data transfer to Mac from
Apple II or other machines)

Reader Service Number 325

Mac + II 3.0

Meacom
P.O. Box 272591
Houston, TX 77277
(713) 526-5706
\$99.95

Reader Service Number 326

II in a Mac

COMPUTER:applications
13300 Southwest Street Circle
Miami, FL 33186
(305) 385-4277
\$69.95

Reader Service Number 327

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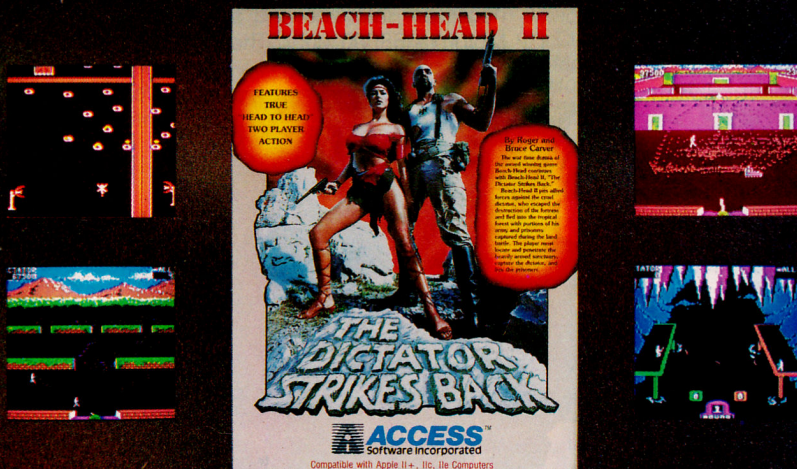
NO GUTS....NO GLORY

Beach-Head and Beach-Head II, the best selling, award winning war game series is now available for the Apple II+, IIc and IIe personal computers. Both feature strategy, Arcade action and incredible three dimensional graphics.

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BEACH-HEAD II - The Dictator's back and more ruthless than ever! If your troops can survive the land assault and rescue the prisoners, you'll face the Dictator in a one-on-one battle of superiority. Beach-Head II is a true "head-to-head" two player game that allows you to play against a friend or the computer!



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NEWS LINE

edited by *inCider* staff

Rockin' at MIDI

Don't worry about dancing in the dark to complicated computer-music software. Computer Sheet Music, from Passport Designs and Hal Leonard Publishing, offers newcomers an easy way to learn keyboard technique. Just follow the bouncing-ball cursor to songs from popular artists such as Bruce Springsteen, Michael Jackson, and Duran Duran.

"Playing along with your favorite song from Duran Duran or the Police is a lot more entertaining than memorizing the same scales over and over again," says Chris Albano, vice president of marketing.

For your Apple IIe, Computer Sheet Music includes a disk with recorded music and music books. You'll

also need a MIDI (Musical Instrument Digital Interface) keyboard and Passport MIDI interface card. With Computer Sheet Music, you can learn at your own pace. Like a game of Follow the Leader, you play the notes after they appear on the monitor.

For more information, contact Passport Designs at 625 Miramontes Street, Half Moon Bay, CA 94019, (415) 726-0280.

Compact Storage

InfoWorld reports that compact-disk read-only memory (CD-ROM) may be available for Apple II owners in 1986. A coprocessor board, developed by Management Resources International, includes the necessary interface and a Motorola 68000 chip. The

system upgrade is expected to cost between \$1495 and \$1995.

Grolier Electronic Publishing in New York has published the *American Academic Encyclopedia* on CD-ROM for the IBM PC using a Phillips disk drive (\$1395 for the package); only the hardware hinders the Apple II version. We saw a makeshift version—spaghetti cables and a retrofitted Sony CD player—of the Apple II encyclopedia on CD-ROM at Comdex in November. Grolier was negotiating with Phillips, Hitachi, and Sony in December, and should ship a product by February. It's a nifty data base with a panoramic purview.

And if you wonder where Gary Kildall of CP/M fame has been hiding lately, it's not the TV. He wrote the Knowledge Retrieval System for Activenture that Grolier used for its American Academic Encyclopedia disk product. Gary was in Las Vegas, too, proclaiming the virtues of CD-ROM.

Mac Look-a-Likes

Macintosh compatibility for the Apple IIe and IIc will be a reality within a year, predicts Tim Bjarin of Creative Strategies in San Jose, California. Creative Strategies is a market research firm that reviews company strategies and analyzes the marketplace. We at *inCider* practice similar skills and feel that Macintosh-like technology in the Apple II line will become the trend. While we won't go so far as to say the Mac and Apple II will be compatible, we will say the trend is to share a similar user interface.

Already we have seen exciting Mac-like software products from International Solutions in Sunnyvale, California, with its Mouse Desk, Mouse Calc, Mouse Word, and Mouse Budget series. And we hear that International has three more Mac-like products on the way—a data-base program, a communications program, and a graphics program. Other developers working in Mac-like environments include Roger Wagner Publishing in San Diego, California, with MouseWrite; Quark in Denver, Colorado, with Catalyst 3.0; and Pinpoint Publishing in Oakland, California, with its desk accessory program called Pinpoint.

And we believe that these products are only the beginning. We know that Apple is working with AppleWorks author Rupert Lissner to produce a new edition of that top-selling program using a mouse, pull-down menus, and other Mac-like features. We expect a wealth of new Mac-like hardware and software will have emerged during "Apple Week"—San Francisco's MacWorld Expo Show, which was expanded to include Apple II exhibits.

One product that should encourage more developers to create in a Mac-like environment is the MouseText Toolkit from Kyan Software in San Francisco. This program, which made its debut at the Fall Comdex show in Las Vegas in November, lets developers add a Macintosh-like user interface to Kyan Pascal programs. The company says MouseText Toolkit easily integrates pull-down menus, windows, and mouse-controlled cursor movements into the Apple II programs.

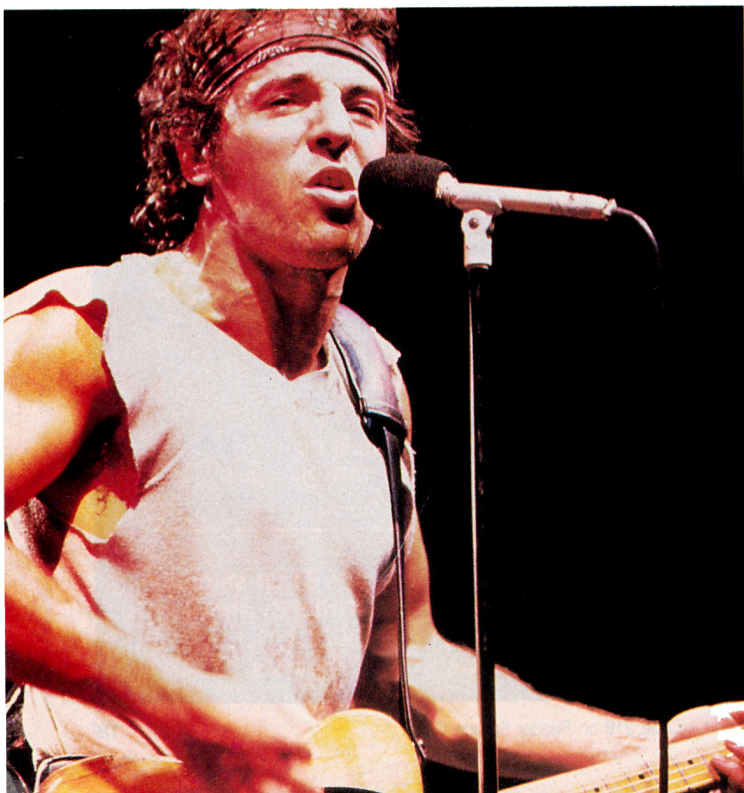


Photo by J. Zerschling, PHOTO RESEARCHERS

II on a Mac

Despite Apple Computer's reluctance in the past to market the II series in the business sector, Paul Cubbage of Dataquest reports that retail software for the Apple II still outsells business software for the Macintosh. The Apple II has 11.6 percent of business-market sales, while the Macintosh has 8.3 percent, he says.

A new product from Computer:Applications, Inc., of Raleigh, North Carolina, is capitalizing on those statistics. It has announced a program called "II in a Mac" (\$49.95), which lets a 512K Mac run Apple II applications. While we at *inCider* have not yet had a chance to review this program, it caught our attention. The company says the II in a Mac package includes communications software for both the Apple II and the Macintosh to make transferring software easy. Users select from either a

serial transfer (using the standard RS-232 ImageWriter cable) to receive complete Apple II disks, or a modem transfer to receive files individually by phone. As soon as we get our hands on this program, which was scheduled for release January 2, we'll let you know more.

Apple II to Replace IBM PC?

"The Apple II/e will replace the IBM PC as the entry-level business machine," boldly predicts Ash Jain, who runs the Apple Products Group at AST Research in Irvine, California. Ash should know: AST is a major supplier of add-ins and add-ons to the Big Blue market, and last year jumped into the Apple II with its MicroStor hard disk, Multi I/O multifunction card, and, most recently, Mega-RamPlus and SprintDisk memory-expansion boards. Ash isn't troubled by the incompatibilities between the



Photo by COMSTOCK, INC./TOM GRILL

Apple II RAM Expansion Card and Applied Engineering's *de facto* standard, RamWorks. "We have one for each standard," Jain says: the SprintDisk, which uses Apple bank-switching magic, and the Mega-RamPlus, which works like RamWorks. AST can be smug—whatever happens. "We mean business," smiles Jain. "The II now has all the memory and speed of the IBM PC, and it's cheaper." We like his confidence—and wonder what Ash knows about the future II that we don't.

Story Hour

Everyone has a story to tell—and if you're a fourth- to ninth-grade student, Scholastic and Apple Computer can make it worth your while with the Second

Annual National Story Tree Writing Contest. Winning authors will receive Apple II/c computers for themselves and their schools.

Story Tree is Scholastic's interactive creative-writing program for the Apple II, Commodore 64, and IBM PC and PCjr. Contestants have until April 30, 1986, to submit their stories. There are two divisions: elementary (grades 4 to 6) and junior high (grades 7 to 9). One grand prize and ten honorable mentions (\$100 worth of Scholastic Software programs) will be awarded in each division.

For more information, write to Scholastic Software, Story Tree Contest, Dept. WW, 730 Broadway, New York, NY 10003. Winners will be announced in May.

Please send Apple-related news items and press photographs to News Line, inCider, Suite C-200, 1060 Marsh Road, Menlo Park, CA 94025.

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February 7-8 MISSOURI COMPUTER- USING EDUCATORS

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contact:
Douglas R. May
Conference Coordinator
University of Missouri-
Columbia
101 Hill Hall
Columbia, MO 65211
(314) 882-7831

February 12-14 THE ROLE OF THE COMPUTER IN EDUCATION VI

Arlington Heights, IL
contact:
Rick Nelson
Micro-Ideas
2701 Central Road
Glenview, IL 60025
(312) 998-5065

February 18, 20 DIAL-UP COMMUNICATIONS

Washington, DC
Atlanta, GA
contact:
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Microcom
1400A Providence Highway
Norwood, MA 02062
(617) 762-9310

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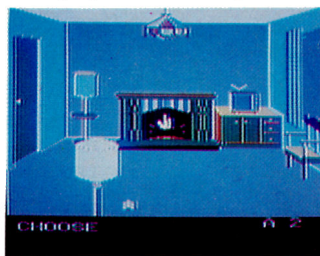
THE X-10 POWERHOUSE INTERFACES WITH YOUR APPLE TO CONTROL YOUR HOME...FOR SECURITY, COMFORT AND ENERGY SAVINGS.

This remarkable Interface lets you run your home through your Apple IIe or IIc and a mouse, keyboard or joystick.

When you're away, it makes your home look and sound lived in. When you're home, it can turn off the TV at night and wake you up to stereo and fresh brewed coffee in the morning. It can even turn on your air conditioner and control your heating.

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You simply pick a room from the display screen. Use your mouse, joystick or keyboard to position graphics of lights or appliances. Then follow on-screen instructions to program any light or appliance to go on or off whenever you choose. You can even control thermostats, light intensity and more.



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EXPLORING A UNIVERSE OF APPLE PRODUCTS



When Halley's Comet came into view this year, eyes turned toward the heavens, and the unlimited potential of the universe was once again discovered. We chose a theme of unlimited potential for the February issue of *inCider* and decided to explore the universe of products available for the Apple II in a three-part feature. In exploring the wide range of products for the Apple II, we grouped them into three categories: astrology software that helps you discover outer space, science software that helps you discover more about the space around you, and, finally, multifunction I/O boards that explore the space within the Apple II. Our explorations have only just begun in this issue. We will continue to probe the never-ending universe of Apple products throughout the year, because the range of Apple II products, like the universe, is limited only by how far one is willing to push his or her imagination, creativity, and skills.

We hope the special "Universe of Apple Products" issue of *inCider* will expand your horizons and help you learn more about yourself and the world around you by using your Apple II. Our goal here at *inCider* is to bring you information that makes your Apple II more useful and keeps it working as a tool through which you can continue to explore the world around you in business, education, and personal productivity. ■



JOURNEY THROUGH THE STARS

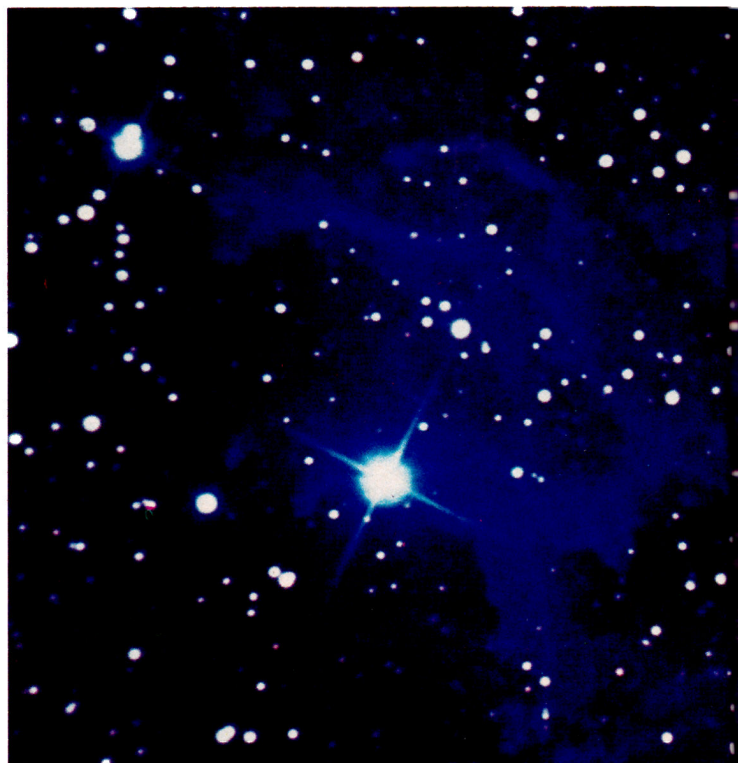
*Stargazers peering into the night sky this year
searching for Halley's Comet
may find much more to explore than ever expected.
Let our collection of astronomy software
guide you through the heavens.*

by Bob Ryan, *inCider* staff

About 15,000 years ago, while the earth was still in the throes of the last ice age, Comet Halley was nudged out of the orbit it had followed since the formation of the solar system, and into the path that brings it into the neighborhood of the sun once every 76 years. The earliest reference to this celestial body comes from a Chinese astronomer who observed a bright comet in 239 B.C. It wasn't until Edmund Halley foretold the comet's 1759 return, however, that people realized that comets, like planets, orbit the sun in a predictable fashion.

The current reappearance of Comet Halley is the 30th in recorded history. For most people, searching for the comet in the spring sky will be a first attempt at celestial observation. Many of these folks will undoubtedly become enthusiastic converts to amateur astronomy. If you're one of them, you should be aware of the many personal-computer products available to the nonprofessional astronomer.

Generally, astronomy packages for the Apple II fall into two categories: learning aids and utilities. The former teach you about the night sky and help you find specific celestial objects. This group includes most of the Halley-finder programs and star-atlas software. While a map of the heavens on disk is no

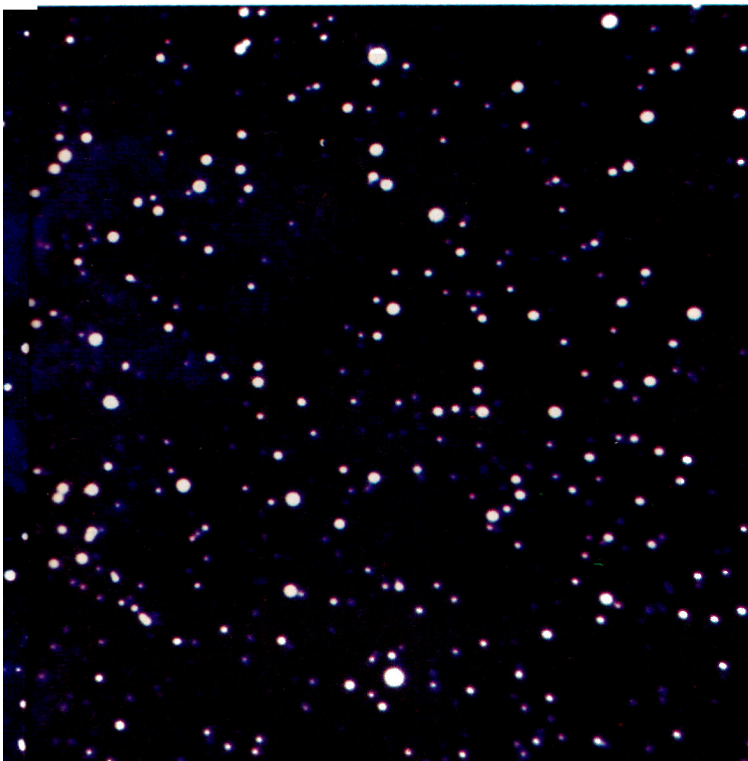


substitute for the *Sky Catalog 2000.0* (at least not yet), such software is a good introduction to the often confusing concepts of declination, right ascension, and the celestial sphere.

Astronomy utilities are of interest to more serious stargazers. With these types of programs, you can perform a variety of "hard-core" astronomical functions, such as calculating the positions of celestial objects like the moon and planets that constantly travel against the background of the stars.

The most interesting (and most expensive) astronomy product I found for the Apple II is a \$1400 hardware/software system that intensifies the images you get with your telescope and digitizes them for viewing and analysis with your Apple II. Working best with rich-field telescopes (those with greater light-gathering capability, f/6 and below), Astro-Link's Complete Starlight Acquisition System brings professional astronomical tools to the knowledgeable amateur.

In the following pages, *inCider* presents a review of The Halley Project, an educational game that's an enjoyable initiation into the study of the solar system, and a listing of selected astronomy products for your computer. Let your Apple be your guide to the wonders of the night sky. ■



Product Information

Astronomy: Stars for All Seasons

Educational Activities
1937 Grand Avenue
Baldwin, NY 11510
(516) 223-4666
\$59.95
Plots 34 constellations for young astronomers (grades 5-12)

Reader Service Number 314

Astro Series and CometWatch

Zephyr Services
306 South Homewood Drive
Pittsburgh, PA 15208
(412) 247-5915
\$31.95 each
Astroid offers conversions for serious astronomers; Astro-base aids in discovering deep-sky objects; Astrocalc computes data for sun, moon, and planets; Astrostell locates 88 constellations; CometWatch helps find Halley's Comet only.

Reader Service Number 315

Celestial Basic and Halley's Comet

S&T Software Service
13361 Frati Lane
Sebastopol, CA 95472
\$49.95 for both
Useful to serious astronomers

Reader Service Number 316

Constellations, Astro Conversions, Sunrise, Phases, and Planet Show

Ron Dawes
882 Chestnut Circle
Wright-Patterson AFB
Dayton, OH 45433
\$1 and a 5½-inch disk
Public-domain software for fledgling astronomers

Denver Astronomical Society
(303) 455-3113
24-hour bulletin-board system for astronomers; for a trial run, type SKY and TELESCOPE as names, and DASBBS as the password.

Eclipse Map, Planetarium, and World Map

Charles Kluepfel
11 George Street
Bloomfield, NJ 07003
\$30 each
Eclipse Map spots solar eclipses; Planetarium displays the whole sky; World Map plots the sun and moon over the planet.

Reader Service Number 317



Electronic News Service of Sky and Telescope

CompuServe Information Service
5000 Arlington Centre Boulevard
Columbus, OH 43220
(614) 457-8650
Offers a variety of information, including downloads from *Sky and Telescope's* Astronomical Calculations; type GO:ACCESS and REA NEWS.DAT[70275,125].

HALSYS1: A Complete Starlight Acquisition System

Astro-Link
P.O. Box 1978
Spring Valley, CA 92077
(619) 698-9174
\$1400 postpaid
Includes digitizer, black-and-white video camera, starlight image intensifier, adapters and interfaces (components also available separately)

Reader Service Number 318

Continued.



The Halley Project

Every 76 years, a massive chunk of ice, gas, and dust known as Halley's Comet passes by our sun. The solar wind excites the molecules of this iceball and makes them glow and trail off in a strikingly attractive luminous tail.

And every 76 years, people go crazy over this cosmic display. Depending on what era you're living in, observers may sacrifice unpopular members of the community to make the apparition go away, invade England, prepare for the end of the world, or write computer programs to commemorate the event. This brings us to Tom Snyder Productions' appropriately titled simulation, *The Halley Project*.

In this adventure, you're a fledgling spaceship pilot training to become a member of the supersecret Halley Project—an unspecified mission involving Halley's Comet. To qualify for the mission, you must complete ten training voyages, each more difficult than the last.

In the first mission, you pilot your spaceship from Halley's Comet, where the training base is located, to Earth and back. In the process, you'll discover that the solar system this program simulates is very tricky to navigate.

Subsequent orders may ask you to voyage to a planet "without a moon" or a "satellite with an atmosphere." Since this is educational software designed in the Snyder style, you'll probably have to get up from the keyboard and go to the bookshelf, perhaps even as far as the library, to find out which bodies in the solar system are your mission objectives. Once you've figured out the puzzle in your orders, your troubles begin in earnest.

The Right Stuff

First, locate your goal on the radar screen, which will show your position relative to the nine planets in the solar system (moons aren't shown, but Halley's Comet is). You have to find the planet to which you're traveling against a background of the constellations of the zodiac. The plane of the planets' orbits passes through the constellations, to give you some constant landmarks that will help you locate planets more precisely.

Indoor Astronomer

Astro-Link
\$59.95
Catalogs 6000 stars and 2000 deep-sky objects (Comet Path Finder, Messier Catalog, and more also available)

Reader Service Number 319

The Observatory

LightSpeed
2124 Kittredge Street
Berkeley, CA 94704
(415) 486-1165
\$49.95
Provides sky map with magnification up to 512x (see *inCider's* review, May 1985, p. 90)

Reader Service Number 320

Sky and Telescope

Sky Publishing
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(617) 864-7360
\$20 per year
Publishes a monthly column called *Astronomical Computing*

Starchart

Visionary Software
P.O. Box 1063
Midland, MI 48641
(517) 835-9025
\$44.95
Finds stars, nebulae, and other stellar objects

Reader Service Number 321

Star Finder

Earl Enterprises
440 Harrell Drive
Spartanburg, SC 29302
(803) 579-1305
\$44.95
Displays 46 stars and 88 constellations

Reader Service Number 322

TellStar 1.03

Spectrum Holobyte
1050 Walnut Street
Boulder, CO 80302
(303) 443-0191
\$79.95 (Northern and Southern Hemispheres)
\$49.95 (Northern Hemisphere only)
Special Halley version

Reader Service Number 323

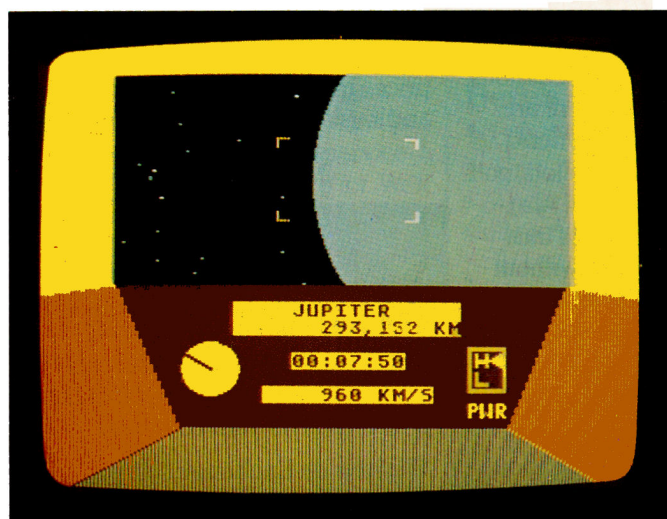
The game includes a hyperdrive mode, so you can make it to your objective in seconds. After watching the radar screen to get an idea of the distance, push the spacecraft speed to 300,000 kilometers per second and enter hyperspace. A display ticks off the tens of millions of miles. Press any key when the mileage approaches the desired distance and you'll stop—hopefully not too far from your goal.

Now you must consider your descent. A headlong rush straight toward the planet, an orbiting object, is not advised—it will move out of your path with surprising speed. (That's because it's traveling along a curve while you're moving in a straight line.) The trick is to approach it at a moderate speed, at the right angle, and to hit the brakes about 100,000 kilometers out. From there, you can settle into orbit.

Once in orbit, you've got the game under control. On most planets and satellites, you must land in a very limited area to complete the mission. When the landing-site indicator flashes on screen, a single keystroke starts an automatic descent sequence. Shortly after landing, you'll lift off and return to the base on Halley's Comet.

Entertainment Plus Education

The Halley Project is a subtly fascinating adventure—and as a technical achievement, it's second to none. It's



Find the comet and complete *The Halley Project*.

not as dazzling as Sublogic's Flight Simulator II, but it does grow on you. Consider the sophistication of a program that keeps track of the paths of nine planets and their families of moons in real time, and simulates the variables that determine their gravities and orbits.

It also succeeds as entertainment. Playing against the clock, you learn how to catch up with and orbit a planet without any coaching or hints from the documentation. You must acquire a feel for flying in the solar system—a reasonably tough challenge.

The documentation is quite effective. It explains as much of the game as possible, without compromising its educational value or the challenge of play. Supporting materials go some way (à la Infocom) toward creating an illusion of reality that gives this simulation even more impact.

Of course, the final question is whether or not this educational game actually teaches—and it does. Beyond exploiting our curiosity about this fascinating comet, The Halley Project harnesses one of the most effective motives for learning—the desire to excel in a game. For students and newcomers to astronomy, success in The Halley Project means hitting the books and looking up such data as planetary and lunar sizes, orbits, gravities, atmospheres, and so on.

All in all, The Halley Project is a most enjoyable way to acquire a working knowledge of the universe. ■

Brian J. Murphy
Fairfield, CT

Mindscape

3444 Dundee Road
Northbrook, IL 60062
Educational simulation
Any 48K Apple II
Joystick optional
\$44.95

Ratings*

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

*Highest rating is four stars



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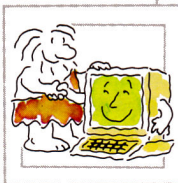
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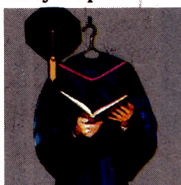
Worldwide Exchange sets you up with the perfect yacht, condo, villa, or whatever it takes to make your next vacation *a vacation*.

A to Z Travel/News Service provides the latest travel news plus complete information on over 20,000 hotels worldwide.



MAKE PHI BETA KAPPA

Grolier's Academic American Encyclopedia's Electronic Edition delivers a complete set of encyclopedias right to your living room just in time for today's homework. It's continuously updated ... and doesn't take an inch of extra shelf space.



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

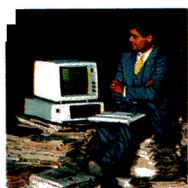
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Healthnet will never replace a real, live doctor—but it is an excellent and readily available source of health and medical information for the public.

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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.

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THE SCIENTIFIC APPLE

*If improving your aerobic conditioning,
simulating a lab experiment,
or teaching your child the basic body systems
sparks your interest, get ready to enjoy
these seven science programs.*

by Cynthia E. Field



Does your stomach flip-flop at the thought of dissecting things that—if only out of respect—should have been buried long ago? Does mention of the word “chemistry” send chills up and down your spine?

Come to think of it, those visceral responses probably remind you a lot of the way you felt when you brought your Apple home. You can smile now as you recall your first encounter with a grinding, thrashing disk drive.

If you're chuckling as you read this, you are indeed a scientist—your desire for new experiences and knowledge overshadows your fear.

The seven science packages I'll examine (see the accompanying **Table**) have been carefully designed to mimic actual laboratory conditions. Two of the programs teach human anatomy the rubber-gloveless way. Another simulates the outcome of chemistry experiments—without the danger or the mess.

Four packages include hardware components that attach easily to your Apple. One program is perfect for monitoring your aerobic fitness. Two packages are so ripe for creative applications that it wouldn't be surprising if they became integral parts of many school science-fair exhibits. Still another release is sophisticated enough to be a first-rate addition to any high-school or community-college chemistry lab.

In short, whatever your level of scientific expertise, at least one of the following packages will bring out the imaginative discoverer in you.

The Body in Focus

The Body in Focus provides a nonthreatening introduction to the body's basic structural units and, therefore, should appeal to youngsters in the middle and junior-high-school grades.

Packaged with the program is an EasyKey keyboard overlay. Somewhat ill-fitting, though serviceable, this vinyl cover has color-coded program options printed on it. To see how a sneeze occurs, for example, you simply press the key marked Sneeze on the overlay. Because you can easily execute choices, you spend more time learning the program's substance instead of wending your way through menus.

The electronic cadaver splayed across the screen is no ordinary corpse. This sexless body (the reproductive system isn't taught) gets goose bumps, flexes muscles, digests food, and performs other functions through the magic of animated color graphics.

In the Body Close-ups module, the computer gives

The Body in Focus keyboard overlay.

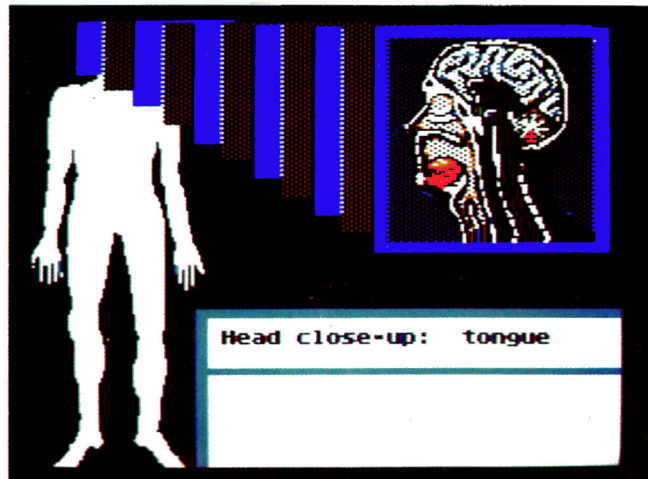


you a CAT-scan view of the head or torso. To slice off the layers of tissue composing the torso—first the muscles, then the bones, then the organs (from superficial ones like the lungs to deeper ones like the kidneys), for example—you press the reveal key. After you've brought the seven layers into focus, you can replace them one by one with the conceal key.

A Body I.Q. test quizzes you about your newly acquired knowledge of human structure and function. To answer some questions accurately, you must locate the appropriate organ on the screen; to score on others, you select from multiple-choice answers. A correct response is worth five points on your first try, two points on your second. Twenty questions from a collection of more than 200 compose each quiz.

Overall, The Body in Focus portrays anatomical structures accurately, and the program, though

You move in on the head and focus on the tongue.



superficial, presents factual material clearly and precisely. The language used to relay these facts, however, is stilted, lacking a polished style. The word "the," for example, is frequently omitted—as in "Skull is composed of bones" or "Blood leaves brain for heart." The overall impression is that the textual parts of the program were written in a much too hurried fashion.

The Body Transparent

While younger students will enjoy *The Body in Focus*, older ones will appreciate the breadth and flexibility *The Body Transparent* offers. DesignWare's release treats the subject of human anatomy in a more scholarly, though not stuffy, fashion, making this software a worthwhile adjunct to a high-school or introductory college biology course.

The program disk includes three learning activities. The first, *Body Assembly*, could easily be renamed *Body Construction Set*, since you can build a skeleton by moving the randomly presented bones to their appropriate locations, with the keyboard, a joystick, or a mouse. You will have to be quite astute to position the right ulna in the right forearm and the left fibula in the left lower leg.

As an alternative, you can build a female or male body—internally at least. For some strange reason, the male body lacks a penis and testes while the female body is complete with uterus and ovaries, even though DesignWare claims the product is anatomically correct.

Both options let you choose either an easy level, which names the body parts, or a difficult level, in which names don't appear. When you have com-

pleted the body, the program lists the bones or organs you misplaced.

The second module on the program disk, *Body Facts & Functions*, presents you with a deeper, factual description of the bones, systems, functions, parts of organs, diseases, and body parts. After reviewing the facts, you can receive a piece of information to help you point to the area of the body described.

Selecting the *Parts* option, you discover that organs like the stomach are actually composed of subcomponents. Here, happily, the males are not eunuchs. The *Diseases* section teaches you about conditions, such as stroke and emphysema, that are likely to affect you or someone you know.

The third section, *Make Your Own Anatomy Game*, lets you type in and save your own set of facts and accompanying body locations. You can then play tailor-made games as in *Body Facts & Functions*.

The Body Transparent is fairly well detailed in its representations of bones and organs. Some bones are starkly drawn, however. The clavicle, for example, is drawn as a straight line, not as its characteristic S-shape. Also, the program misleadingly shows the whole hand as "carpals," the bones that make up only the wrist. Other than the manual's erroneous spelling of phalanges on page 26, *The Body Transparent* presents material correctly.

Chem Lab

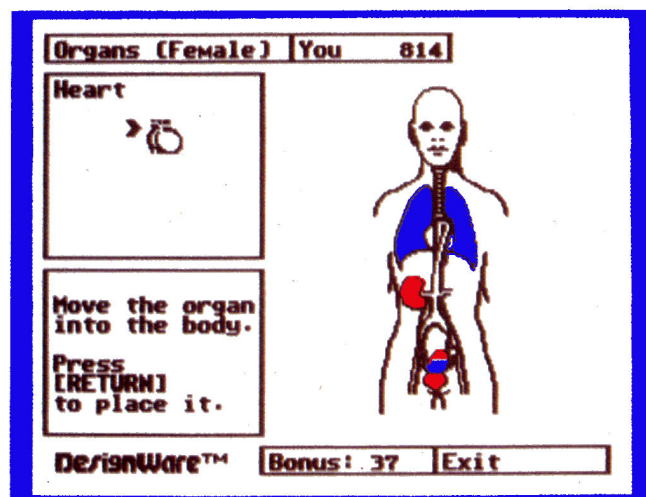
Simon & Schuster claims its program is "a great way for kids to learn about chemistry." Unfortunately, *Chem Lab* represents a good idea gone seriously wrong. Instead of providing a sound approach to the study of chemistry, the program encourages a hit-or-miss, anything-goes attitude that an actual science lab would quickly extinguish.

You can electronically perform *Chem Lab*'s 50 experiments. Written up as cutesy scenarios, the exercises are sometimes more absurd than clever: "Take a pinch of powdered baseball, add a spritz of supernova juice. . ." experiment 1's (*Drink Me*) instruction begins.

The objectives of other experiments are more realistic. Some, however, are imbued with dangerous—even fatal—ideas. Experiment 8 is entitled *Drink Up!*, the idea being to make water. But, the raw materials include mercury, a highly toxic liquid (not a solid as the experiment wrongly instructs).

Although the manual warns new chemists not to experiment with real chemicals, this may be more the publisher's disclaimer than a serious safety alert. In fact, the program encourages you to "take a

The Body Transparent—the heart's in the right place.



"SwiftCard™ is an incredible addition to my Apple® IIe."

Steve Wozniak,
Apple IIe user

This new \$89.95 plug-in card gives you an amazingly easy, blindingly fast way to write, file, communicate and calculate.

You've never seen an Apple IIe do word processing, filing, communicating and calculating the way it does with a SwiftCard.

Steve Wozniak calls it revolutionary, adding "If I had thought of the SwiftCard while creating the Apple II, I would have built it in." Fomenting revolutions comes naturally to SwiftCard inventor Jef Raskin, whose previous efforts to make computers simple and useful include creating the Macintosh™ project at Apple.



SwiftCard creator Jef Raskin and
Apple IIe creator Steve Wozniak

SwiftCard transforms the Apple IIe into the computer it ought to be.

The SwiftCard creates a 40K-byte working space, or "universe," capable of holding about 20 pages of single-spaced text. The universe accepts whatever you put in — text, numbers and data, in any form you choose, without you having to switch programs or modes.

Throughout your workday, you can enter information into the universe in free form: a report, names and addresses, daily to-do list, new telephone numbers, client list — anything you're working on.

A universe resides in memory while you are using it, and when you are done you save it to a disk. An unlimited number of universes can be created, each kept on a separate disk.

The secret to working in a SwiftCard universe is the patent-pending cursor. It works faster than control keys or a mouse, and doesn't make you take your hands off the keyboard.

SwiftCard is a better solution to your day in, day out word processing and data management needs. It is faster, easier and more useful.

How much faster is SwiftCard?

From a power-off start, SwiftCard loads a universe and displays exactly where you were last working in just six seconds, automatically, with no commands.

SwiftCard finds and displays any piece of information in your universe in less than 300 milliseconds.

SwiftCard saves an entire universe to a disk in just eight seconds, including automatic formatting if necessary.

How much easier is SwiftCard?

For all it does, SwiftCard uses only seven commands. And each is available immediately by pressing a single key once.

To start using SwiftCard, simply plug the card into Slot 3 (which most other cards can't use), turn the Apple IIe power on, wait six seconds and begin typing.

To use an Apple program, just load it in; SwiftCard turns itself off and won't interfere.

How much more does SwiftCard do?

SwiftCard communicates with data services without you having to learn their editors, and lets you directly edit information you bring in without special commands or file transfers.

SwiftCard is great with numbers, performing calculations — including scientific work — anywhere in your universe.

Using the SwiftCard-ProDos utility disk, which is included, you can transfer information developed in SwiftCard to other programs, and vice versa.

SwiftCard is not a spreadsheet, nor will it do everything for everybody. But no other system delivers the common sense utility of SwiftCard.

Of course, SwiftCard comes with a complete manual and an on-screen tutorial.

Try SwiftCard for 30 days.

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Computer system requirements

Apple IIe, regular or extended 80-column card, 80-column monitor, one disk drive with controller. For communications: 300 or 1200 baud modems and Super Serial card. To transfer data between SwiftCard and Apple programs with ProDos utility: extended 80-column card or two drives. To print: any Apple, Brother, C.Itoh, Centronics, Epson, HP, NEC, Okidata, Panasonic, Qume, Star, Toshiba and most other printers.

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Information Appliance Inc.

chance. Mess around." And, the manual exclaims that there are "thousands of chemical reactions that explode, boil over and go crazy when you least expect it." Pretty exciting! Pretty irresponsible pedagogy.

You "mess around" in The Main Lab by using two on-screen robot arms. One dispenses liquids, collects solids and gases, and stoppers flasks. The other is a "go-fer"; it gathers beakers, condensers, and other glassware from the equipment stockroom. Once you mix chemicals, you can heat or superheat them under pressure.

At the end of the hardcover manual you'll find blank Chem Lab Notebook forms. There are only 13 forms, and these are secured by the book's binding, giving you the impression that keeping data is not a top priority. After all, the program was "designed to be fun."

The manual supplies formulas for the chemicals used in the program, as well as a Periodic Chart—again in the back of the book—and a good explanation of what chemistry is all about appears in

Chem Lab presents an array of lab instruments.

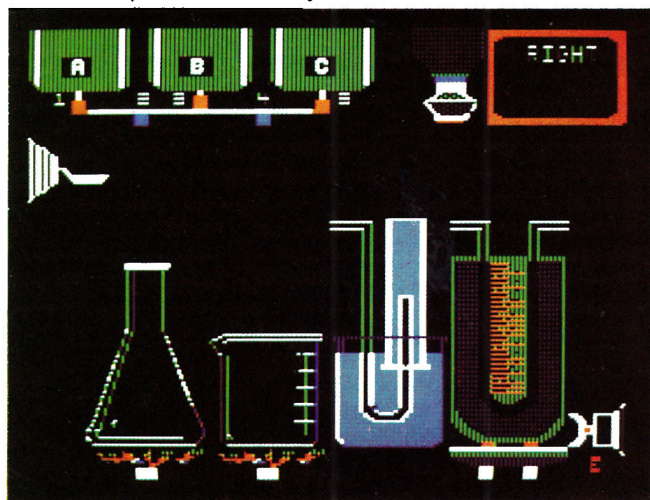


Table. Comparison chart for seven science-lab software packages.

Product	Manufacturer	Price	System	Memory
The Body in Focus	CBS Software	\$39.95	II Plus, //e, //c	48K
The Body Transparent	DesignWare	\$44.95	II Plus, //e, //c	48K
Cardiovascular Fitness Lab	HRM Software	\$165	II Plus, //e	48K
Chem Lab	Simon & Schuster	\$39.95	II Plus, //e, //c	64K
Experiments in Chemistry	HRM Software	\$335	II Plus, //e, //c	48K
Science Toolkit: Master Module	Broderbund Software	\$59.95	II Plus, //e, //c	64K
Temperature Lab*	Hayden Software	\$99.95	II Plus, //e, //c	64K

*Hayden now offers a second unit in the Science Discovery Series: the Light Lab. This program uses the same interface box, and includes a light probe and light meter. It sells for \$49.95.

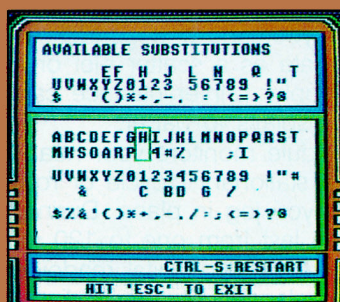
Product Ratings*	Ease of learning	Ease of use	Documentation	Support	Overall
The Body in Focus	★★★★	★★★★	★★★	★★★	★★
The Body Transparent	★★★	★★★	★★★	★★★	★★★
Cardiovascular Fitness Lab	★★★★	★★★★	★★★★	★★★★	★★★★
Chem Lab	★★★	★★★	★★	★★	★
Experiments in Chemistry	★★★	★★★	★★★★	★★★★	★★★
Science Toolkit: Master Module	★★★★	★★★★	★★★	★★	★★★
Temperature Lab	★★★	★★★★	★★★★	★★★★	★★★★

*Highest rating is four stars

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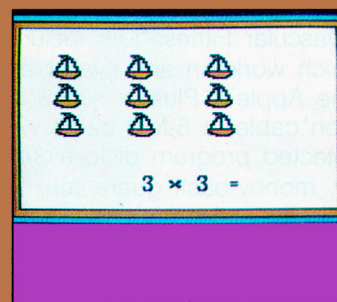
Ages 8-adult



Stickybear® BASIC

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Ages 9 & up



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Ages 7-10

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Middletown, CT 06457

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the "Chemistry Is Everywhere" chapter. The program, however, provides no guidance for writing and balancing chemical equations or for understanding the principles that serve as foundations for basic chemical knowledge.

Would-be female chemists may feel discriminated against since the program is slanted in favor of boys. The cover photo features a fairly disheveled boy wonder, complete with lab coat, safety glasses, and glazed look. Also, experiment 23 (I Do, I Do) reads: "You popped the big question, and your lady said yes."

As a simulation of real laboratory conditions, Chem Lab has realistic chemicals, equipment, and experiments. What's missing is the proper treatment of chemical principles—not to mention proper respect for the chemicals themselves.

Cardiovascular Fitness Lab

If you're a preppie—or better yet, a yuppie—you'll love Cardiovascular Fitness Lab. With this hardware/software combination you'll be able to pioneer a novel application: aerobic computing!

The Cardiovascular Fitness Lab includes an interface card (which works in any available slot, except slot zero in the Apple II Plus or slot 3 in the IIe), a 6-foot extension cable, a 5-foot cable with pulse sensor, an unprotected program disk, a 34-page guide, and a 30-day, money-back guarantee.

The pinch-clip-like pulse sensor is actually a light-emitting, light-sensing device. You clip the sensor to your ear lobe or finger, where blood flows close to the surface of the skin. Light is emitted from one

The pulse is steady, but she's only been pedaling nine seconds.



side of the clip and transmitted through the ear lobe (or finger).

The light sensor on the other side of the clip monitors the transmitted light. With every pulse, the blood flow surges momentarily, interfering with the amount of light that passes through the flesh. This enables the sensor to measure your pulse rate and send these data directly to the Apple's memory.

The program offers two approaches: experimental and training. You can carry out the experiments written in the manual (studying the effects of exercise, common drugs like caffeine and nicotine, biofeedback, fear, and meditation), or you can design your own investigations.

For those beginning a fitness program, the experiment involving the Kasch Pulse Recovery Test is quite revealing. You step up and down a stool (or a ladder with a rung about 1 foot from the floor) continuously for three minutes at the rate of 24 full steps per minute. Then, you attach the probe to your ear lobe and let the software measure your pulse for the next full minute. Using the table provided in the manual, you can determine your fitness level, adjusted for your age and gender. The software graphs the data as a scatter plot or histogram. If you have a Grappler printer-interface card, you can dump these displays to paper.

The Training module monitors your heart rate as you exercise on a stationary bicycle or rowing machine, or even as you jog in place. During each session, which can last from one to 120 minutes, the computer screen shows digital readouts for your heart rate and the elapsed time, and diagrams your training zone. A rising and falling red heart, complete with audio lub-dup, graphically shows how well you're doing. At the session's end, the program tells you what percentage of the time you were within your training range.

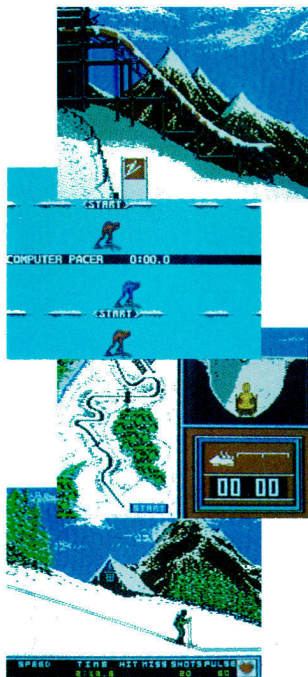
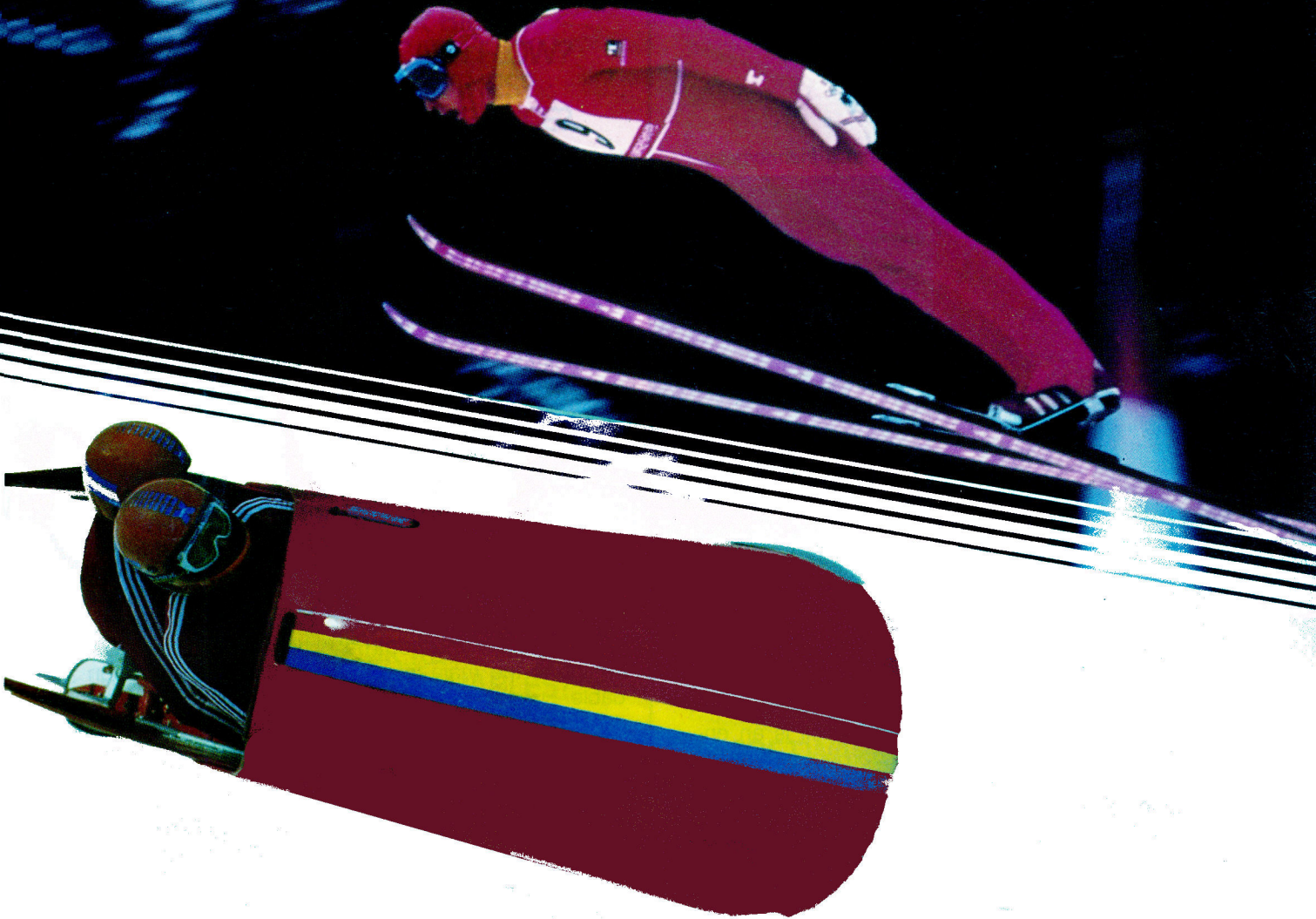
This quality package is a fine selection for your school, your fitness center, or your home.

Temperature Lab

Temperature Lab, the first release in Hayden's Science Discovery Series, is an impressive and carefully designed package. Your relatively small dollar investment can result in hours of creative enjoyment.

The package includes an Apple II external interface. A 4-foot-long cable with connector joins this sturdy, plastic box to the joystick port on the rear of the IIe or IIc. An adapter for the II or II Plus is available for \$10. Besides being an integral part of the Temperature Lab program, the box serves as an interface for future releases in the Science Discovery Series.

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Temperature Lab turns your Apple II into a thermometer.



The temperature-measuring device itself is an en-sheathed and unbreakable plastic probe secured to one end of a 2½-foot-long cable. At the other end of the cable, a phono-type jack plugs into the interface box. For \$15, you can purchase a second probe for measuring dual temperatures.

The noncopy-protected software is easy to use since everything is menu-driven—whether you're calibrating the temperature probe or setting up the parameters for your first experiment. Also, you can instantaneously shift from the Fahrenheit to Celsius temperature scale.

The screen concurrently displays the progress of temperature versus time experiments in colorful graphics form. You can easily print these graphs with an Apple ImageWriter; an Epson RX-, FX-, MX-, or JX-series printer; or any other printer using a Grappler or Grappler+ interface card.

The Temperature Lab software rates an excellent, but the Temperature Lab manual rates a superb. It's entertaining, thorough, accurate, precise, and well organized. The "Temperature and Its Measurement" chapter is unparalleled for clarity and simplicity. Even the most hard-nosed science teacher should admire its completeness.

The manual contains many challenging experiments you can perform using ordinary household supplies, and encourages and teaches you how to record data and print graphs using xerographic copies of the notebook pages printed in the back of the manual.

With Temperature Lab, you should have little

trouble designing, carrying out, and explaining the ramifications of your upcoming school science-fair project. The manual offers a generous sprinkling of suggested readings to get your creative juices flowing.

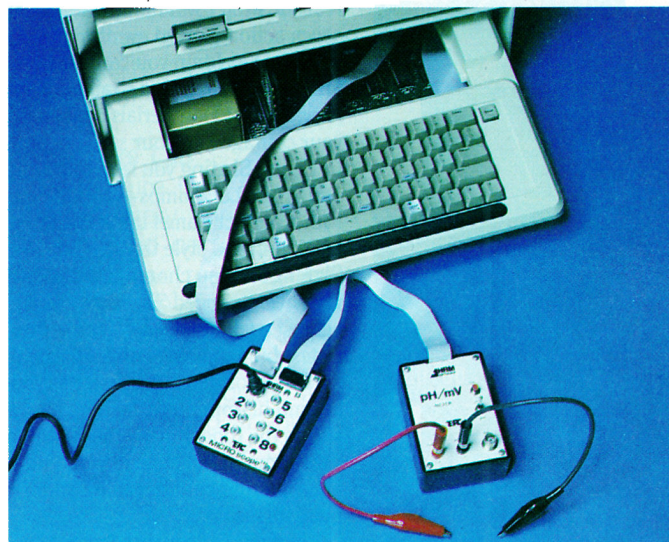
Experiments in Chemistry

Experiments in Chemistry is in a class by itself. This package is about as close as you can get to a computerized science laboratory. Yet, it's this sophistication that prevents the program from being useful to the average Apple user or to the average Apple-using school.

An impressive package, Experiments in Chemistry contains, besides the unprotected program disk, a *Teaching Guide*, a main interface box, a pH/mV meter, assorted cables, alligator clips, and a temperature probe. The tough, plastic interface box connects internally to the game I/O port via a 16-pin connector at the end of a 3-foot ribbon cable. An adapter is available for the //c. The pH/mV meter daisy-chains to the main interface box via another ribbon cable.

Although you can set up your own experiments with this package, the program centers around 15 well-defined investigations. These include higher-level temperature analyses, like specific heat and heat-of-neutralization measurements, and experiments using the pH meter, such as standardization of sodium hydroxide and titrations of weak acids, as well as potentiometric titrations in mV mode. But, to carry out some experiments, you need additional laboratory equipment, such as reference and combination electrodes.

Experiments in Chemistry: a professional lab.



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This is clearly not a home product. The accessory equipment and necessary chemicals are simply not available. The package may not be appropriate for the average school either, unless it has a combination of small class size and large equipment budget.

For a very select group, like a high-school honors chemistry class, Experiments in Chemistry is an ideal package. It teaches chemistry in a way that near-state-of-the-art laboratory-automation techniques can enhance.

Science Toolkit

Last year Broderbund Software asked, "Where in the World Is Carmen Sandiego?" Now, the company's new addition to its Explorations series, Science Toolkit, teases, "Which falls faster, a rock or a feather?"

This electronic lab offers you four common measuring devices: a thermometer, a light meter, a timer, and a strip chart. With these tools and the user guide, you can perform innumerable investigations in chemistry, physics, and biology.

A 3-foot-long cable connects a small, square interface box with four input sockets to the joystick port. (The II Plus requires an adapter.) You can use two of the interface box's input sockets with the accompanying thermistor (for temperature measurements) and photocell (for light-intensity determinations). Each of these sensory probes has a 4-foot-long cable that attaches the device to the interface box.

The lab timer takes its input from the Apple's own internal clock. The strip chart converts experimental data from your temperature and light experiments into a picture. Its display is not just a bar graph on

Hayden's Light Lab complements Temperature Lab.



a static piece of paper, however; it looks like one produced by a fancy lab printer in which the pen moves up and down to record data as a continuous squiggle.

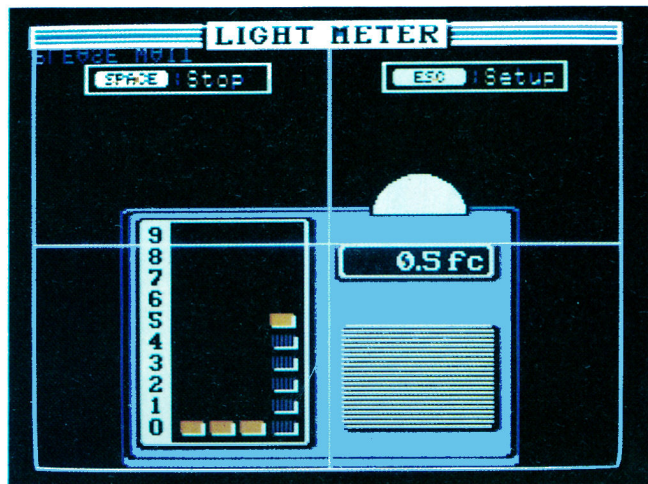
In fact, all of Science Toolkit's on-screen tools not only look authentic (the thermometer even has red fluid that moves up and down in response to temperature change), they work authentically, too—but within limits. Although the manual claims you don't need to calibrate the probes, the temperature probe may be off by as much as 2 degrees Fahrenheit from household thermometers. The response time for the photocell is incredibly fast, but the thermistor may take nearly half a minute to "notice" temperature changes obvious even to the observer.

As usual, Broderbund's graphics are appealing. Its program design would be immaculate were it not for a major failing: the inability to print graphs.

The manual's format is exceptional, but what's written between the lines troubles me. Two dozen predesigned experiments explore the nature of heat, light, and time—sometimes in unnecessarily pristine, abstract ways. The experiment dealing with seed dispersal, for example, has you prepare a model (a cotton ball with a corn kernel packed inside) instead of encouraging you to explore nature and collect real seeds to test.

A Broderbund spokeswoman claims that many computer users live in cities where natural materials may not be available. What a perfect opportunity for the family to take a drive or visit a city park to ex-

The Science Toolkit measures light intensity.



plore and collect materials together. Scientists can go on picnics, too.

Science Toolkit doesn't teach or even encourage you to read instruments for precision: The package doesn't even include a simple dime-store thermometer, for instance. Nor does the program teach you how to record data and construct graphs, since it assumes you already know these all-important skills.

Broderbund is designing other modules that will work with the Master Module interface box. These enhancements, the first of which the company may release this spring, will include additional hardware probes, a new volume of software, and an added manual.

If you've mastered the basics of reading instruments, recording data, and preparing graphs, Science Toolkit can help you strive for new levels of discovery. But, Broderbund's package, despite its undeniable strengths, may not improve your science literacy. If you lack science skills to begin with, turning your computer into a glorified thermometer, light meter, or watch may mislead you into thinking you are deriving more benefit than you really are. ■

Write to Cynthia Field at 10 Border Avenue, Wakefield, RI 02879.

Product Information

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Chem Lab

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Science Toolkit: Master Module

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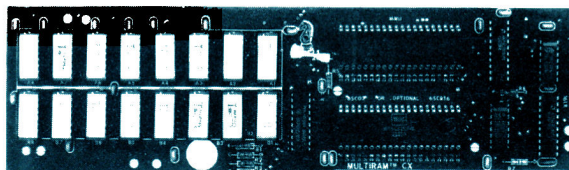
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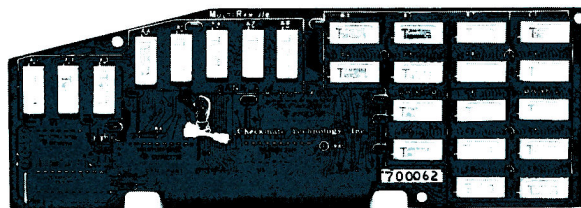
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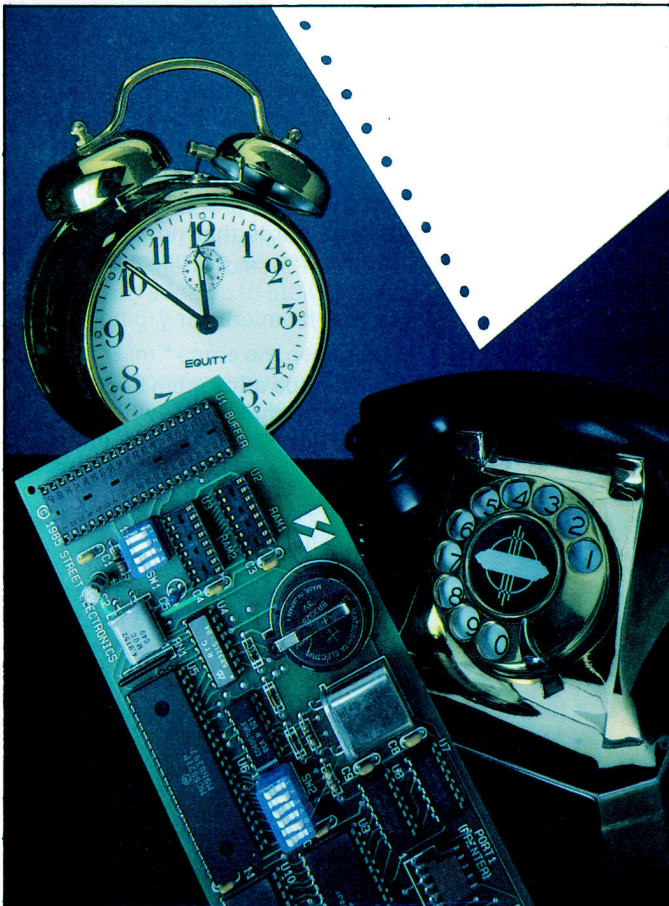
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Read on, as inCider's technical editor
describes four of the most popular
multifunction I/O boards.*

by Bob Ryan, *inCider* Technical Editor



In the past, when you wanted your Apple to interface with a printer or communicate with the outside world, you needed to buy a special I/O board to make each of those functions happen. Buying as many as three or four separate boards to give your Apple added capability could get expensive and could end up reducing system reliability.

But no longer. Now multifunction boards have arrived on the market, and they can add three or more functions on one board for much less money. The popularity of this type of hardware has been growing rapidly, and a number of manufacturers—including some firms that made their reputations in the IBM market—introduced new multifunction I/O boards for the Apple in 1985. If you need a little guidance before you buy, this article explains how multifunction boards work and evaluates four of the more popular ones (see the accompanying **Table** and Product Information sidebar): VERSAcards, Multi I/O, MultiCore, and BusinessCard.

Apple Boards

Communication between your Apple and such peripheral devices as printers and modems takes place through the slots on the Apple motherboard—eight slots on the //e (seven standard slots and one auxiliary). Your Apple sends data through these slots to printers and plotters, for example, and carries on two-way communication with modems and disk drives. The slots, of course, aren't designed to con-

trol communication with peripherals. They just provide a resting place for the interface cards that actually govern the flow of information.

Your Apple communicates with a card in a particular peripheral slot by reading from and writing to a limited number of dedicated memory locations. Each slot has its own reserved locations in memory. When your Apple accesses a location dedicated to a particular slot, the card in that slot reacts to the signal it receives. This type of communication structure is called *memory-mapped I/O*. Your Apple performs its various input and output functions by accessing specific memory locations.

A multifunction I/O board uses a technique called *phantom slotting* to perform its many operations. Although a multifunction board occupies only one physical slot, it uses the memory space of many different slots. By monitoring the memory devoted to other slots (besides the one the card occupies), a multifunction board can intercept signals targeted for other slots. The board can then act on these signals as if it occupied the monitored slots; one card can perform the function of many.

Multifunction boards don't free any slots, since phantom slotting takes up a slot's memory, but the boards do offer cost advantages and improved reliability. Add up the prices of the boards you need, and if you find a multifunction card that can do everything you want for less money, buy it. The economic advantage is greatest if you're a new Apple owner and don't have peripheral cards for your computer. If you already own one interface card, you may not realize any benefit by buying a multifunction board. If you own two or more boards that duplicate functions found on a multifunction board, it's almost a certain bet the multifunction board won't be a good buy.

When it comes to system reliability, a multifunction card (instead of two or more single-function cards) draws less power and dissipates less heat than the cards it replaces. Also, a multifunction card doesn't restrict the flow of air inside the computer as much as two or three other boards. With less heat buildup, you'll have fewer chip failures, and thus happier computing.

The Task at Hand

Multifunction cards are notoriously difficult to evaluate, simply because they perform so many tasks. I ran the four boards mentioned above through various software and hardware configurations. While

each boasts different features, all four boards essentially lived up to their claims. The biggest problem was configuring the boards to work at all. Sometimes I spent hours configuring a card to operate with a particular modem-and-software combination. With others, it took days to assemble the cables needed to interface a board to a particular printer. Consequently, I based my evaluation on that time-honored criterion—ease of use.

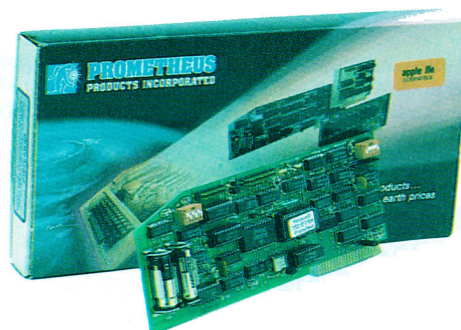
VERSACard

The VERSACard from Prometheus Products is the elder statesman of the boards under scrutiny, since it's been around longer than the others reviewed here. Longevity has its rewards. Compared to its competitors, the VERSACard has more direct software support from third-party developers. For example, I was pleasantly surprised to find that ASCII Express, the grandfather of Apple II telecommunications programs, directly supports the VERSACard. All it takes is the touch of a key to get ASCII Express to recognize the card.

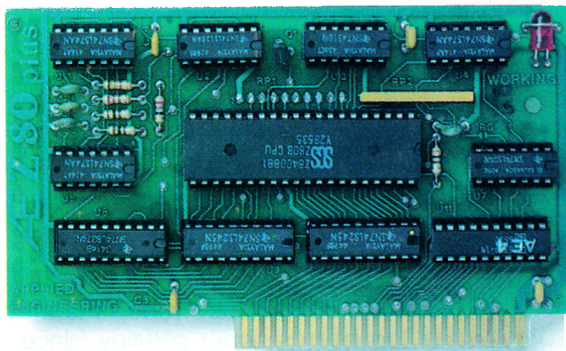
The VERSACard performs four functions: parallel printer interface, serial communications interface, clock/calendar, and BSR/X-10 interface, which lets you run a home-control system with your computer.

Along with the VERSACard, you get a manual and warranty-registration card. What you don't get is a way to connect the VERSACard to any peripheral device. I'm not talking about external cabling here; I don't expect that. What I do expect is that a card will come with the simple connectors needed to hitch it to the external cables. Since the VERSACard lacks these basic connectors, it's unusable "out of the box." You have to buy connectors from either your dealer or Prometheus Products. If you don't have ready access to a 20- or 26-pin block connector, you may want to consider a more complete I/O board.

Once I managed to scrounge up some connectors, the VERSACard operated efficiently. The parallel



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The new 4.0 boasts advanced features like built-in disk emulation for popular memory expansion boards, boosting both system speed and storage capacity. And menu-driven utilities that let you get to work faster. The Z-80 Plus also lets you run older CP/M programs—all the way down to Version 1.6 (2.2 is the most popular).

The Z-80 Plus 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.

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- Does EVERYTHING other Z-80 boards do, *plus* Z-80 interrupts
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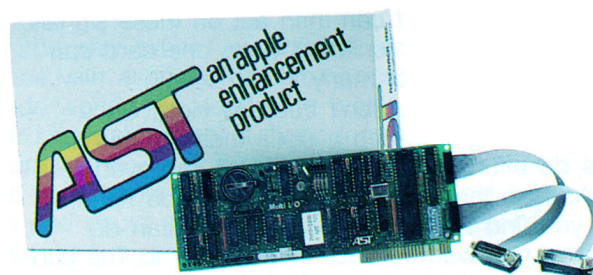
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interface worked like a charm with an Epson RX-80, a Datasouth DS-180, and a Juki 6100 letter-quality printer. I had no problems using the serial interface for telecommunications, with a Hayes Smartmodem 1200. The manual's appendix explains how to attach the VERSAcards to a number of popular serial printers. It also includes the Prometheus Technical Support telephone number, which could come in very handy—especially when you want to interface with an uncommon serial device. All in all, the VERSAcards is a good product, but the package should include the connecting cables.

Multi I/O

Multi I/O from AST Research provides three functions on one card: serial printer port, serial communications port, and clock/calendar, which, like those on all the boards evaluated here, gives you automatic date and time stamping of ProDOS files.

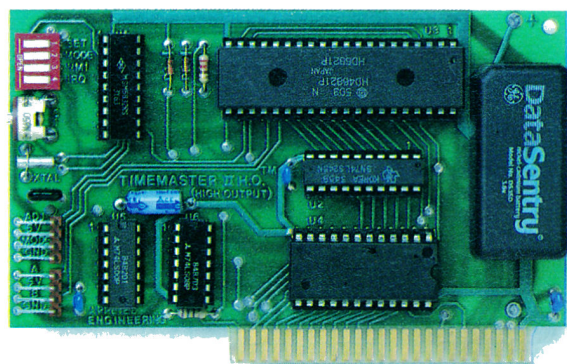


The Multi I/O package also comes with a 29-page manual, two back-panel connectors, a warranty-registration card, a utilities disk, and an *Application Notes* booklet. The manual isn't indexed, but since it doesn't provide the technical information the VERSAcards manual does, an index isn't necessary.

AST includes back-panel connectors with Multi I/O, but I wish they were the proper ones. Specifically, the cable that runs from the communications jumper on the card to the back panel ends in a male D-25-type connector. Since most modem-interface cables have male connectors on both ends, you must buy a gender changer or replace the Multi I/O communications connector with a female connector before you can use the card to communicate with an external modem.

After I unearthed a gender changer from the supply closet, I had no difficulty using a Smartmodem 1200 with Multi I/O. Since Multi I/O has a serial printer port, I tested it with an ImageWriter. To my dismay, I couldn't get any output from the printer. In desperation, I turned to the *Application Notes*, where

Timemaster H.O.[™] the only clock that displays time and date on AppleWorks[™] screens and files.



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I quickly learned that the ImageWriter's switch 2-3 must be closed when the printer is hooked up to Multi I/O. Everything then ran smoothly until I tried Apple Computer's ImageWriter Tool Kit and MousePaint. Since Multi I/O doesn't directly emulate an Apple Super Serial card or a //c serial port, these packages won't print graphics using the Multi I/O interface. This isn't a fault of the card, but a failure on Apple's part to support third-party hardware vendors.

To overcome this incompatibility with Apple graphics software, AST includes a program on the utilities disk that dumps graphics to an ImageWriter. The disk also includes four other useful programs: software to set the clock/calendar, a telephone dialer for the Smartmodem, a simple terminal program, and a listing utility for text files.

The most useful item in the Multi I/O package is the *Application Notes* booklet. This manual (mine was Revision A) explains in nitty-gritty detail how to configure Multi I/O to run with three printers (including the ImageWriter), two high-speed modems (Apple Modem 1200 and the Hayes Smartmodem 1200), and three very popular software packages (AppleWorks, ASCII Express, and Broderbund's Print Shop). This detailed information is essential in setting up a multifunction card or peripheral card. AST Research also maintains a technical-support line for people with questions about using Multi I/O with other hardware and software.

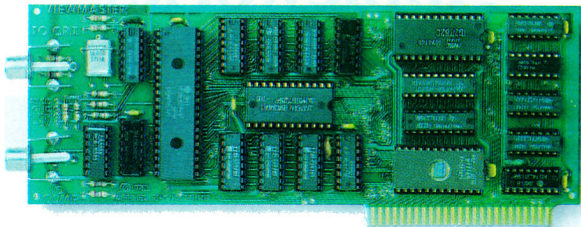
Although the Multi I/O printer interface doesn't automatically handle graphics dumps, I found that this board did a good job providing a link between my Apple and the outside world.

MultiCore

MultiCore from Quadram features a parallel port, serial port, clock/calendar, and up to 256K bytes of RAM. The MultiCore package includes two back-panel connectors, a configuration disk, and a 61-page manual. It's designed to work on Apple and Apple-compatible computers.

MultiCore offers more interface options than any other multifunction card. You can configure one slot as a parallel or serial port, a second slot to handle two different serial printers, and a third as a communications port (in addition to the clock/calendar and RAM disk). Remember, you can't have all these options active simultaneously, but by swapping cables and accessing different slots you can control any one or two of five devices without reconfiguring MultiCore.

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The price you pay for MultiCore's versatility is simplicity. Although configured from software, MultiCore isn't an easy card to set up. The manual isn't very helpful because it doesn't tell you how to configure MultiCore to run with specific hardware and software combinations. I had more difficulty setting up MultiCore than the other cards. MultiCore needs something like the *Application Notes* supplied with Multi



I/O to simplify the process. Quadram has a technical-support line, but I'm still waiting for a return call.

Once you get past the configuration stage, you'll notice MultiCore's nice features. Both its parallel and serial interfaces are intelligent; you control them via software and can dump graphics to an ImageWriter or an Epson. Software that uses 16K bank switching, such as FlashCalc from Paladin, can take advantage of the on-board memory, or you can use the memory as a RAM disk. I'm not particularly fond of RAM disks, but some of the new AppleWorks accessories like Pinpoint could easily change my mind.

MultiCore is a quality product from a quality company. What it needs is a major infusion of "user friendliness."

BusinessCard

Appearances can be deceiving. My first reaction to the BusinessCard from Street Electronics wasn't favorable: The connectors attached to the card weren't the familiar D-25 type, but rather //c-style DIN connectors. I thought I'd never find the right cables to hook up my printer and modem. But I couldn't have been more wrong. As it turned out, I had less trouble configuring the BusinessCard than the other multi-function boards. The reason is simple: The BusinessCard connectors not only look like a //c's, they act like a //c's.

To hook up the BusinessCard to my ImageWriter, I used the cable that came with the board. (Yes, Street Electronics actually put an external cable in the box.) Then I used the //c Personal Modem accessory kit to attach the BusinessCard to Apple's new Personal Modem. When I configured ASCII Express to run with the BusinessCard, I chose the //c communication driver from the ASCII Express menu. What could be easier? To make my day complete, the BusinessCard resembles the //c ports so closely that the ImageWriter Tool Kit, Apple Access II, and MousePaint ran without problems or modification. I was impressed.

Easy to set up and use, the BusinessCard is also intelligent. Its firmware lets you perform myriad tasks, from configuring the communications port to printing double-hi-res-graphics pictures in living color on an ImageWriter II. You can access these functions from software with special commands (called "star" commands because they're preceded by an asterisk), or, if you have an enhanced //e, you can select a particular function from a menu you bring up on screen by typing *MENU after activating the printer port with a PR#1.

The star commands offer a number of configuration and graphics-printing options; they also set the BusinessCard's clock/calendar. You can embed star commands in your word-processed documents as you would any formatting command. I particularly like the



*DATE and *TIME commands. When you insert them into your text and print it, the current date and time from the BusinessCard's clock/calendar are printed in place of the commands.

Besides the standard printer and communications port and clock/calendar, Street Electronics offers an

Continued on p. 46.

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Continued from p. 43.

optional print buffer for the BusinessCard. A 64K buffer costs \$79.95.

The Verdict

All of these multifunction boards perform well, and

all merit consideration, but the BusinessCard is the easiest to set up and use. People with parallel printers can buy a parallel version of the card. Taking performance and types of features into account, the BusinessCard is without doubt the best of the lot. ■

Table. Comparison chart for four multifunction I/O boards.

FEATURES

	BusinessCard*	MultiCore	Multi I/O	VERSAcad
Price	\$219.95	\$219-399	\$235	\$199
Parallel Printer		●		●
Serial Printer	●		●	
Serial Communications**	●	●	●	●
Clock/Calendar	●	●	●	●
RAM Expansion		●		
BSR/X-10 Controller				●
Built-In Graphics Dump	●	●		optional

RATINGS

Ease of Installation	★★★★	★★	★★	★
Ease of Use	★★★	★★	★★★★	★★
Documentation	★★	★★	★★★★	★★
Support	★★★	★	★★★★	★★
Overall	★★★★	★★	★★★★	★★

Ratings:

★★★★Excellent ★★★Above average ★★Good enough ★Not up to standards

*Parallel version also available for \$249.95.

**Can also be used as a serial printer interface.

Product Information

BusinessCard

Street Electronics
1140 Mark Avenue
Carpinteria, CA 93013
(805) 684-4593
\$219.95 (serial)
\$249.95 (parallel with cable)

Reader Service Number 310

MultiCore

Quadram
4355 International Boulevard
Norcross, GA 30093
(404) 923-6666
\$219 (0K), \$279 (64K),
\$329 (128K), \$399 (256K)

Reader Service Number 311

Multi I/O

AST Research
2121 Alton Avenue
Irvine, CA 92714
(714) 863-1333
\$235
(Stripped-down version with
clock/calendar and empty
sockets, \$155)

Reader Service Number 312

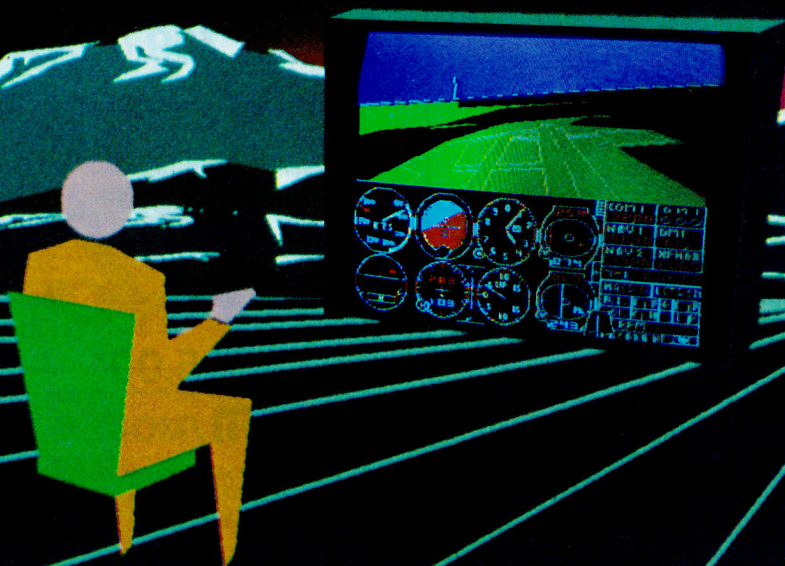
VERSAcad

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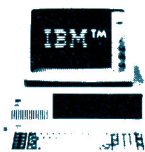
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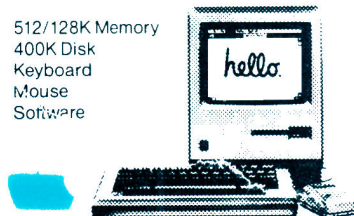
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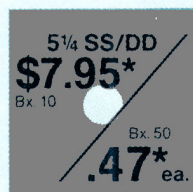
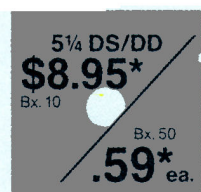
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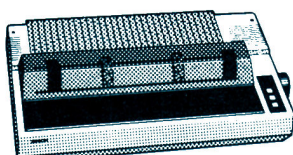


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STATUS REPORT

Innovation



"Jumping out of the system or radically altering it is the road to true innovation. We like those kinds of neat ideas."

by Paul Statt, *inCider* staff

A beginning computer-product developer wanted us to review his three-dimensional "maze cube." "This industry," he moaned, "was made by guys in garages with neat ideas. But now you don't have a chance unless you're Broderbund or Electronic Arts."

Nobody likes neat ideas more than *inCider*. But not as many innovations come through those garage doors as Woz and Jobs created ten years ago. Yet this month *inCider* is full of improvements—and ideas for improvements—for your old Apple II.

This month's Editors' Choice, a software package called **Fantavision** (p. 120), calculates (although it may not look like calculation) quickly and accurately. Nobody but an abstract mathematician would see the power of the calculation that animates those delightful cartoons—it's a programming masterpiece. The mathematics of *Fantavision* go extraordinarily deep, but Broderbund is selling fun, not fractals. Just the same, some Japanese hardware makers—who labor under incredible difficulties with character recognition and creation—are curious about *Fantavision*'s technology.

Fantavision, by the way, is written under an operating system called KDOS—it's ProDOS without some of the bells and whistles Apple added. Ken Rosen dreamed up KDOS for Broderbund. He saw that ProDOS was the right environment for *Fantavision*, but would waste *Fantavision*'s time. He didn't abandon Apple's hierarchical operating system—he reduced it to fighting weight and came up with a trim environment compatible with the ProDOS standard, and an animation creator that "floats like a butterfly and stings like a bee."

That's an innovation. Broderbund increased speed and power with a trick that developers with special demands—speech or character recognition, for instance—may find interesting.

And Electronic Arts is just as committed to creative ideas. Trip Hawkins, president of the firm, told us in conversation about the Commodore Amiga, the Atari 520ST, and other novel machines that the software industry will stand still until hardware people make computers that run any package, just as "record players can play any record." Trip reminded us that the record industry looked sluggish when manufacturers built phonographs that played only 78 or 33 rpm records. It took some genius to combine the two standards.

Electronic Arts is certainly up to something new with its Affiliated Label program. Trip Hawkins and company seek out worthy, but unknown, software—**Wilderness** from Electric Transit is one example (see Game Room, p. 105)—and give indigent programs of promise and talent the push they deserve. Scholarship programs, you might call them. Electronic Arts is also pushing the **Ultima** series written by Lord British of Origin Systems. You don't need to be a genius to discover an innovative product.

Trip's unified computer should take less genius. It's a "universal Turing machine," capable of performing *any* task you can write as an algorithm. A surfeit of operating systems clouds a clear need.

Jef Raskin's **SwyftCard**, last month's Editors' Choice (see January, p. 128), demonstrated what the Apple II can accomplish *outside* the operating system altogether. Jumping out of the system or radically altering it is the road to true innovation. We like those kinds of neat ideas.

As for the fellow with the 3-D maze cube—he's working on a puzzle in four dimensions. He should call us when he has time. ■

This month marks the debut of Status Report, a column of news and commentary from the world of Apple products, by inCider's review editor, Paul Statt.

InCider's Ratings

★★★★	Excellent
★★★	Above average
★★	Good enough
★	Not up to standards
☆	The empty set

PFS:Plan

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Ease of setup	★★
Ease of use	★★★
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Overall	★★

PFS:Plan removes the intimidation factor associated with the complicated appearance of some spreadsheets. It offers a rather plain-Jane worksheet, much like the paper ledger sheets of pre-VisiCalc days. Although PFS:Plan is easy to use, it won't appeal to red-blooded spreadsheet users, because worksheets are restricted to 70 rows and 36 columns. So, when you're out of rows or columns, you're totally out of rows or columns.

To facilitate PFS:Plan's operation—and all but eliminate the need to memorize commands—the authors programmed the number row to work with the open-apple key. Using two-key combinations, you can activate program functions such as copying rows or changing formats.

Quick Reference

Software Publishing Corporation includes a preprinted template with a tab that slips into the space above the number row on the keyboard. This template not only labels the func-

tions, but serves as a quick-reference card for cursor-movement and editing commands. Unfortunately, an unattractive, distracting vertical fold underscores the anemic state of this spreadsheet program.

With PFS:Plan, you type titles such as "Sales" or "Orthodontist" into the two heading areas that appear above and to the left of the spreadsheet. While the default cell size is seven characters wide, cells expand to accommodate your longest heading.

The Quick Entry function automatically enters your designated headings. It was a joy to type "January" and have the program run through consecutive months at the touch of a tab key.

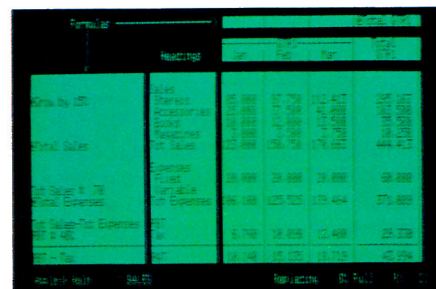
The Numbers Game

When you want the program to manipulate values, you don't need to type in formulas such as $+A3*B7$. Instead, you can type in the words you used as headings, such as $HOURS * RATE$. Besides the four arithmetic operators, PFS:Plan offers keywords that are no more than the @ functions used in VisiCalc.

Don't expect to find too many functions built into PFS:Plan, though the program does include averages, total, minimum, and maximum. The program also provides financial functions: net present value (NPV), future value (FV), and loan payment (PAYMENT). Advanced mathematical and statistical functions aren't offered. If you work with exponents, logarithms, or trigonometry, PFS:Plan isn't for you.

Because you type in formulas in the Formulas area (which is outside the spreadsheet proper), it's too easy to overwrite the results. You must be alert to recalculate whenever you edit your spreadsheet, because the program doesn't remind you until you try to save the file. It takes six keystrokes to correct your oversight.

Memory is at a premium in PFS:Plan. After I used about 150 cells, the spreadsheet was 36 percent full! I



PFS:Plan will appeal to those looking for an uncomplicated, easy-to-use spreadsheet.

nearly filled a data disk with five moderate and three miniscule files.

All in Due Time

Some features of PFS:Plan, such as global reformatting, are fast. But the program recalculates even a small spreadsheet lethargically. Inserting a row, a process that requires two disk accesses, is intolerably slow.

PFS:Plan lacks the oomph and flexibility the spreadsheet genre demands. Because of its ease of use, though, it may appeal to those who want to tinker with spreadsheets or to those who are familiar with the PFS series. ■

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Continued on p. 54.

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Date	Account	Description	Amount	Balance
01/01	CH	151 Safeway		
01/02	CH	152 Wal-Mart		
01/03	SA	Dep Salary		
01/04	UI	153 Visa (Se		
01/05	CH	Video Re		
01/06	CH	MacArthur Park	43.50	
01/07	CH	Macy's	63.25	
01/08	CH	TWA - New York	45.00	
01/09	Tr	Checking Acct		750.00
01/10	CH	Carney's	23.50	
01/11	CH	Gas	23.00	
01/12	CH	Master Card		56.33
01/13	CH	T-Bill		122.70
01/14	CH	Computer Depot	145.50	
01/15	CH	SF Forty Niners	125.00	
01/16	CH	Bruce Bishop	125.00	
01/17	CH	Safeway	33.00	

Generate informative reports with detailed transaction lists.

Each transaction appears in the appropriate account.

Continued from p. 51.

that shoebox of receipts and check registers aside. Version Soft has exported its tidy home-finance program, Mouse Budget. This program does supremely well all that it claims to do, and it should perform up to most people's expectations. Those with somewhat complicated finances, how-

ever, may find the program inflexible.

What separates Mouse Budget from the rest of the personal-finance pack is its friendly, easy-to-use mouse interface. (Either Apple's mechanical AppleMouse II or Mouse Systems' optical A+ Mouse does nicely.) Whereas other accounting packages drag you through menu after menu, this one lets

you drag a mouse instead. With the five pull-down menus—file, edit, transactions, reports, and setup—you can readily perform any of the essential home-finance functions.

A Wealth of Features

But Mouse Budget does much more than simply reconcile your

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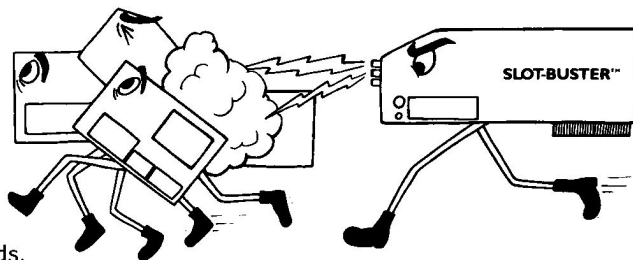
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checking account's status with the bank's monthly statement. "Budget" is built into more than just the program's name—it's part of the software, too. Mouse Budget lets you define how much you intend to spend on, say, magazine subscriptions, then compares your actual expenditures to these wishful-thinking figures.

Mouse Budget keeps up to a year's worth of financial information on one file disk. Although you can begin using the program anytime during the year, you must format a new data disk each January 1. But, you need not start your data from scratch; you can carry over balances from the previous year.

After you prepare your file disk, you must set up a "chart of accounts," containing as many as 60 account categories—including such little nonessentials as food, the mortgage, and car payments. You can assign each account a two-character code of your choice (such as FO for food or EN for entertainment). If you're a serious investor or run a part-time business, you could quickly

exhaust the account categories. Setting up separate file disks would help, but you'd sacrifice a precise calculation of net worth.

Before you begin typing in transactions (money received and bills paid), you must specify each account's type: income, expense, credit card, bank account, cash, assets, or liabilities. But, since Mouse Budget is a single-entry system, you don't have to know if your data entries are debits or credits.

Akin to Macintosh software, Mouse Budget has elevators for scrolling, grow boxes for enlarging or reducing windows, and close boxes for removing windows. These features, together with mouse input and pull-down menus, make recordkeeping and budgeting as pleasurable as possible.

Unfortunately, though, like any household accounting program, this "mousehold" one is not programmed to automatically know when you write a check. So, although the tedium of transcribing data from paper to disk is lessened, it's still present.

When the time comes to transfer the data back from disk to paper,

Mouse Budget really shines. It can generate a transaction list, showing all your monthly money moves; a tax-items list, highlighting tax-deductible expenses; and a category-balances list, featuring starting and current balances for the month.

With a few mouse maneuvers, you can determine your net worth or generate an income statement. Mouse Budget claims to work with the ImageWriter, the Scribe, and Epson and most other Apple II printers.

Conclusions

First versions of any program rarely have all the embellishments to which users feel entitled. Mouse Budget is no exception. The program would be much more versatile if it could search and sort transactions by key words, not just by codes or tax-deductible status. And, if one picture is worth a thousand words, Mouse Budget would be worth at least a thousand cents more if it could show you graphically how well you're living within your means—and if it could print your checks. ■

*Cynthia E. Field
Wakefield, RI*

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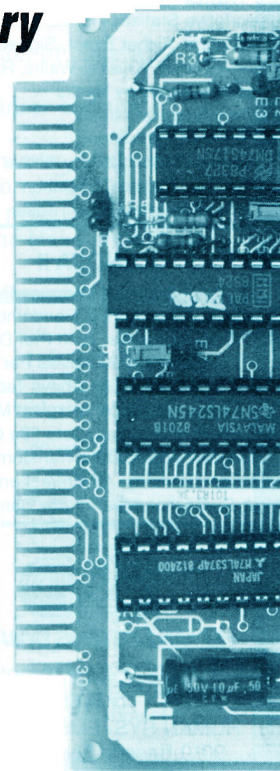
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REVIEWS

Quicken

Intuit

540 University Avenue
Palo Alto, CA 94301

Checking and home finance
Apple II/e or II/c, 128K, extended 80-column
text card, one disk drive (two recommended)
\$79

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

The only thing I can't figure out about this software is why it's called Quicken, unless that's short for "quick 'n' easy"—because that's how it works.

This checking and finance package is perfect for balancing any household or small-business checkbook. I've tried other personal-checkbook programs, and I'd sooner record checks and balance bank statements by myself than put up with programs that are hard to learn and even harder to use. Thanks to Quicken, I'm automating my personal checking account. I've never seen such an easy-to-read manual or software that's so simple to use.

If you're already familiar with AppleWorks, you can probably get down to work within 30 minutes—Quicken's format is just like AppleWorks'. Everything is menu-driven, with help screens every step of the way. The commands are also similar to AppleWorks'.

The steps you follow to enter checks and write them are logical—and the check register even *looks* like a check register. You can type in transactions without worry, since you can correct any mistakes by moving the cursor around. You can easily fix old errors, too, with a complete update of the check register, a feature not found in some more expensive accounting programs.

To prepare a check for printing, you must type the information on a blank check form (you can purchase them from Intuit) the way you want it printed. The written amount is printed after you type in the numerical amount, and the program automatically records the check in the register.

You can easily summarize expense categories using the search-and-list selection from the main menu. And for a more detailed analysis, you can directly transfer information from the



check register to an AppleWorks spreadsheet. Small businesses can use this option to analyze expenses and prepare income statements. There isn't any budgeting feature in the program, but since you can integrate a spreadsheet, it would be superfluous.

Intuit provides free customer assistance during normal business hours. And, although the program is copy-protected, two program disks are included, so you have a backup.

When it's time to balance your account, Quicken might actually make you look forward to it. Once you type in cleared items, the program highlights any out-of-balance figure to make reconciliation easier. If you've balanced your account correctly, Quicken even congratulates you. ■

Martin Blumenthal
Chicago, IL

Bank Street Mailer

Broderbund Software

17 Paul Drive
San Rafael, CA 94903

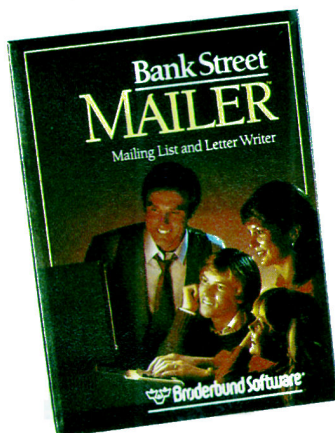
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column card, 64K II Plus and II/e (40-column)
\$69.95

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

Suppose you have 150 form letters to get out by noon, and ten of them need personalized messages. Sound like drudgery? Then you may be interested in Bank Street Mailer, the latest addition to the Bank Street series—a package that's sure to speed up and simplify your letter writing.

Bank Street Mailer combines word processing and data management. It mimics Bank Street Filer and Bank Street Writer in design, and produces text files compatible with all members of the Bank Street family. You can use the Letter Writer and Mailing List portions separately or together. With just a few keystrokes, you can move from one part of the program to another, though you must save your data first.

The Letter Writer has a number of functions that make preparing your correspondence easier. For example, the program's utility lets you define ten of your favorite salutations and closings (five in each category) to keep on file. You can then insert them into your text with a closed- or open-apple-key command. Special time-saving insert features plug in the current date, your return address, and the name and address of the recipient. You can define and save such information as the names of spouses and children, hobbies, or the date someone joined a club.



Bank Street Mailer can speed up and simplify your letter writing.

Another handy feature is the calculator you can access with the closed- or open-apple and equals-sign (=) keys. The program performs computations in a separate window, and you can dismiss the results or incorporate them into the text.

The Letter Writer runs automatically when you boot the system, unless you use the utility program to change the settings. (You can access the utility by pressing the escape key while the program is loading into the computer.) You can also override the utility setting by pressing the M key (for mailing list) while the program is loading.

The merging of data and text dur-

ing printing is the point where the two parts of Bank Street Mailer come together. Depending on whether you want letters or mailing labels and envelopes, you can print from either the word-processing or mailing-list part of the package. The data-management capabilities of Bank Street Mailer let you select portions of the mailing list you want to print, and sort fields alphabetically or numerically. The Mailer can pause before printing a letter so that you can write a customized message on the document—a particularly

helpful feature. It's ideal for those times when you have a mass mailing to do, but need to send personalized notes to several people on your list.

Comparisons

Bank Street Mailer's Letter Writer on the whole works very much like Bank Street Writer, but it can handle only three-page documents (or 6K files), while the Writer can manage up to ten pages (or 20K files). You can merge a Bank Street Mailer letter with text from Bank Street Writer, but

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Broderbund warns against putting a long letter from the Writer's file into the Mailer's word processor. Except for this restriction, you can easily move text files among the Mailer, Writer, and Speller.

There are also some limitations on sharing data files between Bank Street Mailer and Bank Street Filer. The Mailer's data-management scheme is less sophisticated than the Filer's. The Filer can read and use an address list you've put together with the Mailer, but you may set up some Filer fields the Mailer won't recognize. In addition, Filer material must first be processed by the "convert filer data" option in the Mailer's utility program. (Broderbund recommends making a copy of a Mailer file before using it with the Filer to ensure that data aren't lost when the Filer changes and re-saves a Mailer file.)

Bank Street Mailer is hard to beat as a letter-writing tool. I compared this package to Software Publishing's

PFS:Write and File programs, which our office once used for departmental mailings. With the PFS products, you must make all changes in text files with Write, then close and print the documents with File. The Mailer streamlines this editing and printing task in two ways—by providing both functions in a single program, and by letting you pause during printing to insert information or edit text. And you must code items manually on the data list in PFS:File to sort the material for printing. The Mailer provides a "sort sentence" that easily identifies portions of the mailing list you want to print.

Whether you have a small business, a busy department, or an active social life requiring mass correspondence, Broderbund's latest Bank Street product is a welcome answer to an annoying task. ■

Wendy Lea McKibbin
inCider staff

ZBASIC

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3438 Country Club Road
Tucson, AZ 85716

BASIC language
Any Apple II
\$89.95

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

Since the advent of Pascal in the early '80s, BASIC has become a less-attractive programming language. Although exaggerated at times, most of the criticisms of BASIC are valid: In many systems, the language is slow, looping structures are limited, character sets are confined to uppercase, and almost no utility routines exist. Now, in contrast to these evolutionary diehards, arrives ZBASIC, a modern and easy-to-use version of BASIC. Al-

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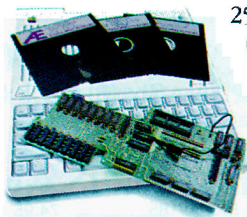


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REVIEWS

though it is an excellent product for software developers and seasoned programmers, new programmers and those who use BASIC infrequently may find the price a bit steep.

The most noteworthy facet of ZBASIC is that, unlike other BASICs, it's a compiled rather than an interpreted language. Consequently, execution is quicker. And, compared to most language compilers for the Apple, ZBASIC's compilation is fast and produces efficient code.

The system literature strongly emphasizes that ZBASIC source code is portable among many microcomputers: You can move a ZBASIC program written on an Apple to an IBM PC, for example. Present versions of ZBASIC include DOS, TRS-80, and CP/M-80, and Macintosh and other versions are in the works. Although this feature is nice for software developers who must produce object code for a variety of systems, the average person has no reason to transplant programs.

ZBASIC supports the standard BASIC commands and operations, but it inCider

also goes further and provides much-needed extensions to the language—to graphics in particular. The combination of hi-res, lo-res, and text graphics, as well as the standard graphics routines, may just tempt you to write that strip-poker video game. If you prefer a more learned diversion, ZBASIC also includes routines for numeric calculation, device I/O, memory manipulation, and music. The most welcome addition to standard BASIC, however, is probably ZBASIC's ability to support long variable names, with the first 15 characters being significant.

The major problem with the system is the editor. Like the relics that preceded it, ZBASIC has only a line editor, as opposed to the full-screen editors of the 20th century. For a line editor, it performs the job well, but it is still outdated. Fortunately, you can use other editors or word processors to write your program and then load the text into ZBASIC when you're ready to compile and run it.

ZBASIC comes with one of the best user manuals in the industry, and the people at Zedcor seem willing to help

with any technical problems. (Even the authors sometimes answer the phone.) If you're developing application programs in BASIC, the portability and speed (as well as a generous licensing agreement) make the system quite attractive. ZBASIC is unquestionably an excellent implementation of the language and a product you should consider seriously. ■

James McKelvey
London, England

Editor's note: Mike Garipey of Zedcor reminds readers that ZBASIC has important features not mentioned by our reviewer. Among them are "lack of copy-protection and royalty fees." ZBASIC offers structured programming in BASIC. It supports the Super Serial Card and mouse, as well as super-hi-res graphics and Applesoft conversions. "This is the first time that a line editor has worked exactly the same on every system," he adds, stressing ZBASIC's portability, which even "new programmers and those who use BASIC infrequently" may use.

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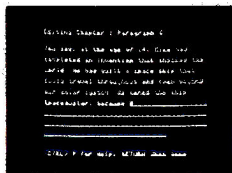
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REVIEWS

P-Tral

Woodchuck Industries
340 West 17th Street
New York, NY 10011

BASIC-to-Pascal translator
Any 64K Apple II
\$125

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

P-Tral, a BASIC-to-Pascal translation system, claims to provide Apple programmers with a fast, economical, instructive way to convert Applesoft BASIC programs to Apple Pascal programs. P-Tral (release 1.0, a "pioneer" version) lets you take advantage of 128K systems by providing an alternate 128K-memory model with the 64K version and demo disks.

With this type of software, you can easily convert programs from one language to another by "translating" the commands, syntax, and logic of the

source program to one recognized by the target language.

Installation

After you conduct the start-up procedures, you can begin P-Tral's three-stage translation process.

In stage one, the software reads your Applesoft program into memory (the 128K version allows more than 3000 statements) and displays it on screen. If P-Tral detects a syntactic or lexical mistake, it displays an error message. It then prompts you to abort the process or continue with stage-one translation.

After you complete stage one, P-Tral analyzes your program's structure and reports any semantic errors such as unmatched FOR...NEXT, GOTO, and GOSUB statements. P-Tral is very liberal when it comes to nested loops, GOTO's, and the maximum number of BASIC statements (200) permitted on any one line. The system also attempts to determine subroutine start/end points.

Stage three creates the actual Pascal source code. Here, you must pro-

vide fixed dimensions for dynamic arrays, rename some variables that conflict with Pascal or P-Tral criteria, and provide a name for each subroutine. After the translation is complete, the software writes the Pascal source code to disk and displays it on screen.

Up to Interpretation

P-Tral's translation of BASIC programs is by no means complete. P-Tral doesn't translate Apple DOS commands; it flags them during translation and displays them as warning messages embedded in the Pascal source code. This means you must manually convert I/O calls with Pascal equivalents, such as open, reset, rewrite, and seek.

Some may see this as an important omission, but P-Tral is more than a functional utility. It's a learning tool. Since it requires new Pascal programmers to delve into the translation process, P-Tral helps reduce the trauma of learning Pascal.

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Consider the source code P-Tral creates during translation. The beautifully formatted text lets you view Pascal's structure, commands, and syntax. P-Tral indents all declarations, IF...THEN statements, and nested procedures a respectable two spaces. Pascal keywords and program variable names automatically appear as upper- and lowercase, respectively.

P-Tral also provides the source-code translations of many BASIC constructs and procedures, such as those used for hi- and lo-res graphics, string handling, and cursor control.

Finding Fault

I do object to P-Tral's poor support and documentation. I called Woodchuck Industries many times over several days and left a message on a machine, but no one returned my calls. The content of the P-Tral manual isn't bad, but there's no excuse for consistently poor grammar and misspellings. "Pioneer" version or not, dot-matrix-printed manuals are a no-no.

Lastly, P-Tral isn't very fast. Since you constantly interact with the program, the subjective translation time doesn't seem that long. But if you plan any serious conversion projects, borrow or buy a hard-disk drive. Constant disk accesses account for much of the program's lack of speed. Better yet, use a RAM disk and emulator software.

If you need a system that provides a complete translation of BASIC source programs, especially a database program, or one that requires much disk access, the P-Tral package isn't for you. But if you need a functional utility that teaches more about Pascal, this system will do the job. Economically priced at \$125, P-Tral will more than pay for itself in the long run. ■

David W. Hoover
Sacramento, CA

Editor's note: John Dyson of Woodchuck apologizes for the inconvenience caused to P-Tral users by the telephone problems the company suffered through last year: "Our telephone-support system is now in place. The manual has been extensively revised—and improved—since the pioneer version."

Super Serial Imager

Apricorn

7050 Convoy Court
San Diego, CA 92111

Multipurpose I/O board

Any Apple II

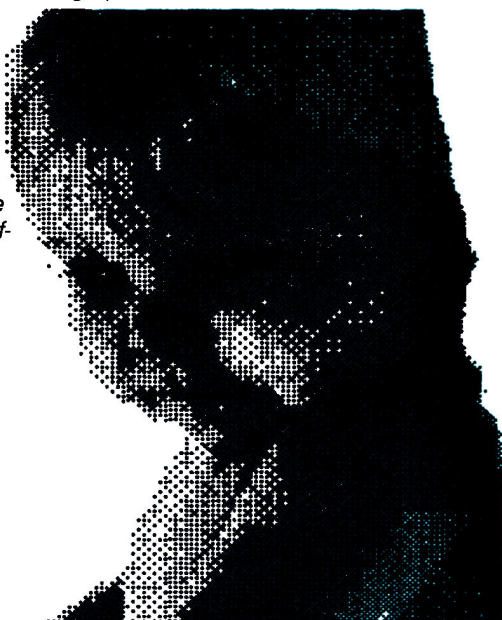
\$129.95

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

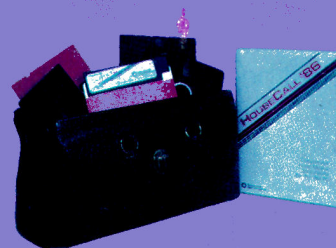
Apricorn takes up the Apple challenge with its Super Serial Imager, a multipurpose I/O product for the Apple II series. Consisting of a hardware interface and a set of sophisticated programs contained in an 8K-bit-by-8-bit ROM chip, the Super Serial Imager (SSI) is 100 percent compatible with Apple's Super Serial Card. It's so compatible it even duplicates a bug in Apple's code (which shows up in print mode). The two cards also offer the same features for telecommunications, terminal emulation, and printing.

The SSI's graphics interface marks the primary difference between the two cards. Users of the Apple Super Serial Card need another board, such as Orange Micro's Serial Grappler, for graphics functions. The Imager also sports built-in logic that automatically configures the "handshaking" specifications for various RS-232 devices, and thus eliminates the need for special cables. This self-configuration feature is important, since there are no standards for signaling specifications such as "carrier detect" and "data terminal ready."

Example of Super Serial Imager graphics.



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Where?

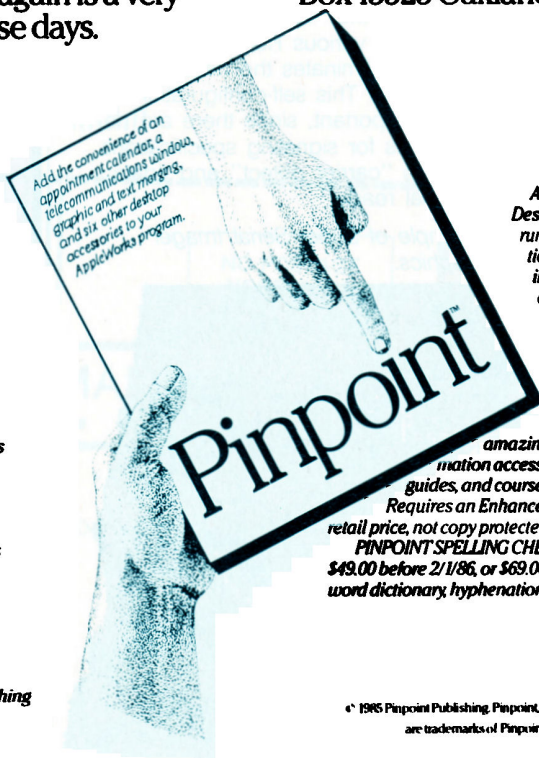
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Opening Communication

Although the Apple card has less ROM than the SSI, both use the same 6551 serial controller chip that lets your system communicate with other terminals, modems, and printers.

You can configure the SSI board for terminal mode (system-to-printer or system-to-system communications), external communications, or graphics printing. For the printer interface, the card goes in slot 1, in the second slot if used with a modem or as a general-purpose I/O port, and in slot 3 for use with an external terminal.

Pretty Pictures

As a printer interface, the SSI acts as a graphics interface in Imager GPI mode or as a Super Serial Card in Super Serial Emulation mode. With GPI mode, you can print graphics nine ways: inverse, rotated, overlaid, side by side, emphasized, double-sized, zoom picture, horizontal, and vertical. Apricorn encloses a graphics sampler with the board. Although I produced quality graphics with the sampler, at times the program would "hang" during execution.

In GPI mode, the Imager can also perform text-screen dumps. SSI lets you print text in Apple II 40-column format, 40-column side-by-side, the Videx 80-column display, or the Apple IIe 80-column arrangement. You can take a snapshot of text screens without printing the entire document.

The company's technical support is first rate. This is fortunate, since the documentation won't receive any plaudits. Printed in 8-point type, the unillustrated manual is pure migraine material. It's poorly organized and unclear. Apricorn's technical-support person admits that many people have complained particularly about the manual's obfuscated instructions for DIP-switch setting. He says that, although there's an easy-to-use program on disk to set the switches, the directions are difficult, and a new manual will address this problem.

The Super Serial Imager and Apple's Super Serial Card are comparably priced, but the SSI offers smart circuitry that minimizes cabling problems and a powerful graphics-interface program. Although you must dedicate the card to one function at a time, the Apricorn board still provides a handsome array of options at a competitive price. ■

Wendy Lea McKibbin
inCider staff

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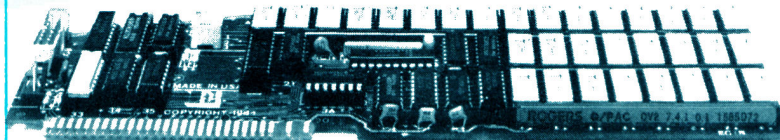
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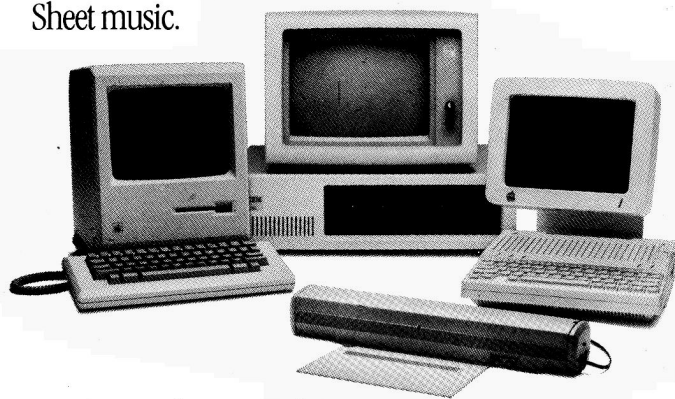
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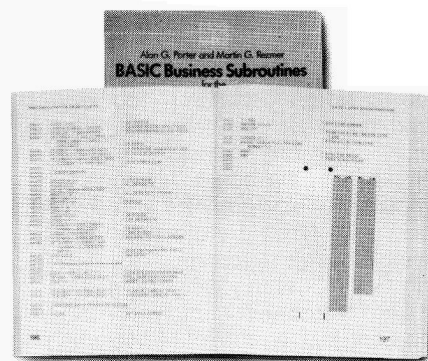
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Softstrip
CASH BUDGET

Softstrip
CAUZIN DEMO

1a

1b

1c

2

NEW PRODUCTS

edited by Paul Statt

Copy Cat

The **Xerox 635 Diablo** daisy-wheel printer features the reliability and durability of the Diablo 630—long the de facto industry standard—but costs \$500 less. It's also 25 to 35 percent faster, 30 pounds lighter, and 7 decibels quieter. Print speed is 55 characters per second. Boasting a simple two-switch operating panel, the 635 is easy to use. The printer offers serial and parallel plug-in interfaces for Apple computers. The 635 sports 255 different print wheels, including type styles for word processing, accounting, engineering, foreign languages, science, and math. All the best word-processing features are also available, for \$1485, from Xerox, Xerox Square 006, Rochester, NY 14644, (716) 423-5078. For more information circle number 354 on the Reader Service card.

Dream of Genie

A new domestic-network service for personal-computer users, **GENie**, offers information and software exchanges, communications, and shopping services for only \$5 an hour after prime-time hours. The sign-up fee is \$18. SIGs and bulletin boards are dedicated to CB simulation



The Diablo 635 features letter-quality print at 55 characters per second and your choice of 255 print wheels.

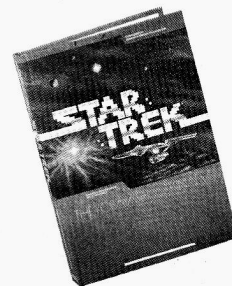
and electronic mail, software libraries, electronic periodicals, national on-line conferences, shopping and swapping, and the GENie Game Room. With a 300- or 1200-baud modem you can sign up for GENie from the keyboard—just get your VISA, MasterCard, or checking-account number ready and call (800) 638-8369. After you connect, type HHH, and at the U + # = prompt type in 5JM11999, GENie. For help call General Electric Information Services, 401 North Washington Street, Rockville, MD 20850, (800) 638-9636. For more information circle number 351 on the Reader Service card.

War Under Water

Silent Service is an exciting in-depth simulation of World War II submarine conflict in the Pacific—you can experience the thrill and danger an American captain felt in combat. You can work from several locations in the ship—engine room, conning tower, or bridge—and attack with either five-inch guns or Mark XIV torpedoes. Maps and charts of the southern ocean make planning your strategy easier. Silent Service sells for \$34.95, from MicroProse, 120 Lakefront Drive, Hunt Valley, MD 21030, (301) 667-1151. For more information circle number 369 on the Reader Service card.

Beam Me Up

Star Trek: The Kobayashi Alternative is a computer simulation designed to test the command abilities of Starfleet candidates. Your mission: Pilot the *Enterprise* to recover a mysteriously vanished Federation starship under Lieutenant Sulu's command. The Kobayashi Alternative is no mere test of your skills of observation and deduction, but tracks your endurance, empathy, and humor, as well—traits that are equally important in a leader. The Kobayashi Alternative stars the familiar Star Trek crew, but isn't based on any particular adventure. It sells for \$39.95 from Simon & Schuster Computer Software, 1230 Avenue of the Americas, New York, NY 10020, (212) 245-6400. For more information circle number 361 on the Reader Service card.



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

Everything

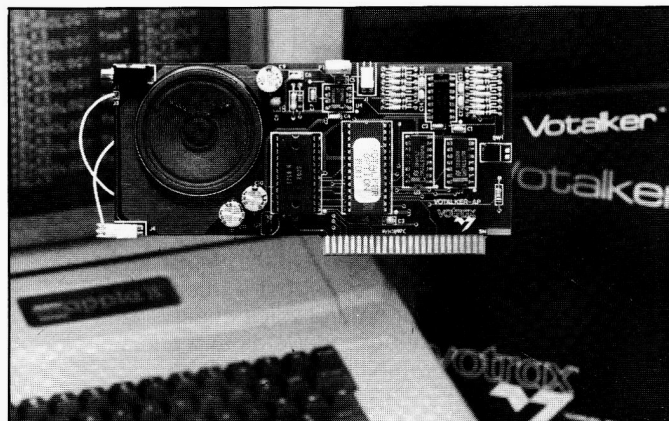
The Works! brings you 13 different programs on one disk. You'll enjoy all the most popular home applications: a letter writer, graphics printer, typing teacher, music composer, calculator, stock portfolio, loans and investments, family finances, calendar pad, weights and measures, address book, math formulas, and, for a bit of fun, math races. The Works! uses a proprietary system that controls all 13 sections, each using on-screen prompts and help screens. The Works! costs just \$49.95, from FirstStar Software, 18 East 41st Street, New York, NY 10017, (212) 532-4666. For more information circle number 364 on the Reader Service card.

Adds Up

An Apple version of the popular Atari and Commodore spreadsheet **SynCalc** is now available. SynCalc has all the features you expect from an electronic spreadsheet—flexible formatting, variable column width, options like centering and comma insertion, and vertical and horizontal split-screen capabilities—all this and SynCalc's "pop-up" menus, too, for ease of use. SynCalc needs 128K, leaving you almost 80K for your data. SynCalc retails for \$49.95, from Synapse/Broderbund, 17 Paul Drive, San Rafael, CA 94903, (415) 479-1170. For more information circle number 365 on the Reader Service card.

Green Thumbs

With **Ortho's Computerized Gardening** you can work your garden or landscape your lawn with the help of information specifically programmed for your piece of earth—not just your "growing region" or city, but your very neighborhood, by zip code. Ortho's Computerized Gardening makes plant lists, provides a plant encyclopedia, creates customized planning calendars and diaries, and simplifies reckoning on a built-in calculator. The package includes a Personalized Plant Selector Program, the 192-page *Gardening Techniques* book, and the Bonus Garden Planning Kit, all for \$49.95, from Ortho Information Services, Division of Chevron Chemical, 575 Market Street, San Francisco, CA 94105, (415) 894-1981. For more information circle number 359 on the Reader Service card.



Votalker's SC-02 chip offers unlimited-vocabulary speech generation.

Speak to Me

The **Votalker AP** for the Apple II, II Plus, and IIe speaks in two preprogrammed voices you can vary through an on-board filter. This synthetic-speech-generating system offers four voice patterns through its SC-02 chip. Votalker AP software creates text through programs or the keyboard. Your computer can speak an unlimited vocabulary with 32 inflections, sing in five octaves with 4096 pitches, or make sound effects in 16 amplitudes. The board operates from an internal card slot, keeping your serial port free. Votalker sells for \$179, including board, software translator, and user manual, from Votrax, 1394 Rankin Road, Troy, MI 48063, (313) 588-0341. For more information circle number 358 on the Reader Service card.

Computer Science Press

Almost any language is spoken at Computer Science Press. **Learning Pascal Step by Step** (\$19.95) takes you into this important instructional language in a systematic way. **Learning Apple FORTRAN** (\$17.95) is a modern machine-specific text on 1977 ANSI FORTRAN. The **Applesoft BASIC Primer** (\$9.95) helps teachers and parents who have no programming experience learn what they need to know to teach students and children about Apple computers and BASIC. **Logoworlds** (\$19.95) provides a guided learning experience for teachers of grades K-8. Supplemental disks are available for *Learning Apple FORTRAN* and *Applesoft BASIC Primer*, all from Computer Science Press, 1803 Research Boulevard, Rockville, MD 20850, (301) 251-9050. For more information circle number 357 on the Reader Service card.

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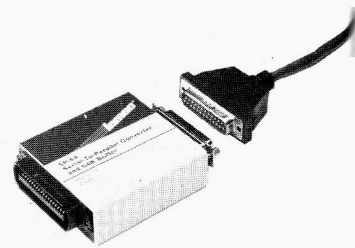
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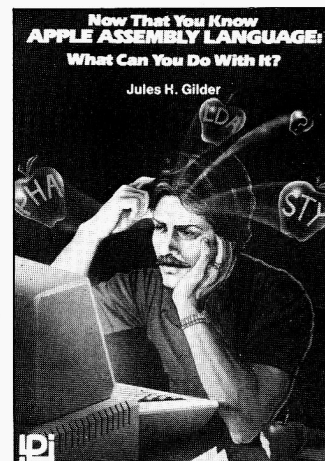
The INMAC SP-64 converts serial signals to parallel output and provides a 64K buffer for maximum efficiency.

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Now That You Know Apple Assembly Language: What Can You Do With It? takes you step by step through assembly-language programming, assuming that you're familiar with the fundamentals of the language. You learn to develop your own library of useful subroutines, while the process of assembly-language programming becomes almost as simple as BASIC. You enter into the depths of the 6502 stack, and learn to write Apple's built-in assembly routines into your programs. *Now That You Know Assembly Language* sells for \$19.95 from Redlig Systems, 2068 79th Street, Brooklyn, NY 11214, (718) 332-8429. For more information circle number 356 on the Reader Service card.

Teach Thyself

EduCalc, Note Card Maker, and The Information Connection are three new "self-teaching productivity tools" that students older than 10, small-business folks, and computer-shy adults can use to learn about spreadsheets, simple data bases, and telecommunications software. *EduCalc* and *Note Card Maker* retail for \$49.95 each; school editions are \$59.95, and *Lab Paks* for six students are \$115.95. *The Information Connection* costs \$59.95. All three are available from Grolier Electronic Publishing, Department 333, Sherman Turnpike, Danbury, CT 06816, (800) 858-8858. For more information circle number 362 on the Reader Service card.



Product Updates

● Electronic Arts (2755 Campus Drive, San Mateo, CA 94403, 415-571-7171) is introducing an improved version of **Movie Maker**, with three humorous animated stories by widely known cartoonist Gahan Wilson, and a large selection of new art. It sells for \$39.95.

● Look also for **AutoDuel** (\$49.95), a Mad Max role-playing adventure, and **Moebius** (\$59.95), in which you probe the Zen of martial arts, from Origin Systems under EA's affiliated-label program.

● The affiliated-label program has also resurrected Imagic's popular **Football** game, for \$34.95.

● **Heart of Africa** (\$32.95) carries on the tradition—good geography and an historically accurate map—of the award-winning M.U.L.E. and Seven Cities of Gold games. Electronic Arts picked this one up, too.

● Checkmate Technology (509 South Rockford Drive, Tempe, AZ 85281, 800-325-7347) has revved up the AppleWorks-expansion software that accompanies its **MultiRam //e and //c** boards. Now it automatically segments large files and increases the capacity of each file on the desktop.

● **AST Research** (2121 Alton Avenue, Irvine, CA 92714, 714-863-1333) couldn't make its boards better, so it gave them an unconditional two-year warranty—easy to do when you have a return rate of only one-tenth of 1 percent.

● The bonny lads at Cir-Tech Limited in Scotland have concocted a 1-mega-byte plug-in card called **Flipster** that expands the RAM in your //e or II Plus to gigantic heights. Call Greengate Productions, 2041 Pioneer Court, San Mateo, CA 94403, (415) 345-3064.

● Locksmith, the controversial copy program that raised a small storm with version 1.0 in 1981, has evolved from bit-copy software into a complete disk-utility system. **Locksmith 6.0** (\$79.95, \$29.95 for owners of version 5.0) now supports the popular RAM-expansion boards from Applied Engineering and Checkmate, too.

● The **ProClock //c**, like its old man the ProClock //e from West Side Electronics (8041 Sadring Avenue, Canoga Park, CA 91304, 818-884-4794), adds clock and calendar functions to Apple's little computer—it's completely ProDOS-compatible.

● Kyan Pascal owners are studying the first issue of **Update**. . . **Kyan**, a newsletter for serious Pascal programmers. Anybody can subscribe—just send \$9 to Kyan Pascal, 1850 Union Street, San Francisco, CA 94123.

● The **Covox VoiceMaster** is a cosmopolitan peripheral. Phonemes for pronouncing and recognizing French, German, Spanish, Yiddish—almost any tongue—make the \$89.95 hardware/software combination at home anywhere. Covox, 675-D Conger Street, Eugene, OR 97402, (503) 342-1271.

Back Issues

Yes, back issues of *inCider* are available for all months, but in limited quantities. Here's a short list of some of the best of what we've published in the past:

January 1985: Apples and VCRs, Computerized tax returns, "LORES TO HIRES," Joysticks—selection and adaptation, "Match Point," Readers' game choices

February 1985: Simplified word processing, ProDOS's file structure, Apple Writer explained, "PORTAL," "Raider," "TYPE," Manageable business templates

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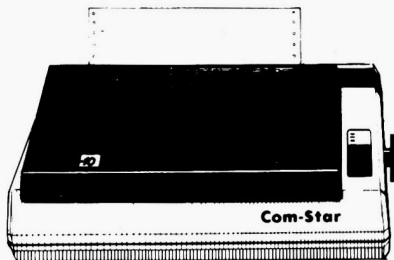
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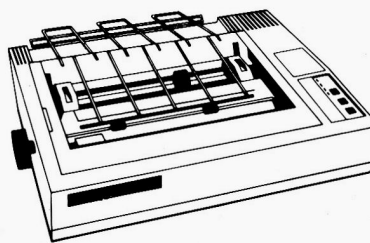
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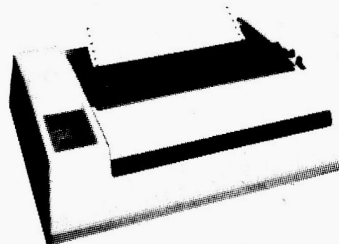
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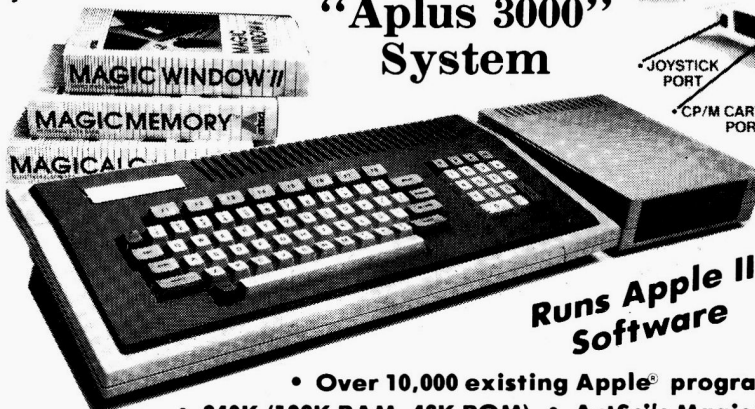
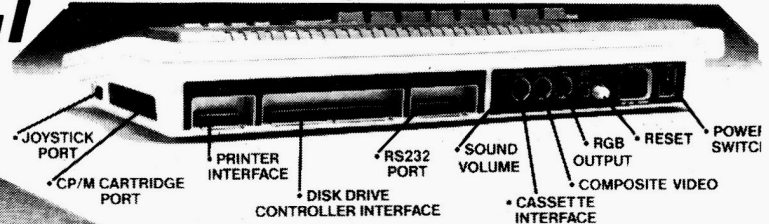
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PASCAL PRIMER

Facts on Filer: Part 4

by Tom Swan

Arrays in Pascal hold variables of the same type—integers, real numbers, Boolean true and false values, or any other data type. This month, I'll first explain how to use arrays, then complement the discussion with a frustratingly fun game that uses a TurtleGraphics display. I'll also describe a bug I found in the Apple Pascal compiler, and complete my discussion of the Filer.

Declaring Arrays

To create a Pascal array of ten integers, you could use the variable declaration below:

```
VAR
  TenNumbers : ARRAY[ 1 .. 10 ] OF
    integer;
```

This type of declaration starts with an identifier (TenNumbers), which names the array. Next come a colon, the key word ARRAY, a range of indexes in brackets, and the key word OF. After that is the array-element data type—in this example, an integer.

As the following TYPE declaration shows, you can have other kinds of arrays, too:

```
TYPE
  TwentyReals = ARRAY[ 20 .. 40 ] OF
    real;
```

Notice that you must determine the starting and ending indexes. In the example above, the array element begins at index 20; therefore, TwentyReals describes an array data type of 20, not 40, real numbers.

Once you've created this new array, you can declare variables with a statement similar to the following, which creates two array variables, A and B, each containing 20 real numbers:

```
VAR
  A, B : TwentyReals;
```

Accessing Array Elements

After you declare an array variable, use brackets to access individual elements, which you can use anywhere

**Add the remaining
Filer commands
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the game Agony
will show you how.**

you might use regular variables of the same type. Think of the elements as simple variables, stacked up by number in the array. The statement below, for example, assigns the value of pi to the fifth element of real-number array A (remember, the starting index is 20, not one):

```
A[24] := 3.14159;
```

You can also use array elements in expressions, writeln statements, or loops. The FOR loop below, which uses an integer variable, Index, displays all 20 array elements:

```
FOR Index := 20 TO 40 DO
  writeln( A[Index] );
```

If you want to perform an operation on the entire array, omit the brackets. The statement A := B, for example, assigns all elements of array B to array A.

Multiple Dimensions

Multiple-dimension arrays are simply arrays of other arrays. You can declare such arrays in two ways: with brackets separating each set of index ranges or with a single pair of brackets containing all index ranges, each separated by a comma. Either way, the final result is the same as the following two-dimensional arrays show:

```
VAR
  ChessBoard : ARRAY[ 1 .. 8, 1 .. 8 ]
    OF integer;
  CheckerBoard : ARRAY[ 1 .. 8 ][ 1 ..
    8 ] OF integer;
```

One way to view two-dimensional arrays is to imagine they have rows and columns. The examples above have eight rows of eight columns,

Listing 1. ARRAYBUG.TEXT.

```
0: PROGRAM ArrayBug;
1: TYPE
2:   TestArray = ARRAY[ 1 .. 9 ] OF Boolean;
3: VAR
4:   A, B : TestArray;
5:   i : integer;
6:
7: FUNCTION tf( b : boolean ) : char;
8: BEGIN
9:   IF b THEN tf := 'T' ELSE tf := 'F'
10: END; (* tf *)
11:
12: BEGIN
13:   FOR i := 1 TO 9 DO
14:     A[i] := false;
15:     B := A;
16:     B[ 5 ] := NOT B[ 5 ];
17:     A[ 5 ] := true;
18:     FOR i := 1 TO 9 DO
19:       writeln( 'A[' , i , ']' = ' , tf(A[i]) ,
20:         ' B[' , i , ']' = ' , tf(B[i]) );
21:     writeln;
22:     write( 'Comparison shows A ' );
23:     IF A = B
24:       THEN write( '=' )
25:       ELSE write( '<>' );
26:     write( ' B' )
27:   END.
```

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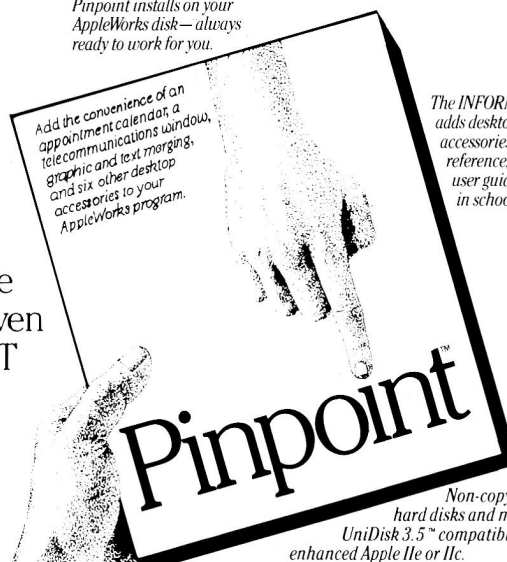
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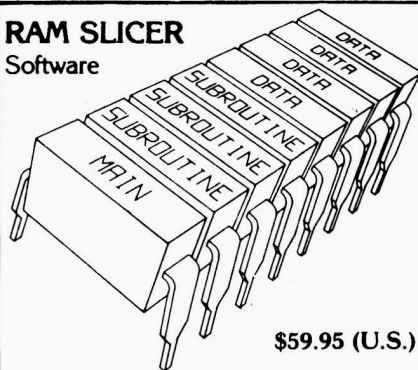
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PASCAL PRIMER

and could represent checkerboards in game programs.

To access an individual element, use brackets as you did before, but identify the row and column indexes. ChessBoard[4, 2] locates a single integer at row 4, column 2; ChessBoard[5] locates row 5, an array of eight integers; and ChessBoard with no brackets references the entire two-dimensional array.

Beyond two dimensions, arrays quickly use up memory. An array with indexes [1..10,1..10,1..10] of type integer takes 1000 (10 by 10 by 10) words, with each word equal to 2 bytes. Adding a fourth dimension takes 10,000 words, or 20,000 bytes. Add a fifth, and you're out of memory!

A Bug Surfaces

While writing this month's example to further explain arrays, I discovered an apparently unreported compiler bug. On page 86, the *Apple Pascal Reference Manual* claims you can directly compare array variables as in the following IF statement that compares arrays A and B:

```
IF A = B
  THEN writeln( 'A = B' )
```

The manual goes on to say that "the statement following the THEN will be executed if each element of A is equal to the corresponding element of B." But it turns out that such comparisons may not work if array elements are Boolean true and false values.

Listing 1 proves this assertion by declaring two arrays of nine Boolean variables. Lines 13-17 initialize the array elements, which the program displays in a FOR loop at lines 18-20. If your system has the bug, Pascal will mistakenly report in lines 22-26 that the arrays are not the same, even though all array elements are identical!

I believe this bug occurs because Pascal ignores all bits in Boolean variables except the least significant bit to determine if the variables are true or false. But the array comparison seems to consider all bits, even though only one is significant. This leads me to assume that the expression (NOT TRUE) and the value FALSE are logically equivalent, but do not always have the same in-memory bit patterns. Comparing those patterns, therefore, produces unreliable results.

The moral is to never directly compare Boolean arrays. I think a proper fix would be to prohibit such comparisons on the grounds that compilers

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should not allow expressions they cannot properly evaluate.

A Game of Agony

Several of you wrote to ask if Apple Pascal is any good for writing games. I'm tempted to shout, "You bet it is!" Instead, I'll present my answer in **Listing 2**, Agony, a popular game that's sure to exercise your brain muscles. It fulfills a promise I made several months back to include more examples of TurtleGraphics.

Agony starts with an Apple "star" in the center of a three-by-three game board. To play, type the number of any star. For reference, the right center of the display shows the numbers of the squares. Your first move is always five. Each time you type a star number, other stars change to dots. Your goal is to change the pattern to resemble the **Figure**. If all stars become dots, you lose. Although the

Figure. Winning game board for Agony.

```

*      *      *
*      .      *
*      *      *
    
```

changes may at first seem random, there's a design to the dementia—you can accomplish your goal in 11 moves.

Analyzing Agony

Listing 2 is longer than usual, but you should recognize most features by now. The program uses arrays in several places, and has a number of procedures you can extract for your own games.

The program also shows how I solved the Boolean array bug. I discovered the problem in a previous version where I used these statements in place of the ones in lines 185-187:

```

Win := ( Board = WinPattern );
IF NOT Win
    THEN Lose := ( Board = LosePattern );
    
```

Because the three boards are Boolean arrays of type PlayingField, the direct comparisons fail to recognize wins and losses. The Boolean function at line 44 fixes the problem. EqualPatterns takes two array variables as parameters p1 and p2, and compares each array element in a

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PASCAL PRIMER

Listing 2. AGONY.TEXT.

```

0: (*$S$*)
1: PROGRAM Agony; (* An Apple Pascal game by Tom Swan *)
2:   uses Applestuff, TurtleGraphics;
3:
4: CONST
5:   ReverseMode = 5; (* Character display modes *)
6:   NormalMode = 10;
7:
8: TYPE
9:   PlayingField = ARRAY[ 1 .. 9 ] OF Boolean;
10:  TestPatterns = ARRAY[ 1 .. 9 ] OF String[5];
11:
12: VAR
13:   Choice, (* Star to "shoot" *)
14:   Shots : integer; (* Number of shots taken *)
15:   Win, Lose, Quit : Boolean; (* True / false variables *)
16:   Patterns : TestPatterns; (* Stars affected per choice *)
17:   Board, (* Game board *)
18:   WinPattern, (* Match equals win *)
19:   LosePattern : PlayingField; (* Match equals lose *)
20:
21: FUNCTION Val( ch : char ) : integer;
22: (* Return integer value of character ch *)
23: BEGIN
24:   Val := Ord( ch ) - Ord( '0' )
25: END; (* Val *)
26:
27: PROCEDURE ShowNum( n : integer );
28: (* Display integer n *)
29: VAR s : string[6];
30: BEGIN
31:   str( n, s ); wstring( s )
32: END; (* ShowNum *)
33:
34: PROCEDURE Print( x, y : integer; s : string );
35: (* Display string s at x and y *)
36: BEGIN
37:   moveto( x, y ); wstring( s )
38: END; (* Print *)
39:
40: PROCEDURE Println( x, y : integer; s : string );
41: (* Display string s at x and y. Clear to end of line *)
42: VAR i : integer;
43: BEGIN
44:   Print( x, y, s );
45:   FOR i := length( s ) TO 40 DO wchar( ' ' )
46: END; (* TextLine *)
47:
48: FUNCTION EqualPatterns( VAR p1, p2 : PlayingField ) : Boolean;
49: (* True if two playing field patterns are equal *)
50: VAR i : integer;
51: BEGIN
52:   EqualPatterns := true;
53:   FOR i := 1 TO 9 DO
54:     IF p1[i] <> p2[i]
55:       THEN EqualPatterns := false
56:   END; (* EqualPatterns *)
57:
58: PROCEDURE ShootStars( n : integer; VAR Shots : integer );
59: (* "Shoot" the stars controlled by location n. Advance Shots *)
60: VAR i, j : integer;
61: BEGIN
62:   IF Board[n] THEN
63:     BEGIN
64:       Shots := Shots + 1;
65:       FOR i := 1 TO length( Patterns[n] ) DO
66:         BEGIN
67:           j := val( Patterns[n][i] );
68:           Board[ j ] := NOT Board[ j ]
69:         END
70:       END
71:   END; (* ShootStars *)
72:
73: PROCEDURE SelectStar( VAR StarNumber : integer; VAR Quit : Boolean );
74: (* Select and return StarNumber; Quit = true if selection = 0 *)
75: VAR ch : char;
76: BEGIN
77:   REPEAT
78:     read( keyboard, ch );
79:     StarNumber := val( ch )
80:   UNTIL ( StarNumber >= 0 ) AND ( StarNumber <= 9 );
81:   Quit := ( StarNumber = 0 )

```

Listing continued.

Table. Work-file commands.

Command	Description
G(et	Specifies work-file name
N(ew	Clears work files and starts new ones
S(ave	Saves work to named disk files
W(hat	Displays work-file names and status

FOR loop. The function shows the correct way to compare Boolean arrays and avoid the bug.

More Filer Commands

The list of work-file commands in the **Table** completes my ongoing look at the Apple Pascal Filer.

G(et

To G(et a text file, type G, then the name of the file you want to edit or compile. Don't type the file's extension, .TEXT or .CODE. If the Filer locates your files, you'll see a message similar to the one below:

Text & Code file loaded

The Filer loads the file names, not the file contents, into memory. After that, the editor and compiler automatically use those names. Typing R at the >Command: menu, for example, runs the work .CODE file or compiles and then runs the work .TEXT file, storing the result in SYSTEM.WRK.CODE.

If you change a loaded text file and save the result by updating SYSTEM.WRK.TEXT, the Filer asks:

Throw away current workfile?

Answer N and use the S(ave command to preserve your changes. Then, type G and answer Y to the above prompt to start a new work file.

A little-known fact is that G(et also erases a back-up copy of a file with the extension .BACK in place of the usual .TEXT. To use this feature, T(ransfer MYPROG.TEXT to MYPROG.BACK, then G(et MYPROG. After editing and updating, a second G(et prompts:

Remove MYPROG.BACK ?

Answer Y or N to clear the work file, then type a new file name. Only if you answer Y does G(et remove the back-up copy.

N(ew

Typing N clears SYSTEM.WRK.TEXT and SYSTEM.WRK.CODE files

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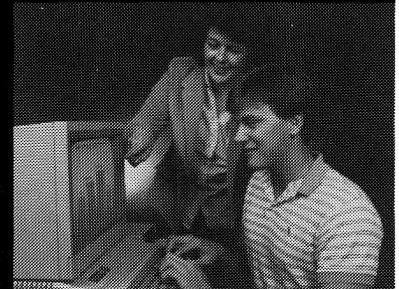
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PASCAL PRIMER

Listing continued.

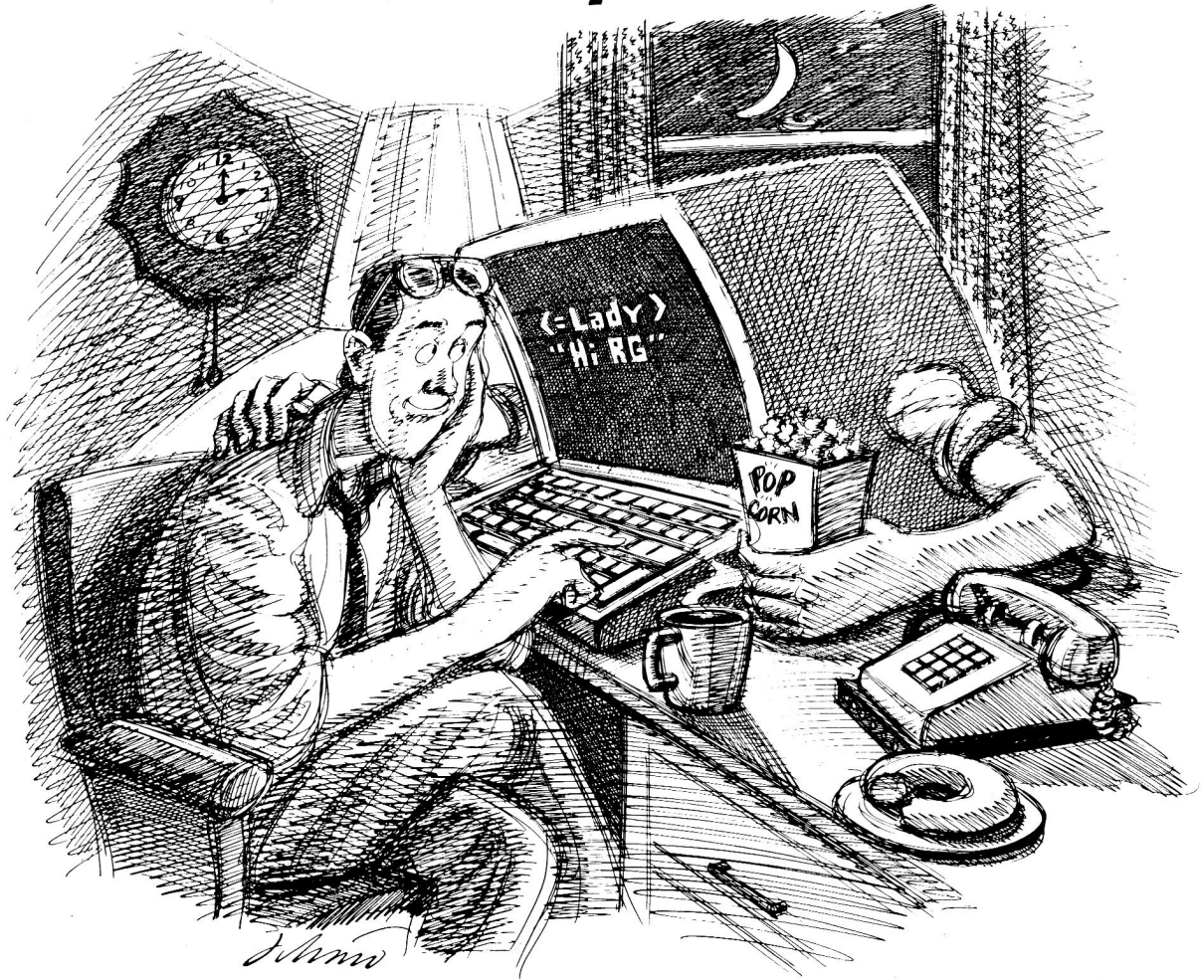
```

82: END; (* GetPosition *)
83:
84: PROCEDURE DrawLine( x1, y1, x2, y2 : integer; Color : ScreenColor );
85: (* Connect coordinate (x1,y1) and (x2,y2) with colored line *)
86: BEGIN
87:   MoveTo( x1, y1 );
88:   PenColor( Color );
89:   MoveTo( x2, y2 );
90:   PenColor( None );
91: END; (* DrawLine *)
92:
93: PROCEDURE ShowField( VAR Board : PlayingField; Shots : integer );
94: (* Display pattern in this game board, and number shots taken *)
95: VAR i : integer;
96: BEGIN
97:   moveto( 256, 175 );
98:   ShowNum( Shots );
99:   FOR i := 1 TO 9 DO
100:    BEGIN
101:      MoveTo( 100 + ( ( i - 1 ) MOD 3 ) * 40,
102:              132 - ( ( i - 1 ) DIV 3 ) * 40 );
103:      IF Board[ i ]
104:      THEN wchar( Chr(1) )      (* Apple *)
105:      ELSE wchar( Chr(0) )      (* Dot *)
106:      END (* for *)
107:    END; (* ShowField *)
108:
109: PROCEDURE ShowBoard;
110: (* Display blank game board *)
111: VAR i, x, y : integer;
112: BEGIN
113:   x := 80; y := 35;
114:   FOR i := 1 TO 4 DO
115:     BEGIN (* Draw board squares *)
116:       DrawLine( 80, y, 200, y, Orange );
117:       DrawLine( x, 35, x, 155, Orange );
118:       y := y + 40; x := x + 40
119:     END; (* for *)
120:     chartype( ReverseMode );
121:     print( 10, 175, ' A g o n y ' );
122:     print( 10, 103, ' Lose ' );
123:     print( 10, 39, ' Win ' );
124:     chartype( NormalMode );
125:     print( 192, 175, 'Tries = ' );
126:     print( 145, 12, 'Type 1 to 9 to play' );
127:     print( 145, 2, 'Type 0 to quit' );
128:     print( 222, 109, '1 2 3' );
129:     print( 222, 93, '4 5 6' );
130:     print( 222, 77, '7 8 9' );
131:     print( 18, 147, ' . . . ' );
132:     print( 18, 131, ' . . . ' );
133:     print( 18, 115, ' . . . ' );
134:     print( 18, 83, ' * * * ' );
135:     print( 18, 67, ' * * * ' );
136:     print( 18, 51, ' * * * ' );
137:   END; (* ShowBoard *)
138:
139: PROCEDURE Initialize;
140: (* Set up variables and display instructions *)
141:
142: PROCEDURE MakeField( BitString : String;
143:                      VAR Pattern : PlayingField );
144: (* Set bits in Boolean Pattern array according to BitString *)
145: VAR i : integer;
146: BEGIN
147:   FOR i := 1 TO length( BitString ) DO
148:     Pattern[i] := ( BitString[i] = '1' )
149:   END; (* MakeField *)
150:
151: BEGIN
152:   Patterns[1] := '1245';      Patterns[2] := '123';
153:   Patterns[3] := '2356';      Patterns[4] := '147';
154:   Patterns[5] := '24568';     Patterns[6] := '369';
155:   Patterns[7] := '4578';     Patterns[8] := '789';
156:   Patterns[9] := '5689';
157:   MakeField( '111101111', WinPattern );
158:   MakeField( '000000000', LosePattern );
159:   MakeField( '000010000', Board );
160:   Win := false; Lose := false; Quit := false; Shots := 0;
161:   InitTurtle;
162:   ShowBoard;
163:   ShowField( Board, Shots );
164: END; (* Initialize *)
165:

```

Listing continued.

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PASCAL PRIMER

Listing continued.

```
166: PROCEDURE CleanUp;
167: (* Display score and end program *)
168: BEGIN
169:   IF Win THEN Println( 0, 12, ' Congratulations, you win!' ) ELSE
170:   IF Lose THEN Println( 0, 12, ' Sorry, you lose!' ) ELSE
171:     Println( 0, 12, ' Agonizing, isn't it?' );
172:   Println( 0, 2, ' Type U to try again, return to quit...' );
173:   REPEAT (* wait *) UNTIL Keypress;
174:   TextMode
175: END; (* CleanUp *)
176:
177: BEGIN
178:   Initialize;
179:   REPEAT
180:     SelectStar( Choice, Quit );
181:     IF NOT Quit THEN
182:       BEGIN
183:         ShootStars( Choice, Shots );
184:         ShowField( Board, Shots );
185:         Win := EqualPatterns( Board, WinPattern );
186:         IF NOT Win
187:           THEN Lose := EqualPatterns( Board, LosePattern );
188:         END (* if *)
189:       UNTIL Win OR Lose OR Quit;
190:       CleanUp
191:     END.
```

End of listing.

from your boot disk. If those files don't exist or are unchanged since the last G(et or S(ave, you'll see the message "Workfile cleared." If you do change your work file, N(ew operates similarly to G(et, asking for permission to throw away the current work file.

On occasion, the Filer doesn't know you saved your changes. This often happens when you edit and write to a named disk file instead of updating SYSTEM.WRK.TEXT. In that case, the Filer still asks, "Throw away current workfile?" If you've already saved your work, answer Y.

S(ave

After editing and updating your work file, type S to save your changes from SYSTEM.WRK.TEXT and SYSTEM.WRK.CODE to named files. The first time you S(ave a file, the Filer asks you for a file name. If a file with that name already exists, the Filer asks if you want to remove the old file. If you answer Y, it first saves your file, then removes the old copy. This preserves the original in case of disk errors.

The next time you S(ave the same file, the Filer asks:

Save as APPLE2:MYPROG ?

Answer Y to save your file under the same name. If you answer N, the Filer asks you for a file name. If you try to save any work file already

saved, the Filer says, "Workfile is saved."

W(hat

If you forget the name of the current work file you used in the last G(et, use the W(hat command. This command reports "not named" if you never saved the file by name; otherwise, it shows the name of your file. If you changed the file, W(hat tells you "(not saved)." You could then use the S(ave command to permanently store your changes.

Pascal News

The major story this month is an all-but-confirmed rumor of a new Apple Pascal version 1.3. Sources tell me to expect support for 3½-inch disk drives and newly revised manuals. I also understand that Apple's upgrade policy itself is due for an update—a welcome change considering the problems and hurt feelings that plagued the last version change from 1.1 to 1.2. As soon as I receive the new version, I'll devote an entire column to it. ■

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.

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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.

80-Column Color Monitor

I have an Apple II Plus with a language card and a Comrex CR-6500 color monitor. When I purchased this system in December 1982, I was told I couldn't get an 80-column display with a color monitor. Recent ads lead me to believe that it may now be possible to buy a card that will provide this. If this is true, would you please tell me what the options are and what drawbacks to watch out for. Is there any source that reviews most of the available cards and outlines their merits and pitfalls? Any information you have will be appreciated.

Joan Schilling
Wooster, OH

Two types of color monitors are available for the Apple—NTSC monitors and RGB monitors. The output of the Apple video jack is NTSC-compatible, but until recently, no NTSC monitors suitable for 80-column text display were available. That has changed with Apple's recent release of the A2M2056 ColorMonitor II/e and A2M4043 ColorMonitor II/c (see "Apple Announces New Products That Dazzle, New Enhancements That Perform," November 1985, p. 12). I haven't yet seen these monitors for myself, but I understand their quality is less than, but approaches, that of a good RGB. I'll report on them more reliably after I get a look.

RGB monitors with horizontal resolution of 560 or more points are suitable for 80-column display. Your

Comrex CR-6500 is an RGB monitor, but its resolution is only 300 by 260 points, good enough only for 40 columns of text. Bill O'Brien's "Screen Tests" in the October 1985 inCider (p. 16) will give you a good idea of the quality available in high-resolution RGB monitors.

To use an RGB monitor with an Apple II Plus, you need a peripheral card that converts Apple video to RGB video. The combined cost of a good RGB monitor and this card will be in the \$500–\$800 range, so this is not an inexpensive solution.

Printer Aspect Ratio

I use an Epson MX-80 printer (Graftrax ROM) and Grappler interface card with my Apple II Plus. Fontrix 1.5, from Data Transforms, is the most useful program for my applications, but it produces severe aspect-ratio distortion with my printer. Everything is horizontally "squashed," so graphics images appear tall and thin, rather than the proper proportion as on the monitor. For example, it prints a circle as a vertical ellipse. I have Data Transforms' other program, Graftrix, but it prints correctly.

I wrote the company about this problem. The representatives explained that Graftrix has separate driv-

ers for each printer, but since Fontrix is compatible with many more configurations, it isn't possible to provide a separate driver for each version.

That doesn't solve my aspect-ratio problem. Do you know of some fix for the MX-80 or Grappler card, or a way to rewrite a portion of the Fontrix graphics-dump routines so they produce proper results? I'm wondering if there is a way to take the MX-80 driver of Graftrix and incorporate it into my copy of Fontrix. I'm not interested in making the software compatible with other printers, so drastic modification of the Fontrix printing program would be acceptable. If you have a fix, I'd really appreciate knowing about it.

My other related question arose when Data Transforms suggested I consider buying a printer with a square aspect ratio. Since the company didn't mention a brand, can you tell me which printers on the market have equal or near equal aspect ratios?

I've run a test on all my graphics printing programs. The results for MX-80 with Graftrax are in **Table 1**, for you and your readers.

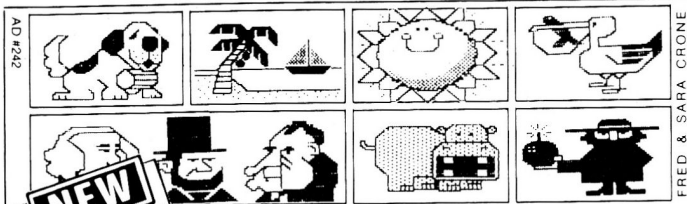
Stuart C. Keen, Jr.
Reston, VA

You don't need a square aspect ratio, Stuart, because Apple hi-res images don't have a square aspect ratio. In Apple 280-point graphics on a 4/3 aspect-ratio monitor or television, the ratio of horizontal distance between dot centers to vertical distance between dot centers is about .84 (see computation on page 8-28, Understanding the Apple II by Jim Sather, Quality Software, 1983). This would be a good ratio to have available to a printer for Apple graphics dumps. Another would be .42, the display aspect ratio for 560-point Apple graphics.

The vertical distance between dots in the MX-80 and other printers with

Table 1. Proportionality of printer dumps from various programs.

Software	Results
Printographer	True aspect ratio
Graftrix	True aspect ratio
Image Print	True aspect ratio
Fontrix	Vertical greater
Graphics Dept	Horizontal greater
Zoom Graphics	Vertical greater
Screen Dump	Horizontal greater
The Print Shop	Vertical greater



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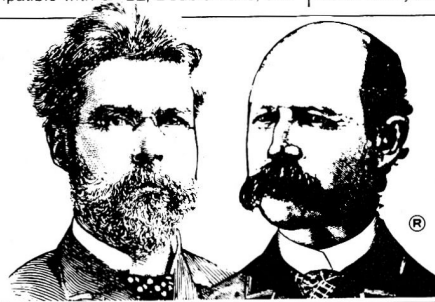
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nine- or seven-pin heads is fixed at 1/72 inch, since the pins are 1/72 inch apart in the head. Horizontal spacings available in the MX-80 are 1/60 and 1/120 of an inch. These yield H/V aspect ratios of 1.2 and 2.4, respectively. The Grappler uses 1/60-inch spacing for its control-I "G" standard-density dump. This results in a fat image, distorted by a factor of 1.4 (1.2/.84).

Epson FX, RX, and compatible printers have a greater variety of horizontal densities than the MX printers. In particular, the 1/80-inch spacing is just right for Apple dumps, yielding an H/V aspect ratio of .9 (72/80). My Super 5 EN-P1091 (a Panasonic KX-P1091 in disguise) has all the modes of the FX series, and I suspect a number of other printers are the same. If you can look at the reference manual of the printer you are thinking of buying, look for the ESC, " ", 4, n1, n2 bit-graphics command in the list of printer commands.

Incidentally, the FX (but not the RX) and compatible printers also have a 1/72-inch horizontal-dot spacing mode. This yields a square aspect ratio and would be useful in printing squares and circles generated by programs that didn't compensate for the unequal horizontal and vertical distances in the Apple display. But, it wouldn't be as good as the 1/80-inch mode for duplicating the proportions of the Apple display.

I don't think you can modify your Grappler to get proportional outputs from Fontrix, since it probably doesn't even use the Grappler dump routines, and the weakness is in the MX-80 anyway. I don't know if it's possible to give the MX-80 a 1/80-inch mode by modifying the Grafrax ROMs. I do know that this would be a major project for someone unfamiliar with MX-80 mechanisms and firmware.

It's certainly possible for you to modify the printer drivers in your copy of Fontrix, but I don't have a copy of the program and I'm not sure how easy or hard it would be. I

did look at the MX-80 driver in Dazzle Draw to see how its programmer achieved proportional output.

The programmer used a technique that extends half of the dot positions horizontally by one dot and all the dot positions vertically by one dot. This yields effective distances between dots of 1/36 inch vertically, 1/80 inch horizontally with 1/120-inch spacing selected, and 1/40 inch horizontally with 1/60-inch spacing selected. These spacings yield .45 and .9 aspect ratios, good for 560-point and 280-point dumps, respectively. Owners of FX/RX compatibles can see the result by comparing Dazzle Draw dumps of the same display using the MX driver and the FX/RX driver.

Your letter made me realize my Grappler+ was giving me needlessly distorted dumps since my printer is FX-compatible. I worked out a patch so the Grappler EPROM uses 1/80-inch spacings instead of 1/60-inch ones. With this patch, Grappler G, GS, and GD commands generate

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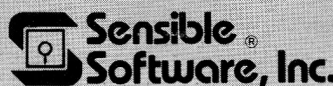
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Table 2. Patch to Grappler+ ROM for FX/RX-compatible printers.

Location	Old Data	New Data
\$20E8-\$20F0	Zeros	20 C8 CC A9 2A 20 C8 CC 60
\$26A2-\$26A3	C8 CC	E8 C8
\$26AC	4B	04
\$26B6	4C	01

dumps similar in proportion to the Apple display. As an added bonus, side by side (GS) and double size (GD) Grappler commands actually fit on 8½-inch paper. Just use GLS and GLD to make sure the dump starts at the left margin. The patch works only with FX/RX-compatible printers, not with MX printers.

To make the patch, remove the 2732 EPROM (or equivalent ROM) from your Grappler+ and read its data to RAM using a PROM burner. Enter the Monitor, move the data to \$2000-\$2FFF, and modify as noted in Table 2. Save the data to disk by typing BSAVE PATCH,A\$2000,L\$1000.

Burn this disk file to 2732 EPROM using a PROM burner, and install this EPROM in your Grappler+. Save your original Grappler+ ROM or EPROM in a safe place.

Disk Write Protection

At a meeting of my Apple user group, a demonstrator explained a new addition to the club's commercial software library, but warned prospective users that the program erases itself if the disk is write-protected. The demonstrator said this is possible since the disk drive's write-protect switch is only a software-detectable

on-off switch, which doesn't prevent a program from writing to a disk.

I've always thought that the way the write-protect switch was tied into the drive circuitry prevented all writing to a disk when the switch was triggered. In other words, if you write-protect a disk, it's guaranteed to be safe from all attempts to write to it. Am I right, or is the demonstrator? Or does it depend on the disk-drive manufacturer?

Bruce Hahne
Midland, MI

You're right, Bruce. It's true that a program can read the state of the write-protect switch (or photo sensor on some drives). Disk-writing software usually checks the state of the write-protect switch before attempting to write, then notifies you if a disk is write-protected. A program can go through the motions of writing to a write-protected disk, but won't affect the disk data because logic gating in the drive prevents activation of the

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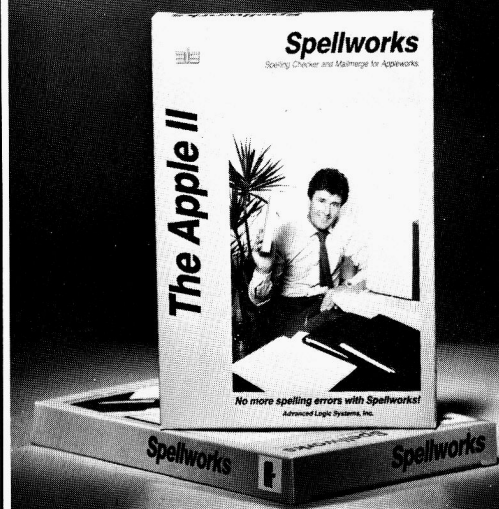
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Program listing. Clobber disk track.

```
5 END : REM ACCIDENT PROTECTION
10 SLOT6 = 49376 : REM $C0E0
20 DRIVE1 = PEEK (SLOT6 + 10)
30 DRIVESTART = PEEK (SLOT6 + 9)
40 WRITE = PEEK (SLOT6 + 15)
50 FOR DLY = 0 TO 1000 : NEXT
60 DRIVEOFF = PEEK (SLOT6 + 8)
```

write circuitry. This is certainly true of the Apple Disk II drive, and it's probably true of all alternate-source, Apple-compatible drives.

The accompanying **BASIC Program listing**, which clobbers the track where the disk head is resting, proves that programs cannot write to a write-protected disk on any drive. Initialize a blank disk, then put a write-protect tab on it. Type CATALOG to move the head to the catalog track, then load the program and type RUN 10. If the disk isn't write-protected, the program clobbers the catalog track

and subsequent attempts to catalog the disk will produce an I/O error. If the disk is write-protected, you can still catalog it.

The track-clobbering program can be quite dangerous if you misuse it. Use the program only with blank disks as described here; otherwise, you might destroy important data. Don't even save this program on a disk with other data for fear you might accidentally run it and lose your data. Clobbering is forever.

Surge Protection

Come on, Jim. All those books may be good, but Ralph Olsen's letter in the September 1985 Apple Clinic ("Apple IIe Schematics," p. 58) contains an error. Sams does have an Apple IIe schematic—Computerfacts CC10. Computerfacts are also available for the Epson MX-100 (CP2) and the Apple II monitor (CMT8). As for the disk drive, it's too bad you can't pirate Apple's disk package, which is available only to dealers (who charge

bucks to repair simple little things), and not to novices who know nothing about electronics.

While I'm at it, I could use some help, and many other users could, too. Although manufacturers make filters that protect computers from transient voltages, lightning, noise, and the like, all of these filters are for three-wire power circuits. It may come as a shock to some manufacturers that just as many homes, if not more, have two-wire systems. How can we protect our equipment if the wall plugs come with two holes and not three? A cheater (a three-prong to two-prong adapter) certainly won't help.

Dallis J. Christensen
Holladay, UT

I was waiting for product descriptions or review copies from Sams before I mentioned the CC10, but I haven't received them yet. Several readers, though, wrote to recommend

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the product. Tim Flaming of Cypress, California, says the set consists of 24 8½" by 11-inch sheets with photos, schematics, and written documentation covering the Rev B motherboard, power supply, and Disk II controller board.

As for Apple's disk-alignment package, don't bother trying to copy the disk. That thing is written with a special rig, not a normal disk drive. It's true that many Apple owners would benefit from Apple's service manuals and aids, but it's normal and acceptable for manufacturers to reserve special tools for their servicing dealers.

You're wrong about noise filtering and surge protection in two-wire houses, Dallas. The answer is a cheater. Roy Hicks of RH Electronics told me that most, if not all, protector/filters with three-prong plugs and sockets will protect and filter hot line to common line, not just hot to ground and common to ground.

Roy also suggested looking for IEEE class-B surge protection in the

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device specifications, not just for class A. Class-B specification devices provide effective protection to within 20 feet of your house's power panel; class-A devices provide protection only to within 50 feet. RH Electronics makes two devices that provide class-B surge protection and noise filtering—the Super Fan II and the Dual Outlet Surge Protector (with 5-foot power cord).

To use a three-wire protector/filter or other device in a two-wire house, plug the three-prong device into a cheater, and plug the cheater into a wall socket. Cheaters are safe only if the ground tab is adequately grounded. To do this, drill a small hole through the floor and connect a wire through the hole between a basement water pipe and the ground tab of the cheater. The ground wire, which protects you from possible electrical shock, is necessary because of the inherent shock hazard of two-wire electrical wiring. ■

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BASIC Scroll Control

by Dan Bishop

As you explore new applications for your Apple and begin to write more complex programs, you'll eventually need to display more information than your monitor can handle on a single screen.

The simplest and least satisfactory approach is to let all of the data scroll across the screen, while you control the scrolling from the keyboard. A better method is to write your program so that it displays a full screen of information at a time, and pauses between displays until you press the return key. This way, the program is in control and, by letting you page from one screen to the next, it's more "user friendly," as well.

This month, I'll explain the BASIC programming techniques you can use to display your data one screen at a time, and I'll develop that algorithm so that you can scroll forward or backward. A final refinement will provide you during the display process with a menu of options that lets you page forward and backward, start again from the first screen or jump to the last screen, or exit the program.

For those who are tax-conscious (and at this time of year, who isn't?), I've included a program that calculates an amortization schedule on any loan up to 30 years in length and uses these screen-display techniques to show any part of the schedule, with subtotals on principal and interest paid for the period selected. For tax-deduction purposes, you'll be able to find out the amount of interest you've paid throughout the year on any of your loans.

The Variable FOR...NEXT Loop

The key to screen-display control for long lists of data is the FOR...NEXT loop in BASIC. You've probably used this command structure many times. For example, the simple program below prints the numbers 1 to 10, each followed by three dots and the word

Applesoft lets you display your data one screen at a time.

HELLO, down the left side of the screen:

```
10 FOR I = 1 TO 10
20 PRINT I;"...HELLO"
30 NEXT I
```

The loop limits in line 10 control the number of repetitions, or cycles through the loop. In this case, the loop counter starts with a value of 1, and increases by increments of +1 each time the cycle is completed. The program continues cycling until the loop counter has a value greater than ten.

Adding a STEP function to the FOR command line gives you control over the amount by which the counter is incremented. You can use negative numbers, giving a "countdown" character to the loop counter. Thus, the following program makes the numbers 10 through 1, each followed by three dots and the word GOODBYE, appear in the left column of your screen:

```
10 FOR I = 10 TO 1 STEP -1
20 PRINT I;"...GOODBYE"
30 NEXT I
```

What gives the FOR...NEXT command its great flexibility in programming is that variables can replace all three of the numbers in line 10 above. You can set these variables within the program and execute the loop on the basis of the values you give them. The program can then change the values of the variables and execute the loop again, this time using the new values.

In this month's listings, I'll use the variables listed in the **Table** for loop control. You give values to C1 and C9 from the keyboard—you must specify the range of data elements in which you're interested. You may also type in C4's value, if you like.

On the other hand, the program as-

signs C5 either +1 or -1, depending on the values you type in for C1 and C9. If C9, the ending boundary, has a lower value than C1, the starting boundary, the program assumes you want your computer to display the data backward, and sets C5 to -1.

The program also calculates C2 and C8, and gives them new values before each loop cycle. For the first display, the program always sets C2 equal to C1, and C8 equals $C1 + C4 - 1$, where the value of C5 determines the signs. In BASIC, this formula becomes:

$$C8 = C1 + C5 * (C4 - 1)$$

For example, suppose you want to display elements 31 through 95 from a set of data containing 200 elements. Your program would ask you to input the numbers 31 and 95 for the starting and ending boundaries. The program assigns these values to C1 and C9, and +1 to C5. Now if you set C4 as 10 (the computer will display ten values at a time), the program will assign 31 to C2 and $31 + 1 * (10 - 1)$, or 40, to C8. The first screen display will show elements 31 through 40.

For the second screen display, the program sets the value of C2 to the old value for C8 plus one, or 41, and changes the value of C8 to $C2 + C5 * (C4 - 1)$, or 50. Then your computer executes the display loop and displays the next ten data elements.

Whenever you use variables in FOR...NEXT loops, it's important to

Table. Variables for loop control.

C1, C9	Range boundaries for the entire set of data to be displayed through several screens
C2, C8	Starting and ending values for the FOR...NEXT loop for the current screen display
C5	STEP value to be used
C4	Number of lines to appear on the display screen at any one time

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Listing 1. Simplest form of scroll control—unidirectional display of data.

```

1  REM  ASCII VALUES LISTER
2  REM  PROGRAM TO ILLUSTRATE
3  REM  SCREEN CONTROL
4  REM  TECHNIQUES FOR LARGE
5  REM  AMOUNTS OF DATA
7  REM
8  REM  *****
9  REM
10 REM  *** MAIN PROGRAM ***
11 REM
12 REM  *****
13 REM
20 DIM A(256),A$(256)
30 HOME : GOSUB 1000
40 INPUT "ENTER STARTING NUMBER (0-255)...";C1
50 INPUT "ENTER ENDING NUMBER (0-255)....";C9
60 IF C1 < 0 OR C1 > 255 OR C9 < 0 OR C9 > 255 THEN 100
70 IF C9 < C1 THEN 100
80 INPUT "ENTER DISPLAY SIZE (# LINES)...";C4
90 GOSUB 500
100 END
494 REM
495 REM  *****
496 REM  DISPLAY VALUES IN ARRAY
497 REM  ONE SCREEN AT A TIME
498 REM  *****
499 REM
500 HOME :C2 = C1:C8 = C1 + C4 - 1
510 REM
520 IF C2 > C9 THEN C2 = C9
530 IF C8 > C9 THEN C8 = C9
560 GOTO 610
610 HOME
620 FOR I = C2 TO C8
630 PRINT A(I),A$(I)

```

Listing continued.

verify that the values these variables represent are valid before your computer executes the loop. Thus, after the program assigns each new set of values to C2 and C8, it checks the values to be sure they are both within the boundaries C1 and C9 have set. If they aren't, the program gives C2 or C8 (or both) the appropriate boundary value.

Scroll Control

Listings 1 through **3** make increasingly sophisticated use of variable FOR...NEXT loops for scroll control. In all three programs, the data used consist of two arrays of 256 elements each. The numeric array A(i) contains integers between zero and 255 (in sequence), and the string array A\$(i) contains the corresponding ASCII characters for these integers. The program loads the arrays with the values during execution of the subroutine at line 1000.

Listing 1 is the simplest form of variable loop control. It assumes that C1 will always be less than C9 (thereby eliminating the need for C5),

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then assumes the STEP function to always be +1. When you run the program, it asks you to type in the starting and ending numbers for the range of ASCII characters you want to see. It then asks you to type in the display size (number of lines) you want to use. The program assigns this value to C4. If you type in a number larger than your screen size, the computer will still display the elements, but the first elements to appear will scroll off the top of the screen.

With values for C1, C9, and C4 in hand, the computer next executes the display subroutine at line 500. (Note that the line numbers in **Listings 1** and **2** are not incremented evenly, so that lines in the first two listings will correspond to lines appearing in **Listing 3**.)

In **Listing 1**, line 500 calculates the starting values for C2 and C8, and lines 520 and 530 verify that these starting values fit within the specified range, C1 through C9, and reset them if necessary. The computer then displays the first screen of data (lines 520-670), ending in a prompt to

Listing continued.

```

640 NEXT I
670 INPUT "PRESS <RET> ...";X$
680 IF C8 = C9 THEN 740
690 GOSUB 750: GOTO 510
740 RETURN
750 C2 = C8 + 1: C8 = C8 + C4: RETURN
994 REM
995 REM *****
996 REM ROUTINE TO LOAD ARRAYS
997 REM WITH ASCII VALUES AND
998 REM CHARACTERS
999 REM *****
1000 PRINT "LOADING ARRAYS..."
1010 FOR I = 0 TO 255
1020 A(I) = I
1030 A$(I) = CHR$(I)
1040 NEXT I
1050 RETURN

```

End of listing.

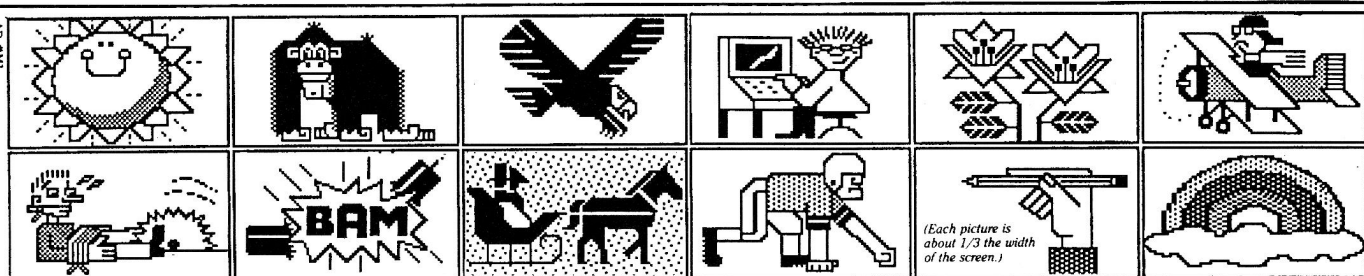
Listing 2. Scroll control with STEP function.

```

1 REM ASCII VALUES LISTER
2 REM PROGRAM TO ILLUSTRATE
3 REM SCREEN CONTROL
4 REM TECHNIQUES FOR LARGE
5 REM AMOUNTS OF DATA
6 REM BIDIRECTIONAL DISPLAYS
7 REM
8 REM *****
9 REM
10 REM *** MAIN PROGRAM ***
11 REM
12 REM *****
13 REM
20 DIM A(256), A$(256)
30 HOME : GOSUB 1000
40 INPUT "ENTER STARTING NUMBER (0-255)...";C1

```

Listing continued.



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Listing continued.

```

50 INPUT "ENTER ENDING NUMBER (0-255).....";C9
60 IF C1 < 0 OR C1 > 255 OR C9 < 0 OR C9 > 255 THEN 100
70 C5 = 1: IF C9 < C1 THEN C5 = - 1
80 INPUT "ENTER DISPLAY SIZE (# LINES)...";C4
90 GOSUB 500
100 END
494 REM
495 REM *****
496 REM DISPLAY VALUES IN ARRAY
497 REM ONE SCREEN AT A TIME
498 REM *****
499 REM
500 HOME :C2 = C1:C8 = C1 + C5 * (C4 - 1)
510 IF C5 = - 1 THEN GOTO 570
520 IF C2 > C9 THEN C2 = C9
530 IF C8 > C9 THEN C8 = C9
560 GOTO 610
570 REM
590 IF C2 < C9 THEN C2 = C9
600 IF C8 < C9 THEN C8 = C9
610 HOME
620 FOR I = C2 TO C8 STEP C5
630 PRINT A(I),A$(I)
640 NEXT I
670 INPUT "PRESS <RET> ...";X$
680 IF C8 = C9 THEN 740
690 GOSUB 750: GOTO 510
740 RETURN
750 C2 = C8 + C5:C8 = C8 + C5 * C4: RETURN
994 REM
995 REM *****
996 REM ROUTINE TO LOAD ARRAYS
997 REM WITH ASCII VALUES AND
998 REM CHARACTERS
999 REM *****
1000 PRINT "LOADING ARRAYS..."
1010 FOR I = 0 TO 255
1020 A(I) = I
1030 A$(I) = CHR$(I)
1040 NEXT I
1050 RETURN

```

End of listing.

Listing 3. Scroll control with menu options after each screen display.

```

1 REM ASCII VALUES LISTER
2 REM PROGRAM TO ILLUSTRATE
3 REM SCREEN CONTROL
4 REM TECHNIQUES FOR LARGE
5 REM AMOUNTS OF DATA
6 REM BIDIRECTIONAL DISPLAYS
7 REM AND FULL PROMPT MENU
8 REM *****
9 REM
10 REM *** MAIN PROGRAM ***
11 REM
12 REM *****
13 REM
20 DIM A(256),A$(256)
30 HOME : GOSUB 1000
40 INPUT "ENTER STARTING NUMBER (0-255)...";C1
50 INPUT "ENTER ENDING NUMBER (0-255).....";C9
60 IF C1 < 0 OR C1 > 255 OR C9 < 0 OR C9 > 255 THEN 100
70 C5 = 1: IF C9 < C1 THEN C5 = - 1
80 INPUT "ENTER DISPLAY SIZE (# LINES)...";C4
90 GOSUB 500
100 END
494 REM
495 REM *****
496 REM DISPLAY VALUES IN ARRAY
497 REM ONE SCREEN AT A TIME
498 REM *****
499 REM
500 HOME :C2 = C1:C8 = C1 + C5 * (C4 - 1)
510 IF C5 = - 1 THEN GOTO 570
520 IF C2 > C9 THEN C2 = C9
530 IF C8 > C9 THEN C8 = C9
540 IF C2 < C1 THEN C2 = C1
550 IF C8 < C1 THEN C8 = C1
560 GOTO 610
570 IF C2 > C1 THEN C2 = C1
580 IF C8 > C1 THEN C8 = C1
590 IF C2 < C9 THEN C2 = C9

```

Listing continued.

press the return key to continue.

When you tap the return key, your computer checks the value of C8 to determine if there are any more screens to be displayed. If there are, the computer executes the one-line subroutine at 750, in which the program gives C2 and C8 new values for the next loop cycle. On the other hand, if C8 = C9, the computer has displayed all the necessary screens, and the program ends.

Listing 2 differs from **Listing 1**, in that you may reverse the values for C1 and C9 so that C9, the ending value, is less than the starting value. Line 70 checks for this possibility, and, if true, assigns a value of -1 to C5, the STEP function. The computer uses C5 in the FOR...NEXT loop at line 620, of course, and in lines 500 and 750 to determine the values for the loop parameters C2 and C8.

Since it's possible to decrement C2 and C8 through each cycle, an additional check on C2 and C8 is required (lines 590-600) to be sure C2 and C8 are not less than C9 (the lowest boundary value when C5 = -1).

The most sophisticated of the three programs, **Listing 3**, contains the algorithm for handling just about any scroll-control situation you might need. In addition to letting the computer display your data either forward or backward, the program gives you a menu at the bottom of each display, so that you can type in one of five characters. N makes the next screen display appear, and P produces the previously displayed screen (unless you're at the edge of your C1/C9 boundaries). F starts the process over with the very first screen, while L displays the last screen in the sequence (even though that screen may not have appeared yet). Finally, typing X will terminate the display process and end the program.

To handle the four options that present additional display screens, subroutines 750, 760, 770, and 780 provide the calculations that give C2 and C8 their new values. Because of the greater number of possibilities now allowed, four additional validation checks are also necessary; they're located between lines 510 and 610.

Since different computer configurations—systems with various add-on cards—handle ASCII codes between zero and 31 and 96 to 255 in different ways, you should restrict your first tests with any of these three programs to values between 32 and 95.

Listing continued.

```

600 IF C8 < C9 THEN C8 = C9
610 HOME
620 FOR I = C2 TO C8 STEP C5
630 PRINT A(I),A$(I)
640 NEXT I
650 PRINT "PRESS N, P, F, L OR X FOR"
660 PRINT "NEXT, PREV, FIRST, LAST OR"
670 INPUT "      CANCEL...";X$
680 IF X$ = "X" THEN 740
690 IF X$ = "N" THEN GOSUB 750: GOTO 510
700 IF X$ = "P" THEN GOSUB 760: GOTO 510
710 IF X$ = "F" THEN GOSUB 770: GOTO 510
720 IF X$ = "L" THEN GOSUB 780: GOTO 510
730 GOTO 510
740 RETURN
750 C2 = C8 + C5: C8 = C8 + C5 * C4: RETURN
760 C8 = C2 - C5: C2 = C2 - C5 * C4: RETURN
770 C2 = C1: C8 = C1 + C5 * (C4 - 1): RETURN
780 C8 = C9: C2 = C8 - C5 * (C4 - 1): RETURN
994 REM
995 REM *****
996 REM ROUTINE TO LOAD ARRAYS
997 REM WITH ASCII VALUES AND
998 REM CHARACTERS
999 REM *****
1000 PRINT "LOADING ARRAYS..."
1010 FOR I = 0 TO 255
1020 A(I) = I
1030 A$(I) = CHR$(I)
1040 NEXT I
1050 RETURN

```

End of listing.

Listing 4. Amortization processor.

```

1 REM AMORTIZATION PROCESSOR
2 REM INCIDER MAGAZINE - FEB 1986
3 REM BY DAN BISHOP
4 REM APPLESOFT ADVISOR
5 REM *****
6 REM MAIN PROGRAM
7 REM *****
10 HOME
20 DIM P(360),I(360),B(360)
30 F2 = 0: GOSUB 1000
40 GOSUB 500
50 GOSUB 2000
60 GOSUB 100
70 IF F1 = 1 THEN GOSUB 2100: GOTO 60
80 IF F1 = 2 THEN 30
90 END
95 REM
96 REM *****
97 REM MENU DISPLAY
98 REM *****
99 REM
100 HOME : PRINT "DO YOU WANT..."
110 PR# 1
120 PRINT TAB( 10)"1. AN AMORTIZATION TABLE."
130 PRINT TAB( 10)"2. ANOTHER CALCULATION."
140 PRINT TAB( 10)"3. END THE PROGRAM."
150 PRINT
160 PRINT TAB( 20);: INPUT F1
170 IF F1 < 1 OR F1 > 3 THEN 100
180 RETURN
200 X$ = ""
210 INPUT " ";X$
220 RETURN
496 REM *****
497 REM PAYMENT CALCULATION
498 REM *****
500 P(0) = INT (((B(0) * AI / NP) / (1 - (1 / (AI / NP + 1))
    ^ N)) * 100 + .5) / 100
510 RETURN
530 I(J) = INT (B(J - 1) * (AI / NP) * 100 + .5) / 100
540 P(J) = INT ((P(0) - I(J)) * 100 + .5) / 100
550 B(J) = INT ((B(J - 1) - P(J)) * 100 + .5) / 100
560 I(0) = I(0) + I(J)
570 RETURN
591 REM
592 REM *****
593 REM INITIALIZING AND

```

Listing continued.

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Listing continued.

```

594 REM LOADING ARRAYS
595 REM *****
596 REM
600 PRINT : PRINT "INITIALIZING ARRAYS..."
610 FOR J = 1 TO 360
620 P(J) = 0:I(J) = 0:B(J) = 0
630 NEXT J:I(0) = 0
640 FOR J = 1 TO N
660 GOSUB 530
670 NEXT J
680 F2 = 1
690 RETURN
995 REM
996 REM *****
997 REM DATA INPUT ROUTINE
998 REM *****
999 REM
1000 HOME : PRINT "ENTER..."
1010 GOSUB 1200: GOSUB 200
1020 IF X$ = "" THEN GOSUB 1200: PRINT B(0): GOTO 1040
1030 B(0) = VAL(X$)
1040 GOSUB 1210: GOSUB 200
1050 IF X$ = "" THEN GOSUB 1210: PRINT AI: GOTO 1070
1060 AI = VAL(X$)
1070 GOSUB 1220: GOSUB 200
1080 IF X$ = "" THEN GOSUB 1220: PRINT NP: GOTO 1100
1090 NP = VAL(X$)
1100 GOSUB 1230: GOSUB 200
1110 IF X$ = "" THEN GOSUB 1230: PRINT N: GOTO 1130
1120 N = VAL(X$)
1130 PRINT "-----"
1140 RETURN
1195 REM
1196 REM *****
1197 REM INPUT SCREEN DISPLAY
1198 REM *****
1199 REM
1200 HTAB 4: VTAB 2: PRINT "BEG.BALANCE OF LOAN: ";: RETURN
1210 HTAB 4: VTAB 3: PRINT "ANN.INT. RATE (EG. 0.115): ";: RETURN
1220 HTAB 4: VTAB 4: PRINT "NUMBER OF PYMTS PER YEAR: ";: RETURN
1230 HTAB 4: VTAB 5: PRINT "TOTAL NUMBER OF PAYMENTS: ";: RETURN
1995 REM
1996 REM *****
1997 REM OUTPUT ROUTINES
1998 REM *****
1999 REM
2000 PRINT "EACH PYMT. WILL BE $ ";P(0)
2010 PRINT : PRINT "PRESS <RET>...";
2020 INPUT " ";X$
2030 RETURN
2100 IF F2 = 0 THEN GOSUB 600
2110 HOME : INPUT "ENTER STARTING PYMT.NO. (OR 0)...";C1
2120 IF C1 = 0 THEN 2290
2130 IF C1 < 1 OR C1 > N THEN 2100
2140 INPUT "ENTER ENDING PYMT.NO. (OR 0)...";C9
2150 IF C9 = 0 THEN 2290
2160 IF C9 < 1 OR C9 > N THEN 2100
2170 C2 = C1
2180 C8 = C2 + 1: IF C8 > C9 THEN C8 = C9
2190 SP = 0:SI = 0: GOSUB 2500
2200 PRINT C2 - 1; TAB( 30)B(C2 - 1)
2210 FOR K = C2 TO C8
2220 PRINT K; TAB( 7)P(K); TAB( 17)I(K); TAB( 30)B(K)
2230 SP = SP + P(K):SI = SI + I(K)
2240 NEXT K
2250 GOSUB 2600
2260 IF C8 = C9 THEN 2290
2270 C2 = C8 + 1
2280 GOTO 2180
2290 RETURN
2500 HOME : PR# 1
2510 PRINT "AMORT. OF $"B(0)" LOAN AT "AI * 100"&"
2520 PRINT "FOR "N" PYMTS AT "NP" PYMTS/YR"
2522 PRINT : PRINT "MO.PYMT: $"P(0)" TOTAL INT: $"I(0)
2530 PRINT "-----"
2540 PRINT "PYMT PRINCIPLE INTEREST REM.BALANCE"
2550 RETURN
2600 PRINT "-----"
2610 PRINT TAB( 7)SP; TAB( 17)SI;
2620 PRINT "PRESS <RET>...";
2630 INPUT X$: RETURN

```

End of listing.

After you save your program and test it in the safe range, go ahead and expand to these other areas and see what happens. You can't hurt your computer, although you may have to reboot the system if it hangs.

An Amortization Processor

Listing 4 contains the amortization-schedule program I promised last month. It includes last month's program, which calculated monthly payments for any loan. Note that the data-entry lines (1000-1230) are the same, since calculation of monthly payments requires the same input data you need to build an amortization schedule.

In last month's program, after the computer displayed the monthly payment for the loan, a prompt asked you if you wanted another run. This column's **Listing 4** displays a menu instead. You can choose to have another calculation, build an amortization table for this loan, or end the program.

If you decide to build an amortization table, the program jumps to the subroutine at line 2100. The program now asks you to type in the boundaries (payment numbers) for the payments of interest (C1 and C9) or to type a zero to return to the option menu. This program assumes that you won't need to see the table data backward, so be sure that the beginning payment number you type in is less than or equal to the ending payment number.

The program also assumes that if the range you specify is greater than 12 payments, you will want the payments displayed on screen 12 at the same time. This makes it easy to show up to a full year of monthly payments, and the subtotals at the bottom of the screen for each 12-month display will correspond to total principal or total interest for that year.

When you've completed the sequence of displays for the range you specified, the program returns to the menu. Now if you select option 1, an amortization table, again, without changing any of the loan data, your computer will be able to immediately display the new range of values you specify without recalculating the whole table. This is because the program stores the table in the P(i), I(i), and B(i) arrays when the computer first calculates it, and gives a flag variable F2 the value 1. The program changes F2 back to zero only if you alter the

loan parameters. So the second time you type in the amortization subroutine, if the value of F2 is still 1, the program uses the old array values.

After carefully studying **Listings 1** through **3**, you should find lines 2170 through 2290 in **Listing 4** very easy to understand. The algorithms closely follow those in **Listing 1**, the simplest of the three sample programs.

A word of caution before you go into business providing amortization tables to the world: Because of the varying approaches used in rounding

numbers and calculating interest payments, you may find your amortization table to be different from the table your local bank or realtor supplies for the same loan. The disparity will be slight, probably no more than a few cents a month. Over a period of 30 years, it may accumulate to a few dollars. Such discrepancies are common and nothing to be concerned about. But in the end, it will be your bank's amortization schedule that counts! ■

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The more things change, the more they stay the same. About 50 years from now, with a full catalog of 21st-century problems on top of those left over from the 20th, the world will once again face a profound crisis.

In **A Mind Forever Voyaging**, a popular U.S. Senator, preaching a sort of fundamentalist political philosophy, has enlisted the spirit of the nation in his Plan for Renewed National Purpose. The idea is that an infusion of old-time values will turn the country around and pull everyone together to erase the ills of society.

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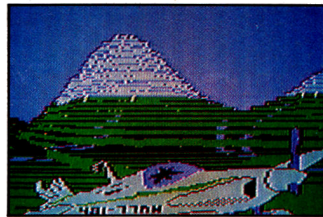
A Mind Forever Voyaging is Infocom's most creative idea yet, a real departure from the Infocom norm. There are very few puzzles or locked doors. The fun of the game is in sampling this detailed simulation of future life, collecting information, and enjoying the sensation of future shock. In this respect, Infocom has created truly interactive fiction and a whole new twist on adventure gaming. The result is an endlessly fascinating science-fiction/fantasy experience.

Testing Your Survival Skills

Any month when I can tell you about two four-star games is a good month indeed. **Wilderness**, a full-color adventure game from Electric Transit (distributed by Electronic Arts), very solidly fits the requirements of a top-rated game. As an adventure, it offers challenge and excitement. As a simulation, it is highly detailed and realistic—the Flight Simulator II of the great outdoors.

Photo.

When your plane goes down miles from civilization, you face the challenge of Wilderness alone.



Wilderness begins with a plane crash in the wilderness (see the **Photo**), miles from the nearest sign of civilization. Your task is to trek across inhospitable territory to a ranger station to find help. On the way you have to get past natural obstacles like rivers, mountains, and forests. You can learn to gather edible plants and insects, and trap small animals for food. (Be grateful this is a simulation, and you don't really have to eat what you catch.)

As the miles pass, you learn to preserve your energy, find the likeliest places to discover water (you can make a solar still in the desert for that purpose), and avoid dangerous animals. Chances are you'll injure yourself or subject yourself to exhaustion or dehydration along the way. You may even get a good case of Montezuma's revenge by drinking tainted water. When these things happen, you'll have to treat your ailments and march on.

Switching to on-screen maps, you'll learn how to read a topographical chart. Using landmarks and sun positions in a 3-D display, you'll discover how to navigate on land and arrive safely at the ranger station.

A number of different scenarios are available on Global Explorer disks (sold separately at \$19.95 each), offering variations in terrain and climate. Your adventure could take place in the jungles of New Guinea or Burma, the mountains of Chile, or the frigid uplands of British Columbia. On the Sierra Nevada disk that comes with the package, you can increase the level of difficulty by customizing the scenario or redrawing the topo map. Rest assured that survival in any location you choose will be one of the grittiest gaming chal-

lenges you'll ever enjoy.

Wilderness' documentation is superb. The game is fully explained, and there's a detailed, comprehensive guide to survival in the wild that any downed pilot would be glad to have in a real emergency. Even after the game wears down your endurance, it'll be fun just to leaf through this fascinating book.

Short Takes

Recommended games this month also include **I, Damiano**, from Bantam Imagic Living Literature. This is an expertly illustrated adventure adaptation of R.A. MacAvoy's trilogy of fantasy novels *Damiano*, *Damiano's Lute*, and *Raphael*. The game is very intense and evokes the spirit of the books. The level of challenge is especially high—when you make the wrong decision, you end up right in the Devil's hands. For that reason, it's not for little kids, but it's perfect for young-adult players.

War gamers may want to take a look at a new offering from Simulations Canada, an armored-warfare game called **Golan Front**. It's a hybrid (with a map and counters instead of graphics) and it plays well enough, but when will S.C. get with it and start using graphics? At around \$60 a game, that's not asking too much. As for Avalon Hill's **Beast War**, my verdict is "ho-hum." This game is designed to appeal to Archon aficionados, but they'd be better off sticking with Archon. Till next month, aloha. ■

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

RIGHT OF ASSEMBLY

Assembly-Language Looping

by Roger Wagner

Last month, I challenged you to write an assembly-language routine that would read the game controller and print both the screen-character and hex equivalents of the value read from the controller. **Listing 1** is the Applesoft program that CALLs the routine.

Listing 2, a straightforward routine, is a possible solution to the challenge. Line 13 starts by loading the X register with a zero as the entry condition to read game-controller zero on line 14. The program then stores in location \$5BC the value read from the controller to display the screen-character equivalent of the value. Now, the problem is to get that value into the accumulator for the PRBYTE routine. An elegant solution is to load the accumulator directly from location \$5BC, then CALL the PRBYTE routine in line 17.

The Applesoft program must perform the HTAB and VTAB statements for you, because at this point you lack the needed information to know how to do the equivalent from assembly language. Don't worry, though, you soon will.

Loops and Counters

Before learning to print more than single letters of text, you'll have to learn a few more basic concepts of assembly-language programming—specifically, how to create loops and counters the way you do with FOR...NEXT loops in Applesoft. In BASIC, the FOR...NEXT loop is one of the most essential parts of many programs, and this is no less true in assembly-language programming. The only difference is the way the loop/counter combination is actually carried out.

In BASIC, IF...THEN statements may test counters, or the NEXT statement of a FOR...NEXT loop may do it automatically. In assembly language, the program examines *flags* in the *status register* to test the counters.

Create loops and counters in your assembly-language programs with the aid of the status register.

These flags indicate the results of the 6502's last mathematical operation; general zero/nonzero conditions of numbers loaded into the X, Y, and accumulator registers; and other handy things within your program.

The status register is the 6502's fourth register, one I haven't previously mentioned. Before going on with loops and counters, it will be necessary to briefly discuss the status register and binary numbers.

Like the other three registers—the

accumulator and the X and Y registers—the status register holds a single byte, which can have a value from zero to 255 (\$00 to \$FF). As it happens, you can look at and interpret numbers in many ways. The common way is to consider only the size of a number. Noticing that 255 is larger than 128 gives you only a very simple piece of information: whether a number is less than, equal to, or greater than another number.

Binary Numbers

A second way is to look at the *binary* form of a number. Binary is another term for the base-2 numbering system. The binary system lets you see more information in a number, and that in turn can make it much more useful for an assembly-language program.

Listing 1. BASIC program that CALLs an assembly-language program.

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

Listing 2. Assembly-language routine "solution."

1	*****		
2	* GAME CONTROLLER READ/PRINT *		
3	* 2/1/86 *		
4	* MERLIN ASSEMBLER *		
5	*****		
6	*		
7	SCREEN EQU \$5BC	; SCREEN LOCATION	
8	PREAD EQU \$FB1E	; READ A PADDLE	
9	PRBYTE EQU \$FDDA	; PRINT A HEX BYTE	
10	*		
11	ORG \$300		
12	*		
0300: A2 00	13 START LDX #00	; CONTROLLER #0	
0302: 20 1E FB	14 JSR PREAD	; READ CONTROLLER	
0305: 8C BC 05	15 STY SCREEN		
0308: AD BC 05	16 LDA SCREEN	; GET CHAR IN ACC.	
030B: 20 DA FD	17 JSR PRBYTE	; PRINT HEX VALUE TO SCREEN	
030E: 60	18 DONE RTS		

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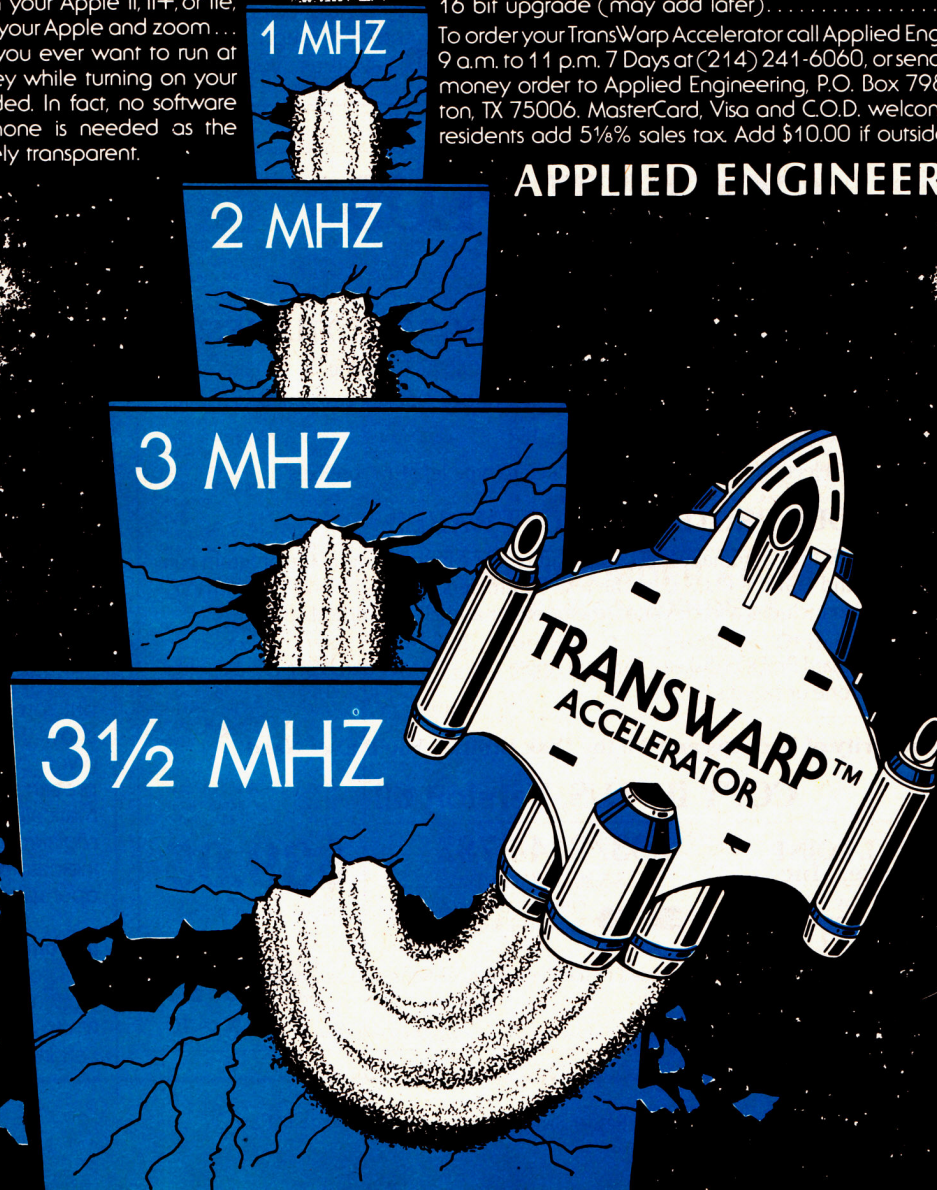


Figure. The 6502's status register.

7	6	5	4	3	2	1	0
N	V	—	B	D	I	Z	C
Sign	Overflow	Not Used	Break	Decimal	Interrupt	Zero	Carry

You've already seen that you can represent a single byte either as zero to 255 or \$00 to \$FF. In the binary system, the same byte can fall in the range of 00000000 to 11111111. For instance, 133 (base 10) is represented as \$85 hexadecimal. In binary, it appears as 10000101. Each one or zero represents the presence or absence of a given condition—it thus conveys eight distinct pieces of information, as well as all the various possible combinations.

Before you run shrieking from the room, remember this is all done to make things easier (really!), not harder. Besides, learning base 16 (hex) wasn't that bad a few issues back, was it? So, let's take a moment

to see what this bits-and-bytes stuff is all about.

The Apple is an electronic device and, actually, in many ways, a simple one at that. In most parts of its circuitry, the flow of electricity is either off or on. That's it. No in-between. Having two possible conditions is perfect for base 2. The idea of a number base has to do with how many symbols, or units, you use for counting. We (humans) normally use ten. We have a total of ten possible symbols to write in a single position before we have to start doubling up and using two positions to represent a number. You'll recall that in hex, using zero through nine and A through F gives you 16 possibilities; thus, you have

base 16. With the on/off nature of the Apple, you're limited to two possibilities: zero and one.

How high can you count in one position in binary? Not very high. You start at zero, then go to one, and that's it. Then you have to add another position. The next number, therefore, is 10, which represents what we usually call "two." If you use three positions, the lowest number is 100 (representing the quantity "four" in base 10).

By using eight positions, you can go up to 11111111, which just happens to be 255. How handy! This is the same maximum value as a byte. And, if the truth be known, it's actually the other way around. You use the numbers zero through 255 because 8 bits comprise each byte. Whether a bit is a zero or a one depends on whether the part of the electrical circuit responsible for that bit is off or on.

The Status Register

The accompanying **Figure** represents a single byte, made up of 8 bits. In particular, this byte is the status register of the 6502. The important difference between this register and the others is that it isn't used to store number values. Instead, it indicates various conditions (shown at the bottom of the **Figure**).

The bits of the status register, numbered zero to seven from right to left, are called flags and indicate the results of different operations. By using this register, you can create counters and loops in your programs. The flag with which you should be immediately concerned is bit 1, the *zero flag*.

In terms of commands you already know, the zero flag is affected by an LDA, LDX, or LDY. If the value loaded into the accumulator or X or Y register is \$00, the flag is set to one. If it's a nonzero number, the flag is zero. Seemingly backward perhaps, but remember each flag is set to show the presence or absence of a given condition—in this case, the presence of a zero. The 6502 automatically sets or clears each status-register flag after each program step, indicating the results of any particular operation.

Incrementing and Decrementing

To create a counter and then a loop, use the status register to tell when a given register or memory location reaches zero. To change the

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Table 1. Mnemonics of the commands to increment or decrement memory locations and registers.

	Accumulator	X Register	Y Register	Memory Location
Increment: (Add 1)	Not Available*	INX	INY	INC
Decrement: (Subtract 1)	Not Available**	DEX	DEY	DEC

*INC—6502 only
**DEC—6502 only

Table 2. Effects of "wrap around."

Original Value	Result of Increment	Result of Decrement	Z Flag Set?*	Z Flag Contents*
\$05	\$06	\$04	no;no	0;0
\$0F	\$10	\$0E	no;no	0;0
\$01	\$02	\$00	no;yes	0;1
\$FF	\$00	\$FE	yes;no	1;0
\$00	\$01	\$FF	no;no	0;0

*The first item shows the status of the Z flag before an operation; the second, the status after an operation.

value of a counter in a regular fashion, the 6502 *increments* (adds one to) or *decrements* (subtracts one from) a memory location or the X or Y register, using one of the commands in **Table 1**. The increment/decrement commands affect the zero flag, depending on whether the result of the operation is zero or not.

The sample lines in **Listing 3** illustrate the usual syntax for using these commands in an assembly listing. For the register operations, the command stands alone, with no need of an operand. In the case of INC and DEC, **Table 1** lists the memory locations on which the command will operate.

One thing to mention here is the *wrap-around* nature of all the operations. To understand this, examine **Table 2**, which shows the effects of incrementing and decrementing different values, along with the effects on the zero flag after the operation. The first example is simple: $5 + 1 = 6$; $5 - 1 = 4$. In both cases, the result is nonzero, so the zero flag isn't set. For \$0F, the same holds true. Remember that, in hex, the number after \$0F is \$10. Incrementing \$01 produces \$02, but decrementing it produces \$00, so the zero flag is set.

Here's where it gets interesting. When the starting value is \$FF, adding one would normally give \$100. But, since a single byte has a range of only \$00 to \$FF, the new "1" is ignored, and the value becomes \$00. This sets the zero flag. Since decrementing \$FF produces \$FE, the zero flag is not set.

Although incrementing \$00 produces the expected \$01, decrementing it wraps around in the reverse of the previous case, giving \$FF. Both results are nonzero, so Z (short for the zero flag) is clear (that is, not set) for both operations.

Looping with BNE

The final step in creating a loop is to test the Z flag and then return to the top of the loop for another pass. **Listing 4** is a simple BASIC loop that starts with the counter X set to 255. The program prints, then decrements, the value and repeats the process until the counter reaches zero. You can make the loop execute any number of times by resetting the initial value of X.

In assembly language, you accomplish the test and the GOTO with a *branch instruction* such as BNE, which stands for "Branch Not Equal (to zero)." This is a *conditional instruction*, and will be executed only

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Listing 3. Syntax for assembly-language commands.

```

10      INX      ; ADD 1 TO THE X REGISTER
11      INY      ; ADD 1 TO THE Y REGISTER
12      INC $0600 ; ADD 1 TO A MEMORY LOCATION
13      DEX      ; SUBTR. 1 FROM THE X REGISTER
14      DEY      ; SUBTR. 1 FROM THE Y REGISTER
15      DEC $AA53 ; SUBTR. 1 FROM A MEMORY LOCATION
16      ; ADD 1 TO ACC (6502 ONLY)
17      ; SUBTR. 1 FROM ACC (6502 ONLY)

```

when a register is loaded with a non-zero number. This can happen either directly with an instruction like LDA #001, or as the result of an arithmetic operation, such as INX.

Listing 5, the assembly-language equivalent of the BASIC **Listing 4**, starts with the usual screen clear, then loads the X register with a starting value of \$FF. Next, the loop starts. Storing the contents of the X register at \$5BC presents the loop's action as a screen character for each pass through the loop. Lines 16 and 17 introduce a new Monitor routine, WAIT—a delay function based on the content of the accumulator. This is required because, without it, the loop would execute so quickly you couldn't see it in action. Experiment with different values in the accumulator on line 16 to see what I mean, and try eliminating the JSR WAIT altogether for maximum speed.

On line 18, DEX subtracts one from the current value of the X register. The BNE then continues the loop back up to LOOP until the X register reaches \$00, at which point the test will fail, and program execution falls through to the RTS at the end of the program.

Listing 4. BASIC loop program that decrements a number to zero.

```

10 HOME
20 X = 255
30 PRINT X
40 X = X - 1
50 IF X < > 0 THEN GOTO 30
60 END

```

Next Month

That's it for this month. Next month I'll give a quick demo of using BEQ in a loop, and then show you how to print more than just one character on the screen. ■

Roger Wagner is the author of Assembly Lines: 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, San tee, CA 92071.

Not every //c has a mini-assembler (December 1985, p. 106). Only enhanced //e's and //c's upgraded for the UniDisk 3.5 have this feature. —R.W.

Listing 5. Assembly-language equivalent of Listing 4.

```

1      *****
2      *          LOOP DEMO ROUTINE #1          *
3      *          2/1/86                          *
4      *          MERLIN ASSEMBLER                *
5      *****
6      *
7      *          ORG $300
8      *
9      HOME      EQU $FC58
10     SCREEN     EQU $05BC
11     WAIT       EQU $FCA8      ; MONITOR WAIT ROUTINE
12     *
13     START      JSR HOME      ; CLEAR VIDEO SCREEN
14     LD          LDX $FF      ; X = 255
15     LOOP        STX SCREEN    ; PUT CHAR ON SCREEN
16     LDA         LDA $80      ; ACC = 128
17     JSR         JSR WAIT     ; DO THE WAIT
18     DEX         DEX          ; X = X - 1
19     BNE         BNE LOOP     ; BRANCH IF X <> 0
20     END         RTS          ; THAT'S ALL FOLKS!
0300: 20 58 FC
0303: A2 FF
0305: 8E BC 05
0308: A9 80
030A: 20 A8 FC
030D: CA
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by Bob Ryan,
inCider Technical Editor

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

OverBOOT

Dear *inCider*:

I have two questions I hope you can help me with.

1. Is there a serious problem with ProDOS—something that won't let a ProDOS-formatted disk boot over a DOS 3.3-formatted disk? This happened to several of us at a workshop this summer. One person was programming in DOS 3.3 on the only computer attached to a printer. When we wanted a printout of our work, we just put our ProDOS disk in the drive and typed PR#6 without shutting the computer off, and zap—our work was scrambled every time.

2. Do I need separate PFS:File programs to run on a II Plus and IIe? I've developed a large data base with PFS:File on a II Plus and I'm wondering if the same program will work on a IIe.

Dr. Edward Malterer
Department of Music
Box 763
Morehead State University
Morehead, KY 40351

Dear Edward:

The problem you're having is a result of the booting process, not a bug in ProDOS. When you issue the PR#6 command, control of your computer passes to a program stored in the ROM of your disk-controller card. This ROM program, the Boot ROM, positions the read/write head of your disk drive over track zero of the disk and reads the 256 bytes of sector zero into memory, beginning at location \$800. When executed, these bytes

finish loading the ProDOS loader. The ProDOS loader, in turn, loads the ProDOS Relocator starting at location \$2000. The ProDOS Relocator completes the booting process by loading the ProDOS kernel. BASIC.SYSTEM and STARTUP are loaded after the ProDOS kernel is in memory.

Since your BASIC programs normally start at location \$801, the boot process, which loads track zero/sector zero starting at location \$800, necessarily clobbers any BASIC program in memory. In addition, when BASIC.SYSTEM is loaded, it resets all the Applesoft pointers including the start-of-program pointers. Any program in memory during a warm boot normally doesn't survive to tell about it. The moral of the story: Save your work before booting.

Concerning your second question, you'll be happy to know that your version of PFS:File will work on a IIe. Just be prepared to keep your caps-lock down.

80-Column Enigma

Dear *inCider*:

I own an Apple IIc with the option to switch from 40-column to 80-column display. The 80/40-column key is next to the reset key and the QWERTY/Dvorak key. I've noticed the 80/40-column key has no effect on the display of any IIc—you must use the PR#3 command. Does the 80/40-column key have any function at all, or is it there only for looks?

Marc Evans
67 Laurelwood Drive
Shelton, CT 06484

Dear Marc:

That 80/40-column key on the top of your IIc has a definite function, albeit one most IIc owners will never need. The purpose of the 80/40 key is to let you indicate to your computer whether you have an 80-column

video-display device or a 40-column display device—not to change the video output from 80 to 40 columns and back. The switch doesn't actually enable or disable the 80-column display; it merely sets a flag that any application program can read to see if you have an 80-column display device, like the IIc monochrome monitor, hooked up to your computer. If you do, leave the 80/40 switch in the up (80-column) position. If you have only a 40-column display device, such as a standard TV set, put the 80/40 switch in the down position. If you're running well-designed software, it will check the status of the switch and activate the 80-column firmware if the switch is up, or keep the display firmware in 40 columns if the switch is down.

This isn't the same as checking for the presence of an 80-column card. All IIc's have built-in 80-column cards. The 80/40 switch is your way of letting a program know whether or not you can handle an 80-column display. The rest is up to the software.

If you want to check the status of the 80/40-column switch from your own programs, PEEK into location 49248 (\$C060). If the number there is greater than 127, the switch is set to 40 columns. Otherwise, the switch is set to 80 columns.

IIc and RGB

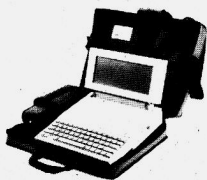
Dear *inCider*:

I read the article on RGB monitors (*inCider*, October 1985, p. 16) and found it very interesting. I'm thinking about buying a color monitor for my IIc, and the Princeton Graphic HX-9 appeals to me since it looks like the IIc Monitor. I'd like to know if it's possible to use the HX-9 with the IIc monitor stand and whether I can hook my IIc up to the HX-9 without any special hardware.

Brian Ratkevich
6509 Sabado Tarde #11
Goleta, CA 93117

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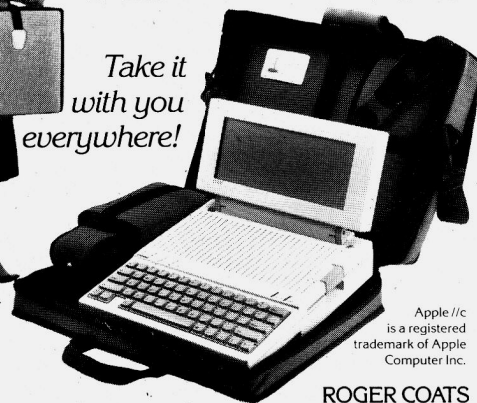


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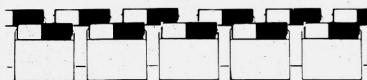
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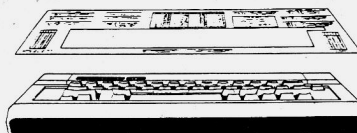
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Dear Brian:

Although the HX-9 resembles the //c Monitor, it doesn't fit on the //c monitor stand. Also, since it's an RGB monitor, the HX-9 requires special hardware to run with the //c—a //c RGB interface and a Mapper. Both products are available from Video-7, 12340 Saratoga-Sunnyvale Road, Saratoga, CA 95070, (408) 725-1433.

The reason you need all these extras to use an RGB monitor with the //c is that the //c puts out an NTSC video signal—essentially a signal that, in conjunction with a RF modulator, can be used by a TV. It must be converted to an RGB signal before it's passed to an RGB monitor.

Dendrite Mismatch Error

Many of you who tried the fix I suggested to John Klein (Ask inCider, November 1985, p. 94) for changing the volume number on a DOS 3.3 disk are probably wondering about the "Volume Mismatch Error" you get every time you access a file. There's nothing wrong with your computer or your disk—the problem is with my solution. As many readers have pointed out, track 17, sector zero, byte 6 isn't the only place on a DOS 3.3 disk where the volume number appears. In fact, the volume number appears in the address field of every sector of

a DOS 3.3 disk. To change the volume number, you have to alter every location that contains it. I apologize for my mistake—I should know better than to trust my feeble memory rather than the many reference books that are lying around. I hope you didn't waste too much time trying to implement my "fix."

The easiest way to change the volume number of a DOS 3.3 disk is to create a new volume. Simply initialize a blank disk with the volume number you want and use the FID utility on your DOS 3.3 System Master to transfer all the files from your old volume to the new one. It's that simple, and it works.

Dream Machine?

Dear inCider:

My //e is making me lose sleep. All its functions seem to be intact, except one. Attempting to "reboot" with open apple-control-reset results in a test of the kernel, just like solid apple-control-reset. It's no big thing, but I always have to follow my open apple-control-reset with a control-reset to generate a boot. How come?

J. David Baker III, M.D.
Associate Professor
Department of Anesthesiology
Medical University of South Carolina
Charleston, SC 29425

Dear David:

There are a number of explanations for the problem you're having with the open apple-control-reset function. You may have a short in your keyboard, or the LS251 chip in your Apple (next to the numeric keypad connector) may be on the fritz. You should check out these things with your dealer.

There may be a simpler solution to your problem—one I became aware of when Paul Statt, inCider's Review/New Products Editor, experienced the same problem with his computer. Paul has a KoalaPad connected to the 16-pin game I/O socket inside his computer. He also tends to pile stuff on top of the KoalaPad when he isn't using it. As it turns out, button #1 on the KoalaPad was depressed constantly, even though he wasn't using the KoalaPad. Since button #1 produces the same signal as the solid-apple key, Paul wound up performing a self-test whenever he wanted to reboot. If your open- or solid-apple keys aren't acting the way they should, check anything connected to the game ports before taking your computer in for servicing. ■

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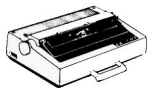
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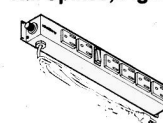
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HINTS/TECHNIQUES

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.

Abbreviated DOS

by James M. Wilson

One of the most annoying features of DOS is that control-D must precede every disk-operating command in a program. You'd think a computer as clever as the Apple would figure out that OPEN, READ, WRITE, CATALOG, and so on were disk commands, since Applesoft doesn't recognize them. But until Apple makes things easier for us, you can take advantage

of certain techniques to shorten the DOS commands yourself.

It's very simple to employ variables in DOS—you've probably already noticed that you can use files as string variables (for example, F\$ = "FILENAME"), and control-D is usually defined as D\$. You can go a step further and define the actual DOS commands as string variables, too. I include line 10, Abbreviated DOS (see the **Program listing**), as the first line in most programs I write that use DOS. This sets up a number of variables that become abbreviations of the more common DOS commands.

Programming with DOS is much quicker and easier with these new commands. Instead of typing PRINT CHR\$(4); "OPEN"; "FILENAME" to

Program listing. Abbreviated DOS.

```
10 D$ = CHR$(4); O$ = D$ + "OPEN"; R$ = D$ + "READ"; W$ =  
D$ + "WRITE"; C$ = D$ + "CATALOG"; CL$ = D$ + "CLOSE";  
BL$ = D$ + "BLOAD"; BS$ = D$ + "BSAVE"
```

open a file, you can now type in PRINT O\$;"FILENAME". Remember, too, that your Apple regards ? and PRINT as synonyms. You can enter these DOS commands in a fraction of the time it would usually take, and your statement to open a file will be 16 characters shorter than the standard expression. ■

Write to James M. Wilson at the Department of Management Studies, Glasgow University, 25 Bute Gardens, Glasgow G12 8RT, Scotland.

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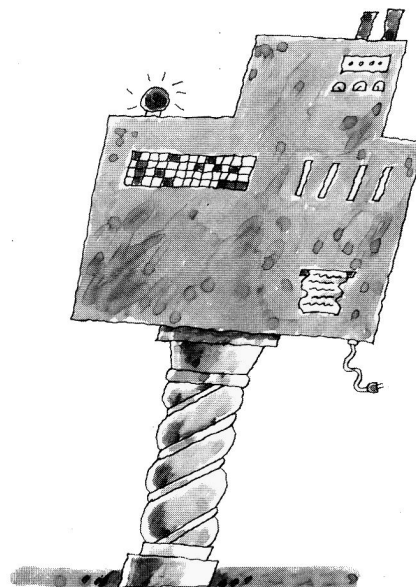
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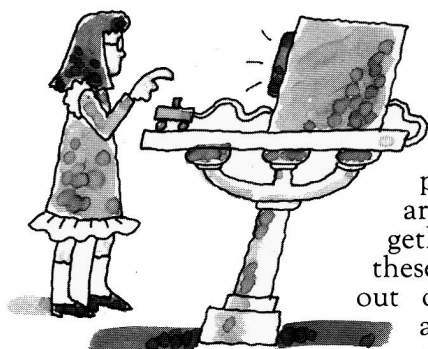
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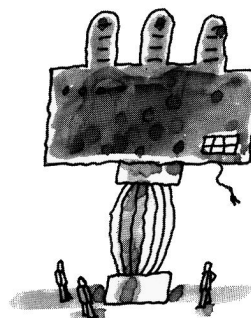
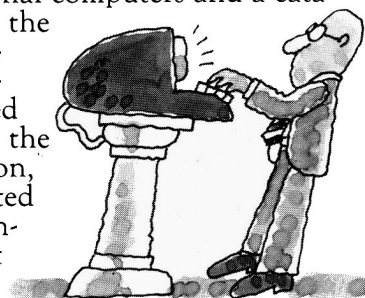
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evolution of personal computers and a catalog highlighting the Museum's collections. If your submission is accepted for addition to the Museum collection, you will be invited to the grand opening of the exhibit and will receive a bound edition of the catalog. If your item is selected as one of the five best “finds”, you will also receive an all-expense-paid trip to Boston for the grand opening party.

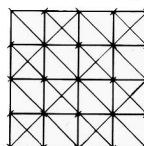


So, get up to the attic, down to the cellar and into your closets, and tell us what you find! Call or write the Museum for an official entry form, or send a photo and description of your items by March 1, 1986

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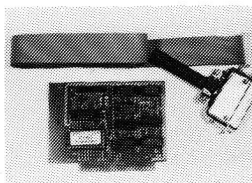


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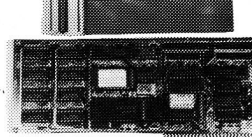


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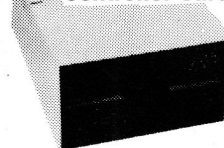
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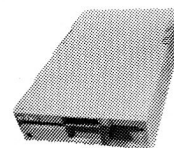


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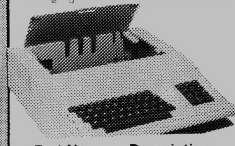
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EDITORS' CHOICE

Fantavision

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

Fantavision is software that creates animated films on your Apple II. Animation—displaying small successive changes in pictures so rapidly that they simulate motion—is not in itself fantastic, just hard work. But Fantavision is fantastic.

What keeps you from drawing hundreds of pictures with KoalaPad or Dazzle Draw and sending them to your monitor one after another? The holdup lies in drawing those hundreds of frames. If you could render that many drawings that quickly you could work for Walt Disney.

Fantavision takes the work out of animation. You draw the first picture—say, a man lying in bed—and the last one—say, a beetle. Your computer obligingly sketches as many as 64 intermediate frames that smooth the metamorphosis. Without further ado, you have a movie—maybe a meaningful one.

The technique that handles the transformation is called *tweening*. Tweening is what happens “in between” the two frames you create. At Walt Disney Productions, a crew of talented animators tweens Mickey and Donald for artists who create the beginning and end of the cartoon. With Fantavision, you draw and your Apple II tweens.

You create motion—perhaps poetry in it—that might remain the stuff of dreams but for the grace of Broderbund. No doubt you'll boot up Fantavision and start playing at once. But the manual is clear and complete and will answer most of your questions about Fantavision's bothersome intricacies. It isn't easy—there's more to

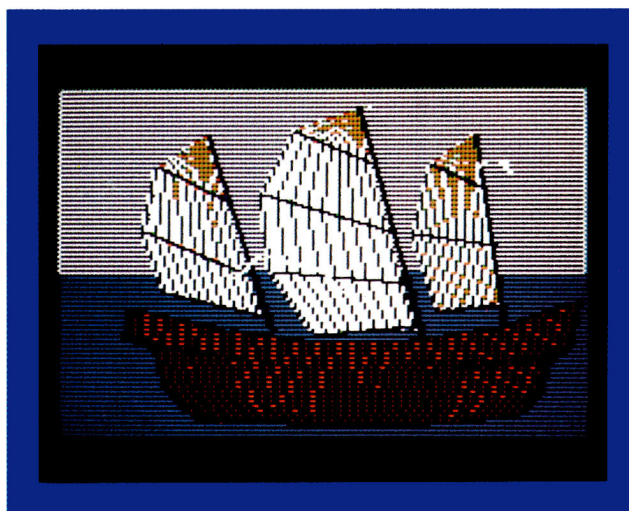
animation than meets the eye.

“Not everything about animation is intuitive,” says Scott Anderson, who designed Fantavision. Fantavision is the first program of its kind for the Apple II—tweening makes it different from Electronic Arts' Movie Maker.

The creator of this animation creator fantasizes about updates and improvements. “It's just the seed,” Anderson says. “Fantavision's still in a primitive state. Some of the plans I have are so exciting I'm sure I can't talk about them.” He imagines, for example, a professional version that will “put back some of the power we took out” when Broderbund transformed a software-design tool into a consumer product. He's playing with fractals and dreaming of Fantavision in ROM and double-hi-res graphics.

When you see the quality of Fantavision's animation, Anderson's belief in small TV stations and advertising agencies as a market for a \$50 game doesn't seem so outlandish.

Broderbund president Gary Carston envisions a Fantavision for programmers and developers, libraries of clip-art movies for vertical markets like TV stations, enhancements in the program's painting capability, and what he calls a “less klugy” interface. He'd be happy to see a whole “industry” spring up around Fantavision, like the market around The Print Shop, the



Fantavision: Tweening smooths the transition from first frame to last.

first package in Broderbund's Creative Workshop series.

Anderson wants to effect the “democratization of animation”—it's a mouthful, but it's certainly what The Print Shop and The Newsroom (Springboard) have been doing for publication. At \$49.95, with a mere 64K of RAM required (thanks to KDOS, a pruned version of ProDOS), Fantavision is for everybody (almost).

Bob Ryan, inCider's technical editor, sums it up: “Fantavision's neat.” He knows a good toy when he plays with one.

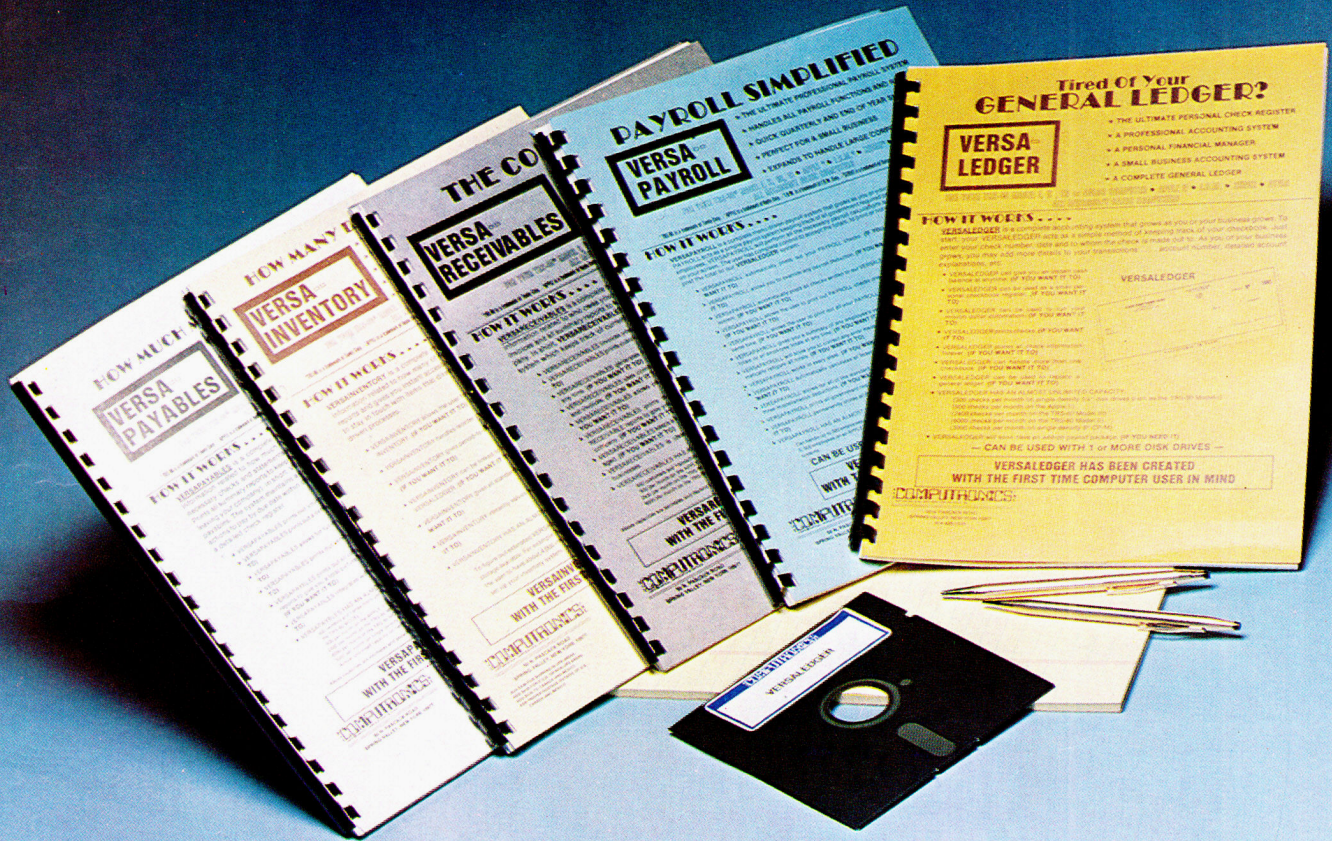
inCider's new editor in chief, Deborah de Peyster, adds, “The technology of creating motion would seem to have all kinds of scientific applications, such as charting the movement of the stars or estimating the extent of chemical disaster. It's amazing to see the potential wrapped up in one product.”

And Review Editor Paul Statt is particularly impressed with Fantavision's power and universal appeal: “Electronic Arts' Movie Maker is great—for animators who happen to own an Apple. But Fantavision makes any amateur with a computer into an animator.”

Fantavision is available for \$49.95 from Broderbund Software, 17 Paul Drive, San Rafael, CA 94903. ■

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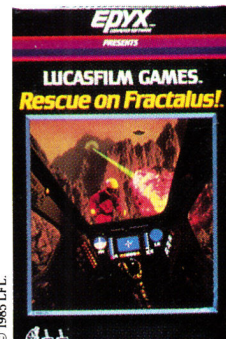
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