January 1985, USA $2.95
A CWC/I Publication

Buyer's Guide to Tax Software

inCider

The Apple II Journal

VCR/Apple Connection: *Hottest New Application*

How to Buy and Use Tax Software

Build this Joystick Adapter for Under $5

Our Readers Pick their All-Time Favorite Games

Free Programs Inside:

- Match Point
- Paint Pot
- Lo-Res to Hi-Res
- Koala Pad Utility

0 74820 08482 01

Finally, a Computer Keyboard Kids Can Use

A computer can help your child learn, but the keyboard often gets in the way. It's a jumble of keys that's confusing and hard for little fingers to operate. And it's not much fun.

Introducing Muppet Learning Keys™ from Koala Technologies™

It's the first computer keyboard made especially for young children. Unlike regular computer keyboards, all the letters and numbers are in order. So a child can find A-B-C and 1-2-3 without hunting all over the keyboard. And with Muppet Learning Keys software, learning letters and numbers becomes fun.

From the Experts

Muppet Learning Keys was created by education specialists to make learning exciting for your child. It's the first computer keyboard with Kermit, Miss Piggy and the whole Muppet gang right on it, ready to introduce your children to the magic of letters, numbers and colors.

© Henson Associates, Inc., 1984

Kid Stuff

Muppet Learning Keys has things that every child knows and loves:

- A paint box with eight touchable colors
- A blackboard with the ABC's in order
- A ruler with the numbers where they're supposed to be
- And keys the right size for small fingers

Press any key and something always happens. Press K and Kermit flies his kites. Press 6 and six kites appear. Touch a button on the paint box and leave a colorful impression.

Muppet Learning Keys–for a child's hands, a child's mind and a child's heart. Give your child Muppet Learning Keys and make computer learning child's play.

Muppet Learning Keys. The Hands-on Keyboard for Kids.

Jim Henson's Muppet Learning Keys™

For the Apple® IIe and IIc, Atari® and Commodore 64™ computers. In-Box software by Sunburst Communications. Muppet Learning Keys works with software that is designed or adapted for it.

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Circle 541 on Reader Service card.

Koala Technologies Corporation

REACH NEW HORIZONS with CH Products

MACH II and MACH III JOYSTICKS

The second generation MACH II and MACH III Joysticks incorporate a **new slide-switch spring disconnect** feature that **requires no stick deflection** and **new rotary trims** which are **four times more precise**.

Additional features include: "spring centering" or positive true-positioning" modes of operation, electrical trims for each axis, two fire buttons on the deck of the control and a stainless steel ball as the main pivot for added precision and durability. Our MACH III Joystick has an added fire button on the stick handle.

These highly accurate and reliable 360 degree microcomputer cursor controls used for games, business and graphics applications provide more features, greater durability, and longer life cycles. Plug in compatible with Apple II, IIE, IIC, IBM PC, PCjr and TRS-80 Color Computers.
MACH II $44.95/MACH III $54.95

PADDLESTICKS

PADDLESTICKS are a new and unique paddle control design that promises to return the fun and excitement back to paddletype games. They are faster, easier to operate and less fatiguing than conventional type paddles. The PADDLESTICKS operate as a single-axis joystick and are currently plug-in compatible with the Apple II, IIE and IIC personal computers. $44.95 (pair)

MICRO-TRAK TRACKBALL

The MICRO-TRAK TRACKBALL is the ultimate 360 degree cursor control that is engineered with the latest state-of-the-art technology. The MICRO-TRAK is controlled by two custom designed microprocessors and is 100% digital for higher reliability. The unit plugs into the standard game I/O and is 100% software compatible. It has four switch selectable modes of operation and requires no additional hardware or software. Both the "Positioning Mode" and "Velocity Mode" have a choice of two sensitivity levels. In addition the "Velocity Mode" has an "Auto-Center" feature that returns the cursor to the selected center position to emulate a self-centering joystick. There is also a "Rapid Fire" feature and dual switches for either left or right handed operation. Available November 1984 for Apple II, IIE and IIC personal computers. $99.95

Manufactured in U.S.A.

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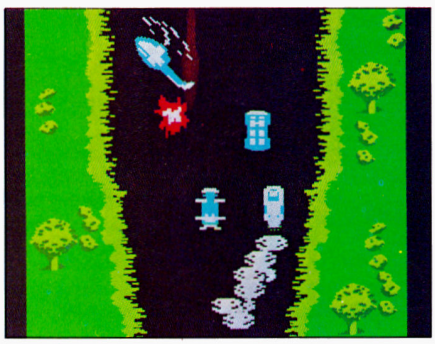
Effective 1/1/85–$139.95

OUR ARCADE GAMES WE BROUGHT



Bally Midway's Spy Hunter puts you in the driver's seat of the hottest machine on four wheels. You're after enemy spies. The situation is life and death. You'll need every weapon you've got – machine guns, and guided missiles, oil slicks and smoke screens. But the enemy is everywhere. On the road, in the water, even in the air. So you'll have to be more than fast to stay alive in Spy Hunter. You'll need brains and guts, too.

Do you have what it takes?

Bally Midway's Tapper would like to welcome you to the fastest game in the universe.

You're serving up drinks in some of the craziest places you've ever seen. And the service better be good, or else. You'll work your way through the wild Western Saloon to the Sports Bar. From there to the slam dancing Punk Bar and on into the Space Bar full of customers who are, literally, out of this world.!

Are you fast enough to play Tapper? If you have to ask, you probably already know the answer.

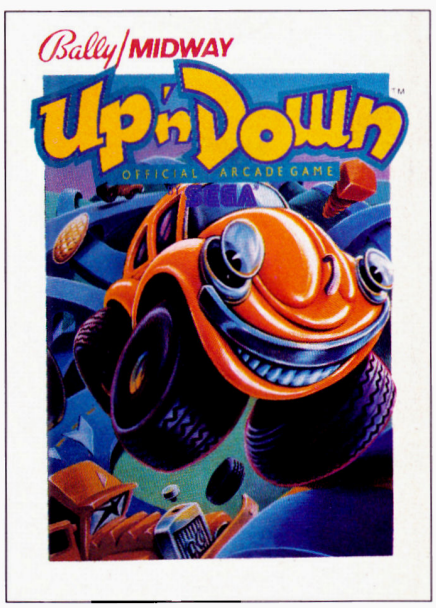
Bally Midway's Up 'N Down by Sega. In this game, a crash is no accident.

In fact, it's the whole object of the game. You'll race your baja bug over some of the worst roads south of any border. Leap dead ends, gaping canyons and oncoming traffic in a single bound. And if anyone gets in your way, crush 'em.

Crashing, bashing Up 'N Down. It's one smash hit that really is a smash.

The #1 Arcade Game of 1984.

Nominated as Most Innovative Coin-Op Game of 1984 by *Electronic Games* magazine.



#1 Arcade Hit, *Play Meter* Conversions Poll, 8/1/84.

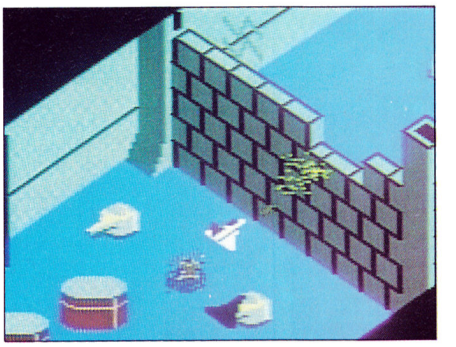
WERE SUCH BIG HITS, THEM HOME.

Circle 105 on Reader Service card.

Sega's Congo Bongo rocked the home game world when it shot up to Number 3 on the Billboard chart this spring.

And now it's available for even more home systems. So check the chart and get ready for jungle action. You'll pursue the mighty ape Congo up Monkey Mountain and across the Mighty River. Do battle with dangerous jungle creatures. Ride hippos, dodge charging rhinos and try to avoid becoming a snack for a man-eating fish.

Congo Bongo. It's fast and it's fun. But be careful. It's a jungle in there.



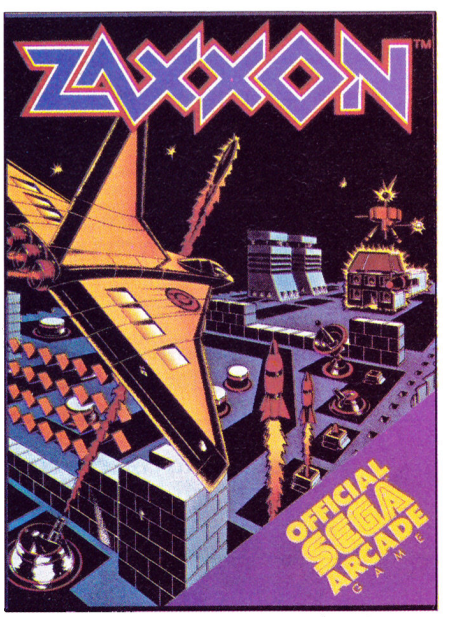
Sega's Zaxxon. If you haven't played Zaxxon, you must have been living on another planet for the past few years.

And now the ultimate space combat game is available for even more home systems. You'll pilot a space fighter through force fields and enemy fire on your way to do battle with the mighty Zaxxon robot. Countless others have gone before you in this Hall of Fame game. But this time your life is in your own hands.

Zaxxon killed them in the arcades. But compared to what it will do to you at home, that was child's play.

	SPY HUNTER	TAPPER	UP 'N DOWN	CONGO BONGO	ZAXXON
Atari 2600 cartridge	✓ NEW	✓ NEW	✓ NEW	✓	✓
Atari 5200 cartridge				✓	✓ NEW
Atari Computers* cartridge	✓ NEW	✓ NEW	✓ NEW	✓	✓ NEW
Atari Computers† diskette	✓ NEW	✓ NEW	✓ NEW		✓
ColecoVision & ADAM cartridge	✓ NEW	✓ NEW	✓ NEW	✓ NEW	✓
Commodore 64 cartridge	✓ NEW	✓ NEW	✓ NEW	✓	✓ NEW
Commodore 64 diskette	✓ NEW	✓ NEW	✓ NEW	✓ NEW	✓
Apple II, IIe, IIc diskette	✓ NEW	✓ NEW	✓ NEW	✓ NEW	✓
IBM PC diskette	✓ NEW	** NEW	✓ NEW	** NEW	** NEW

Arcade and Home Smash. Hit #3 on *Billboard* magazine's Top Video Games survey.



One of only ten games ever to make *Electronic Games'* Hall of Fame.

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*Atari 400, 800, 600XL, 800XL and 1200XL. (Congo Bongo cartridge: 400, 800 and 800XL.)

†Atari 800, 600XL, 800XL and 1200XL.

**Also available for IBM PCjr.

All new games are scheduled to be in your stores for Christmas. Check your local dealer.

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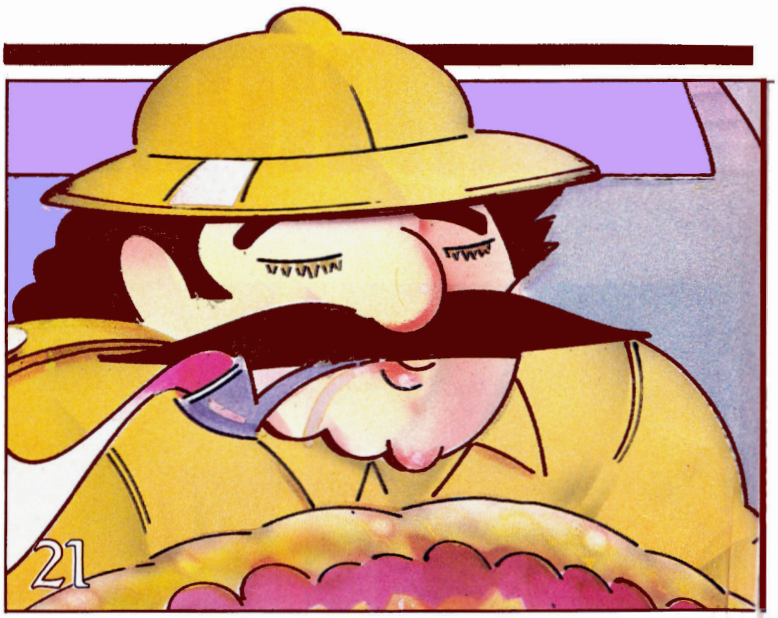

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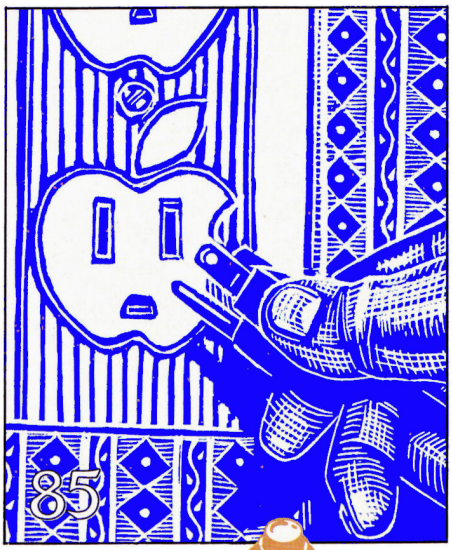

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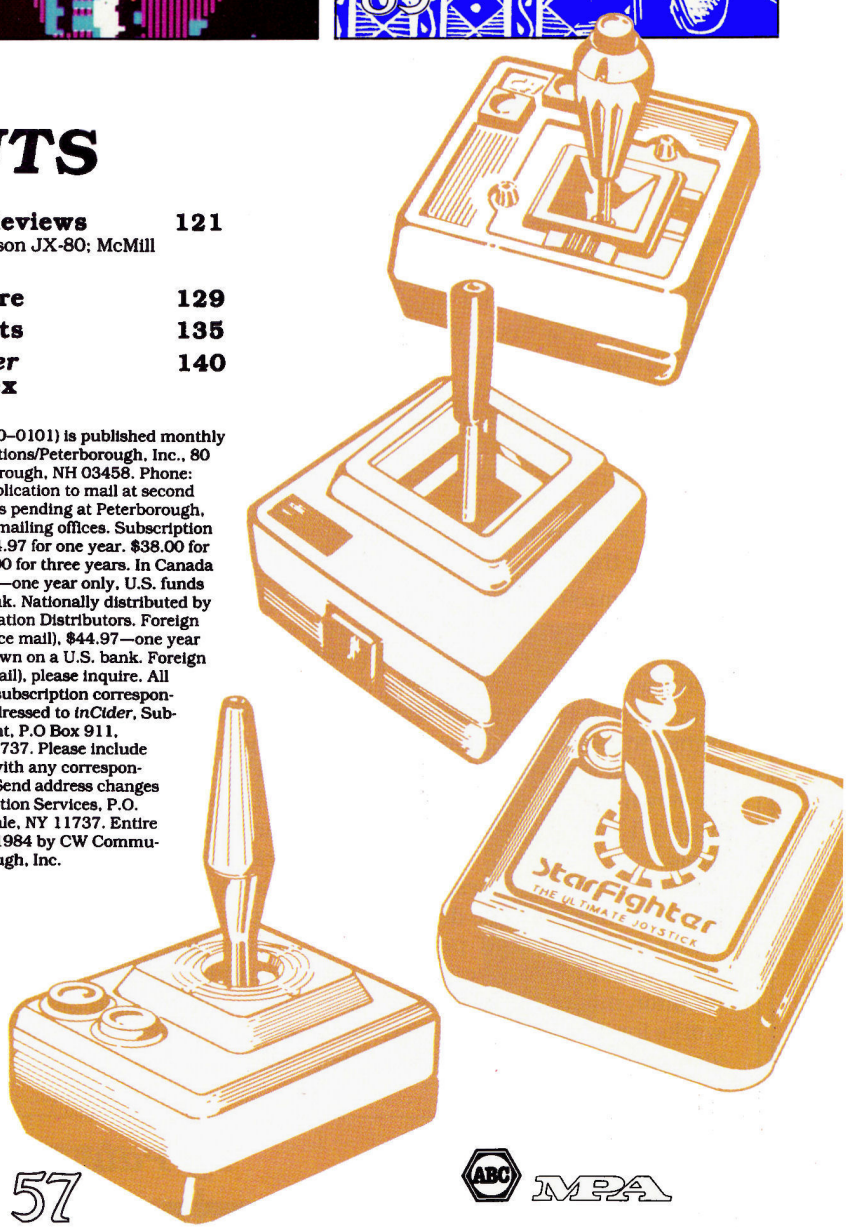
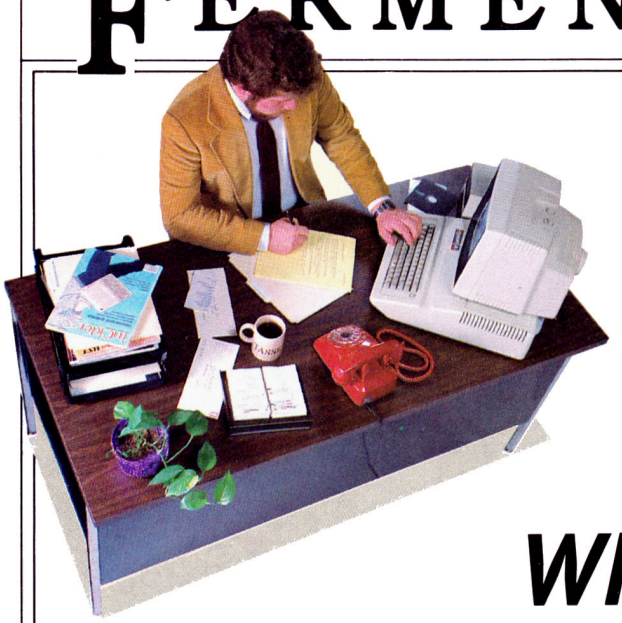




What's Up Apple's Sleeve?

It's a safe bet that Apple Computer will make one or more major moves this year, moves that will affect you directly. Of course, to a certain extent Apple can coast. Its reputation is solid; its products are excellent; its sales are strong. But market pressure will force it to take action, perhaps as early as March. Consider the following:

- Apple must innovate, either in technology or price. If not, it will retreat by default. A no-new-Apple 1985 would slow the momentum generated in 1983 by the //e and continued in 1984 by the Macintosh, the //c, and the Fat Mac. The fires would die down and the specter of an aging product line would rise from the coals.

Apple's probable response: Bundle attractive package deals that include software and peripherals. (Who could resist a //c or a //e with monitor, modem, printer, and Appleworks for, let's say, $1500?) It could also release a brand new machine, although such a move is unlikely, since it would siphon sales from existing products. More realistically, Apple will probably announce enhancements to the II line and the Macintosh. (Color for the Mac? A 16-bit //e?)

- Atari and Commodore will likely release Apple-compatible computers early in 1985. These rumored products (probably add-on operating systems) will be pegged well below current Apple II family sticker prices. If this happens, Apple will have no alternative but to reexamine its absence in the under-$500 price category. Once middle Americans decide to buy micros—as hundreds of thousands will this year—they'll be very price-conscious. They'll also develop a sophistication about the practical aspects of the machines, which means they'll be turned on by the II's capabilities but perplexed by its price. At this point, an Atari or Commodore clone would be a very real alternative.

Even without this iffy scenario, at some point Apple will be forced into the mass market. To ease the transition, it must change its price structure and distribution network. To put it another way, eventually you'll be able to buy a //e or //c at Sears, Macy's, or K-Mart for $500. True, this probably won't happen in 1985, but it's almost inevitable in 1986.

Apple's probable response: Wait it out, but if we lose too many opportunities, make the customer an offer he can't refuse.

Things can only get better for Apple II owners; the II is a top contender for industry standard and well on its way to becoming a true commodity. That's insurance against obsolescence and for better software at lower prices. It also means that when—not if—significant home market applications are developed, they'll be written for the Apple. And if you've dreamed about adding on a second system, it may be an affordable reality in the near future. ■

by Paul Quinn

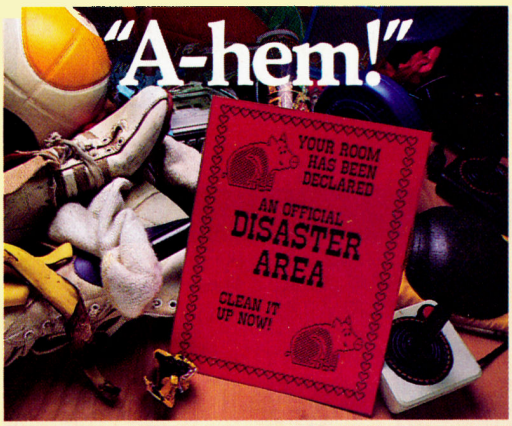
Express Yourself!

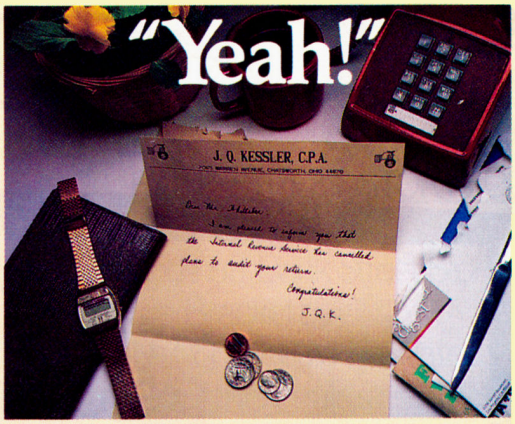
A few minutes and a few keystrokes. That's all it takes to turn your personal computer into a personal print shop.

Everything you need is in the program: typefaces, border designs, background patterns, pictures, symbols and a starter kit of colored paper and matching envelopes. The Print Shop will also guide you along, step by step, even if you've never touched a computer before.

So think what you'd like to say, then put it in your own words with The Print Shop.

Make quite an impression with just five easy keystrokes.





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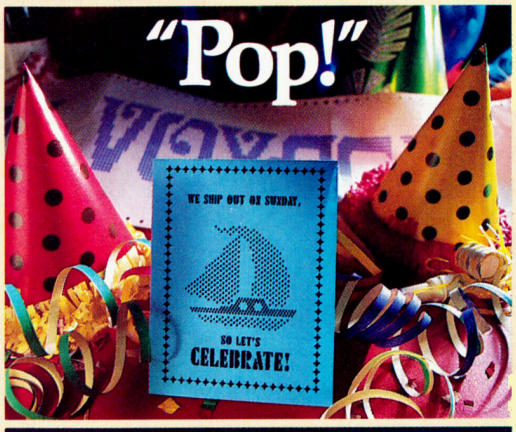
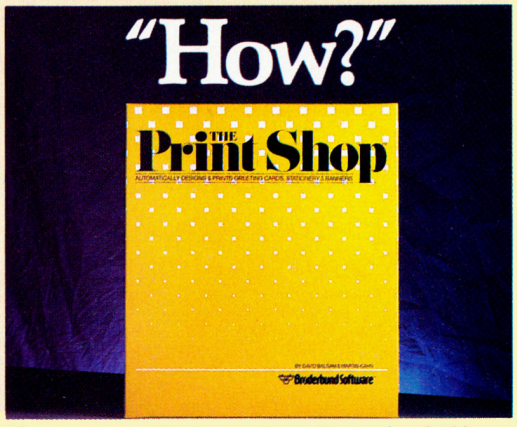
Your originality shines through, so good news becomes even better.



Dozens of pictures and symbols to suit every purpose and occasion.

Letterheads, logos, banners and signs. If you can imagine it, you can make it!



Keep your creativity flowing...put it in your own words with The Print Shop.

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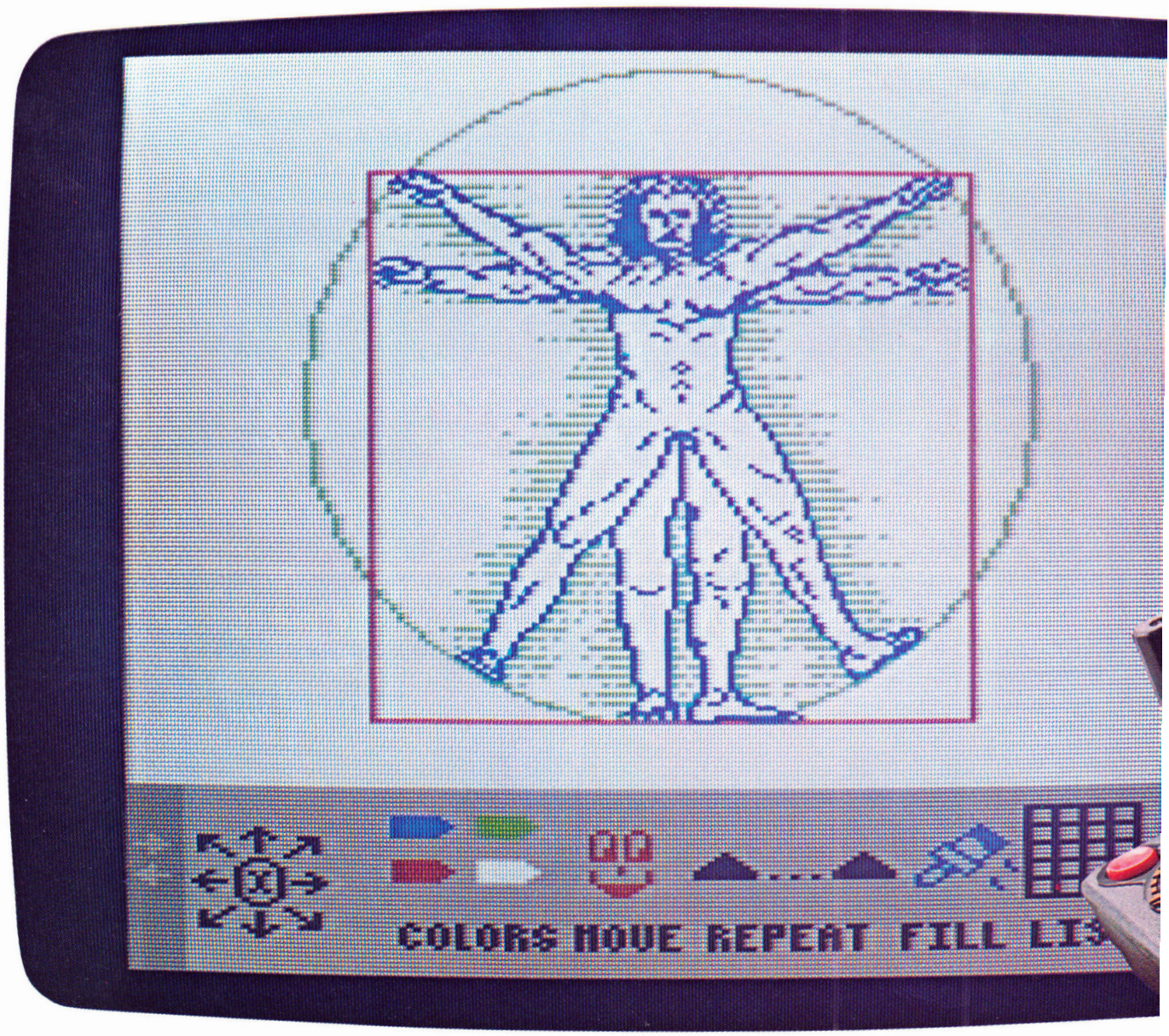
Al Capp would ha



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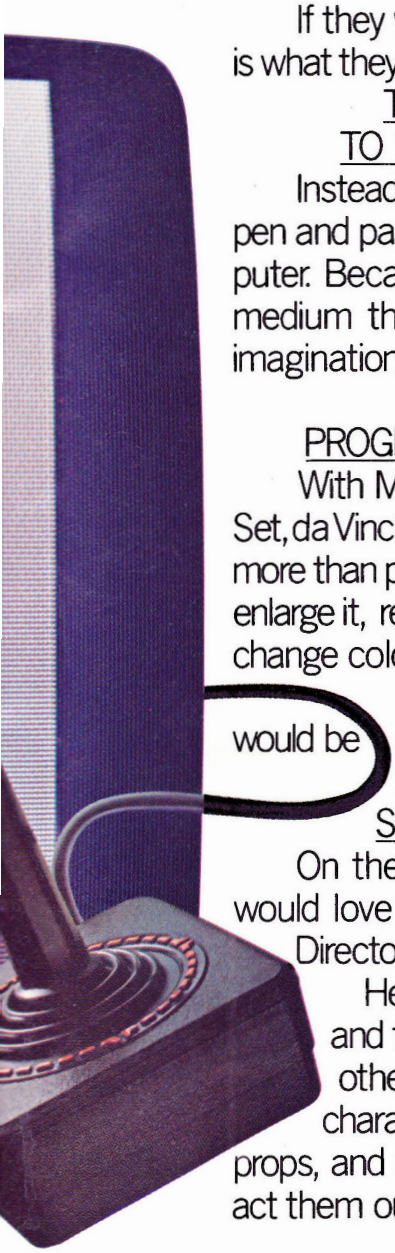
rams for kids that eare, Dickens and ve loved.



If they were starting out today, this is what they could start with. Pixelwerks.

THE OTHER WAY TO DRAW AND WRITE

Instead of a brush and canvas, a pen and paper, they'd create on a computer. Because Pixelwerks is the first medium that can keep up with their imaginations.

MR. PIXEL'S PROGRAMMING PAINT SET

With Mr. Pixel's Programming Paint Set, da Vinci (or any 8-year old) could do more than paint a picture. He could also enlarge it, repeat it, move it around, and change colors. Instantly.

And at the same time, he would be developing his programming skills. Painlessly.

SHOW DIRECTOR

On the other hand, Shakespeare would love to play around with Show Director.

He'd use it to create plots and think up one scene after another, and he'd get a big cast of characters, lots of backgrounds, props, and musical sound effects to act them out.

BANK STREET STORYBOOK

Dickens wouldn't be able to keep his hands off Bank Street StoryBook by George Brackett.

Not only could he write his own story, but he could also illustrate the scenes and characters he sees in his mind.

MR. PIXEL'S CARTOON KIT

Maybe Al Capp wouldn't be satisfied with cartoons that just sit on the page after he tried Mr. Pixel's Cartoon Kit. Because he could make his cartoons come to life by animating them. His characters could move around, and even react to each other.

Every kid has a touch of creative genius buried inside. The job of Pixelwerks is to bring it out, with more features, more options and more flexibility than other programs.

In short, we supply the tools. Kids supply the imagination.

Mindscape

MINDSCAPE INC

For more information, call 1-800-221-9884. In Illinois 1-800-942-7315.

Compatible with Apple,® Commodore® and IBM.® Pixelwerks is published by Mindscape, Inc., 3444 Dundee Road, Northbrook, IL 60062.

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LETTERS

Too Close to COPY

I recently purchased AppleWorks for my //c and have found it to be an excellent program as described in *inCider* (July 1984, page 80). However, there is an irritating idiosyncrasy of which //c owners should be aware.

According to the instructions, I copied the AppleWorks Startup disk without trouble and attempted to copy the AppleWorks Program disk. After the majority of the program disk was copied, an I/O error appeared on the //c monitor. After multiple attempts and tactics with different blank disks, I moved the monitor and stand approximately 5 inches from the keyboard, and the program disk was copied with ease!

I can only speculate about the problem, but evidently the proximity of the //c monitor to the built-in disk drive was causing RF interference.

Ken Eades, M.D.
800 8th Avenue, Suite 106
Fort Worth, TX 76104

Thanks for passing along the advice, Ken. We haven't had any problem with AppleWorks, but it's pretty safe to say that printer interference was the culprit. Remember, you should keep the disk drives away from the monitor and keyboard to avoid problems.

—eds.

Ripping Mad

I understand that the wishes of certain advertisers need to be addressed to maintain accounts, but I'm not addressing this particular annoyance. Rather, I'm angry by the self-promotion tear-out cards that make your magazine difficult to use as a reference publication as well as hard to read.

Today, I was trying to find an article concerning a new product. I was unable to scan the articles quickly because of the reply cards inserted within the magazine. I started ripping out the cards only to find that some of these could not be easily removed without damaging the pages. Most of these annoying cards were self-promotion for the magazine. This seems to be a waste of resources and needless duplication of effort, since I had already purchased the magazine and there were the handy, free information reader service/subscription cards on the last page which didn't interfere with my effort to find the article.

I don't think you should subject your readers to this unnecessary inconvenience just to promote your own publications more than four times in one issue. Most likely, I won't be renewing my subscription after wasting time in the office trying to locate an article because of this self-serving tripe.

Robert N. Clarkson
401 North Hoback Street
Helena, MT 59601

Sorry you feel that way, Robert. If it's any consolation, we don't care much for the way those cards are bound in the magazine, either. Even editors don't fully comprehend the psychology behind magazine development, but it's a documented fact that although readers find these cards annoying, they're the first ones to cry foul when they're missing. A little advice—try skimming the table of contents next time. *—eds.*

The Pirate Rationale

William Wright's open letter to software pirates (September 1984, page 13) compelled me to write. Like many others, I copy software strictly for my own use. I wouldn't sell a copy of a copyrighted disk, but think little of copying a friend's or letting a friend copy one of mine.

Ninety-nine percent of the disks I copy I wouldn't have purchased in the first place. Usually, I copy "luxury" disks, such as games, that I

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LETTERS

could quite easily live without. I'm a student on an extremely limited budget, and I'm not about to pay $50 or more for a little entertainment. I can get along without Night Mission Pinball if I have to. Since I wouldn't have purchased the disk in the first place, the publisher wouldn't have made any money from the sale. Nobody loses. (Actually, the publisher may even make a little cash off this kind of copying. If I like a program, I may want to buy other programs from the same publisher. I hesitate to mention this, because I'm sure that on the large scale, software companies make very little to no money on this type of advertising.)

I consider software to be in the same category as other copyrighted mass-market products. Take a record album, for example. If the library has an album you enjoy, would you think twice about recording a cassette tape of the album? This is piracy; the record jacket's copyright labels have warnings against "unauthorized duplication." I highly doubt that your stereo has been authorized by the record company.

Books also fall into this category. I'm sure you've photocopied a page out of a book—strictly for your own reference, of course. Still, the book is copyrighted and "no part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopy, recording or otherwise without the prior written permission of the publisher."

"But that's not the same!" I hear you cry. "That's just minor. No one cares about copying records or books, unless you're trying to make a profit from it!" Exactly.

I'm not trying to profit from my illegal disks, either. I just want to discover Frobozz, just like you want to listen to Mozart without paying the library's rental fee.

Please go easy on us, Mr. Wright. Most "pirates" aren't trying to cheat companies out of their hard-earned money. We realize they have the right to make a buck. But then, I see no reason not to copy a program when I'm not going to deprive the manufacturer of anything.

Name withheld

Your reply reiterates what piracy advocates have been saying for years. But no matter how the case is defended, rationalized, or condoned, piracy is illegal.

We agree with William Wright that software piracy has received general acceptance in schools, homes, and businesses. The copyright laws exist to protect not only the publisher's rights, but the consumer's as well. As Mr. Wright said, software piracy will "doom us forever to the curse of sophisticated and costly protection schemes."

And the dilemma over whether to copy or not to copy—there is none. You know the penalties. The choice is yours. —eds.

A Few Kind Words

This is a somewhat belated, but nonetheless sincere, thank you to a member of your fine editorial staff in going out of the way to help a confused computer beginner.

A little while back, I was confused by what I thought was conflicting information about modems in your magazine, so I wrote to you about it.

Instead of the usual perfunctory response in a letters column, or no response at all, I received a handwritten (that's right, in cursive) response from Bob Ryan, your technical editor. This was a real first in my experience, and a most impressive act. Not only that, but Mr. Ryan's advice was explicit, convincing, and useful.

Mark H. Conner
Rt. 7, Box 310
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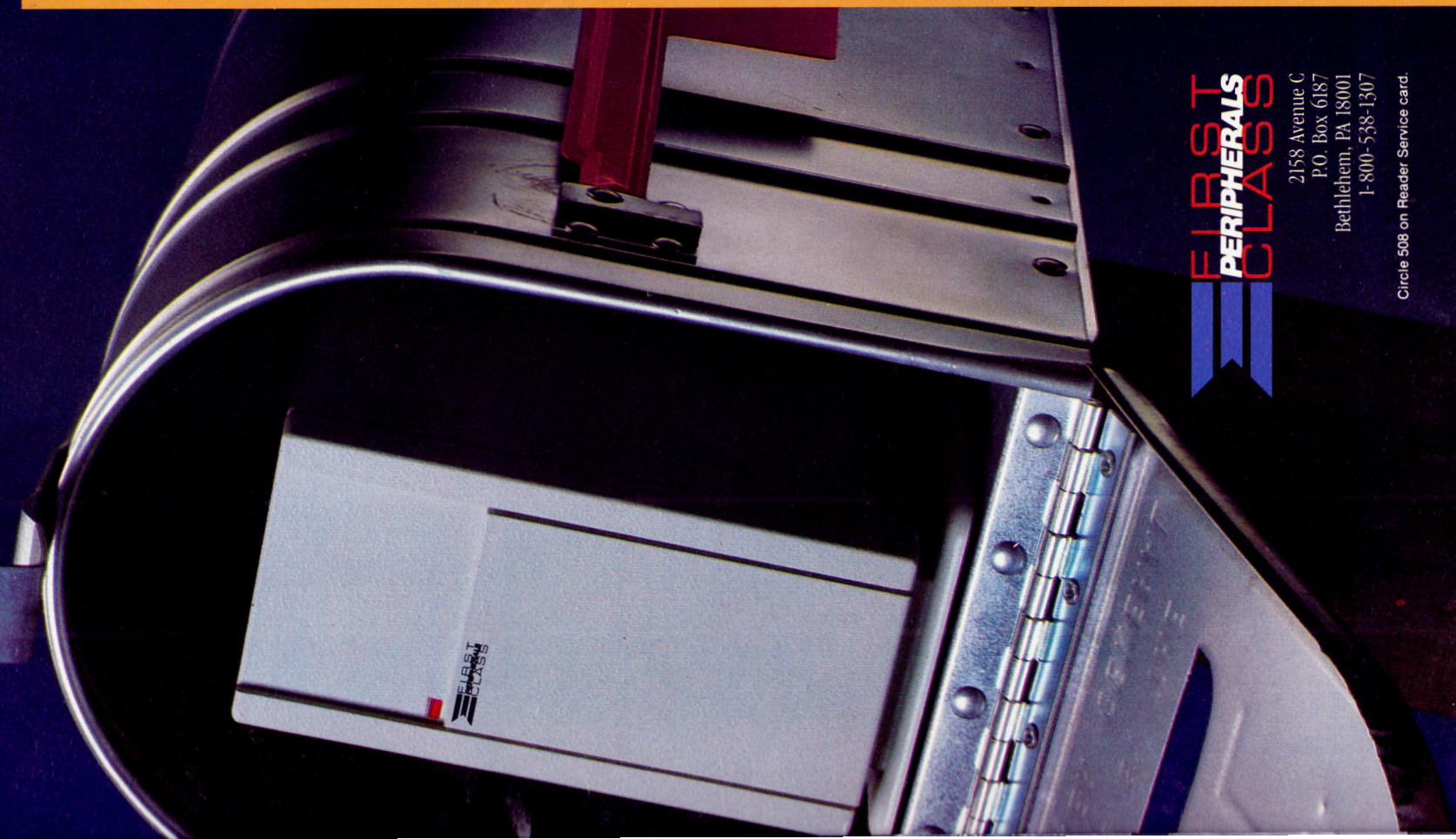

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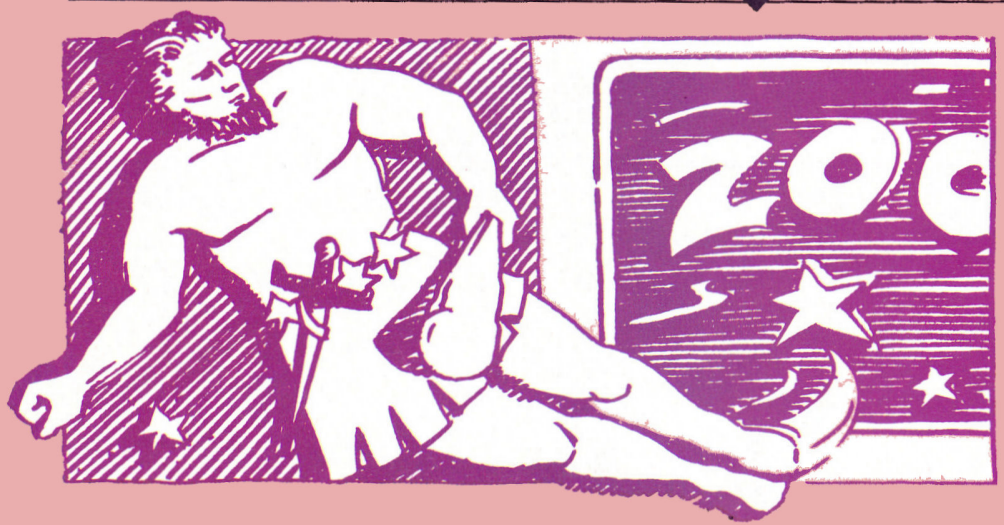


Super Comics on Disk

Destined to defend the world from the forces of evil, super hero Orion joins the likes of Superman, Flash Gordon, and Captain Marvel. But you don't have to rush down to the corner drug store to catch up on this new titan's exploits. Apple users who are comic strip fans can simply slip in a disk for the latest serial adventure.

Orion the Sky Hunter is the first DATAMAX Disk Comics release from Viking Data Based Technologies, Inc.

"This is the first one that we know of for a comic on disk," states Bill Kelly of Viking. "It's something we wanted to do and we'll see how the public reacts."

Mario Neves, senior illustrator, handled Orion's design. He used an Apple to delineate Orion's escapades in hi-res graphics. Although the story panels are set up in comic book style, the backgrounds are simple; Neves says too much detail would meld the pictures.

"I'm pleased with the drawings. The computer presents them fairly well," Neves says.

Kelly and Neves anticipate the bimonthly comic disk will become a collector's item. "We feel like we're setting down a milestone," Neves notes.

"Let's face it. We'd all like to create our own comic hero and this is the way to do it," Kelly adds.

The double-sided comic disks operate only on the Apple II line and cost $9.95.

Mail Call

Neither rain nor sleet nor dark of night can stop the Big Red Apple Club. Established in March 1982, the group first provided Apple computer enthusiasts in the rural areas of Norfolk, Nebraska, with computer club news. Their means of communication—the mail. By the end of the first year, the club had 200 members.

Today, there are more than 3500 members. California tops the membership roster with 500. President John Wrenholt also conducts club business for members in 40 foreign countries.

Club members communicate via a modem-less disk network—a "bulletin board system" on disk. Members don't need a modem and, therefore, avoid high phone bills. The disk includes articles, messages, and public domain programs.

Among its perquisites is the club's public domain software catalog, featuring 300 different titles including programs in business, education, games, graphics, and utilities. Free to members, the catalog is available to others for $2.50.

Those interested in a club membership should write to Wrenholt at 1105 South 13th Street, Suite 103, Norfolk, NE 68701, or call (402) 379-4680.

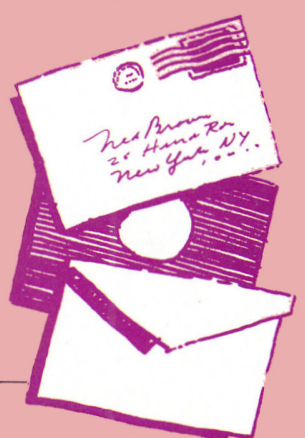
Within Public Domain

Do you believe a small investment can yield high returns? Check out the Oklahoma Educational Computer Users Program. For a $35 first-year membership fee, free public domain software is among the many rewards. Members can copy these disks, but must return them within three days.

Other membership benefits include complimentary magazines, a trial subscription to *The Computing Teacher*, grant opportunities, contests, and notice of computer-related events.

Soon, members will be able to borrow from the OECUP "lending library" programs under copyright. On a weekly basis, people will sign out software to test at home before investing in a package that may not be right for them. Members must agree not to copy these non-public domain disks.

Write to Richard V. Andree, Mathematics Department, University of Oklahoma, Norman, OK 73019, if you're interested in joining.



edited by Cynthia K. Carr

For Women Only

"You've come a long way, baby," and Marcia Freedman plans to help women go even farther through the Women's Computer Literacy Project. Formed in 1982 by Deborah Brecher, Freedman, and Jill Lippet, the organization offers introductory computer classes to women.

The classes were designed as an outreach to women concerned about the computer boom.

"Everybody's jobs are being affected by computers," Freedman says, but in the past machines and mathematics have been a man's territory—not a woman's. Now women are finding this educational and cultural gap a career hindrance. The Women's Computer Literacy Project helps women develop computer skills, satisfy their curiosity, and address their computerphobia.

Of those in the work force, Freedman says 52 percent suffer from computerphobia, and women are especially affected. That's why the organization stresses a hands-on learning experience.

More than 2000 women have completed the one- to two-day classes. "We have a cross section of ages, ethnic backgrounds, and work. Most of them are between ages 30 and 55, and are often professional women."

Class size is restricted to 12 students per instructor to ensure the organization's intention that nobody fail. The course covers terminology, programming, operating systems, data-base management, and word processing. Continuous classes are conducted in San Francisco and New York, where the project maintains offices. The group also brings its program to other cities during the year.

Find out about class schedules, scholarships, and group discounts by contacting the organization at 1195 Valencia Street, San Francisco, CA 94110, (415) 647-1404.

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

Household Guardian

You can never have too much security. Just ask Joe Goetz. He designed the security system for the House of the Future, a futuristic solar home built by the Frank Lloyd Wright Foundation in Phoenix, Arizona. The glimmering copper house "thinks" for itself, thanks to the Apple //e Goetz installed to monitor security, internal temperature, outside visitors, windows, doors, lights, fire zones, and more.

Goetz was drawn into the House of the Future project by Don McIlraith, now his partner in the Chess Electric Company. Before Goetz's //e took over the show, the old system comprised five computers and, according to Goetz, would break down every few days.

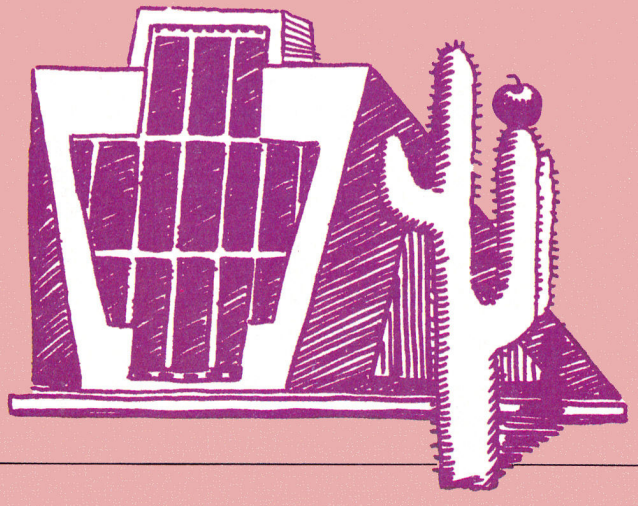
"In some computer homes, the computer is the brain," Goetz says, "and the four worst words in the world are 'The computer went down.' This was the case in the House of the Future. [With the new system] the Apple is the brain, but you, the homeowner, are still in full control. You can override it at any time."

Goetz says his security system differs only slightly from a conventional burglar alarm. Yet, what burglar alarm can sense visitors approaching your property, telephone the fire or police department in an emergency, or activate lights in certain hallways during a power blackout?

While the old system cost $300,000, Goetz's system costs $8000 including installation and backup. Goetz says the first system's custom-made equipment and programs weren't practical for everyday use. He uses hardware and software anyone could purchase at a store or through mail order.

You might think Goetz's system would require more than one //e. Not so. A disk drive, monitor, peripheral card, Thunder clock (real-time clock), and two programs (one for security and one for appliances) round out the inventory list.

Goetz emphasizes the need to keep the security system simple so anyone can use it. And with his commitment to program the system to do almost anything a customer requires, he remarks, "Thank goodness it doesn't eat."



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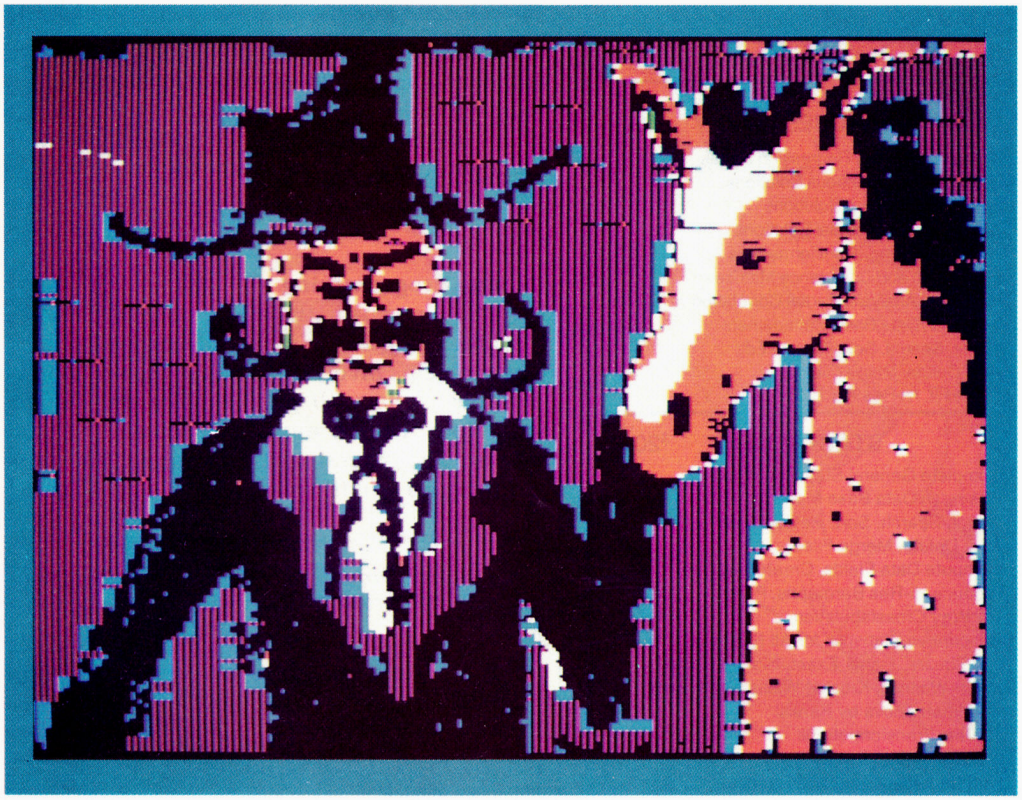
Mousing Around with CAD.PAINT



A new mouse version of the author's "painting" program reveals some handy programming hints.

Having spent a couple of years now, developing Apple CAD (computer-aided-design) software, I've come to realize that the choice of peripheral manipulation device—mouse, paddle, joystick, chalkboard, graphics tablet, "pad"—can mean the difference between awkwardness and convenience in using a program. For instance, in "painting" applications graphics tablets are best, chalkboards, pads, and mice are alright, and joysticks are shaky but viable. However, the average user is lost with a game paddle.

On the other hand, for pointing, as in selecting an icon or using the Micro-Illustrator, mice excel. A joystick is definitely too shaky here, a paddle is too confusing, and the pads are too bulky to fit well on many desk tops (Koala is least bulky).

When you need to create straight, perpendicular lines, such as those in a flowchart or electrical schematic, the game paddle is the device of choice. In fact, it's designed with this purpose in mind. A chalkboard is second-best (because of its grid), a mouse is fair, a pad is poor, and a joystick works miserably.

Now, while it is true that some manipulation devices are inherently poor at some tasks, the situation can at times be improved through programming. For instance, you'll find that the AppleMouse version of my CAD .PAINT "painting" program, in **Listing 1**, has a "snap-line" option that automatically makes nearly horizon-

by Don Fudge

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tal mouse-drawn lines truly horizontal, nearly vertical lines truly vertical, and wavy lines truly straight. All that's needed is a control-F. And drawing continues from the end of the corrected line—not from where the old line left off.

Mouse Programming

This brings us to the whole issue of programming for the AppleMouse and the problems involved. The first problem has to do with peripheral cards and slots. The //c mouse, of course, needs no peripheral card, even though it functions as if it were in slot 4. The //e mouse, however, does need one, and it can occupy any slot except 0. Well, how do you "talk" to the correct slot?

Take a look at lines 11 and 12 in **Listing 1**. They check for a mouse in slots 1 through 7 and set PS equal to the slot in which it is found. If one isn't found, a message directs you to check the mouse installation. The reason the algorithm in these lines works is that with a mouse in a peripheral slot, $20 goes into $CNOC and $D6 into $CNFB, where N is the slot number containing the mouse card.

Continued on p. 100

Figure. *Program lines excerpted from the original paddle version of CAD.PAINT for comparison with the mouse version.*

```
91 X% = 1.094 *  PDL (0):Y% = .749 *  PDL (1): XDRAW 2 AT X%,Y%:
     FOR QW = 1 TO 50: NEXT : XDRAW 2 AT X%,Y%
100 PX% = 1.094 *  PDL (0):PY% = .749 *  PDL (1): XDRAW 2 AT PX%
    ,PY%: FOR QW = 1 TO 50: NEXT : XDRAW 2 AT PX%,PY%
1010 X% = 1.094 *  PDL (0):Y% = .749 *  PDL (1)
1025  IF  PEEK ( - 16287) > 127 THEN  XDRAW D AT X%,Y%: GOSUB 10
    40: GOTO 1010
9320 OY% = Y%:OX% = X%: HCOLOR= HC: RETURN
30030 P0 = 1.094 *  PDL (0):P1 = .749 *  PDL (1)
```

Listing 1. *The mouse version of CAD.PAINT. The screened lines are the ones that differ from the paddle version of CAD.PAINT.*

```
0  POKE  - 16302,0: REM CAD.PAINT
1  ONERR  GOTO 63990
2 HC = 3: ROT= 0: SCALE= 1:C = 3: HCOLOR= 3: POKE 230,32: CALL 6
    2450:S = 1
3 GZ = 1: GOSUB 9800
4  GOTO 10
6  VTAB 1: PRINT D$"IN#0": PRINT D$"PR#"PS: PRINT  CHR$ (0): PRINT
    D$"PR#0": RETURN
7  VTAB 1: PRINT D$"PR#"PS: PRINT  CHR$ (1): PRINT D$"PR#0": PRINT
    D$"IN#"PS: RETURN
8  VTAB 1: PRINT D$"IN#0": PRINT D$"PR#0": RETURN
9  VTAB 1: PRINT D$"IN#"PS: RETURN
10 D$ =  CHR$ (4): PRINT D$"BLOADPAINT": POKE 232,0: POKE 233,8
11 Z = 0: FOR Q = 49420 TO 50956 STEP 256:Z = Z + 1: IF  PEEK (Q
    ) = 32 AND  PEEK (Q + 239) = 214 THEN PS = Z:Q = 50956: GOTO
    15
```

Listing continued.

The Envelope, Please

The Shiftky readers' poll and other gamey topics

Happy New Year! I have a wonderful New Year's Eve party planned. The base lodge will really rock tonight! I've got a bin full of Old Rhino and mixers, chip 'n dip, pizza, hot oven grinders, a hot tray full of sausage and peppers, and several magnums of champagne (Rhino Vieux 1982).

But I've been so busy tabulating the vote in the Great Warden Shiftky Game Poll that I forgot to mail invitations. I suppose I can eat and drink all this stuff myself. Oh well, to heck with the diet! Let's pop the cork on the first magnum, slice the pizza (nothing tastes better than pizza and champagne), and get on with the poll!

Way back in July, I asked you to write me with your choices for all-time favorite games in three categories: arcade, strategy/fantasy, and adventure. Well, you did.

I learned a few things from this exercise, and, in particular, that strategists prefer fantasy/role-playing games to war games. War games hardly got a mention.

The top three games, as you picked 'em, are Wizardry, Exodus, and Castle Wolfenstein. A close runner-up in fourth place was Ultima I, followed by Legacy of Llylgamyn, Flight Simulator II, and Knight of Diamonds. Only two war games—Fighter Command and North Atlantic '86—got any votes at all.

with Warden Shiftky

I hope that the last few columns have made you war-game conscious. In the meantime, I'll be on the lookout for the kinds of fantasy/role-playing games that interest you.

Spotting trends in the arcade games was a little harder. All the games picked in the poll were toughies. The general lesson seems to be that the more sophisticated and colorful the program, the more advanced the challenge, the better you like it.

It was a close race for first place between two great games, and here's how it turned out: One-on-One, Choplifter, and Hard Hat Mack. Runners-up included Raster Blaster (no longer in print), followed by Dig Dug, Night Mission Pinball, Star Blazer, and Repton.

I bet you can't guess which adventure game took the top honors. Oh? You CAN guess which adventure game came first? So could I, but I thought we'd go through the formality of the poll anyway, just to make sure. The results were: Zork I, Suspended, and Transylvania.

Following right behind the leaders were Zork III, Zork II, Witness, and Sherwood Forest. Note, if you will, that of this lot only two are illustrated. Note also that Infocom publishes all but two. Infocom's text adventures use sophisticated syntax, offer high degrees of challenge and escapism, and are the standard by which all adventures are measured. This poll merely reconfirms that.

Can I level with you? The response to the poll wasn't overwhelming. I got a goodly number of responses, but not enough, in my opinion, to draw any earth-shattering conclusions about the preferences of all Apple users. All the same, I have a better idea of what you like. That will help me make the Game Reserve more interesting to you in 1985.

Achievement Awards for '84

Now, my picks and pans for the year past. These are games (and other computer achievements) that deserve either applause or brickbats.

- **Most Beautifully Packaged Game:** Chivalry from Weekly Reader Software. It comes in a bookcase box, contains a marvelous game board (which is totally unnecessary), and is utterly gorgeous. Richard Hefter is responsible for the art (more on his work later in this column).

- **Most Obvious Attempt to Exploit the Olympics:** Summer Games by Epyx. A great game, this appeared just as the Los Angeles Olympics were ending. Its release could have been timed better.

- **Smartest Idea Four Years Too Late:** Atari's decision to make its popular arcade games available for Apple computers. Who knows? If Atari had done that four years ago, maybe Jack Tramiel would have bought *Apple* last summer, instead of Atari.

- **Factor Most Responsible for Ensuring the Continuance of the Apple II Line Through 1985:** The IBM PCjr's "chiclet" keyboard. This substandard component was the most crucial of several design features responsible for the tepid response to the PCjr, thus keeping the door open for the successful introduction of the Apple //c. Only after the //c had hit the market did IBM change the keyboard.

- **Best Simulation Game:** Flight Simulator II by SubLOGIC. The experience of flight is ultra-realistic. I enjoy it, despite my preference for flying around Bridgeport, Connecticut.

- **Game Company Making Biggest Strides Toward Industry Leadership:** Electronic Arts. It was a tough pick, because Infocom is always bringing out great new games. Nevertheless, with great packages like One-on-One and Pinball Construction Set, Electronic Arts is the fastest-rising company in the field.

- **Most Interactive Arcade Game:** Pinball Construction Set by Bill Budge, published by Electronic Arts. It's one of the best examples of the newest wrinkle in arcade software: the user-modifiable game.

- **Most Addictive Game:** Atarisoft's Dig Dug. This game could easily start a new career for me, if I can convince *inCider* to pay me for playing games instead of reviewing them.

- **Most Challenging Game:** One-on-One from Electronic Arts. What I'll never understand, though, is how anyone was able to bit-map Larry Bird and Dr. J. right down to the last slam-dunk and double fake.

- **Worst Adult Game to Let Your Child Play:** Bilestoad by Datamost. You'll understand why I picked this game when the first arm is severed, spreading a puddle of blood all over your monitor.

- **Best Adult Game to Let Your Child Play:** The Coveted Mirror from Penguin Software. Adventure games teach kids to think creatively. Play them with your children.

- **Apple's Worst Idea:** Nonstandard (that is, round) serial ports for the Apple //c. If you don't want the Apple printer or modem, then you must have a cable built for around $50 at your local computer store. No one can figure out the pin layout for my Okidata 82A, either.

- **Apple's Best Ideas:**

1. The Apple II Forever Festival reaffirming the company's commitment to the Apple II family of computers.
2. Lowering the price of the Apple //e.
3. The Apple //c. Double hi-res, 80 columns, upper/lowercase, QWERTY/Dvorak keyboard, and built-in drive make it a good value.

Run for It

I have to confess an almost automatic tendency to praise anything Richard Hefter, Steve Worthington, Susan Dubicki, and their company, Optimum Resource, produce for Weekly Reader Family Software. Maybe I'm just a sucker for superb graphics, challenging games, and simplicity of design. We all have our weaknesses.

Run for It (by Hefter and Worthington), a maze and levels game, resembles Donkey Kong, Miner 2049er, and Beer Run. But Run for It is a much more entertaining game than the others, with far better graphics and animation than most arcade software.

The game's hero, Orbit, a talented little robot (see **Photo 1**), can run, jump prodigiously high, scrunch down, and shoot bursts of laser energy. Believe me, he'll need all those talents to complete the game because he must ascend an 18-level maze with 54 rooms.

A display at the upper right of the screen shows the number of energy canisters left for Orbit to consume. At zero, the game is over. The consumption rate is rapid, but energy canisters

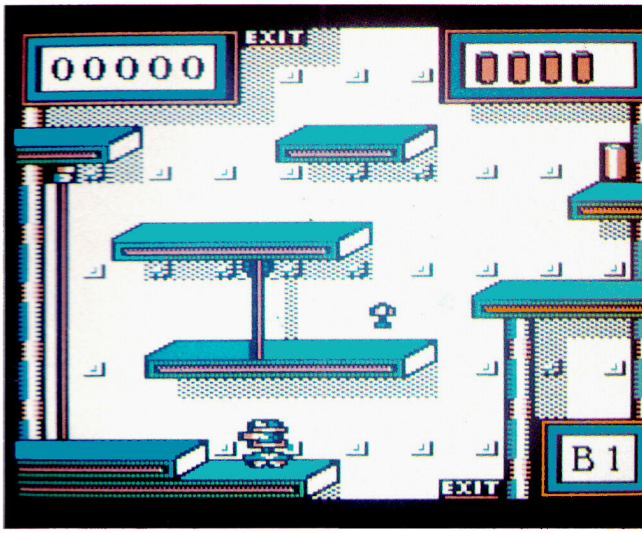

Photo 1. *Orbit in the opening room from Run for It.*

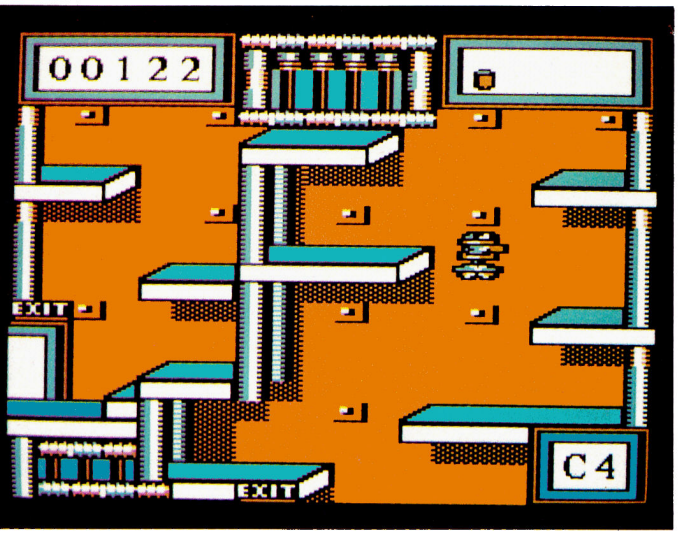

Photo 2. *Orbit the robot does an amazing bounce.*

are scattered throughout the maze. Just jump Orbit onto them to renew his fuel supply.

The catch is that more than a few of the capsules are guarded by little anti-robot energy drainers. Contact with one drains Orbit a full canister's worth of power. Some of the drainers fly in an unvarying pattern, so you can avoid touching them by carefully timing Orbit's jumps or scrunches. You'll also find that a few drainers block your way from one room of the maze to the next. They must be shot down so Orbit can pass. Still other energy drainers chase your robot. It takes considerable skill (and practice) to shoot them down in time.

The many energy canisters in nearly inaccessible locations require deft work with the joystick when Orbit jumps. You can twist and maneuver your robot in "midair" to land on the desired platform (see **Photo 2**). If you miss, don't worry. A long fall won't damage the sturdy little robot.

But what a big maze. It's small consolation that you don't have to visit all 54 rooms to complete the trip to the top. Still, you'll probably wind up exploring all of them just to find your way around. The color poster included with the game shows all the rooms, but not the drainers or energy canisters; for those, you'll have to send Orbit "in person."

I've spent long hours here at the base lodge trying to advance further than level G (the maze begins at level A and ends at level R) only to run out of fuel or be hit by drainers at the last gasp. It's fun getting even that far, though. The maze is beautifully designed and drawn, with three-dimensional effects. The robot simulation is characterized by smooth animation. Orbit's bouncing when he/she/it lands on a platform adds an offbeat element of realism.

Run for It is relentlessly addictive. It seems easy, but you can never beat it. The prospect of victory, so tantalizingly near and yet so far, will keep you glued to your computer.

Beach Landing

Only a little less addictive and colorful is another offering from Weekly Reader, **Beach Landing**. An arcade game by Hefter and Dubicki, it simulates landing troops on a World War II beachhead (see **Photo 3**). In this game you pilot a landing craft that picks up troops from two navy ships at the top of the screen and ferries them, under fire, to the beachhead at the bottom.

Trouble begins just a few pixels south of the ships, where enemy artillery fire is splashing into the water. One of those shells will put your landing craft out of commission before you even get near the beach. As you draw near the shore, the program zooms in on the section of beach you're assaulting (**Photo 4**) to reveal floating mines, underwater obstructions, and the tracks of cannon fire. All of these can deactivate your landing craft. With a total of nine beaches in the game, and only five landing craft, you can ill afford to lose a single one.

As you get closer to the beach, and further into the game, the defenses get tougher and denser. Even at the simplest beach (Able 1) it's a real chore to bring the landing craft through the maze of mines. Then you discharge the troops. (Make sure not to drown them far away from the beach.) Avoid grounding on the beach or hitting an

Photo 3. *Title screen from Weekly Reader's Beach Landing.*

Photo 4. *Troop carrier returns after securing the beach.*

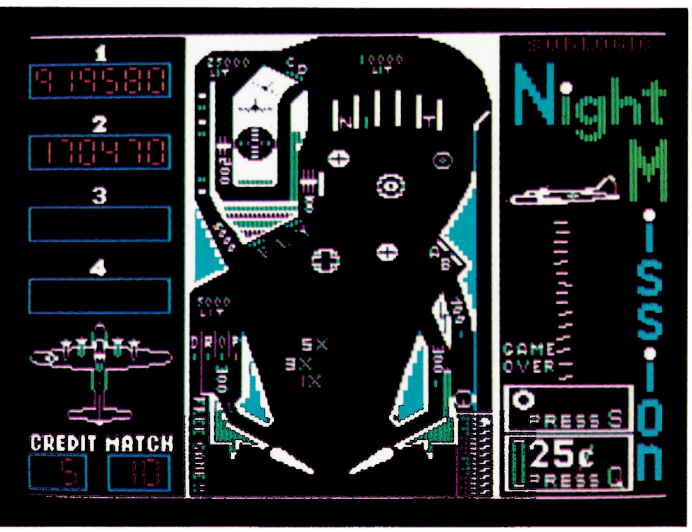

Photo 5. *Winning high score from Nels Anderson.*

obstruction, and then get the craft back to the troopship for more soldiers.

As soon as you capture a sufficient stretch of beach with the required number of troops (signified by an American flag) you receive an extra landing craft and go on to the next beach. Beaches require more and more troops as you progress. You need only three flags on the first beach, but on the fifth beach you need six, and by the ninth beach it takes eight. It's not impossible to land that many troops, just very, very difficult.

I've been an admirer of these Weekly Reader games and educational programs since they first came out. They have a coherent sense of style, largely because of Hefter's graphics. The educational programs are designed with great care. The games are entertaining and playable for kids while, at the same time, challenging for adults. They are packaged handsomely and durably, supported by clearly written manuals and other materials.

This approach represents more than just good business sense. I get the clear impression that the people who put these products together really care about us. It's a good attitude, one that more software makers should emulate.

Player of the Century

Now we turn from great ideas (like Weekly Reader's games) to bad ones (like my Player of the Month). A few months back I suggested that readers with incredibly high arcade-game scores could send in their scores, with some sort of proof, and I would select from the responses a Player of the Month.

As it turned out I got a grand total of one reply. One reply! It sure gets lonely out here on the Game Reserve.

The respondent was Nels Anderson of Framingham, Massachusetts, who racked up 919,580 points on Night Mission Pinball (see **Photo 5**). Nice shootin', Nels!

Since Nels was the only respondent, I'm not only naming him "Player of the Month," but "Player of the Century." I'm also sending him Micro-Lab's Boulder Dash as a prize. Now don't you wish you'd sent in *your* score?

Someday, I hope to resume the competition, with more prizes. Until that time, aloha!■

Send your New Year's wishes to the Warden at inCider, *80 Pine Street, Peterborough, NH 03458.*

Product Information

Run for It
Beach Landing

Weekly Reader
Family Software
245 Long Hill Road
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Any 48K Apple II, joystick optional.
$39.95 each

Readers' Choices

Strategy/Fantasy Games

1. Wizardry: Proving Grounds. . . (Sir-Tech Software)
2. Exodus: Ultima III (Origin Systems)
3. Castle Wolfenstein (Muse Software)

Arcade Games

1. One-on-One (Electronic Arts)
2. Choplifter (Broderbund Software)
3. Hard Hat Mack (Electronic Arts)

Adventure Games

1. Zork I (Infocom)
2. Suspended (Infocom)
3. Transylvania (Penguin Software)

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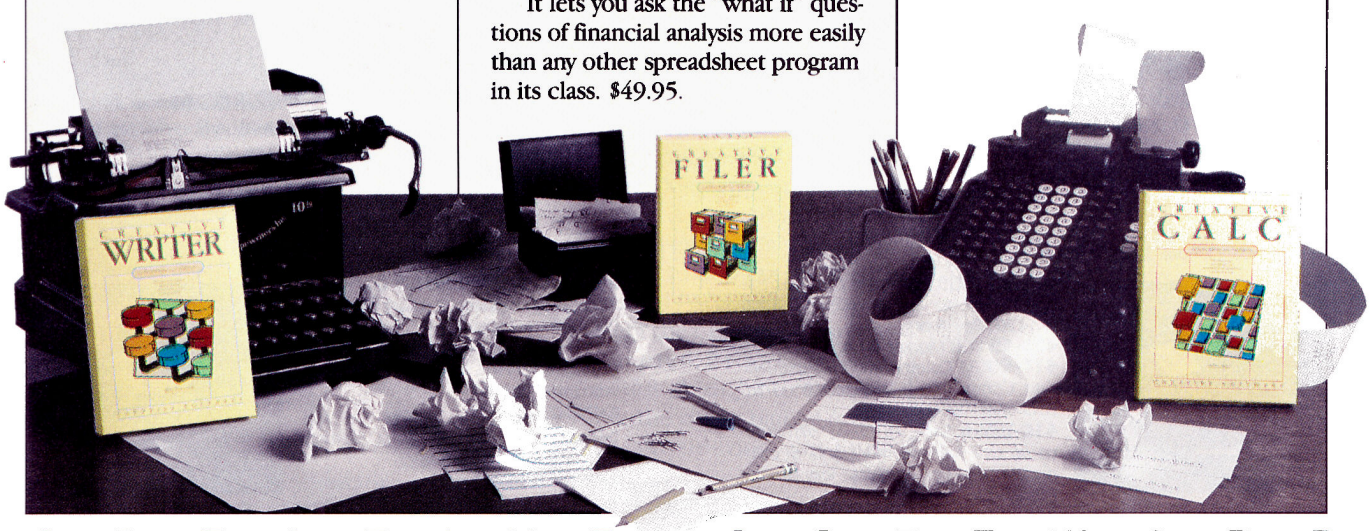

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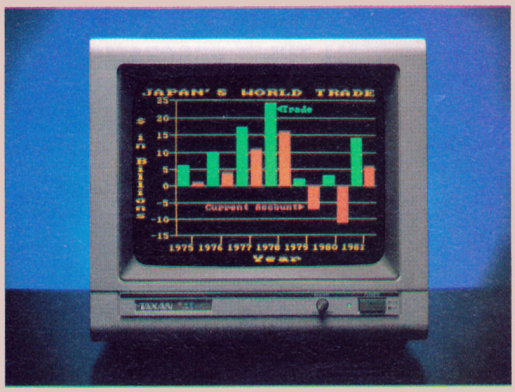

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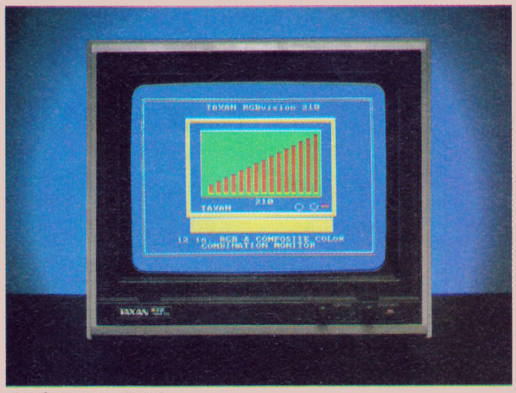

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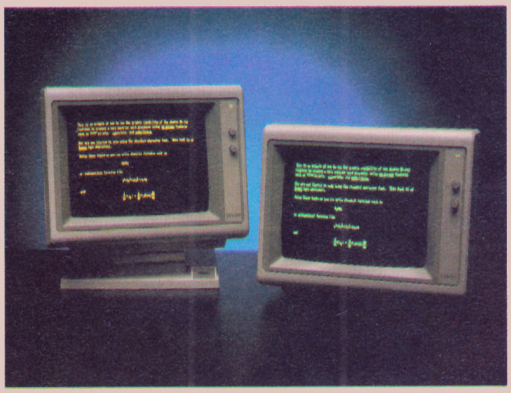

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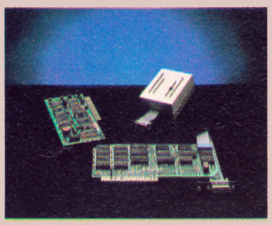

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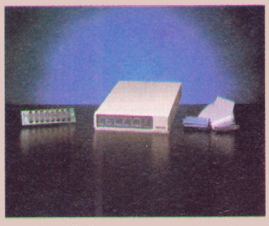

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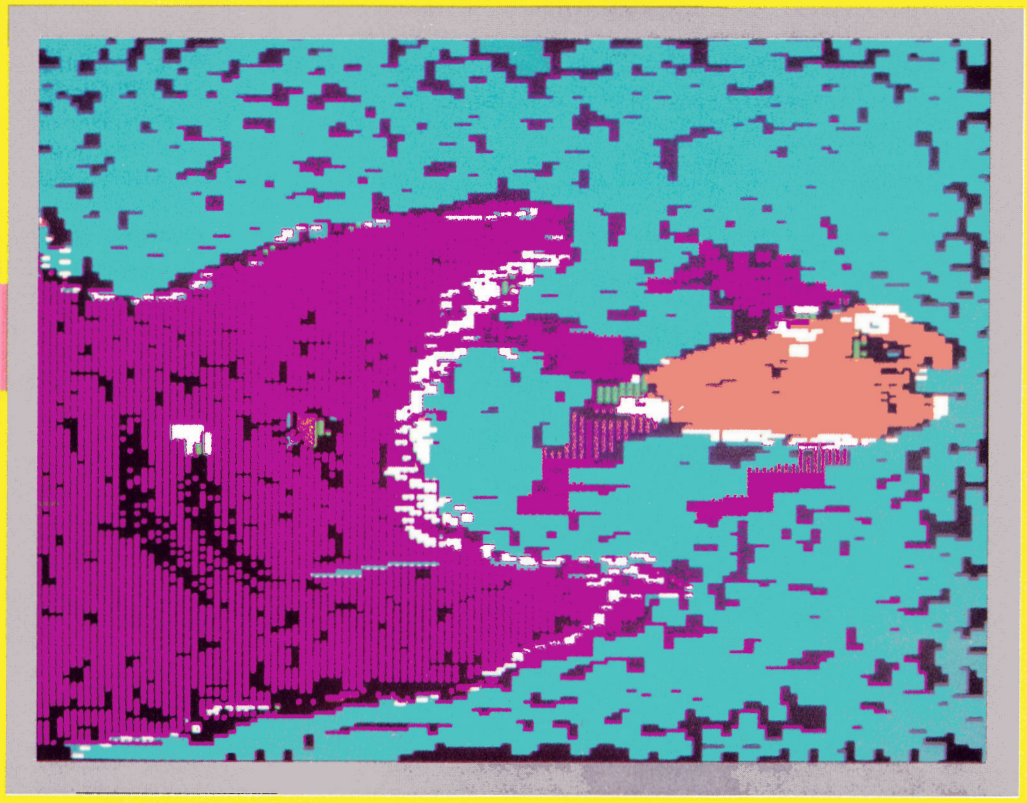
Paint Pot



Don't cry over spilled paint. Now children can draw and fill in colors on the computer screen.

Tired of tempera spills on the rug? With Paint Pot, young artists can paint on the computer screen instead, using a joystick or paddles. My program includes four colors, three brush sizes, and an erase feature.

To type Paint Pot into your Apple, type NEW and hit the return key to clear the computer. Then type and save the **Program listing**. Check for and correct typos, then resave the program.

The data in lines 550–570 contains the shape table and is POKEd into memory by line 90. Notice that line 100 checks the shape table for errors and warns you if it finds a typo.

Painting on the Screen

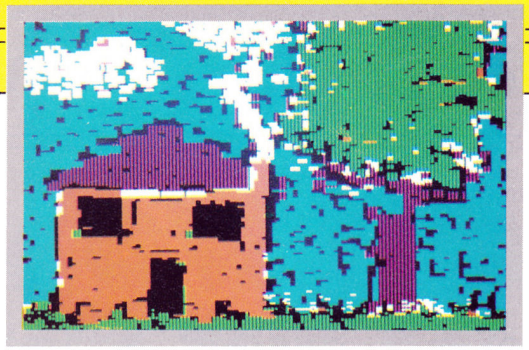
To paint on the screen, type RUN PAINTPOT and hit the return key. The drawing area is the full graphics screen. The cursor shows where the paintbrush is poised, ready for contact with the canvas (screen). To move the cursor, just move your joystick or paddles. To lower the brush to canvas, press paddle button zero.

The blob at the lower left of the screen indicates color and brush size. To change brushes, press the space bar until you see the size you need. To change color, press button one on your joystick or paddles until your color choice appears.

Erasing

Two of the colors are black. This won't make sense until you remember how Apples draw colors on the screen. Violet and blue dots appear at even values of X; green and red dots appear at odd values. So we need two kinds of black—odd black and even black—to cover the two kinds of colors. To erase a red spot, select the first black and try painting over the red. If the red doesn't disappear, or if it changes to another color, then try the other black. A few minutes' experimentation will illus-

by Michael A. Seeds



Program listing. *Paint Pot.*

```
10  REM ***  PAINT POT  ***
20  REM ***     BY      ***
30  REM *** MIKE SEEDS  ***
40  REM
50  REM
60  REM   LOAD SHAPE TABLE
70  HOME : PRINT  TAB( 15)"PAINT POT": SCALE= 1: ROT= 0
80 EP = .30:BR = 2:XS = 0:XL = 50:YL = 50:CL = 3:SU = 0
90  FOR J = 1 TO 33: READ HX: POKE 16383 + J,HX:SU = SU + H
    X: NEXT J
100  IF SU <  > 1812 THEN  TEXT : HOME : PRINT "TYPO IN DAT
    A LINES": END
110  REM
120  REM  DRAW SCREEN
130  POKE 232,0: POKE 233,64: HGR : POKE  - 16302,0
140  HCOLOR= 3: HPLOT 0,0 TO 279,0 TO 279,191 TO 0,191 TO 0
    ,0
150  GOSUB 320
160  HCOLOR= CL: XDRAW 1 AT XL,YL: REM  DRAW
170  REM
180  REM
190  REM   MAIN LOOP
200 X = 279 *  PDL (0) / 256:X = EP * XL + (1 - EP) * X:X =
    2 *  INT (X / 2) + XS
210  XDRAW 1 AT XL,YL: REM  ERASE
220 Y = 191 *  PDL (1) / 256:Y = EP * YL + (1 - EP) * Y
230  IF  PEEK ( - 16287) > 127 THEN  DRAW BR AT X,Y: REM  P
    AINT
240  XDRAW 1 AT X,Y: REM  DRAW
250 XL = X:YL = Y
260  IF  PEEK ( - 16286) > 127 THEN  GOSUB 320
270  IF  PEEK ( - 16384) = 155 THEN  XDRAW 1 AT X,Y: POKE  -
    16368,0: END
280  IF  PEEK ( - 16384) > 127 THEN  GOSUB 430
290  GOTO 200
300  REM
310  REM
320  REM  CHANGE COLOR
330  IF CL = 0 AND XS = 0 THEN XS = 1: GOTO 400
340  IF CL = 0 THEN CL = 3:XS = 1: GOTO 400
350  IF CL = 3 THEN 380
360  IF XS = 0 THEN CL = 0: GOTO 400
370 XS = 0: GOTO 400
380  IF XS = 1 THEN XS = 0: GOTO 400
390 XS = 1:CL = 7: GOTO 400
400  GOSUB 480: RETURN
410  REM
420  REM
430  REM  CHANGE BRUSH SIZE
440 BR = BR + 1: IF BR > 4 THEN BR = 2
450  GOSUB 480: RETURN
460  REM
470  REM
480  REM  DRAW BLOB
490  HCOLOR= 0: DRAW 2 AT 7,185: DRAW 2 AT 6,185: HCOLOR= C
    L
500  DRAW BR AT 6 + XS,185
510  POKE  - 16368,0: RETURN
520  REM
530  REM
540  REM  SHAPE DATA
550  DATA 4,0,10,0,20,0,28,0,31,0,36,149
560  DATA 173,219,246,24,8,56,7,0,36,108,54,110
570  DATA 36,36,0,255,108,54,0,4,0
```

trate erasing with two blacks.

Don't expect a small child to create *realistic* pictures of houses and boats. The joystick isn't an ideal graphics tool, and it's difficult to control the paintbrush with great precision. The strange behavior of colors on the Apple graphics screen also makes it difficult to create realistic masterpieces. But do encourage your children to create abstracts in glowing colors.

Saving Pictures

When your little artist finishes a masterpiece, you can save it to admire later. First, cycle through the colors to black to make the blob in the lower left corner invisible. Then press the escape key to erase the cursor and display the graphics screen. To see the text screen, type TEXT and hit the return key. (To switch back to the graphics screen without erasing it, type POKE – 16304,0: POKE – 16302,0). To save the screen, type BSAVE PICTURE1,A$2000,L$2000. If you save more than one picture on a disk, give each one a different name.

Displaying Pictures

To show the best selections to visitors, just type VTAB 22:HGR. Then type BLOAD PICTURE1. (Use your own file names to select the picture you want.) These commands appear below the hi-res picture so you can see what you type. When the picture is loaded completely, type POKE – 16302,0, and the bottom of the picture will replace those four lines of text.

If you have a graphics printer utility such as Zoom Grafix, Printographer, or a printer card with a graphics screen dump such as the Dumpling GX, you can print the graphics screen. You'd need a color printer for the whole effect, but your little artist might like to color a black and white printout with crayons or with paint—being careful not to stipple the white shag. ■

Address correspondence to Michael Seeds at Franklin and Marshall College, P.O. Box 3003, Lancaster, PA 17604.

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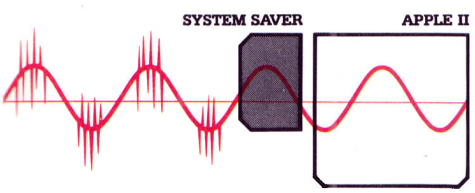

System Saver makes your Apple more convenient to use.
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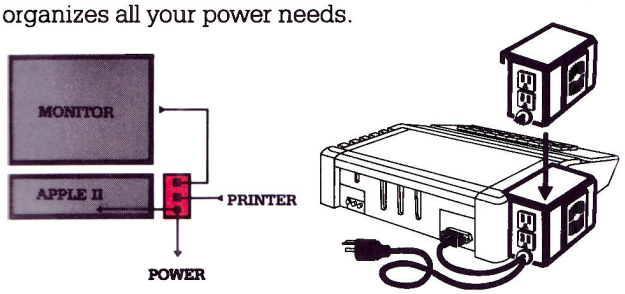

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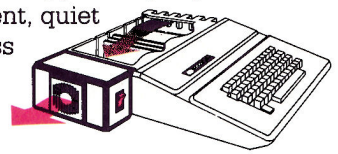

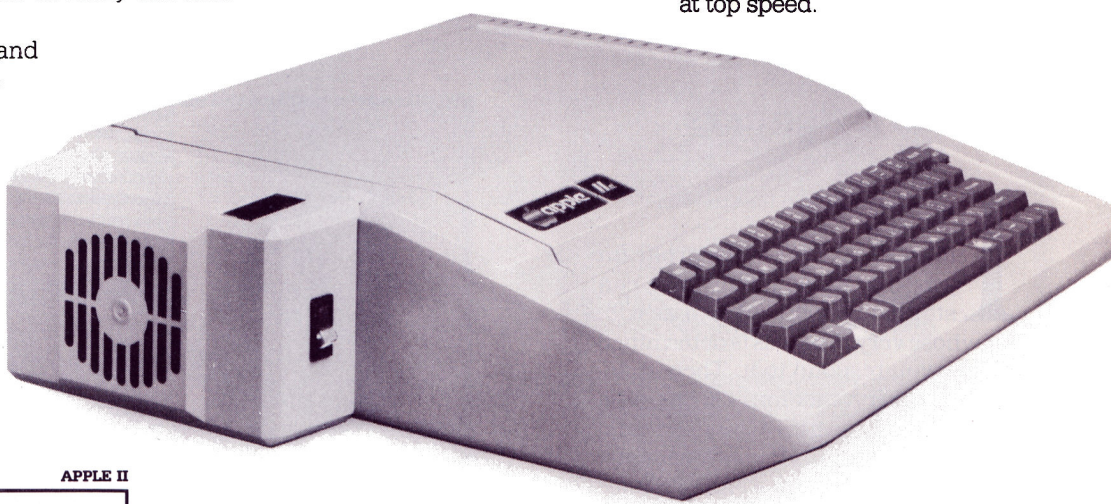

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VCR and CRT: The Latest Media Marriage

by Mark Sanders

Imagine a television program you, the viewer, not only can stop and start up again at will, but whose very progress is determined by how you respond to it. Then imagine that such a medium can be individualized enough to be used as a training film for hundreds of students, each of whom works at a different pace and approaches a subject with varying experience and skills. Now you can begin to appreciate my excitement when, looking for a way to implement microcomputer technology in my college classroom, I stumbled upon interactive video—with full-color, computer-generated graphics and text screens all coordinated by a microprocessor.

With my Apple II Plus, I can call these fireworks up on my color monitor and choreograph them in any configuration. Students can manipulate the show from the keyboard, so each student can see a "different" scene. From an educator's perspective, the potential seemed limitless.

What iced it was the cost. While I found video*discs* require a Michael Jackson bankroll to produce, interactive video*tape* represents an affordable alternative. For $600, I purchased an interface card so my videotape player could talk to my Apple. (Editor's note: Companies distributing interactive video hardware/software for videotape systems are listed at the end of this article.) With course-authoring software costing another $400, I created question and information pages (see the **Table**) and controlled video scenes and computer-generated graphics. One thousand dollars was a bargain, since it gave me the opportunity to work with an exciting instructional tool.

Photo. *Title page generated by a Koala Pad for the offset press program.*

Hardware Requirements

At the heart of my system is an Apple II Plus (or //e), one disk drive, and a color monitor with audio capability. The computer is interfaced to a Sony SLO-325 Beta I videotape recorder with an interface card and cable. The videotape recorder must have a port at the back that accepts the cable from the interface card. This type of port is available on the more expensive "industrial" videotape recorders from Sony, JVC, and Panasonic ($1300 and up).

The less expensive "consumer" videotape decks don't have this port, but with interactive video's rapid growth, manufacturers are certain to include the port on less expensive models in

Interactive video joins the best of two technologies into one training package ideal for employers and educators.

the near future. A printer, indispensable during software development, gives students and teacher the option to print student results.

From among the many boards that interface a microcomputer and videotape recorder, I selected the BCD card because it was the least expensive board with absolute frame addressability: The software developer can identify the start and stop points of a video scene to the nearest video frame. (Videotape operates at 30 frames per

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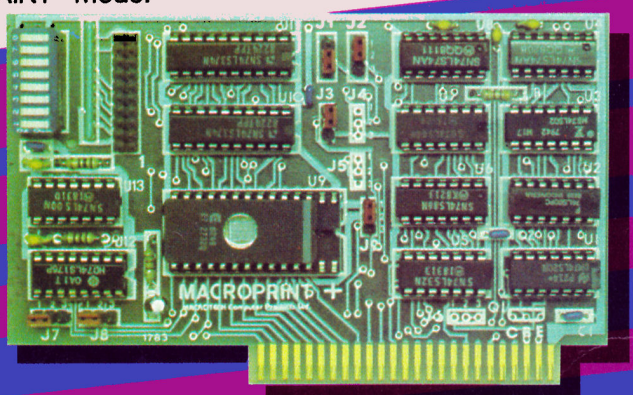

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second, ensuring accuracy to within 1/30 second.) Less accurate addressability could make a video scene start earlier or later than desired. Further, completing the BCD Associates' system, the course-authoring software eliminates hardware and software incompatibility problems.

Individualized Instruction On Videotape

With the help of the Learning Resources Center at my university, I designed and produced an interactive video instructional program to introduce students to the principles and operation of the offset press. The interactive video system is set up in the laboratory so students can use the instructional program whenever they're ready for it. The program takes 45 to 75 minutes. The time varies because no two students see, hear, and do exactly the same thing while working through the program.

When a student is ready for instruction on the offset press, he or she gets a short workbook and heads for the Apple II Plus in the lab. The first page of the book shows how to load the proper videotape into the videotape player, turn on the color monitor, and boot the Offset Press Lesson disk.

The student receives all further directions from the computer monitor. Up pops a full-color title page I designed with Koala Pad (see the **Photo**). After five seconds, the computer loads the offset press program. Next, it checks that the student inserted the correct videotape. If the student loaded the wrong tape, the computer indicates the error and waits until the student loads the correct one. Then, the Apple asks for the student's name, identification number, and date. This information, along with the student's lesson responses, is placed in a disk file that documents the student's progress.

From the beginning, the student is in control. The menu options include program introduction and unit instruction. If the student completes part of a lesson or wants to review one section, he or she may skip to option 4, for example, which describes the dampening unit of the offset press. The methodology behind interactive video assumes that each person interacts with the material differently and will therefore move through the program differently.

In my program, option 1 starts the student "at the beginning." A text page

appears and describes what the student is about to see: video segments followed by questions. "Enjoy the ride," it says as the videotape automatically fast-forwards to the first video scene in only a few seconds. What happens next is, for most students, a startling experience: Full-color video appears on the monitor. There I am, talking about the basic principle of offset lithography: oil and water don't mix.

It's important to note that I've never done this particular demonstration in the classroom. For the video production, I took the time to set up a "Mr. Wizard" demonstration of the process using props and tricks that I couldn't have pulled off in front of 20 students.

With interactive video, you can use virtually any other medium along with the video. In this case, a workbook lets the student write in notes to use as a study guide away from the computer or as an aid when operating the offset press. As soon as the video segment is over, a message refers the student to Figure 1 in the workbook. Then the student is asked a multiple choice question about Figure 1 in the workbook. The computer indicates if the student keyed in the correct answer; then the response is recorded on disk and a second question is presented. If the student answers the first question incorrectly, the computer automatically branches to remediation.

Play It Again, Sam

Remedials may be in the form of text screens, computer graphics, video segments, and even workbook references. Video remedial segments are among the most interesting options—as anyone who's ever seen Dragon's Lair in a video arcade can attest. With video segments, the instructional designer has several options. The easiest is simply to branch back to the exact scene the student just viewed. Yet a long scene would contain more information than the question tested.

A more appropriate option is to show the student a shorter portion of the video segment that addresses the content in question. This is relatively easy, because the video already exists. All you have to do is identify the portion of the video you want to display as the remedial. From the student's perspective it's also gratifying because the video remedial is short and sweet (some are only a few seconds long).

A third video remedial option, and perhaps the most sound, is to show an entirely new video scene. If the stu-

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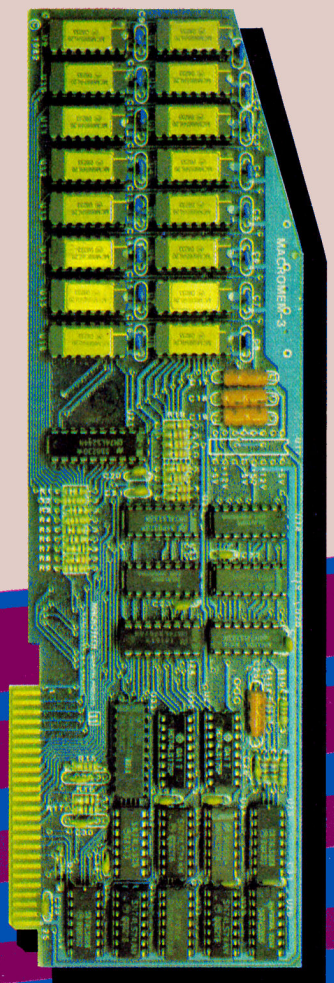

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High-Tech Training Ground

On the average, Americans spend almost one third of their lives staring at television sets. It's a given that the medium influences marketing trends, styles, behavior, and even learning methods. Educators, recognizing television's universality for some time now, have incorporated the medium into their lesson plans. The process, however, extends past not only the traditional classroom but also traditional methods. Today, people are clamoring for *interactive video*, a technology that combines video with microcomputers for training purposes.

"People *believe* TV because it's so much of their lives now," says Diane Howard, president of BCD Associates, a company involved in interactive video production.

Television's "credibility" makes it a particularly useful learning tool in many contexts. Seat a factory worker in front of the computer, and she can learn all about on-the-job safety; a marketing staff can review point-of-purchase sales; a beginning pilot can receive flight training. Businesses welcome interactive video because it cuts down on training expenses. No longer does a company have to absorb the costs of sending personnel to out-of-town seminars or hiring outside instructors. The training can be conducted in-house.

Applications run the gamut from employee orientation to flight simulation. Advocates say the method is more effective than watching a linear videotape or an on-screen lesson. The reason: branching.

The branching format lets the viewer go through the lesson at his or her own pace and then answer questions. The program won't continue until the viewer answers the questions correctly. If the viewer misses a question, the program reviews the corresponding segment and repeats the question.

BCD Associates reports more than five times as many interactive video clients than it had two years ago. Howard says users are "thrilled" with the technology. "We've allowed programmers to create their own programs," Howard says, "and they can be as creative as they want."

The applications are limitless, considering what you can add to the system. One company added voice recognition because a trainee's fingers were too big for the keyboard. Instead of keying in answers, he responded orally. Special-needs instructors welcome interactive video into their classrooms. A school for the blind in Florida uses it to teach signing to instructors.

Howard cites a Pioneer Electronic's study delineating interactive video's superiority over traditional learning methods. According to Howard, the study reveals that interactive video students have less standard deviation and three times the retention of their counterparts.

But training isn't the only application. The process carries into day-to-day business. Take a real estate company, for example. Instead of driving clients to look at each house, an agent can show a prospective buyer the actual houses—from foundation to closet space—on the computer monitor. Other interactive video production areas cover data storage and retrieval, archiving, and nurses' training. □ —**C.C.**

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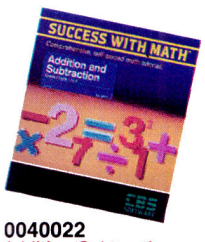

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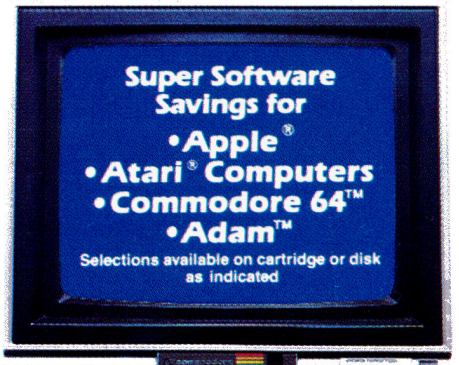
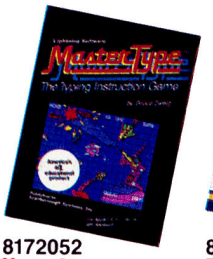
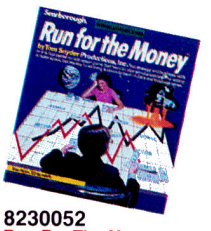




8172052
Master Type
C-64, Atari H.C.: *disk and cart;* Apple: *disk.*



8230052
Run For The Money
C-64, Atari H.C. and Apple: *disk.*

8122062
Pitfall II
Adam, Atari H.C.: *cart;* C-64: *disk and cart.*

8100022
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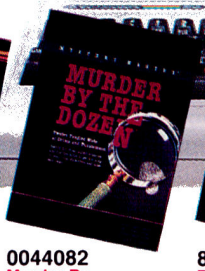
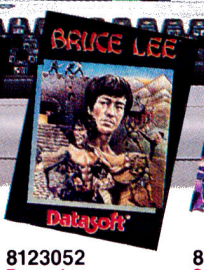
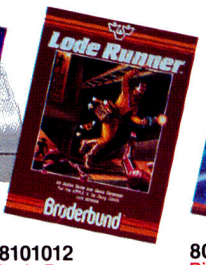


0044082
Murder By The Dozen
C-64, Apple: *disk.*

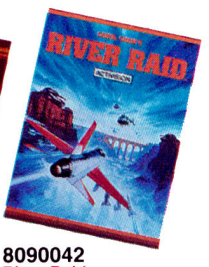


8123052
Bruce Lee
C-64, Atari H.C. and Apple: *disk.*

8216032
Seastalker
C-64, Atari H.C. and Apple: *disk.*



8101012
Lode Runner
C-64, Atari H.C.: *disk and cart;* Apple: *disk.*

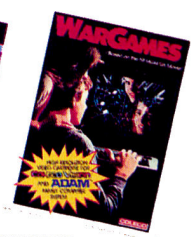


8090042
River Raid
C-64: *disk and cart;* Atari H.C., Adam: *cart.*

8105072
Zork II
Atari H.C. and Apple: *disk.*

8104082
Zork I
Atari H.C. and Apple: *disk.*

8150012
Summer Games
C-64, Atari H.C. and Apple: *disk.*



8149052
WarGames
Adam: *cart.*

8102002
Temple of Apshai
C-64, Atari H.C. and Apple: *disk.*

8215042
Beach-Head
C-64, Atari H.C.: *disk.*

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8229082
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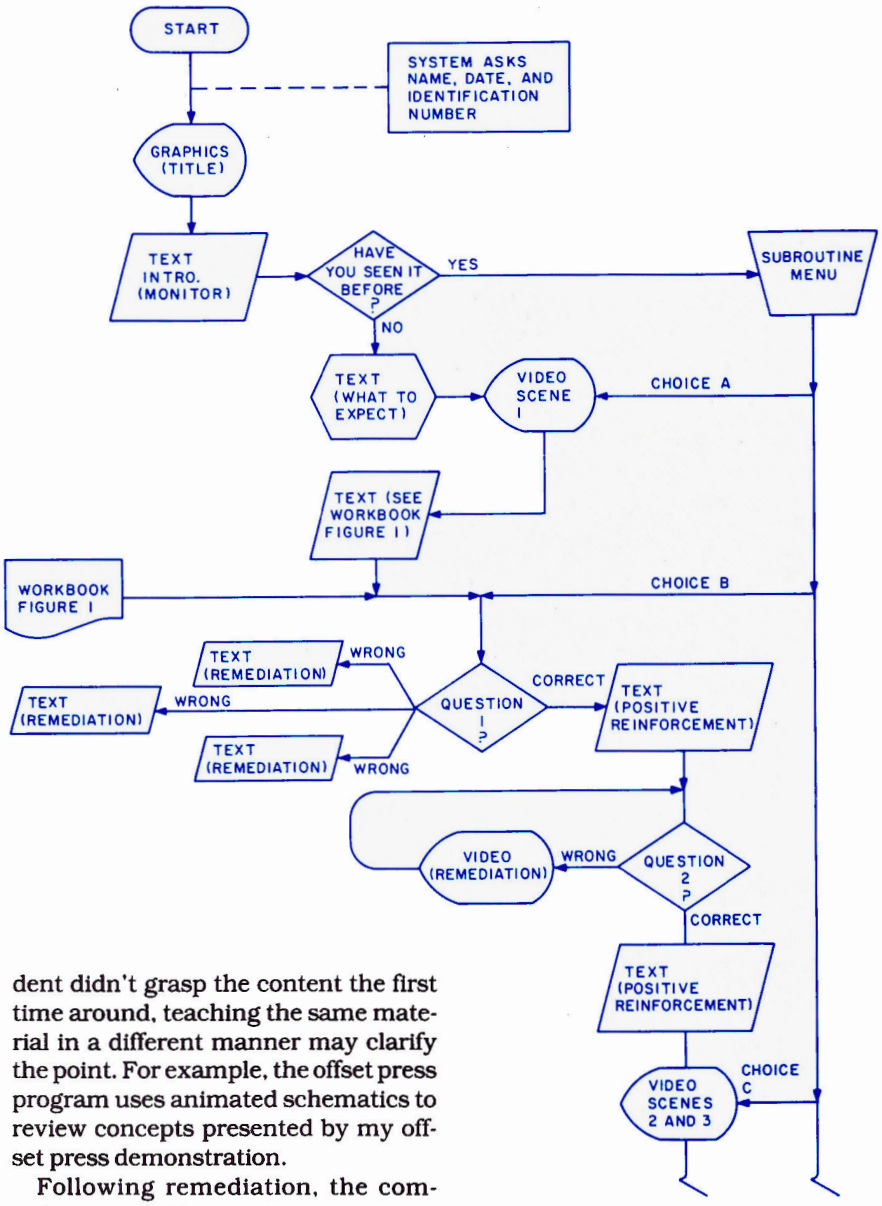
Figure. *Flowchart for the interactive video program on the offset lithographic press.*



dent didn't grasp the content the first time around, teaching the same material in a different manner may clarify the point. For example, the offset press program uses animated schematics to review concepts presented by my offset press demonstration.

Following remediation, the computer repeats the question or asks an analogous query. If the student misses the question again, the program presents another remedial (either a new or a different one). Some educators succumb to frustration or impatience when a student asks the same question over and over; the computer doesn't. Students can continually miss a question, and the interactive video system will guide them through remedial segments until they get it right.

With the offset press program, the students can't advance through the lesson until they correctly respond to the questions segment. So when a student completes the program, you're certain he or she answered the questions correctly. During a live lecture, I may ask the class a few questions, but I have no way of knowing if everyone understands what I'm teaching. With interactive video, students *master* the material at their own pace.

At any point during the lesson, the student may stop the video by pressing the space bar. He or she then has four options: start the video scene at the beginning; resume the video from the point it was interrupted; skip the remainder of the video scene (which brings him to the questions segment); or quit. This feature allows the student to review a scene, get a drink of water, answer a question from a fellow student—and return to the program without missing a thing.

At the end of four of the seven units in the lesson, students must name the offset press parts labeled in the workbook. The monitor displays the correct answers so that they can check their work. When a student completes the lesson, or opts to quit, the computer tallies the percentage of correctly-answered questions, records all responses, and bids farewell. The student may also request a performance printout.

Table. *Page options in BCD Associates' The Instructor course-authoring software.*

Filename	Description
Information pages	Text page of one or two five-line paragraphs that provide information during the lesson.
Question pages	Multiple choice questions with four responses.
Keyword pages	Questions requiring student to type in correct answer.
Menu pages	Menus with up to nine items and one-line title.
Graphics page	Contains the name of a graphics file. When the program calls for this page, it searches the catalog and displays the graphics, which may be programmed or digitized.
Random page	The computer randomly chooses one of four possible branches. It simulates real life where there is more than one result from a given input.
Audio page	Plays only the audio and displays the last video that appeared on the screen.
Tape record	Activates a video camera to record during the actual lesson (for example, to record student performance for instructor's evaluation).

Software Requirements

I used "The Instructor," BCD Associates' course-authoring software, to develop the final courseware. The instructional developer performs two basic functions using this course-authoring software. First, you log the start and stop points with a subprogram, Logger II. You must write a special frame code on channel 2 of the videotape using the Logger II program. Then, you simply view the videotape and press the space bar at the "in" point and again at the "out" point of each desired video scene to record the frame number of each scene's start and stop points. This data file is writ-

ten to your disk and can be edited as needed.

The second, more elaborate task involves writing the lesson file comprising material like that found in the **Table**. The accomplished programmer can write this part of the program in BASIC to gain the flexibility of options not provided by the BCD software. Of course, the trade-off requires more time spent developing this portion of the program. Other course-authoring programs and languages can help you develop interactive video courseware. (For example, see "SuperPILOT: Between Student and Teacher," *inCider*, September 1984, p. 57).

Designing the lesson portion is an involved task. Not only must you write questions and answers, produce graphics, and write information pages, but while writing these pages, you have to make branching decisions. You must provide four plausible choices for multiple choice questions. And for each choice, you need to decide which video scene and page the program should branch to next. You must think in several dimensions simultaneously to develop this instructional material; it's helpful to work closely with flowcharts. (See the **Figure**.)

Once you write the data file (logged start and stop points for the video scenes) and the lesson file, you can add them to a BCD files catalog. From the time the student boots the prepared lesson disk, everything is automatically accessed.

Video Production

Producing the video is the most time-consuming element in developing interactive video courseware. Quality video production requires substantial planning and technical expertise as well as adequate facilities. Fortunately, many schools and colleges boast good video facilities that are available to those who want to develop interactive video courseware.

For this program, we spent a day taping in the graphics communications laboratory. We spent another two days in the studio, taping animated video schematic diagrams, supers (words overlayed on the video scenes), and the introductory video demonstration. Another two days were devoted to editing the tape to its final Beta version.

Clearly, video production isn't for everyone. But there is an alternative. I taught interactive video courseware development to a group of 12 graphic communications students. I used an existing videotape and showed my students how to use the interactive video hardware and software to retroactively convert conventional linear videotape into interactive video.

Put interactive video to work for you. See what a little imagination can do to change a staid classroom or workplace into a vibrant educational setting. ■

Mark Sanders is an assistant professor at the Virginia Polytechnic Institute and State University, Division of Vocational and Technical Education, Blacksburg, VA 24061.

Interactive Video: Tape Versus Disk

Interactive videotape and interactive videodisc, though similar mediums, present important distinctions. Among its advantages, videodisc allows random access of each of the 54,000 video frames on a disk, thus providing a "worst case" search time of just a few seconds. With videotape, you must advance or reverse the tape to access scenes. This can produce a "worst case" search time of a couple of minutes—a problem careful editing minimizes.

Videodisc also offers still-frame capability: each of the 54,000 frames may be frozen, like slides. To stop videotaped action, you must tape a still image for as long as you want it frozen, a process that eats up tape rather quickly. Further, videodiscs, virtually indestructible, are more durable than the comparatively fragile tapes.

On the cost scale, you can spend several thousand dollars for your first videodisc—or about $8 for your first videotape. In the long run, videodiscs are less expensive since making copies is analogous to producing vinyl audio recordings from a master. Interestingly, though, videodiscs are made from videotapes. Since the program is developed with videotape, you lose little by breaking into the technology with tape. □

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BCD Associates
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(518) 869-5581

Omega Group
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Cleveland, OH 44122
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Panasonic
Audio Visual Systems Division
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Secaucus, NJ 07094
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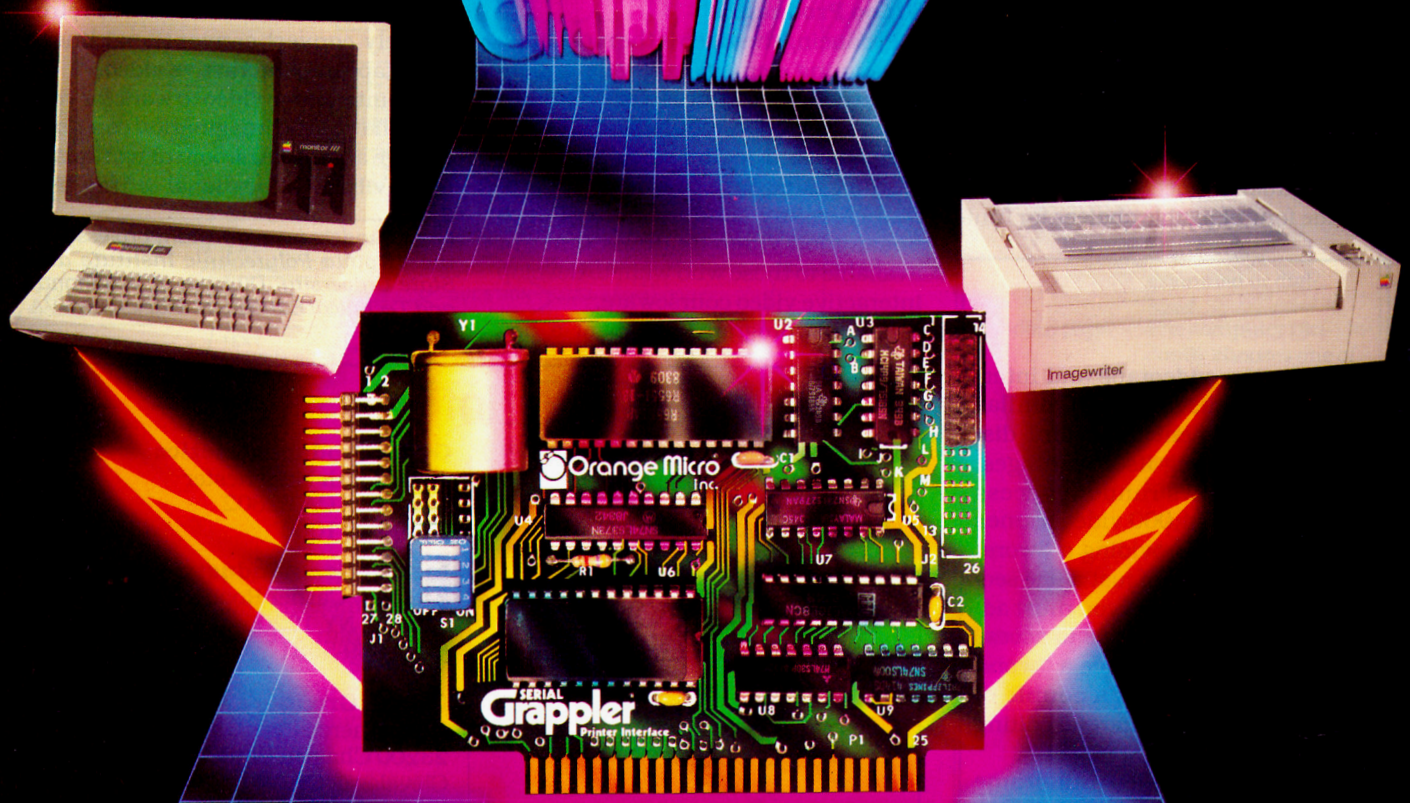

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Taxing Questions

by Gregory R. Glau

The right software package can help you cope with 1984 tax pressures.

You're going to file early this year. Wasn't that one of the resolutions you made when you bought an Apple? But before you buy a tax package, ask yourself two questions: How much do I really know about taxes? And what exactly do I want this program to do?

As with most software, you can pick up a tax package and learn how to operate it. But with tax systems, knowing how to use the program is only half the battle. The other half involves tax laws, rules, procedures, and forms to wade through. The type of program depends on the functions you need: tax planning, data storage, sorting through data to concentrate on preparing tax forms, and so on.

Examining Your Motives

Who does your taxes now? If you do them yourself, are you familiar with ever-changing IRS rules to take all legitimate deductions? Do you want a program that simply calculates your taxes based on lump-sum information you enter? Or do you need itemizing to detail your income and deductions? Must the system print the required forms per government specifications, so you can just sign your name and send them to the IRS? Do you already know which IRS schedules and forms your tax situation requires? Or should the software "know" what information you need to track and ask for data automatically?

The software selection process, then, concerns both what you know and how involved you want to be. The situation is aggravated by the fact that we use our tax program only once a year and tend to forget how to run the darn thing by next tax season.

Tax programs come in a variety of shapes and prices, but generally perform one of two main functions. *Tax planning systems* let you enter your projected income and deductions and display or print your projected tax liability. These systems help you get an idea of how many dollars you'll have to relinquish to Uncle Sam as different things happen to your financial picture.

Tax preparation programs take the information you enter to calculate your taxes and print most or all of the

tax return forms. The better programs provide the IRS schedules that detail what's summarized on form 1040. Accountants and other tax preparers use these programs for client accounts, since the Apple does the drudge work.

Some packages combine these two programs when both planning and preparation are needed.

Tax Law Changes

One of the first things you learn about tax programs is that they aren't always a sure thing. Tax laws change, and so a tax package must allow you to make internal changes or offer quick updates in case you bought a system the day before the new law went into effect.

A case in point: I received Personal Tax Planner 1984/85, from Aardvark/McGraw-Hill for review in mid-July, and by late August the program was outdated. When I questioned the company about how something could become obsolete so quickly, I was told a new law had just been put into effect. I said, gee, didn't they know that the law was coming along? Well, yes, they did, but they weren't sure if it would be signed into law. So they kept selling the program until the President signed the bill.

While you might question their marketing methods, you must sympathize with the folks who put out tax programs, because they live or die at the whim of Congress and the executive branch of the government.

Look Before You Leap

So, the first consideration is to make sure you buy a current product and check into the company's background to determine if they'll upgrade the package when changes occur. (For your information, Aardvark/McGraw-Hill intends to upgrade the Professional Tax Planner, but there are no scheduled plans for the Personal Tax Planner.)

The second consideration is your tax situation. If you get by without itemizing deductions, have a stable income, currently do your own tax paperwork by hand, perhaps even report on the 1040A short form, chances are you really don't need to computerize your taxes. The same holds true if you don't have any tax shelters (like real estate investments), don't see your income changing in the near future, won't be making large donations, and so on. If your life is simple, and it appears that it'll stay that way, why spend anything on a tax program?

But if your income is rising, if you spend the week before April 15 in a state of hysteria, if the check you send your Uncle in Washington, D.C., gets larger every year, if your accountant is driving a better car than you are, then let your Apple and a good tax program come to your rescue.

Would it help you to forecast what your tax situation will be under certain conditions? In 1985, suppose you get a 15 percent raise, your oldest daughter gets married (so you lose her as an exemption), and you sell a share of your vacation home? What if all those things take place, and you buy a small apartment building as a tax shelter? Most tax programs let you plug your data into their forms, and will calculate your tax liability. You can change items to project what your tax situation would look like under different conditions.

Other tax packages concentrate on the forms themselves. After you enter your information, following a pre-set plan, the system calculates your taxes and prints the necessary IRS forms. You'd find this type of software appropriate if you know where to list each item and which form to use.

In any case, know what you're doing. None of these programs takes you by the hand and shows you which number goes where. Sure, the line your total income goes on is pretty obvious (the government makes that part easy), but how you should itemize deductions is the real trick. If you don't know what is allowable and what isn't, or what are the proper forms to use, then you'll have trouble with your taxes—whether you do them by hand or on your Apple.

If you understand the tax system, then a program for your Apple can be a true help, because the calculations are built in and the computer does the math. Many programs also let you enter data for next year's taxes as income is received and deductions are spent, so you'll be ready when the next tax season comes along. Almost every company sells yearly updates that change along with the laws.

Personal Considerations

Start with who you are and what your financial future holds. Read a good tax book or two (one often recommended is J.K. Lasser's *Your Income Tax*) so you're up-to-date on tax laws. The IRS publishes *Your Federal Income Tax*, if you can get someone to pick up a copy for you at the IRS office. (You wouldn't go in *yourself*, would you? They might recognize you.)

Poke through your old income tax forms; they are excellent guidelines for

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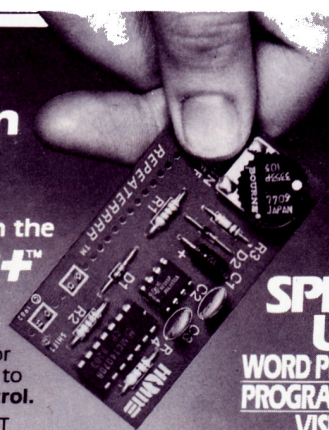

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itemizing this year's deductions and checking that you don't miss any deductions.

Before you buy a tax program, make sure it provides all the forms and schedules your financial condition warrants. Ask your local computer store owner to let you borrow a program (or test it in the store) before you buy it. Enter information from last year's tax return to see how complex a particular package is and to check its math.

While no tax program substitutes for competent advice, a good, coordinated program can save you hard-earned, *taxed* dollars by forecasting your tax liability under various circumstances and by tracking your information. None of this is great fun, but why not use your Apple to make the process a bit less painful?■

Write to Gregory Glau at P.O. Box 1627, Prescott, AZ 86302.

Buyer's Guide to Tax Preparation Software

An Apple II-family computer (II, II Plus, //e, or //c) running on DOS 3.3 and with 48K RAM and one disk drive is assumed in these product descriptions. Additional system requirements or capabilities are specified.

Asset-Manager
Micro Lab
$200
Forms 1040, 1065, 1120, 4562, 4797, 4255
Two drives
Keeps track of depreciation on 999 assets and ten businesses. Automatically chooses most cost-effective method.

Corporate Tax Planner
Aardvark/McGraw-Hill
$350
64K
Evaluates tax implications of continuing operations, analyzes the effects of potential audit adjustments, and plans for special, non-recurring items. Does computations and prints results on schedules.

Estate Tax Planner
Aardvark/McGraw-Hill
$750
128K
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Estate Tax Planner
TaxCalc Software
$100 ($50 when purchased with TaxCalc Tax Planner at $150)
Form 706
128K; SuperCalc 3, VisiCalc IV, Multiplan, and some other spreadsheets
Templates follow tax forms for what-if analyses.

Forecast
Monogram
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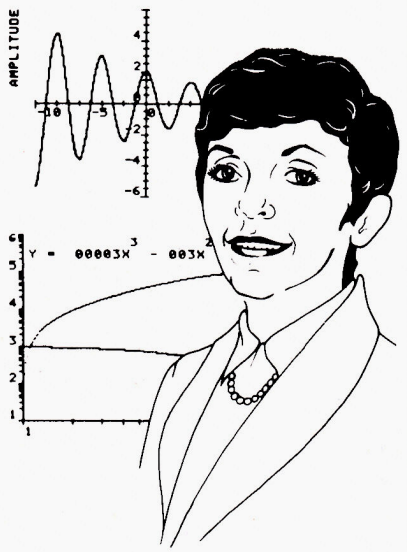

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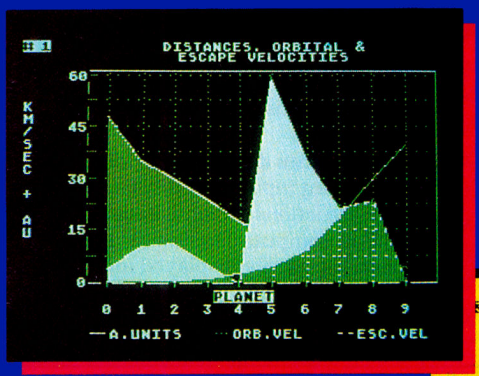

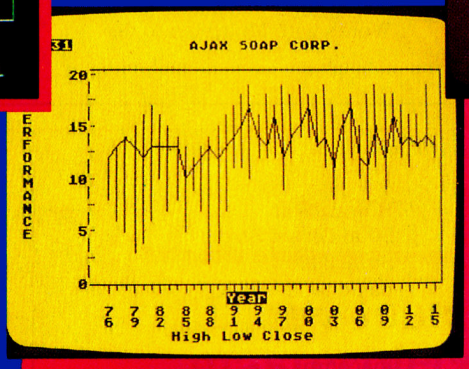

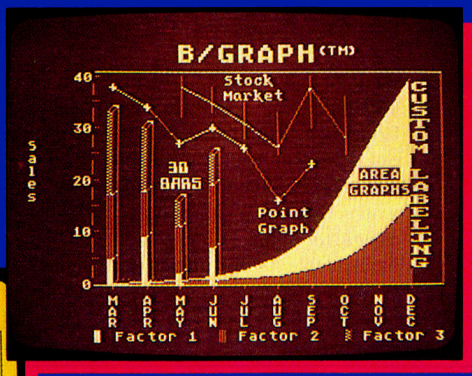

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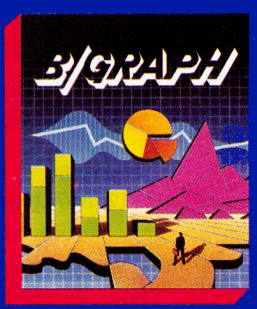

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Graphic Conversions

LO-RES to HI-RES

by Mark Steinborn

Don't lose those video masterpieces: Print out even lo-res pictures in minute detail.

Low-resolution graphics, simple both to learn and to produce, let you see your drawing develop as you add lines to your program. But most printing programs and printer interface cards with built-in graphics screen-dump generators print only high-resolution pictures. My program, LORES TO HIRES, lets you convert any picture from lo-res to hi-res. By producing all 16 possible lo-res colors in hi-res, the program ensures that sufficient contrast exists for you to recognize your pictures—even if you use a black-and-white printer.

Background

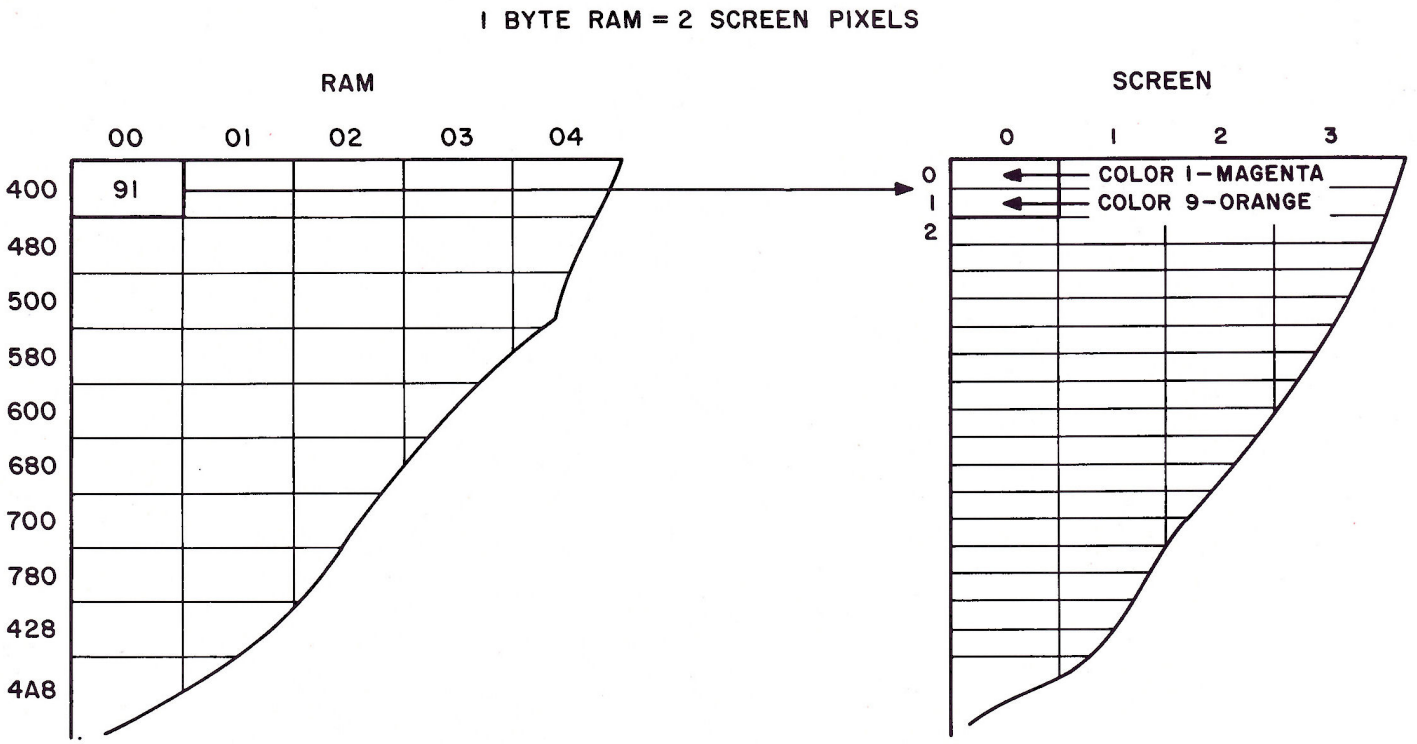
The following facts from the Apple II reference manual helped me write the machine-language version of LORES TO HIRES (**Listing 1**):

- The lo-res graphics screen consists of 960 bytes (24 rows by 40 columns), with an address range of $400–$7FF. (Note that a $ signifies a hexadecimal number; otherwise, the number is decimal.)
- Each lo-res byte describes two lo-res color dots (pixels) plotted on top of each other. This accounts for the 48 row by 40 column lo-res picture resolution.
- The hi-res graphics screen consists of 7680 bytes—exactly eight times as many as the lo-res screen (192 rows by 40 columns). The address range of page 1 of the hi-res screen is $2000–$3FFF. Consider each lo-res byte as 8 stacked hi-res bytes (a "box") or each lo-res color pixel (one half of a lo-res byte) as 4 hi-res bytes stacked on top of each other.
- Given the address of any lo-res byte, adding $1C00 to it determines the equivalent hi-res page 1 starting address—the address of the top byte in the box mentioned above. (Add $3C00 to determine the hi-res page 2 starting address.)

Lo-Res RAM and Screen Organization

Assume that $91 is stored at memory location $400, the upper-left corner of the lo-res graphics screen (see **Figure 1**). Each nibble of a byte of RAM can hold a number from 0–15 ($0–$F), and these 16 numbers translate conveniently into the Apple's 16 lo-res color numbers (see the **Table**). In **Figure 1**, byte $91 represents the colors orange (9) and magenta (1) with

Figure 1. Lo-res RAM and screen organization.



Listing 1. *LORES TO HIRES: machine language code.*

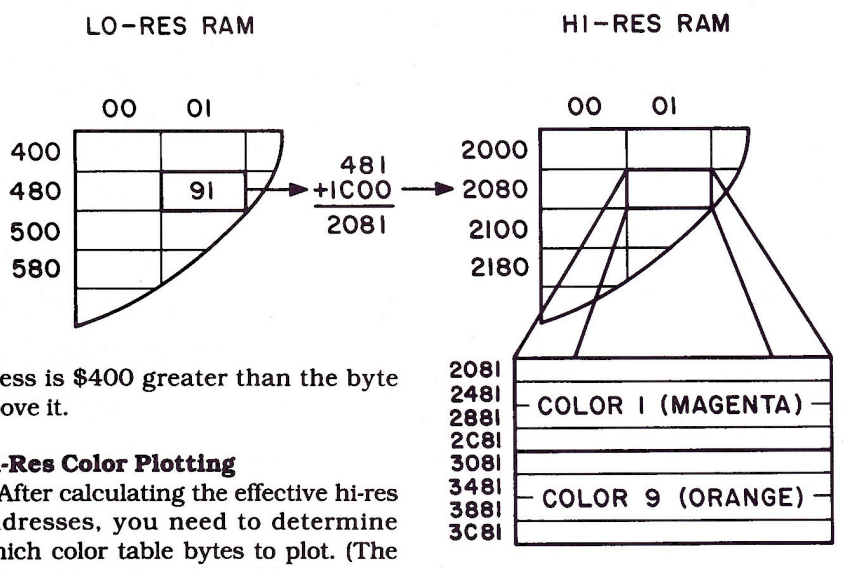
```
0300- A9 00 85 00 A8 A9 04 85
0308- 01 A9 00 85 06 A5 00 85
0310- 02 18 A5 01 69 1C 85 03
0318- A5 02 29 03 85 06 B1 00
0320- 48 29 0F 20 47 03 20 64
0328- 03 68 29 F0 18 6A 6A 6A
0330- 6A 20 47 03 20 64 03 E6
0338- 00 D0 08 E6 01 A5 01 C9
0340- 08 F0 03 4C 09 03 60 0A
0348- 0A 18 65 06 AA BD 82 03
0350- 85 04 A5 06 C9 02 B0 04
0358- E8 E8 D0 02 CA CA BD 82
0360- 03 85 05 60 A2 00 A5 04
0368- 91 02 18 A5 03 69 04 85
0370- 03 A5 05 91 02 18 A5 03
0378- 69 04 85 03 E8 E0 02 90
0380- E5 60 00 00 00 00 44 08
0388- 11 22 91 A2 C4 88 55 2A
0390- 55 2A 08 11 22 44 33 66
0398- 4C 19 D5 AA D5 AA DD BB
03A0- F7 EE 88 91 A2 C4 AA D5
03A8- AA D5 66 4C 19 33 77 6E
03B0- 5D 3B 2A 55 2A 55 EE DD
03B8- BB F7 3B 77 6E 5D FF FF
03C0- FF FF
```

the lower-nibble color plotted on top of the upper-nibble color (magenta at 0,0 and orange at 0,1).

Lo-Res and Hi-Res RAM Addressing

In **Figure 2**, adding $1C00 to lo-res address $481 converts it to the associated hi-res address $2081, yielding the top address in the 8-byte box. The blown-up box at $2081 shows the 8 bytes of RAM with $2081 at the top. Within the 8-byte box, each byte's address is $400 greater than the byte above it.

Figure 2. Lo-res to hi-res RAM address relationships.



Hi-Res Color Plotting

After calculating the effective hi-res addresses, you need to determine which color table bytes to plot. (The color table is found at address range $382–$3C1. See **Listing 1.**) Under normal circumstances, when you use only the colors Apple provides, 2 bytes are necessary to display any one color. For example, if you want a solid row of blue, you would alternately place in RAM $D5 and $AA for even and odd column numbers, respectively. Normally, Applesoft's Hi-res Position and Plot subroutines at $F411 automatically ensure that you're plotting with the correct color byte (color mask). If you were to reverse the color bytes ($D5 odd and $AA even), you'd see an orange row instead of a blue one.

Normally, I'd be more than happy to let Applesoft set up the color mask for me. Unfortunately, to provide the 16 colors necessary in the lo-res to hi-res conversion, I had to create my own Hi-res Position and Plot routine. Because the composite colors are so complex, it takes me twice as many bytes to describe a color as it does Applesoft. *Composite colors* are created by alternating a normal Apple hi-res color with either black or white. For example, a composite orange can appear as either light orange or dark orange, depending on whether black or white is

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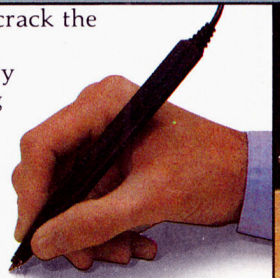

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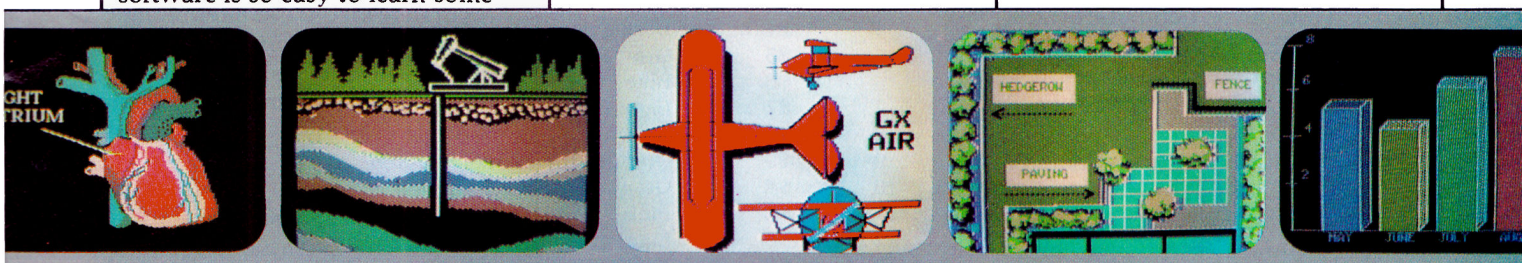

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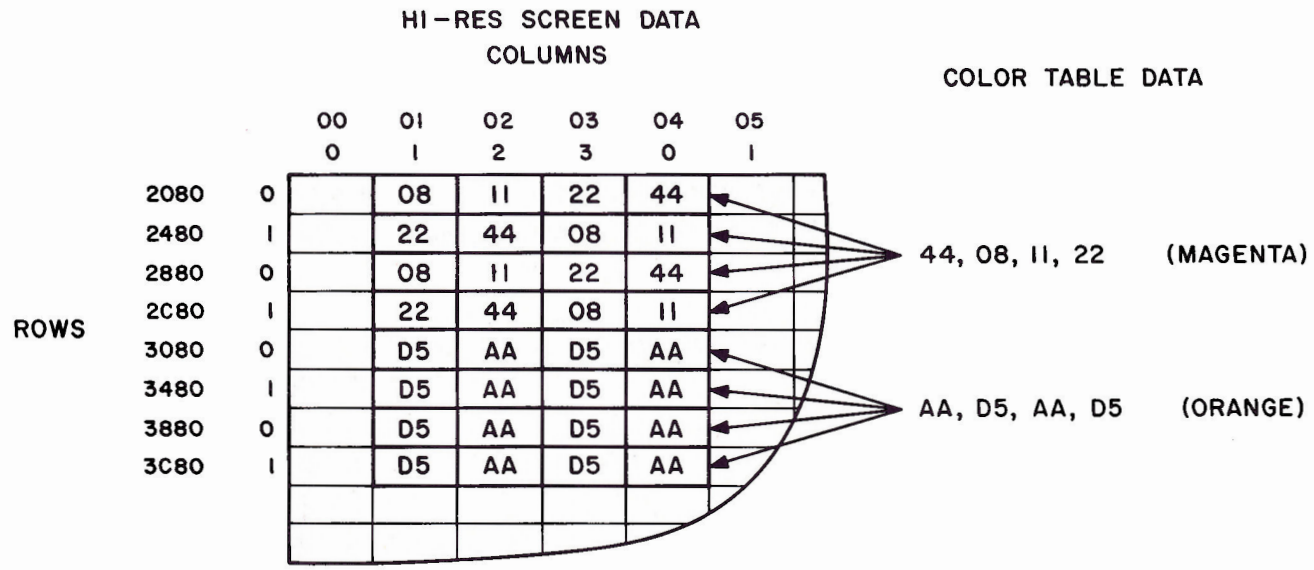
Figure 3. Hi-res screen data versus color table data.



alternated with orange.

When these composite colored rows are stacked on one another, they must appear as a checkerboard pattern. So to complicate matters further, you must alternate the 4 bytes you're plotting to correspond with either an even or an odd row. If you don't, the overall composite color will appear as alternating black (or white) and color columns instead of as a checkerboard pattern.

Figure 3 displays the contents of the box at $2081. To illustrate the full use of the color table, I've filled four adjacent columns, each 8 bytes high. On the left side of the figure is the RAM space excerpt, and on the right side, an excerpt from the color table. The RAM excerpt shows columns numbered from zero to 3 across the top, and rows numbered from zero to 1 (even and odd, respectively) along the side.

Adding the outer row number to the outer column number gives you the RAM address. For example, look at the upper-left corner byte ($08). The outer row number for this row is labelled $2080, and the outer column number for this column is labelled 01. Adding these two numbers together results in $2081, the byte's actual address.

To determine which byte of the color table to use, follow these steps:

- Determine initial starting position within the color table. If the *inner column* number is a zero, use the first byte from the color table data (see **Figure 3**). If the column number is a 1, use the second byte in the table; if it's 2, use the third byte; and if it's 3, use the fourth byte. This method of indexing—using zero instead of 1 as the index origin—may be a bit confusing at first for novices.
- Determine even or odd starting position in the color table. If the *inner row* number is a zero, it's an even row; if the inner row number is a 1, it's an odd row. If the row is even, do nothing; use the byte you pointed at in step 1. If the row is odd, move over 2 bytes to the right of the byte you used in the color table in step 1; this new byte is now the byte to use.

In practice, the byte at $2081 is 08 because the column number is 1, and the row is even. According to the previous explanation, a byte in column 1 of an even row dictates the use of the second byte in the table, or 08.

As you can see in **Figure 3**, the upper four rows will be magenta, while the bottom four rows will be orange.

***Table.** Lo-res color table.*

Number		
Decimal	Hexadecimal	Color
0	$0	Black
1	$1	Magenta
2	$2	Dark blue
3	$3	Purple
4	$4	Dark green
5	$5	Gray 1
6	$6	Blue
7	$7	Light blue
8	$8	Brown
9	$9	Orange
10	$A	Gray 2
11	$B	Pink
12	$C	Light green
13	$D	Yellow
14	$E	Aquamarine
15	$F	White

The program transforms lo-res magenta into a composite hi-res color (alternating violet and black pixels). Looking once again at the color table in **Figure 3**, you can see that all 4 bytes that make up magenta have different values. On the other hand, lo-res orange *is* Apple's hi-res orange. As I've mentioned, normal Apple colors require only 2 bytes, not 4. In order to fill the table, I've simply repeated the 2 Apple color bytes in order to get 4 color bytes.

Using the Program

Enter the machine-language program by typing the following:

```
CALL - 151
300:A9 00 85 00 A8. . .
```

Continue until you've typed in the entire program, and press the return key as needed. Then type the following to save the program to disk:

```
BSAVE LORES TO HIRES,A$300,L$C2
```

The easiest way to use the program is to create your lo-res picture, place the disk with LORES TO HIRES in your disk drive, and while the lo-res picture is still on the screen, BRUN LORES TO HIRES. This will transfer the lo-res image to the hi-res screen. The lo-res picture *must* be on the screen when you BRUN the LORES TO HIRES program. Since lo-res graphics and text share the same area of RAM, you want to ensure that picture information, not text information, is transferred to the hi-res screen.

The transfer process takes about a second. Once it's done, POKE 49239,0 to view the hi-res screen. Then POKE 49238,0 to view the lo-res screen once

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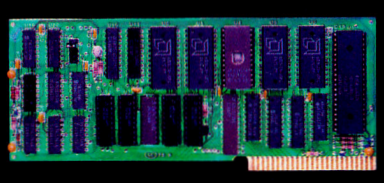

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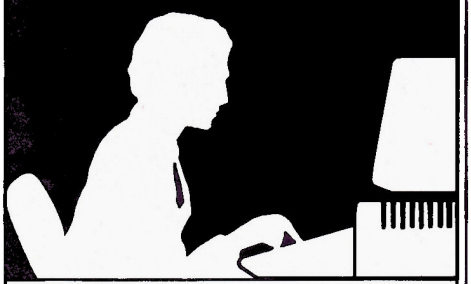

EDX/AB is a full screen Applesoft editor which turns the Apple II+ or //e into a serious programming tool. Full screen editing allows you to make changes to the program anywhere on the screen, unlike line editors which limit you to calling up and changing only one line at a time. In addition you can scroll through the program in both directions—forward and backward either a screenful at a time or line by line. Gone is that helpless feeling of watching the line you want roll off the screen. A simple keystroke brings it back.

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Listing 2. *This sample BASIC program displays all 16 colors in hi-res.*

```
0  REM  ************************
1  REM  *     LORES TO HIRES    *
2  REM  *     SAMPLE PROGRAM    *
3  REM  *  BY MARK STEINBORN    *
4  REM  ************************
10  TEXT : HOME :ST = 49168:KBD = 49152:HR = 49239:LR = 492
    38
20  PRINT  CHR$ (4)"BLOAD LORES TO HIRES": GR
30 :
40  REM  DRAW APPLE
50 :
60  COLOR= 12: VLIN 9,10 AT 33: VLIN 10,11 AT 32: VLIN 11,1
    2 AT 31
70  HLIN 23,38 AT 16: HLIN 24,37 AT 15: HLIN 24,37 AT 14
80  HLIN 25,29 AT 13: HLIN 32,36 AT 13: HLIN 27,28 AT 12: HLIN
    33,34 AT 12
90  COLOR= 13: HLIN 23,38 AT 17: HLIN 23,37 AT 18: HLIN 23,
    36 AT 19
100  COLOR= 9: FOR Y = 20 TO 22: HLIN 23,35 AT Y: NEXT
110  COLOR= 1: HLIN 23,36 AT 23: HLIN 23,37 AT 24: HLIN 24,
    38 AT 25
120  COLOR= 3: HLIN 24,38 AT 26: HLIN 24,38 AT 27: HLIN 25,
    37 AT 28
130  COLOR= 2: HLIN 26,36 AT 29: HLIN 26,36 AT 30: HLIN 28,
    34 AT 31: HLIN 29,30 AT 32: HLIN 32,33 AT 32
140 :
150  REM   PRINT "TRY A BYTE"
160 :
170 C = 1
180  POKE ST,0: COLOR= C: HLIN 8,10 AT 7: VLIN 8,11 AT 9: VLIN
    7,11 AT 12: VLIN 7,9 AT 14: VLIN 9,10 AT 13: PLOT 14,1
    1: PLOT 13,7: REM    "TR"
190  VLIN 7,8 AT 16: VLIN 7,8 AT 18: VLIN 9,11 AT 17: REM
    "Y"
200  VLIN 18,22 AT 12: VLIN 18,22 AT 14: PLOT 13,18: PLOT 1
    3,20: REM  "A"
210  VLIN 29,33 AT 5: HLIN 6,7 AT 29: HLIN 6,7 AT 31: HLIN
    6,7 AT 33: PLOT 8,30: PLOT 8,32: REM   "B"
220  VLIN 29,30 AT 10: VLIN 29,30 AT 12: VLIN 31,33 AT 11: REM
     "Y"
230  HLIN 14,16 AT 29: VLIN 30,33 AT 15: REM    "T"
240  VLIN 29,33 AT 18: HLIN 19,20 AT 29: HLIN 19,20 AT 33: PLOT
    19,31: REM   "E"
270 :
280  REM  CALL LORES TO HIRES ROUTINE AT $300
290 :
300  CALL 768
310  IF  PEEK (KBD) < 128 THEN 310
320  POKE HR,0: POKE ST,0: REM  WHEN KEY IS PRESSED, FLIP O
    N HIRES SCREEN
330  IF  PEEK (KBD) < 128 THEN 330
340  POKE LR,0: REM  WHEN KEY IS PRESSED AGAIN, FLIP LORES
    SCREEN ON AGAIN
350 :
360  REM  INCREMENT THE COLOR NUMBER AND START OVER.
370 :
380 C = C + 1: IF C = 16 THEN C = 0
390  GOTO 180
```

again. To save your hi-res picture type:

BSAVE PICTURE NAME,A$2000,L$2000

The sample BASIC program (**Listing 2**) displays all 16 colors. The program draws an apple on the screen with the words TRY A BYTE. Lines 300–340 call the LORES TO HIRES transfer, and flip the screen from lo-res to hi-res and back to lo-res again. I've set up a loop from lines 180–390 that redraws the message over and over in all of the 16 colors.

You'll see what all the composite colors look like *and* be able to spot any typing error that might have occurred in the machine-language color table. An error would show up as any inconsistency in the color pattern.

You can modify LORES TO HIRES. If you prefer using hi-res page 2 to page 1, for example, change the $1C at $315 in **Listing 1** to a $3C. From BASIC, BLOAD LORES TO HIRES, then POKE 789,60. To execute the program, CALL 768. Once the program transfers the picture, BSAVE PICTURE NAME,A$4000,L$2000. Additionally, POKE 49237,0 to view the hi-res picture on page 2.

Experimenting with different byte values in the color table results in literally millions of different color (and contrast) patterns. Have fun!■

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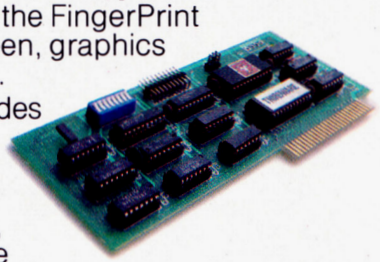

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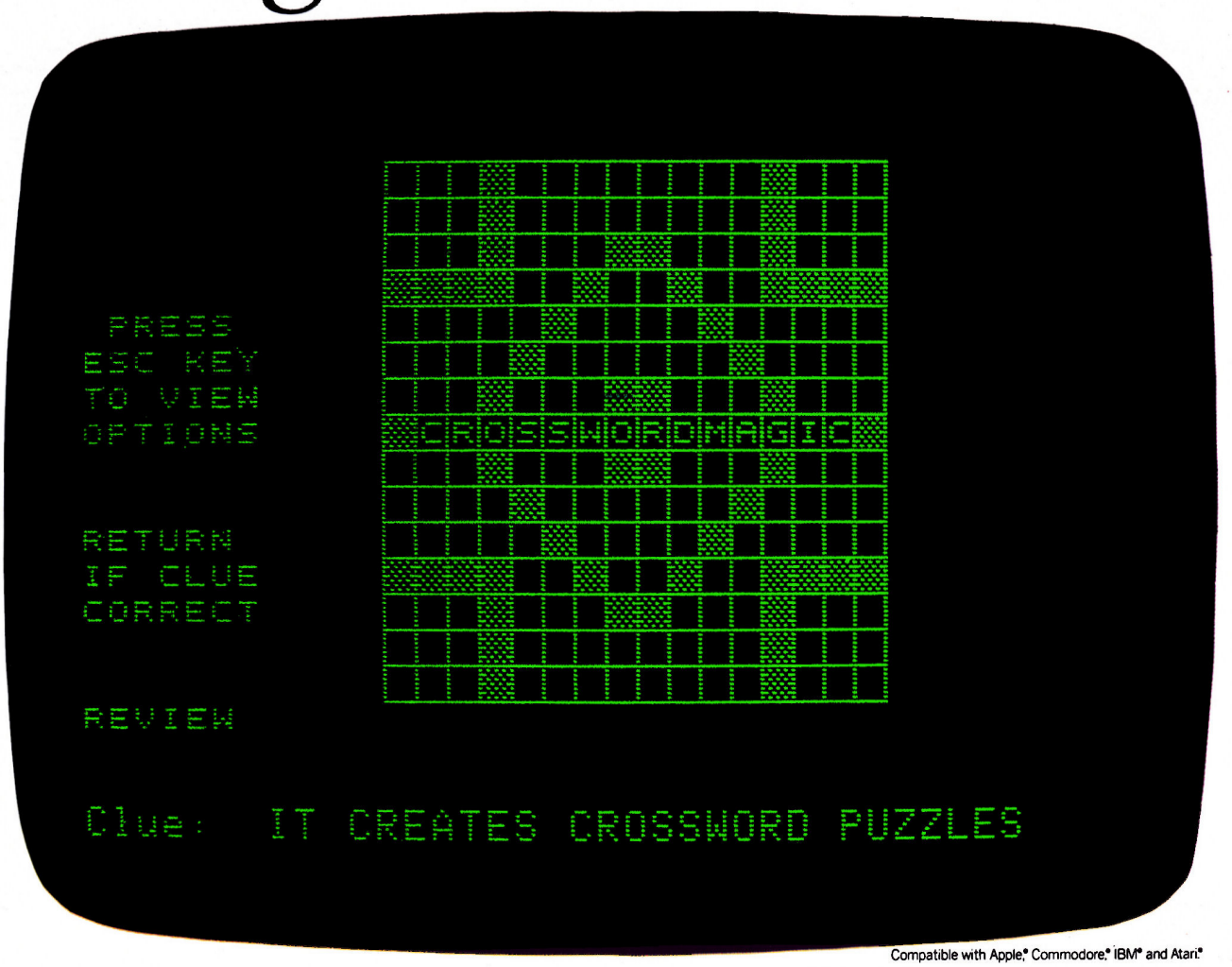

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A Handle on Joysticks

Get a grip on the best stick designed for your gaming or graphics needs.

by *Jeff Hurlburt*

Rugged and reliable, today's joysticks—even inexpensive ones—represent significant advances over former designs. To match this trend toward improved hardware, software manufacturers are producing more games, word processors, graphics utilities, and other programs with a joystick option; some software even requires joystick control.

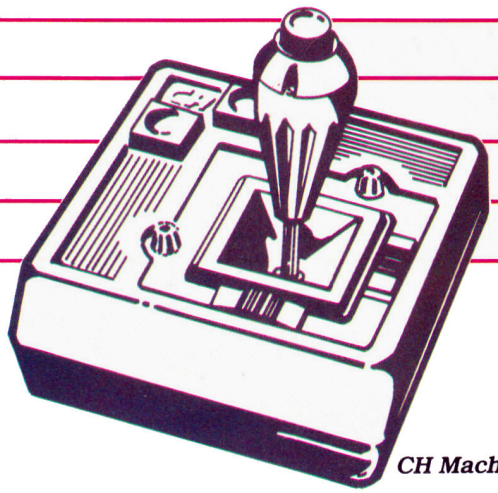
If you plan to buy a joystick, base your choice on at least two criteria: a "test-drive" (or simply, how individual sticks feel to you) and the applications you plan for your joystick. To help you decide, I've outlined some standards and provided examples of some joysticks on the market and their unique qualities.

From "hot" game sticks to the more utilitarian models, the eight joysticks in this survey offer looks, actions, and options to suit every taste. A handle-mounted button, switched 16-pin game port extension, adjustable stick travel, a third pushbutton (connected to PB2), and switchable sensitivity are among the many features available.

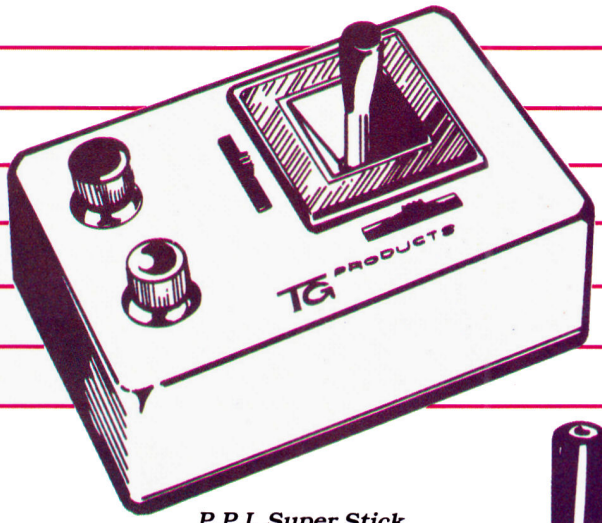
Most manufacturers offer centering adjustment as well as the option to defeat centering. Fine-tuning your stick through centering adjustment is useful since "center" can vary from program to program. It also compensates for changes that occur with normal use. Despite the clever techniques and costs involved, the benefits of a centering-defeat option are less obvious. In graphics utility/electronic paintbrush applications, all but two of the units I tested performed better with centering (see the **Table**).

"Feel"—that elusive quality—is possibly the single best index of joystick performance. Its basic elements include smoothness, centering tension, and handle design. Large, thick handles make for successful, comfortable game-playing; short, thin handles are usually best for graphics work.

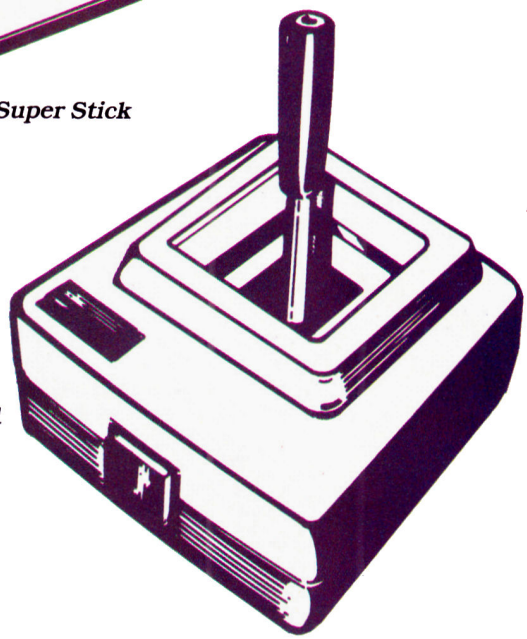
At high-action game speeds, shorter stick travel and quick return (higher tension) are definite pluses. Good graphics performance requires lower tension and smoothness, although very low stick resistance can tire you out. "Good feel" implies not only deft response but also accurate, easy-to-interpret tactile and positional feedback.



CH Mach III



P.P.I. Super Stick



Ampoc AJA-1

Ampoc AJA-1

This is a no-frills unit with a price tag to match. You get exceptionally smooth action with the right centering tension, optimal top/front button placement, and compactness. The absence of centering adjustment practically disqualifies the AJA-1 for serious game use, but as a graphics controller it ranked among the best.

P.P.I. Super Stick

Distinguished by its super-rugged, red-topped pushbuttons and quick-release centering defeat, the Personal Peripherals (formerly TG Products) stick is a good general purpose unit. Testing revealed significant centering error that, in some games, might prove unacceptable: You can find yourself moving when you mean to halt. Its slightly chalky feel and moderate centering tension place the stick among the better graphics performers.

Wico Computer Commander

With its large red handle and big red buttons Wico's Computer Commander looks like a parody of the hot game-stick. The buttons, sitting on leaf switches, lack any semblance of snap, and the handle turns somewhat floppily in its socket. Surprisingly, it's one of the top performers because its playing response is smooth and natural-feeling. Add quickness and you have a very good game stick. The real surprise is what happens when you flip off the centering. Except for the handle's weight (to provide necessary feedback) there is virtually no resistance to movement in any direction, resulting in a nearly ideal graphics controller.

CH Mach III

Top-rated for feel, the CH (formerly Hayes) Mach III is a handsome, rugged unit well suited to both gaming and graphics. The only Apple joystick with a button in the handle, it confers a decisive advantage in rapid-fire games like Randamn and One-on-One. The handle button and right-angle arrangement of on-case buttons make for virtual ambidexterity.

Suncom Star Fighter

Suncom's Star Fighter was designed to be a game, not a graphics, stick: Unusually hard tension and nonlinear response discourage fine control. Game specialization is further reflected in such refinements as an option to restrict handle travel, high/low sensitivity selection, and top/front button placement. The PB0 button is duplicated on each side for ambidexterity. Star Fighter is compact for easy handling.

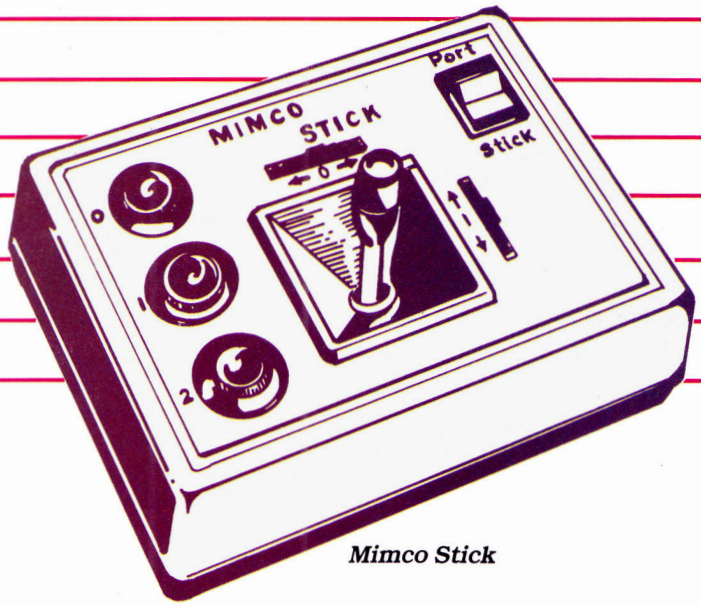
This is the only unit that uses pressure transducers as control elements. Silicone bumper activators and the silicone-anchored handle produce extraordinarily reliable centering and the sort of hard, fast response typical of commercial arcade devices.

Kraft Joystick

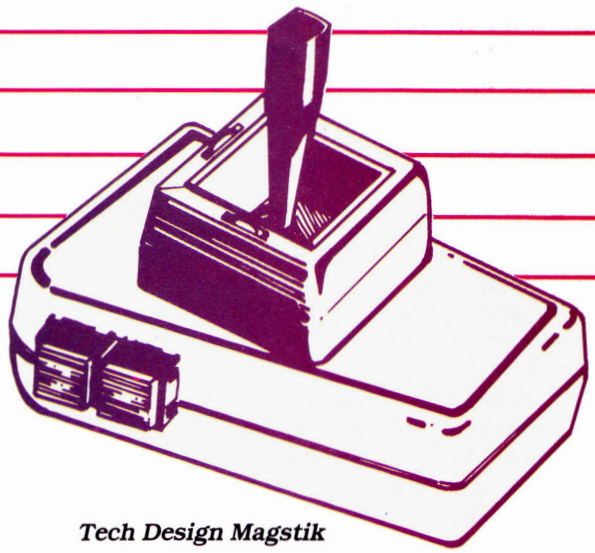
The Kraft Model 820-001, an attractive, Apple-colored unit, tested well in both competition and graphics applications. Compactly designed, the stick employs tough, short-travel buttons placed top/front for the thumb/forefinger triggering favored by most right-handers. Unlike other joysticks' handles, Kraft's is connected directly to both pots through an ingenious pivot arrangement for tight centering and exceptional responsiveness.

Mimco Stick

Among the larger units in my survey, the Mimco Stick is a solid performer incorporating features not found on other joysticks. Besides the usual buttons for PB0 and PB1, it has a third pushbutton for word processors that use PB2. A port/stick switch and back-mounted 16-pin socket make swapping between paddles and graphics tablet or other accessories easy. Boasting the solid centering and quickness of a good game stick, the Mimco's no-glitch feel puts it near the top for graphics work as well.

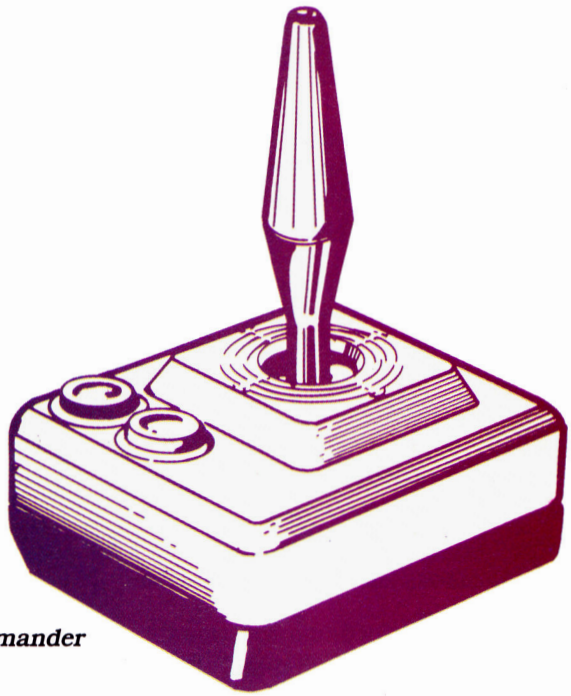


Mimco Stick



Tech Design Magstik

Suncom Star Fighter

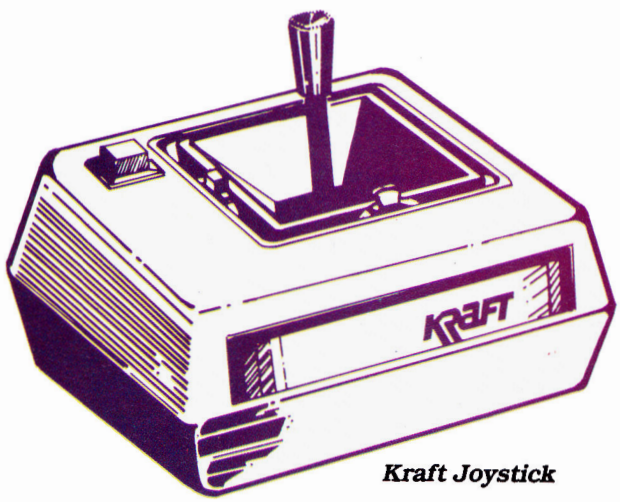


Wico Computer Commander

Tech Design Magstik

Tech Design's entry is a petite, professional-looking device molded for comfortable holding. The Magstik's centering through two permanent magnets produces a distinctly odd feel since pull decreases precipitously as you move the handle off center. (Be forewarned that hefty permanent magnets near a personal computer can cause data loss.)

A freely rotating square handle and slipperiness produce a difficult-to-control stick. Snap-action pushbuttons and a look inside confirm an overall impression of quality workmanship. The crimp-on metal strain relief ring, though, probably shouldn't be flopping around next to exposed circuit boards. Too slow for game use, the Magstik tested well as a graphics controller with the bottom centering magnet unsnapped.



Kraft Joystick

"Ideally, centering should always restore a joystick's horizontal and vertical outputs."

Several vendors now offer game port expanders that place the game port within easy reach with some means for switching between two or more devices.

Ohm Electronics' ZF11 Scooter Twin Game Port ($34.95) typifies the simple, direct approach to expansion: a pair of sockets mounted on a small circuit card with a slide switch to select between inputs. Since the sockets are zero-insertion types, the real hazards associated with plugging and unplugging 16-pin connectors are eliminated (no more broken pins, pulled wires, or puncture wounds). In fact, the second socket is hardly necessary, since inserting or removing connectors is so quick and easy.

The Paddle-Adapple ($29.95) is one of several similar products, including models with //e type D sockets, offered by Southern California Research. Like the Scooter, this expander provides switched selection of two devices but with standard sockets.

Unlike its competitors, it has a third expander with 22-pin socket and jumpers to allow practically any configuration of joystick and pushbutton inputs. This includes simultaneous inputs on all four game controller lines for two-stick games like One-on-One.

Personal Peripherals' Select-a-Port ($39.95) offers five standard socket inputs; four are independently selectable via simple slide switches and an internal diode network. One socket is unswitched since, given the offsets introduced by diodes, some devices may not perform properly. (Testing each stick and a Koala Pad plugged into a switched socket did yield a small offset. However, except for the Suncom stick, the effect was negligible.) One of the selectable sockets is configured as a second stick, so the Select-a-Port also facilitates two-stick gaming. A fifth switch runs to a separate, one-line connector for convenient control of the popular shift-key modification.

The selection guide (see the **Table**) summarizes manufacturer, price, feature, and performance data for the eight joysticks. Prices shown are suggested retail. "Hand" refers to handedness as determined by button placement, and assumes that you move the stick with your dominant hand and operate buttons with the other. Numbers in the "PB's" column show the button count. "H/V Adj. Range" indicates the percentage of total range over which horizontal and vertical center outputs may be set using centering adjustments. The following column tells whether or not a unit allows defeat of centering, and the next, the extent of centering tension.

Ideally, centering should always restore a joystick's horizontal and vertical outputs regardless of direction and distance of handle movement and whether the return is rapid or slow. Experiments with a number of different tests led to selection of centering error, "wiggle," as the best measure of centering action. To sample wiggle, move the handle slightly off center along one axis, then allow it to return slowly. Note output and repeat the

Table. Apple joystick selection guide.

Maker and Model	Price	Hand	PB's	Percent of H/V Adj. Range	DEF.	Centering Tension	Percent of Wiggle	Performance Ratings Games	Graphics	Feel
Ampoc AJA-1	$19.95	R	2	None	N	Medium	8.4	F	VG	G
CH (Hayes) Mach III	49.95	RL	3*	51 58	Y	Medium	2.9	VG	G	EX
Kraft 820-001	49.95	R	2	34 33	Y	Medium	0.4	VG	G	VG
Mimco Mimco Stick	59.95	R	3	49 46	N	Medium	0.8	VG	G	VG
Suncom Star Fighter	49.95	RL	3*	91 82	N	Hard	0.0	G	P	F
Tech Designs Magstik	64.95	L	2	28 29	Y	Light	4.3	F	G†	P
Personal Peripherals Super Stick	44.95	R	2	29 37	Y	Medium	18.2	F	G	G
Wico 50-1030	44.00	R	2	63 67	Y	Medium	2.0	EX	VG†	G

* Two buttons connect to one line, typically PB0.
† Rating is with the centering defeated.
P = poor F = fair G = good VG = very good EX = excellent

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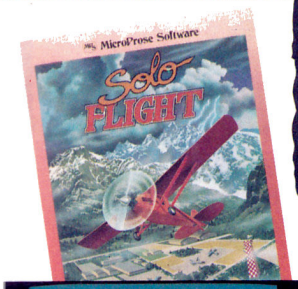

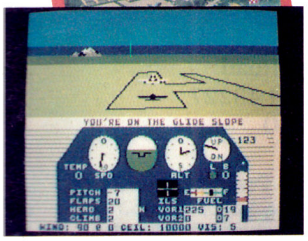

Major Bill has over 3000 hours of flying. He loves the sophistication of the SOLO FLIGHT simulation and its real life challenges of deteriorating weather, failing instruments, and overheating engines!! He knows the reality of flight — with SOLO FLIGHT he can bring it home!!

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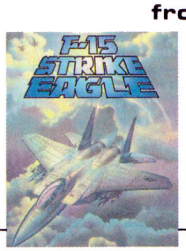

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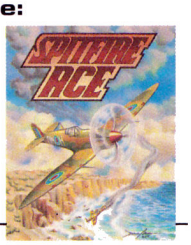

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movement in the opposite direction. The difference in center outputs is wiggle. Several samples (both horizontal and vertical) have been taken and the number under the "Wiggle" column is the average converted to a percentage of total range. Though the significance of a result depends on your application, a low percentage generally speaks well for a joystick's performance.

The performance ratings reflect the evaluations of each stick's feel, as well as its behavior in game and graphics applications. Among the games used were Caverns of Callisto, Lady Tut, Speedway Classic, and One-on-One, an assortment guaranteed to test joystick quickness, centering, button placement, and durability. The Koala Micro Illustrator was the vehicle for checking fine-control graphics capabilities. Feel was judged by a panel of four experienced users; I rated the other categories myself.

From the **Table** you'll conclude that the "Perfect Stick" is yet to be crafted. Though the CH Mach III with its stick button was the overall first choice, the Wico stick is a better controller, the Star Fighter is more rugged, and the Mimco Stick offers some nice extras. Ampoc's entry is inexpensive enough to buy two, and the Super Stick boasts super-durable buttons and the easiest centering defeat. Several users preferred the Kraft's game response, and the Magstik's buttons had the surest feel. Each device offers advantages, and any could be your first choice. ■

Write Jeff Hurlburt at 7814 Santa Elena, Houston, TX 77061.

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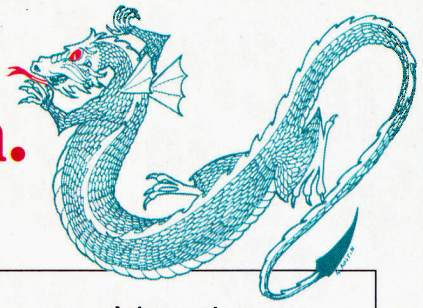

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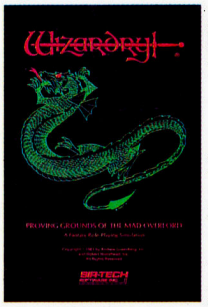

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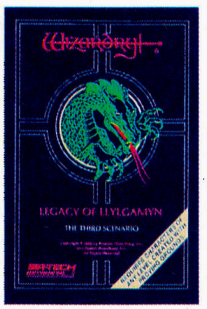

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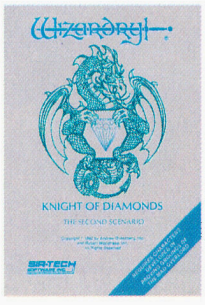

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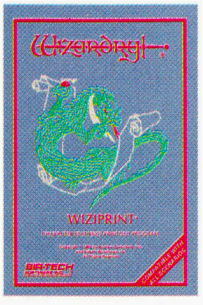

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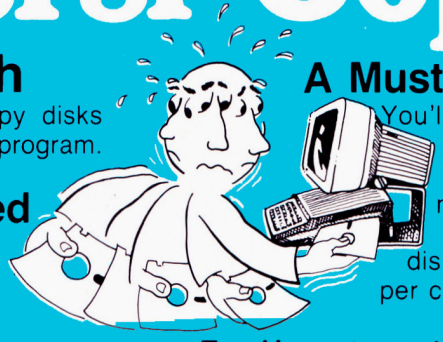

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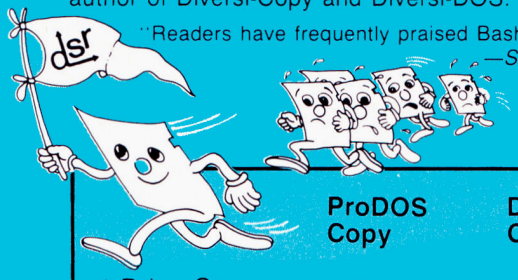

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A Crafty Joystick Adapter

by Tom Benford

Having been Commodore aficionados at my home for the last few years, we thought it was about time to see how the rest of the world lives. So, we bought an Apple, choosing the //c for its portability as well as its supposed compatibility with all of the other Apple products. However, we found that our Kraft joystick, although designed for the Apple, wouldn't work on the //c because the joystick port doesn't match the connector on the stick.

We had two options: purchase another joystick (for approximately $50) that would plug in directly, or come up with a makeshift adapter for the stick we already had. Looking for an alternative to mowing the lawn that afternoon, I chose to build the adapter.

Materials for this project (pictured complete in **Photo 1**) cost no more than $5, you can finish it in under a half-hour, and all you need to know is how to use a soldering iron. Follow my instructions and you'll have no problem.

Construction

Begin by gathering the supplies listed in the **Table**. When you're ready to start work, the first step is to cut the 30-gauge insulated wire into nine 4-inch pieces. Strip off approximately ¼ inch of insulation from both ends of each piece. Then plug in the soldering iron.

The next step is to notch out an opening on one end of the circuit board large enough to accommodate the DB-9 socket; it should be just large enough for the socket itself to fit through, but not the mounting flanges. It'll help to refer to **Photos 2**, **3**, and **4**. Apply some Krazy Glue to the flanges to hold the socket in position on the board.

Position the 16-pin DIP socket at the opposite end of the board and apply some glue to it, being careful to glue only the plastic edges, not the pins themselves. Note that the pins of both the DB-9 socket and the DIP socket should be on the *same* face of the circuit board (**Photos 3** and **4**).

Photo 1. *The completed Kraft joystick adapter.*

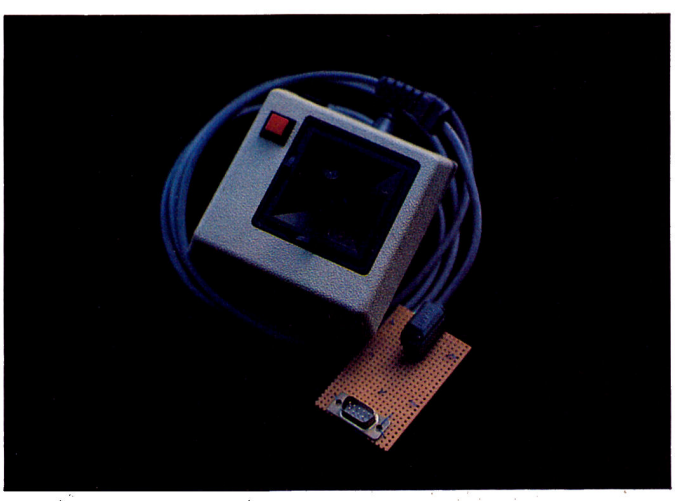
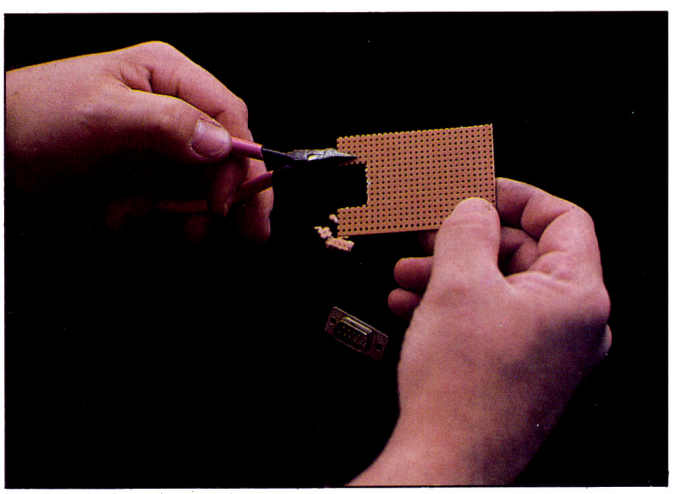


Photo 2. *Cutting out a piece of the board.*



If your //c and your Kraft joystick don't mix, try this easy fix for under $5.

By now your soldering iron should be hot enough to work with. Take each of the nine pieces of wire and "tin" both ends by melting a small amount of solder onto the wire. Then refer to the photos and the wiring diagram in the **Figure** for making your connections. Be sure to work carefully, applying only enough heat to solder the wire onto the appropriate pin. Beware of solder "runs" or "bridges," as these will impede the proper operation of the joystick.

I can't stress enough the importance of checking and double-checking the connections. You're dealing with nine pins on the DB socket, and 16 pins on the DIP socket, seven of which aren't

Table. *Joystick adapter project supplies, available at Radio Shack or other well-stocked electronics parts/repair stores.*

Parts (Photo 1):

A male DB-9 joystick socket (chassis mount).

A 16-pin wire-wrap DIP socket. (Be sure it's the wire-wrap type—these have longer "legs" than standard sockets.)

A 2-inch-by-5-inch piece of perforated "breadboard" (no foil or soldering runs—just plain phenolic circuit board with holes in it).

Four feet of AWG 30-gauge insulated wire (wire-wrap wire).

Tools and Materials:

Rosin-core electronics solder.

Krazy Glue (or other "instant" glue).

A medium-heat (30–50 watt) fine-tipped soldering iron.

Wire-strippers or nipping pliers.

Photo 3. *The front (plug) face of the board, with the DB-9 socket (bottom) and DIP socket in place.*

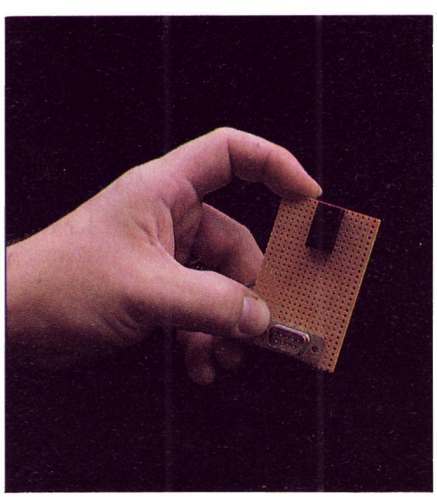


Photo 4. *The back (wiring) face of the board, with the DB-9 socket and DIP socket in place.*

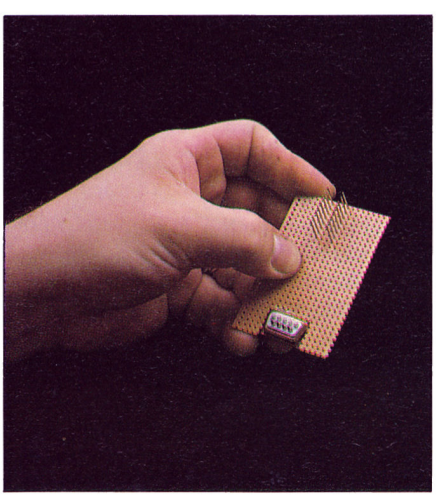
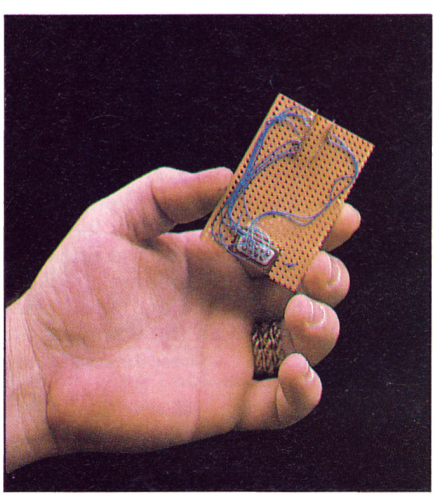


Photo 5. *The back (wiring) face of the completed board.*



Photos by Liz Benford

used. This can be confusing if you're not careful.

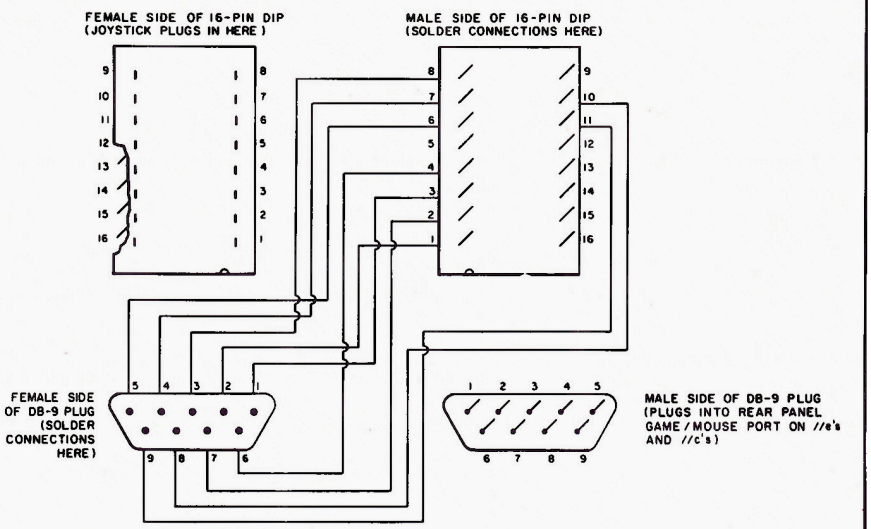
Using your nippers, trim off any excess wire, and be sure there are no visible "shorts" caused by dripped solder or stray pieces of wire. Once again, check all connections against the wiring diagram.

Plug the board into the //c, and then carefully plug the stick into the DIP socket (taking care not to bend any legs on the stick connector). The joystick cable should be facing the top of the circuit board.

Now turn on the //c with a game disk in the drive. If the joystick doesn't work, check all of your connections again. Locate the bad connection(s) and correct the situation before repeating the above step.

When it does work properly, remove the board and, with your nippers, cut off the seven unused legs on the DIP socket flush with the board. This will make it much easier to reconnect a wire to the right leg should the present one ever work loose or break off. You can also trim off any extra length on the nine legs you did use for your connections, to make a neater job. (Just make sure you don't ruin the connections!)

Figure. *Wiring diagram.*



You can use any leftover scrap wire to "tie down" your wiring on the board. Not only does this improve the board's appearance, it also lessens chances of a wire pulling loose from its connection (**Photo 5**).

That's it! Give yourself a pat on the back—you did something useful, and saved about $45 to boot. That's enough money to pay the kid down the block to mow the lawn, pocket the difference, and settle down to an afternoon of Lode Runner on the //c!■

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Tennis, Anyone?

The U.S. Open may be months away, but tennis buffs can practice their serves on Match Point.

by Barry Wilmeth

Remember Pong's brief popularity a few years ago? Old games may fade away, but as long as people spar on video screens, opposing paddle rattlers will continue to meet in head-to-head competition. Match Point, a two-player, hi-res game based on a three-set match, carries on the video tennis tradition.

I wrote Match Point to teach my five-year-old son tennis. By playing on the screen, he's learned score-keeping and serving rules as well as how to use his quick young reflexes to his advantage.

You can select an advanced, intermediate, or beginner's level. Score and ball movement are controlled within the program. The player on the left uses PDL(0) to control the movement of the player on the screen; the player on the right uses PDL(1).

Game play coincides with the standard tennis rules observed at the U.S. Open. No tiebreaker rule exists. You earn each set by winning a minimum of six games and having a two-game advantage over your opponent.

The three competition levels govern ball speed and serve accuracy. Court coverage is wide-ranging, so the beginner's level is quite forgiving. Intermediate play provides more of a challenge, since the ball moves twice as fast as it does in the beginner's level. The advanced mode quickly separates the club players from the pros.

Table 1. *Line descriptions.*

Lines	Description
10–140	Load initial variables and draw court.
150–290	Reset ball and player locations.
300–650	Control ball movement.
700–820	Control player movement.
900–970	Ball is returned.
1000–1080	Ball hits net.
1100–1370	Point is scored.
1400–1650	Match is over.
1700–1840	Check for faults on serve.

To start, load the Applesoft program (**Listing 1**) and save it to the file, MATCH POINT. Next, load the hi-res, machine-language coding in **Listing 2**. Type CALL – 151 to enter the monitor and type the code as follows with colons used in place of hyphens:

6000: 11 00 24 00 61 00 9C 00

Return to Applesoft by entering 3D0G. Save the code by typing BSAVE PLAYERS, A$6000, L720. Test the program, then practice paddle control.

I deliberately set a fast-paced game because: 1) the ball occasionally curves across the net and you need speedy control to respond; 2) the game is considerably slower when players move every time the ball crosses the screen; 3) players have more control over the game's action.

To restrict player movement for a realistic game, make the following changes in **Listing 1**:

```
720 IF PDL(0) < Y-6 THEN Y = Y-6:
    GOTO 740
725 IF PDL(0) > Y+6 THEN Y = Y+6:
    GOTO 740
780 IF PDL(1) < W-6 THEN W = W-6:
    GOTO 800
785 IF PDL(1) > W+6 THEN W = W+6:
    GOTO 800
```

Match Point was originally set on a green court with orange tennis balls and fashionably dressed players. If you rewrite the game in color, the game may be too slow for today's gamers. Tailor the game to your own play level by using **Tables 1** and **2** as redesign guidelines. ■

Barry Wilmeth serves up aces at 1901-F Fox Boulevard, Honolulu, HI 96818.

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Table 2. *Main variables.*

Main Variables	Description
PT	Point indicator; determines the serve.
X,Y,Y1	Plot positions for left player (girl).
V,W,W1	Plot positions for right player (boy).
B1,B2,BX,BY	Plot positions for ball animation.
DIR	Direction. When DIR = 0, ball was hit by girl. When DIR = 1, ball was hit by boy.
SV	Determines direction of serve.
FS	Initial counter for displaying message: Press paddle button to serve.
NBR	Random number from 1 to 175 that determines vertical point of ball return.
INCR	Incremental variable that plots horizontal animation points of ball in play.
GC$	Girl's current game score.
BC$	Boy's current game score.
GG	Number of games girl won.
BG	Number of games boy won.
GS	Number of sets girl won.
BS	Number of sets boy won.
XC$,YC$,XG,YG, XS,YS	Counters used to change score; X prefix indicates winner of point and Y prefix refers to the other player.
G0$	Uses GET command at game end to restart or quit.
CLICK	Adjusts speaker using PEEK(– 16336).
SQ,SP	Serve percentage allowances. Serving accuracy will increase at higher competition levels (advanced or intermediate).
SB	Indicates ball being served.
ST	Status indicator. ST will equal 1, 2, or 3 to indicate beginner, intermediate, or advanced mode.

Listing 1. *Match Point.*

```
10  REM ***************
11  REM * PLAY OPTION *
12  REM * AND COURT   *
13  REM * SET UP      *
14  REM ***************
20  PRINT  CHR$ (4);"BLOAD PLAYERS,A$6000": POKE 232,0: POKE
     233,96
30  TEXT : HOME : VTAB 4: HTAB 8: PRINT "WELCOME TO ";: INVERSE
     : PRINT "MATCH POINT!": NORMAL
40  VTAB 7: PRINT "PLAYER ON THE LEFT WILL USE PADDLE 0 TO"
     : PRINT "CONTROL PLAYER MOVEMENT.  PLAYER ON THE": PRINT
     "RIGHT WILL USE PADDLE 1.  PRESS PADDLE ": PRINT "BUTT
     ON TO SERVE."
50  VTAB 12: PRINT "CHOOSE PLAYER STATUS: ": PRINT : PRINT
     "         1 - ADVANCED": PRINT : PRINT "         2 - INT
     ERMEDIATE": PRINT : PRINT "         3 - BEGINNER": PRINT
     : INPUT "          ";ST
60  IF ST < 1 OR ST > 3 THEN 30
70  IF ST = 1 THEN ST = 10:SQ = 40:SP = 100
80  IF ST = 2 THEN ST = 20:SQ = 30:SP = 110
90  IF ST = 3 THEN ST = 40:SQ = 20:SP = 120
100  HOME : HGR : HCOLOR= 3: ROT= 0: SCALE= 1:X =  - 5:Y =
     10:GC$ = "  00 ":BC$ = "  00 ":GG = 0:BG = 0:GS = 0:BS
      = 0:SV = 0:PT = 1:DIR = 0:SC = 0:FS = 0
110  FOR J = 8 TO 17: IF J = 13 THEN X = X + 20
120 X = X + 20: DRAW J AT X,Y: NEXT J
130  HPLOT 20,40 TO 220,40 TO 220,140 TO 20,140 TO 20,40: HPLOT
     120,40 TO 120,140: HPLOT 122,38 TO 122,138: HPLOT 120,
     40 TO 122,37: HPLOT 120,140 TO 122,137
140  HPLOT 190,40 TO 190,140: HPLOT 50,90 TO 190,90: HPLOT
     50,40 TO 50,140: HPLOT 19,39 TO 221,39 TO 221,141 TO 1
     9,141 TO 19,39
150  REM ***************
151  REM *  SET START  *
152  REM *  LOCATIONS  *
153  REM ***************
160 SB = 0
170 PT = PT + 1
180  IF SB = 1 THEN  HOME : VTAB 22: HTAB 13: FLASH : PRINT
     "SECOND SERVE": NORMAL
190  IF PT / 2 =  INT (PT / 2) THEN X = 30:Y = 120:V = 200:
     W = 80:CR = 0: GOTO 210
200 X = 30:Y = 80:V = 200:W = 120:SV = DIR:CR = 0
210 B2 = 100: IF SV = 1 THEN B1 = 210:B2 = W - 20: GOTO 230
```

Continued on p. 104.

Basic Koalifications

Use marvelous KoalaPad graphics creations in your BASIC programs.

by Phil Makurat

A ten-line program is all you need to incorporate your KoalaPad creations into a BASIC program. You can illustrate adventure games, create mazes or besieged cities for arcade games, or develop graphs and charts for business presentations.

In **Listing 1** on the next page, line 10 displays a message that explains how to use the program. Line 20 asks you to type in the name of the picture exactly as it appears in the catalog. Line 30 appends the address of hi-res page 1 (2000 hexadecimal) to the name of the picture. Adding this address to the name makes line 40 load the picture into memory. Lines 50, 60, 70, and 80 are four switches that determine the parameters of video output, as explained below. The program displays the picture and waits at line 90 until you depress a key. Line 100 returns the screen display to text.

At this point the picture is still in memory and you can view it again quickly without reloading it by typing RUN 50. Line 60 sets the graphics resolution to hi-res.

You can have two drawings in memory at any time as full-screen pictures or as graphics with four lines of text printed at the bottom of the screen. To load a picture to the second graphics page, change the address $2000 to $4000 in line 30, and change line 70 to POKE -16299,0. If you want text at the bottom of the graphics screen, change line 80 to POKE -16301,0.

Listing 2 is the outline of a program you can incorporate into a larger BASIC program to load a title or map into the first graphics page and a second picture into the second graphics page. In the example, the pictures are called MAP1 and MAP2.

To flip back and forth between the two maps, use a loop to hold the picture on the screen for a short period. **Listing 3** loads two pictures, MAP1 and MAP2, and flips between them. Since this program causes an endless loop, use control-C to interrupt it.

As you can see, KoalaPad graphics can easily grace any BASIC program you write. So illustrate your works lavishly—Koala'fy them!■

Write to Phil Makurat c/o College of Education, 3031 Winther Hall, University of Wisconsin–Whitewater, Whitewater, WI 53190.

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Listing 1. *Loading a KoalaPad-created picture into a BASIC program.*

```
10 PRINT "THIS PROGRAM WILL DISPLAY PICTURES THAT
ARE DRAWN BY THE KOALAPAD. WHEN DONE VIEWING
ANY PICTURE PRESS THE SPACE BAR."
20 INPUT "WHAT IS THE NAME OF THE PICTURE?";P$
30 P$ = P$ + ",A$2000" : REM APPEND ADDRESS $2000
40 PRINT CHR$(4) "BLOAD";P$ : REM LOAD PICTURE
50 POKE -16304,0 : REM GRAPHICS
60 POKE -16297,0 : REM HI RES
70 POKE -16300,0 : REM PAGE ONE
80 POKE -16302,0 : REM FULL SCREEN
90 GET Z$ : REM WAITS FOR A KEY TO BE PRESSED
100 TEXT : REM RETURNS TO THE PROGRAM
```

Listing 2. *Loading two pictures—the first with a full screen of graphics, the second with four lines of text at the bottom.*

```
REM LOAD THE PICTURES MAP1 AND MAP2
PRINT CHR$(4) "BLOAD PICTR.MAP1,A$2000"
PRINT CHR$(4) "BLOAD PICTR.MAP2,A$4000"

REM VIEW MAP1
POKE -16304,0 : REM GRAPHICS
POKE -16297,0 : REM HI RES
POKE -16300,0 : REM PAGE ONE
POKE -16302,0 : REM FULL SCREEN
GET Z$ : REM WAITS UNTIL A KEY IS PRESSED
TEXT : REM RETURNS TO THE PROGRAM

REM VIEW MAP2 WITH FOUR LINES OF TEXT
POKE -16304,0 : REM GRAPHICS
POKE -16297,0 : REM HI RES
POKE -16299,0 : REM PAGE TWO
POKE -16301,0 : REM FOUR LINES OF TEXT
GET Z$ : REM WAITS UNTIL A KEY IS PRESSED
TEXT : REM RETURNS TO THE PROGRAM
```

Listing 3. *Flipping between the two screens.*

```
10 REM LOAD MAP1 ON PAGE ONE
20 PRINT CHR$(4) "BLOAD PICTR.MAP1,A$2000"
30 REM LOAD MAP2 ON PAGE TWO
40 PRINT CHR$(4) "BLOAD PICTR.MAP2, A$4000"
50 POKE -16304,0 : REM GRAPHICS
60 POKE -16297,0 : REM HI RES
70 POKE -16300,0 : REM PAGE ONE
80 POKE -16302,0 : REM FULL SCREEN
90 FOR X = 1 TO 250 : NEXT X
100 REM SWITCH TO PAGE TWO
110 POKE -16299,0
120 FOR X = 1 TO 250 : NEXT X
130 GOTO 70
```

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Math & Statistics

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Math & Statistics 061

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Music and Sound

Music & Sound 064

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I 014 Music Bach Squares 1
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I 003 Music Bugle
I 021 Music Childrens
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Music & Sound 065

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I 019 Music Computer
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I 017 Music Mozart Theme
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I 013 Zoom 1
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B 017 Cubik-1 (A$800/L$FB3)
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I 002 Exercise 6
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Pastime and Other

Pastime & Other 069

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Utility 074

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Utility 076

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A 002 Cursor Dash
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Utility 086

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A 008 Epson Driver Instr
B 002 Epson Driver.
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A 006 Epson Labels III
A 002 Epson Lower Case
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A 024 MX80 Label Maker I
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A 003 Epson MX80 Letterhead
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inCider's inSidious inSolubles

January is a time for reflection. Things accomplished, things undone. Resolutions. This month also marks the first-year anniversary of my column. In honor of the occasion, I'll let you peek behind the scenes of inSolubles—an inSide inSight, so to speak.

Your letters have been arriving at the rate of two or three a week. But because of a three-month lead time, they appear in the column much later than you might expect. And I don't like to tell someone that he or she has a great submission, though I won't print it for another seven or eight months. And you thought DOS 3.3 was slow.

In the past seven months I've received 71 inSoluble submissions or letters and comments. Several readers have sent in two problems; one error-ridden programmer has submitted as many as nine entries. I've heard from teenagers, lawyers, doctors, men, and women. The letters are postmarked Alaska, Hawaii, Guam, Singapore, Tokyo, even New Hampshire. None have come from Europe. (Don't they have bugs in Europe?) I've responded to all who've sent in problems and to many who've just asked questions or provided comments. I apologize for letters that have gone unanswered; I've tried to respond to everyone in these pages.

Some of your letters have included programming hints or minor problems that don't fit into the inSoluble format but are, nonetheless, interesting BASIC concepts that could lead to program problems or syntax errors. I may start to mention them in future columns. I've also received programs that improve and update the short inSoluble programs, and I'm thinking of listing some of them. What are your thoughts on these plans?

Now back to our usual (unusual?) assortment of brain teasers, puzzles, and erroneous results. Remember an inSoluble is an Applesoft BASIC program that has one or more problems, errors, mistakes, or some inTangible inAccuracy submerged within. Most of our submissions are from readers whose programs developed the same problems their puzzles display. By submitting an inSoluble and having it published, you will receive $20 and have your name proudly displayed in print.

If you're new to our column just key in the listing, follow the simple rules, type RUN, and hope for the best. If your typing was accurate, you won't see SYNTAX ERR, but what you will see is not what you'd expect. Or is it?

Rules for inSidious inSolubles

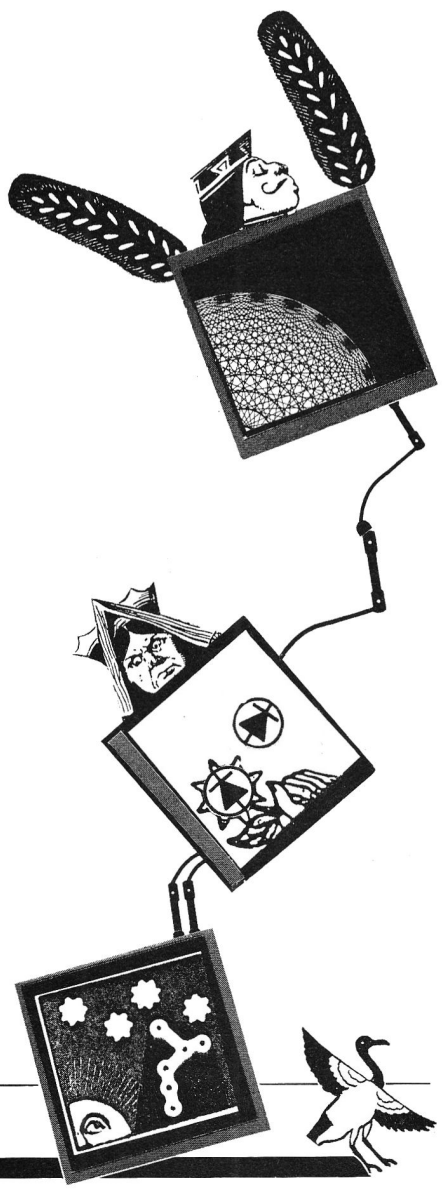
1. An inSoluble is a BASIC Applesoft program. Any POKEd machine-language subroutines and CALL's to that subroutine are correct.
2. The program must accomplish something. In other words, when it's run it should produce some kind of a result.
3. The program should not generate an error message. If it does, check your typing.
4. A short explanation of what the program is supposed to do should be included and may contain clues to the problem.
5. The program can use common peripherals such as disk, printer, or modem. DOS 3.3 or ProDOS commands are acceptable.
6. More than one error can appear in the program.

When submitting your puzzles, remember to provide the solution, and please include an SASE if you would like a reply to your entry before it appears within these pages. The shorter the inSoluble, the better—but we like programs that do something useful.

Solutions on page 108.

Caught Off Base

The first problem, Caught Off Base, from Wayne Clift of Trona, California, converts a number from bases 2–9 to base 10. For example, the number 100, base 8 is 64, base 10. Wayne found this Applesoft dilemma in his programming class and thought we would enjoy it. I'm not sure we're all up to this one, Wayne, but I'll pass it on to those math wizards among us. Perhaps someone can come up with a simple program to convert any number to any base. In BASIC, please.



by Art Ude

***Listing 1.** Caught Off Base.*

```
10  REM CAUGHT OFF BASE
20  TEXT : HOME
30  PRINT "FIRST TYPE A NUMBER, T
    HEN THE BASE OF   THAT NUMBE
    R (2-9)."
40  PRINT "FOR EXAMPLE, YOU MIGHT
     TYPE: 1042,5": PRINT
50  PRINT "NO DIGIT IN THE NUMBER
     MAY BE GREATER   OR EQUAL T
    O THE BASE.": PRINT
60  PRINT "THE PROGRAM WILL CONVE
    RT YOUR NUMBER TO A BASE 10
    NUMBER."
70  PRINT : INPUT "TYPE NUMBER, T
    HEN BASE ";N$,B
80 L =  LEN (N$)
90  FOR X = L TO 1 STEP  - 1
100 S = S + B ^ X - 1 * ( VAL ( MID$
    (N$,X,1)))
110  NEXT X: PRINT
120  PRINT N$;" (BASE ";B;") = ";
    S;" (BASE 10)"
130  END
```

Disappearing DOS

The second inSoluble idea combines problems from Charles Moore of Dundee, New York, and Dave Townsend of Seattle, Washington. Disappearing DOS, it seems, is a national problem observed from coast to coast. You must send the list of items in the DATA statement first to your printer and then to the disk as a text file. If you lack a printer, you can still tackle this problem by changing line 60 to 60 PR# 0. This will send the list to your screen before it writes (or tries to) to the file. Lots of answers to this one. I can think of two. ■

***Listing 2.** Disappearing DOS.*

```
10  REM DISAPPEARING DOS
20  TEXT : HOME
30  DIM A$(10):D$ =  CHR$ (4)
40  FOR X = 1 TO 10
50  READ A$(X): NEXT
60  PR# 1
70  PRINT "HERE IS THE LIST OF DA
    TA IN THE FILE"
80  FOR X = 1 TO 10
90  PRINT A$(X): NEXT
100  PR# 0
110  PRINT D$;"OPEN TEXT FILE"
120  PRINT D$;"WRITE TEXT FILE"
130  FOR X = A TO 10
140  PRINT A$(X): NEXT
150  PRINT D$;"CLOSE TEXT FILE"
160  DATA APPLE,DISK,PROGRAM,KEYB
     OARD,ANIMALS,DOS,CAT,BIRD,FI
     SH,RABBIT
170  END
```

Send your inSolubles to Art Ude c/o inCider, 80 Pine Street, Peterborough, NH 03458.

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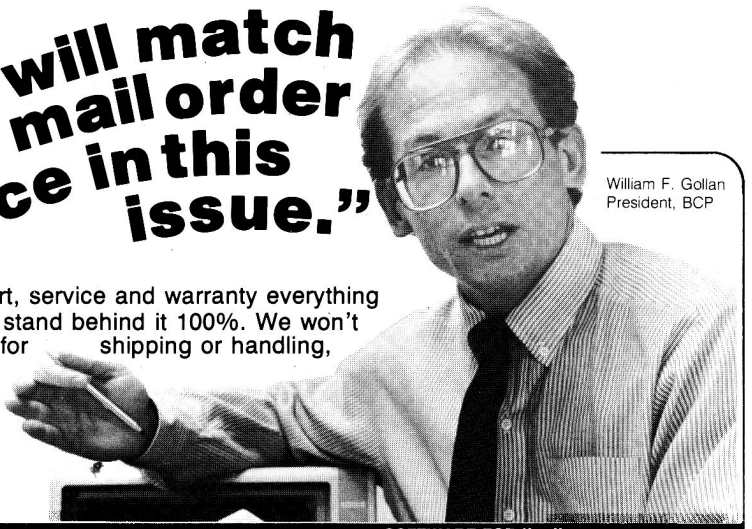

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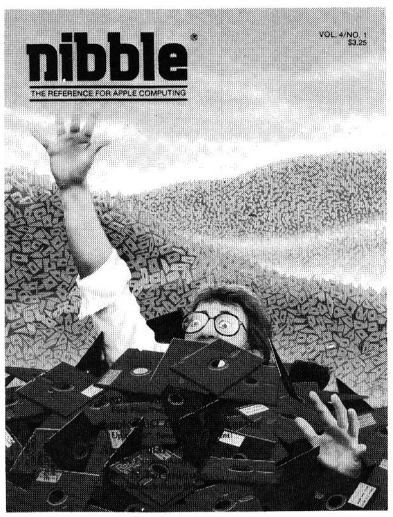

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Lighten your tax burdens and gain financial security with an effective tax planner.

No matter how many tax loopholes you think you've found or tax shelters you've tried to take advantage of, you still end up baring your financial soul on IRS form 1040 (or 1040A). Unfortunately, no one has yet devised a sure way to avoid paying taxes, but a few folks have come up with some helpful software programs that—while they won't make the process fun—help you fill out and understand all those forms.

This month I'll look at programs ranging from a simple forecasting tool that projects future tax liability (Dynacomp's Tax Optimiser) to a VisiCalc overlay that figures your taxes (SofTax) all the way to a system that does everything for you from selecting the proper form to putting your numbers into the right places (HowardSoft's Tax Preparer). All *you* have to do is sign the form, attach your check, and drop it in the mail.

Documentation

HowardSoft's Tax Preparer, while not the speediest program in the world, does a thorough and effective job of preparing your tax forms. The first 68 pages of the 235-page manual present a tutorial that uses a sample tax return on disk. The manual even includes a good section on recent changes in the tax laws, and annual updates for the program disk are available.

Dynacomp's Tax Optimiser is a simple package that lets you forecast your tax liability under varied conditions. While the concept is a good one, the program is saddled with a brief, 25-page booklet that gets you started, but inadequately explains why certain things happen as they do. The program works with *scenarios*, different ways to examine your financial data.

A generic product, the Tax Optimiser is compatible with North Star's Horizon and with TRS-80's. You're led through each menu selection and then taken through a tutorial, but a few pages of advice on what to look for and how to manipulate your financial data would improve the manual.

SofTax's 91-page manual places its reference section first, and then gives some tutorial examples. This package insists that you have VisiCalc, so for anyone familiar with VisiCalc, SofTax's obvious operation is to its credit.

by Gregory R. Glau

Running the Packages

The HowardSoft Tax Preparer is designed for experienced users: people who already calculate their own taxes or professional tax preparers, who know what data to enter on the different forms. The manual gives good advice as to which figures go where, along with a complete rundown detailing each form. Though the most detailed of the three manuals, it still doesn't replace expertise in tax preparation.

HowardSoft's Tax Preparer lets you access 21 different IRS forms and schedules and, using IRS guidelines, prints them on plain paper (except for form 1040, which the IRS insists be printed on its standard form). The manual, however, does list suppliers of blank 1040 forms for your printer.

As you're working with the Tax Preparer, you can print any screen at any time—a helpful feature. A built-in calculator helps you figure. You won't need it often, though, as the program does all mathematics automatically. In fact, it's so complete that when I entered data from my 1983 return to check the program, it even calculated the depreciation, based on the type of property and its expected life. For an old building that my accountant listed as having 15/30 depreciation, the program incorrectly based its calculations on 15 years. Thankfully, for such situations, the Tax Preparer's override mode lets you adjust an entry manually.

One of the Tax Preparer's best features is its ability to itemize any line of any form, so you can insert as much detail into your tax return as necessary. The program keeps track of every entry, and on-line, context-sensitive help pulls up brief messages to explain any ongoing process.

The system's *roadmap* takes you through form 1040 line by line and always returns you to the current line, so it's impossible to get lost among the many forms. For example, at line 34a, pressing the letter I takes you to Schedule A to itemize your deductions. Then, the program totals this amount and automatically returns to line 34a, letting you continue to enter data. The system never forgets to save the itemized information either and, with a single-drive Apple, prompts for the data or program disk as needed.

Since the Tax Preparer collects so much detail in so many places, it's cumbersome as a tax planner. HowardSoft promises a new planning module to give it more flexibility to forecast the effects of tax decisions. This module will be included in future versions of the package and can also be added separately to existing packages.

Finally, the Tax Preparer includes a batch-entry method, eliminating some of the program's slowness and the constant recalculation the standard mode uses. Through this method the professional can enter a lot of data at one time, and the individual user can input his or her information rapidly, without waiting as each entry is handled mathematically.

Dynacomp's Tax Optimiser lets you select from one to five alternatives in 11 categories so you can see the effect of different income or deduction amounts on your net tax liability. The program comes with tax tables for 1982 and 1983 already on disk; you can update these, or create your own from IRS forms.

The Tax Optimiser's help screens display information about the area you're working in. Once you enter figures, the program calculates and displays or prints the results. It also automatically saves the data to use another time. Good thing, too, because if you want to return to that worksheet and change some information, you must reload it into memory.

The VisiCalc Approach

SofTax is an interesting program that provides VisiCalc *overlays*. In effect, you load templates for 21 different tax forms and schedules into memory as you need them—each template on a different section of your worksheet. This approach lets you work with just the forms and schedules that your own tax return requires. Once you've entered all your information, the system sums up the details and computes your tax liability.

A simulation screen lets you alter data to see the effect on your tax situation without affecting the actual information. For these what-if scenarios, SofTax is more effective than Tax Preparer, as its summary is more concise and the process itself much faster.

SofTax uses VisiCalc in its manual recalculation mode, so you don't have to wait for the program to calculate after each entry. To compute, press the ! key. This method isn't perfect, of course; for some schedules you must request a recalculation *seven* times. SofTax also has a module that lets you remove all of last year's data, but still keeps permanent information like your name and social security number intact.

Weak Spots

Insufficient breakdowns for deduction categories is the Tax Optimiser's most serious drawback. The four that it does allow can contain all of your data, but don't let you change information in enough detail. The Tax Optimiser isn't completely idiot-proof, either. When I tried to load a fictitious scenario called CAT, a beep indicated that I'd reached the end of data and that there was a break in line 760. The program then was put into *BASIC*.

The Tax Preparer package takes two minutes to load. Even running on a 128K Apple //e, I still got the

STANDBY! Pausing to Refresh

message every so often. When you select a menu item, the instruction is carried out after a brief delay. While this program almost always tells you what it's doing, at times when there is no message in sight, it's tempting to hit the return or escape key (and that would move you somewhere else, once the package started again).

SofTax presents some problems, too. For example, you must know which schedule to use to itemize a particular income condition or deduction breakdown. Contrast that with the Tax Preparer, which automatically retrieves the correct schedule or form to use when you request itemization.

The version of VisiCalc SofTax was designed to work with cannot protect its cells, so you can easily write over an existing SofTax formula. This doesn't hurt your data, but means you must reload that particular section of your overlay to get the formula back into memory. (Perhaps future editions of the SofTax package will include the latest version of VisiCalc, which allows protected cells.)

VisiCalc never works with menus, so neither does SofTax. To load a form or schedule, you must use VisiCalc's /SL command, followed by the file

name. It's not as easy an approach as a menu-driven system provides.

SofTax also comes with VisiCalc's quirks. The screen displays two areas—one for the item description and the other for your data. However, you can scroll out of the entry area and unless you remember in which direction you accidentally went, you can get lost and be forced to reload the module you're working in. Pressing the ; key sends you into the text part of your worksheet (where you shouldn't be). Finally, you must save information in two forms—a standard file and a data interchange format (DIF) file—because the program uses the DIF file when it prints information.

What to Buy

For simple projections, Dynacomp's Tax Optimiser gives you fair capability (and it's not an expensive program). If you have VisiCalc and like its format, SofTax works well but you must know which schedule to use for each tax situation you find yourself in. HowardSoft's Tax Preparer is the most comprehensive package of the three, and well worth its cost to someone who wants to automate his or her tax preparation process. It's also a terrific program for someone with a good knowledge of tax laws who wants to start his or her own tax business. Now, if only someone would come up with the cash to *pay* those taxes. . .■

Write to Gregory Glau at P.O. Box 1627, Prescott, AZ 86302.

In a Nutshell

The Tax Optimiser lets you forecast up to five different tax alternatives to see how different conditions could affect your tax liability. While it doesn't provide for much detail, it can present an overall view of your tax situation. SofTax's VisiCalc overlays calculate your income and deductions and produce tax forms. It's workable and fast, but you must know which schedule(s) to use. HowardSoft's Tax Preparer is a comprehensive tax-preparation program that takes you line by line through each form and schedule and creates as detailed a return as you need.□

Product Information

The Tax Preparer
HowardSoft
8008 Girard Avenue, Suite 310
La Jolla, CA 92037
(619) 454-0121
64K Apple, one disk drive (two are recommended)
The Tax Preparer will run on any of the Apple II family.
$250
$75 for a yearly update

The Tax Optimiser
Dynacomp
1427 Monroe Avenue
Rochester, NY 14618
(716) 442-8960
48K Apple, one disk drive
The Tax Optimiser will run on any of the Apple II family.
$59.95

SofTax
Design Trends Ltd.
525 South Washington Street
Naperville, IL 60540
(312) 357-2664
64K Apple, one disk drive
80 column card
SofTax will run on the Apple II Plus or the //e.
Unless your version of VisiCalc is designed to work with the Apple //e, you'll need a $49 pre-boot package called VC/80, available from Saturn Systems.
$199
$50 for a yearly update

Circle 56 on Reader Service card.

AMPERGRAPH

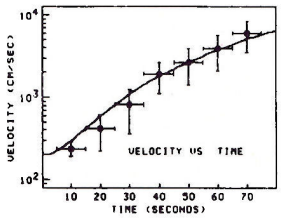
AMPERGRAPH is a powerful, easy-to-use relocatable graphics utility for the Apple II +/e/c. AMPERGRAPH adds twenty-two Applesoft commands that allow effortless generation of professional-looking plots of scientific or financial data. All of the necessary scaling and screen formatting is accomplished with just a few, simple Applesoft lines.

Unlike most other plotting systems for the Apple II which are stand-alone systems, the AMPERGRAPH utility provides extended BASIC graphics language macros that you can use directly in your own Applesoft programs. The additional commands are &SCALE, &LIMIT, &AXES, &GRID, &FRAME, &LOG X, &LOG Y, &LABEL AXES, &LABEL, &VLABEL, &CENTER LABEL, &CENTER VLABEL, &DRAW, &PENUP, &CROSS, &OPEN SQUARE, &CLOSED SQUARE, &OPEN CIRCLE, &CLOSED CIRCLE, &ERROR BARS, &DUMP (to dump the graph on a Silentype printer) and &*DUMP (to link with AMERDUMP, see below).

$45.00

SAMPLE AMPERGRAPH PROGRAM LISTING:

```
10 &SCALE, 0, 80, 80, 13000
15 LX$ = "TIME (SECONDS)":LY$ = "VELOCITY
   (CM/SEC)"
20 &LOG Y: &LABEL AXES, 10, 10
25 LABEL$ = "VELOCITY VS. TIME":&LABEL, 30,
   200
30 FOR T = 0 TO 80:&DRAW, T, 150 + T12:NEXT T
35 FOR T = 10 TO 70 STEP 10
40 &CLOSED SQUARE, T,
   (150 + T12)*(.8 + .4*RND(3) )
45 &ERROR BARS, 5, T12/2
50 NEXT T:&DUMP
```



AMPERDUMP

AMPERDUMP is a high-resolution graphics dump utility which can be used either in menu-driven mode, or directly from your Applesoft program, with, or without AMPERGRAPH. The following printers will work with AMPERDUMP: Apple Dot Matrix, Imagewriter; Epson; Gemini; NEC PC-8023A-C; C. Itoh 1550, 8510A/B, 8600; Toshiba 1340, 1350. AMPERDUMP offers many features which are not available in other graphics dump routines:

- Horizontal magnifications: 3 to 12, depending on printer.
- Vertical magnifications: 2 to 9, depending on printer.
- Horizontal and vertical magnifications can be specified independently.
- Normal / Inverse dumps
- Adjustable horizontal tab
- Compatible with AMPERGRAPH
- Fast
- Easy to use
- Relocatable

$40.00

The AMPERGRAPH and AMPERDUMP graphics utilities require an Apple II +/e/c. The AMPERDUMP utility requires one of the following interface cards: Epson, Apple, Grappler, Interactive Structures, Mountain Computer, Epson Type2, Tymac, or Microbuffer II, Tackler, Microtek, Printerlink, Super Serial.

AMPERGRAPH and AMPERDUMP are available from your dealer or order direct. Include $2.00 for shipping and handling; Wisconsin residents add 5% sales tax.

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ASK inCIDER

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.

ProDOS on Parade

Dear *inCider*:

I'd like some information about the Apple //c. Can you explain what ProDOS is? Also, do you think there is much of a future for the //c and Apple Computer?

Dorrel Christie, Jr.
1 Meadow Hill Road
Newburgh, NY 12550

Dear Dorrel:

ProDOS is the latest disk operating system for the Apple II family. A disk operating system consists of programs and routines that allow a computer to communicate with and control a disk drive. For example, the disk operating system translates general statements like LOAD PROGRAM into the specific instructions that position the read/write head of the disk drive.

ProDOS is designed to supplement, and eventually replace, DOS 3.3. The most significant difference between DOS and ProDOS is that DOS is limited to working with 35-track disk drives. ProDOS, however, isn't limited by the number of tracks it can address. It also has a file structure that handles large directories (list of files) created with a hard disk. The ability to support a hard disk is the ProDOS raison d'etre.

For more information about ProDOS, pick up next month's inCider. *Lee Swoboda, author of "The Compleat Text File Primer," has written a new series that explains how to use ProDOS. I'm sure it will be as successful as his last series.*

Your second question is a lot harder to answer. In the volatile microcomputer industry many major companies may not see the end of 1985, especially in the IBM-compatible market. Apple, however, appears to have a secure future. Macintosh sales are strong and the demand for //e's and //c's has not let up. Apple Computer will be around to support its products for a long time.

Joyous Menus

Dear *inCider*:

You published a program (August 1984, page 34) that lets someone choose and run programs from a menu using a joystick. Is there any way to modify the menu so that I could use it with my own programs?

Brian Cranford
32 Deane Avenue
Holden, MA 01520

Dear Brian:

You can easily modify the menu program to accommodate your own programs. First, change the DATA statements that begin at line 400. List the programs you want in the menu exactly as they appear on your disk catalog. Next, change lines 300 and 350 to reflect the number of choices in your menu. Finally, if you have more than ten menu items, change the DIM statement in line 20.

And the Winner Is. . .

Back in August, I announced the Two-Bit Game Contest. Originally, I planned to reveal the winner in the December issue, but I didn't foresee how many *inCider* readers would have the savvy to fit a fun, workable game into two lines of Applesoft BASIC code. No one was more surprised than I by the avalanche of entries that wound up on my desk. Although typing in the entries wasn't easy (thank God for GPLE), I was constantly amazed at your cleverness.

Out of the hundreds of entries, I chose five finalists. With the staff's help, we decided on the winner and two honorable mentions. It was a tough decision, but here are the results:

- Winner ($100): Brian Veit, of Mt. Holly, NJ, for his game, Weeds!

- Honorable Mentions: Joe Farmer for The Snake and Joseph Reynolds for Battle Barge.

These games are a lot of fun to play. In Weeds! (**Listing 1** on the next page), you have to position your paddle to intercept the encroaching weeds (a peculiar species that grows horizontally). The pace gets frantic before too long. (Note: Anytime you play Weeds!, the first round appears in text, instead of graphics. If this annoys you, enter a GR from immediate mode before running the game.) In The Snake (**Listing 2**), use the A, Z, and arrow keys to avoid running into walls, obstacles, or the ever-expanding body of your reptile. In Battle Barge (**Listing 3**), you must dodge the torpedoes using the arrow keys (any other key stops the barge) and transport five loads of supplies back to your home port.

As a skill marker, my best score with Weeds! was 19. I made it to 188 on The Snake, and I received a "quick" rating with Battle Barge. I hope you have fun bettering my scores.

Congratulations to the three top contestants for their great games. I'd also like to thank Jim Moore, Paul Nix, Jon and Andrew Thomason, Jason Goldbloom, Aaron Leventhal, and the other entrants for keeping me entertained for hours. I only wish I could have published everybody's entry.

One more thing: When you enter the programs, don't include any unnecessary spaces. And be sure to use a ? for any PRINT statement. Have fun and Happy New Year!

by Bob Ryan, inCider staff

Listing 1. *The winner—Weeds!*

```
1  FOR X = Ø TO 38 STEP  INT (S) +
     1: COLOR= 12: HLIN Ø,X AT Y:
      COLOR= Ø:L =  - 16336:K =  PEEK
     (L):B =  INT ( PDL (1) / 7.2
     ): VLIN D,D + 4 AT 39: COLOR=
     15:D = B: VLIN D,D + 4 AT 39
     : NEXT : HLIN Ø,38 AT Y: IF
      SCRN( 39,Y) <  > 15 THEN  FOR
     F = Ø TO 39: HLIN Ø, INT ( RND
     (1) * 39) AT F:K =  PEEK (L)
     : NEXT : PRINT "WEEDS!": GET
     A$: GR : RUN
5 SC = SC + 1: HOME : VTAB 23: PRINT
     "SCORE:"SC: COLOR= Ø: FOR E =
     38 TO Ø STEP  - 1: PLOT E,Y:
     K =  PEEK ( - 16336): NEXT :
     Y =  INT ( RND (1) * 37):S =
     S + 1 / 4: POKE  - 16368,Ø: GOTO
     1
```

Listing 2. *Honorable mention—The Snake.*

```
5  HCOLOR= 3
10  HGR : HOME : FOR I = Ø TO 6: READ
     A: POKE 768 + I,A: NEXT : POKE
     232,Ø: POKE 233,3: ROT= Ø: SCALE=
     5: FOR I = 4 TO 278 STEP 6: DRAW
     1 AT I,7: DRAW 1 AT I,151: NEXT
     : FOR I = 13 TO 145 STEP 6: DRAW
     1 AT 4,I: DRAW 1 AT 274,I: NEXT
     :K = 49152:X = 136:Y = 79: DATA
     1,Ø,4,Ø,37,55,Ø: POKE 234,Ø:
     S = Ø
20 N = X:O = Y:T =  PEEK (K):X =
     X +  - 6 * (T = 136) + 6 * (
     T = 149):Y = Y +  - 6 * (T =
     193) + 6 * (T = 218):P =  INT
     ( RND (1) * 45 + 1) * 6 + 4:
     Q =  INT ( RND (1) * 23 + 1)
      * 6 + 7: POKE 234,Ø: DRAW 1
      AT X,Y:V =  PEEK (234): DRAW
     1 AT P,Q: IF (N = X AND Y =
     O) OR V < 20 THEN S = S + (N
      <  > X OR O <  > Y): VTAB 2
     3: PRINT "SCORE: "S: GOTO 20
```

Listing 3. *Honorable mention—Battle Barge.*

```
1 S = 49200:K = S - 48:X = 2: TEXT
     : HOME : COLOR= 13: HLIN Ø,3
     9 AT 6: POKE 34,4: FOR E = Ø
      TO 1:X = X + ( PEEK (K) = 1
     49) - ( PEEK (K) = 136):X =
     X - (X > 35) + (X < 2): VTAB
     2: PRINT : PRINT T TAB( X +
     1) MID$ ("OOO",1,3 * L) TAB(
     40)5 - T - L;: HTAB X: PRINT
     "-###-":D =  SCRN( X,8) +  SCRN(
     X + 1,8) +  SCRN( X + 2,8):T
      = T + (L AND X = 2):M = M +
     1
3 L = (L OR X = 35) AND X > 2: CALL
      - 912:C =  RND (1) < (T + 1
     ) / 5: COLOR= C: PLOT  RND (
     1) * 30 + 5,46:Z =  PEEK (S *
     C) -  PEEK (S * C):E = T = 5
      OR D: NEXT : HOME : TEXT : VTAB
     5:R =  INT (8.3 - M / 100):R
      = R - (R < Ø) * R: GET A$: PRINT
      MID$ ("BARGE SUNK!SPEED=" +
      MID$ ("SLOWGOODFASTQUIKWARP
     ",1 + 4 * R,4),1 + 11 *  NOT
     D,11): END
```


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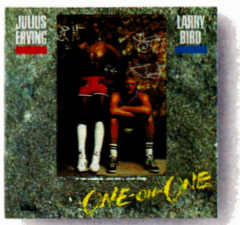

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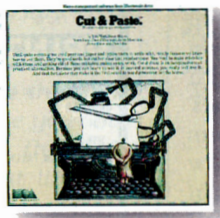

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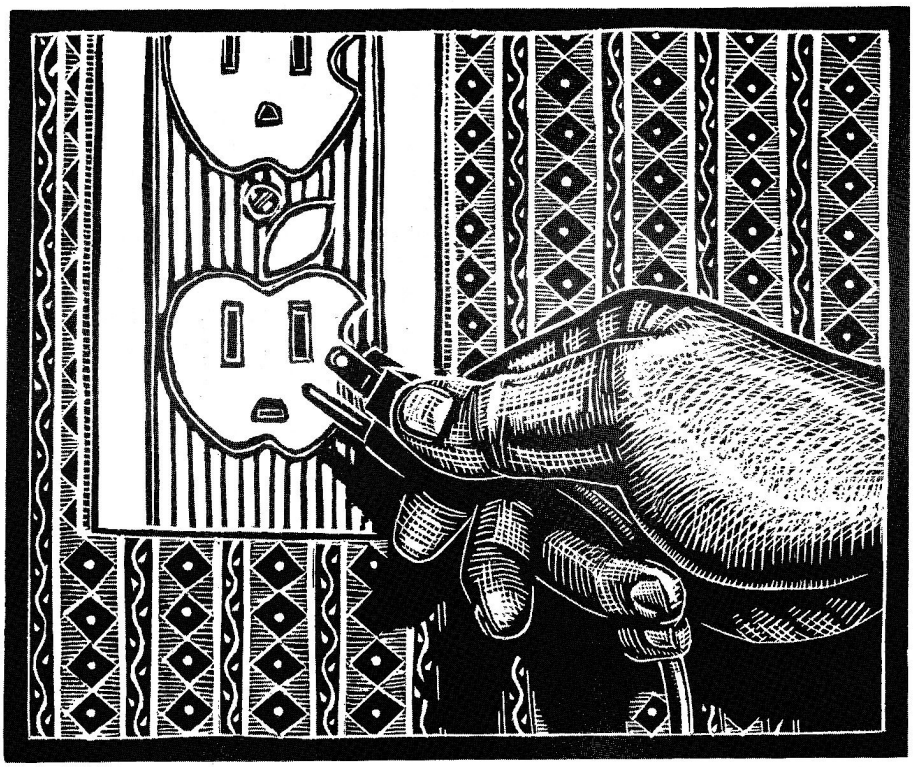
Apple Ecology: Part I



Steal my car, burn my apartment, dump my Häagen-Dazs down the drain, but never call me before 10 a.m. Battling microproblems and fending off deadlines often keep me burning the oil into the wee hours.

My clients know this one idiosyncrasy of mine, and they respect it. So you can imagine my surprise when Quasimodo rang me at 8:30 on a Saturday morning. At such times my erudition is suspect. I manage a gravel-voiced "Huh?" somewhere near the mouthpiece.

"The computer isn't working!" Phrases like that are the computer consultant's main fare. They can mean anything from "I can't find the right disk" to "The machine is in flames—what do I do now?"

"Yeah" was about as decisive as I could get at the moment, so I hung up. For the next 20 minutes, morning ablutions, dressing, and dog-walking became automatic functions. Somewhere along the way I packed a Pepsi for breakfast, and woke up while I was opening the garage door.

My client was kneading his hands when I met him in the parking lot outside his office. His Apple wouldn't boot, no matter which disk he tried.

It was one of nine machines in a beautifully carpeted, slightly extravagant floor of offices in a newly developed section of New Jersey. The offending machine looked no different from the others. I jerked my hand back at the small shock I got when I touched its metal back—they had very nice carpets.

There are quite a few reasons why an Apple won't boot. Knowing this particular installation, I went straight to the RAM. A few chips later everything was working correctly. Only two brief delays occurred when the power winked out for a few seconds.

When it was over, the client and I sat down to the usual quandaries: "How did it happen?" "I thought these things never broke down." (Ha!) "Are they reliable?" It becomes an exercise in therapy.

We talked for almost an hour, covering points that had been made when the computers were first purchased.

Create safe outlets for your computer.

by Bill O'Brien

Although my client listened with rapt attention now, he had shrugged off my initial suggestions with "This is a new complex. There aren't any of those problems here." We talked about the Apple and its environment: It must have good working conditions to operate at peak efficiency.

What constitutes a safe and viable environment? Surprisingly enough, computers need conditions that closely parallel those a living organism (like yourself) requires. Counterparts in an electronic ecology are electrical power, operating environs, and climate.

Most competent, servicing Apple dealers will perform a site inspection to determine what, if any, preventive steps you should take before plugging in the equipment. A comprehensive inspection can cost anywhere from $100 to $150. There's no question as to whether or not it's worth the money. It is. But with a little common sense, and for a lot less money, you can do your own.

Tapping the Power Line

The wall outlet in your home or office is not the meek and gentle beast you might think it is. Actually, it's a raging maelstrom of electrical activity. And you need to answer the following questions about an object you have probably taken for granted over the years:

- What type of outlet is it?
- How much power is available?
- How clean is the available power?
- Is it always available?

When electricity was first installed throughout the country, a simple principle was followed: Voltage needs one wire to enter the outlet (the power or "hot" line) and one wire to exit (the return or neutral line). The latter connection went back to ground (literally, the earth). The two-prong outlet was born. Toasters, tube-type televisions, and your old Victrola worked fine. Then "electronics" reared its ugly head.

Electronic equipment, and specifically your Apple computer, uses DC voltage internally. Although it also has a ground line, you can't directly mix an AC and DC voltage without catastrophic results. With a two-wire system, there was no way to compensate for the differences between the two. The DC return line was left floating inside the equipment, though it should have gone to ground.

To compensate, many homes and offices, and most new buildings, were converted to a three-prong wall outlet system. The additional line from the outlet was connected to the chassis, or frame, of the equipment, as was the return line of the DC electronics. With this "ground" line, both the AC and DC voltages could be brought back to a common point, the earth, without interfering with one another.

It's a good working arrangement and relatively easy to understand. One line from a three-prong outlet is AC in, another AC out to ground, and the third is DC ground to earth-ground. Your computer needs to be plugged into a three-prong, grounded outlet. If you have one, skip this section. If you don't, read on.

When Three's Company

The usual way of reconciling two-prong outlets and three-prong power cords is to take a pair of pliers and yank out the circular grounding lug from the cord. Alternately, in a fit of devious intellect, some have used extension cords that allow the grounding lug to pass harmlessly, and ineffectually, over the outlet.

Though suitable for power drills, saws, and sanders, such tactics are tantamount to Apple homicide. Perhaps it won't happen immediately. You'll feel smug. But as sure as Jobs and Wozniak made little Apples, someday there will be an acrid puff of smoke as the unequalized potential between the AC and DC voltage erupts in micro-Vesuvian style.

A simpler and relatively cheap solution, a three-prong adapter, is available in a package of two for $1.09 from Radio Shack (catalog number 61-2720). Replacing the main logic board in an Apple costs about $100. You *do* have a choice.

Like the outlet itself, the adapter is a simple device, with two prongs and a metal strip on one end, and a three-prong outlet on the other. Inside the adapter, one end of the metal strip is connected to the hole for the power cord's grounding lug; the other end terminates in its own U-shaped grounding lug.

First, unscrew the center screw on your wall outlet. Plug in the adapter. Then screw the center screw back in, making sure that the adapter's U-shaped lug is seated between it and the wall plate. Tighten the screw to hold the lug firmly in place. The metal in the outlet box behind the wall, together with the metal jacket on the wires connected to it, make a good path to ground.

The Right Stuff

Whether you already have a three-prong outlet or you're using an adapter, you can't tell if the wires in the wall are connected to the correct holes in the outlet. And is that a problem?

Perhaps all "electricians" weren't created equal. Or maybe you've just paneled the computer room and needed to extend the outlets out from the wall to the panels. Whatever the cause, an accidental rearrangement of your electrical service usually won't be determined until *after* the damage has been done.

The solution is also available at Radio Shack: the three-wire outlet analyzer (catalog number 22-101). And it will set you back $5.95. Depending on which of its light-emitting diodes (LEDs) glow, what color they are, and where they are in relation to one another, you'll know if your outlet is wired correctly.

Line Voltage

The last problem I'll look at this month involves the voltage level in your wall outlet. The Apple II series was meant to work with AC voltages between 105 and 129 volts. Your local power company does its best to keep the line voltage somewhere in the middle of this range.

Unfortunately, depending on your utility's actual voltage output and your position within the power grid, this isn't always possible. The real voltage level at your wall outlet may range anywhere from 90 to 130 volts.

Don't take my word for it. After research at 24 computer sites, spending an average of 11 months per site, researchers for Bell Labs found that 87 percent of all power line problems were caused by drops or "sags" in line voltage level (see Goldstein, M. and P.D. Speranza, "The Quality of US Commercial AC Power," *IEEE*, April 1982).

Given the probability of the problem, before you plug in your Apple you might need to bring the voltage up or

down to a level it prefers. But first determine if the problem exists.

Unless you're comfortable on your knees, under a desk, playing with an electrical outlet, you may want to take the simplest of several approaches. You can call your power company and ask them what their specified line voltage is for your area. They should be able to supply the information.

Then you can visually monitor your environment to determine the accuracy of their claim as it applies specifically to you. Do your light bulbs seem a little dim for their rating? Is your television picture just a little smaller than it should be? If so, you may have low line voltage. Alternately, if your light bulbs tend to burn out in a shorter period than their rated life span, you might have an over-voltage problem.

If these symptoms aren't obvious, and you suspect that you might have problems, you must measure the voltage at the outlet. You can call an electrician who will do this for you at a fee, or you can measure it yourself. If you're sure of your prowess around a potentially dangerous object like a wall socket, then be prepared to spend $10.95.

You'll be buying a volt-ohm meter (VOM) from Radio Shack (catalog number 22-212). First, you turn a switch on its face to a VAC (volts AC) range usually between zero and 150. Then, using the two probes that come with the meter, you insert one into each of the thin rectangular sockets on your wall outlet (the power and return lines). It doesn't matter which probe goes where.

Be careful to handle the probes only by their rubber or plastic handles and *not* by the metal tips—a mishap could be fatal. The best approach is to insert one probe in one of the holes, release it, and then insert the other. Once you've done this you can read the actual line voltage from the meter.

A good reading will fall somewhere between 110 and 120 volts. You may think that anything within the Apple's range is all right. That's not true. If you're in the lower area of acceptable voltage levels, you'll need to take at least one more thing into account. Whether you call them drops, sags, or the more traditional "brownouts," if you're already on the low end of the power rating, dips in the line voltage level can cause your outlet voltage to fall below acceptable levels.

Usually this will happen during the summer months. During periods of peak electrical usage, some power companies reduce the line voltage by anywhere from 3 to 7 percent. Peak loads themselves can cause the voltage to drop just from the drain on the utility's power supply.

The converse of this situation is over-voltage. If your measurements indicate that you're in the higher range of electrical power, you may feel safe during a voltage drop. Remember, after peak usage periods, your line voltage can go up. If your outlet measured 125 volts during a peak period, a rise of only 3 percent can put you dangerously close to Apple's upper maximum.

The usual answer in either situation is a line conditioner or voltage regulator. They're large and bulky and they're expensive—usually over $200. They also work very well. (For a list of manufacturers of power-line conditioners, see the table at the end of this column.)

You plug a line conditioner into your wall outlet. It accepts the AC voltage, passes it through a transformer, and then pushes it through its own outlet. As long as your power company can deliver between 85 and 150 volts, the line conditioner will pump a steady 120 volts into any equipment you have plugged into it.

The cost of such conditioners can vary, depending on your system's power ratings. An Apple with monochrome monitor and printer would probably use one rated at 300 or 400 watts. A hard disk in your system will probably increase your requirement to between 500 and 750 watts. This higher power-handling capability drives up the price of a line conditioner.

Additional features in most conditioners further account for their costliness. I'll discuss some of these extra attractions, and devices that will handle them without the expense of a conditioner, in next month's episode, but I'll warn you about one thing in advance: Don't succumb to paranoia and run out to buy a line conditioner. Most urban computer installations don't require such a device. If you experience brownouts, or your light bulbs burn out quickly (provided that you're buying quality bulbs), you have ample evidence of your need.

Recap

Look at what you've done: For a grand total of $18 you've tracked and traced the primary hazards to your Apple. Considering that this amount is probably less than 1 percent of the overall cost of your system, it's a solid investment. You've also seen one way to guard your system against the most immediate and dangerous voltage-level problem.

Next month I'll look at alternatives for those who have a rarer voltage-level problem—the blackout (and extended brownouts). I'll also discuss the more insidious problems of static, line noise, radio frequency interference (rfi), and voltage spikes that tend to rob you of your computer's usefulness.

Until then, with the proper precautions, have a Happy New Year and make mine Apple.■

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

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Basic BASIC Sorts

In my previous two columns I described the FOR. . .NEXT looping structure BASIC uses to conduct repetitive operations, and demonstrated how this structure, in conjunction with arrays, can greatly simplify the treatment of large amounts of data. December's column included a simple address book listing built on these principles. The data, stored in DATA statements, was deposited in arrays for processing by READ statements. Then a simple FOR. . .NEXT sequential search located a given name in the list of names in the array.

If you were to write a subroutine for that program to list the data, you would find the names appearing on the screen in the same order as they were read into the array. If the names weren't entered in alphabetical order, the displayed list would not be alphabetized either. This month's column presents two simple programming algorithms for sorting the elements of an array into alphabetical order.

Neither of these techniques is efficient for numbers of data elements much over 20. Their introduction at this point in my tutorial series is useful, however, in that both are relatively easy to understand. In fact, I will describe how they work in terms of sorting a stack of name cards. If you find my explanations difficult to follow, actually work your way through the procedures with some 3-by-5 cards. Then go back to the flowcharts and program listings and correlate what you are doing by hand with what the computer is doing electronically.

The Exchange Sort

So, imagine that you have a stack of name cards. The names are randomly arranged, and your job is to sort the cards so the names are in alphabetical order. The only rules are that you may look at just two cards at a time and those two cards must be adjacent to each other in the stack. **Figure 1** illustrates how you might accomplish the task.

First, place the stack of cards face-up and call this the "unsorted-cards" stack. Now remove the top card and compare it to the card immediately below. If the top card comes first alphabetically, place it face-down on the table in a "discard" stack, and repeat the above process with the remaining cards.

On the other hand, if the top card comes after the card below, exchange the two. That is, remove the card now on top of the stack and place the first card back on the stack. You are now holding the second card from the stack, which alphabetically precedes the card now on top of the stack. So place the card in your hand face-down on the discard stack and proceed as before.

Eventually you will get to the bottom of the unsorted-cards stack, and the only card left in your hand will be the card that belongs at the end of the alphabetically sorted list. Start a third stack with this card, arranged face-up on the table, and call this the "sorted-cards" stack.

Finally, turn the entire discard stack face-up to become the new unsorted-cards stack. Repeat the process, this time ultimately finding the next-to-last name in the alphabetized list, which will go face-up on the sorted-cards stack. This procedure continues, with one more card being removed from the unsorted-cards stack and placed on top of the sorted-cards stack with each cycle.

To complicate things a little, but for the sake of efficiency, you might keep track of the last exchange to take place within the discard stack. If, for example, you make an exchange at the eleventh card from the end and then go through the last ten cards with no exchanges, the last ten cards, plus the one you are holding, are already in alphabetical order. They can be turned upright on the sorted-cards stack as a batch, with the card in your hand going down first.

Figure 2 shows the flowchart for the exchange sort subroutine (lines 100–170) in **Listing 1**. Since the subroutine uses a FOR. . .NEXT loop to cycle through the array, the minimum subscript value (MN) and maximum subscript value (MX) for the array are assigned starting values. Then the initial value of a flag variable, K, is designated as 1. This variable will be the marker the program uses, as it cycles through the unsorted-cards stack, to keep track of where the last exchange took place. When each cycle is completed, the value of MX, the maximum subscript value to be used for the next cycle, will be set equal to K so the computer won't have to sort through a sequence of array elements that are already known to be properly sorted.

The FOR. . .NEXT loop compares each array element, A$(J), with its neighbor immediately following, A$(J + 1). If the two are already in alphabetical order, the loop cycles to compare the next pair. (That is, A$(J + 1) becomes A$(J) for the next comparison.) If the two elements in the next comparison are not in order, the value of the marker, K, is set equal to J to keep track of where the most recent exchange took place, and the two ar-

by Dan Bishop

ray elements are exchanged (as described below).

Finally, when all the array elements have been compared, the value of the marker is checked. Since K was initially set to 1 and changed only if an exchange took place, if K still equals 1, the array has been completely alphabetized and the subroutine is finished. On the other hand, if K has a value other than 1, further exchanges may be necessary. MX is reset to the value of K so, if K is different from the previous value of MX, the next cycle of comparisons will stop before running through an already-alphabetized set of array elements. Then K is initialized again to 1, and the process repeats itself.

Loading the Array with Test Data

Figure 3 shows the flowchart for the programs in **Listings 1** and **2**. Note that, with the exception of dimensioning arrays and initializing some variables, the main program consists of a series of modular subroutine calls. The first is to the subroutine that loads the array with test data for the sorting procedures.

For these programs the array is loaded with string data. To set up a "worst case" situation, the array elements contain three alphabetic characters determined by the subroutine at line 1000. All three characters for a particular element are the same, such as MMM or TTT, and there are 104 elements. The subroutine cycles through the alphabet four times, assigning values to array elements starting at the end of the alphabet and working forward. So A$(1) = "ZZZ", A$(2) = "YYY", and so on. This sets the array elements in an order exactly opposite to the order required by the alphabetical sort technique.

The function that accomplishes this feat is the CHR$, or *character string*, function. Every symbol (letter, numeral, punctuation mark, special character) the computer uses is stored in memory as a number having a value ranging from 32 to 255. The number that represents a given symbol is referred to as that symbol's *ASCII (American Standard Code for Information Interchange) code.*

For example, the ASCII code for a blank space is 32, that for the numeral 1 is 49, and that for an upper-

Figure 1. *The exchange sort method illustrated. In this "hand," Sue and Ben are being compared. Since Sue comes after Ben, the cards must be exchanged. In the next move, the card in hand, Ben, will be placed upside-down in the discard pile. Then Sue will again be in hand, to be compared with whatever card is next on top of the unsorted-cards stack.*

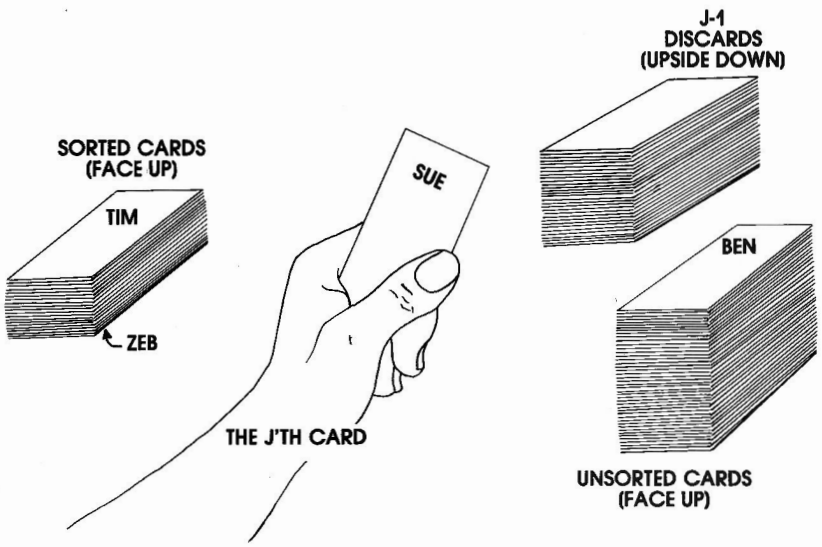
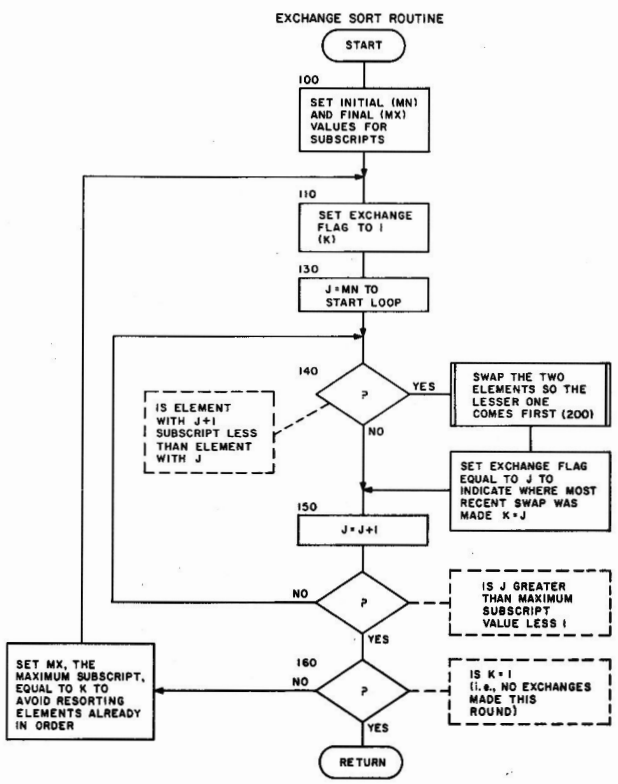


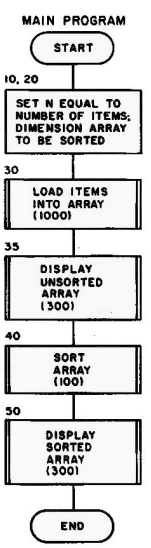
Figure 2. *A flowchart for the exchange sort routine presented in Listing 1.*

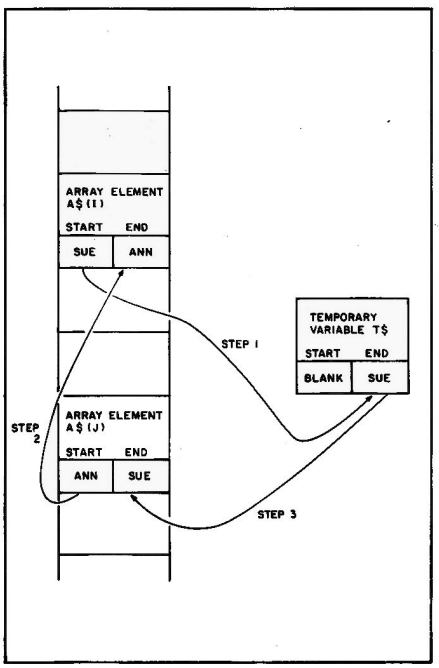


Listing 1. *A sample program illustrating the use of an exchange sort to alphabetize the elements of an array.*

```
9  REM  ****  EXCHANGE SORT EXAMPLE  ****
10  HOME :N = 26 * 4: REM  NUMBER OF ITEMS TO BE SORTED
20  DIM A$(N + 6)
30  GOSUB 1000: REM  LOAD ARRAY TO BE SORTED
35  GOSUB 300: REM  DISPLAY UNSORTED ARRAY
40  GOSUB 100: REM  SORT ARRAY
50  GOSUB 300: REM  DISPLAY SORTED ARRAY
60  END
98  REM
99  REM  ****  EXCHANGE SORT ROUTINE
100 MN = 1:MX = N: REM  SET ARRAY SUBSCRIPT LIMITS
110 K = 1: REM  INITIALIZE TERMINATION FLAG
120  PRINT "*** SORTING.  PLEASE WAIT..."
130  FOR J = MN TO MX - 1: REM  SECONDARY LOOP COUNTER
140  IF A$(J + 1) < A$(J) THEN K = J:I = J + 1: GOSUB 200: REM
     SWAP
150  NEXT J
160  IF K <  > 1 THEN MX = K: GOTO 110
170  RETURN
198  REM
199  REM  ****  ROUTINE TO SWAP TWO ARRAY ELEMENTS
200 T$ = A$(I): REM  HOLD I'TH VALUE IN T
210 A$(I) = A$(J): REM  SO THE I'TH VALUE CAN BE
220 A$(J) = T$: REM  REPLACED BY J'TH VALUE.
230  RETURN : REM  THEN PUT VALUE IN T INTO
240  REM               J'TH ELEMENT.
298  REM
299  REM  ****  ROUTINE TO DISPLAY ARRAY
300  HOME
310  FOR I = 1 TO 21
320  PRINT I;" ";A$(I);"  ";I + 21;" ";A$(I + 21);"  ";
330  PRINT I + 42;" ";A$(I + 42);"  ";I + 63;" ";A$(I + 63);"  "
     ;
340  PRINT I + 84;" ";A$(I + 84)
350  NEXT I
360  INPUT "PRESS <RETURN> TO CONTINUE...";X$
370  RETURN
998  REM
999  REM  ****  ROUTINE TO FILL ARRAY WITH ALPHA CHARACTERS
1000  FOR I = 0 TO N / 26 - 1: REM   # OF ALPHABETS IN ARRAY
1010  FOR J = 1 TO 26: REM  LOOP FOR EACH ALPHABET
1020 X$ =  CHR$ (91 - J): REM  GENERATE LETTER BASED ON J
1030 A$(J + 26 * I) = X$ + X$ + X$: REM  ASSIGN ARRAY VALUE
1040  NEXT J
1050  NEXT I
1060  RETURN
```

Figure 3. *The flowchart for the main program sequence in Listings 1 and 2. Note the modular subroutines.*





case A is 65. When the computer compares data to determine if one string should come before or after another alphabetically, it is actually comparing the ASCII codes of the symbols within the strings. A string that begins with a number would be alphabetized ahead of one beginning with an alphabetic character; a string beginning with a blank space would come at the head of the whole list!

You can find the ASCII code for any symbol by referring to your computer manual or through the ASC command when your computer is in immediate mode. PRINT ASC("$"), for instance, would display the number 36, since the ASCII code for the dollar sign is 36. Now try PRINT CHR$(36). A dollar sign will appear on the screen. The computer is displaying the character that has the ASCII code of 36.

In line 1020 of both program listings, X$ is assigned the character with an ASCII value of 91 minus the current value of J. As the computer cycles through the loop, J increases from 1 to 26, so the ASCII values in question start at 90 and decrease to 65. Since the ASCII value of Z is 90 and that for A is 65, the value of X$ progresses from Z to A with each successive cycle through the loop. And since X$ assigns values to the array elements in line 1030, the values in the array represent the alphabet in reverse order, creating an array with ideal text values for a sorting subroutine.

Swapping Array Values

Both programs require a procedure to exchange the values in two different array elements. Since a simple assignment statement erases a variable's initial value, a roundabout approach must be used. Suppose you wish to swap the values in the elements A$(I) and A$(J). **Figure 4** illustrates how this can be done without losing either of the two values.

Figure 4.
A diagram showing how an exchange of two variables is handled in Applesoft BASIC. Three steps are required. Note that the starting and ending values for each of the three variables involved in the swap are shown. The ending values, of course, replace the starting values as soon as the reassignment takes place.

The first step is to assign the value in A$(I) to a temporary variable. The second step is to copy (using an assignment statement) the value in A$(J) into A$(I). The third step is to copy the value in the temporary variable—the old value of A$(I)—into A$(J). And there you have it! Some of the newer BASICs have a SWAP command that takes care of this operation in one step, but Applesoft doesn't, so the subroutine at line 200 in the program listings appears often in Applesoft programs.

The Bubble Sort

The bubble sort technique for sorting array elements can also be demonstrated by sorting a stack of randomly organized name cards, as pictured in **Figure 5**. The major difference between the bubble sort and the exchange sort is that, while the sorted-cards stack is built up from the bottom in the exchange sort, with the bubble sort the sorted-cards stack is built down from the top.

Place the stack of unsorted cards face-up on the table, just as you did before. The rule to follow when playing "bubble sort" is this: Always compare the card in your hand with the top card on the unsorted-cards stack, and if the card on the stack alphabetically precedes the card in your hand, exchange the two—so the card you end up holding would precede the card on the stack if sorted alphabetically.

Remove the top card from the unsorted-cards stack and compare it with the newly exposed card. Exchange the two if necessary, so you are holding the lower of the two cards. Now remove the top card from the unsorted-cards stack and place it face-down on the table, starting the discard pile. Repeat the process with the freshly-exposed card, exchanging if necessary and adding the resulting top card to the discard pile. Continue until there are no more cards left in the unsorted-cards stack. You have essentially gone through the entire stack and removed the lowest-valued card.

Place this card face-down on the table, forming a third stack, the sorted-cards stack. Now turn the discard stack face-up, to become the unsorted-cards stack for the next round. Begin again as described above, working your way through the unsorted-cards stack until you end with the next-to-lowest-val-

Listing 2. *A sample program illustrating the use of a bubble sort to alphabetize the elements of an array. Note that this listing is identical to Listing 1 with the exception of lines 99–170, the subroutine that handles the sorting procedure.*

```
 9  REM   ****  BUBBLE SORT EXAMPLE  ****
 10  HOME :N = 26 * 4: REM  NUMBER OF ITEMS TO BE SORTED
 20  DIM A$(N + 6)
 30  GOSUB 1000: REM  LOAD ARRAY TO BE SORTED
 35  GOSUB 300: REM  DISPLAY UNSORTED ARRAY
 40  GOSUB 100: REM  SORT ARRAY
 50  GOSUB 300: REM  DISPLAY SORTED ARRAY
 60  END
 98  REM
 99  REM   ****  BUBBLE SORT ROUTINE
100 MN = 1:MX = N: REM  SET ARRAY SUBSCRIPT LIMITS
110  FOR I = MN TO MX - 1: REM  PRIMARY LOOP COUNTER
120  PRINT "*** SORTING.  PLEASE WAIT..."
130  FOR J = I + 1 TO MX: REM  SECONDARY LOOP COUNTER
140  IF A$(J) < A$(I) THEN  GOSUB 200: REM  SWAP ELEMENTS
150  NEXT J
160  NEXT I
170  RETURN
198  REM
199  REM  ****  ROUTINE TO SWAP TWO ARRAY ELEMENTS
200 T$ = A$(I): REM  HOLD I'TH VALUE IN T
210 A$(I) = A$(J): REM  SO THE I'TH VALUE CAN BE
220 A$(J) = T$: REM  REPLACED BY J'TH VALUE.
230  RETURN : REM  THEN PUT VALUE IN T INTO
240  REM               J'TH ELEMENT.
298  REM
299  REM  ****  ROUTINE TO DISPLAY ARRAY
300  HOME
310  FOR I = 1 TO 21
320  PRINT I;" ";A$(I);"  ";I + 21;" ";A$(I + 21);"  ";
330  PRINT I + 42;" ";A$(I + 42);"  ";I + 63;" ";A$(I + 63);"
     ;
340  PRINT I + 84;" ";A$(I + 84)
350  NEXT I
360  INPUT "PRESS <RETURN> TO CONTINUE...";X$
370  RETURN
998  REM
999  REM  ****  ROUTINE TO FILL ARRAY WITH ALPHA CHARACTERS
1000  FOR I = 0 TO N / 26 - 1: REM   # OF ALPHABETS IN ARRAY
1010  FOR J = 1 TO 26: REM  LOOP FOR EACH ALPHABET
1020 X$ =  CHR$ (91 - J): REM  GENERATE LETTER BASED ON J
1030 A$(J + 26 * I) = X$ + X$ + X$: REM  ASSIGN ARRAY VALUE
1040  NEXT J
1050  NEXT I
1060  RETURN
```

Figure 5. *The bubble sort method illustrated. In the "hand" shown, Carl and Ben are being compared. Since Ben precedes Carl in the sort, the two cards should be swapped so that Ben becomes the card in hand. Then the top card (Carl) on the unsorted-cards stack will be placed upside-down on the discard stack, revealing the next card for comparison.*

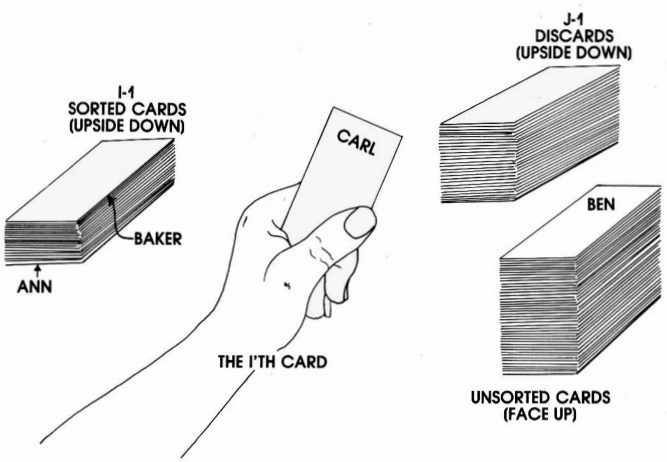
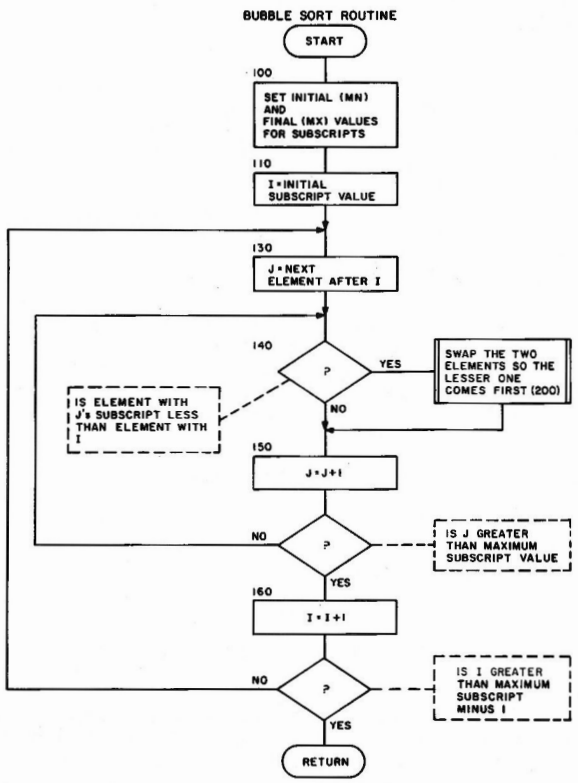


Figure 6. *A flowchart for the bubble sort subroutine in Listing 2.*



ued card in your hand. Add this card, face-down, to the sorted-cards stack. Continue until all cards are in the sorted-cards stack.

Listing 2 is identical to **Listing 1** except the sort subroutine from lines 100 to 170 is a bubble sort. As before, the beginning and ending subscript values are assigned to MN and MX, but in this listing these values remain constant throughout the process.

The bubble sort involves two nested FOR. . .NEXT loops. The inner one, with J for the loop counter, corresponds to going through the entire unsorted-cards stack just once. A swap is required each time the card at the top of the stack, A$(J), is smaller than the card being held, A$(I). When that loop has finished, the card in hand is the lowest-valued card remaining in the unsorted-cards stack. So the next cycle begins at array position I + 1, since elements 1 through I have now been sorted (corresponding to the sorted-cards stack of the example above). **Figure 6** shows the flowchart for the bubble sort routine.

Which Sort Is Better?

As I mentioned above, neither of these sorts is actually efficient for more than 20 elements. But, to compare the two, for my program examples it takes the bubble sort 3 minutes and the exchange sort twice as long to sort the 104 elements.

These times, however, are somewhat misleading. The starting array was purposely set up in an order opposite to the sorting order. In this worst-case scenario the exchange sort is at a disadvantage—it has no choice but to work through the entire remaining unsorted elements on each cycle. There can be no chance to label a block that is already sorted, then skip that block the next time around. Under normal circumstances the exchange sort might take less time.

The bubble sort, with no such trickery built in, always must plod through the entire remaining unsorted stack every cycle. Thus, the choice as to which technique to use depends on the starting array. If most of it is already in alphabetical order, the exchange sort would be more efficient. On the other hand, if the initial order is quite random, the bubble sort may be better.

Conclusion

As is true of many things, you must learn to walk before you fly. You now know two simple techniques for sorting arrays into alphabetical order, and (from last month) a sequential search technique to locate a given element in an array. With these methods you can manipulate small arrays with ease. As your arrays become larger, however, you will find them woefully inadequate. A bubble sort or sequential search on several hundred items can take hours, especially if disk access to the data is required, and the wear and tear on a disk drive can be horrendous.

There are solutions to these problems, and in a future column I'll tackle each in turn with array index manipulation, binary searching, and sort/merging. In the meantime, see if you can set up your own data-base files using the READ/DATA input approach I described last month, and then sort the data with the techniques covered in this month's column. ■

You can write to Dan Bishop c/o Custom Comp, P.O. Box 429, Buena Vista, CO 81211.

Note

I'd like to correct an omission in Listing 4, Prime Number Tester, on page 103 of my November 1984 column. The following line should be added:

```
15 IF X=2 OR X=3 OR X=5 OR
   X=7 OR X=11 THEN 50
```

Thanks to John Perrotta of Corona, NY.

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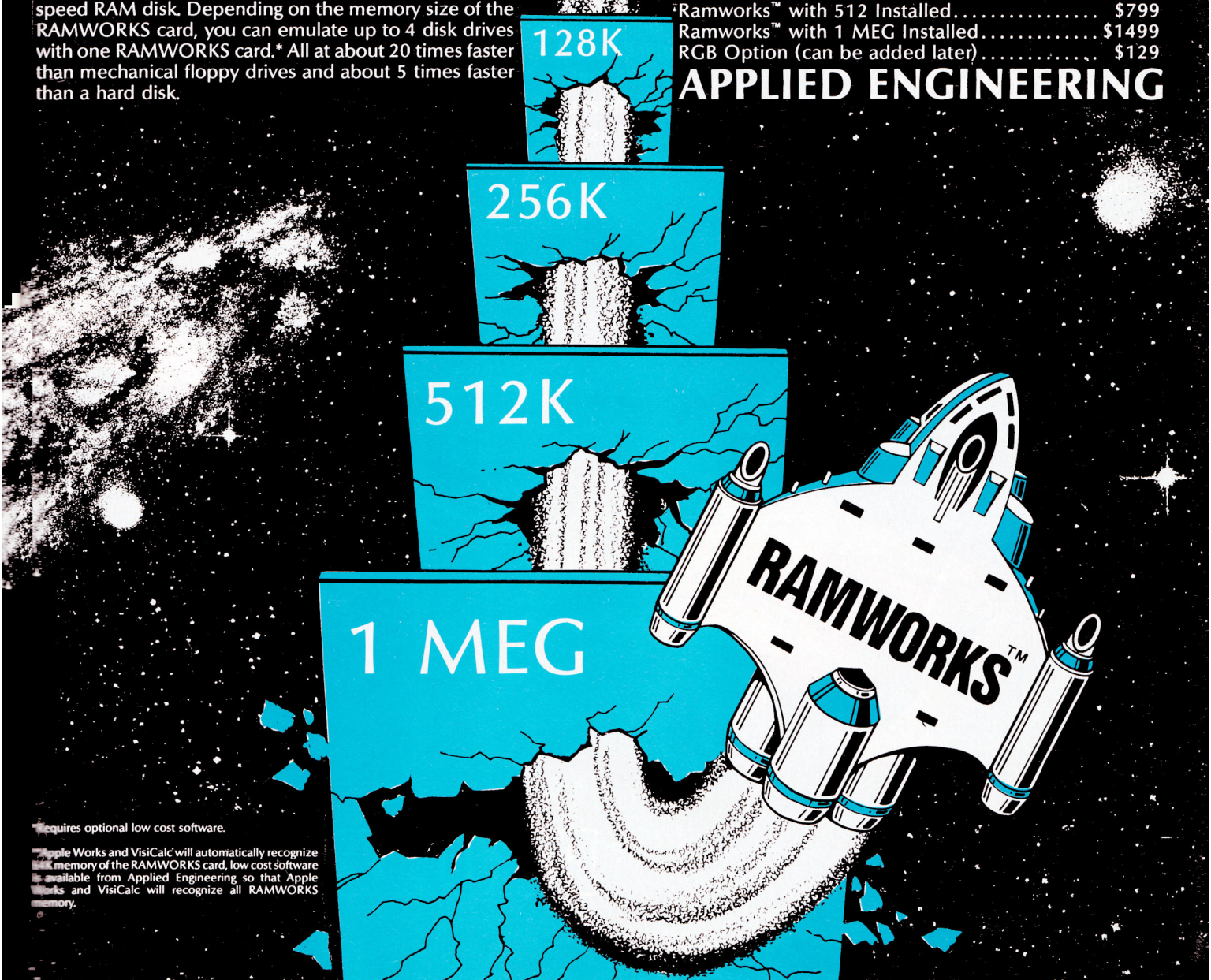

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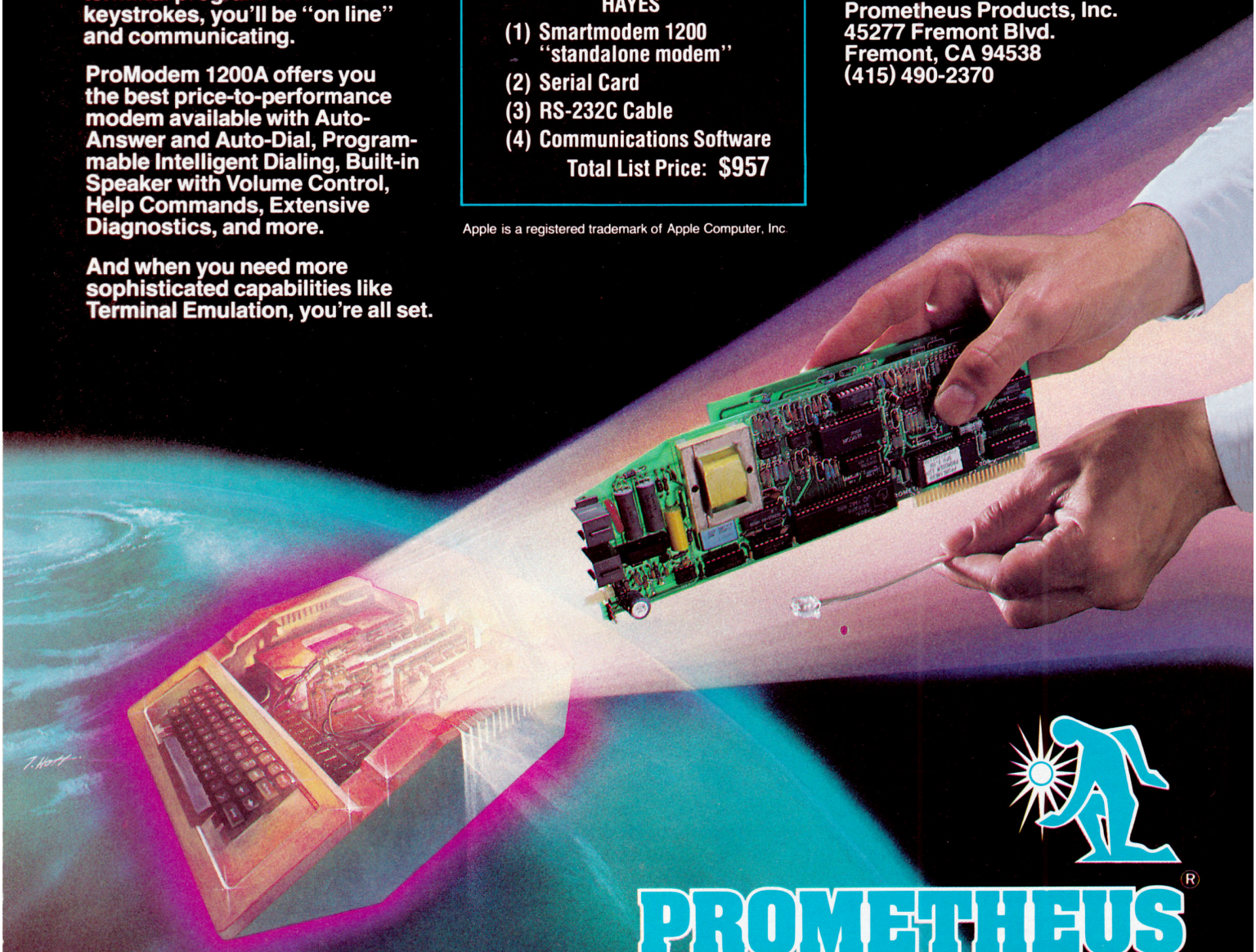

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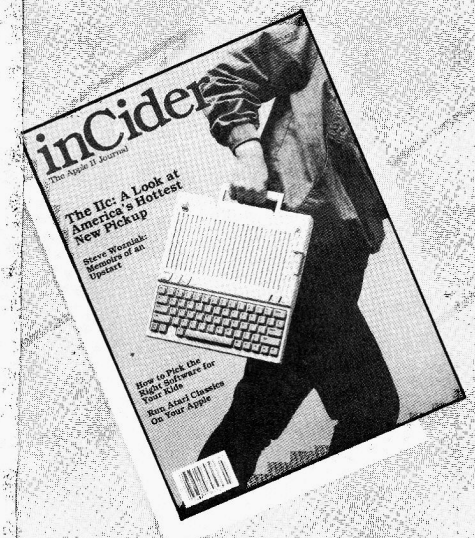

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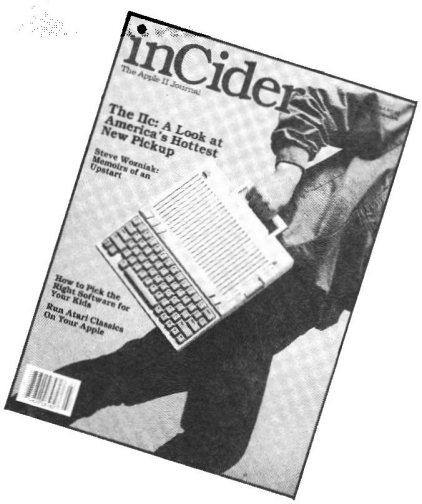

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Applesoft Shortcuts

by Jim Lazar

These one-liners are no jokes; rather, they're tools to simplify your programs.

Text Screen Routines

You can leave out a semicolon in a PRINT statement as long as it doesn't come between a numeric variable and any other variable. The semicolon is also necessary at the end of a PRINT statement to keep the cursor from dropping down a line.

To print numbers preceded by zeros or spaces, use the following formula, which prints a six-digit number:

```
PRINT RIGHT$("00000"+STR$(A),6)
```

You can replace the five zeros with up to eight zeros or spaces and the number 6 with the number of places in the numeral. The number of zeros or spaces must always be one less than the number of places in the numeral. In the example, "A" represents the number; you can replace it with a different variable if you need to.

On line 24 use a PRINT command to print the first 39 characters of the line (without scrolling), putting a semicolon at the end. Then POKE the last character into location 2039 with the value 128 plus the character's ASCII value for normal text; you'll have to experiment to find the correct values for inverse and flashing text.

Force Applesoft to list program lines that don't end in spaces with POKE 33,33, which will cut the screen down to a width of 33 columns. (Note that this doesn't work with an 80-column card on the //e.) To reset the screen to its normal width you can use the TEXT command, press the reset key, or type POKE 33,40.

DOS Devices

To change the number of lines (*n*) DOS prints in the catalog, POKE that number into the following locations:

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DP Mode:					
Pica	9 x 8 + 3	80	50	10	1
Elite	9 x 8 + 1	96	60	12	1
Condensed	5 x 8 + 2	136	86	17	1
NLQ Mode:	NOTE: There is expanded (double-width) printing function in every character mode.				
Pica	9 x 16 + 3	80	25	10	2
Elite	9 x 16 + 1	96	30	12	2
Proportional	N x 16	—	—	—	2
Super/Subscript	5 x 8	136	43	17	2
Italic Cursive	12 x 16	80	25	10	2

Line Spacing	6, 8, 7½, 12, or N/120 (N = 0-99) lines per inch.
Paper Feed	Pin-feed and friction-feed (single sheet)
Paper Width	Adjustable from 4.5 to 10 inches (fanfold paper)
Paper Type	Fanfold or cutsheet paper
Ribbon	Single color, special self-inking cassette
Dimensions	12" (D) x 16.5" *(W) x 4.5"* (H) (including paper separator)
Printing Method	Two-hammer
Printing Format	9 x 8 (DP); 9 x 16 (NLQ)
Character Kinds	96 ASCII + 44 characters and symbols
Graphics	Arbitrary combination of 8 dots or 16 dots.
Multiple Copies	3 including original

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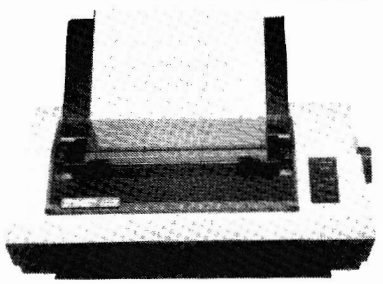

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POKE 44452,(*n*)
POKE 44605,(*n*)

The first location is the number of lines printed when the catalog is first displayed (the portion with the volume number in it). The second location is the number of lines printed after the computer waits for a keypress.

After loading a binary file from disk, you may need to know the file's starting address and length, which the following two commands return. The hexadecimal locations are listed after the commands, low byte first.

Starting address:

PEEK (43634) + PEEK (43635)*256
[$AA72 and $AA73]

Length:

PEEK (43616) + PEEK (43617)*256
[$AA60 and $AA61]

CALL 40383 reconnects DOS (if DOS commands don't work) only if DOS is in memory.

Graphics Tricks

You can clear the hi-res screen to any one of the eight Apple colors by using the following subroutine call:

HCOLOR = [color to clear screen]:
HPLOT 0,0: CALL 62454

The HPLOT must precede the CALL whenever it is used.

The following commands display the hi-res screen without clearing it:

POKE – 16304,0 [set graphics mode]
POKE – 16297,0 [set hi-res graphics mode]

The next two commands select which page is displayed, so use only one:

POKE – 16300,0 [set display to page 1]
POKE – 16299,0 [set display to page 2]

These two select either full or mixed graphics, so use only one:

POKE – 16302,0 [set display to full screen graphics]
POKE – 16301,0 [set display to mixed screen graphics]

Keyboard Magic

To get the computer to wait for a key to be pressed, use WAIT – 16384, 128. If the computer needs to do something else while waiting for a key to be pressed, read location – 16384. If it's greater than 127, a key was pressed. If the number is less, a key was not pressed and you can have the computer do whatever you want it to do. Use PEEK (– 16384) – 128 to find the ASCII value of the key that was pressed. To clear the keyboard from any previous input, use POKE – 16368,0.

Saving Memory

Don't exit from a FOR. . .NEXT loop with GOTO or GOSUB. You should set the variable you are using with the loop to the highest or lowest number to which the loop was to go up or down. The computer thus believes that the loop is done and will go on to the next instruction after the loop.

A = FRE(0) cleans up variables so you can get rid of all old numbers and data. Use any variable for A.

If you branch to a subroutine with a GOSUB and want to exit from it with a GOTO instead of a RETURN, execute a POP command first to clear the last GOSUB statement from memory.

These few lines have streamlined my programs and my programming technique. I hope you try them out and can use them in your own computing efforts. ■

Write to Jim Lazar at 1109 Niesen Road, Port Washington, WI 53074.

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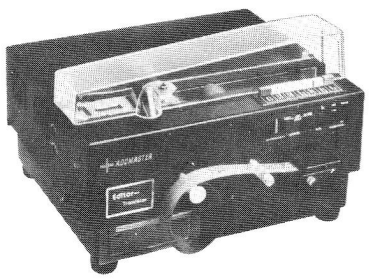

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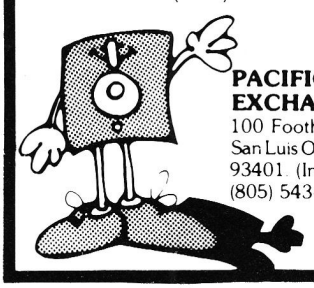

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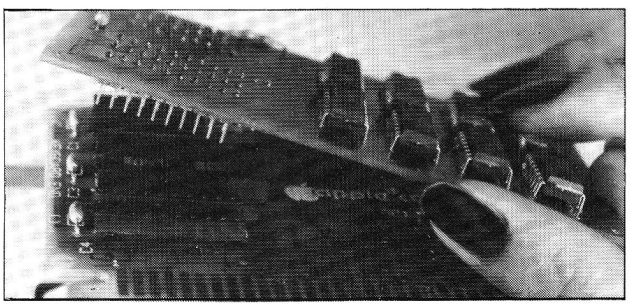

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Listing continued.

```
12  NEXT : TEXT : HOME : FLASH : PRINT "PLEASE RECHECK MOUSE INS
    TALLATION       INSTRUCTIONS!": END
15  PRINT D$"BLOADALLCHAR,A2560"
20  GOTO 600
40  GOSUB 62000: RETURN
76  GOSUB 9: INPUT "";P0,P1,S0: GOSUB 8: IF P0 > 279 THEN P0 = 2
    79
77  IF P1 > 191 THEN P1 = 191
78  RETURN
86  GOSUB 9: INPUT "";PX%,PY%,S0: GOSUB 8: IF PX% > 279 THEN PX%
     = 279
87  IF PY% > 191 THEN PY% = 191
88  RETURN
90  PRINT "": TEXT : HOME : PRINT "MOVE CURSOR TO UPPER LEFT COR
    NER OF THE ERASE BLOCK & HIT SPACE.  THEN MOVE THE CURSOR T
    O THE LOWER RIGHT CORNER OF THE ERASE BLOCK & HIT SPACE.": GOSUB
    63000: POKE  - 16304,0: POKE  - 16297,0
91  GOSUB 96: XDRAW 2 AT X%,Y%: FOR QW = 1 TO 50: NEXT : XDRAW 2
     AT X%,Y%
92 PK =  PEEK ( - 16384): IF PK > 127 THEN  POKE  - 16368,0: PRINT
    "": GOTO 100
95 OO =  PEEK ( - 16336): GOTO 91
96  GOSUB 9: INPUT "";X%,Y%,S0: GOSUB 8: IF X% > 279 THEN X% = 2
    79
97  IF Y% > 191 THEN Y% = 191
98  RETURN
100  GOSUB 86: XDRAW 2 AT PX%,PY%: FOR QW = 1 TO 50: NEXT : XDRAW
    2 AT PX%,PY%
102 PK =  PEEK ( - 16384): IF PK > 127 THEN  POKE  - 16368,0: PRINT
    "": GOTO 110
105 OO =  PEEK ( - 16336): GOTO 100
110  HCOLOR= 0:O8 = PX%:O1 = PY%:O0 = X%:O9 = Y%: FOR OO = O0 TO
    O8: HPLOT OO,O9 TO OO,O1: NEXT : HCOLOR= C: RETURN
220  IF  LEN (A$) = 0 AND A$ <  > " " THEN  RETURN
222  HCOLOR= 3
225 AA =  ASC (A$) - 31: IF AA =  - 4 THEN UP =  NOT UP: GOTO 37
    0
228  IF UP = 0 AND AA > 33 AND AA < 60 THEN J = AA + 32: GOTO 23
    1
230 J = AA: GOTO 359
231  IF AA < 1 OR AA > 96 THEN 40
359  IF FX = 0 THEN  DRAW J AT X,Y: HCOLOR= C: RETURN
360  XDRAW J AT X,Y: HCOLOR= C: RETURN
370  IF FV = 1 THEN Y = Y - 7: RETURN
380 X = X - 7: RETURN
600  GOSUB 6: TEXT : HOME : VTAB 2: INVERSE : HTAB 11: PRINT "ME
    NU FOR CAD.PAINT": NORMAL : PRINT : POKE 232,0: POKE 233,8
605  HCOLOR= C: ROT= 64: SCALE= S: CALL 54915:FF = 1:FX = 0:FV =
    0
606  ONERR  GOTO 63990
609  PRINT "(0) GO TO MAIN MENU"
610  PRINT "(1) PAINT PICTURE"
611  PRINT "(2) DELETE PICTURE"
612  PRINT "(3) PRINT OUT PICTURE ON PRINTER"
613  PRINT "(4) SEE DISK CATALOG"
614  PRINT "(5) INSERT EXTRA LABELS"
615  PRINT "(6) SAVE PICTURE TO DISK"
616  PRINT "(7) GET STORED PICTURE FROM DISK"
617  PRINT "(8) ERASE & GIVE BACKGROUND COLOR": PRINT "(9) VIEW
    SCREEN"
619  PRINT : INVERSE : PRINT "C";: NORMAL : PRINT " = SEE COMMAN
    DS": PRINT
620  FLASH : PRINT "(0-9 OR C):";: NORMAL : GET AN$: IF  LEN (AN
    $) = 0 THEN 600
622  PRINT  CHR$ (13): CALL 1002
624  IF  ASC (AN$) = 67 THEN GZ = 1: GOSUB 9800
625 Q =  VAL (AN$): IF AN$ = "0" THEN  PRINT D$"RUNMENU"
626  IF Q < 1 OR Q > 9 THEN 600
630  ON Q GOTO 1000,900,13000,17000,30000,31000,33000,37000,3200
    0
640  GOTO 600
900  PRINT : INVERSE : PRINT "HIT RETURN TO ABORT": NORMAL
902  PRINT : INPUT "FILE NAME TO DELETE: ";F$: IF  LEN (F$) = 0 THEN
    600
930 D$ =  CHR$ (4): PRINT D$"DELETE";F$: GOTO 600
1000  POKE  - 16304,0: POKE  - 16297,0:D = 2
1009  GOSUB 7
1010  GOSUB 96
1015  XDRAW D AT X%,Y%:PK =  PEEK ( - 16384): IF PK > 127 THEN  POKE
     - 16368,0: XDRAW D AT X%,Y%: GOSUB 9000: GOTO 1010
1025  IF  ABS (S0) < 3 THEN  XDRAW D AT X%,Y%: GOSUB 1040: GOTO
    1010
1030  XDRAW D AT X%,Y%: GOTO 1010
```

Listing continued.

Continued from p. 20

The second question that arises in mouse programming is how to create an algorithm that talks "Mousese." An answer appears in comparing lines 6–9, 76–88, 96–100, 600, 1009–1010, 1025, 30016, 30030, and 30035 of this mouse version of CAD .PAINT and the original paddle version (*inCider*, October 1984, p. 111). Most of these lines are additions to the original version. The original version of the lines that are actually changed appears in the **Figure**.

Now, examine line 1010 in each version. The paddle version stores the coordinate values of the current cursor position in X% and Y%. The mouse version GOSUBs to line 96, thence to line 9, where the peripheral in slot PS (the number ascertained earlier) is activated. Then the horizontal and vertical coordinates of the mouse (X% and Y%), as well as the status of the mouse button and keyboard (SO), are read. If SO is minus, a key has been pressed; if its absolute value is under 3, the mouse button has been pressed.

Next, a GOSUB 8 terminates input from the mouse to return to normal keyboard operation. Then lines 96–98 test to see if drawing has reached the edge of the screen, and if so, they prohibit passing beyond.

The routine at line 76 (GOSUB from 30030) and the routine at line 86 (GOSUB from 100) devolve upon line 9, as did the GOSUB in line 96. But now examine the old and new lines 1025. The IF PEEK (– 16287) > 127 has been replaced by IF ABS (SO) < 3, since, as already stated, the latter corresponds to a press of the mouse button.

You might think of line 1009 as saying, "Okay, turn on the mouse—we'll need it," while line 1010 says, "Take one reading of mouse status." Notice that line 1010 is included in a program loop—line 1030 keeps jumping back to it. What the program does is turn on the mouse once, but read the coordinates over and over again.

It's interesting to note that activating the mouse resets all mouse values back to zero, regardless of the position of the roller ball. That's why line 1009 absolutely cannot be part of the program loop, since it keeps moving the cursor to the upper left corner of the screen.

"Line 8910 erases the line and plots a new, precisely vertical, one."

The Line-Fix Algorithm

Let's look now at the line-fix algorithm that enables you to draw perfectly straight, horizontal, and vertical lines with an AppleMouse. Refer to lines 8900–8950, 9003, and 9320 in **Listing 1**. Line 9003 responds to a typed-in control-F (ASCII 134), after line 1015 has determined that a key has been pressed. This sequence leads to line 9000, which interprets the key hit. Line 9320 saves not only the old end-of-line coordinates (OX% and OY%), but the ones before that as well (X9% and Y9%). (The new coordinates are X% and Y%.) Line 8900 determines if the line-to-fix is more vertical than horizontal. If so, line 8910 erases it and plots a new, precisely vertical, one. Line 8950 does the same for horizontal lines.

Typing in the Programs

Use the old paddle version of CAD.PAINT from October, if you have it, as the basis for the new mouse version. The lines screened in gray in the new version are the ones that differ from the old. These are the ones that need to be changed or added.

ALLCHAR, **Listing 2**, is a binary file that provides upper- and lowercase characters for labeling CAD.PAINT pictures. You may already have this file from one of my previous columns, including October's. If not, its BSAVE parameters are BSAVE ALLCHAR, A2560,L1272. Should you not care about labeling your pictures, eliminate line 15 from CAD.PAINT, so it won't be looking for ALLCHAR.

PAINT, **Listing 3**, is a shape table that supplies "brushes" to use when "painting" with CAD.PAINT. It also appeared in my October column. If you still need to type it in, the BSAVE parameters are BSAVE PAINT,A2048, L502. Have fun "painting," and see you next time!■

Send correspondence to Don Fudge at Avant-Garde, P.O. Box 30160, Eugene, OR 97403.

Listing continued.

```
 1040  IF DR = 0 THEN 1060
 1050  XDRAW D AT X%,Y%:OX% = X%:OY% = Y%: RETURN
 1060  DRAW D AT X%,Y%:OX% = X%:OY% = Y%: RETURN
 8900  IF  ABS (OX% - X9%) >  ABS (OY% - Y9%) THEN 8950
 8910  HPLOT X9%,Y9% TO OX%,OY%: HPLOT OX% - 1,OY% TO X9% - 1,Y9%
       : HPLOT OX% + 1,OY% TO X9% + 1,Y9%: HCOLOR= C: HPLOT X9%,Y9
       % TO X9%,OY%:OX% = X9%: RETURN
 8950  HPLOT X9%,Y9% - (Y9% > 0) TO OX%,OY% - (OY% > 0): HPLOT X9
       %,Y9% + (Y9% < 191) TO OX%,OY% + (OY% < 191): HPLOT X9%,Y9%
       TO OX%,OY%: HCOLOR= C: HPLOT X9%,Y9% TO OX%,Y9%:OY% = Y9%:
       RETURN
 9000 C = HC: IF PK = 141 THEN  POP : GOTO 600
 9001  IF PK = 192 THEN 90
 9002  IF PK = 155 THEN 9100
 9003  IF PK = 134 THEN  HCOLOR= 0: GOTO 8900
 9004  IF PK = 174 THEN D = 2: GOTO 9200
 9005  IF PK = 173 THEN D = 2: GOTO 9300
 9006  IF PK = 186 THEN 9030
 9007  IF PK = 187 THEN D = 2: GOTO 9700
 9008  IF PK > 175 AND PK < 184 THEN 9400
 9009  IF PK < 193 THEN  RETURN
 9010 D = PK - 192: IF PK > 192 THEN  RETURN
 9020  GOSUB 62000: RETURN
 9030  HOME : POKE  - 16303,0: POKE  - 16298,0:DR =  NOT DR:X$ =
       " DRAW": IF DR = 1 THEN X$ = "XDRAW"
 9040  VTAB 9: PRINT "YOU'RE NOW IN ";: FLASH : PRINT X$: NORMAL
       : PRINT " MODE.": GOSUB 63000: POKE  - 16304,0: POKE  - 162
       97,0: RETURN
 9100  TEXT : GOTO 9800
 9200  HPLOT X%,Y%:OX% = X%:OY% = Y%: RETURN
 9300  HCOLOR= C: HPLOT OX%,OY% TO X%,Y%
 9310  IF  ABS (OX% - X%) <  ABS (OY% - Y%) THEN  IF C <  > 3 AND
       C <  > 7 THEN  HPLOT OX% + 1,OY% TO X% + 1,Y%
 9320 X9% = OX%:Y9% = OY%:OY% = Y%:OX% = X%: HCOLOR= HC: RETURN
 9400 HC = PK - 176:C = HC: HCOLOR= HC: RETURN
 9700  IF  ABS (Y% - OY%) >  ABS (X% - OX%) THEN 9750
 9705 OY = OY%:YI = (Y% - OY%) / (( ABS (OX% - X%) / 3) + ( ABS (
       OX% - X%) = 0))
 9710  HCOLOR= C: FOR OX = OX% TO X% STEP 3 * (X% > OX%) - 3 * (X
       % <  = OX%): HPLOT OX,OY:OY = OY + YI: NEXT
 9720 OY% = Y%:OX% = X%: RETURN
 9750 OX = OX%:XI = (X% - OX%) / (( ABS (OY% - Y%) / 3) + ( ABS (
       OY% - Y%) = 0))
 9760  HCOLOR= C: FOR OY = OY% TO Y% STEP 3 * (Y% > OY%) - 3 * (Y
       % <  = OY%): HPLOT OX,OY:OX = OX + XI: NEXT : GOTO 9720
 9800  HOME : INVERSE : HTAB 10: PRINT "COMMANDS": NORMAL : PRINT
       "- = LINE FROM LAST POINT PLOTTED": PRINT
 9805  PRINT "; = DOTTED LINE FROM LAST POINT PLOTTED": PRINT : PRINT
       ". = BEGIN LINE HERE OR DRAW DOT": PRINT
 9810  PRINT "@ = AREA ERASE": PRINT : PRINT ": = DRAW/XDRAW TOGG
       LE SWITCH": PRINT : PRINT "0-7 = CHOOSE COLOR": PRINT : PRINT
       "ESC = SEE COMMANDS": PRINT : PRINT "RETURN = BACK TO PROGR
       AM MENU": PRINT
 9820  PRINT "MOUSE BUTTON = PAINT WITH SHAPE"
 9830  PRINT : PRINT "CTRL F = FIX NON-STRAIGHT LINE": GOSUB 6300
       0
 9900  TEXT : HOME : PRINT "A = DOT": PRINT "B = 2X2 SQUARE   C =
       3X3 SQUARE": PRINT "D = 4X4 SQUARE   E = 5X5 SQUARE": PRINT
       "F = 6X6 SQUARE   G = 7X7 SQUARE"
 9910  PRINT "H = HORIZONTAL LINE": PRINT "I = VERTICAL LINE": PRINT
       "J = N.E. DIAGONAL": PRINT "K = N.W. DIAGONAL": PRINT "L =
       BALL (4 WIDE)": PRINT "M = BALL (5 WIDE)": PRINT "N = BALL
       (8 WIDE)": PRINT "O = CIRCLE (4 WIDE)"
 9920  PRINT "P = CIRCLE (5 WIDE)": PRINT "Q = CIRCLE (8 WIDE)": PRINT
       "R = HORIZONTAL RECTANGLE": PRINT "S = VERTICAL RECTANGLE":
       PRINT "T = LARGE PAINTBRUSH": PRINT "U = LARGE TIPPED PAIN
       TBRUSH"
 9930  PRINT "V = SMALL PAINTBRUSH": PRINT "W = SMALL TIPPED PAIN
       TBRUSH": PRINT "X = DARKER PATTERN": PRINT "Y = LIGHTER PAT
       TERN": PRINT "Z = VERY LARGE SCATTERBRUSH"
 9998  GOSUB 63010: IF GZ = 1 THEN GZ = 0: RETURN
 9999  GOTO 1000
13000  HOME : VTAB 1: PRINT "NOW TYPE THE CTRL CHARACTERS YOU NE
       ED TOGET YOUR PRINTER TO PRINT OUT HI-RES    PAGE 1 AS A GR
       APHICS PICTURE. MAKE SURE YOU HIT RETURN AFTER YOU'RE DONE
       TYPING ALL THE CTRL CHARACTERS:": PRINT :A9 = 0
13005  FLASH : PRINT "DON'T FORGET TO TURN ON YOUR PRINTER!": NORMAL
       : PRINT
13010 A9 = A9 + 1
13020  GET CR$(A9): IF  ASC (CR$(A9)) <  > 13 THEN 13010
13021  PRINT  CHR$ (13): CALL 1002
13022  PRINT  CHR$ (4);"PR#1"
13025  FOR QW = 1 TO A9: PRINT CR$(QW);: NEXT
13028  PRINT  CHR$ (4);"PR#0"
```

Listing continued.

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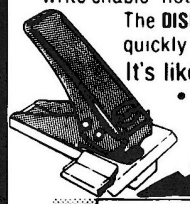

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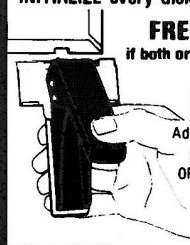

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Listing continued.

```
13030  GOTO 600
17000  PRINT : PRINT  CHR$ (4);"CATALOG": GOSUB 63000: HOME : GOTO
     600
30000  GOSUB 36000:FZ = 0
30001 AN$ = "":Z$ = "": PRINT "LABEL: ";
30002  GET Z$:AN$ = AN$ + Z$: IF  ASC (Z$) = 13 THEN AN$ =  LEFT$
     (AN$, LEN (AN$) - 1): PRINT  CHR$ (13): CALL 1002: GOTO 300
     07
30003  IF  ASC (Z$) = 8 THEN AN$ =  LEFT$ (AN$, LEN (AN$) - 1): IF
      LEN (AN$) > 0 THEN AN$ =  LEFT$ (AN$, LEN (AN$) - 1)
30004  IF  ASC (Z$) = 27 THEN FZ =  NOT FZ: GOTO 30002
30005  IF FZ = 1 THEN  INVERSE
30006  PRINT Z$;: NORMAL : GOTO 30002
30007  POKE 232,0: POKE 233,10: NORMAL
30010  HOME : VTAB 2: PRINT "USE PADDLES TO POSITION LABEL; PRES
     S ANYKEY TO PRINT LABEL.  USE ESC FOR UPPER  AND LOWER CASE
      SWITCH.": GOSUB 63000
30016  GOSUB 7
30020  POKE  - 16304,0: POKE  - 16297,0: HCOLOR= 3:UP = 0
30021  IF FV = 1 THEN  ROT= 16
30022 FX = 1: GOTO 30030
30024  IF FV = 1 THEN X = P0:Y = P1: FOR Q = 1 TO  LEN (AN$):A$ =
      MID$ (AN$,Q,1): GOSUB 35000: GOSUB 220:Y = Y + 7: NEXT :X =
     P0:Y = P1:UP = 0: FOR Q = 1 TO  LEN (AN$):A$ =  MID$ (AN$,Q
     ,1): GOSUB 35000: GOSUB 220:Y = Y + 7: NEXT : GOTO 30030
30025 X = P0:Y = P1: FOR Q = 1 TO  LEN (AN$):A$ =  MID$ (AN$,Q,1
     ): GOSUB 35000: GOSUB 220:X = X + 7: NEXT :X = P0:Y = P1:UP
      = 0: FOR Q = 1 TO  LEN (AN$):A$ =  MID$ (AN$,Q,1): GOSUB 3
     5000: GOSUB 220:X = X + 7: NEXT
30030  GOSUB 76
30031 UP = 0
30035 PP =  PEEK ( - 16384): IF PP > 127 THEN  POKE  - 16368,0: GOSUB
     6: GOTO 30128
30040  GOTO 30024
30128  IF FV = 0 THEN X = P0:Y = P1: FOR Q = 1 TO  LEN (AN$):A$ =
      MID$ (AN$,Q,1): GOSUB 35000: GOSUB 220:X = X + 7: NEXT : GOSUB
     63010: GOTO 600
30129 X = P0:Y = P1: FOR Q = 1 TO  LEN (AN$):A$ =  MID$ (AN$,Q,1
     ): GOSUB 35000: GOSUB 220:Y = Y + 7: NEXT : GOSUB 63010: GOTO
     600
31000  HOME : VTAB 1: INVERSE : IF F$ = "" THEN F$ = "NONE"
31002  PRINT "CURRENT FILE NAME: "F$: NORMAL : PRINT
31005  PRINT : INVERSE : PRINT "HIT RETURN TO ABORT. DO NOT TRY
     TO SAVE PICTURES ON THE PROGRAM DISK.": NORMAL : PRINT
31010  INPUT "PICTURE NAME: ";F$: IF  LEN (F$) = 0 THEN 600
31040  PRINT  CHR$ (4);"BSAVE";F$;",A8192,L8192": GOTO 600
32000  POKE  - 16304,0: POKE  - 16297,0: GOSUB 63010: GOTO 600
33000  PRINT : INVERSE : PRINT "HIT RETURN TO ABORT.": NORMAL : PRINT
33010  INPUT "PICTURE NAME: ";F$: IF  LEN (F$) = 0 THEN 600
33040  PRINT  CHR$ (4);"BLOAD";F$;",A8192": POKE  - 16304,0: POKE
      - 16297,0: GOSUB 63010: GOTO 600
35000  IF X > 273 THEN X = 273
35005  IF Y > 184 THEN Y = 184
35010  RETURN
36000  HOME : VTAB 1: INVERSE : PRINT "HIT RETURN TO ABORT"
36001  NORMAL
36002  PRINT "HORIZONTAL OR VERTICAL LABEL? (H/V): ";: GET AZ$: PRINT
     AZ$: PRINT  CHR$ (13): CALL 1002
36004  IF  ASC (AZ$) = 13 THEN  POP : GOTO 600
36005  IF  ASC (AZ$) <  > 86 AND  ASC (AZ$) <  > 72 THEN 36000
36010  IF  ASC (AZ$) = 86 THEN FV = 1
36020  RETURN
37000  HOME : VTAB 8: FLASH : PRINT "DANGER: THIS WILL ERASE ENT
     IRE SCREEN!": PRINT : PRINT : INVERSE : PRINT "HIT RETURN T
     O ABORT:": PRINT "SURE YOU WANT TO ERASE? (Y/N): ";: NORMAL
     : GET AN$
37005  PRINT AN$: PRINT  CHR$ (13)
37010  IF  ASC (AN$) <  > 89 THEN 600
37020  PRINT : PRINT "GIVE COLOR (0-7): ";: GET Q$:AQ =  VAL (Q$
     ): IF AQ > 7 OR AQ < 0 THEN 37020
37030  PRINT Q$: PRINT  CHR$ (13): HGR : POKE  - 16302,0: HCOLOR=
     AQ: HPLOT 0,0: CALL 62454: HCOLOR= HC: GOTO 600
62000  FOR WQ = 1 TO 15:PK =  PEEK ( - 16336): NEXT : RETURN
63000  PRINT : PRINT "(PRESS SPACE TO CONTINUE):";
63010 PH =  PEEK ( - 16384): IF PH > 127 THEN  POKE  - 16368,0: PRINT
      CHR$ (13): RETURN
63020  GOTO 63010
63990  POKE 216,0:PQ =  PEEK (222): PRINT "": PRINT "": PRINT ""
63991  ONERR  GOTO 63990
63992  IF PQ = 254 THEN  RESUME
63994  IF PQ = 6 OR PQ = 5 THEN  PRINT : PRINT "FILE NOT FOUND!
     TRY AGAIN...": GOSUB 63000
63999 C = 3: SCALE= 1: ROT= 64: GOTO 600
```

End of listing.

Listing 2. *ALLCHAR,A2560,L1272.*

```
0A00- 7E 00 FE 00 00 01 06 01
0A08- 0C 01 1D 01 2B 01 37 01
0A10- 44 01 48 01 50 01 58 01
0A18- 66 01 6E 01 75 01 7A 01
0A20- 7F 01 87 01 96 01 9E 01
0A28- A9 01 B4 01 C1 01 CE 01
0A30- DB 01 E4 01 F2 01 00 02
0A38- 05 02 0C 02 15 02 1D 02
0A40- 26 02 2F 02 3D 02 4C 02
0A48- 5A 02 66 02 72 02 7F 02
0A50- 8A 02 96 02 A2 02 AB 02
0A58- B4 02 C1 02 C8 02 D5 02
0A60- E3 02 EF 02 FB 02 08 03
0A68- 17 03 24 03 2C 03 36 03
0A70- 40 03 4C 03 58 03 64 03
0A78- 6F 03 7C 03 83 03 90 03
0A80- 98 03 9F 03 A4 03 AF 03
0A88- BA 03 C4 03 D1 03 DC 03
0A90- E5 03 F2 03 FD 03 05 04
0A98- 0D 04 17 04 1F 04 2A 04
0AA0- 36 04 40 04 4C 04 59 04
0AA8- 64 04 70 04 77 04 7F 04
0AB0- 88 04 92 04 9D 04 A9 04
0AB8- B4 04 BF 04 C8 04 D2 04
0AC0- D9 04 2D 25 2D 25 2D 2D
0AC8- 14 65 2B 27 FD 0E 22 E7
0AD0- 24 1E ED 1E 2A 75 12 1C
0AD8- 6D 0E 6B 0E 6B E6 12 E7
0AE0- 24 3F 22 66 6B 65 45 1C
0AE8- 24 1E 2A 0C 12 2E 12 0E
0AF0- 14 E7 24 1E 24 1E 24 1E
0AF8- 6A 1C 07 75 0A 00 01 00
0B00- 49 36 36 16 06 00 09 36
0B08- 0D 24 04 00 09 36 36 36
0B10- 0D 24 24 24 8D 13 16 1F
0B18- 04 F8 16 06 00 49 2E B5
0B20- F2 37 1C 67 61 3F 1C 0C
0B28- 0E 05 00 31 25 4D F2 1E
0B30- 1E 1E 4E 29 3C 07 00 09
0B38- 0E F6 0E 0D 1E 0E 1F E7
0B40- 24 20 04 00 49 36 06 00
0B48- 49 1E 1E 36 0E 0E 05 00
0B50- 49 0E 0E 36 1E 1E 1E 00
0B58- 49 36 36 36 0D E0 04 60
0B60- DF 73 16 1E 1E 00 49 32
0B68- 36 2E 40 FF 3F 00 49 92
0B70- 12 F6 06 00 2D 91 2A 2D
0B78- 2D 00 49 92 92 06 00 91
0B80- 92 0C 0C 0C 0C 05 00 09
0B88- 2D 0E 36 36 1E 3F 1C 24
0B90- 24 4E F1 1E 06 00 49 1E
0B98- 35 36 76 3F 07 00 11 0C
0BA0- 2D 0E F6 F7 1E 2E 2D 2D
0BA8- 00 29 2D 35 1E 1E 75 F6
0BB0- 3F 1C 04 00 49 31 36 0E
0BB8- 37 3E 80 80 3F 64 0C 04
0BC0- 00 29 2D B5 3B 3F B4 49
0BC8- 31 F6 3F 1C 04 00 49 09
0BD0- 3F 1E 1E 36 76 2D 0C E4
0BD8- 3F 07 00 29 2D 35 1E 1E
0BE0- 1E 36 06 00 09 2D 0E F6
0BE8- 3F 1E 76 2D 0C 24 D8 1B
0BF0- 24 00 09 2D 0E 36 F6 1E
0BF8- 3F 04 40 2D DC 23 04 00
0C00- 49 12 16 06 00 49 92 16
0C08- F6 06 00 49 49 F1 1E 1E
0C10- 0E 0E 0E 05 00 91 2D 2D
0C18- 16 3F 3F 07 00 09 0E 0E
0C20- 0E 1E 1E 1E 07 00 11 0C
0C28- 2D 0E 1E 1E B6 06 00 09
0C30- 2D 0E 36 96 3F E7 24 24
0C38- 8D 36 25 04 00 91 36 36
0C40- 4D 21 3C 3F 04 80 80 0C
0C48- 0E 0E 36 00 29 2D 0E F6
0C50- 3F 04 18 36 36 2E 2D 0C
0C58- 24 00 49 89 1C 3F 1E 36
0C60- 36 0E 2D 0C 04 00 29 2D
0C68- 0E 36 36 1E 3F 27 24 24
0C70- 04 00 29 2D B5 1A 3F 04
0C78- 18 36 36 2E 2D 2D 00 29
0C80- 2D B5 1A 3F 04 18 36 36
0C88- 36 00 09 2D F5 DB 36 36
0C90- 0E 2D 25 3C 07 00 31 36
0C98- 36 6E 09 24 3C 3F 4C 21
0CA0- 24 00 09 2D 1E 36 36 0E
0CA8- 3F 07 00 49 09 36 36 F6
0CB0- 3F 1C 04 00 31 36 36 6E
0CB8- 09 1C 1C 1C 0C 0C 0C 0C
0CC0- 00 31 36 36 2E 2D 2D 00
0CC8- 31 36 36 6E 09 24 24 24
0CD0- 1E 1E 1C 04 00 31 36 36
0CD8- 6E 09 24 24 24 9F 13 0E
0CE0- 0E 06 00 09 2D 0E 36 36
0CE8- 1E 3F 1C 24 24 04 00 31
0CF0- 36 36 2E 80 80 28 65 E4
0CF8- 3F 04 00 09 2D 0E 36 FE
0D00- 0E 0E 1F E7 24 24 04 00
0D08- 29 2D 0E F6 3F 04 18 36
0D10- 36 6E 09 1C 1C 05 00 09
0D18- 2D 0E DF 33 0E 2D 0E F6
0D20- 3F 1C 04 00 29 2D F5 33
0D28- 36 36 06 00 31 36 36 0E
0D30- 2D 0C 24 24 24 00 31 36
0D38- 76 0E 0C 0C 24 24 04 00
0D40- 31 36 36 66 0C AC 72 24
0D48- 24 24 04 00 31 0E 16 1E
0D50- 6E 09 E4 1C 0C 0C 24 00
0D58- 31 0E 0E 36 2E 80 80 80
0D60- 80 0C 24 00 29 2D 35 1E
0D68- 1E 1E 1E 2E 2D 2D 00 31
0D70- 36 36 2E 2D E5 1B 24 24
0D78- 2C 2D 05 00 11 0E 0E 0E
0D80- 0E 05 00 29 2D 35 36 36
0D88- 3E 3F 67 09 24 24 07 00
0D90- 91 12 0C 0C 0E 0E 05 00
0D98- 91 92 12 2D 2D 05 00 09
0DA0- 0E 0E 06 00 91 29 35 36
0DA8- 2E DE 38 1C 0C 2D 00 31
0DB0- 36 36 2E 70 65 24 1C F7
0DB8- 06 00 91 49 39 3F 1E 36
0DC0- 0E 2D 2D 00 49 09 36 36
0DC8- 36 1C 1E E7 24 0C 75 06
0DD0- 00 91 29 75 3E 3F 1C 36
0DD8- 0E 2D 05 00 49 75 DF F6
0DE0- 2D 1E 36 06 00 91 29 0D
0DE8- 1E F5 35 F6 3F 04 08 E7
0DF0- 24 00 31 36 36 2E 80 80
0DF8- 60 75 36 36 00 49 16 77
0E00- 36 1E 2D 05 00 49 16 77
0E08- 36 F6 1C 04 00 31 36 36
0E10- 6E E1 1C 0C 0C 04 00 09
0E18- 35 36 36 1E 2D 05 00 91
0E20- 36 36 0D 24 E4 0D 0E 36
0E28- 36 00 91 36 36 0D 18 80
0E30- 80 0C 75 36 36 00 91 29
0E38- 75 36 1E 3F 1C 24 04 00
0E40- 91 36 36 2E 80 80 2D 0C
0E48- E4 3F 07 00 91 29 35 36
0E50- 36 F5 03 80 80 38 1C 24
0E58- 00 91 36 36 0D 18 80 80
0E60- 0C 75 06 00 49 89 3A 3F
0E68- 1E 0E 2D 0E 1E 3F 3F 00
0E70- 49 F6 2D 1E 36 36 00 91
0E78- 36 76 2D 0C 24 24 00 91
0E80- 36 0E 0E 0C 0C 24 04 00
0E88- 91 36 76 0C 24 95 62 24
0E90- 24 00 91 0E 16 1E 4D E1
0E98- 1C 0C 0C 0C 00 91 36 0E
0EA0- 2D 25 24 95 D2 1E 3F 07
0EA8- 00 91 2D 2D 1E 1E 1E 1E
0EB0- 2D 2D 05 00 49 2D DE 73
0EB8- 1E 77 F1 0E 2D 05 00 09
0EC0- 0E 0E 0E 1E 1E 1E 1E 00
0EC8- 29 75 1E 0E F5 73 1E 3F
0ED0- 07 00 11 0C 0E 0E 0C 05
0ED8- 00 29 2D 2D 35 3F 3F 3F
0EE0- 2E 2D 2D 35 3F 3F 3F 2E
0EE8- 2D 2D 35 3F 3F 3F 2E 2D
0EF0- 2D 35 3F 3F 3F 07 00 00
```

Listing 3. *PAINT,A2048,L502.*

```
0800- 1A 00 36 00 38 00 3B 00
0808- 41 00 4A 00 58 00 6B 00
0810- 85 00 89 00 8D 00 93 00
0818- 99 00 A0 00 AD 00 C9 00
0820- CF 00 D9 00 E7 00 F3 00
0828- FF 00 27 01 64 01 72 01
0830- 84 01 99 01 B0 01 04 00
0838- 25 3F 00 3C 36 2D 24 04
0840- 00 65 3F 37 36 25 35 25
0848- 24 00 25 3F 36 2D 25 24
0850- 3F 3F 36 36 2D 2D 05 00
0858- 25 3F 36 2D 25 24 3F 3F
0860- 36 36 2D 2D 25 24 24 3F
0868- 3F 3F 00 25 3F 36 2D 25
0870- 24 3F 3F 36 36 2D 2D 25
0878- 24 24 3F 3F 3F 36 36 36
0880- 2D 2D 2D 05 00 2D 2D 05
0888- 00 24 24 04 00 0C 0C 0C
0890- 0C 0C 00 1C 1C 1C 1C 1C
0898- 00 25 27 37 37 35 2D 00
08A0- 25 3F 36 2E 2C 2E 20 E4
08A8- 3F 17 36 06 00 2D 25 27
08B0- 27 3F 37 37 37 36 35 35
08B8- 2D 25 25 25 3F 3E 3E 3C
08C0- 3C 2C 2C 2C 0E F7 2E 05
08C8- 00 21 1C F7 76 2D 00 09
08D0- E4 3F 1E 36 0E 2D 0C 04
08D8- 00 49 E4 1C 3F F7 1E 36
08E0- 76 0E 2D 65 0C 24 00 38
08E8- 3F 36 2E 2D 2D 2D 24 3C
08F0- 3F 07 00 21 24 3F 37 36
08F8- 36 36 2D 25 24 04 00 04
0900- 08 DC DF 1A 16 4E FA 1B
0908- 04 C0 04 40 4D B1 0A 4D
0910- 49 D6 D6 DE FB 1B DF D8
0918- 04 18 20 80 80 0C 80 80
0920- 4D 09 4D 51 4D 2A 00 35
0928- E7 2C 55 D6 DF E0 60 69
0930- 8D 16 D6 1F 18 1F 04 18
0938- 04 60 69 69 95 15 16 D7
0940- 1E 1F F0 07 F0 1F E0 38
0948- 80 80 60 60 09 4D 69 09
0950- 8E 31 8E B1 F3 3A DE FA
0958- FB 1B 4C DF 1B 1C 18 04
0960- 80 80 04 00 95 DF DC 04
0968- 08 4C 4D 8E 95 BA 1B DF
0970- 3B 00 35 3F 24 2D 0E 95
0978- DF 1F 20 60 4C 8D DF DB
0980- B3 56 06 00 4D 69 09 8D
0988- DF FB 1B 9F 4D 69 09 55
0990- DF FB 1B 9F 4D 69 09 05
0998- 00 2D 0D 2D 0D 2D 5E 1F
09A0- 3F 1F 3F 1F 2E 6D 2D 0D
09A8- 2D FE 3F 1F 3F 1F 07 00
09B0- 29 48 A9 12 97 1B DF FB
09B8- 18 18 04 18 18 18 DF F3
09C0- D3 1A 4E 09 8E FA DB 8E
09C8- 51 11 4D 01 08 08 96 0A
09D0- 4D 08 08 8D 51 05 08 80
09D8- 80 68 8A 61 80 80 20 80
09E0- 80 C0 04 80 80 18 DF 1B
09E8- 18 DF 9A 23 C0 1B DF DB
09F0- DF D3 9A 31 00 E0 AA AA
```

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Continued from p. 70.

```
220 B1 = 30:B2 = Y - 20
230  XDRAW 1 AT X,Y: XDRAW 2 AT V,W: XDRAW 7 AT B1,B2
240  IF FS > 0 THEN 270
250  HOME : VTAB 22: PRINT " PRESS PADDLE BUTTON TO SERVE B
     ALL"
260 FS = 1
270  IF DIR = 1 AND  PEEK ( - 16286) > 127 THEN  HOME : GOTO
     300
280  IF DIR = 0 AND  PEEK ( - 16287) > 127 THEN  HOME : GOTO
     300
290  GOTO 270
300  REM ***************
301  REM *  MOVEMENT   *
302  REM *   OF BALL   *
303  REM ***************
310 NBR =  INT ( RND (1) * 175): IF  RND (1) < .5 THEN NBR =
     - NBR
320  IF SB > 1 THEN 360
330  IF DIR = 1 AND B2 = 60 OR DIR = 0 AND B2 = 100 THEN  IF
     NBR <  - SP OR NBR >  - SQ GOTO 310
340  IF DIR = 1 AND B2 = 100 OR DIR = 0 AND B2 = 60 THEN  IF
     NBR < SQ OR NBR > SP GOTO 310
350  GOTO 390
360  IF DIR = 1 AND NBR <  - (160 - W) OR DIR = 1 AND NBR >
     W - 20 THEN 310
370  IF DIR = 1 THEN 390
380  IF NBR > (160 - Y) OR NBR <  - (Y - 20) THEN 310
390 INCR = NBR / ST
400  IF SB > 0 THEN  HOME
410  FOR J = 1 TO ST
420 BX = B1:BY = B2: IF DIR = 1 THEN B1 = B1 - 200 / ST:B2 =
     B2 - INCR: GOTO 440
430 B1 = B1 + 200 / ST:B2 = B2 + INCR
440  GOSUB 700
450  IF J =  INT (ST * .7) AND SB < 2 THEN 1700
460  IF B2 < 0 THEN B2 = 0
470  IF B2 > 179 THEN B2 = 179
480  IF J =  INT (ST * .7) THEN  FOR K = 1 TO 3:CLICK =  PEEK
     ( - 16336): NEXT K: IF B2 > 142 OR B2 < 38 THEN  XDRAW
     7 AT BX,BY: XDRAW 7 AT B1,B2: GOTO 1000
490  IF J =  INT (ST * .5) AND  RND (1) > .8 THEN INCR = IN
     CR / 4: GOTO 510
500  IF J =  INT (ST * .5) AND  RND (1) < .2 THEN INCR =  -
     INCR / 4
510  IF B2 < 0 THEN B2 = 0
520  IF B2 > 179 THEN B2 = 179
530  XDRAW 7 AT BX,BY: XDRAW 7 AT B1,B2
540  IF B1 = 120 AND  RND (1) > .9 THEN 1000
550  IF DIR = 0 AND B1 <  > 210 THEN 630
560  IF DIR = 1 AND B1 <  > 30 THEN 630
570  FOR C =  - 7 TO 4
580  IF DIR = 0 THEN 610
590  IF  INT (B2) = Y + C THEN 900
600  GOTO 620
610  IF  INT (B2) = W + C THEN 900
620  NEXT C
630  NEXT J: HOME : VTAB 22: PRINT "             MISSED SHOT
      !": FOR L = 1 TO 30:CLICK =  PEEK ( - 16336): NEXT L:
      FOR L = 1 TO 200: NEXT L
640  XDRAW 1 AT X,Y: XDRAW 2 AT V,W: XDRAW 7 AT B1,B2
650  GOTO 1100
700  REM ***************
701  REM *  MOVEMENT   *
702  REM * OF PLAYERS  *
703  REM ***************
710 Y1 = Y
720  IF  PDL (0) < Y - 6 OR  PDL (0) > Y + 6 THEN Y =  PDL
     (0): GOTO 740
730  GOTO 770
740  IF Y < 20 THEN Y = 20
750  IF Y > 150 THEN Y = 150
760  XDRAW 1 AT X,Y1: XDRAW 1 AT X,Y
770 W1 = W
780  IF  PDL (1) > W + 6 OR  PDL (1) < W - 6 THEN W =  PDL
     (1): GOTO 800
790  RETURN
800  IF W < 20 THEN W = 20
810  IF W > 150 THEN W = 150
820  XDRAW 2 AT V,W1: XDRAW 2 AT V,W: RETURN
900  REM ***************
901  REM *   BALL IS   *
902  REM *  RETURNED   *
903  REM ***************
910  HOME :SB = 2: VTAB 23: HTAB 13: PRINT "NICE RETURN !"
920  XDRAW 7 AT B1,B2
```

Listing continued.

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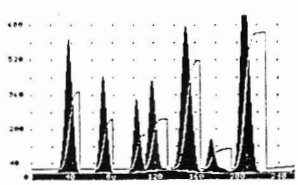

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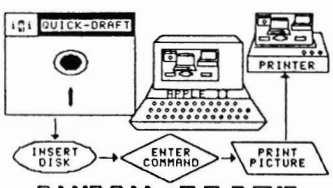

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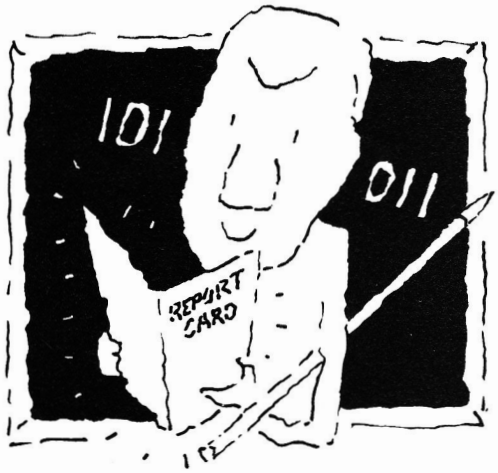

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```
930 DIR = DIR + 1: IF DIR > 1 THEN DIR = 0
940  IF DIR = 1 THEN 960
950  XDRAW 1 AT X,Y: XDRAW 3 AT X,Y: FOR L = 1 TO 20: NEXT
     L: XDRAW 3 AT X,Y: XDRAW 5 AT X,Y: FOR L = 1 TO 5:CLIC
     K =  PEEK ( - 16336): NEXT L: FOR L = 1 TO 20: NEXT L:
      XDRAW 5 AT X,Y: XDRAW 1 AT X,Y: GOTO 970
960  XDRAW 2 AT V,W: XDRAW 4 AT V,W: FOR L = 1 TO 20: NEXT
     L: XDRAW 4 AT V,W: XDRAW 6 AT V,W: FOR L = 1 TO 5:CLIC
     K =  PEEK ( - 16336): NEXT L: FOR L = 1 TO 20: NEXT L:
      XDRAW 6 AT V,W: XDRAW 2 AT V,W
970  XDRAW 7 AT B1,B2: GOTO 300
1000  REM ****************
1001  REM * BALL HIT NET *
1002  REM ****************
1010  IF CR = 0 THEN SB = SB + 1
1020  IF SB < 2 THEN 1040
1030 DIR = DIR + 1: IF DIR > 1 THEN DIR = 0
1040  FOR L = 1 TO 3:BX = B1:BY = B2: XDRAW 7 AT B1,B2:B2 =
     B2 + 2
1050 CLICK =  PEEK ( - 16336):CLICK =  PEEK ( - 16336): XDRAW
     7 AT B1,B2
1060  FOR M = 1 TO 150: NEXT M
1070  NEXT L
1080  XDRAW 1 AT X,Y: XDRAW 2 AT V,W: XDRAW 7 AT B1,B2: IF
     SB < 2 THEN 180
1100  REM ****************
1101  REM * CHANGE SCORE *
1102  REM ****************
1110 XC$ = GC$:YC$ = BC$:XG = GG:YG = BG:XS = GS:YS = BS:SC
      = 0: IF DIR = 0 THEN 1130
1120  FOR L = 1 TO 5:W = W + 2: XDRAW 6 AT V,W:CLICK =  PEEK
     ( - 16336):CLICK =  PEEK ( - 16336): FOR M = 1 TO 20: NEXT
     M: XDRAW 6 AT V,W: NEXT L:W = W - 2: GOTO 1170
1130  FOR L = 1 TO 5:Y = Y + 2: XDRAW 5 AT X,Y:CLICK =  PEEK
     ( - 16336):CLICK =  PEEK ( - 16336): FOR M = 1 TO 20: NEXT
     M: XDRAW 5 AT X,Y: NEXT L:Y = Y - 2
1170  IF DIR = 1 THEN XC$ = BC$:YC$ = GC$:XG = BG:YG = GG:X
     S = BS:YS = GS
1180  IF XC$ = " ADD " THEN 1260
1190  IF XC$ = "DEUCE" THEN XC$ = " ADD ":YC$ = "  40 ": GOTO
     1300
1200  IF XC$ = "  40 " THEN 1240
1210  IF XC$ = "  30 " THEN XC$ = "  40 ": GOTO 1300
1220  IF XC$ = "  15 " THEN XC$ = "  30 ": GOTO 1300
1230  IF XC$ = "  00 " THEN XC$ = "  15 ": GOTO 1300
1240  IF YC$ = "  40 " THEN XC$ = " ADD ": GOTO 1300
1250  IF YC$ = " ADD " THEN XC$ = "DEUCE":YC$ = "DEUCE": GOTO
     1300
1260 XG = XG + 1:PT = 1: IF XG >  = 6 AND XG > YG + 1 THEN
     XS = XS + 1:XG = 0:YG = 0
1270 XC$ = "  00 ":BC$ = "  00 ":YC$ = "  00 ":GC$ = "  00
     ": IF SV = 1 THEN SV = 0: GOTO 1290
1280 SV = 1
1290  IF XS > 1 THEN FS = 3
1300  IF DIR = 1 THEN BC$ = XC$:BG = XG:BS = XS:GC$ = YC$:G
     G = YG:GS = YS
1310  IF DIR = 0 THEN GC$ = XC$:GG = XG:GS = XS:BC$ = YC$:B
     G = YG:BS = YS
1320  HOME : VTAB 21
1330  PRINT  TAB( 10);"SCORES   GAMES   SETS"
1340  PRINT "LEFT       ";GC$;"      ";GG;"      ";GS
1350  PRINT "RIGHT      ";BC$;"      ";BG;"      ";BS
1360  IF FS = 3 THEN 1400
1370 DIR = SV: GOTO 150
1400  REM ***************
1401  REM * MATCH OVER  *
1402  REM ***************
1410  VTAB 21: PRINT "              ";: FLASH : PRINT "GAME
     OVER";: NORMAL : PRINT "              ": REM 13SPACES I
     N EACH
1420  GOSUB 1640
1440  FOR L = 1 TO 3:X =  - 5:Y = 10
1450  FOR J = 8 TO 17: IF J = 13 THEN X = X + 20
1460 X = X + 20: XDRAW J AT X,Y:CLICK =  PEEK ( - 16336):CL
     ICK =  PEEK ( - 16336): XDRAW J AT X,Y
1470  NEXT J
1480  NEXT L
1490  FOR M = 1 TO 1000: NEXT M
1500  HOME
1510  FOR J = 1 TO 18
1520  POKE 49232,1
1530  FOR M = 1 TO J:CLICK =  PEEK ( - 16336): NEXT M
1540  POKE 49235,1
1550  POKE 49239,1
1560  POKE 49236,1
```

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Solutions to inSidious inSolubles

page 76

Solution to Caught Off Base:

This program contains two interesting bugs which Wayne discovered in his programming class. Wayne tells us the first is a problem of computer hierarchy; since the first digit in any number has been raised to the "zero power," 1 must be subtracted from "X" raised to a power. The second problem is a matter of multiplying the beginning powers with the ending digits, and vice versa. Change line 100 to:

```
100 S=S+B^(X-1)*(VAL(MID$
    (N$,L-X+1,1)))
```

Solution to Disappearing DOS:

Although the PR# command can be used as shown in the program, you will run into problems when operating under DOS if you do not precede it with a control-D. Change lines 60 and 100 to:

```
60 PRINT D$;"PR#1"
100 PRINT D$;"PR#0"
```

Another solution that works, but is not as good, is to insert an INPUT command after the PR#0. For example:

```
100 PR# 0: INPUT "PRESS ANY
    KEY ";I$
```

Correction

There is an error in the Screen Saver program on page 65 of "Capturing Big Games" in the November 1984 issue. Part of line 610 was cut off. Line 610 should read:

```
610 HOME : X = PEEK (Z) + PEEK
    (Z) + PEEK (Z) + PEEK (Z)
```

Listing continued.

```
1570  IF J = 16 THEN 1600
1580  POKE 49233,1: POKE 49236,1
1590  NEXT J
1600  HOME : VTAB 21: HTAB 9: PRINT "R)ESTART  OR  Q)UIT ":
      GET GO$
1610  IF GO$ = "R" THEN 30
1620  IF GO$ <  > "Q" THEN 1600
1630  TEXT : HOME : END
1640  IF GS = 2 THEN  VTAB 22: INVERSE : PRINT "WINNER!": NORMAL
      : VTAB 23: PRINT "LOSER": RETURN
1650  VTAB 23: INVERSE : PRINT "WINNER!": NORMAL : VTAB 22:
      PRINT "LOSER": RETURN
1700  REM ****************
1701  REM * CHECK FAULTS *
1702  REM ****************
1710 SB = SB + 1:CR = 1
1720  IF DIR = 1 THEN 1810
1730  IF PT / 2 =  INT (PT / 2) AND B2 > 91 THEN 1780
1740  IF PT / 2 =  INT (PT / 2) AND B2 < 39 THEN 1780
1745  IF PT / 2 <  >  INT (PT / 2) AND B2 < 89 OR PT / 2 <
      >  INT (PT / 2) AND B2 > 141 GOTO 1780
1750  IF PT / 2 <  >  INT (PT / 2) AND B2 < 89 OR PT / 2 <
      >  INT (PT / 2) AND B2 > 141 GOTO 1780
1760  GOTO 480
1780  HOME : VTAB 22: HTAB 16: FLASH : PRINT "FAULT!": NORMAL
      : PRINT  CHR$ (7)
1790  XDRAW 7 AT BX,BY: XDRAW 7 AT B1,B2: IF SB < 2 THEN 10
      40
1800  GOTO 1000
1810  IF PT / 2 =  INT (PT / 2) AND B2 < 89 THEN 1780
1820  IF PT / 2 =  INT (PT / 2) AND B2 > 141 THEN 1780
1830  IF PT / 2 <  >  INT (PT / 2) AND B2 > 91 OR PT / 2 <
      >  INT (PT / 2) AND B2 < 39 THEN 1780
1840  GOTO 480
```

End of listing.

Listing 2. *Machine-language coding for Match Point.*

```
6000- 11 00 24 00 61 00 9C 00
6008- D6 00 0D 01 47 01 87 01
6010- 8A 01 B4 01 DE 01 F3 01
6018- 10 02 2C 02 53 02 74 02
6020- 8F 02 BB 02 37 36 36 2E
6028- 07 40 18 18 3F 48 0E 08
6030- CE 2D F5 0E 36 3D 18 18
6038- 40 18 4F 1C 0C 3F 27 2D
6040- 1C 2C 24 2C F5 5A C4 33
6048- F6 24 F4 26 40 29 9F F3
6050- 76 04 40 18 71 8A 91 92
6058- 71 54 65 2D 0E 1E 3F 04
6060- 00 DB 05 28 75 1E 3F 4C
6068- 49 2B 05 28 28 28 2D 0E
6070- 36 C4 0B 3F 77 FD 1E 2D
6078- 35 3F 37 1E 0E 04 80 69
6080- 35 36 2E 07 80 DB 0B 1E
6088- 04 40 18 40 18 40 18 49
6090- D9 2C 24 3C 37 35 37 1C
6098- 4C 09 26 00 24 37 36 3E
60A0- 67 0D 40 18 70 36 3E 2E
60A8- 05 30 F5 0B 1E 0E 35 04
60B0- C0 DB 1E 0E 0E 24 40 18
60B8- 40 18 40 03 BC 24 2C F5
60C0- 35 26 98 DB 03 30 0E 3E
60C8- 2C B0 72 04 40 18 30 4C
60D0- 09 B6 FA 1B 00 00 49 09
60D8- 40 03 2D F5 3F 2E 35 3F
60E0- 2E 2D B4 15 0E 3E 04 C0
60E8- DB 1E 2D 26 40 18 40 18
60F0- 20 27 2C F5 35 04 40 03
60F8- 3F 56 09 DC 1B 6E 49 01
6100- 30 36 1E 1E 04 40 18 08
6108- 2C 3C 96 02 00 27 A4 31
6110- 0C 36 0E 0E 3F 3F 3F 0C
6118- 2D F5 DA 42 1E 36 5F 04
6120- 40 49 15 15 2E 04 40 18
6128- 40 18 C0 DB 1C 24 2C 36
6130- 2E 24 74 E6 DB B6 4A 49
6138- 40 03 05 28 28 36 1E 1E
6140- 27 9E DC 1B 77 04 00 49
6148- 41 08 28 2D 1E FD 37 2D
6150- 3E 3F 2E 2D 2E DF 3B 04
6158- 40 18 40 09 3C 24 2C 2D
6160- 17 36 07 20 D7 84 49 31
6168- 96 92 92 18 18 18 18 18
6170- 18 08 3C 38 38 36 0E 0E
6178- 75 24 96 92 1A 1E 0E 3E
6180- 04 40 49 F1 2D 26 00 2E
6188- 24 00 24 24 24 24 2C 36
6190- 36 36 36 26 50 4A 49 09
6198- 24 24 24 24 3C 36 36 36
61A0- 36 FE 03 40 18 40 18 05
61A8- 28 F8 DB 0E 0E DC 0E 0E
61B0- 2D 28 20 00 24 24 24 2C
61B8- 28 28 2D 2D 0E 0E 36 36
61C0- 36 3E 24 24 24 3C 38 3F
61C8- 3F 1E 36 36 36 26 40 18
61D0- 40 18 69 49 19 9F 12 2D
61D8- 3E 3F 3F 2C 25 00 49 21
61E0- 24 24 24 3C 3F 27 2D 2D
61E8- 2D 2D 35 3F 3F 36 36 36
61F0- 36 04 00 09 2D 2D 2D 25
61F8- 3F 3F 3F 3F 07 20 24 24
6200- 05 28 28 2D 2D 2D 3E 3F
6208- 3F 3F 3E 36 36 2E 04 00
6210- 24 24 24 24 2C 36 36 2E
6218- 2D 2D 2D 25 24 24 37 36
6220- 36 36 36 25 24 1F 3F 3F
6228- 3F 36 26 00 24 24 24 24
6230- 2C 2D 2D 2D 0E 0E B6 D2
6238- 03 38 3F 3F 27 2D 2D 2D
6240- 05 30 0C 1C E4 3F 3F 3F
6248- 36 B6 32 66 08 08 08 48
6250- 04 20 00 40 03 24 24 64
6258- 0C 2D 2D 75 0E 36 36 F6
6260- 1E 3F 3F 3F 20 24 24 2C
6268- 2C 2D 2D 2E 36 36 3E 3E
6270- 3F 3F 24 00 2D 2D 2D 2D
6278- 25 3F 3F 24 24 24 2C 2D
6280- 25 3F 3F 3F 3F 37 2D 2D
6288- 36 36 36 3E 3F 27 00 24
6290- 24 24 24 74 36 36 36 36
6298- 04 40 18 40 18 71 0E 0E
62A0- 0E 0E 0E 0E 24 24 24 24
62A8- 3C 36 36 36 3E 38 38 38
62B0- 38 38 38 70 89 91 51 4A
62B8- 92 23 00 49 21 24 24 24
62C0- 3C 3F 27 2D 2D 2D 2D 35
62C8- 3F 3F 36 36 36 36 04 00
```

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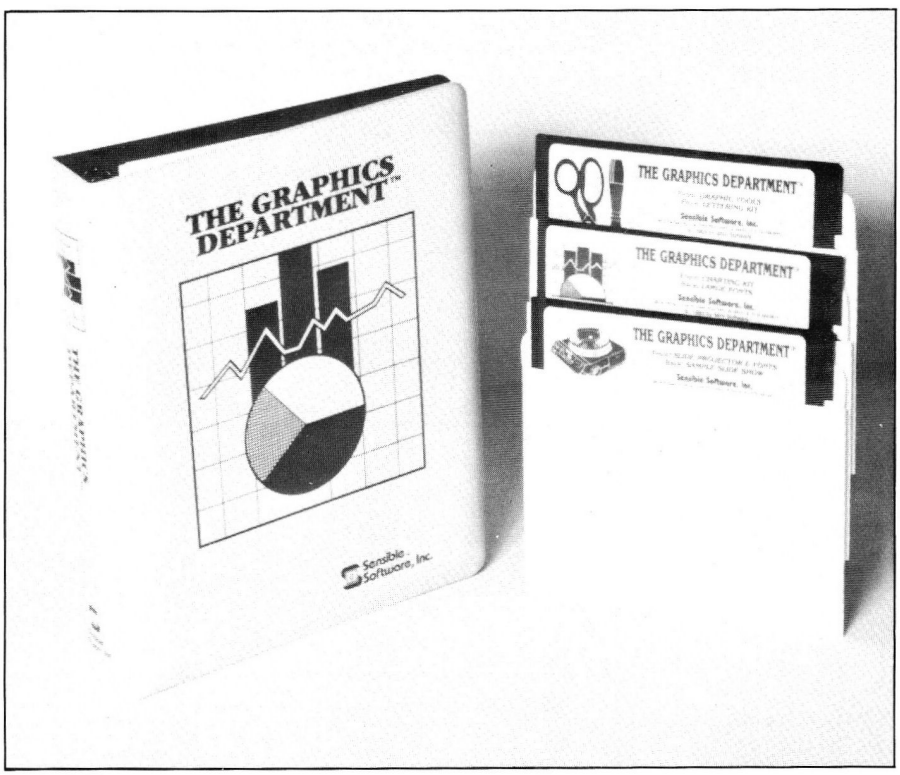


Prepare graphics and illustrations with The Graphics Department.

with any commercial screen dump program that accepts such disks. A software interface allows Apple's Silentype dot-matrix printer to print pictures in black and white from the screen.

The Lettering Kit module creates lettering that may be placed either on charts produced by the other modules, or used in text displays. More than 30 type font styles, ranging from 70 to 20 characters per line, are provided and each may be magnified up to five times. Upper- and lowercase are available with nine levels of kerning (spacing between letters), eight colors, and five orientations (right, left, up, down, and columnar).

The Graphics Tools module adds graphics designs to an image produced by another module or creates a graphics design from scratch. The screen serves as a work space where variable-sized, rectangular windows are defined and their contents manipulated. Similar to Etch-a-Sketch, you can draw straight lines, circles, ellipses, and rectangles. Images from standard Apple shape tables also may be used. Forty such shapes are included.

A valuable feature of the Graphics Tools module is its ability to work with two pictures stored at different memory locations and to move graphics between them. For example, the Transfer command copies a windowed region from one picture and places it anywhere on the second picture. Similarly, two pictures may merge into a single picture or one picture may be reduced 25 percent and placed into a selected quadrant of the second picture.

Consult the Slide Projector module to create a slide show where a formatted slide disk stores up to 16 slides. You can include a maximum of 99 possible slide frames in a presentation of one or two slide disks with some slides shown more than once, if desired. The slide show presentation is controlled manually by keyboard or paddles, or automatically with timing predefined for each slide.

The Graphics Department is an attractive software package for presenting slide shows on an Apple computer. The features make maximum use of the Apple's graphics potential. The program allows high-resolution, binary picture files that are produced with other software (and stored as files on DOS 3.3 disks) to be used as input for subsequent modification by The Graphics Department.

Unfortunately, the program does not offer provision for output to a higher resolution drawing device, such as a pen plotter. All cursor movement is controlled via the H, I, J, K, L, and M keys, but "speed" settings and X-Y coordinate indicators allow for precise addressing of individual pixels and rapid movement.

The Graphics Department requires 48K memory, Applesoft BASIC, and one disk drive. The software and graphics data are provided on three disks in a padded three-ring binder. ■

Allan H. Schmidt
Concord, MA

Sweet Shoppe

Eric Software Publishing
1713 Tulare
Fresno, CA 93721

Basic number skills
$39.95

★★★

To the child learning basic number skills, the computer keyboard itself can be a formidable obstacle. The Sweet Shoppe, a new math package from Eric Software, makes input easier for the beginner by implementing only a joystick for answering program prompts—no hunting and pecking for numbers, no fumbling for the space bar and the return key.

Sweet Shoppe's single disk holds three early numbers programs: Jelly Bean (a counting/number recognition program), Ice Cream (a subtraction program), and Popcorn (an addition program).

Once the program is running, the child will find a jelly-bean character visiting a "sweet shoppe." Each shoppe window displays one of three treats: jelly beans, ice cream cones, or popcorn. Using the joystick, the child moves Mr. Jelly Bean to a window; selection is automatic as soon as Mr. Jelly Bean is close enough to the chosen window.

In Jelly Bean, five balloons, each surrounding a number, appear at the top of the screen. From screen left, Mr. Jelly Bean enters and knocks over a jar of jelly beans. The child uses the joystick to maneuver the character to the balloon whose number corresponds with the amount of jelly beans spilled. And down he floats, balloon in tow. A correct choice fills the screen with smiling jelly bean faces, accompanied by a rewarding tune.

For addition problems, the child moves Mr. Jelly Bean to the popcorn window to add boxes of popcorn while a popping machine merrily pops away. Again, the child selects the correct answer by positioning Mr. Jelly Bean with the joystick. Correct responses result in three rewards: The selected box of popcorn tumbles from the top of the screen and falls into place next to the problem; the popcorn machine "pops out" the appropriate number of popcorn kernels, and the screen fills with "popping" happy faces.

Selecting the ice cream option displays subtraction problems. Possible answers are embedded in five ice cream bars. When Mr. Jelly Bean moves to the correct answer, not only is the bar slurped up, but an empty ice cream cone at the bottom of the screen fills with the corresponding number of ice cream scoops. As a final reward, an ice cream sundae is created before the next problem.

A child can operate all programs on disk without pressing a key, though to switch programs before completing ten problems he or she can hit the escape key at any point to return to the Sweet Shoppe menu. Because young computer users have a hard enough time finding the escape key, Eric Software provides a bright, red and white "ERIC" sticker that fits on the key. The company also includes a card with complete operating instructions and a "Message to Parents."

Eric Software understands the classroom environment. Wrong answers are not met with clanging bells or obnoxious buzzers, but with Mr. Jelly Bean dropping into position for another attempt. (All program sounds can be eliminated.)

Finally, my hat is off to any software company offering an "unlimited lifetime warranty. Even a disk clogged with peanut butter and jelly will be cheerfully replaced."

The Sweet Shoppe requires any Apple II with at least 48K and a joystick. A new version for the //c is equipped with a keyboard option. ■

Bill Rowland
Glen Ellyn, IL

OMNIS 2

Organizational Software Corp.
2655 Campus Drive
Suite 150
San Mateo, CA 94403

Data base
$195

★★★

OMNIS 2, a complete, workable data manager, includes among its unique functions a text editor that lets you create form letters in much the same way as you create reports. You can pull names and addresses from customer files, then insert them into business correspondence, thank-you notes, and so forth, much more easily than is possible with most database programs.

OMNIS 2's indexed, 396-page manual thoroughly covers the program's operation. Unfortunately, the manual is generic: a paragraph outlining how to perform some function on your Apple //e will be followed by two others explaining the same thing for the II Plus and the Apple ///. Every so often, you'll find a reference to the IBM PC or the DEC Rainbow—evidently to keep you on your toes. Hard disk instructions are intermingled with those for floppies. None of this really detracts from the manual's quality, though. A 106-page tutorial precedes another 113-page advanced tutorial, but you can probably learn to operate OMNIS 2 from the extensive chapter summaries alone.

OMNIS 2 allows up to 120 fields per record, with a maximum of 79 characters per field, and searches and sorts up to ten indexed fields. You can specify up to 50 selection criteria, and can implement the full power of an AND search (find this AND this AND that) and an OR search (select this OR this OR that). The system can update your data files globally. For records that require about 175 characters of information, OMNIS 2 allows roughly 400 records per data disk.

While more than one data disk can store the same basic file format and records, the program can't go from disk to disk to collect summary information; it considers each disk to be separate. Each file you create requires two disks to run the system—a data disk (for your information) and a library disk (which stores the record format, report designs, and other format information).

OMNIS data managers share a common file structure.

To position fields, simply move the cursor and then enter the field information. OMNIS 2 provides some limited data-input checking, and can calculate between fields. You can also fill in sections of each form with your choice of characters. You can move a field or a group of fields from one spot to another on your screen, or even to another page of your record (12 pages maximum per record).

OMNIS 2, menu-driven for its major functions, provides a command line as you work within files. Press the ? key to display brief explanations of available commands. OMNIS 2 can combine fields and use a function similar to the BASIC MID$ command to examine the interior details of words. Error explanations are displayed in English. OMNIS 2 provides up to four levels of password protection that you can structure to control user access.

You create reports as you would make a screen display—you're already familiar with the commands and format. Your reports can be up to 240 columns wide and 240 lines deep, with subtotals and page breaks exactly where you want them.

OMNIS 2's handling of field names is a bit weak. Let's say you want to keep a warranty record list, including a field called CUSTOMER ADDRESS. Since OMNIS 2, for its report designs and search patterns, can't work with names longer than seven characters, or with two-word field names, you must assign a code name to each field. In this example, you can't use your field name (CUSTOMER ADDRESS) because it's too long and comprises two words, so you might code it as ADDRESS.

When you position the code name on your report design, OMNIS 2 converts it to a numeral representing its *location* on your report. What started as CUSTOMER NAME appears as a number—502, for instance. The program does this conversion automatically and keeps track of it all, but working with report formats that use code numbers in place of field names is difficult.

Because the system is written in Pascal, disk drive 1 is (sometimes, but not always) called drive 4; drive 2 is called drive 5; and if you have three drives, 3 is called 9. OMNIS 2 can convert information into data interchange format (DIF) files, but it's a two-step process.

None of these criticisms should discourage you from buying OMNIS 2. It's a powerful and functional program whose data is compatible with the other two programs in the OMNIS family. The manufacturer lets you upgrade for the difference in price between programs, plus a handling charge—a good deal.■

Gregory R. Glau
Prescott, AZ

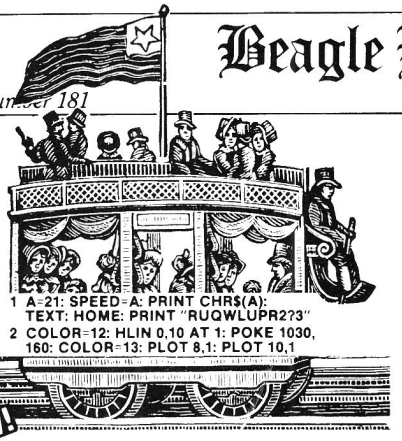
Circle 179 on Reader Service card.

Ad Number 181

Beagle Bros Apple® Software Report

"All the News That Fits"

Fall/Winter 1984



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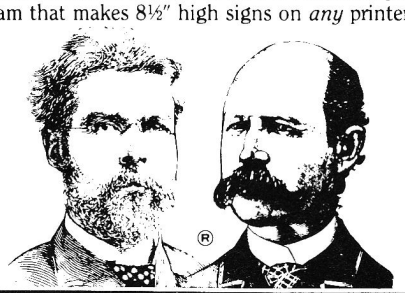

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The Beagle Bros Catalog

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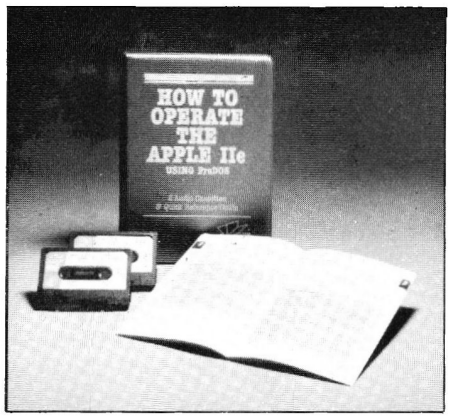

FlipTrack's complete instruction package for the new //e owner.

How to Operate the Apple //e

FlipTrack Learning Systems
999 Main Street
Glen Ellyn, IL 60137

Tutorial
$57 DOS 3.3 version
$39.95 ProDOS version

★★

Anyone suffering from computerphobia recognizes the tingling sensation that runs up the spine or the cold sweat that breaks out upon spotting that gem of modern technology, the computer. But FlipTrack Learning Systems has concocted a cure. *How to Operate the Apple //e*, by Howard Manthei and Lee McFadden, is an audio tutorial of three cassette tapes for the first-time computer user.

Instruction begins at square one. It assumes that you have no technical background or hands-on experience. The system lets you learn at your convenience without the embarrassment inflicted by condescending placating instructors or co-workers looking over your shoulder.

The course takes about six hours to complete (two hours for each cassette tape). Although computer familiarity isn't required, you do need a tape recorder, an Apple //e, Disk II drive, monitor or television set, and both the System Master 3.3 disk and the Sample Programs disk. Optional system components include a color monitor, second disk drive, printer, and 80-column card. A blank practice disk would also be valuable.

If you have the optional hardware, fine, but if you don't, that's fine too. FlipTrack's branching format allows you to flip the tape at key points in the lesson for optional topics or reinforcement.

From turning the computer on to running a program, lesson 1 takes you by the hand and leads you through the basics. "Getting Acquainted" covers keyboard skills, error messages, and edit functions. The section touches on arithmetic operations, with an explanation of the symbols used (+ to add, - to subtract, * to multiply, / to divide, ^ to raise a power, and ( ) to control order of operations).

Lesson 2, "Using Disk Storage," teaches you how to interpret a disk's catalog. The catalog tells you which programs are on the disk, whether they are locked or protected, the number of sectors of storage occupied, the language the program is written in, and if it's a data or text file. Initializing, or preparing, a disk is discussed, as are copying and saving programs from one disk to another. The tape's flip side streamlines these procedures for two disk drives.

After completing lesson 2, some procedures become second nature, such as pressing the return key after each command to tell the computer the instruction is complete, or running a program from a disk.

The third cassette continues the copying technique, but instead of copying one program at a time, your instructor has you duplicate disks with the Copy program on your System Master. You must follow the computer's prompts with this method to swap the original and duplicate disks through several cycles as each file is copied. To copy files without copying the entire disk, the lesson has you use the FID (or FILEM) program on the System Master disk. Merely follow the prompts for source slot and drive number, followed by destination slot and drive number, and your files are copied on the duplicate disk.

You'll wonder why you were afraid of the computer after you routinely use the List command to display a program listing—line by line, a line range, or a single line—and modify screen displays. By typing new line instructions, you can control the speed at which characters are displayed, cause an inverse display with dark characters on a light background, and flash characters on the screen.

You need the tape recorder at your side during the lessons. Pauses are recorded to give you time to type commands, so you're often starting and stopping the tape. It's a minor point, but it beats having your stereo system on one side of the living room and the computer on the other.

At the end of each lesson, a short quiz gives you the chance to test yourself and try procedures on your own. Answers are provided by the instructor, but you can rewind the tape to the section in question for further guidance.

The only problem involves listing new lines in lesson 3. The tape tells you to interrupt a listing by pressing control-C and then to type in the new lines. It works fine, but the instructor never tells you how to start the listing again to continue.

Unlike other recorded tutorials, the instructor's voice isn't irritating or syrupy, so it doesn't grate on your nerves. It keeps a good pace for listeners to follow directions. The instructor asks prompting questions to reinforce key points and even congratulates you upon mastering a new function.

There is no need to worry about jotting down notes to remember what does what. The Operator's Guide lists the important points, terms, and procedures of each lesson. FlipTrack options are covered in the manual, also.■

Cynthia K. Carr
***inCider* staff**

Xyphus

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playing adventures like Wizardry and Ultima, Xyphus combines a logical plot and balanced challenge that should entertain the novice role-player.

Penguin's new game pits you against the demon lord Xyphus who, confined beneath Arroya, keeps your people from inhabiting the land. Up to four characters (elves, dwarfs, or humans) may embark on the quest to destroy Xyphus. Each possesses advantages and disadvantages: Elves, for example, are nimble yet tire quickly while wielding heavy weapons. While an elf makes a capable spellcaster, humans and dwarfs are best suited to combat. But such a limited selection of character races and professions lacks the thoroughness of other Apple fantasy games. Whereas Wizardry offers eight colorful professions, Xyphus offers only two of the most mundane.

After selecting your characters you begin the first of six scenarios. Each requires three to 12 hours of playing time, but you can save the game at any point. Your first objective is to locate an outpost where you can purchase armor, weapons, and up to 12 spells.

A secondary objective is to procure a xiphoid amulet—a necessity for your spellcaster's incantations. A map near the first outpost indicates an amulet hidden toward the northwest. Unfortunately, a pack of ferocious rodents called toothpaws guard the treasure. The toothpaws are but one of more than 50 types of monsters you can face in the game.

A hi-res aerial view shows your characters amid various terrains. Rivers appear in textured aqua, marshes in indigo, grassy areas in green, and mountains in a rocky pattern. These attractive graphics constitute one of the game's most appealing features.

To move a character, simply select a direction from the keys surrounding G on the keyboard. To attack, direct a character to the targeted terrain hexagon. Long marches become ungainly despite your ability to move characters as a unit by pressing the appropriate direction and control keys.

The game's plot proceeds through an almost programmatic series of encounters. Often you must defeat one monster to gain the means to fight the next. The werefalcons in the first scenario, for example, protect an attack spell essential for surviving an encounter with a demon captain. Unpreparedness is tantamount to doom. Thus, the game steers players toward their goal.

Your exploration of Arroya consists mainly of whomping monsters and periodically visiting outposts to heal wounds and purchase improved weapons, armor, and spells with uncovered gold. The game appeals to "hack-and-slash" enthusiasts in this respect.

Nevertheless, Xyphus maintains a demanding challenge. After slaying each monster, characters enter higher experience levels and face stronger monsters. When three of my characters advanced from level zero to level one, I felt a genuine sense of accomplishment.■

Steven E. Williams
Chester, NJ

FlashCalc

VisiCorp
2895 Zanker Road
San Jose, CA 95134

Spreadsheet
$99

★★★

VisiCorp expects FlashCalc to replace VisiCalc as the standard in low-cost electronic spreadsheets. Its faster speed is one of its biggest advantages.

FlashCalc runs on any Apple II with at least 64K of memory and supports an 80-column card. If you have additional memory in your system, FlashCalc makes full use of it, up to 512K. Any changes you make to the program's default display and configuration settings can be stored on the program disk and loaded automatically.

ProDOS, Apple's new disk operating system, is responsible for much of the "Flash" in FlashCalc. ProDOS lets a program store and retrieve disk data faster than would be possible under DOS 3.3. The new DOS also enables you to use FlashCalc with Apple's ProFile hard disk.

Designing and using a worksheet is fairly simple. If you've used VisiCalc, you'll soon be comfortable with FlashCalc. Most of the commands either duplicate or improve upon VisiCalc's.

The Replicate command is much more versatile under FlashCalc than with VisiCalc. For example, you can copy a large block of information from one part of the worksheet to another in a single step. VisiCalc allows only cells, or sections of a single row or column, to be copied. FlashCalc also permits variable column widths, a feature sorely lacking in VisiCalc.

Format commands are enhanced. In addition to right and left justification, FlashCalc lets you center entries or set them to a specific number of decimal places.

FlashCalc's Attribute command controls or limits the type of data contained in a cell. Use this command to enter only labels in certain cells, only values in others. A cell's attributes can protect it from changes, and can even make the entry invisible.

When loading or saving a file, FlashCalc displays a listing of current files on the data disk. You can select a file by typing its name or corresponding number. Files can be saved as a worksheet or in data interchange format (DIF), which allows information to be transferred to and from other programs. Since the program is based on ProDOS, data files are not directly compatible with DOS 3.3 files.

The program's manual is clearly written and informative, but the quality of its illustrations is poor, and its screen photos are totally unreadable. Along with the main manual, VisiCorp supplies two smaller booklets. Entitled "QuickStart" and "Getting Started," these guide you through setup and provide a quick and effective tutorial.

To get an idea of how FlashCalc performs, I ran it against the latest version of VisiCalc in a few tests. I used them both on a two-drive Apple //e with 128K of RAM and an 80-column display.

VisiCalc allowed a slightly larger worksheet overall—64 columns by 137 rows, compared to FlashCalc's 64 columns by 130 rows. (It's unlikely that you'd need this large a spreadsheet in even the most exotic applications.)

SCRG PRODUCTS FOR THE APPLE COMPUTER

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The **SWITCH-A-SLOT** is an expansion chassis, which allows the user to plug in up to four peripheral cards at one time. One of these cards is selected for use, and only that card draws power.

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

- Allows up to four peripheral cards to be plugged into one peripheral slot.
- User selects desired card by front panel rotary switch.
- Only selected card draws power.
- Plugs into any peripheral slot.
- Saves wear and tear on delicate connectors.
- 18" cable connects Switch-a-slot to computer.

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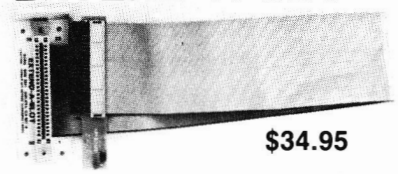
SWITCH-A-SLOT and EXTEND-A-SLOT work well with all slow to medium speed cards, such as Modems, Printers, Clock, 80 Column, Music, etc. They are not recommended for high speed data transfer devices such as disk drive controllers, alternate processor, and memory cards. These products may be incompatible with some alternate processor cards.

EXTEND-A-SLOT



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The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability.

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EASY TO USE—just plug it in as you would any expansion card, then plug your card in. When you want to change cards, do it easily outside the computer, without the wear and tear on the computer expansion slot.

OTHER PRODUCTS

D Manual controller. Gives complete control over the $C000 through $C0FF range in hardware. Can be switched while program is running. $89.50.

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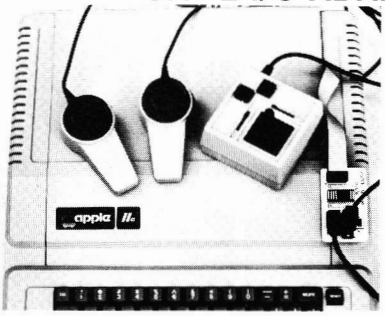

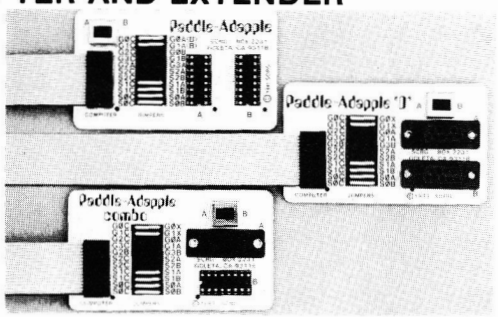

- Works with all Apple compatible joysticks, paddles and other I/O devices.
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The **Paddle-Adapple** has two 16 pin sockets

The **Paddle-Adapple "D"** works with the subminiature D connectors.

The **Paddle-Adapple Combo** has one 16 pin socket and one subminiature D connector.

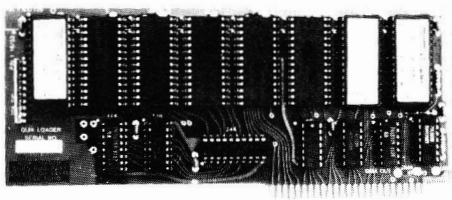
NEW 9-16 Adapter

For Apple / /e and / /c

This product permits the use of most 16-pin I/O devices with the APPLE //c or //e. By plugging this adapter into the sub-miniature 'D' connector, you can plug in a 16-pin device, such as the Paddle-Adapple, paddles, joystick, KOALA PAD™, etc. The only limitations are those devices that use the annunciators or the C040 strobe, such as the POWER PAD™. Please note that the //c does not support four joystick inputs.

$14.95

quikLoader™



FAST AND CONVENIENT

The quikLoader is the *fastest* way to load programs. **BAR NONE!** Programs can be loaded in fractions of a second. More importantly, DOS is instantly loaded every time the computer is turned on. Integer is even loaded in the language card. This process takes less than a second, saving valuable time. Frequently used programs are available *instantly* when you need them, without having to look for the disk, or hoping that the lengthy disk loading procedure goes smoothly.

To run a program from the quikLoader, bring up the quikLoader catalog (Q-reset), and the names of the programs will be displayed, along with an index letter. Pressing the index letter will instantly load and run the program.

Up to 23 programs on the quikLoader can be displayed on the screen at one time. If you have more programs, you may scroll through the catalog in either direction.

The quikLoader is **ideal** for applications requiring a dedicated computer. Your program can be automatically loaded and run at "power-up".

PROGRAMMING EPROMS

Putting your own programs on the quikLoader is easily done, using a separate EPROM programmer such as the **PROmGRAMER.** For APPLESOFT, INTEGER, or single machine language files, no programming knowledge is necessary. You **will** need experience if you want to save copy-protected or complex programs. The amount of experience necessary depends on the complexity of the program.

COMMERCIAL PROGRAMS

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

We start your library of programs with the most popular utilities on the card, FID and COPYA. Now, if you have to copy a disk, you don't have to search for the master disk. You can start copying within 3 seconds after turning on the computer.

We are currently licensed to sell several very popular programs on EPROM. **DOUBLE—TAKE** by BEAGLE BROS., and **COPY][PLUS** by CENTRAL POINT SOFTWARE. The introductory price for DOUBLE—TAKE is $45.00. This includes the program exactly the same as you would buy it at your dealer for $34.95 (including disk and documentation), and a programmed 27128 EPROM (worth about $25.00). COPY][PLUS cost $65.00. This includes the original program (worth $39.95) and **two** programmed 27128's.

Other programs available directly from us or the publishers are, **BARKOVITCH I/O TRACER AND SINGLE STEP TRACE, MICRO/TYPOGRAPHER** from **TIDBIT SOFTWARE, ECHO** speech synthesizer software from **STREET ELECTRONICS,** and **MERLIN** assembler, from **ROGER WAGNER PUBLISHING.** More commercial programs are now in the works.

MEMORY CAPACITY

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

INCREASED DISK CAPACITY

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

ABOUT THE DESIGNER

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

SYSTEM REQUIREMENTS

The quikLoader plugs into any slot of the APPLE][+ or //e. If used in a][+, a slightly modified 16K memory card is required in slot 0. A disk drive is required to save data.

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

$179.50

PROmGRAMER™

The **PROmGRAMER** will read or program any of the standard single-volt EPROMS from the 2708 to the 27512. Features include:

- Slot independent operation for the APPLE // family of computers.
- Zero insertion force sockets accepts 24 or 28 pin devices.
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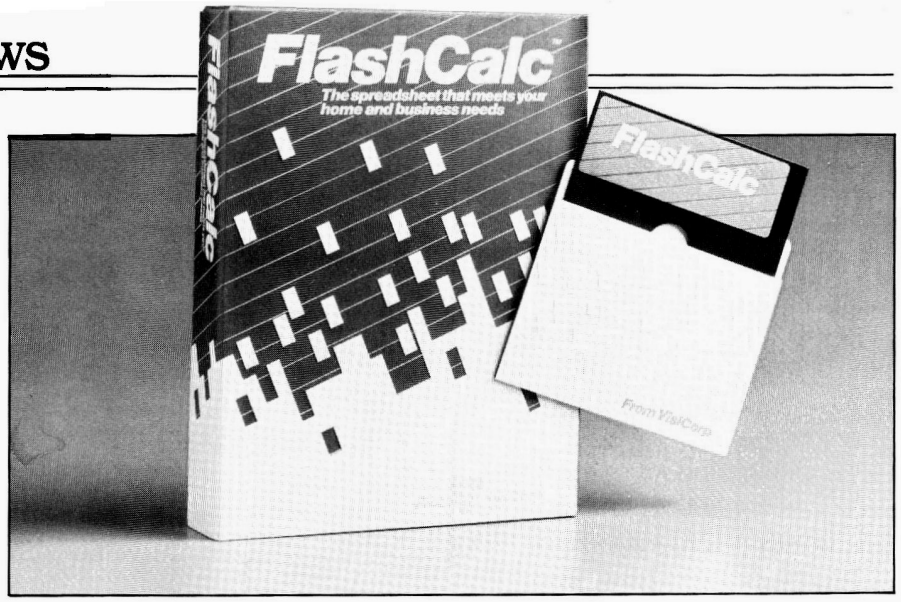

FlashCalc speeds spreadsheet forecasting.

For speed measurements, I set up a 50-row by 50-column spreadsheet containing a simple formula in each cell that adds one to the value in the previous cell. I then measured the time it took for the programs to recalculate all 2500 entries. FlashCalc was a bit faster, doing the task in 26 seconds; VisiCalc took 34.

Moving across 50 cells with the arrow keys gave VisiCalc a big edge. FlashCalc required 45 seconds to make the trip; VisiCalc took only 13. FlashCalc is painfully slow in scrolling through a worksheet. The programs moved the cursor with a direct GOTO command in the same amount of time.

Saving and reloading this large worksheet from disk gave a good indication of the effect ProDOS has on the system. Surprisingly, VisiCalc with DOS 3.3 saved the file in less time; one minute 14 seconds, versus one minute 32 seconds. FlashCalc was the clear winner in file-loading, however, bringing 2500 entries into the computer in two minutes 36 seconds as opposed to four minutes 18 seconds with VisiCalc.

Like many business programs, FlashCalc carries a 90-day warranty against disk failure. The manufacturer will send you a single back-up for $10. After the warranty expires, a replacement disk will cost you $50—half the price of an entire new package.■

W. Charles Doherty
South Dartmouth, MA

Story Maker

Scholastic Software
730 Broadway
New York, NY 10003

Graphics and data base
$39.95
★★★

Story Maker is the electronic equivalent of a pad of paper, box of colored pencils, lettering kit, scissors, sheet of clip art, and pot of paste. The program, one of two in Scholastic Software's Fact and Fiction Tool Kit, is designed to make authors and artists out of children ages 8 and up.

The 32-page instruction manual and reference cards, one for the Apple //e, the other for the //c, make learning and using the program a snap, and it's even easier for those who've used a mouse. Although the program works with either a mouse or a joystick, the mouse is preferred.

After booting Story Maker, children can "make," "edit," "read," or "print" a story, or "do disk work." The last choice lets them list or erase stories on a data disk or initialize a fresh disk to save stories.

Creating a story is easy. The program provides about three-quarters of the screen, with the background in inverse color, as the work area. A row of icons in the bottom quarter represent available functions. Positioning the cursor on top of an icon and clicking the mouse or joystick button activates each function. Choose the typewriter icon to type text (eight stencil-like fonts are available), the picture gallery to select illustrations, the pencil to draw pictures, the eraser to rub out unwanted text and artwork, the book pages to store a finished page and start another, or the exit sign to return to the main menu.

To write, select the typing function and choose a font. Then position the cursor where the words are to appear, click the mouse or joystick button, and start typing. Typing functions are limited; this is not a word processor. Letters are lost if you type too quickly, and words don't wrap. The left-arrow key deletes letters only within the typing function. Be careful with the erase function; a few times, I erased a picture near the words I was trying to remove.

Go into the picture gallery (on a separate disk) to see what illustrations are available. To lift a picture from the gallery, position the cursor on it and click the mouse or joystick button. After you return to the work area, you can paste the picture onto the page in small or large size and flip it to face either left or right. Create new pictures with the program's drawing utility. The program provides a variety of colors and line widths.

Once you've created and saved a story, you can call it up onto the screen and read a page at a time or print it. Edit a story by clearing the entire page and starting fresh, or erasing the page and adding new things.

Fact and Fiction Tool Kit runs on the Apple //e with an extended 80-column card, or on the Apple //c. The ProDOS program requires a mouse or joystick.■

Bruce S. Trachtenberg
Port Chester, NY

Pascal Utility Pack

Mach 2 Software
106 Fairfax Building
43rd and Locust Streets
Philadelphia, PA 19104

UCSD Pascal utilities
$24.95
★★★

The Pascal Utility Pack (a two-sided disk and 40-page reference manual) includes a number of

library units for Apple Pascal that enhance the usefulness of the UCSD Pascal System as implemented on the Apple II or //e. Some of these units should interest anyone writing programs in Pascal, no matter what his or her level of expertise.

This set of utilities should be attractive to BASIC programmers who are reasonably comfortable with Applesoft and find that they miss certain features when they start working in Pascal. For instance, the Loresgraphics unit provides most of the low-resolution graphics commands found in Applesoft. (Apple Pascal provides only hi-res graphics in the turtle graphics unit.)

The PUP presents an impressive range of items for $24.95, including four library units already compiled and ready to install in your System.Library, three Pascal system programs, and two unit demonstration programs. Text files for two assembly-language programs used by the library units are included for informational purposes. These text files are assembled and linked into the appropriate units, so you don't have to know anything about such processes to use the library units.

Two of the units make Pascal seem more like BASIC. Unit Loresgraphics includes the familiar GR, PLOT, HLIN, VLIN, SCRN procedures as well as the SETLOWCOLOR, TEXTWHOLE, and GRWHOLE procedures that parallel the Applesoft COLOR, TEXT, and POKE -16302,0 commands. The Videostuff unit includes PEEK, POKE, NORMAL, INVERSE, and FLASH (the latter three usable in only 40-column display), and also provides CURSX and CURSY, SYSTEMVERSION, and KEYTYPED utilities. (Having searched unsuccessfully to find the memory location for the X,Y coordinates of the cursor position in Pascal on the //e, I was impressed that Mach 2 could read them.)

With Pascal, the only way to get a 40-column display (and thus use INVERSE and FLASH) is to remove the 80-column card. Mach 2 solves this problem with Program NO80CARD that toggles System.Apple to either use or ignore the 80-column card.

The other two units make the Pascal Operating System more accessible to a programmer. One unit, Directory, does what it implies by listing a directory for any Pascal disk from within a program without invoking the Filer, particularly useful when a program—a printer formatter, for example—requires that you enter file names.

The Mach2stuff unit provides a number of I/O utilities useful in interactive programs to: keep user responses within the bounds anticipated by the programmer (and thus avoid catastrophic disruption of the program); clear parts of the screen; check the presence, name, and status of disks in specified drives; change the system date; and use special characters such as controls A, Z, W, E, K, S, and F in ways not normally possible in Pascal.

Program Diskrunch and Program Diskdemo perform other Pascal System actions. The first mimics the Filer Krunch command. You can incorporate it within a program when there isn't enough contiguous space on a disk to save the graphics screen. Diskdemo includes a fast Transfer program that also duplicates a Filer function.

This is the only instance where I found an error in the programs and units. The Transfer program ends with the error message "Better luck next time"—even though the transfer has been completed successfully.

Documentation consists of a typewritten, stapled, 40-page softcover booklet. It is clearly printed (daisy wheel, not dot-matrix) and explains the units and programs quite well. Instructions help incorporate these units into your System.Library; this leads to a rather large library (61 blocks), but it is worth the space on disk.

The text files documentation is superb. At least 60 percent comments, the text files explain each step of the program. Mach 2 was wise to separate the unit instructions from the how-to explanations. Careful perusal of these text files could teach a beginner a great deal about programming in Pascal. The PUP package is worth its price for introducing the inner workings of the UCSD Pascal System through these comments. Best of all, everything is completely open and copyable so you can modify it to suit your needs. ■

James R. Florini
Syracuse, NY

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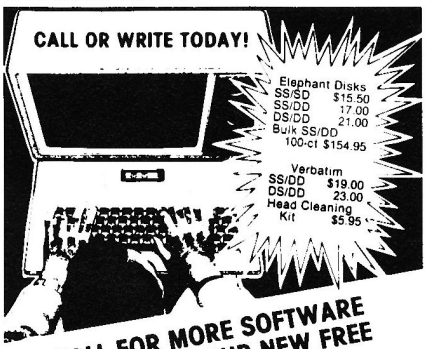

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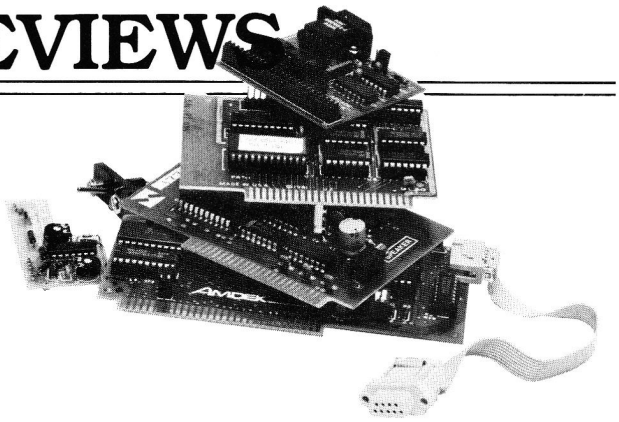

inCider's Ratings

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

Voice Box III

The Alien Group
27 West 23rd Street
New York, NY 10010

Speech synthesizer
$129
★★

As children, we mastered the basics of the English language but never thought about the intricate speech techniques required to say something as simple as hello. Difficult as it may be, the procedure is even more complex for a machine. Although the text-to-speech program in Voice Box III is far from infallible, it is one of the most accurate routines I have heard with an Apple-based speech device.

Introduced by The Alien Group, Voice Box III produces clear, understandable speech, accepts input in English, and adds inflection automatically. Voice Box III consists of a small circuit board that plugs into the Apple's main bus, an enclosed, external loudspeaker, and a program disk.

The main board is remarkably small—approximately 2½ inches square, and houses the speech chip, volume control, and external loudspeaker connectors. Alien chose the new Votrax SC-02 speech chip for the Voice Box. This latest version promises to be more intelligible than other modules.

The board materials aren't of high quality, nor was the physical design thought out well: The bottom edge of the board is too large for the slot, making it a tight squeeze. The loudspeaker jack is positioned so the plug presses under the top lid of the computer, increasing the chance of an intermittent connection.

In a 4-inch-by-4-inch black metal case, the loudspeaker with a mesh grill on the front and a swivel bracket on the back is well suited for mounting under a shelf or on a wall. At the top of the case, a noise filter slide switch activates a high-frequency filter to lower static. The loudspeaker is the same as those designed for mobile CB or amateur radios. You can connect the Voice Box to Apple's internal speaker, but speech fidelity and intelligibility suffer when you use this method.

Software includes the speech program and optional graphics routines that display a face whose lip movement is synchronized with the words spoken.

The main program requires only 5K of memory—much less than that used by other speech systems. This program, TEXTTOSPEECH, contains the data required to convert written English into the spoken word.

Voice Box III's graphics mouth words along with the text.

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Putting data into the Voice Box is easy: In its simplest form, a word can be typed on the keyboard and then spoken. Since this system is limited, interface the Voice Box with your own programs for more effective speech. With BASIC, any phrase can be spoken by assigning it to the string variable SP$, and then calling the speech program as a subroutine. No complex machine- or assembly-language routines are involved; just add two extra lines at the start of your BASIC programs to set memory limits and load the text-to-speech program. Instructions for assembly language users are included also.

Another routine allows you to load Apple text files from disk and read them aloud. I ran several files to hear how they sounded and the text-to-speech conversion software read text well. There's no doubt that the voice comes from a machine, though, so you must listen carefully to understand every word.

The text-to-speech program takes every word literally. If the number 1000 appeared in the text, Voice Box would pronounce each numeral—"one, zero, zero, zero"—rather than "one thousand." For correct pronunciation, you need to spell the number out. Certain words won't sound like they're supposed to because of phonetical construction that we take for granted. For example, you must change "control" to "controle" for the Voice Box to pronounce it correctly.

Voice Box's impressive automatic intonation system imitates human speech very well by changing the pitch and stress of words according to construction and punctuation. This way the voice follows a familiar, colloquial pattern; pitch drops at the end of sentences, rises for questions, and pauses at commas. The words also change according to context.

Two voices (male or female) are available, although both sound unmistakably electronic. The voice speed can be changed and intonation can be added.

Alien's documentation is atrocious; the print quality is so poor on the six-page, photocopied flyer that it is difficult to read and to follow. Future versions should include a better manual.

The $129 Voice Box is a clever device for any programmer or hobbyist. Its modest memory requirements make it usable in almost any application, and the low cost keeps Voice Box within a tinkerer's budget. ■

W. Charles Doherty
South Dartmouth, MA

Epson JX-80

Epson America
3415 Kashiwa Street
Torrance, CA 90505

Color dot-matrix printer
$800
★★★

A fast, sophisticated dot-matrix printer with seven bold colors, the JX-80 is a quality machine designed to spark up your reports, advertising, billing, and spreadsheets.

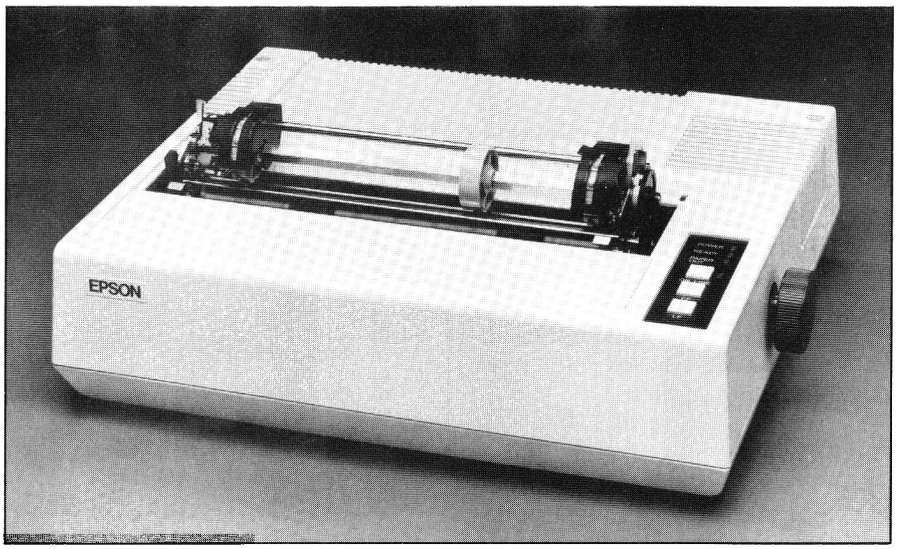
The JX-80 isn't a machine for beginners whose needs run to term-paper texts and other general applications. Rather, you'd buy it for its programmable characters as well as its color printing.

The printer is easy to hook up to your system. It requires a Centronics-style cord and parallel interface card in your Apple. A serial model is also available.

Powerful Printing

At the heart of the JX-80 is a full-featured dot-matrix printer with a speed of 160 characters per second (cps) and sound level of 58 decibels. Your choice of friction or tractor feed handles paper widths up to 8½ inches. It prints 80 characters per line in normal type style, 137 characters per line in condensed print, and 40 characters per line in expanded print. Form-handling ability includes vertical and horizontal tabs, margins, variable line feed, and reverse feed.

Roman and elite fonts come in normal, condensed, and enlarged type sizes (see the **Figure**). Special uses can call on italic, underscore, subscripts, and superscripts. Print den-



The Epson JX-80 seven-color printer.

sity varies from normal to emphasized to double-strike. Proportional spacing lends a professional typeset look to documents.

A control-codes system regulates these features. The JX-80 uses the same codes as the rest of the Epson family. However, by pressing the form feed button before printing data you can control these options. For condensed print, just tap the button before printing.

The character set has 96 letters, numbers, and other symbols, using true descenders for letters like y and g. Eleven international character sets differ slightly, but include accent marks, diphthongs, and currency symbols. The graphics mode controls individual dots and supports screen-dump programs.

DIP switches, located under a top-mounted panel, are described in the manual and easily set. One switch enables a 2K buffer so the computer sends data to the printer buffer and then returns for more work. This lets you prepare the next document while the printer finishes the first.

One JX-80 option defines up to 256 of your own characters. This time-consuming process involves drawing designs and counting dots and reminds me of Apple shape tables. But once you get the hang of it, you can include smiling faces, Apple's apples, or flying saucers anywhere in your document. Your customized characters replace regular characters. If you redefine < as an apple, each time you want the apple, just type <.

The Rainbow Connection

Other good dot-matrix printers offer these features, but the JX-80's color printing sets it apart from the lot. Like all Epson ribbons, the inked, cloth ribbon keeps recirculating until you replace it.

Colors are arranged in four hori-

Figure. *Sample of some JX-80 type styles.*

NORMAL	ABCLIM abcjly
EMPHASIZED	ABCLIM abcjly
PROPORTIONAL	ABCLIM abcjly
DOUBLE STRIKE	ABCLIM abcjly
NORMAL	ABCLIM abcjly
ELITE	ABCLIM abcjly
ITALIC	*ABCLIM abcjly*
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zontal bands on the inch-wide ribbon, which the printer raises and lowers to the proper band of color. Black is along the top, followed by magenta, blue, and yellow. Secondary colors (violet, orange, and green) require two passes of the print head to layer the primary colors. Skillful overprinting of the basic four colors produces 80 shades of color. All this overprinting and ribbon moving drastically reduces printing speed. (The advertised 160 cps applies only to single-color printing.)

You can change color through control codes, just as you would change type style. Before sending data to be printed, send this line of BASIC to your printer:

```
PRINT CHR$ (27); "r" ; CHR$ (N);
```

Escape, CHR$ (27), alerts the printer for special instructions. The color code is the letter *r*. (Apple II Plus owners, use CHR$ (114) instead.) CHR$ (N), where N is a number from zero to 6, delineates color.

The four-color ribbon is expensive ($17), so use an Epson FX-80, black ribbon ($14) for general word processing. Yellow, the lightest color, is rated at 800,000 characters. Black is rated at 1,400,000 characters. While the other colors are true and rich, yellow is illegible but it's the basis of stronger colors, like green and orange.

Color Your World

If your word processor lets you send control codes to the printer, you have easy access to the JX-80 colors. Just send the proper codes before and after passages for the words you want printed in color. Charts, graphs, and reports take on a more dramatic, professional look.

Since this hardware is ahead of available software, it will take a while for manufacturers to develop programs that will challenge the JX-80's capabilities.

You must wait for software authors to write color screen dumps to witness the printer's full potential. Then the JX-80 will handle business graphics, game screens, and drawings. Look for this in updated versions of Penguin's Paper Graphics ($49.95), Koala's Graphics Exhibitor ($39.95), and Roger Wagner Publishing's Printographer ($39.95).

One way to control the JX-80 is through your own BASIC program. At the beginning of your program, define strings with all the control characters needed to shift colors (see the **Program listing**). Use one in a PRINT statement and the text comes out that color. The American Epson manual explains this well, but the examples are in MBASIC so you'll have to translate into Applesoft.

The Last Analysis

Epson's JX-80 is a powerful dot-matrix printer that offers type styles and sizes for just about any use. Experienced programmers will be pleased with its programmable characters, alternate character sets, and graphics abilities. The color produced by the JX-80 is bright and accurate. Controlling color is sophisticated, but no more so than controlling italics and underlining. ■

Kerry J. Lanz
***inCider* staff**

Program listing. *Color commands can be stored as strings at the beginning of an Applesoft BASIC program.*

```
10  REM
11  REM    Demo of color control
12  REM    on Epson JX-80
13  REM
48  REM     Define color controls
49  REM
50 B$ =  CHR$ (27) +  CHR$ (114) +
     CHR$ (0): REM Black
51 M$ =  CHR$ (27) +  CHR$ (114) +
     CHR$ (1): REM Magenta
52 C$ =  CHR$ (27) +  CHR$ (114) +
     CHR$ (2): REM Cyan or Blue
53 V$ =  CHR$ (27) +  CHR$ (114) +
     CHR$ (3): REM Violet
54 Y$ =  CHR$ (27) +  CHR$ (114) +
     CHR$ (4): REM Yellow
55 O$ =  CHR$ (27) +  CHR$ (114) +
     CHR$ (5): REM Orange
56 G$ =  CHR$ (27) +  CHR$ (114) +
     CHR$ (6): REM Green
98  REM
99  REM
100  PRINT  CHR$ (4)"PR#1"
199  REM
200  REM    PUT YOUR PROGRAM HERE
201  REM
210  PRINT Y$;"THIS IS IN YELLOW,
     Y$"
220  PRINT G$;"WITH G$ YOU GET GR
     EEN"
230  PRINT V$;"V$ MAKES IT VIOLET
     "
240  PRINT B$;"NOW TO BLACK WITH
     B$"
250  REM
1000  PRINT  CHR$ (4)"PR#0"
1500  END
```

McMill 68000

Stellation Two
P.O. Box 2342
Santa Barbara, CA 93120

Coprocessor board
$229
$299 with assembler

★★

Stellation II designed McMill for software developers, educators, and hobbyists who want to learn more about the 68000 series of 32-bit processors. This coprocessor board is based on a Motorola 68000-series microprocessor—the chip used in both the Macintosh and the Lisa.

Unlike other coprocessor systems, McMill isn't intended to enhance the Apple II's basic performance. (Its speed is limited by the timing of the Apple II's clock.) Nor does it let you run software written for other popular computers.

But at $229 (without optional assembler software), McMill is much less expensive than any other 68000 development system, and, unlike the others, McMill requires no additional on-board memory.

The device slides into any slot of the Apple's main bus. The processor itself is actually a 68008—completely software-compatible with the 68000, but equipped with an 8-bit external data bus instead of the normal 16. So the 68008 can work within an 8-bit system like the Apple while maintaining the 16- and 32-bit internal functions of the 68000. Code used on one will work on the other with no modification.

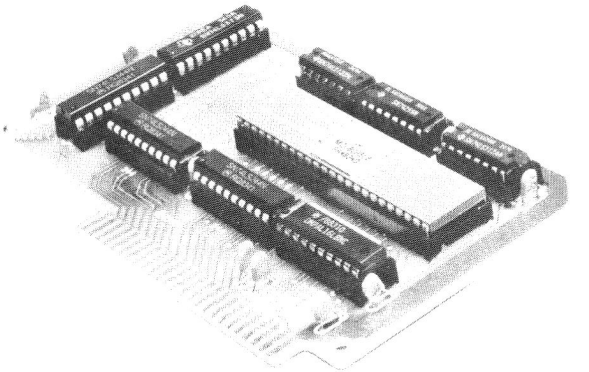
The package includes a disk of FIG Forth, a public-domain edition of that popular computer language. Stellation Two also supplies a copy of *Programming the M68000* by Tim King and Brian Knight, one of the most informative software reference manuals I have seen for any processor. Without being overly technical it presents the 68000 from the ground up.

You can purchase McMill with an editor-assembler from S-C Software. This $299 combination makes using the system much easier. You could almost consider the Macro Assembler a necessity. It's very forgiving, and uses many BASIC-like commands such as

LOAD, SAVE, and LIST, rather than some obscure command structure. Unfortunately, the main part of S-C's manual is devoted to its 6502 version, with the 68000 edition treated as an afterthought. Although the Macro Assembler produces code for the 68000, it uses the Apple's 6502 to do so. Plans are in the works for a true 68000 assembler, one that generates 68000 code on the processor itself.

The sparse documentation for McMill consists of an eight-page photocopied booklet with an unreadable schematic diagram. (Stellation Two has plans for an improved version of the manual.) The package also includes a Motorola 68000 instruction reference card with print fine enough to make a lawyer envious.

With hardware from one manufacturer, software from another, and a reference book from a third, I found myself constantly going from manual to manual. For example, the assembler commands given in *Programming the M68000* are slightly different from those used by S-C Software and would result in an error unless you check the manual carefully.



McMill 68000 brings 32 bits to your Apple II.

The product is not for the casual user. Before even considering McMill, you should be comfortable with machine- and assembly-language programming. If you are, and you need to work with or learn about 68000-related equipment, McMill offers an excellent, low-cost alternative to traditional development systems. ■

W. Charles Doherty
South Dartmouth, MA

At press time, Stellation Two announced the McMill Plus for $499. This adds expandable memory and debugger EPROM to the basic McMill. —eds.

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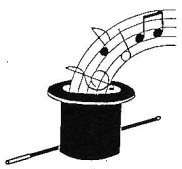

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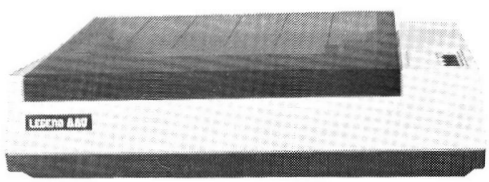

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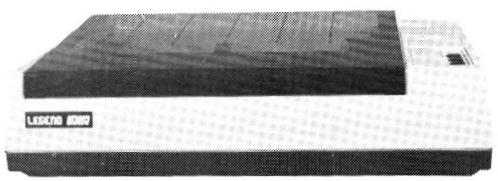

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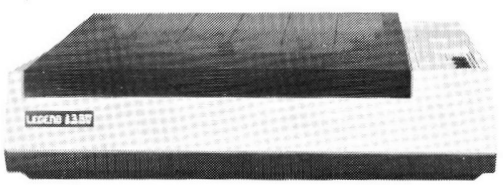

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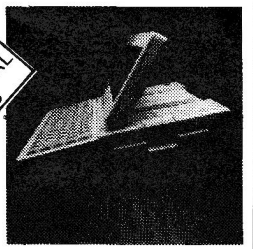

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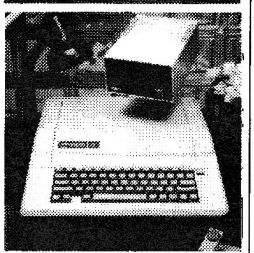

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13 CORPORATE ACCOUNT PROGRAM — Almost 50% of The NETWORK'S members are corporate buyers and users *(see opposite page left).* The NETWORK can establish open account status and assign designated account managers to expedite orders, and coordinate multiple location shipments.

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NEW SOFTWARE

Apple Writer Printer Library

Let Apple Writer // have full control of your printer with **Glossary Disk** ($16). This collection of files covers printers such as Epson, Okidata, ProWriter, and NEC. The manual shows how to send any printer code with a single keystroke. For more information, write MinuteWare, P.O. Box 2392, Columbia, MD 21045, or use number 460 on the Reader Service card.

All-in-One Fiscal Planner

Let **Beacon** show you the way through fiscal fog. The Beacon system costs $90 and runs on any Apple II with 48K. It keeps tax records, estimates net worth, and manages cash, investments, and assets. You can print reports and statements as needed. The system is published by The Cumberland Company, 4765 North Cumberland Boulevard, Milwaukee, WI 53211. Mark Reader Service number 452.

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 an endorsement by inCider *of any given product.*

Writing Tutorial for Bank Street

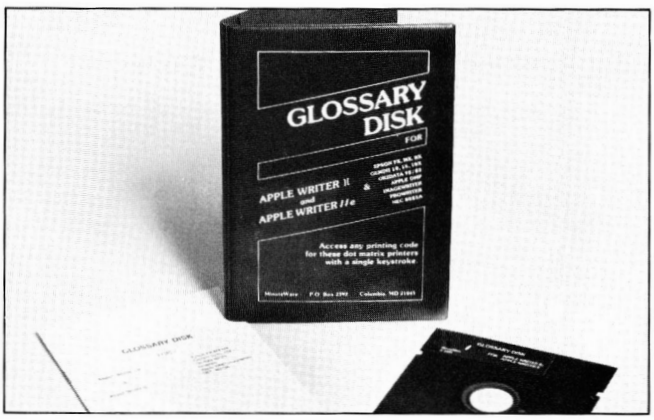
The **Complete Writer** works with Bank Street Writer to teach the fundamentals of good writing. The three-disk package ($99.95) runs on any 64K Apple II. Individual disks ($39.95 each when ordered separately) are: Newsroom (factual writing), Mystery (narrative), and Campaign (persuasive writing). Contact Learnco, 128 High Street, Greenland, NH 03840. Reader Service number is 462.

Printing Your Mouse Work

If you use Apple's MousePaint, **Mouseprint** lets you send your graphics to many popular printers. It works with ProDOS and is compatible with most popular combinations of dot-matrix printers and interface cards. Specify your printer and card and send $22.95 to Ahware, 805 Luz Court, Danville, CA 94526. Use Reader Service number 464.

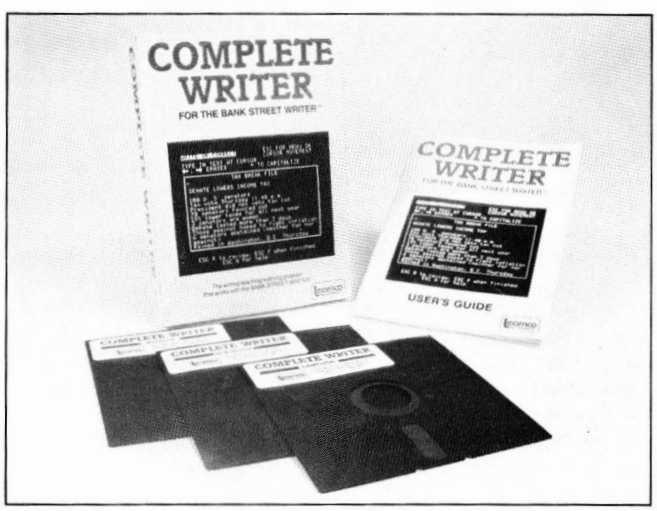
Hitchhiker's Guide

First, a world-class best seller. Next, a top TV series on PBS. What's left but an Infocom text adventure ($39.95) based on **The Hitchhiker's Guide to the Galaxy** by Douglas Adams. Join Ar-



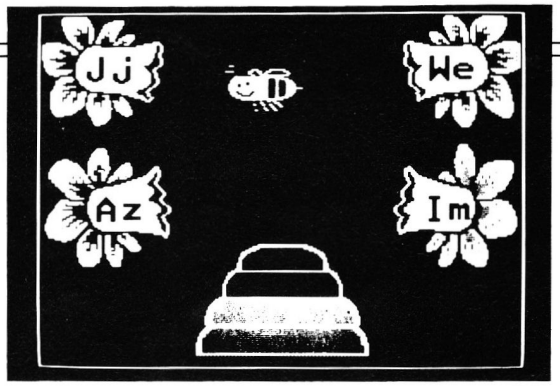
Glossary Disk of printer codes for Apple Writer.

Beacon casts light on financial management.

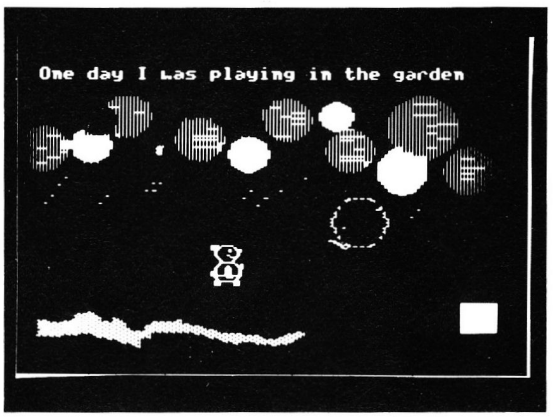


Learn writing skills with Complete Writer.

edited by Kerry J. Lanz



Youngsters learn capital letters in Easy as ABC.



Edit your own hi-res movies with KLI.

thur Dent and friends in their search for the ultimate question. Don't panic, just contact Infocom, 55 Wheeler Street, Cambridge, MA 02138, or check number 456 on the Reader Service card.

Colorful Home Education

Easy as ABC ($40) gives youngsters five alphabet games. In **Stickers** ($35), children move and color 100 shapes. Color your own drawings or fill in the 50 that come with **Rainbow Painter**, an electronic coloring book for $35. These titles work on any 48K Apple II and come from Springboard Software, 7807 Creekridge Circle, Minneapolis, MN 55435. Use Reader Service number 455.

Lights, Camera. . .

Make your own animated stories with **KLI**, a system for combining animated graphics, music, and text. Individual modules let you create shape tables, animation parameters, background scenes, and music. Programmed so even a child can make movies, KLI ($44.95) is from Interlearn, P.O. Box 342, Cardiff-by-the-Sea, CA 92007. Reader Service number is 451.

Develop 68000 Software

Develop software for the Macintosh and other 68000 systems with the **SX-68** cross assembler ($100) on your 64K Apple II. An editor creates source files which can be

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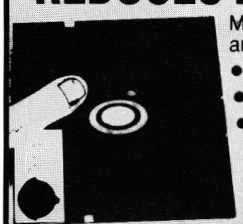

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saved on a disk or sent to the assembler. After two passes, the assembler generates a program listing and object code. For details, contact Allen Systems, 2151 Fairfax Road, Columbus, OH 43221. Use number 461 on the Reader Service card.

Battle the Bismarck

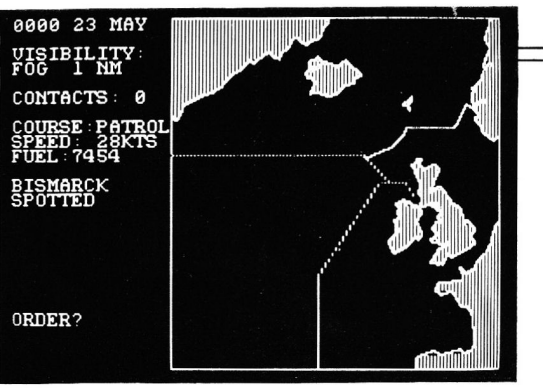
The storm-tossed North Atlantic becomes the stage for **Dreadnoughts'** simulation of World War II naval battles. Choose from more than 40 major ships, including the Bismarck. Priced at $30, the game works on any Apple II and is published by Avalon Hill Game Company, 4517 Harford Road, Baltimore, MD 21214. Use number 466 on the Reader Service card.

Logo Utilities

Solve those nagging Logo problems with the **Logo Wiz-Kit**. These utilities let you print Logo files and graphics, manage memory more effectively, and review Logo files from DOS 3.3. For $21 you get a teacher's disk, a student's disk, and instructions. Write Young People's Logo Association, P.O. Box 75085, Richardson, TX 75081. Use Reader Service number 457.

Figuring Statistics

Analytical Graphics accepts data from keyboard or from DIF files and displays the data in bar and line graphs, with linear or log axes. Graphs can easily be labelled and printed. The package is $90, runs on any 64K Ap-



Dreadnoughts lets you captain the Bismarck.

Wiz-Kit utilities print Logo graphics.

Circle 353 on Reader Service card.

ple II, and includes two program disks, tutorial disk, and manual. This information is from Scientific Software Products, 5726 Professional Circle, Indianapolis, IN 46241. The Reader Service number is 458.

Accounting for Home and Business

Engage your Apple as your accountant with **The Debit Credit Connection** ($90), an accounting package for home and small business. The program works on any Apple II, is copyable, and supports a hard disk. It also prints reports and checks as needed. Write Solitaire, 7146 West 113th Street, Bloomington, MN 55438, or use Reader Service number 467.

Insurance Software

The **Mortgage Accelerator** shows when a whole life insurance policy prepays a mortgage by comparing interest and payments for both the mortgage and the policy. The package ($240) contains a disk for any Apple II, manual, data worksheets, and sample artwork for a proposal folder. Contact American Software Technology, 1150 Kane Concourse, Bay Harbor Islands, FL 33154. Use Reader Service number 459.

Diversified Utilities

Diversi-Copy ($30) copies unprotected DOS 3.3, Pascal, CP/M, and ProDOS disks in seconds. It runs on any Apple II, and works fastest on a //c. **Diversi-Dial** ($50) lets you start a 7-line CB simulation in your own neighborhood. It runs on any Apple II with 64K and a Novation modem. Both products are from DSR, 5848 Crampton Court, Rockford, IL 61111. Reader Service number is 465.

Sport Spreadsheets

Master your statistics with **Sport Stats** for baseball or basketball ($63 each). Coaches and fans speed up their record keeping with these spreadsheet-style programs. Menus help set up categories, update information, and find current stats fast. For more information write Educational Activities, P.O. Box 392, Freeport, NY 11520, or circle Reader Service number 469.

Make a Date with a Comet

The comet is coming and **Halley's Comet** shows you where to look. The disk runs on any Apple II, is not copy-protected, and costs $49.95. It includes a history of the comet and plots the comet's position on any date and for any location. Results are shown on several hi-res maps. Contact American Only, 13361 Frati Lane, Sebastopol, CA 95472. Use number 450 on the Reader Service card.

Converter for BPI Files

GenCalc ($69.50) converts BPI accounting files into formats compatible with AppleWorks, VisiCalc, and business graphics packages. The

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A TASTE-TESTED JEWISH COMPUTER COOKBOOK

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For "Balebostahs," beginning cooks, or bachelors ... features more than 150 of the finest recipes in Jewish cookery. The Jewish Computer Cookbook plays no ethnic favorites. It includes such selections as Rumaki, Knaidlach, Beef Teriyaki, Chili, Spinach Filo, and Biscuit Tortoni - *All Kosher!*

Imagine you're starting with only a few ingredients and want recipes that use them; The Jewish Computer Cookbook will do an instant search of all the recipes for that ingredient! You can add, change or remove any recipe. Print recipes, or shopping lists! Even create your own cookbook of your family's favorite recipes. Plus the cookbook automatically calculates ingredient amounts for different serving sizes.

The Jewish Computer Cookbook is only $39.95 for the basic cookbook and recipe disk.

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Order the Jewish Computer Cookbook at the regular price of $39.95 and get *absolutely free* any two of the supplementary modules. Regularly $12.00 each.

BUT YOU DON'T TASTE JEWISH
A collection of international cuisine (French, Italian, Mexican, Chinese) adapted for the Kosher Kitchen. A wide variety of appetizers, entrees, desserts and more.

LIKE MAMA USED TO MAKE
A mouth-watering array of traditional Jewish Sabbath and Holiday cooking, with recipe suggestions adapted for each festive occasion.

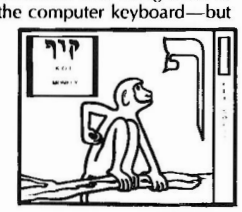
THE PARTY PLACE
Having a cocktail party? a sit-down dinner? a business buffet? This disk does everything except prepare the food! From finger foods to desserts, a selection of the best in party fare.

THE ALEF-BET COMPUTER COLORING BOOK

Software for Pre-Schoolers

Available for Apple II+/IIe/IIc Only $24.95

An interactive program that will familiarize youngsters with the letters of the Hebrew alphabet while providing hours of creative fun. Children can select from a 'palette' of 16 colors to color in 27 different pictures. Each picture corresponds to a different Hebrew letter—and features an object whose first letter in its Hebrew form (or last, if it's a final letter), is the same as the large letter displayed on the screen. Unlike paper coloring books, pictures may be 'colored in' over and over again, and finished artwork can be saved on the disk itself. Older children will enjoy connecting the dots to form the letter before coloring the picture. The Alef-Bet Coloring Book helps in identification and recognition of Hebrew letters and will familiarize children with the computer keyboard—but most important—it's fun!!



The Alef-Bet Computer Coloring Book
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- is an excellent creative tool
- will give your child a head start in learning the Hebrew letters
- for children ages 3 and up

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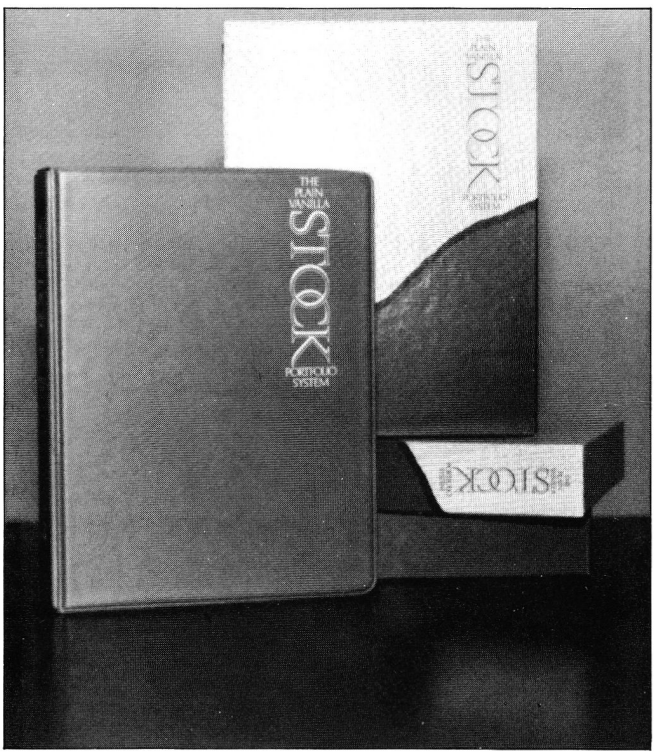
manual contains hints on transferring data and on using AppleWorks to run a small business. For details, write to Business Machines & Systems, P.O. Box 910, Glen Ellen, CA 95442, or circle 453 on the Reader Service card.

Apple on Your Family Tree

Your Apple can record your family lineage with **The Ancestry Link**, a data-base manager for genealogy research. The four-disk system runs on any Apple II, comes with manual, and costs $69.95. A tutorial helps you organize family data and print out a variety of reports. To learn more, contact Accelerated Logic, 108 East 38th Street, Suite 902, New York, NY 10016. Circle number 463 on the Reader Service card.

Take Stock of Your Shares

Pick the investor's helper that is right for you from **The Plain Vanilla Stock Portfolio System**. The Investor ($99.95) tracks small portfolios, while The Manager ($129.95) suits large or multiple portfolios. The Professional ($159.95) works with your modem to automatically update data. The system works on any Apple II and comes from Iris Communications, 660 Newport Center Drive, Suite 750, Newport Beach, CA 92660. Reader Service card number is 454.



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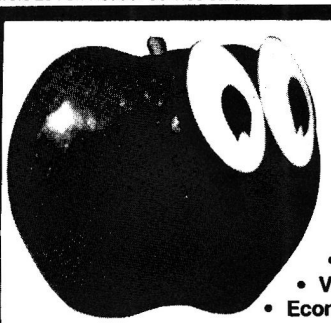

LET YOUR APPLE SEE THE WORLD!

The DS-65 Digisector® opens up a whole new world for your Apple II. Your computer can now be a part of the action, taking pictures to amuse your friends, watching your house while you're away, taking computer portraits . . . the applications abound! The DS-65 is a random access video digitizer. It converts a TV camera's output into digital information your computer can process. The DS-65 features:

- **High Resolution** — a 256 × 256 picture element scan
- **Precision** — 64 levels of grey scale
- **Versatility** — Accepts either NTSC or industrial video input
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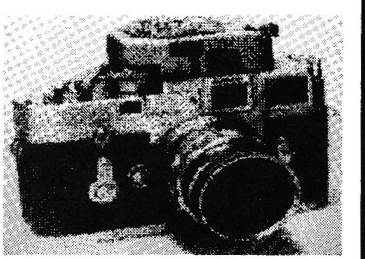

HI-RES PICTURE USING THE DS-65 AND PICTURE SCANNER SOFTWARE

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

- Full screen scans directly to Apple Hi-Res screen
- Easy random access digitizing by Basic programs
- Line-scan digitizing for reading charts or tracking objects
- Utility functions for clearing and copying the Hi-Res screen

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

ADDITIONAL SOFTWARE FOR THE DS-65

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

— **Superscan:** Enables you to enhance the DS-65's Hi-Res pictures with colors! Choose from 21 different colors and assign them to grey scale values, modify pictures, zoom, enhance contrast, etc. Includes print routines for Anadex 9500 or 9501; Epson MX-80GFT and MX-100; and IDS 460 Paper Tiger*. Written for The Micro Works by Magna Soft. Price: $79.95

*Paper Tiger is a trademark of Integral Data Systems, Inc.

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RAMWORKS™—A card that plugs into the Apple IIe auxiliary slot and functions EXACTLY like Apple's extended 80 column card (in fact, a 128K RAMWORKS™ actually costs less than Apple's 64K extended card) but with RAMWORKS™ you get more memory, 80 column text, a 3-year warranty and most importantly, room to grow without using more slots. A design so advanced there's a patent pending on it. If you have a IIc or an IBM, we suggest you do what everybody does, trade it in on a IIe.

You can utilize this RAM memory to expand Apple Works, VisiCalc, and many others. The RAMWORKS™ card will automatically expand Apple Works to 55K, VisiCalc IIe to 95K, Advanced VisiCalc IIe to 78K. Optional low-cost software is available from Applied Engineering to increase the storage capacity of these popular programs EVEN HIGHER! RAMWORKS™ is the only product capable of expanding Apple Works beyond 55K or Advanced VisiCalc IIe beyond 78K. With the Optional RAMDRIVE™ software RAMWORKS™ can also be used as an ultra high speed RAM disk. Depending on the memory size of the RAMWORKS™ card, you can emulate up to 4 disk drives with one RAMWORKS™ card. All at about 20 times faster than mechanical floppy drives and about 5 times faster than a hard disk.

RAMWORKS™ can be used as a solid state disk with DOS 3.3, PASCAL, CP/M, and PRO-DOS (up to 1,900 blocks free)!

RAMWORKS™ can be purchased in a wide range of sizes and is user upgradable using either 64K RAMS or the new 256K RAMS. In fact, RAMWORKS™ is the only auxiliary slot card on the market that will allow the new 256K RAMS to be used. If you already have an extended 80 column card, no problem. Just unplug the 64K RAMS and plug them into the RAMWORKS™ for an additional 64K. A RGB option is also available, you can order it with your RAMWORKS™ card or add it on at a later date.

RAMWORKS™ saves you time, money, slots and hassle. You'll have additional memory NOW and in the future.

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Ramworks™ with 256K Installed	$449
Ramworks™ with 512K Installed	$799
Ramworks™ with 1 MEG Installed	$1499
RGB Option (can be added later)	$129

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There used to be about a dozen 80 column cards for the Apple, now there's only ONE.

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- 80 characters by 24 lines, with a sharp 7X9 dot matrix.
- On-board 40/80 soft video switch with manual 40 column override.
- Fully compatible with ALL Apple languages and software—there are NO exceptions.
- Low power consumption through the use of CMOS devices.
- All connections are made with standard video connectors.
- Both upper and lower case characters are standard.
- All new design (using a new Microprocessor based C.R.T. controller) for a beautiful razor sharp display.
- The VIEWMASTER incorporates all the features of all other 80 column cards, plus many new improvements.

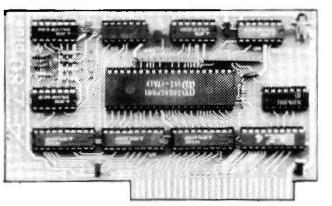
	PRICE	BUILT-IN SOFTSWITCH	SHIFT KEY SUPPORT	LOW POWER DESIGN	80 COLUMN HOME	7X9 DOT MATRIX	LIGHT PEN INPUTS	40 COLUMN OVERRIDE	INVERSE CHARACTERS
VIEWMASTER	159	YES	YES	YES	YES	YES	YES	YES	YES
SUPRTERM	MORE	NO	YES	NO	NO	NO	NO	YES	YES
WIZARD 80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION 80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX 80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
SMARTERM	MORE	YES	YES	NO	NO	NO	YES	YES	NO
VIDEX	MORE	NO	YES	YES	NO	YES	YES	NO	YES

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

PRICE $159

Z-80 PLUS
NOW INCLUDES NEW CP/AM 4.0™

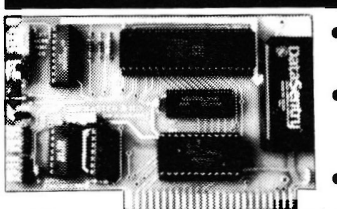
Enter the CP/M world with the new Z-80 Plus card from Applied Engineering and introduce your Apple to thousands of new programs. Only the Z-80 Plus comes standard with the new 4.0 software, the most advanced system for running CP/M programs ever. Only CP/AM 4.0™ has advanced features like built-in disk emulation for popular memory expansion boards (those made by Apple and Applied Engineering and others) to give you a faster system with more storage. You also get menu driven utilities that are much easier to use than the older CP/M utilities so you can get down to all that great CP/M software faster. If you already own the Z-80 Plus, you can upgrade to the 4.0 software for only $29. The Z-80 Plus runs older CP/M programs too, down to Version 2.1 (2.2 is the most popular). With the Z-80 Plus you can run the largest body of software in existence. Simply plug the Z-80 Plus into any slot in your Apple. You'll have two computers in one and the advantages of both, all at an unbelievably low price.



- TOTALLY compatible with ALL CP/M software.
- The only Z-80 card with a special 2K "CP/M detector" chip.
- Fully compatible with microsoft disks (no pre-boot required).
- Specifically designed for high speed operation in the Apple IIe (runs just as fast in the II+ and Franklin).
- Runs WORD STAR, dBASE II, TURBO PASCAL, FORTRAN-80, PEACHTREE and ALL other CP/M software with no pre-boot.
- A semi-custom I.C. and low parts count allows the Z-80 Plus to fly thru CP/M programs at a very low power level. (We use the Z-80A at fast 4MHZ.)
- Does EVERYTHING the other Z-80 boards do, plus Z-80 interrupts.

PRICE $139

THE NEW TIMEMASTER II H.O.



- Absolutely, positively totally PRO-DOS and DOS 3.3 compatible.
- Time in hours, minutes, seconds and milliseconds (the ONLY PRO-DOS compatible card with millisecond capability).
- 24 hour military format or 12 hour with AM/PM format.
- Date with year, month, day of week and leap year.
- The easiest programming in BASIC.
- Eight software controlled interrupts so you can run two programs at the same time (many examples are included).
- Compatible with ALL of Apple's languages. Includes over 35 programs for machine code, Applesoft, CP/M and Pascal on 2 disks.
- On-board timer lets you time any interval up to 48 days long down to the nearest millisecond.
- Rechargeable nickel-cadmium battery will last over 20 years.
- Two BSR/serial ports for future expansion.

Full emulation of all other clocks. It's easy for the H.O. to emulate other clocks, we just drop off features. That's why the H.O. can emulate others, but none of the others emulate us.

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

The Timemaster II H.O. will automatically emulate the correct clock card for the software you're using. You can also give the H.O. a simple command to tell it which clock to emulate.

Of course, most programs will use the Timemaster II H.O. in its native mode, but it's comforting to know that you can use programs written for other products without any modification. **PRICE $129**

Our boards are far superior to most of the consumer electronics made today. All I.C.'s are in high quality sockets with mil-spec. components used throughout. P.C. boards are glass-epoxy with gold contacts. Made in America to be the best in the world. All products work in Apple IIe, II, II+ and Franklin. The RAMWORKS™ is IIe only. Applied Engineering also manufactures a full line of data acquisition and control products for the Apple; A/D converters and digital I/O cards, etc. Please call for more information. All our products are fully tested with complete documentation and available for immediate delivery. All products are guaranteed with a no hassle **THREE YEAR WARRANTY.**

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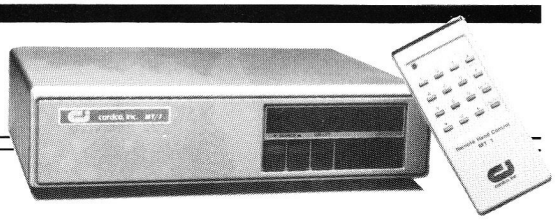


Wireless MT/1 puts TV on your monitor.

Double Your Viewing

After hours of work in front of your monitor, you can change it into a remote-control television with the **MT/1**. This 60-channel, cable-ready tuner ($200) works with color and monochrome monitors and can send the audio output to your stereo. Full information is available from Cardco, 300 South Topeka, Wichita, KS 67202. Reader Service number is 476.

Fifty at Your Fingers

Store and organize up to 50 disks in the **DiskFiler** ($34.95). Five flip-down compartments separate the 5¼-inch disks into categories and a handgrip adds easy portability. This desktop holder is from Computer Accessories, 7696 Formula Place, San Diego, CA 92121, number 484 on the Reader Service card.

Epson Enhancement

Epson's FX and JX printers deliver letter-quality results with the **LetterType** board ($199), including a 6K buffer. Once installed, it's controlled by switch or control-codes. Letter-quality speed is 32 cps and draft speed is 160 cps. This product is from Epson America, Kashiwa Street, Torrance, CA 90505. Circle number 477 on the Reader Service card.

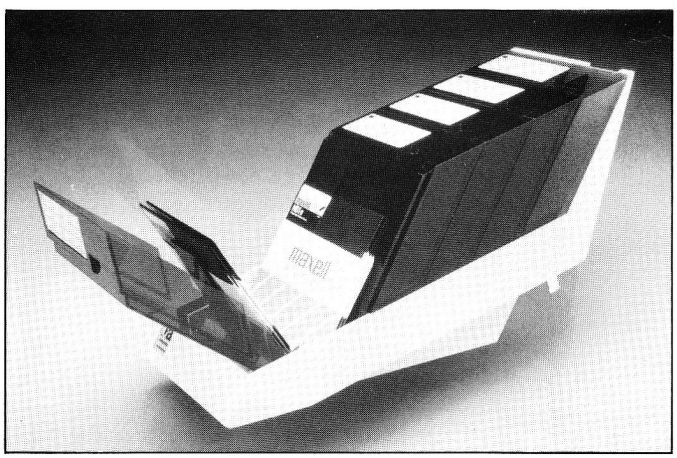
Complete Surge Protection

Wire Tree Plus protects your whole system from voltage surges, spikes, and interference. Of the six outlets, one is continuously on-line and five are switch controlled. It also offers two surge-protected modem connections. This Tree is $99.95 from Networx, 203 Harrison Place, Brooklyn, NY 11237. Circle number 485 on the Reader Service card.

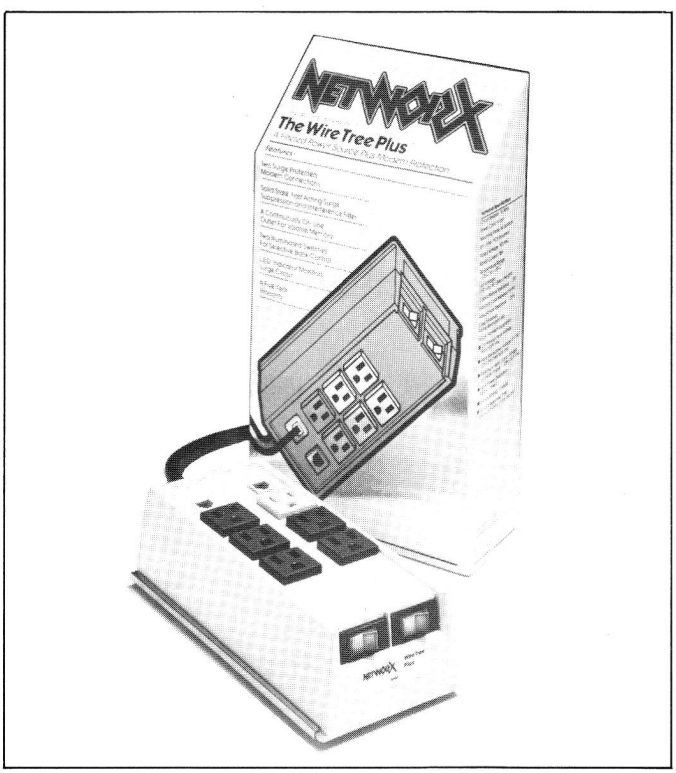
No More Baked Apples

Extra cards and long hours mean high temperature inside your Apple. **The Fan** ($155) fits on the back of your Apple II Plus or //e directing cool air over cards and CPU. It also filters surges for dependable operation. Get more information from Kemcore, Suite 7068, 111 East Drake, Fort Collins, CO 80525. Use number 473 on the Reader Service card.

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

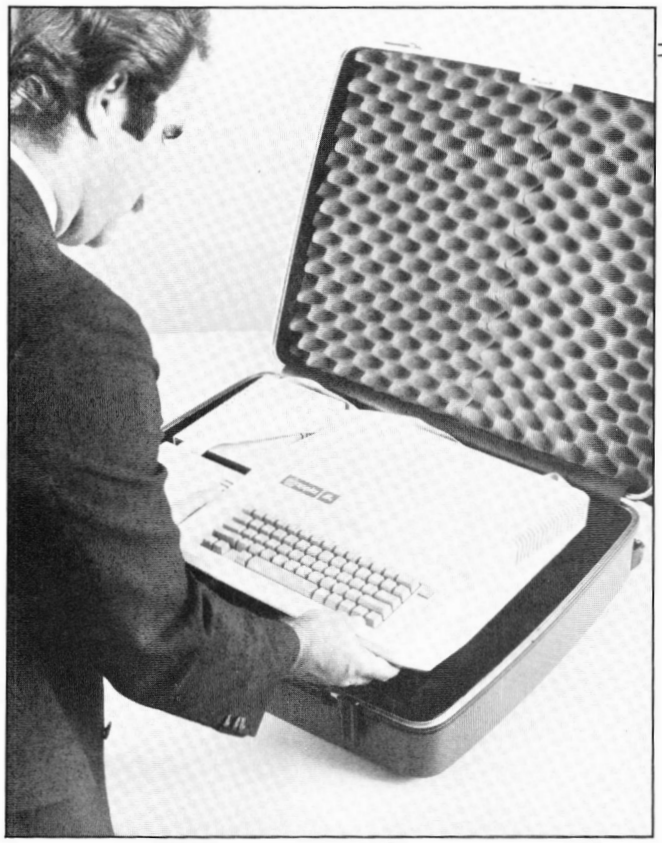


DiskFiler stores 50 disks within easy reach.



Wire Tree protects your entire system.

edited by Kerry J. Lanz



Don't leave home without your Apple.

Don't Leave Without It

Take your computer and your printer on your mid-winter vacation with **American Tourister** computer cases. Each case has a strong outer shell with interior foam cut to fit your equipment. It looks just like any other luggage to foil theft. Prices are $137.50 for an Apple II Plus or //e, and $105 for Epson FX printers. Contact American Tourister, 91 Main Street, Warren, RI 02885. Use Reader Service card number 471.

The Portable Connection

Disk + connects your Apple II Plus or //e to a Radio Shack Model 100 portable. The kit ($69.95) includes instructions, disk for the Apple, cassette and EPROM for the Model 100. Hook the Model 100 to your Apple through an RS-232 interface and use the larger memory of the Apple. Write to Portable Computer Support Group, 11035 Harry Hines Boulevard, Suite 207, Dallas, TX 75229. Reader Service number is 472.

All-in-One Modem Card

The **Zoom/Modem** plugs into a slot in your Apple II, II Plus, or //e and opens up the world of telecommunications. At $229, this auto-dial, auto-answer, 300-baud modem with a built-in terminal program includes offers from on-line information services. Get information from Zoom Telephonics, 207 South Street, Boston, MA 02111. Use Reader Service number 486.

The Truth About inCider

You probably already know that **inCider** is one of the fastest-growing Apple*-specific magazines on the market today.

What you might *not* know is that there are over 1.2 million Apple computer owners out there. And, many of them buy their copies of **inCider** at dealerships like yours every month. They might even be buying it from your competitors. . .

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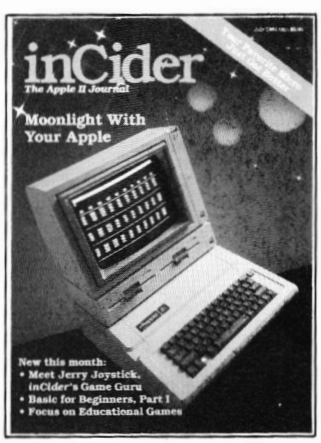


*Apple is a registered trademark of Apple Computer Inc.

Ultra-Fast Printer

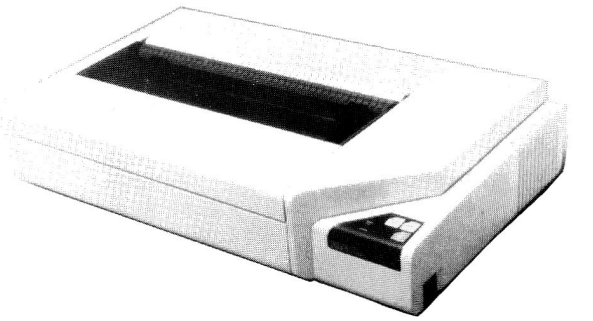
Faster than a speeding typist, the **OT-700** dot-matrix printer ($1495) has a top speed of 700 characters per second. Letter-quality printing is also fast at 350 cps. Graphics printing, alternate character sets, and foreign alphabets are available. For details write Output Technology, 606 110th Avenue NE, Bellevue, WA 98004. Check number 475 on the Reader Service card.

Low-Cost Home Printer

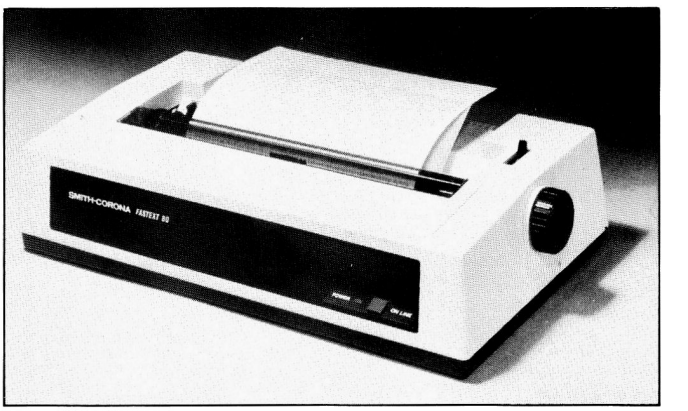
The **Fastext-80**, priced at $259, is an affordable dot-matrix printer with a speed of 80 cps. Features include pica and elite type styles, condensed and enlarged printing, and graphics mode. It comes Centronics compatible, but a serial version is available. Contact Smith-Corona, 65 Locust Avenue, New Canaan, CT 06840, or check off Reader Service number 481.

Alternative Operating System

More disk space and faster speed come from **DOS 4.0**. For $95 you get a CMOS 6502 chip, disk with DOS 4.0 operating system, and two manuals. The new chip provides fast processing, while the new operating system boosts disk storage and efficiency. This system is for an Apple II, II Plus, or //e. Get more details from Rune Enterprises, Suite 214, 80 Eureka Square, Pacifica, CA 94044. Mark number 478 on the Reader Service card.

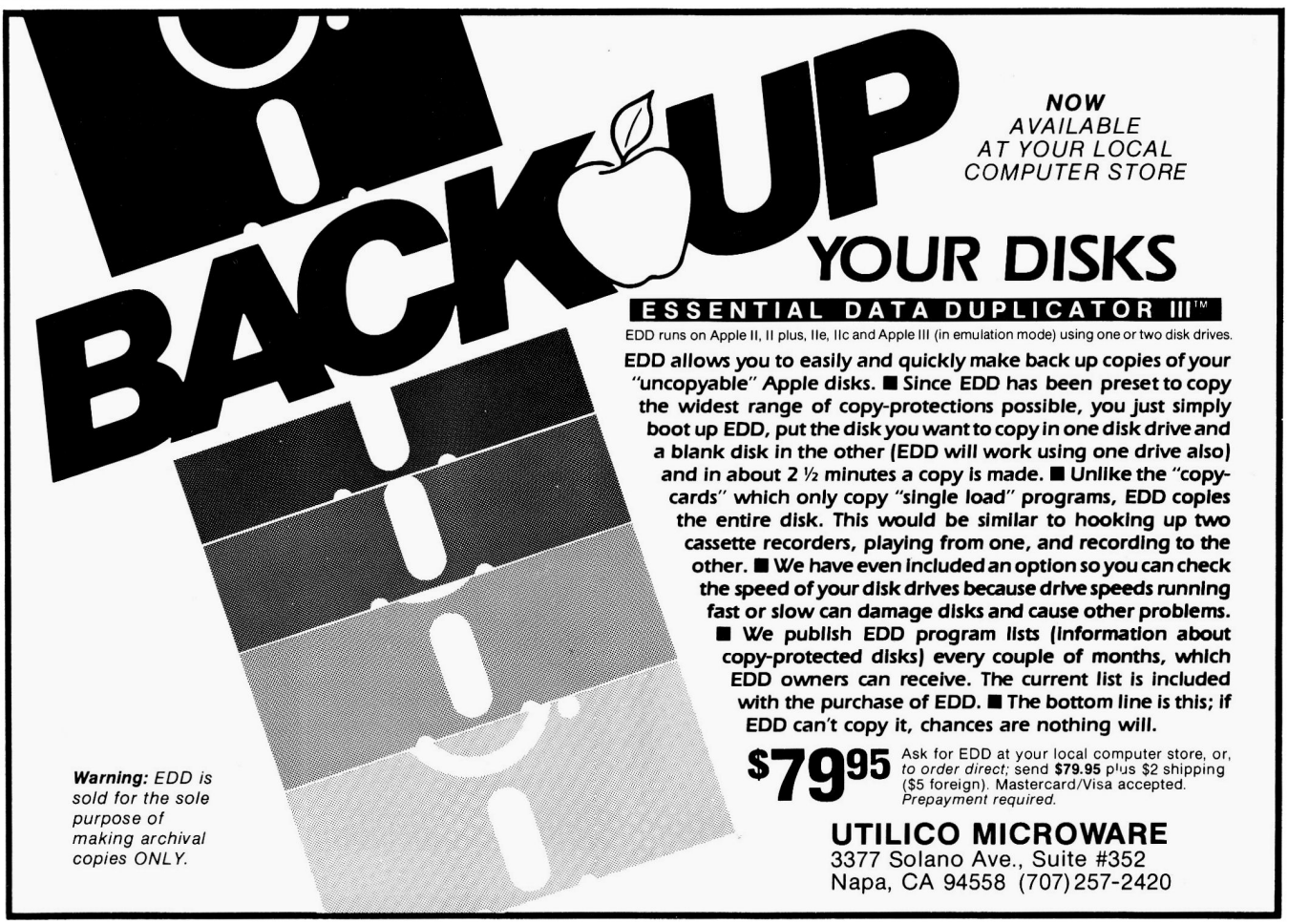


High-speed OT-700 dot-matrix printer.



Affordable printing with the Smith-Corona Fastext-80.

Circle 264 on Reader Service card.



Circle 286 on Reader Service card.

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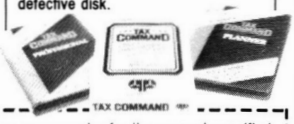

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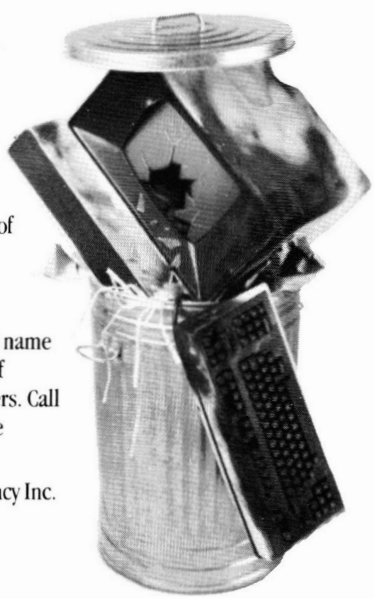

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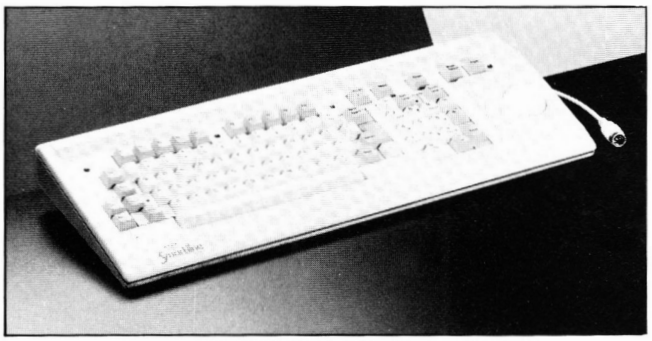


Smartboard programmable keyboard and trackball.

Keyboard and Trackball

Smartboard combines a sophisticated keyboard with a trackball. The keyboard has ten programmable keys, numeric keypad, and optional Dvorak key layout. Use the trackball for games or program it for mouse emulation. Smartboard works with an Apple II, II Plus, or //e, costs $400, and needs an adapter ($50). Contact Wico, 6400 West Gross Point Road, Niles, IL 60648, or mark Reader Service number 474.

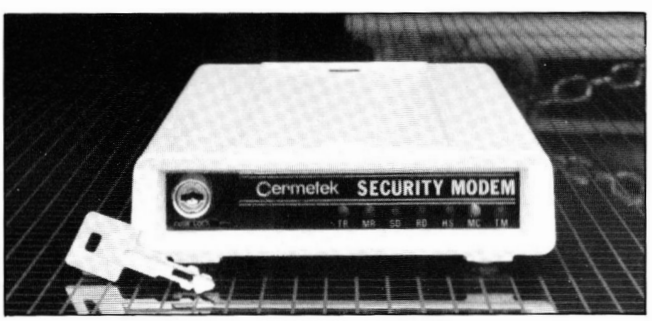
Modem Gives System Security

With passwords and call-back protection, the **Security Modem** ($695) guards your system from unauthorized access. This Hayes-compatible 1200/300/110 baud modem uses an RS-232 interface and stores 25 passwords and phone numbers. For details write Cermetek Microelectronics, 1308 Borregas Avenue, Sunnyvale, CA 94088. Reader Service card number is 482.

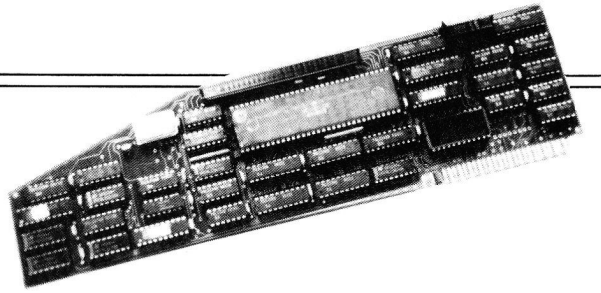
Emergency Power Protection

Don't let winter storms dump your files along with the snow. The **Minuteman 500** ($699) provides your system with 500 watts of power for up to 30 minutes in case of power failure. Use it yearround as a surge protector and line filter, but it automatically comes online in case of brownouts and blackouts. Write Para Systems, 11425 Mathis Street, Suite 404, Dallas, TX 75234. The Reader Service number is 489.

Minuteman 500 protects your power and your data.



The Security Modem protects your system.



PDQ 32-bit card runs the PDQBASIC+ Applesoft compiler.

Applesoft for 32 Bits

Run your Applesoft programs on a superfast 32-bit processor with the **PDQBASIC+** compiler ($95). The compiler requires the **PDQ Super-32** coprocessor card ($795). Execution speed can be 40 times faster with this system. Full details are available from Enhancement Technology, 17 Keeler Street, Pittsfield, MA 01202. Use number 480 on the Reader Service card.

Pooling Your Printer

The **Scooter Multi-Buffer** allows one parallel printer to receive data from three computers without manual switching. Indicator lights tell how much of the 64K memory is being used. Useful for schools or offices, it's priced at $389 by Ohm/Electronics, 746 Vermont, Palatine, IL 60067. The Reader Service number is 479.

Serial Card for Epsons

The **Universal Card** ($129.50) allows your serial Apple //c to drive Epson RX and FX printers. The Card checks data, and changes Imagewriter control codes to Epson codes so it's compatible with all software written for the //c. For additional details contact Hanzon Data, 18732 142nd Avenue N.E., Woodinville, WA 98072, or check Reader Service number 488.

Sweet Talkin' Chip

The new SSI 263 chip lies at the heart of the **Sweet Talker II** sound synthesizer and software. It imitates speaking and singing with complete control of vibrato, tone, and inflection. Music and sound effects are available. Plug it into a slot on your Apple II Plus or //e for $104. Talk to Micromint, 561 Willow Avenue, Cedarhurst, NY 11516, or mark Reader Service number 470.

Testing the Chips

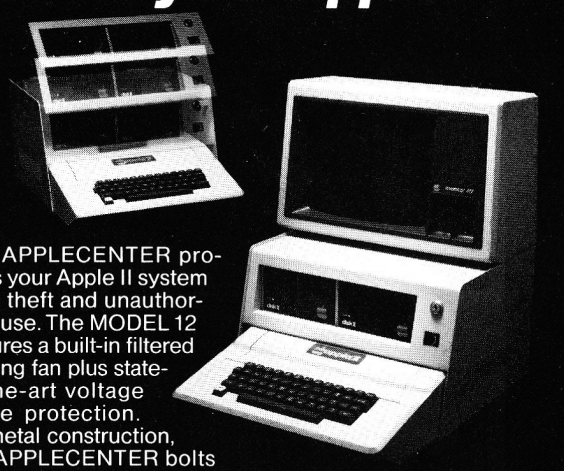
Just the New Year's gift for your techie friend is the **DA6502-B** for $595. This 6502 emulator lets you build, test, and repair any system based on the 6502 CPU, including Apples. The system consists of terminal, emulator program, 6502 chip, bus switch, and power supply. Contact Da-Tech, 92 Steamwhistle Drive, Ivyland, PA 18974. Use number 483 on the Reader Service card.

Switchable Color Monitor

Teknika's **MJ-22** high-resolution monitor switches between RGB and NTSC composite signals. The monitor, priced at $439.95, uses the composite signal of your Apple II. An optional 80-column RGB board for the Apple //e costs $200 and gives additional modes and a choice of text colors. Both monitor and board are from Teknika Electronics, 353 Route 46 West, Fairfield, NJ 07006. Mark Reader Service number 487.

Circle 34 on Reader Service card.

Maximum Protection for your Apple



The APPLECENTER protects your Apple II system from theft and unauthorized use. The MODEL 12 features a built-in filtered cooling fan plus state-of-the-art voltage surge protection. All metal construction, the APPLECENTER bolts easily to the worksurface (or use optional adhesive plate) to secure your Apple II or IIe, 2 disk drives or Duodisk. You control the use of your Apple with the key locking on/off switch. Our MODEL 10 is compatible with side mounted fans.

Our EMBLEM secures your IBM PC from theft.

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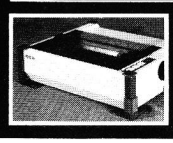

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• 8" •	• 8" •	d-side quad 36.95	• 8" Datalife
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Paul Boule, Sales Manager; Barbara Alvarez

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This card valid until February 28, 1985

My vote for the best advertisement in this issue goes to _____whose Reader Service number is _____.

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- ☐ 2. Computer store
- ☐ 3. Newsstand
- ☐ 4. Bookstore
- ☐ 5. At work
- ☐ 6. Library
- ☐ 7. Friend/Colleague
- ☐ 8. Other

B. How many of each issue's program listings do you actually type in?
- ☐ 1. 0
- ☐ 2. 1
- ☐ 3. 2
- ☐ 4. 3
- ☐ 5. 4
- ☐ 6. 5 or more

C. Are you interested in reading more about the Macintosh or Lisa in *inCider*?
- ☐ 1. Yes, on the Macintosh
- ☐ 2. Yes, on Lisa
- ☐ 3. Yes, on both
- ☐ 4. No

D. Which of the following microcomputers do you own or use?
- ☐ 1. Apple II or II+
- ☐ 2. Apple IIe
- ☐ 3. Apple IIc
- ☐ 4. Apple III
- ☐ 5. Macintosh
- ☐ 6. Apple compatible
- ☐ 7. Other
- ☐ 8. Don't own or use one

E. What is your annual household income?
- ☐ 1. Under $20,000
- ☐ 2. $20,000 - $40,000
- ☐ 3. $40,000 - $60,000
- ☐ 4. $60,000 - $80,000
- ☐ 5. $80,000 - $100,000
- ☐ 6. Over $100,000

F. How much have you spent on computer hardware during the last 12 months?
- ☐ 1. Nothing
- ☐ 2. Under $1,000
- ☐ 3. $1,000 - $2,000
- ☐ 4. $2,000 - $3,000
- ☐ 5. $3,000 - $4,000
- ☐ 6. $4,000 - $5,000
- ☐ 7. Over $5,000

G. How much do you plan to spend on computer hardware during the next 12 months?
- ☐ 1. Nothing
- ☐ 2. Under $1,000
- ☐ 3. $1,000 - $2,000
- ☐ 4. $2,000 - $3,000
- ☐ 5. $3,000 - $4,000
- ☐ 6. $4,000 - $5,000
- ☐ 7. Over $5,000

H. How much have you spent on software during the last 12 months?
- ☐ 1. Nothing
- ☐ 2. Less than $100
- ☐ 3. $100 - $250
- ☐ 4. $250 - $500
- ☐ 5. $500 - $1,000
- ☐ 6. Over $1,000

I. What is your specific interest in the items circled at right?
- ☐ 1. Immediate purchase
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- ☐ 4. Reference
- ☐ 5. Other

J. Do you influence computer purchases within your company?
- ☐ 1. Yes
- ☐ 2. No
- ☐ 3. Doesn't apply

K. On a scale of 1 (no interest) to 5 (great interest), please rate your interest in the following *inCider* columns:
- ___ 1. Fermentations
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- ___ 3. The Glau Report
- ___ 4. O'Brien's Journal
- ___ 5. The Learning Machine
- ___ 6. Child's Play
- ___ 7. The Applesoft Adviser
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- ___ 9. Fudge It!
- ___ 10. Ask inCider
- ___ 11. The Apple Clinic
- ___ 12. Apple Extract

L. If you are not a subscriber, please circle 500.

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26	31	36	41	46	176	181	186	191	196	326	331	336	341	346	476	481	486	491	496
27	32	37	42	47	177	182	187	192	197	327	332	337	342	347	477	482	487	492	497
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29	34	39	44	49	179	184	189	194	199	329	334	339	344	349	479	484	489	494	499
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51	56	61	66	71	201	206	211	216	221	351	356	361	366	371	501	506	511	516	521
52	57	62	67	72	202	207	212	217	222	352	357	362	367	372	502	507	512	517	522
53	58	63	68	73	203	208	213	218	223	353	358	363	368	373	503	508	513	518	523
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126	131	136	141	146	276	281	286	291	296	426	431	436	441	446	576	581	586	591	596
127	132	137	142	147	277	282	287	292	297	427	432	437	442	447	577	582	587	592	597
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130	135	140	145	150	280	285	290	295	300	430	435	440	445	450	580	585	590	595	600

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inCider • January 1985

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This card valid until February 28, 1985

My vote for the best advertisement in this issue goes to _____whose Reader Service number is _____.

A. Where did you get this copy of *inCider*?
- ☐ 1. Personal subscription
- ☐ 2. Computer store
- ☐ 3. Newsstand
- ☐ 4. Bookstore
- ☐ 5. At work
- ☐ 6. Library
- ☐ 7. Friend/Colleague
- ☐ 8. Other

B. How many of each issue's program listings do you actually type in?
- ☐ 1. 0
- ☐ 2. 1
- ☐ 3. 2
- ☐ 4. 3
- ☐ 5. 4
- ☐ 6. 5 or more

C. Are you interested in reading more about the Macintosh or Lisa in *inCider*?
- ☐ 1. Yes, on the Macintosh
- ☐ 2. Yes, on Lisa
- ☐ 3. Yes, on both
- ☐ 4. No

D. Which of the following microcomputers do you own or use?
- ☐ 1. Apple II or II+
- ☐ 2. Apple IIe
- ☐ 3. Apple IIc
- ☐ 4. Apple III
- ☐ 5. Macintosh
- ☐ 6. Apple compatible
- ☐ 7. Other
- ☐ 8. Don't own or use one

E. What is your annual household income?
- ☐ 1. Under $20,000
- ☐ 2. $20,000 - $40,000
- ☐ 3. $40,000 - $60,000
- ☐ 4. $60,000 - $80,000
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- ☐ 6. Over $100,000

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Name_____

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VERSAPAYABLES™ is designed to keep track of current and aged payables, keeping you in touch with all information regarding how much money your company owes, and to whom. VERSAPAYABLES™ maintains a complete record on each vendor, prints checks, check registers, vouchers, transaction reports, aged payables reports, vendor reports, and more. With VERSAPAYABLES™, you can even let your computer automatically select which vouchers are to be paid.

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VERSAPAYROLL™ is a powerful and sophisticated, but easy to use payroll system that keeps track of all government-required payroll information. Complete employee records are maintained, and all necessary payroll calculations are performed automatically, with totals displayed on screen for operator approval. A payroll can be run totally, automatically, or the operator can intervene to prevent a check from being printed, or to alter information on it. If desired, totals may be posted to the VERSALEDGER II™ system.

VERSAINVENTORY™ $99.95

VERSAINVENTORY™ is a complete inventory control system that gives you instant access to data on any item. VERSAINVENTORY™ keeps track of all information related to what items are in stock, out of stock, on backorder, etc., stores sales and pricing data, alerts you when an item falls below a preset reorder point, and allows you to enter and print invoices directly or to link with the VERSARECEIVABLES™ system. VERSAINVENTORY™ prints all needed inventory listings, reports of items below reorder point, inventory value reports, period and year-to-date sales reports, price lists, inventory checklists, etc.

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- handles multiple checkbooks and general ledgers,
- prints 17 customized accounting reports including check registers, balance sheets, income statements, transaction reports, account listings, etc.

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