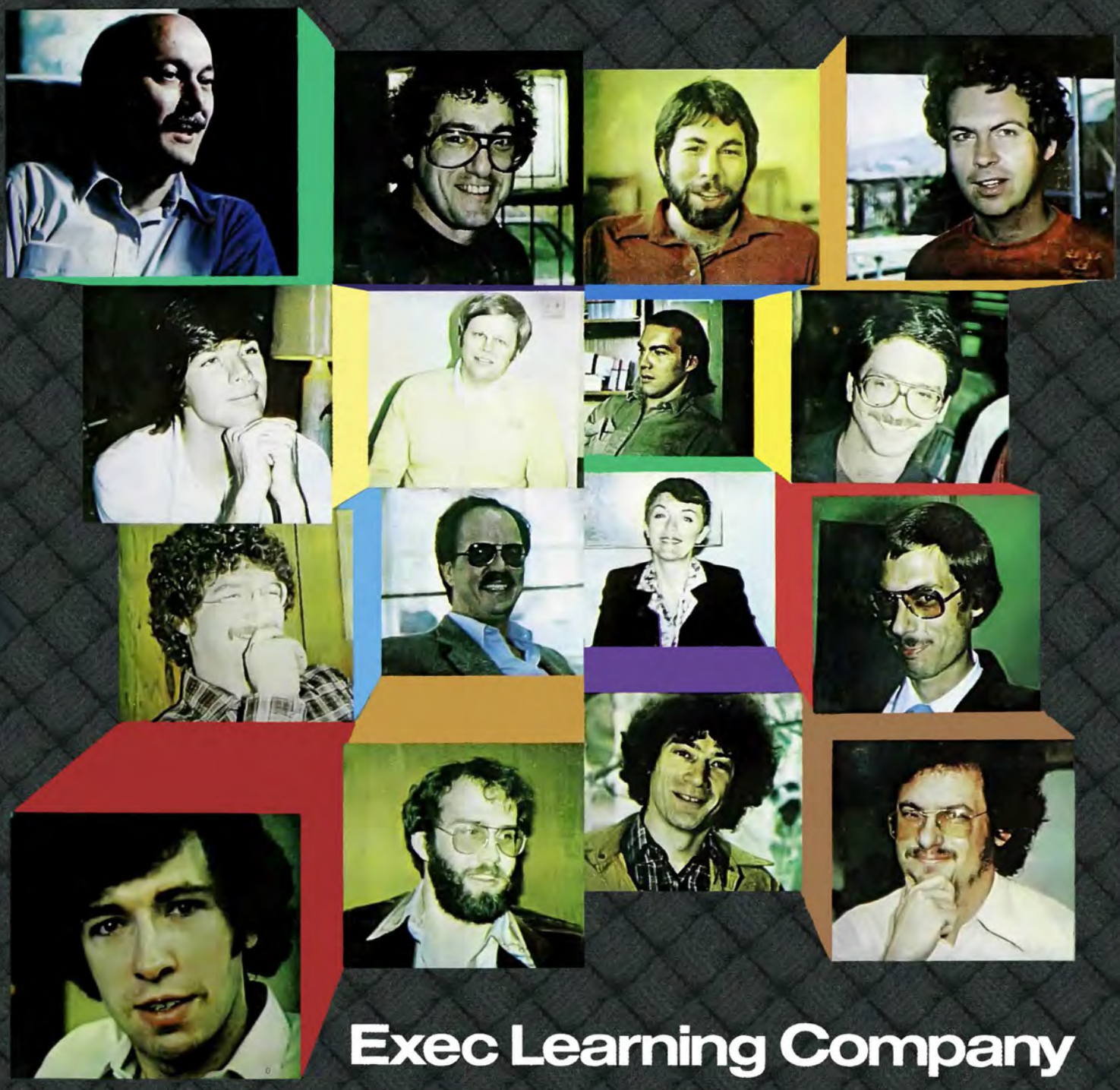
SOFTALK

VOLUME 4 JANUARY 1984 $3.00

Apple Leaders Preview 1984



Exec Learning Company

The Apple III Plus • Softalk Index

SOFTWARE ARTISTS?

How we got this year's hottest sports game out of two rather inexperienced designers.

TO MAKE THE FIRST BASKETBALL PROGRAM that feels like the real thing, it helps to start with two guys who know what the real thing feels like.

Enter Larry Bird and Julius Erving. Bird – the hustler, the strong man, deadly from outside. Erving – The Doctor, maybe the most explosive player in the history of the game.

We talked to them, photographed them in action, studied their moves and their stats and their styles. Then we set out to create on computer disc an event which may never happen in real life. We put the two of them together on a dream court of light, for an electronic afternoon of one-on-one.





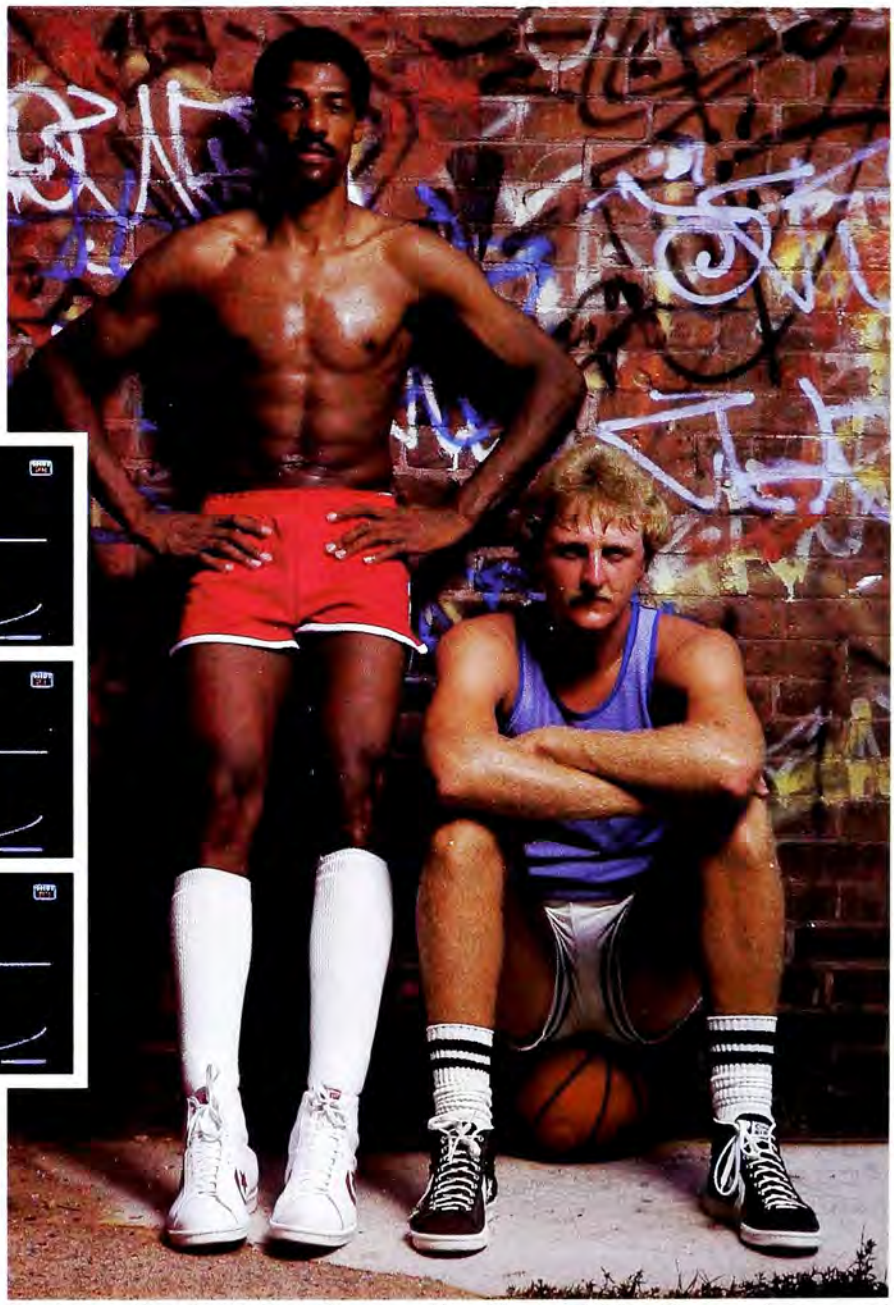


It wasn't easy. When they talked, we listened. When they criticized, we made big changes. When they gave suggestions, we took them.

And it shows. This thing is absolutely uncanny. You actually take on all the skills and characteristics of Bird or The Doctor – their own particular moves, shooting abilities, even strength and speed.

You'll meet with fatigue factors, hot and cold streaks, turnaround jump shots, and 360-degree slam dunks. But there's some whimsy in here, too – a funny referee, a shattering backboard, even instant replay.

It's called *Julius Erving and Larry Bird Go One-on-One.*™ You're Bird. Or you're The Doctor. And that's the last decision you'll have plenty of time to make.

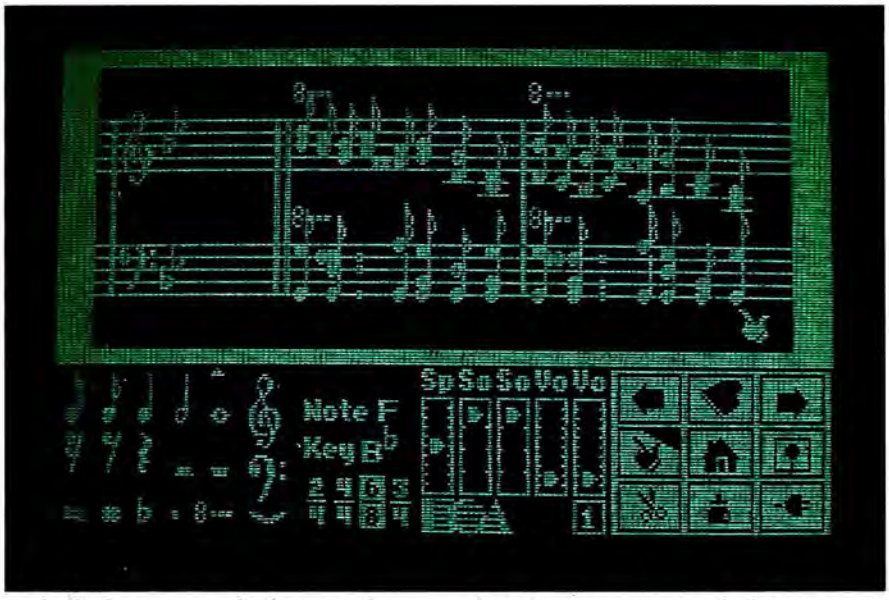


Julius Erving and Larry Bird Go One-on-One is now available on diskette for Apple II, II+ and IIe computers. Apple is a registered trademark of Apple Computer. To find out more about Electronic Arts and its products, write us at 2755 Campus Drive, San Mateo, CA 94403 or call (415) 571-7171.

ELECTRONIC ARTS

The END *of* DINKETY-DINK.

Announcing the first computer music program that actually sounds like music.



LET'S FACE IT. Up till now, music programs for your home computer have all sounded, well, pretty lame. There were the ones that resembled little electronic music boxes, remember? And then there were those that sounded like so many burps.

Enter Music Construction Set.™ It's the first music program that really makes use of the power of that machine you've got. If you're a serious student, this means you'll be able to work with an intricacy and range of sound quality you've never heard before on a computer. And if you know nothing about music, you'll find something even more important. Namely, that this thing is simple enough to be a lot of fun.

Take a good look at this screen because it, you, and a joystick are the whole story here.

That's you at the right end of the staff of notes – the little hand. Move the joystick, and you move the hand. Use it to carry notes up to the staff. Lay in rests, signatures, clefs, then point to the little piano in the lower right and listen, because you'll hear the whole thing played back.

Move those little scales in the middle up and down to vary the music's speed, sound quality, and volume. Use the scissors to cut out whole measures, then use the glue pot to paste them in somewhere else. Got a printer? Great. Print the score out and show it off to your friends.



But what if you're not up to writing your own stuff yet? No problem. There are twelve pieces of music already in here, from rock 'n roll to baroque. They're fun to listen to, and even more fun to change. (Apologies to Mozart.)

The point is, the possibilities are endless. But if you're still skeptical, visit your nearest Electronic Arts dealer and do the one thing guaranteed to send you home with a Music Construction Set in tow.

Boot one up. Point to the piano. And listen.

ELECTRONIC ARTS™

MUSIC CONSTRUCTION SET is now available for Apple II, II+, IIe, and Commodore 64 computers. The Apple version, with a Mockingboard,™ plays chords of up to six notes each. The Commodore version plays chords of up to three notes each. Apple is a registered trademark of Apple Computer. Commodore is a registered trademark of Commodore Business Machines, Inc. For more information about Electronic Arts, write us at 2755 Campus Drive, San Mateo, CA 94403 or call (415) 571-7171.

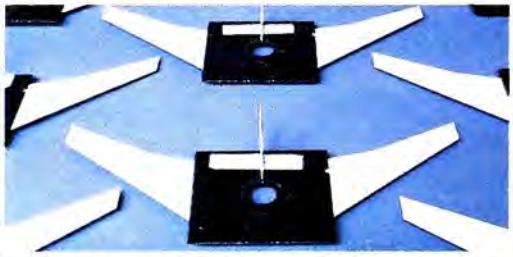
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January 1984



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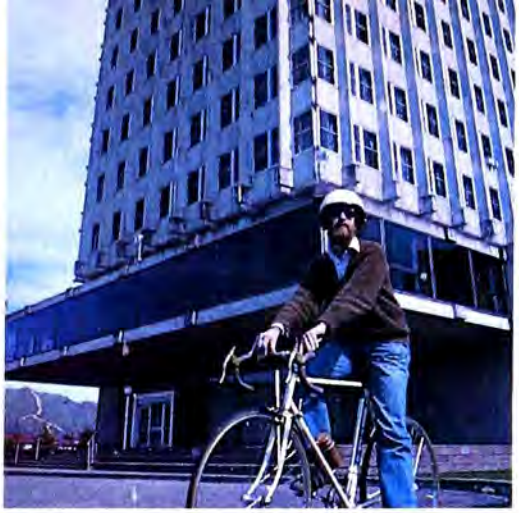
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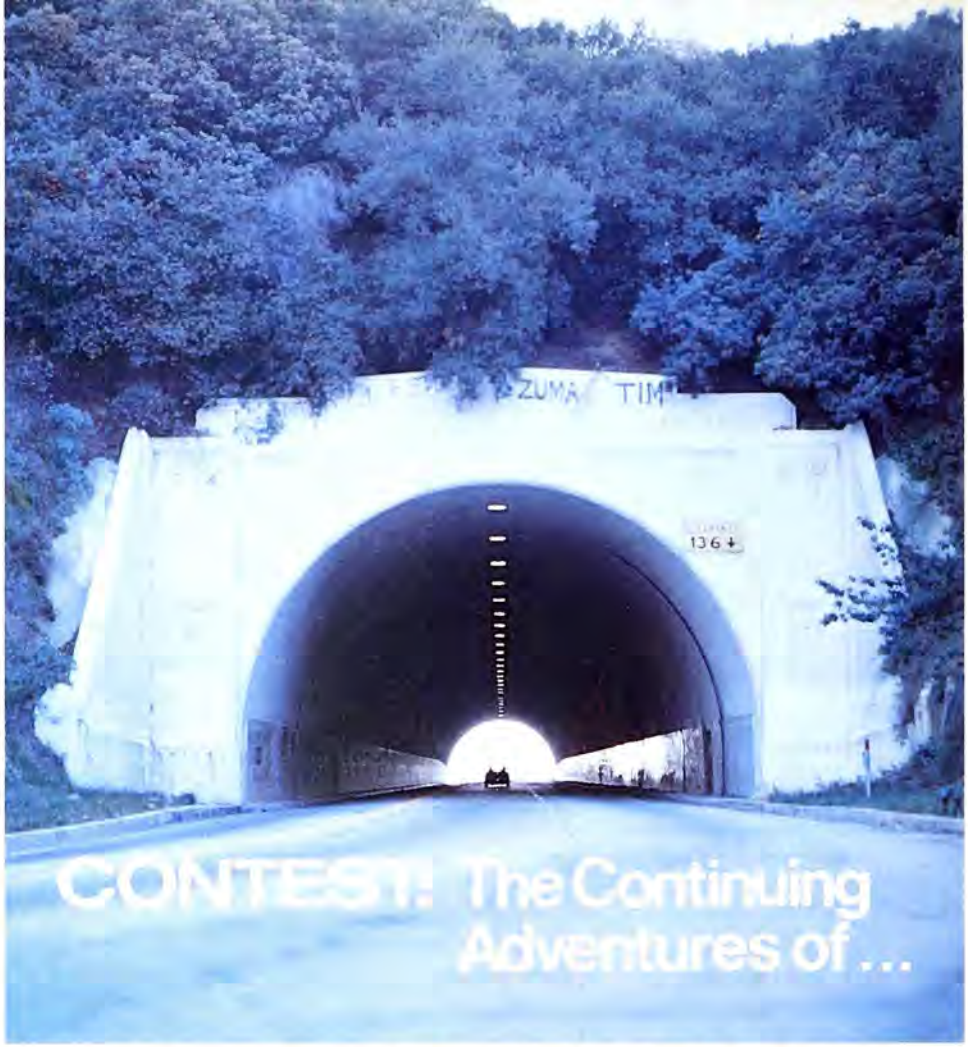
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Problems? If you haven't received your *Softalk* by the fifteenth of the month, or if you have other problems with your subscription, Marsha Stewart can help out. Call (213) 980-5074 or (800) 821-6231.

Moving? Send new address and a label from a recent *Softalk* to Softalk Circulation, Box 7039, North Hollywood, CA 91605; telephone (213) 980-5074. Please allow six to eight weeks for processing.



This month's contest is very simple. What follows is an adventure game, just the way it would appear on the screen. To make things easier, we've taken the liberty of providing all the right commands to get you through the adventure as quickly as possible.

"Well, heck," you're probably thinking, "what's the challenge?"

The challenge is to read through the short adventure and figure out what the player was doing—in other words, what the adventure was about. Once you figure that out, write down what you think the adventurer was doing and send it in. That's it! All you have to write is something like, "The adventurer was . . ." filling in the blank with a sentence or two. If necessary, you can follow that with a brief explanation of why you think that's what the adventure was doing. Then give the adventure game a name, such as "Danger in Uh-oh Land," or whatever suits your fancy.

Just a few rules. First, all entries must be on 8½-by-11-inch paper. No larger, no smaller. You shouldn't need to use more than one sheet of paper, but if your entry is more than one page, then all pages must be stapled together. Your name, address, and phone number must be printed on each page of your entry. You can use a facsimile of the coupon on this page, but it's more important that you write all the information on the entry.

A prize of $200 to be spent on Apple accessories made by *Softalk* advertisers will be awarded to the person who figures out correctly what the task of the adventure was. In the case of a tie, the snooty random number generator (RNG) will send its butler to pick a winner by random drawing. All decisions are final (it figures).

Bonus! A special bonus prize worth $50 will be awarded to the contestant who turns in the most imaginative entry, right or wrong. So even if you can't figure out what this adventure was about, you still have a chance to win. Any entry that gives a description of what was going on, as long as it is consistent with the action in the adventure, is eligible to win this bonus prize.

Entries must be postmarked by February 15, 1984. No exceptions.

Does this sound like just the kind of January fun that will kick off the new year right? Better believe it. So, get adventuring, figure out what the heck was going on, and send in your entry soon to Softalk Adventure, Box 7039, North Hollywood, CA 91605, postmarked by the day after Valentine's Day.

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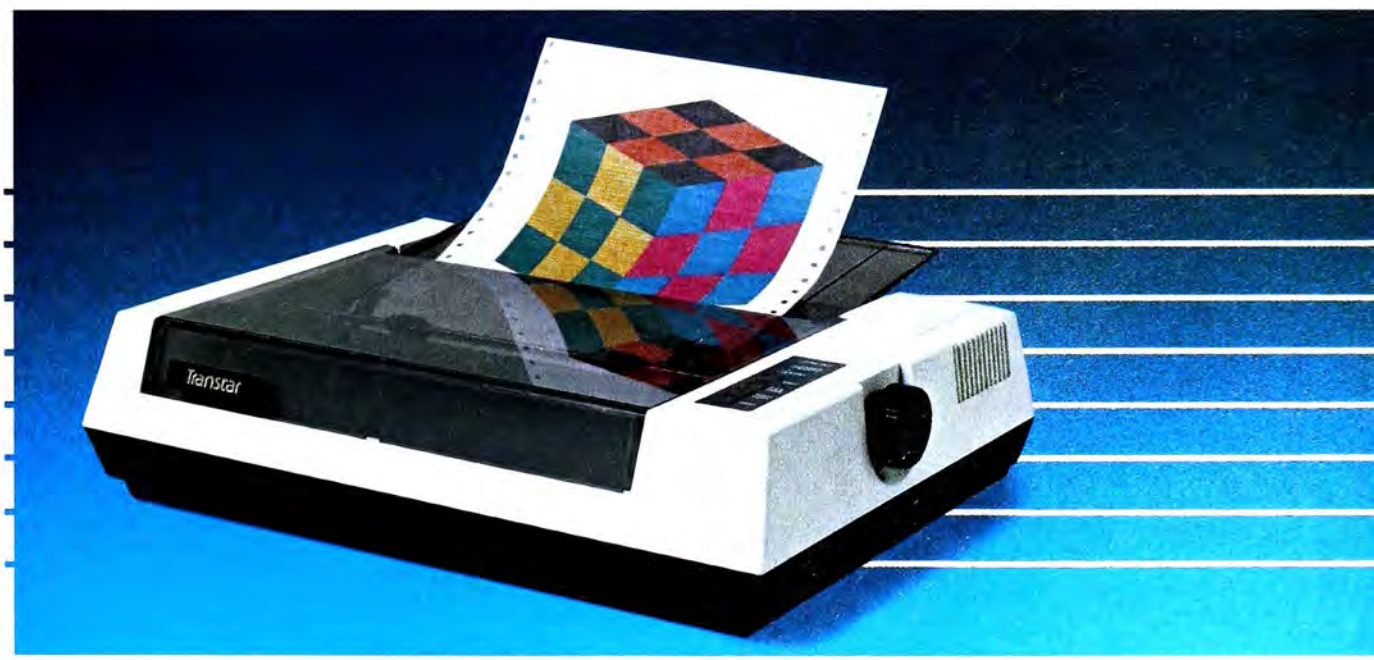
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*PICS cards are currently available for Apples and Franklins. PICS cards for other computers will be available in the future.

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In The Dashing Dungeons of a Bold Hero

You are in a large room. Aluminum artifacts lie strewn about.

>South

You are at the east end of an east-west hallway.

>West

You are still in the hallway. There is a door to the south.

>South

You are in a small room.

>Describe room

There are some ceramic bowls here. An odd-looking container lies against the southern wall. Four transparent bottles sit on a shelf.

>Get bowls

You have no need for the bowls . . . yet.

>Examine bowls

There is a large one and a smaller one. They seem to be made of some blend of kaolin, feldspar, and quartz.

>Examine container

It seems to be made of organic compounds. Inside it are three unidentifiable objects.

>Examine objects

The composition of the objects seems totally alien. Chemical analysis reveals that the objects are composed of a derivative of the Linaceae family of plants.

>Take container

Taken.

>Examine bottles

The bottle on the left contains white, blue, and red crystals. The two bottles in the middle contain smaller, white crystals. The bottle on the right contains a liquid thick as syrup.

>Get bottle

Which?

>Left

Taken.

>Get bottle

Which?

>Right

Taken.

>North

You are in the hallway.

>East

You are in the hallway. There is a door here.

>Open door

You are in the middle of a long north-south hallway that stretches very far in both directions.

>North

You are in the hallway.

>North

There's a T intersection here, with a corridor leading off to the east.

>East

You are in the corridor. There's a huge door to the left, with a panel next to it.

>Describe panel

It has one button. There is space for another button, but it looks like the space was never used.

>Press button

The door opens.

>East

The door closes behind you. There is a door here with a panel of two buttons—one green, the other yellow.

>Press green

The door opens long enough for you to pass . . . and then closes.

>Press yellow

The door remains shut. Suddenly, the floor shakes slightly as though there were a small quake.

>Help

Try pressing a button.

>Press yellow

Strange. For some reason, the door opens this time.

>Go door

The door shuts behind you. It's very dark here; it seems like you're in a small north-south corridor. A pungent odor fills the air, which is damp.

>North

You can hear some loud machinery behind a red door. Next to that is a smaller, brown door with a sign that reads "Authorized Personnel Only!"

>Open door

Which?

>Brown

Can't you read?! Besides, you can't because it's locked.

>Open red

The red door is opened

>Enter room

The room is totally dark. The sound of machinery grows to an almost deafening level.

>Light torch

That's an instrument of old adventure games. Besides, you don't have a torch.

>Take inventory

You have the following:

A container with some objects made of plant derivative in it

Five small disks

Seven large disks

Some sticks with sulfuric substance on the ends of them.

>Rub stick

How primitive. Try feeling around the doorway.

>Feel doorway

Aha, a light switch! Flipping it on floods the room with light.

>Examine disks

They bear some alien inscriptions; different sized disks have different inscriptions. However, some of the inscriptions appear on all the disks.

>Read inscriptions

Though it's all alien, you translate some of it as references to ancient religions.

>Examine room

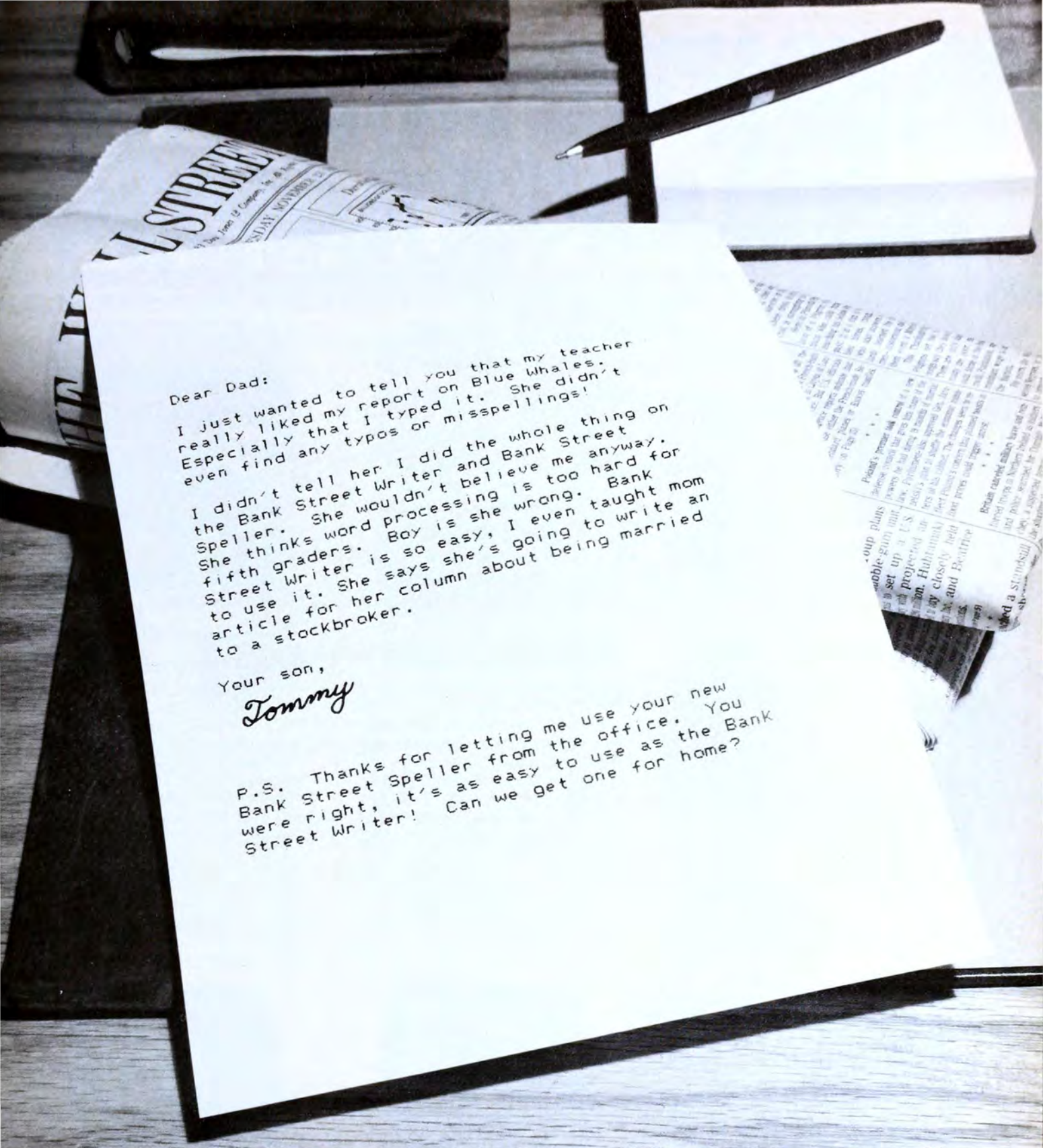
Against the west wall are some small doors with panels of controls next to each door. Along the east wall are similar doors, except that those doors open outward. The doors, though they appear too small for you to fit through, do not appear to be locked.

>West

You are in front of some small doors that are about waist-high.

>Open door

Inside the door is a compartment lined with



Bank Street Writer™ and Bank Street Speller™

from Brøderbund Software. Easy-to-use word processing and spelling software for home and office.

Bank Street Writer is available for the Apple II/II+/IIe, Atari computers, Commodore 64, and IBM PC.
Bank Street Speller is available for the Apple II/II+/IIe.
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Brøderbund Software™

17 Paul Drive, San Rafael, CA 94903

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IF YOU'RE LIKE MOST BUY A SINGLE



YOU'LL BUY LOTS OF SPINNAKER GAMES.

And not just because they're educational, but also because they happen to be a lot of fun to play.

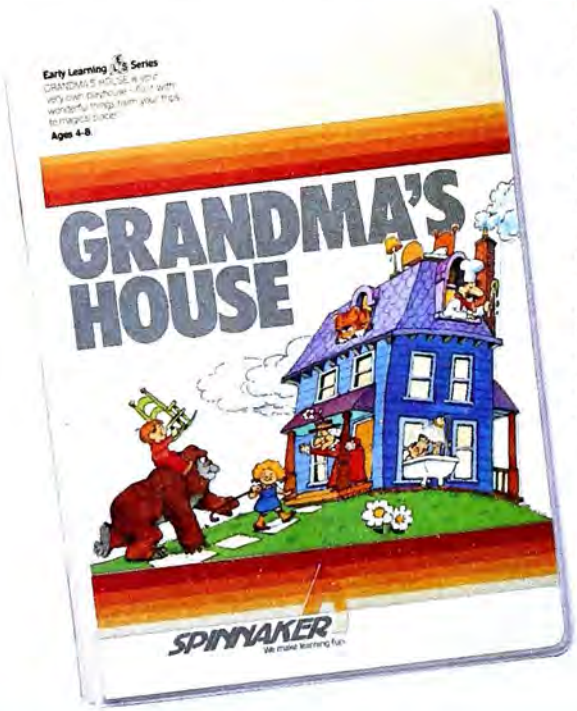
In fact, they're so much fun, parents have been known to sneak in a few hours of play when the kids are asleep.

After all, if your kids are actually enjoying a learning game, there must be something to it. And there is: Fun, excitement and real educational value. That's what sets Spinnaker games apart from all the rest. And what brings parents back for more.

We offer a wide range of learning games for a wide range of age groups: 3 to 14. One look at these two pages will show you how we carefully designed our line of learning games to grow right along with your child.

So if you're looking for a line of learning games that are as much fun to play as they are to buy, consider Spinnaker Games. They're compatible with **Apple, Atari, IBM, Commodore 64, Coleco Adam** and parents who don't mind their kids having fun while they learn.





It's new! GRANDMA'S HOUSE™ is a magical playhouse. Ages 4 to 8.

GRANDMA'S HOUSE is a very special place for your kids, because they can furnish it with lots of wonderful and unusual things from the magical places they'll visit.

GRANDMA'S HOUSE provides children with an imaginative way to exercise their creativity as they design their own perfect playhouse. You'll love watching your kids have fun with GRANDMA'S HOUSE—you can even join in and play it with them!



It's new! KIDWRITER™ lets kids make their own storybook. Ages 6 to 10.

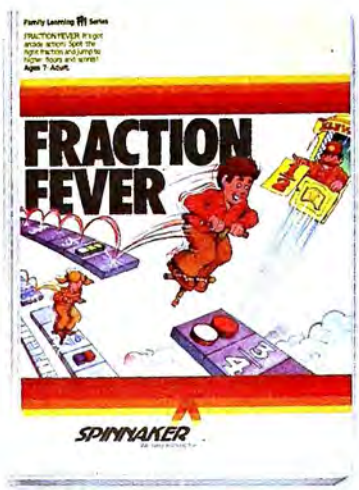
KIDWRITER gives children a unique new format for creating their own stories. With KIDWRITER, kids make colorful scenes, then add their own story lines. It's as versatile and exciting as your child's imagination!

Best of all, while it encourages children to create word and picture stories, it also introduces them to the fundamentals of word processing. KIDWRITER will bring out the storyteller in your children—and in you!



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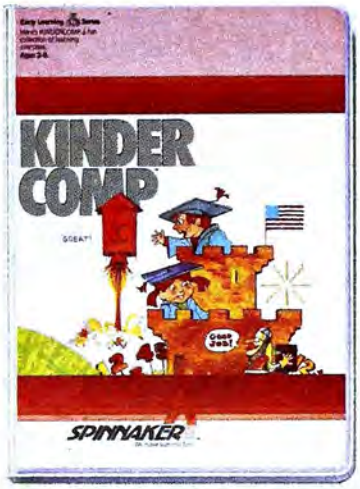
PARENTS, YOU WON'T SPINNAKER GAME.



FRACTION FEVER™ brings fractions into play.
Ages 7 to Adult.

FRACTION FEVER is a fast-paced arcade game that challenges a child's understanding of fractions. As kids race across the screen in search of the assigned fraction, they're actually learning what a fraction is and about relationships between fractions.

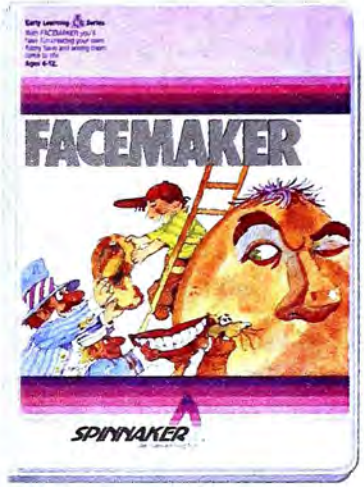
All in all, FRACTION FEVER encourages kids to learn as much as they can about fractions—just for the fun of it!



KINDERCOMP.™ Numbers, shapes, letters, words and drawings make fun.
Ages 3 to 8.

KINDERCOMP allows very young children to start learning on the computer. It lets your children match shapes and letters, write their names, draw pictures and fill in missing numbers. KINDERCOMP delights kids with colorful rewards—the screen comes to life when correct answers are given.

As a parent, you can enjoy the fact that your children are having fun while improving their reading readiness and counting skills.



FACEMAKER™ makes faces fun.
Ages 3 to 8.

FACEMAKER lets children create their own funny faces on the screen, then make them do all kinds of neat things: wink, smile, wiggle their ears, and more.

Plus, FACEMAKER helps familiarize children with such computer fundamentals as menus, cursors, simple programs, and graphics. FACEMAKER won't make parents frown because their children will have fun making friends with the computer.







SPINNAKER™
We make learning fun.

Disks for: Apple, Atari, IBM, Commodore 64, Coleco Adam.
Cartridges for: Atari, Commodore 64, Coleco Adam.

metal. It's too small for you to fit into.

>Put plants

Where?

>Through door

The plant derivatives are now inside the metallic compartment.

>Put crystals

Where?

>With plants

The multicolored crystals are now on the plant derivatives.

>Close door

Okay.

>Examine control panel

The panel has dials and three large slots.

>Launch compartment

I don't know what you mean.

>Turn dial

Okay.

>Insert disks

Which?

>Large

Carefully, you slide three large disks into the three slots.

>Wait

Waiting . . . waiting . . . waiting. . . .

>Open door

Okay.

>Pour liquid

Where?

>Into compartment

The thick liquid oozes out of the bottle. It is now inside of the metallic compartment. Yuck! What a mess.

>Close door

Okay.

>Wait

Waiting . . . waiting . . . ho hum. . . .

>Open door

Okay.

>Get plant

You have the plant derivatives. Funny. They weigh more for some reason. Perhaps they have grown?

>East

You are in front of the doors against the east wall. Whereas the other doors were waist-high, these are lower, about knee-high. A grape Nehi would taste great right now.

>Open door

Okay. Inside the door is a compartment lined with metal. It's slightly bigger than the other metallic compartments; you could probably fit inside, but just barely.

>Put plant

The plant derivatives are now inside the metallic compartment.

>Close door

Okay.

>Examine panel

On the control panel is a dial, a button, and two slots—one large, one small.

>Launch compartment

I don't know what you mean.

>Insert disk

Which?

>Large

Carefully, you slide a large disk into the large slot.

>Insert disk

Which?

>Small

Carefully, you slide a small disk into the small slot.

>Turn dial

Okay.

>Push button

The machine starts to vibrate, making all sorts of obnoxious sounds. It doesn't seem to be going anywhere, though.

>Wait

Waiting . . . waiting . . . dozing. . . .

>Open door

An unbearable heat hits you in the face, causing you to stagger back a few feet. After it dissipates, you approach the compartment.

>Get plant

You now have the plant derivatives, which are very hot. Strange. They seem much lighter than when you put them into the metallic compartment.

>North

There's a door here.

>Go door

Okay.

>South

There is a large door here with a panel next to it. On the panel is one button, though there is space for two.

>Press button

The door opens.

>East

The door closes behind you. There is a door here with a panel of two buttons—one green, one yellow.

>Press yellow

The door opens long enough for you to pass . . . and then closes.

>Press green

The door remains shut. The whole room begins to shake. Feels like a tremor.

>Press green

Strange. For some reason, the door opens this time.

>Go door

You're in a corridor leading to the west.

>West

At the end of this corridor, a long hallway stretches north and south.

>South

You are in the north-south hallway.

>South

There's a door here.

>Open door

Okay.

>Go door

Don't you just hate two-word parsers? You are in a small east-west hallway.

>West

There's a door here.

>West

You are in a room with some chairs and tables.

>Drop plant

The plant derivatives are now on the ground.

Congratulations, you have won this silly adventure! Grab a liquid refreshment. ■

CONTEST WINNERS: An Apple Awarded; A Trickster Treated

A Chicken in Every Pot. That's what economic recovery was all about back in the thirties. After things got better, Americans went beyond having chickens in a pot; two cars in every garage became the symbol of success.

Paul Shanberg (Moraga, CA) isn't counting chickens or cars these days; he's counting computers—his computers. As the winner of the Oracle '83 contest, Shanberg received a brand-new Apple IIe as his prize. Already the owner of an Apple II Plus, Shanberg isn't sure yet of his plans for the second computer.

"My son David is in college, and Jeff will be in college next year." Paul Shanberg hasn't decided who will inherit the II Plus or the IIe, but the decision lies somewhere between the toss of a coin and pistols at twenty paces.

Contest historians might remember that Shanberg was a two-time winner in the Oracle '81 contest. Though he didn't win any parts of the Oracle '82 or '83 contests, winning the big prize at the end of this one seems to have made up for his absence. Here's how he did it:

For the first part of the year-long contest, Shanberg predicted that on January 25, 1983, Apple would announce the release of the Apple IIe. The announcement came on January 19, giving Shanberg a score of minus six points. Next, he predicted that Virginia, UCLA, Iowa, and Memphis State would all make the Final Four in the NCAA Basketball Tournament. None of those teams made it.

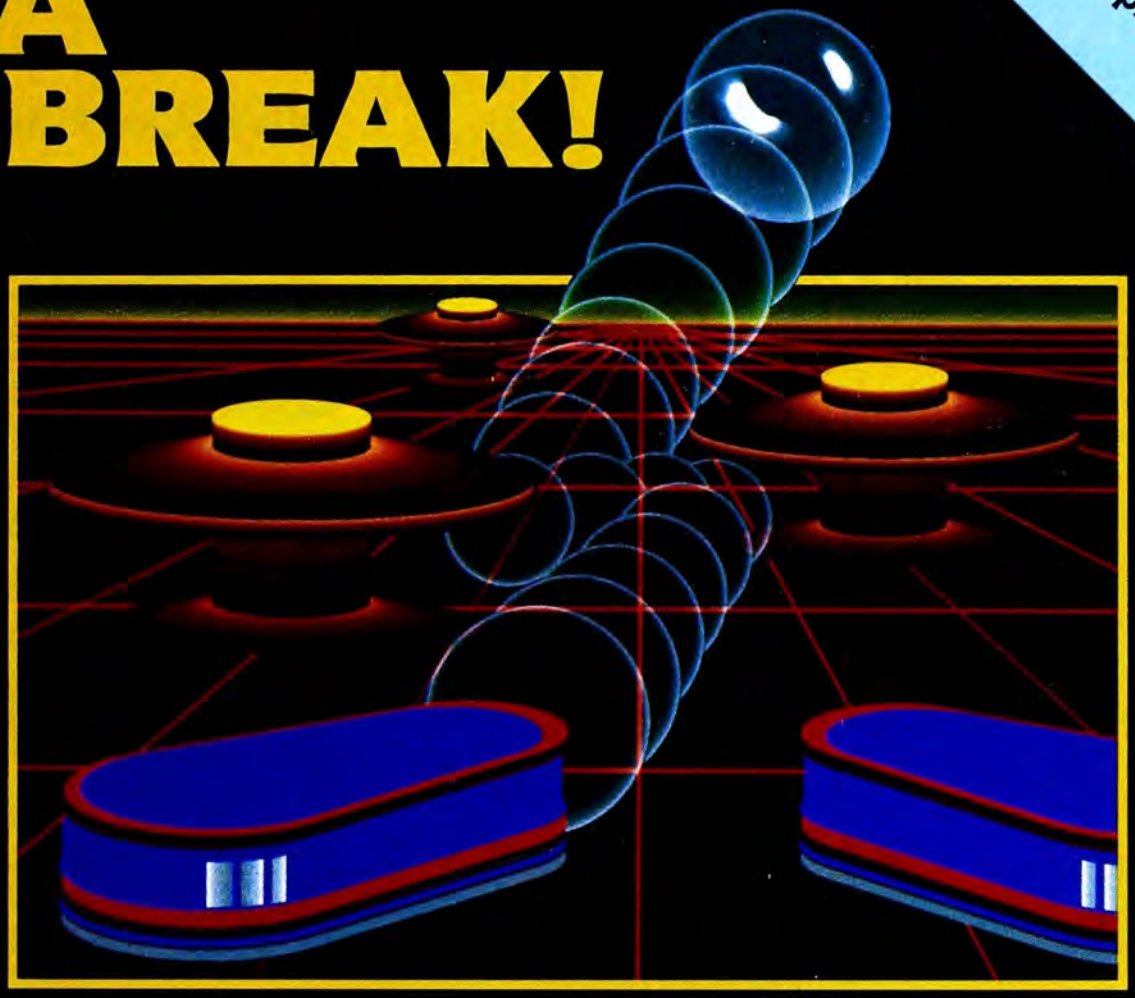
Shanberg's big break came when Ben Kingsley, Meryl Streep, and *Gandhi* won Academy Awards for best actor, actress, and picture respectively. Ten points for each, plus twenty bonus points for getting all three brought Shanberg's score up to forty-four.

Shanberg kept up with the field when Kentucky Derby time rolled around. Though he predicted correctly the sex of the winning horse

GOTO page 222

TAKE A BREAK!

For Apple II, Apple II+, and Apple IIe



WITH NIGHT MISSION PINBALL

You deserve the best. You've earned it. Now reward yourself with a session of Night Mission PINBALL, the most realistic and challenging arcade simulation ever conceived! ■ Stunning graphics and dazzling sound effects put Night Mission PINBALL in a class by itself. Game features: multi-ball and multi-player capabilities, ten different professionally designed levels of play, and an editor that lets you create *your own* custom modes. ■ So take a break with Night Mission PINBALL from SubLOGIC. Winner of *Electronic Games* magazine's 1983 Arcade Award for Best Computer Audio/Visual Effects.



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excerpts from

The Penguin

Penguins Care!

We always have you, the customer, in mind when developing our software and our policies. Penguin Software was the first to publicly promote unprotected, copyable, listable, and modifiable applications software. We were the first to offer top-quality entertainment software at the unheard of price of $19.95. But most of all, our care shows in the software we release. You don't have to fight through the documentation and you don't have to wrestle with the programs. They are written and designed with you, the customer, in mind. We're on your side. We'll always be.

Big Bang Blackmail Nixes 0019.95's 9 to 5ing

Aichenbach, Bavaria - Agent 0019.95, Freddie Pinto, affectionately know as **"The Spy"** to his admiring fans, has once again left the comforts of an administrative post to do what he does best: Terrorizing terrorists and cracking codes.

0019.95's spokespenguin, Maynard, told the press that his client was winging his way to Central Europe as a tourist, bent on studying the architecture of medieval castles. But inside sources informed this reporter that there is more to this jaunt than simple tourism. The rumor mill has it that the sinister Dr. X. Tortion has come out of retirement for one more fling at international blackmail. The Dr., readers may recall, was last seen attempting to obliterate Outer Mongolia by dumping E.T. cartridges on it, an undertaking which he lamentably failed to achieve.



Ask Adelie

Dear Adelie

Every time I try to write a program that other people are going to use, it's always so tedious making sure that it won't bomb when they type weird things, putting in help screens, and making the screen look halfway decent. And then, when I have to sort things, it's always so slow because I don't know any fast sort routines in BASIC. Now my girlfriend won't talk to me because I'm always stuck at the keyboard trying to get the programs right, and my dog just sits around lifeless and bored while watching my sort routine take 3 hours. My boss says I better shape up, the landlord wants to kick me out, my tennis game has gone down the tubes, my car has a flat tire, my sofa exploded, the refrigerator melted . . .

. . . and on and on

Dear On and On . . .

Can't help with the sofa, but we passed your letter on to the Professor von Rockhopper of the Institute for Amiable Applications Software, and he suggested a new program called **Short Cuts**, an unprotected utility from Penguin. With it you can easily add machine-language sorts, customized input and print routines, and a wealth of other helpful features to Applesoft BASIC, making your programming life a lot easier. P.S. Plug in the refrigerator. P.P.S. The sofa?

Adelie

Trivia Question

What do the following companies have in common?

Sierra On-Line, Sir-Tech, Mattel, Milton Bradley, Adventure International, Borg-Warner, Kangaroo, Rhiannon, Scholastic inc., Counterpoint, Ibidinc, Blythe Valley, Davka, and of course, Penguin.

answer in column 5



Does your Dealer have Penguins?

If not, tell him to get with it! Have him order some today. Tell him to call his favorite distributor, or our toll-free 800 number. We'd rather you buy from him if you can — that's what he's there for!

Furballs seen in Minnesota!

Lake Ohno, MN - **Kamungas** poured down on this Western Minnesota farming community late yesterday afternoon, marking the first occurrence of the bouncing furballs outside of the Dakotas. Department of Agriculture analysts fear that the epidemic could spread south into the grainbelt, although they wonder if the damage to soybeans could be as bad as the melon crop disasters up north.



penguin software™

the graphics people

For a free issue of The Penguin Pages, write to Penguin Software, Dept. H, Box 311, Geneva, IL 60134 (312) 232-1984

Pages

Vol. 1, No. 1

The Graphics News

You've probably already heard about the new version of **The Graphics Magician** (the boxed version). You may have heard that the new **Complete Graphics System** is available and twice as good as the original Complete Graphics System and Special Effects put together. But do you know about **Paper Graphics?** It's the new graphics-to-printer utility that works with almost every printer/interface card and has already received an A+ rating from *Peelings II*, who called it "the most complete of all printer dump utilities seen to date." Another new product, **Transitions,** is best described as a combination high-tech slide show, picture disk organizer, and presentation system extraordinaire. For update information on **Complete Graphics System,** Special Effects, or **Graphics Magician,** call our customer service department at (312) 232-1984. To see the new **Complete Graphics System, Graphics Magician, Paper Graphics,** and **Transitions,** see your dealer. Ask about compatibility with Apple Graphics Tablet, Houston Instruments HiPad, Koala Pad, joysticks, trackball, and plotters. When it comes to graphics, at Penguin we don't strive for state of the art; we define it.

SNAFU

Nanuk, Pengolia (PNS) - The tiny nation of Pengolia discovered a slight hitch in its defense systems yesterday when it experienced an attack by a swarm of unidentified robots.

When its defense team, known as **Minit Men,** leapt into action (and the Huey choppers purchased from American Army-Navy surplus stores), they discovered that the particle beam generators guarding the base were more of a nuisance to them than to the invaders! At last report desperate Pengolian pilots were dropping like flies at the hands of their own defense weapons! Between the mutating robots and the haywire security systems the situation looks desperate if not hopeless. The last transmission received from Pengolia contained a worldwide appeal for volunteers....

Answer to Trivia

They are among over thirty companies that publish arcade, adventure, or educational software created with the aid of **The Graphics Magician.** And now, the new version of **The Graphics Magician** is available on several different computers, with the added bonus that you can transfer graphics files between the different systems. No more redrawing pictures in order to have them run on a variety of micros!



Expedition Nears Houston

Nihil, Texas - Professor Arrowhead reported today that the **Amazon expedition** sponsored by Flint University and Restaurant may be making progress toward the lost city of Ka. $600 was raised when the unnamed leader of the expedition was able to persuade his uncle to sell his old pickup. The money was used to charter a flight for the explorers, and they report that they have made their way to Houston, and they expect to maintain their steady southward course if the weather holds.

(800) 323-0884

If you can't find one of our products at your dealer, call us at our toll-free order number and we'll find the name of the Penguin dealer nearest you. Or if there are none you can order with VISA or MasterCard. Dealers: if you carry our products and purchase through a distributor, give us a quick call so that we can put you on this information list and send customers your way.

For product information, adventure hints, or from Illinois, Alaska, and Hawaii, please call (312) 232-1984.

Applications



The Complete Graphics System $79.95



The Graphics Magician $59.95



Transitions $49.95

Adventure



The Quest



Transylvania

Strategy



Pensate

Arcade



Bouncing Kamungas



Minit Man



Spy's Demise



Paper Graphics $49.95



Short Cuts $39.95



$29.95 DISK arRANGER



The Coveted Mirror



Expedition Amazon



Pie Man



Crime Wave



Thunderbombs



The Spy Strikes Back

All games are $19.95

How to create eye-popping color graphics on your Apple* computer for just $39.95.

Turn your Apple computer into a color graphics workstation with FLYING COLORS™ software.

Draw interactively using your joystick or paddles. FLYING COLORS also works with many other input devices that connect to the Apple game paddle ports.

FLYING COLORS features the easiest screen menu you'll ever see. Pick the function you want and begin to draw. Choose from thick lines or thin. Generate automatic circles or boxes of any size with our "rubber banding" algorithm. Erase. Fill. Use "micro" mode for exacting detail work or paint with the broad color brush for big splashes of color. Select from a vibrant pallette of colors and hues.

You can store and retrieve from disk in seconds. Our program stores your drawings in standard binary files so you can reproduce them on your dot matrix printer via most graphics dump printer interface cards or programs.

Free: SLIDE PROJECTOR PROGRAM included.

We've included our unique Slide Projector Program and manual at no extra cost. Create your own "slide shows" from the computer pictures you have drawn with FLYING COLORS and then program their sequence and screen times automatically.



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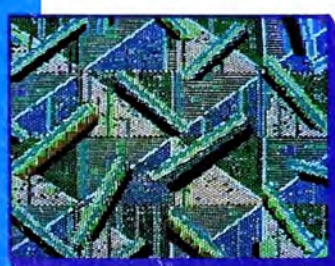
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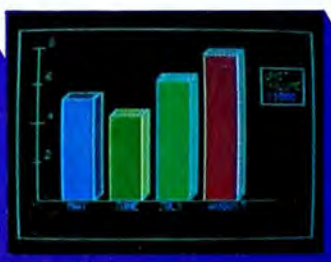


FLYING COLORS™
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THE COMPUTER COLORWORKS
3030 Bridgeway, Sausalito, CA 94965

*Apple II+, IIe with 48K









All images depicted here are actual photographs of screen graphics created using FLYING COLORS™

FASTALK

Fastalk is a quick guide to popular, specialized, new, and classic software. When you need a particular kind of program or just want to see what's new, Fastalk is the place to look for fast answers.

If a program has been reviewed in *Softalk*, it carries the issue date of the review in italics at the end of its listing, and the capsule description given reflects the published review.

A new software entry, which must be of professional quality to be included, is designated by a check mark preceding its name. A new entry loses its check mark after its first appearance and drops out of Fastalk after one to three appearances (depending on genre) if it fails to gain popularity.

A bullet preceding a title indicates a program that *Softalk* has designated as a classic, based on its ability to stand up over time, its significance for its time (breaking new ground or introducing a new genre), or its archetypal qualities.

Other entries in Fastalk are there either by virtue of current activity (the programs are selling at least as much as the least-selling entry on any of the bestseller charts) or because they are representative of the best of programs for a special interest or need (such as card games or non-Basic-specific language terminal programs).

Softalk may arbitrarily omit any package from Fastalk, whether or not it meets the foregoing criteria.

Adventure

Adventuresome story games in which players must deduce commands, make maps, and solve logical puzzles.

● **Adventure.** Crowther, Woods. The original text adventure, created on mainframe, contributed to by many over a long time. Very logical within fantasy framework, excellent puzzles, maps; complex, convoluted, and great. Several publishers: Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $28.95. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $35. Frontier Computing, Box 402, 666 N. Main St., Logan, UT 84321. $10.

The Coveted Mirror. Berns, Thomason. Nicely drawn characters, arcade subgames, and fun, logical puzzles enliven nonviolent medieval adventure. Humorous and animated. Penguin, Box 311, Geneva, IL 60134. $19.95. *11/83.*

Critical Mass. Blauschild. Rungistanian author's next adventure; more colorful graphics, sophisticated and challenging puzzles. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95. *7/83.*

● **Cyborg.** Berlyn. Text adventure with brief action skill game hidden in plot. As a futuristic part man, part robot, you're lost in a strange forest, desperately needing food and power. At its release, in its realism and use of true plot, *Cyborg* represented one of the most significant advances in adventuring since the original *Adventure*. Sentient, Box 4929, Aspen, CO 81612. $32.95. *11/81.*

Deadline. Blank, Lebling. Episode one in a series of murder mysteries by the authors of *Zork*. Includes inspector's casebook, lab report. Text. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *8/82.*

Death in the Caribbean. Hess, Hess. Challenging quest for pirate treasure features a mischievous ghost, huge maze, lush graphics. Well worth it. Micro Lab, 2699 Skokie Valley Rd., Highland Park, IL 60035. $35. *9/83.*

Enchanter. Blank, Lebling. First of trilogy sequel to *Zorks* expands interaction with other characters, goes above ground, increases use of logical magic. No big breakthroughs, but simply delightful. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *9/83.*

● **Hi-Res Adventure #1: Mystery House.** Williams. Whodunit in a Victorian mansion. First adventure with pictures. Two-word parser with logical comprehension. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $24.95.

● **Hi-Res Adventure #2: The Wizard and the Princess.** Williams, Williams. The king has offered half his kingdom to the one who will bring back the kidnapped princess. Cross mountains, deserts; battle the wizard to claim your reward. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $32.95. *11/80.*

Infidel. Berlyn. Excellent puzzles and a surprising bad guy hero in well-written treasure hunt. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *11/83.*

Masquerade. Johnson. Hard, logical, diabolically clever riddles in puzzle solver's *piece de resistance*. Great illustrations. Phoenix Software, 64 Lake Zurich Dr., Lake Zurich, IL 60047. $34.95. *11/83.*

✓ **Philistine Ploy.** Aaron, Rosenbaum. Good Biblical graphic adventure based on the *Book of Judges* features more than 80 screens, some animation. Knowledge of the Bible not necessary to solve. Davka, 845 N. Michigan Ave., #843, Chicago, IL 60611. $34.95. *12/83.*

Planetfall. Meretzky. A lovable robot steals the show in this science-fiction text adventure. Includes many outstanding puzzles, rich, colorful, intelligent text. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *8/83.*

● **Prisoner 2.** Mullich, EduWare. Totally relandscaped but loyal version of original game: full-color hi-res graphics added, puzzles reworded, obstacles expanded. Sophisticated and difficult exercise in intimidation with elements of satire. Escape from an island requires player to solve logical puzzles, overcome obstacles, and answer riddles. Excellent computer fare; nothing else like it. Peachtree Software, 3445 Peachtree Rd. N.E., #830, Atlanta, GA 30326. $32.95. *The Prisoner, 3/81*; *Prisoner 2, 10/82.*

The Quest. Snell, Toler, Rea. As the king's newest advisor, you must accompany a champion on a dragon-slaying mission. Champion, parser accept advice in full and multiple sentences. Penguin, Box 311, Geneva, IL 60134. $19.95. *9/83.*

● **S.A.G.A. Series.** Adams. Scott Adams's prototypical adventures—12 in all—spruced up with 100-color graphics and Votrax vocals. Fun, not always logical, very story-oriented series. Each adventure has its own theme and often exotic locale. They map small but score big on imagination. Adventure International, Box 3435, Longwood, FL 32750. $29.95 each. *7/82.*

Shamus. Mataga. Try to penetrate The Shadow's lair in order to kill him in complex mystery maze game. Four levels, 32 rooms per level. Synapse Software, 5221 Central Ave., Richmond, CA 94804. $34.95.

Suspended. Berlyn. Well-plotted adventure demands control of six independent robots who can act simultaneously. Intelligent, challenging exercise in logic. A milestone. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *4/83.*

● **Swordthrust Series.** Set of adventures, seven so far, that integrate fantasy role playing. Create one character, make friends in each new adventure, battle monsters and achieve goals together. Good stories, fun to map. Vocabulary no mystery, but puzzles are. Single character goes through all. CE Software, 801 73rd St., Des Moines, IA 50312. Number 1 prerequisite for rest. Each adventure, $29.95. *8/82.*

Transylvania. Antiochia. Some of best graphics ever in a hi-res adventure. Excellent puzzles and logic—no unfair tricks. Enjoyable. Penguin, Box 311, Geneva, IL 60134. $19.95. *6/81.*

Witness. Galley. Interactive mystery adventure set in 1938 reflects the style of pulp detective fiction popular then. Fun packaging and fun to play, although less complex than *Deadline*. A good step forward for an infant genre. Infocom, 55 Wheeler St., Cambridge, MA 02138. $49.95. *7/83.*

● **Zork I, II, III.** Blank, Lebling. Text lives! Three masterpieces of logic and grand adventure to revel in. Hard, logical puzzles with erudite parser that understands complete compound sentences and questions, has amazing vocabulary. *I* and *II* use standard scoring, standard goals; *III* has unique point system, and benevolence pays. Infocom, 55 Wheeler St., Cambridge, MA 02138. $39.95. *Zork I, 6/81*; *Zork II, 3/82*; *Zork III, 9/82.*

Business

Accounting Plus II and IIe. *II* version is integrated package; general ledger, accounts receivable and payable, and inventory-purchasing modules. Menu-driven; prompting. *IIe* version is stripped and rebuilt to take advantage of available functions. Software Dimensions, 6371 Auburn Blvd., Citrus Heights, CA 95610. *II*, $1,250; *IIe*, $995.

Ana-List. Siddall, Poor. Easy-to-learn, no frills list processor prepares reports, automatically calculates numeric fields. Includes tabbed reference section, automatic top-of-page feed. User-customizable, compatible with *VisiCalc*. Synoptic Software, 57 Reservoir Ln., Chestnut Hill, MA 02167. $150. *11/83.*

Apple II Business Graphics. Converts numerical data into charts and graphs. Features mathematical and statistical functions. Requires 64K. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

BPI System. Popular six-module business package; programs also available separately. Includes *General Ledger* (a bestseller), accounts receivable, accounts payable, payroll, inventory control, and job costing. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $395 each; job costing, $595.

dBase II. Speedy relational database-management system. Requires SoftCard. Ashton-Tate, 9929 W. Jefferson Blvd., Culver City, CA 90230. $700.

DB Master. Comprehensive database-management system with password protection, extensive report creation options. 1,000 characters per record. Stoneware, 50 Belvedere St., San Rafael, CA 94901. $229. *10/81.*

General Manager. Superb user-definable database management system; can use one to four disk drives or hard disk. Change screen and field formats without reentering data, expandable to IIe and 80 columns at no extra cost. Flexible, self-contained, and powerful. Quite simply the best non-CP/M database there is. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $229.95. Hard-disk version, $374.95. *11/83.*

The Incredible Jack. Word processor, database, and spreadsheet, plus mailing label print and sort.

Gives 80-column u/lc display automatically on the IIe, with 64K, 80-column card on the II Plus. Business Solutions, 60 E. Main St., Kings Park, NY 11754. $129. *8/82.*

List Handler. Keary, Elekman. List-lover's delight. Prints lists, labels, and letters. Handles 3,000 records per disk and eight disk drives. Takes requests. Silicon Valley Systems, 1625 El Camino Real, #4, Belmont, CA 94002. $49.95. *2/83.*

Magicalc. Graves. Electronic spreadsheet with automatic page formatting and support of additional memory boards up to 512K. Compatible with *VisiCalc* and *Magic Window II.* Artsci, 5547 Satsuma Ave., North Hollywood, CA 91601. $149.95. *11/83.*

Magic Memory. Jensen. Simple-to-use database acts like tabbed address book. Includes extensive printing program formatted for tabs, mailing labels, envelopes. Artsci, 5547 Satsuma Ave., North Hollywood, CA 91601. $99.95. *11/83.*

Multiplan. Easy-to-learn electronic work sheet using plain-English commands. Powerful modeling and presentation capabilities. For use in analysis, forecasting, technical engineering, and the home. Versions 1.04 and up use 80 columns and extended memory on the IIe. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $275.

✓ **Participative Management Skills.** Byrd. Interactive five-disk tutorial with text and workbook teaches benign management style leading to creativity, decisions by consensus. A super product with rewarding results. Concourse, 2626 E. 82nd St., #215, Minneapolis, MN 55420. *12/83.*

PFS:File. Page, Roberts. User controls data in totally unstructured database. Up to 32 pages (screens) of information in each record. IIe version has 80 columns, u/lc. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125. *10/80.*

PFS:Graph. Chin, Hill. Works alone or interfaces with files created with *PFS:File* and *VisiCalc.* Produces bar, line, and pie charts merging data from several sources. 80 columns and increased graphics support in IIe version. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125. *5/82.*

PFS:Report. Page. Powerful report generator designed for use with *PFS:File.* Sorts, calculates, totals, formats, and prints presentation-quality columnar reports. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125. *6/81.*

Practical Accountant. Single-entry, small business accounting program allows user to set up chart of accounts with up to 50 user-defined categories, 300 subcategories, 20 tax-type definitions. Tracks cash flow by category to analyze profitability, tax consequences, general performance. Softlink, 3255-2 Scott Blvd., Santa Clara, CA 95051. $149.95.

Quick File IIe. Easy-to-use personal database filing system that generates reports, sorts. Fifteen fields; files as long as disk allows. IIe, two disk drives. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $100.

Risk Simulator. Estimates probability distributions related to risk situations, such as automobile maintenance expenses or employer funding of health benefits. Actuarial Microcomputer Software, 3915 Valley Ct., Winston-Salem, NC 27106. $185.

State of the Art System. Standalone or interfaceable modules for a 12-month accounting period. Includes *General Ledger, Accounts Receivable, Accounts Payable, Payroll, Inventory Control* ($495 each), *Budget and Financial Reporting, Sale Invoicing* ($395 each), and *Professional Time and Billing* ($795). State of the Art, 3183A Airway Ave., Costa Mesa, CA 92626. *Accounts Receivable, 10/83.*

VersaForm. Business-forms generator for invoicing, mailing lists, sales analysis, inventory. Hard-disk-compatible. Applied Software Technology, 14125 Capri Dr., Los Gatos, CA 95030. $389. *6/82.*

● **VisiCALC.** Bricklin, Frankston/Software Arts. Electronic work sheet for any problem involving numbers, rows, and columns. No programming necessary. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $250. *10/80.*

VisiTrend/VisiPlot. Kapor. Combines *VisiPlot* graphics with time-series manipulation, trend forecasting, and descriptive statistics. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $259.95. *7/81.*

Communications

ASCII Express: The Professional. Robbins, Blue. Greatly improved version of original modem software package features automatic redial, individual macro files, and conversion of Integer, Applesoft, or binary programs into text files. Works with a plethora of hardware. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $129.95. *12/82.*

Data Capture 4.0. Copyable, modifiable smart terminal program; compatible with Apple III and most lower-case adapters. Southeastern Software, 6414 Derbyshire Dr., New Orleans, LA 70126. $65. *7/81.*

Dow Jones Market Manager. Portfolio management and investment analysis package that acts with News/Retrieval Service. Tracks all purchases and sales, maintains 26 portfolios. Uses tax lot accounting system. Dow Jones Software, Box 300, Princeton, NJ 08540. $299.

Hayes Terminal Program. Standalone disk designed for the Micromodem II lets CP/M, DOS 3.3, and Pascal disks create, list, delete, send, and receive files. Opens access to nonkeyboard ASCII characters and prints incoming data as it's displayed. Hayes Microcomputer Products, 5835 Peachtree Corners East, Norcross, GA 30092. $99. *9/81.*

Micro/Terminal. Access and exchange information with mainframes and minis, databases like the Source, and other remote terminals and personal computers. Allows keyboard mapping, u/lc, 80-column cards. Microcom, 1400A Providence Hwy., Norwood, MA 02062. $84.95.

P-Term: The Professional. Supports all Pascal-compatible interfaces, asynchronous serial cards, Apple-compatible modems, and baud rates up to 2400. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $129.95.

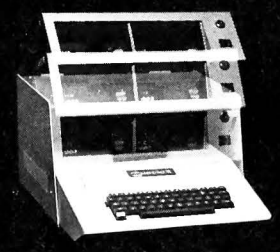
Softerm. Stricklan. Emulation program makes the Apple II Plus into a look-alike for many other popular CRT terminals, allowing use of programs written for other terminals without programming changes. Also enables access to mainframes, time-sharing services, and other Apple computers. Keyboard macros and automatic answerback capabilities. Softronics, 6626 Prince Edward, Memphis, TN 38119. $150.

Transend 1, 2, 3. Intelligent-terminal software with multiple hardware compatibility. Advanced, easy to use. *1* sends text only; menu-driven, limited editor. *2* sends text and files like *VisiCalc*, verifies transmission. *3* does both and handles electronic mail with automatic redial, clock calendar, and password protection. Upgrade: difference in price between two packages plus $20 service fee. SSM, 2190 Paragon Dr., San Jose, CA 95131. $89, $149, $275. *9/82.*

VisiTerm. Well-planned, comprehensive. Hi-res 60-character display; wide range of protocols for sending text. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $129. *9/81.*

Z-Term: The Professional. More than an update.

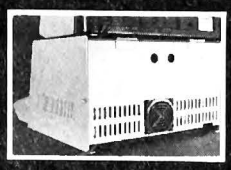
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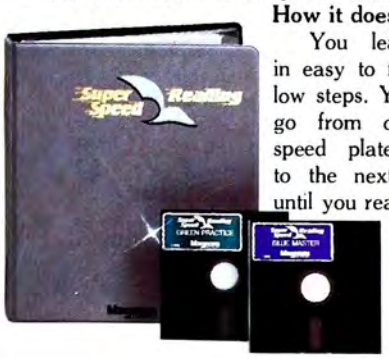
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Compatible with a great variety of modems, interface cards, and screen modes. Simple file transfer with integrity. Southwestern Data, 10761-E Woodside Ave., Santee, CA 92071. $149.95. *5/81.*

Fantasy

Role-playing games involving characters that develop through experience in adventuresome stories, and whose actions players determine via set commands.

● **Beneath Apple Manor.** Worth. The original dungeon game for the Apple, created in 1978. Newly released version has hi-res, sound effects, a few more magic items, but still the classic game. Quality, 6660 Reseda Blvd., #105, Reseda, CA 91335. $29.95. *2/83.*

Exodus: Ultima III. British. Super third installment of *Ultima* saga. Contains many features not found in *Ultima II*. Original score, wind and wave motion, four characters who can interact, tactical combat, and full-color dungeons combine with much more solid, involved plot to make an engrossing fantasy. Origin Systems, 1902 Back Bay Ct., Box 58009, Houston, TX 77258. $54.95. *11/83.*

Knight of Diamonds. Second scenario of *Wizardry*, requiring thirteenth-level characters from the original. Individual quests on each of six dungeon levels. Great. Sir-tech, 6 Main St., Ogdensburg, NY 13669. $34.95. *7/82.*

Legacy of Llylgamyn. Greenberg, Woodhead. Third scenario in classic *Wizardry* series. To save Llylgamyn, descendants of the adventurers of other *Wizardry* scenarios (requires *Overlord*) must wrest a mystical orb from the dragon L'kbreth. New full-screen dungeon, Lisalike information screens. Sir-tech, 6 Main St., Ogdensburg, NY 13669. $39.95. *7/83.*

● **Odyssey: The Compleat Apventure.** Clardy. Fantasy adventure far beyond one place and one setting. Castles, catacombs, an ocean voyage, and the orb of power. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $30. *10/80.*

Standing Stones. Schmuckal, Sommers. Fifteen levels, 200 monsters, humor, and 3-D perspective in dungeon role-playing adventure. Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403. $40.

● **Temple of Apshai.** Lead title in Dunjonquest series, winner 1981 Academy of Adventure Gaming Arts and Design "Computer Game of the Year" award. Epyx/Automated Simulations, 1043 Kiel Ct., Sunnyvale, CA 94086. $39.95.

● **Ultima.** British. Hi-res color adventure, progressing from Middle Ages to beyond the space age. A masterpiece. California Pacific, 757 Russell Blvd., Davis, CA 95616. $39.95. *6/81.*

Ultima II. British. Faster play in a bigger universe with a time-travel option. Typically British look and feel. Events are much more interdependent; larger realm of fantasy with more transactions available. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $59.95.

● **Wilderness Campaign.** Clardy. First fantasy game to leave the dungeon for the great outdoors; first in hi-res; first to bargain with merchants; and more. Synergistic, 830 N. Riverside Dr., #201, Renton, WA 98055. $17.50.

● **Wizardry.** Greenberg, Woodhead. Ultimate role-playing fantasy; ten-level maze in hi-res. Generate 20 characters, six at a time on expeditions. Gripping game; superbly reproduced. Sir-tech, 6 Main St., Ogdensburg, NY 13669. $49.95. *8/81.*

Graphics

Alpha Plot. Kersey, Cassidy. Hi-res graphics and text utility with optional xdraw cursor and proportional spacing. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $39.50.

Coloring Series 1. Thornburg. On-disk coloring book for KoalaPad contains 25 geometric designs, includes manual with background on pattern creation. Koala Technologies, 3100 Patrick Henry Dr., Santa Clara, CA 95050. $29.95. *12/83.*

The Complete Graphics System. Pelczarski. A wealth of graphics tools at a reasonable price. Make 2-D drawings with game paddles; add text in destructive, nondestructive, or reverse modes; create 3-D figures and shape tables. Manual features complete outline of command structure. Penguin, Box 311, Geneva, IL 60134. $69.95. *7/81.*

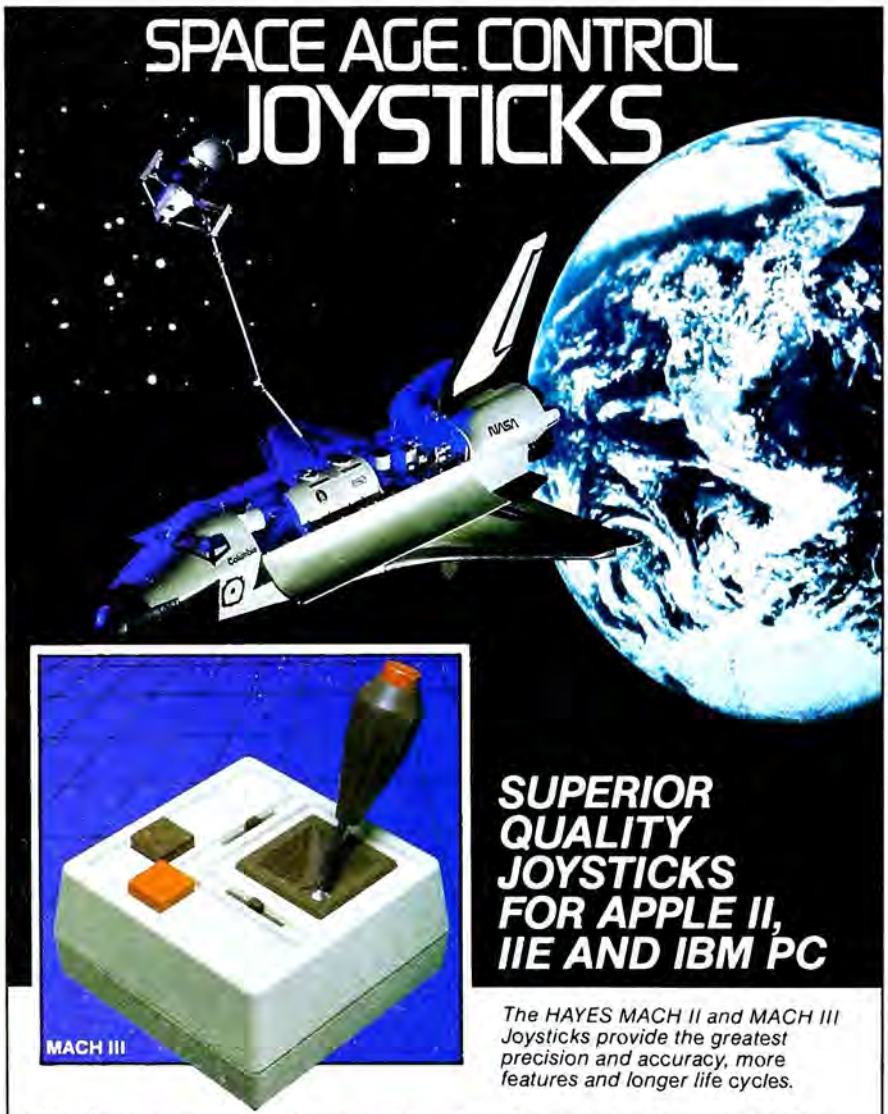
✓ **Doublestuff.** Bonfiglio, Joselow. Programming language similar to Applesoft designed for use with Apple's stunning double-resolution modes. Requires IIe with B motherboard, 128K. Doublestuff Software Development, 2053 W. 11th St., Brooklyn, NY 11223. $39.95. *12/83.*

✓ **Flow Charting.** Patton. Elegantly solves problems of designing and printing flow charts. Fun, easy to use, powerful. Patton and Patton, 340 Lassenpark Circle, San Jose, CA 95136. $138. *12/83.*

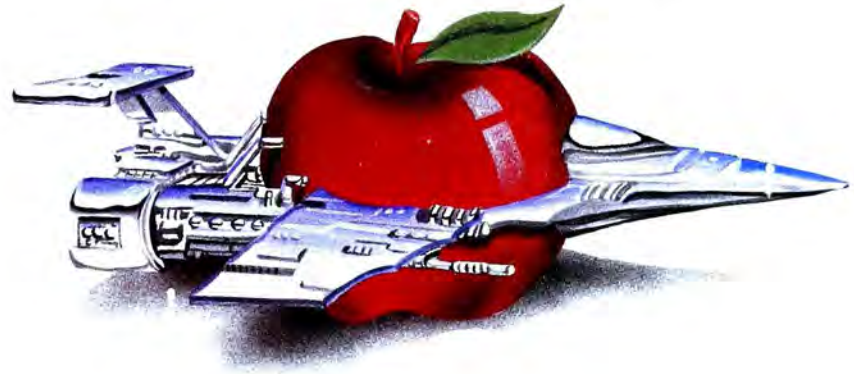
Fontrix. Boker, Houston. Character generator creates unlimited number of typefaces, uses them to write on a screen extended 16 times. Extremely significant development in graphics. Data Transforms, 616 Washington St., #106, Denver, CO 80203. $75. *7/83.*

The Graphics Magician. Jochumson, Lubar, Pelczarski. Outstanding animation package consisting of picture editor and shape-table extender. Comes with utility program to transfer binary files. Penguin, Box 311, Geneva, IL 60134. $59.95. *5/82.*

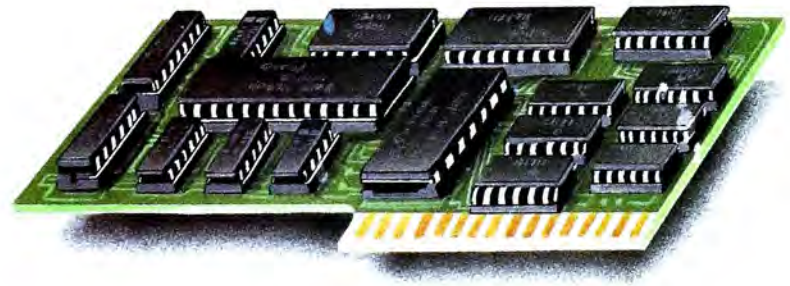
● **LPS II.** Superb hi-res-graphics drawing system with light pen. Draw freehand or use circles and lines to create geometric shapes. Fill routine with



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colors and patterns; fun animation demo; programmable Pentrak driver. Gibson, 23192-D Verdugo Dr., Laguna Hills, CA 92653. $349. *10/82.*

Micro-Illustrator. Island Graphics. Fun and friendly drawing program for the KoalaPad graphics tablet. Easy to learn and use, compatible with most game software. Koala Technologies, 3100 Patrick Henry Dr., Santa Clara, CA 95050. $124.95. *7/83.*

Zoom Grafix. Holle. Graphics-printing utility allows display of picture on-screen prior to print; prints out selected portion at any size. Phoenix, 64 Lake Zurich Dr., Lake Zurich, IL 60047. $39.95. *2/82.*

Home

Bowling Data System. Data Dynamics. Two-disk record-keeping and report-preparation program for infinite number of leagues, up to 40 teams. Weekly recap, season average, more. Rainbow Computing, 9719 Reseda Blvd., Northridge, CA 91324. $149.95.

Chequemate Plus. Moch, Collins. Maintains 500 checks at one time, 20 accounts per disk. Tracks charges, includes user-defined expenditure and tax breakdowns. Masterworks Software, 25834 Narbonne Ave., Lomita, CA 90717. $79.95.

● **Crossword Magic.** Crossword puzzle maker. Choose subject, words, and clues; program automatically connects words. Play on-screen or make printout. L&S Computerware, 1589 Fraser Dr., Sunnyvale, CA 94087. $49.95. *10/81.*

Dollars and Sense. Mullin. Establishes budgets, writes checks, reminds to pay bills. Uses graphs, reports to analyze cash flow, balance sheets, make year-to-date summaries, expense projections. Monogram, 8295 S. La Cienega Blvd., Inglewood, CA 90301. $100.

Einstein Memory Trainer. Rubin, Samet. Interactive tutorial with color graphics and gamelike practice sessions teaches methods for remembering names, faces, phone numbers, dates, and lists. Set your own pace, store personal memory techniques. Three disks, user guide included. Einstein, 11340 W. Olympic Blvd., Los Angeles, CA 90064. $89.95. *12/83.*

Family Roots. Professional genealogy database with unlimited-records capability. Unprotected; works with 80-column and u/lc. Extensive documentation. Quinsept, Box 216, Lexington, MA 02173. $185.

Golf Statistician. Haberle. Helps golfers lower their scores by examining their strengths and weaknesses. GolfSoft, 10333 Balsam Ln., Eden Prairie, MN 55344. $34.95.

Home Accountant. Schoenburg. Thorough, powerful home finance program. Monitors five checking accounts against a common budget, plus credit cards and cash; one-step record or transfer of funds. Continental, 11223 S. Hindry Ave., Los Angeles, CA 90045. $74.95. *4/82.*

Micro Cookbook. Recipe-management system allows entry and modification; selection of recipes by common ingredients, name, or classification. Calorie and nutrition guide. Virtual Combinatics, Box 755, Rockport, MA 01966. $40. *6/83.*

Music Construction Set. Harvey. Interactive music composition and learning tool allows user to create music or experiment with included music library. Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403. $40. *12/83.*

Natural Family Planning Personal Charting Program. Ringsmuth. Charts, stores daily information on womens' fertility signs. Includes graphic and statistical analysis. Family Life Software, 1401 S. 11th Ave., St. Cloud, MN 56301. $39.50.

NFL Scoreboard. Football pointspread prediction system gives probable scores, team performance summary, divisional standings, and season playoff predictions. Can be used season after season. Micro Data, 741 Surrey Dr., Streamwood, IL 60103. $49.95.

Personal Inventory. Benson. Organizes your home, library, personal property for easy access and for insurance purposes. Loaned your widget and forgot who has it? Check your inventory. 8th Dimension Enterprises, Box 62366, Sunnyvale, CA 94088. $59.95.

Power of Words. Funk. Ten interactive word games by the author of the *Reader's Digest*'s "It Pays To Enrich Your Word Power." Humor, graphics, auditory clues demonstrate words and reinforce memory. Funk Vocab-Ware, 4825 Province Line Rd., Princeton, NJ 08540. Two disks, $49.95. *7/83.*

✓ **Simply Music.** Nye, Leonard, Jigour. Personal, effective guide to music comprehension, creation, and performance. Includes 10 available instrument sounds, requires alphaSyntauri keyboard. Syntauri, 4962 El Camino Real, #112, Los Altos, CA 94022. $179.95. *12/83.*

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Fast-action skill games; may include elements of fantasy.

A.E. Horai. Blast away like mad in 3-D. Time the release and detonation of missiles and repel the next wave. Innovative graphics, new firing technique, and fugues to boot. Broderbund, 17 Paul Dr., San Rafael, CA 94903. $29.95. *2/83.*

● **Alien Rain.** Suzuki. Monsters in this classic seem to take it personally when you gun down one of their own kind. Broderbund, 17 Paul Dr., San Rafael, CA 94903. $29.95. *9/81.*

Argos. Lowrance. Painless primer in shoot-'em-ups. Unoriginal and nonchallenging but nice graphics, animation. Datamost, 8943 Fullbright Ave., Chatsworth, CA 91311. $34.95. *11/83.*

✓ **Bats in the Belfry.** Moore. No shooting or getting shot at in bat-catching, vampire-dodging change of pace. Animation, graphics aren't flashy, just expertly and subtly done. Phoenix Software, 64 Lake Zurich Dr., Lake Zurich, IL 60047. $29.95. *12/83.*

Beagle Bag. Kersey. Twenty games and miscellany, written in Basic and unprotected. Great humor, good two-player games. Manual is worth the price of admission. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50. *1/83.*

✓ **Bouncing Kamungas.** Becklund. Sound is okay, animation good, premise original, action intense. Penguin's best arcader. Penguin, Box 311, Geneva, IL 60134. $19.95. *12/83.*

● **Choplifter.** Gorlin. Fly your chopper to rescue 64 hostages, avoiding interceptor jets, homing mines, and tanks. Challenging, realistic, and playful. Stunning graphics. Broderbund, 17 Paul Dr., San Rafael, CA 94903. $34.95. *7/82.*

● **Crossfire.** Sullivan. Critters come at you from four directions on a grid laid out like city blocks. Strategy and intense concentration required. Superb, smooth animation of a dozen pieces simultaneously. One of the great ones. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $29.95. *1/82.*

✓ **Drol.** Ngo. Charming rescue mission set in a dream world with witch doctors, Garfield-like scorpions, kamikaze vacuum cleaners. Marvelous, smoothly animated graphics; challenging and playable. Broderbund, 17 Paul Dr., San Rafael, CA 94903. $34.95. *12/83.*

● **Epoch.** Miller. Superbly stylized animation enhances this filmic shoot-'em-up. Tremendous sense of being in space; neat classical music and dramatic time-warp sequences. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $34.95.

✓ **Fat City.** Hefter, Worthington. *Stickybear*-style urban renewal in family-oriented offering. Knock down deserted buildings while avoiding hostile rats. Superbly executed, playable. Xerox Education/Weekly Reader, 245 Long Hill Rd., Middletown, CT 06457. $39.95. *12/83.*

Frogger. Lubeck. Not even close. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $34.95. *12/82.*

● **Gorgon.** Nasir. Fly over planet shooting and dodging invaders and saving kidnapped inhabitants. Outstanding hi-res graphics, challenging refueling sequence. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95. *8/81.*

Gumball. Cook. In the latest industrial arcade offering, there's work to do at the gumball factory. Color-sort the balls, zap explosive-laced gumballs planted by overzealous dental assistants, and try to get a promotion. Broderbund, 17 Paul Dr., San Rafael, CA 94903. $29.95. *12/83.*

Hard Hat Mack. Abbott, Alexander. Poor Mack. He must avoid vandals, inspectors, falling rivets, and hungry cement mixers to complete his building. Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403. $35. *7/83.*

Lode Runner. Smith. 150 unique levels in super run-climb-dig-jump game—or design your own puzzles, scenes, and setups—in quest to retrieve stolen gold from the Bungeling Empire. Use monkey bars, trap doors, and ladders to your advantage. Broderbund, 17 Paul Dr., San Rafael, CA 94903. $34.95. *8/83.*

✓ **Mad Rat.** Zintsmaster. A B-disk, arcade second feature to pop into the drive and play for hours when no one's looking. Simple but challenging. Phoenix Software, 64 Lake Zurich Dr., Lake Zurich, IL 60047. $24.95. *12/83.*

● **Meteoroids (Asteroids) in Space.** Wallace. Make little asteroids out of big ones, plus occasional hostile alien ships. Hyperspace, autobrake, autofire. Quality Software, 6660 Reseda Blvd., #105, Reseda, CA 91335. $19.95.

● **Microsoft Decathlon** (formerly *Olympic Decathlon*). Smith. Ten standard decathlon events. Hi-res animated athletes, muscle-stirring music; you provide the sweat. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $29.95. *6/81.*

Miner 2049er. Livesay, Hogue. Run, jump, climb, and slide through the mines, reinforcing the groundwork along the way. Elevators, cannons, chutes, and ladders help; mutants don't. Hot stuff, best of the genre. Micro Lab, 2699 Skokie Valley Rd., Highland Park, IL 60035. $39.95. *1/83.*

Minit Man. Malone. Build a bridge, fight off robots, fly a helicopter. Difficult and very detailed. Penguin, Box 311, Geneva, IL 60134. $19.95. *11/83.*

Pinball Construction Set. Budge. Design and play your own computer games on-screen, with zero programming. A miracle of rare device. Superior. BudgeCo, 428 Pala Ave., Piedmont, CA 94611. $39.95. *2/83.*

● **Pool 1.5.** Hoffman, St. Germain, Morock. Makes most shots you could on a real pool table, with the advantages of instant replay and slow motion. Four different games. IDSI, Box 1658, Las Cruces, NM 88004. $34.95. *6/81.*

● **Raster Blaster.** Budge. First realistic pinball game. *Softalk* readers' Most Popular Program of 1981. BudgeCo, 428 Pala Ave., Piedmont, CA 94611. $29.95. *5/81.*

Sammy Lightfoot. Schwader. Sammy must dodge a variety of obstacles as he tries out for the circus. He evidently used to be a miner. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $29.95.

Seafox. A good sub-versus-convoy home arcader. Variety of vessels, bouncing torpedoes, refueling dolphins, and intelligent depth charges. Broderbund, 17 Paul Dr., San Rafael, CA 94903. $29.95. *11/82.*

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● **Sneakers.** Turmell. Many-layered shooting game; one of the best. Stomping sneakers and other creatures require varying techniques. Fun. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $29.95. *9/81.*

Spare Change. Zeller, Zeller. Bright graphics, ultrasmooth animation, clever sound effects, and cute characters add up to create an instant classic—the first computer slapstick comedy. Broderbund, 17 Paul Dr., San Rafael, CA 94903. $34.95. *11/83.*

Stellar 7. Slye. It's you against the Arcturan world in excellent 3-D animated arcader. Seven levels, 14 types of enemies to blast in quest of the alien armada. Software Entertainment, 537 Willamette St., Eugene, OR 97401. $34.95. *9/83.*

● **Super Invader.** Hata. Progenitor of home arcades. Still good hi-res, still a challenge. *Softalk* Readers' Most Popular Program of 1978-80. Astar International, through California Pacific, 757 Russell Blvd., Davis, CA 95616, and Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07960. $19.95.

Super Taxman 2. Fitzgerald. Pac up your troubles! Bigger, more complex version of the most perfect extant rendition of a certain arcade game. H.A.L. Labs, 4074 Midland Rd., #23, Riverside, CA 92505. $25. *1/83.*

Vindicator. Huey. Mutants, vultures, hatchlings, and other lovelies try to steal eggs in Robotronlike game. Cute dragons. H.A.L. Labs, 4074 Midland Rd., #23, Riverside, CA 92505. $25. *9/83.*

● **Wayout.** Exciting 3-D maze that moves in perspective as you play. Map displayed at all times. Lots of angles and cleptangles. Separate version for IIe. Exquisite motion animation is a breakthrough. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95. *10/82.*

Zaxxon. Garcia. 3-D scrolling air raid brought to the Apple with little sacrifice in playability. Datasoft, 9421 Winnetka Ave., Chatsworth, CA 91311. $39.95. *9/83.*

Home Education

✓ **Algebra Arcade.** Mick, Konemann, O'Farrell, Isaacs. Rates a two for arcade fun, an eight for challenge, educational value, addictiveness. For one or two players. Wadsworth Electronic Publishing, 8 Davis Dr., Belmont, CA 94002. $49.95. *12/83.*

Algebra 1-4. EduWare. Sets of learning units progressing from algebraic rules to definitions to graphing and inequalities. Individualized teaching styles to fit everyone's needs. Good for adults wanting to overcome math anxiety as well as for schoolkids. Peachtree Software, 3445 Peachtree Rd. N.E., #830, Atlanta, GA 30326. $39.95 each. *Algebra I, 5/81.*

Algebra 5-6. EduWare. For use after *Algebra 1* through *Algebra 4*, this set completes equivalent of a first-year course. Peachtree Software, 3445 Peachtree Rd. N.E., #830, Atlanta, GA 30326. $49.95.

Apple Logo. Papert. Custom version (by its inventor) of turtle graphics language. First-rate educational tool. Great kid-friendly documentation. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

Arcademic Skill Builders in Language Arts. Chafin. *Word Invasion*, *Word Master*, *Word Radar*, *Word Man*, *Verb Viper*, *Spelling Wiz*. Lots of action and great detailed graphics in arcade-style vocabulary building games. Comes with teaching package. Developmental Learning Materials, 1 DLM Park, Allen, TX 75002. $44 each. *7/83.*

Arcademic Skill Builders in Math. Chafin, Maxwell. *Alien Addition*, *Alligator Mix*, *Demolition Division*, *Dragon Mix*, *Meteor Multiplication*, and *Minus Mission*. Arcade action blended with addition, subtraction, multiplication, and division problems. Shooting correct answers to problems gets rid of pesky attackers. Choose speed, difficulty levels, game length. Developmental Learning Materials, 1 DLM Park, Allen, TX 75002. $29.95 each. *7/83.*

Briar Rose. Halliday, Crandall, Crandall. "Sleeping Beauty" computerized. Reader can change story, expand vocabulary, help the prince find Beauty. Clean graphics. Blythe Valley Software, 48079 Highway 41, Box 353, Oakhurst, CA 93644. $34.95. *11/83.*

Cdex Training for the Apple IIe. Zunkel. Self-paced, graphically oriented training program. Cdex, 5050 El Camino Real, Los Altos, CA 94022. $59.95, three disks.

Compu-Spell. EduWare. Teaches spelling through positive reinforcement for grades four through eight. Program keeps a file to monitor spellers' progress. Additional unit designed for adult user included. Peachtree Software, 3445 Peachtree Rd. N.E., #830, Atlanta, GA 30326. Program and one data disk, $39.95. Additional disk, $19.95. *5/81.*

Computer SAT. Prepares college-bound students for admittance test. Diagnoses strengths, weaknesses; creates study plan, exercises. Harcourt Brace Jovanovich, 1250 6th Ave., San Diego, CA 92101. $79.95.

Counting Bee. Conrad, EduWare. Introduces young children to counting, addition, subtraction, shape discrimination, weight, and measurement. Ages four to eight. Peachtree Software, 3445 Peachtree Rd. N.E., #830, Atlanta, GA 30326. $29.95.

Delta Drawing. Kids can make colorful drawings by using single-key commands. No special talent needed; this one develops programs that create complex graphics. Spinnaker, 215 1st St., Cambridge, MA 02142. $59.95. *11/82.*

Early Games for Young Children. Paulson. Basic training in numbers, letters, Apple keyboard for children ages two to seven with no adult supervision. Has a neat little drawing program. Counterpoint Software, 4005 W. 65th St., Minneapolis, MN 55435. $29.95. *11/82.*

Early Games Music. Paulson. Illustrates music with fun and theory. Children compose music and set to graphics or learn note reading and piano keyboard. Counterpoint Software, 4005 W. 65th St., Minneapolis, MN 55435. $29.95. *8/83.*

Early Games Piece of Cake. Eyestone. Kids become baker's assistants; adding, multiplying, subtracting, dividing cakes. Includes CatchaCake, a problem-solving race against time to stop a cake from falling. Counterpoint Software, 4005 W. 65th St., Minneapolis, MN 55435. $29.95. *10/83.*

✓ **Electronic Playground.** Tunnell. Three programs on one disk include *Matchbox*: a game requiring kids to recognize similar shapes, capital and lower-case letters and to count to nine; *Magic Blackboard*: a drawing and coloring program; and *Heidi's Program*: a kaleidoscope of color and movement controlled by the user. For ages three through eight. Software Entertainment, 537 Williamette St., Eugene, OR 97401. $24.95.

Ernie's Quiz. CTW. Four games, four subjects, one disk. Image recognition, counting skills, creativity, and Muppet expertise are introduced with lots of positive feedback. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50. *2/83.*

Facemaker. DesignWare. Exercises kids' creativity and introduces programlike command sequencing as kids create faces and link them together in animated patterns. Spinnaker, 215 1st St., Cambridge, MA 02142. $34.95.

Fay: That Math Woman. Vincent, Melhus. Basic math functions illustrated on a numberline by hi-res woman. Simple, well-executed, graphically attractive. Nonsexist. Didatech Software, 2301-

1150 Jervis St., Vancouver, B.C. V63 2C8. $29.95. *11/83.*

Fractions. EduWare. Hi-res addition, subtraction, multiplication, and division of fractions. With learning manager system. Peachtree Software, 3445 Peachtree Rd. N.E., #830, Atlanta, GA 30326. $49.

● **French Hangman, Latin Hangman, Spanish Hangman.** Protelsch, Earl. Hangman games that tell you the answer—in a foreign language. Interesting sentences, many formats. Addicting! George Earl, 1302 S. General McMullen, San Antonio, TX 78237. Two-sided disk, $29.95. *9/83.*

Game Show. Guess mystery words from clues given by "celebrity" partners—no threat to Liz Montgomery. Fifteen subjects cover vocabulary, history, algebra, and more. Add topics. Computer-Advanced Ideas, 1442A Walnut St., #341M, Berkeley, CA 94709. $39.

● **Gertrude's Secrets.** Gertrude the Goose teaches four- to nine-year-olds shape and color relationships. Solve logic puzzles, create forms. The Learning Co., 545 Middlefield Rd., #170, Menlo Park, CA 94025. $44.95. *2/83.*

Hansel and Gretel. Crandall, Crandall, Halliday. Hi-res fairy tale lets user help Hansel and Gretel find their way home, expand vocabulary, rewrite story, or create new one. Could be better. Blythe Valley Software, 40879 Highway 41, Box 353, Oakhurst, CA 93644. $34.95.

Hey Diddle Diddle. Disharoon. Three reading and vocabulary games that strengthen reasoning ability. Ages 3 to 10. Spinnaker, 215 1st St., Cambridge, MA 02142. $29.95.

In Search of the Most Amazing Thing. Snyder. Role-playing game lets kids negotiate with aliens, fly hot-air balloon. Ages 10 to adult. Spinnaker, 215 1st St., Cambridge, MA 02142. $44.95. *7/83.*

Kindercomp. Learning exercises for ages three through eight. Spinnaker, 215 1st St., Cambridge, MA 02142. $29.95.

Master Match. Robbins. Matching game with a TV quiz show format. Designed to enhance memory, teach vocabulary and concepts. For one to two players. Additional subject disks include: *Basic Skills, Science and Math, Math and Social Studies*, and foreign language. Computer-Advanced Ideas, 1442-A Walnut St., #341, Berkeley, CA 94709. $39.95; additional subject disks, $19.95.

● **MasterType.** Zweig. Learn to type by playing a game; simple and ingenious. IIe version teaches new keyboard. Lightning, Box 11725, Palo Alto, CA 94306. $39.95. *4/81.*

✓ **Math Maze.** A spoonful of maze helps the math go down in tutorial of four basic operations. Forty mazes, each so engrossing the math will fly by—and be learned. DesignWare, 185 Berry St., San Francisco, CA 94107. $39.95. *12/83.*

Mix and Match. CTW. Create mixed-up Muppets and teach the Apple about animals. Logic and word-guessing games. Add your own word lists. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $50. *2/83.*

Moptown. Two appealing and educational games require children to arrange Moppet characters in imaginary Moptown. *Moptown Parade* teaches logic, strategy development, and pattern recognition for ages six to ten. *Moptown Hotel* teaches use of analogies, strategic thinking, and sequential reasoning for ages nine and up. The Learning Co., 545 Middlefield Rd., #170, Menlo Park, CA 94025. $39.95 each.

● **The New Step by Step, Step by Step Two.** *The New Step by Step* teaches beginning programming. *Step by Step Two* teaches intermediate Basic programming, peek and poke, hexadecimal numbers, concatenations, and more. Program Design, 11 Idar Ct., Greenwich, CT 06830. $89.95. *7/83.*

Pick-A-Dilly Pair. Gray. Computerized Concentration game with cute, animated cartoon



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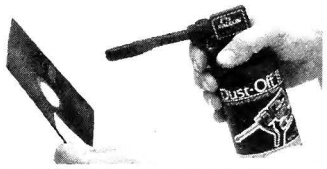
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characters, lively music. Seven difficult variations of standard game; entertaining, appealing—especially to kids. Actioncraft, 5753G E. Santa Ana Canyon Rd., #1200A, Anaheim Hills, CA 92807. $34.95. *12/83.*

PSAT Word Attack Skills and **SAT Word Attack Skills.** Priven, EduWare. Teaches college-bound students testing skills, vocabulary, and techniques for deciphering unfamiliar words in pressurized testing situation. Peachtree Software, 3445 Peachtree Rd. N.E., #830, Atlanta, GA 30326. $49 each.

Rocky's Boots. Robinett, Grimm. Rascally racoon helps children build logical thinking and computer understanding. Construct machines of logical gates in convolutions of thickening complexity. Music and sound effects add to fun. The Learning Co., 545 Middlefield Rd., #170, Menlo Park, CA 94025. $49.95. *2/83.*

SAT English I. Designed to help high school students prepare for college entrance exam. Covers verbal half of test; learn by mistakes. Micro Lab, 2310 Skokie Valley Rd., Highland Park, IL 60035. $30. *11/81.*

The Scaredy-Cat. Nidorf. Extremely well done digitized artwork illustrates animated children's book. Encourages kids to grow beyond fear. Psychological Psoftware, 4757 Sun Valley Rd., Del Mar, CA 92014. $29.50. *11/83.*

Snooper Troops. Snyder. Ongoing hi-res mystery series in form of educational games. Highly structured; excellent fourth-through-eighth-grade educational tool. Fun for adults too. Spinnaker, 215 1st St., Cambridge, MA 02142. $44.95 each. *9/82.*

✓ **Spellagraph.** Grades two through eight get a chance to guess the meaning of a sentence in picture form by correctly spelling words. Four hundred words included; add your own. DesignWare, 185 Berry St., San Francisco, CA 94107. $39.95.

✓ **Spellicopter.** UFOs try to stop player's helicopter from picking up letters to form words in latest spellicader. Slow in spots, not up to top arcade standards, but will help kids through spelling doldrums. DesignWare, 185 Berry St., San Francisco, CA 94107. $39.95. *12/83.*

Spelling Bee Games. EduWare. Hi-res games strengthen eye-hand coordination, memory, motor skills. Word lists include shapes, animals, more. Peachtree Software, 3445 Peachtree Rd. N.E., #830, Atlanta, GA 30326. $29.95. *5/83.*

✓ **Spider Eater.** Borges, Higgins. KoalaPad-controlled musical education game for kids. Features crazy sounds. Koala Technologies, 3100 Patrick Henry Dr., Santa Clara, CA 95050. $29.95. *12/83.*

Stickybear. Hefter, Worthington, Rice, Howe. Animated early education programs. In *Stickybear ABC*, moving pictures with sound represent letters. In *Stickybear Numbers*, groups of moving objects teach numbers and simple arithmetic. Ages three through six. In *Stickybear Bop*, ducks, planets, and balloons bop across screen in three shooting galleries. For all ages. In *Stickybear Shapes*, animated pictures teach shape recognition. In *Stickybear Opposites*, Stickybear and friends illustrate opposites. Xerox Education/Weekly Reader, 245 Long Hill Rd., Middletown, CT 06457, $39.95 each. *Stickybear Numbers*, *Stickybear ABC*, *Stickybear Bop*, *5/83. Stickybear Shapes*, *12/83.*

Story Machine. Helps develop positive attitude toward writing and ability to write correctly. Words come to life when sentence is acted out on-screen. Kids five to nine love to type "The tree ran down the street" and see it do so. Spinnaker, 215 1st St., Cambridge, MA 02142. $34.95.

Terrapin Logo. MIT. The Logo language, using a Terrapin turtle to teach state, control, and recursion. Terrapin Inc., 380C Green St., Cambridge, MA 02139. $149.95.

Tic Tac Show. Teaches facts and concepts about the world in general. Solo or double play; add topics. Computer-Advanced Ideas, 1442A Walnut St., Berkeley, CA 94709. $39.95.

Type Attack. Hauser. Learn to type while defending the planet Lexicon from invaders. IIe version teaches IIe keyboard. Sirius, 10364 Rockingham Dr., Sacramento, CA 95827. $39.95.

Typing Tutor. Ainsworth, Baker. Four levels of proficiency; individualized drills created with time-response monitoring. Microsoft, 10700 Northup Wy., Bellevue, WA 98004. $24.95.

✓ **Wordrace.** Simon, Freedman. Word game, trivia quiz, and teaching tool that talks. Contains four levels, 2,500 words. Adult level is challenging surprise. Trivia section includes 1,200 names of famous sports heroes, historical figures. Just super. Don't Ask Computer Software, 2265 Westwood Blvd., #B-10, Los Angeles, CA 90064. $34.95. *12/83.*

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Bermuda Race. Biddle, Mattox. Excellent yachting simulation of Rhode Island-to-Bermuda race. First-rate graphics, challenging, and exciting. Includes sailing/navigation tutorial; for one or two players. Howard W. Sams, 4300 W. 62nd St., Indianapolis, IN 46268. $29.95. *11/83.*

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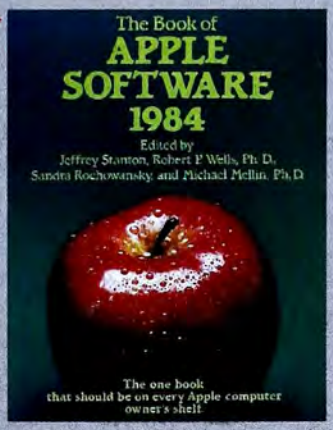
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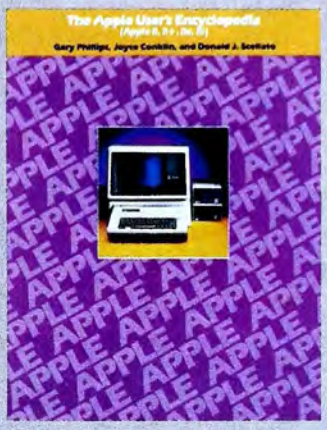
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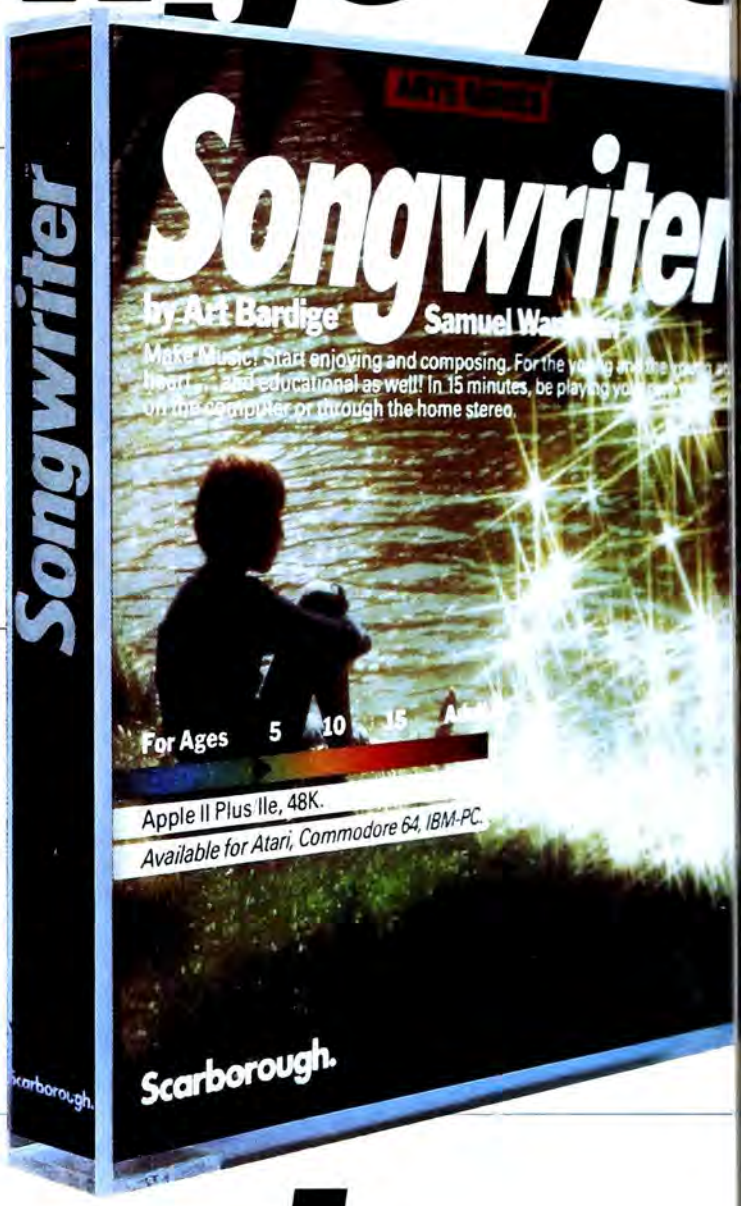
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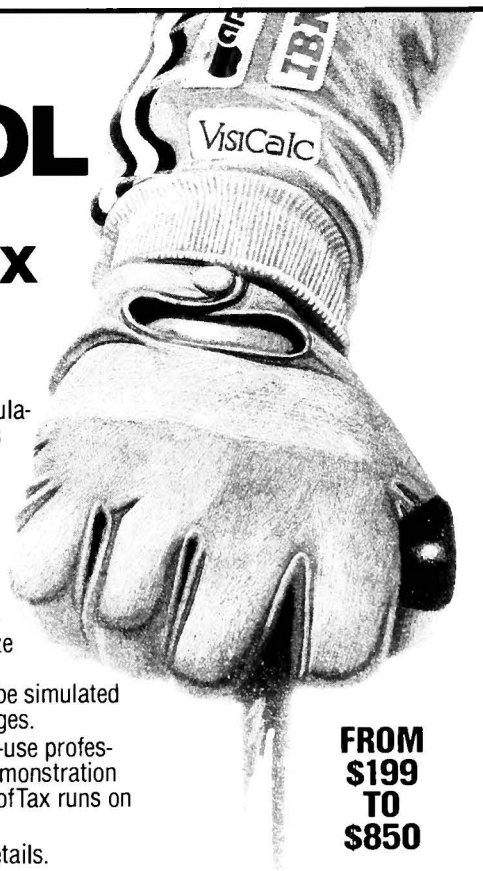
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Beagle Basic. Simonsen. Allows you to enhance and customize Applesoft by adding up to 12 functions. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $34.95. *10/83.*

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Utility City. Kersey. Twenty-one utilities on one disk. Beagle Bros, 4315 Sierra Vista, San Diego, CA 92103. $29.50.

XPS-Diagnostic. Peters. Comprehensive hardware diagnostic utility by author of *Apple Cillin* includes graphic display of bad memory chips, tests for printers, RAM, ROM, and peripheral cards. XPS, 323 York Rd., Carlisle, PA 17013. $49.95.

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Bank Street Writer. Kusmiak, Bank Street College of Education. Designed for use by whole family. Universal search and replace, word wrap are standard. U/lc without hardware. On-disk tutorial. Takes advantage of memory, keyboard on IIe, if you have one. Broderbund, 17 Paul Dr., San Rafael, CA 94903. $69.95. *2/83.*

Format-II, Enhanced Version. Hardwick, Beckmann. Word processor supports all popular 80-column cards, stores up to 50 pages of text on one disk. Includes single keystroke editor, mailing list database; displays text on-screen exactly as it will print out. Compatible with hard disk drives. Kensington Microware, 919 3rd Ave., New York, NY 10022. $150.

✓ **HomeWord.** Williams, Stephenson. Icon-operated word processor displays print-formatted document on-screen before printing, allows mixing of bold, underlined, or regular type. Includes page sketch: a window appearing in lower corner of screen that displays page format while user is working. Also features an automatic outline formatting capability. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $49.95. *12/83.*

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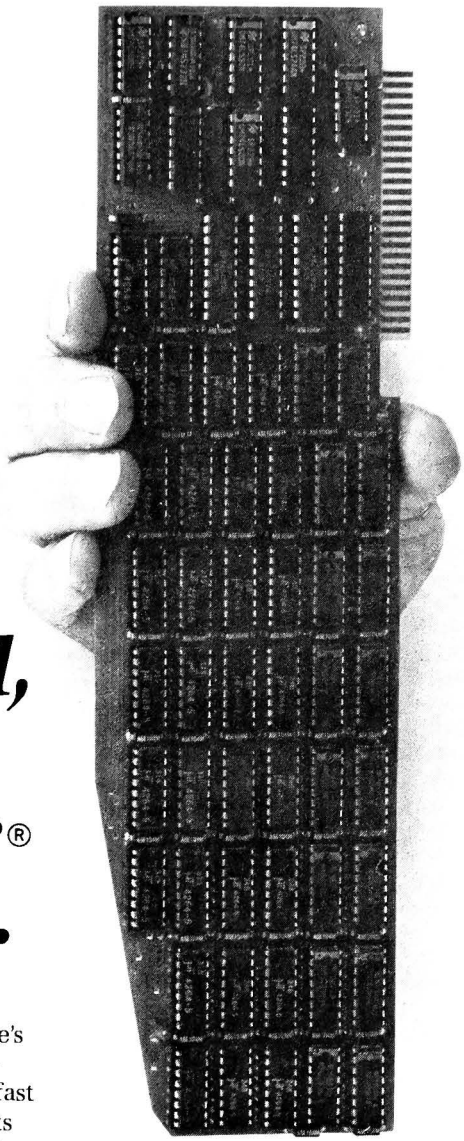
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Evans Ave., #220, Denver, CO 80219. $129. Requires *Word Juggler IIe*, 128K. *10/83*.

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MegaWriter. Gives 80-column page without 80-column card, prints in boldface, underlines via menu; features mail list merge, find, replace, text block move. Written in Pascal. Requires 64K. Megahaus, 5703 Oberlin Dr., San Diego, CA 92121. $59.95. *8/83*.

PFS:Write. Edwards, Crain, Leu. Interfaces with other PFS programs. Includes search and replace, moving and duplicating of text blocks, help screens. Document appears on-screen as it will look when printed—including page breaks, underlining, boldfacing. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125. *12/83*.

PIE Writer. Business processor allows 9,999 pages. Word deletion, auto indent, spooling, and type-ahead buffer. Hayden, 600 Suffolk St., Lowell, MA 01853. $149.95.

ScreenWriter II. Kidwell, Schmoyer. No extra hardware for u/lc, 70-column display, printer spooling. Edits Basic, text, and binary files; complete search and replace. Sierra On-Line, Sierra On-Line Building, Coarsegold, CA 93614. $129.95. *1/83*.

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Word Handler II. Elekman. Simple program with straightforward documentation. Eighty-column printing with the IIe. Silicon Valley Systems, 1625 El Camino Real, #4, Belmont, CA 94002. $199. *11/82*.

Word Juggler IIe. Gill. Sophisticated word processor with search, replace, and block move. Printout can be viewed on-screen prior to printing; multiple copies printed of selected pages. Quark, 2525 W. Evans Ave., #220, Denver, CO 80219. $239. *10/83*.

WordStar. Screen-oriented, integrated word processing system in CP/M. Z-80. MicroPro, 33 San Pablo Ave., San Rafael, CA 94903. $495.

Zardax. Phillips. Highly recommended. Single program includes supersimple use of word processing features. Considerable extras including communication by modem. Good 80-column facility with board, automatic in IIe version. Computer Solutions, Box 397, Mount Gravatt, Queensland, Australia. In the U.S.: Action-Research Northwest, 11442 Marine View Dr. S.W., Seattle, WA 98146. $295. *Zip-Comm* modem program. $80. *11/82*.

Apple III

Access III. Communications program for timesharing and standalone tasks; gives access to remote information services, minis, and mainframes. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $150.

Apple Business Basic. High-level structured programming language. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $125.

Apple Speller III. Sensible Software. Spell-checking program based on the Random House Dictionary recognizes 81,400 words including geographic terms, names, abbreviations, figures. Gives word counts, word incidence; works with most Apple III word processors. Directly accessible from *Apple Writer III*, version 2.0. Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. $175.

Apple III Business Graphics. BPS. General-purpose graphics program draws line graphs, bar graphs in three formats, overlays, and pie charts in 16 colors. Continuous or discrete data; curve-fitting capabilities. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $175.

Apple III Pascal. Program preparer with editor, compiler, disassembler, linker, filer, system library. Features cursor control, text modeling, formatting. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $250.

Apple Writer III. Lutus. Uses WPL (word processing language) to automate text manipulation and document creation. Adjusts print format during printing; translates from typewriter shorthand to English or other language and back again. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $225.

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Catalyst. Allows boot from hard disk; transfers all programs to ProFile. Quark, 2525 W. Evans Ave., #220, Denver, CO 80219. $149.

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Lexicheck. Spelling checker that runs from inside *Word Juggler*. Fifty-thousand word dictionary; add your own words. Eight-thousand-word legal dictionary disk also available. Quark, 2525 W. Evans Ave., #220, Denver, CO 80219. $145.

Mail List Manager. Generates, stores, sorts, edits, and prints mailing list files. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $150.

Micro/Terminal. Gives access to any in-house or remote database; set up and log only once. Built-in editor or edit off-line. Microcom, 1400-A Providence Hwy., Norwood, MA 02062. $99.95.

PFS:File. Page. Form-oriented information-management system stores and retrieves up to 32,000 entries. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $175.

PFS:Graph. Chin, Hill. Works alone or interfaces with *PFS* databases and *VisiCalc* files. Produces bar, line, and pie charts, merging data from several sources. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $175.

PFS:Report. Page. Generates reports; sorts, calculates, and manipulates data filed with *PFS:File*. Software Publishing, 1901 Landings Dr., Mountain View, CA 94043. $125.

Quick File III. Personal index card or filing system that generates reports, sorts. Fifteen fields; file as long as disk allows; can be put on ProFile. Apple, 20525 Mariani Ave., Cupertino, CA 95014. $100.

State of the Art General Ledger and **Business Modules.** Standalone interfaceable modules for 12 accounting periods. *General Ledger* can handle 470 accounts, 100 transactions before updating files. Modules for budget and financial reporting, accounts receivable/payable, inventory control, sales invoicing, payroll, professional time and billing. State of the Art, 3183A Airway Ave., Costa Mesa, CA 92626. *General Ledger, Accounts Receivable, Accounts Payable, Payroll, Inventory Control*, $595; *Sales Invoicing, Budget and Financial Reporting*, $495; *Professional Time and Billing*, $795.

Stock Portfolio System. Tracks investments, generates reports on current portfolio status, profit and loss statements, individual security status, dividend and interest income, expenses. Stores quotes for historical recall, calculates return on investments before and after tax, provides notice of stocks going long-term, dividends coming due, options expiring. Smith Micro Software, Box 604, Sunset Beach, CA 90742. $185.

VersaForm. Landau. State-of-the art business-forms processor. Does invoicing, purchasing orders, mailing lists, client billing. Powerful, complex, worth getting to know. Hard-disk-compatible. Applied Software Technology, 14128 Capri Dr., Los Gatos, CA 95030. $495. *8/82*.

VisiCalc: Advanced Version. Bricklin, Frankston/Software Arts. For corporatewide modeling applications; develop sophisticated templates to be filled in by novice users. On-screen help, IRR and calendar functions, macro facility, variable column widths, locked cell values, and hidden cell contents. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $400.

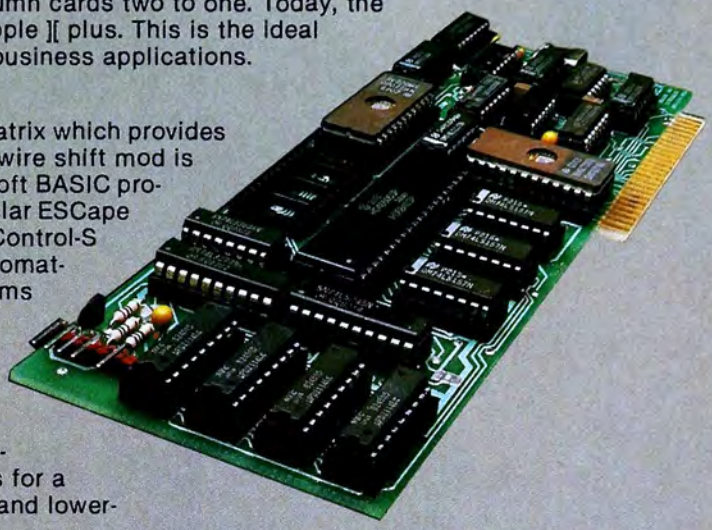
VisiCalc III. Bricklin, Frankston/Software Arts. Just like it sounds; expanded memory, u/lc, 80 columns. Four-way cursor movement. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $250.

VisiSchedule. Critical path PERT scheduler. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. $300.

Word Juggler. Gill. Word processor uses expanded memory. Printout can be viewed on-screen prior to printing; multiple copies printed of selected pages. Quark, 2525 W. Evans Ave., #220, Denver, CO 80219. $295. *12/82*.

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With the Videoterm, you can display your text with a 7 x 9-dot matrix which provides upper and lower case letters with true descenders. The single-wire shift mod is also supported. The Videoterm will list both Integer and Applesoft BASIC programs using all 80 columns without splitting keywords. The popular ESCape sequence editing capabilities and a stop-list function using Control-S are supported. If you install the Videoterm in Slot #3, it will automatically be used by Pascal and CP/M, since these operating systems recognize the Videoterm as a standard video display terminal.

Apple //e Kit

This kit contains an OPTIONAL Videoterm firmware and a redesigned softswitch for the Apple //e. This OPTIONAL firmware is for a BASIC programmer and includes: NORMAL, INVERSE, HOME, and lowercase entry of BASIC commands.

The Videoterm has no trouble keeping up with 1200 baud modems during normal printing or scrolling. The Videoterm is not compatible with cards plugged into the auxillary slot of the Apple //e. For this situation, we recommend the UltraTerm display card.

Videoterm Utilities Disk

The six programs on the Videoterm Utilities Disk will complement the creativity of the 80-column screen. This disk contains:

GRAPHICS TEMPLATE — Create a business form in 80 columns

SCROLL UTILITY PROGRAM—Set a window in 80 columns
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READ SCREEN—Read characters from screen locations
PASCAL DEMONSTRATION PROGRAMS
VIDEXGRAPHICS—Provides MID-RES Graphics in Pascal
MID-RES GRAPHICS—Graphics in 80 columns

Alternative Characters

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§ ¡ Ñ ¿ ' ° ñ ç ~

French

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The Videoterm comes with ASCII standard character set. There is a second socket for an alternate character set. You may choose from foreign languages, inverse, underline, APL language, symbol (math and Greek), and line drawing graphic character sets.

Soft Video Switch



The Soft Video Switch knows whether it should display 40 or 80 columns or Apple graphics. It does the tedious work of video-switching so you don't have to.

Switchplate

Some programs (especially those that use Run-Time Pascal) write directly to the 40-column text page and do not use standard video-switching protocol. For these programs, the Switchplate allows you to easily toggle to the 40-column video output.



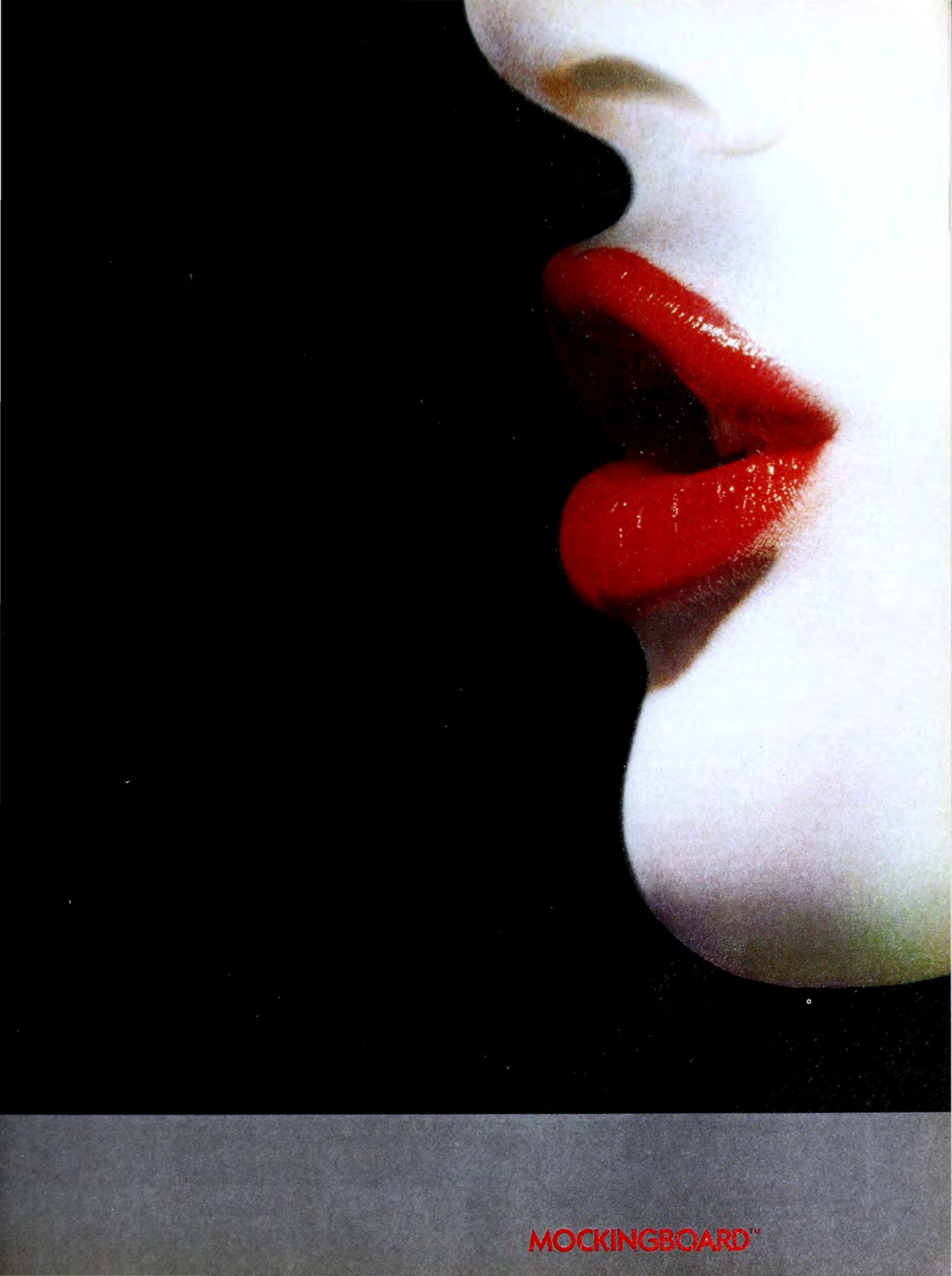
Videx
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OPEN DISCUSSION

Open Discussion gives you the chance to air your views and concerns, to seek answers to questions, to offer solutions or helpful suggestions, and to develop a rapport with other readers. It's what you make it, so share your thoughts, typed or printed, and double-spaced (please), in Softalk*'s Open Discussion, Box 60, North Hollywood, CA 91603. To ensure the inclusion of as many contributions as possible, letters may be condensed and edited.*

Retail Report

I always like to stir up a little controversy, and I'm getting pretty tired of the piracy debate, so maybe I can start a new one: Can anyone think of a good computer store?

Here I am, in the Boston area, the center of East Coast high tech, and I can't find a computer store worthy of my patronage. Here's what I find in the typical computer store: carpet, paneling, about five computers set up, ten books for sale on a shelf, and four or five salespeople having coffee in a back room or sitting hunched over one of the computers ignoring everyone. When one of these "experts" finally comes to my assistance, I almost always find that he or she knows less about Apple hardware and software than a high school student in a beginning computer class!

But the real topper is when you find out that they don't deal with the "home market." Their business is with businesspeople only (read: people who have more money to spend than brains—and it's usually someone else's money).

I even had one salesperson admit that there was no profit in dealing in nonbusiness products! Well, they certainly won't make any profit off me.

There is another kind of computer store. This one has racks and racks of software—almost all games—for every kind of computer you can imagine. There is no hardware at all, except for a few joysticks and trackballs. And behind the counter (if you can get his attention away from his current game of *Wizardry*) is a pimply faced teenager who speaks only assembly language with a Martian dialect. Not much help when you need a printer ribbon or an eighty-column card.

When someone wants to know who my computer dealer is, I just make something up. I do almost all of my dealing by mail order. They always have the best prices, and shopping around is much easier. What about service or personal attention? With the stores in my area, I'd do better asking the mailman!

Actually, I am very grateful for *Call—A.P.P.L.E.* and their hot line. They've gotten me through difficult problems in the time it would take most computer salesmen to figure out how to dial the number! Unless someone manages to come up with a computer store with a decent stock of hardware and software and an intelligent staff willing to deal with "little people," I guess I will remain a recluse, coming out only to look in the mailbox for my latest order.

Scott E. McCullough, Wakefield, MA

Shared Perspectives

While I may not be in a position to speak with authority, my eleven years as a professional in the computing industry has given me some perspectives on copy protection that I would like to share with readers.

Copy protection for business software is absurd to me. What the software house needs is an agreement whereby they will have legal recourse, if necessary, to protect their investment. Capitalists (read: business people) understand and (for the most part) respect licensing agreements. Why risk a legal snarl over what is typically an inconsequential amount of money (less than $5,000?).

Copy protection for game software is another matter. Any copy protection scheme can be broken; all you can do is make sure that it is not cost-effective to break. To do so requires some work with the computer manufacturers to get some hardware that will help do this. One approach would be a hardware identification number built into a custom, proprietary USI device along with other circuitry required for operation of the microcomputer.

The operating system for purchased programs would have to be modified to hold the code of the authorized machines. Starting to get complicated? Could a hacker still copy and run the software? Yes, on both counts. Maybe trying to recover the so-called lost revenues due to pirating is not cost-effective. But at least the above approach would allow honest people to back up their programs with multiple copies.

Hackers and pirates have been getting some national attention lately. What do you do with them? Prosecute the ones with criminal intent and hire the ones who are doing it for the challenge! We have done things when we were younger that bordered on the illegal or immoral. As a retired hacker, I can understand someone who enjoys the challenge of breaking the copy-protection on a game disk. It can be more challenging than the game. Let's harness that creative energy and put it to productive use!

Despite appearances, I do not agree with piracy. I believe software houses must prosecute organized piracy such as is found in some computer user groups. Piracy of software is a criminal act, and those selling pirated goods are professional criminals by definition. Software houses should boycott magazines that publish advertisements for copying software and hardware. Distribution agreements should guarantee that dealers handling your software will not sell software for making copies. The display of a copy program next to your program lends an air of respectability to pirating. Licensing dealers to create backup copies for customers would also help, if the price was reasonable.

In closing, hats off to Infocom for using the "dongler" and not messing with disk copy protection, and to Penguin for not bothering to do anything. You have gained the respect of the honest users.

Jeff Muchow, Dublin, CA

The Analogy Examined

I don't pirate software, yet I remain impartial about the software piracy debate. I am replying to Rudy J. Stricklan's paternal letter (September Open Discussion). Mass production of Ferraris lowers the cost per unit only to a point—labor and expenses prevent further price reduction. However, the labor and materials expenses involved in the communication of information—which is what happens when you copy a disk—are minimal. The analogy fails on this. The software piracy issue, should it ever be resolved, will be clarified by neither such logical failure nor such emotional catharsis as Mr. Stricklan offers us.

Ken Sherwood, Reading, PA

An Expert Beginner

The September *Softalk* has finally goaded me into booting up the old word processor. First, Fastalk no longer lists *The Accountant* by Decision Support. Then, in Open Discussion, Herb Abelson adds one more voice to the chorus wailing over the limitations of the top-selling *Home Accountant* by Continental Software.

I am a user of *The Accountant*, and as a relative novice to computers and home financial management, I have been deeply impressed with both the ease and effectiveness of the program. I researched software while saving up the money to pay for my IIe, and at the time it was clear that *Home Accountant* and most of the other family finance programs are just too limiting and authoritarian. In fact, I would suggest that, despite its sales, the *Home Accountant* "emperor" is at best underdressed. It's astounding to me that most of the literature on the subject doesn't make this more clear, but I suspect it's because most reviews are generally based on brief usage; the assets and liabilities of most financial tools only become obvious with prolonged use.

Another reader wrote that *The Accountant* is excellent, but not suitable for beginners. Well, I'm not an authority on much, but on being a beginner I'm an expert. This program gently guided me into organizing my records so that I now understand where my money is going so quickly. And, unlike other programs, *The Accountant* is flexible; I was able to guide it into accepting my "system" of bookkeeping, and Decision Support is tolerant of dumb questions. That alone may justify the price.

No, no—you can't make me sign off without adding my two cents to that huge pile of pennies known as "The Great Pirating Controversy." I suspect that program copying falls somewhere between taping phonograph records and shoplifting. In both cases, one is acquiring something without paying for it. In both cases, other consumers will often have to pick up part of the tab. But the amount of harm being done varies drastically.

Possible solutions certainly aren't in short supply. For example, a small users's fee could be tacked on to the price of new disks, or copy

programs, or even computers. (Is he crazy?) The revenues would then be distributed among the software sellers who don't protect their programs. But I recognize that such ideas are politically and operationally impractical.

There probably isn't a fair, short-term solution. In the long run, I'm just ignorant enough to believe that as the technology changes (and specifically the media by which programs are distributed) someone will develop a reasonably effective way of charging for software use.

In the meantime, software designers and distributors will continue to try earning the maximum margin of profit, and copiers will continue to avoid paying for programs whenever possible. It's part of the inevitable (and hopefully temporary) price we pay for being members of a species that has the ambition and brains to dream up computers and software in the first place.
Henry Tenenbaum

Specialized Rewards
I recently received *Softalk* in the mail, and one thing caught my eye right away. This magazine is all about computers. Even the ads are all about computer-related products. It sure is nice to see a thick computer magazine that does not contain cigarette, whiskey, or car ads—just computer goodies! *Softalk*, I salute you; keep up the great work!
Richard L. Dean, Sr., Valrico, FL

On the Doctor's Table
The October If Then Maybe column made suggestions for those who are befuddled by hi-res shape table construction. To that list should be added the quite economical *Dr. Grafix* from Micro Program Designs. The disk includes a routine for direct conversion of hi-res shape designs into shape tables. In addition, the tutorial demonstrations show how things are done.
David W. Zunker, Wilmington, DE

Printer Publications
As Epson America's publication manager, I'd like to comment on the October article on the MX printer by Bill Parker.

First, I'd like to express our appreciation for the extensive coverage of our printers in *Softalk*. We want our users to get the most out of their printers, and Mr. Parker's long-term acquaintance with the printers, as well as his clear, straightforward writing style, surely help achieve that objective. There is one problem with long-term acquaintance, however. Old friends may not notice when you change.

Until the autumn of 1982, Epson produced its user manual through outside contractors. Thus, the *MX Printer Manual*, as is noted on its title page, was published not by Epson but rather by David A. Lien's Compusoft Publishing.

To serve its users better, last fall Epson America created an internal publications department, fully staffed with professional writers and editors. Our charter is to make Epson's user manuals for the U.S. marketplace match the high quality of our hardware and software products. 1983 has been a year of rapid growth in documentation, paralleling the growth in the product line. Epson hardware manuals (and some software manuals) now include such user aids as indexes, technical summaries in appendixes, quick-reference cards, and introductory material explaining how to find what you need in lengthier manuals.

One of our first publications was the *FX-80 Printer User's Manual* by David A. Kater. Manuals are now being revised to include the wider models, FX-100 and RX-100 respectively.
Moira Ewings, publications manager,
Epson America, Torrance, CA

Reinking the Problem
I received my October issue of *Softalk* and have been working long hours on the contest (Trick or Treat). I have thirteen more items to find. This contest makes a person read every word; I guess that's one of your tricks. There is one advantage to this: Even though I may not win the contest and may wind up with a dog-eared magazine, I am learning more about my computer.

When reading Bill Parker's Hardtalk, I found the topic of Epson ribbons very interesting. That's my only gripe with my Epson MX80F/T (Graftrax 80), the ribbon's ink doesn't last very long. I've had my Apple II Plus set up since March 1982 and would have had to buy six ribbon cartridges. As frugal as I am, after the first cartridge's ink gave out, I knew that wasn't going to work.

I found the ribbon itself wasn't wearing out, so I decided to reink the ribbons myself. I talked to the owner of a local ComputerLand, inquiring about ink. He stated he didn't know if there was a special ink sold for that purpose. I had some ink I used for rubber stamps, and asked him if that would work. His answer: "I don't know!" I didn't want to mess up my only ribbon cartridge, so I decided to buy a new one. It was my luck that he didn't have one in stock, but he had an old one he said I could have. That started my reinking days.

Here's how it's done: Remove the top lid with a pocketknife (being careful not to break off the guide pins). With an eyedropper, drip a steady line of ink over the ribbon in the tray. (You will find the ribbon is wound accordian style; don't disturb the ribbon.) Drip only one steady line; replace lid. Set aside for at least a week, turning the exposed ribbon into the cartridge with the small knob every few days. The ink will distribute itself evenly. I have two ribbon cartridges now, so I reink the cartridge when I replace the old one with my spare. That way it's ready when I need it. Be careful not to overink the ribbon, or you will have to blot the excess off. I used a folded paper towel, rotating the ribbon with the small knob (don't open the cartridge when doing this). I've reinked each ribbon three times so far. The ribbons are in excellent shape and there have been no ill effects to my printer. I clean and lube my printer when I replace the ribbon.
Bill Bethke, Hutchinson, MN

Using *Trackmover*
I have enjoyed the George Oetzel articles about enhancing the emulation mode. Although I had some trouble interpreting the CHAREDIT listing. I got the program working and installed lower case on the emulation disk. I didn't have a

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copy of *DOS Toolkit* available, so I looked elsewhere for my lower-case character set. I found the complete Apple III set on the Basic disk that comes with Business Basic. By copying the "standard" font to a newly formatted disk and using the *Trackmover* program to copy track 1 to $1000, the character set can be found at $1200. Lower-case characters will begin at $1308 and end at $13D0. The same font can also be found in the console driver, somewhere early in the disk depending on what else is on the disk.

This brings up the possibility of using any of the fonts supplied with Business Basic for the emulation disk. Just copy the font to a blank disk with the aid of *Trackmover*. It can be found in $1200 with the CHAREDIT program. Conversely, the other fonts can be patched into the console driver so they can be used without the use of the Download.inv invokable module.

The lower-case emulation disk does not work with some commercial software, such as *VisiCalc II*. And when using it with *Apple Writer II*, the shift and alpha-lock keys do not work, but upper case could be generated with the escape key. Some copy-protected software must have a lower-case filter installed.

I did not attempt any of the game paddle routines, as I use the Micro-Sci board with Apple II game paddles. I did try to increase memory with modifications to the lower-case emulation disk and DOS but could not detect any increase in memory with the FRE(0) statement in Applesoft, nor by any other method. Any suggestions along this line would be helpful. I hope to try some of the exotic emulation modifications in the future.

The *Trackmover* program seems to have potential in modifying SOS in other interesting ways, and I am looking forward to articles along this line in the future.
Glenn Goodenow, Battle Creek, IA

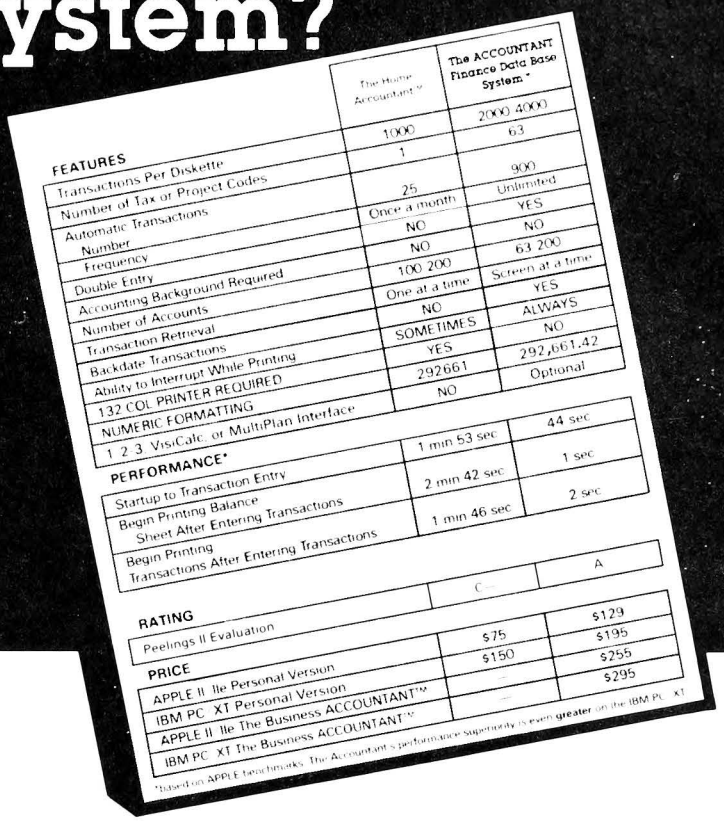
Tick, Tick, Tick

I think I might be able to shed some light on questions raised by John Jeppson in his article "Syncopation in 3/3 Time" (June '83). I've made several interfaces for use of the MM58167 clock chip in the Apple II using both the 6520 PIA and the 6522 VIA.

The 58167 "go" command, as Jeppson mentions, sets the counters from faster than a minute (seconds, tenths-of-seconds, and so forth) to zero. What he failed to mention, and what National Semiconductor's documentation also omits, is the fact that the minutes counter is incremented (by 1) if the tens-of-seconds counter contains a 4 or 5 when the "go" address is referenced. Thus, while the "go" command supposedly permits starting the clock at a known time, it is easy to end up a minute off. Addressing the counter reset address with the proper data on the data lines is a surer way of zeroing the counters faster than minutes, as there is no danger of unintentionally incrementing minutes.

While it is legal for several of the fixed-interval interrupts to be active simultaneously, the effect is the same as if only the highest-frequency interrupt is active. The interrupt is specified at 10 Hz, a 100 Hz interrupt can be obtained in the "alarm clock" interrupt mode

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Begin Printing Balance Sheet After Entering Transactions	2 min 42 sec	1 sec
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*Based on APPLE benchmarks. The Accountant's performance superiority is even greater on the IBM PC XT.

. . . . Here is what one of our users, a Washington D.C. channel 4 newscaster wrote to Softalk

As a computer novice and accounting illiterate, I set out to make a home finance program my first major software purchase. I fear *Softalk's* Fastalk column led me astray.

The Home Accountant is called "thorough and powerful." *The Accountant* is more expensive and gets modest descriptions like "simple-to-use" and "a sleeper." The choice should be obvious.

In fact, I believe *The Accountant* (the more expensive program) is so far superior as to justify the cost. It gives the user credit for brains but will handhold you through a remarkably effective double-entry system. That part might scare people off. In fact, it makes this program more enjoyable, as well as being educational and practical, but not more difficult. The documentation and tutorial are excellent, and Decision Support Software gives excellent user support.

Henry Tenenbaum, Washington, DC

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by writing "don't care" states into all latches except thousandths-of-seconds. If any number 0 through 9 is written to that latch, an interrupt is generated every time the counter and latch match, which happens 100 times each second.

The problems encountered with the reset registers are probably the result of timing incompatibilities between the 6502 microprocessor and the 58167 clock chip. The 58167 was designed to work with 8080 and Z-80 type systems. Those processors put data on the bus much earlier than the 6502 on a "write," and permit "wait" states on write cycles. Thus proper data is available when the reset registers are addressed, and the 58167 can stop the processor entirely until that data has been latched internally.

In a 6502 system, the address is valid up to 600 nanoseconds before the data becomes valid. Thus the 58167 could very well be responding to invalid data at the reset addresses.

One solution to the problem is to use both ports of the interface adapter to interface the clock chip. Drive the clock's data lines with the A port and the address, read, and write lines with the B port. The data to be written to the clock can then be latched in the A port before the address is written to the B port. The timing differences between the 58167 and the 6502 can be easily accommodated in this manner.
F. Kuechmann, Vancouver, WA

III's Allowance
The October *Softalk* had an excellent article by John Jeppson on writing a spooler for the Apple III. However, John made one incorrect statement. He said that all Apple III word processors prevent you from printing to a block device so that you cannot print to disk without using his special character driver. *Apple Writer III* does allow you to print to disk if the file you are printing to already exists. Try it. Simply save the file to be printed using the normal *Apple Writer III* save command (for example, ".d2/printfile"). Then change the print destination to this same name. Type control-P followed by "PD.d2/printfile". Finally, print the file as normal (control-P NP). You will then have an ASCII file on disk that is a print image, all ready for the spooler. Be sure to delete "printfile" before printing a smaller document to disk. For some reason, *Apple Writer III* doesn't reset its end-of-file pointer when it prints to disk. As a result, the rest of the old, larger file will still be treated as part of this new file.
Rod Riggenbach, Sunnyvale, CA

Preteen Turtle Tales
I am twelve years old. My dad and I have been learning GraForth and love it. When we got our computer, my dad wanted me to learn to program instead of playing the great adventure and other games. We borrowed *Apple Logo* and used it for a couple of weeks. At first it seemed neat to draw pictures, but that got boring fast. Then my dad heard about GraForth and bought it through the mail because our computer store didn't carry it. We discovered that GraForth had turtle graphics just as good or even better than *Logo*. We also discovered that GraForth allows you to make beautiful music and allows very, very fast animation with characters and three-dimensional objects. It's so exciting, I'm thinking about writing my own arcade game!

It is strange that *Logo* is on the Bestsellers list when GraForth has turtle graphics just as good and easy to use. Although the turtle graphics of GraForth is as easy to learn as Logo turtle graphics, I must admit that I required my dad's help for the neater things of GraForth.
David Anders, Logan, UT

Pictures and Praise
Can anyone tell me whether Apple Logo pictures can be printed without a graphics card, and if so, how? Inasmuch as I have a graphics dump program (*Printographer*), all I need to know is how to get the picture onto disk as a picture rather than as a procedure.

I'll also take this opportunity to second Thomas E. Militello's praise of *The Spreadsheet 2.0* (November Open Discussion). Anyone interested in knowing more about *The Spreadsheet 2.0* can read the review of *Magicalc* on page 181 of the same issue. Circumstantial evidence indicates that *The Spreadsheet 2.0* is a generic version of *Magicalc*.

Here's some more praise—for *The Accountant*, by Decision Support Software. I tried both *The Accountant* and *Home Accountant*, then bought *The Accountant*, which I found to be faster, more powerful, and easier to use—superior in every way except for packaging and price. It costs twice as much as *Home Accountant*, but it's a much better value.

Many letters to Open Discussion praise companies that support their products. These testimonials are nice to see and potentially valuable to readers, but it's good to bear in mind that much of this praise goes to companies whose support was needed because their products failed to perform as expected. It's good to deal with a company that supports its products, but I'd rather deal with a company whose products don't need support.
Roy Freborg, Hollister, CA

Hamming It Up
Any computer-using educator who is a ham radio operator and would like to start a Computer Educators Round Table should contact me, Wayne Ayers, at Culver City Middle School, 4601 Elenda Street, Culver City, 90230. Or listen for us on Sunday afternoons, 1:00 p.m. PST at 7240 + or −.

The Round Table will be an informal network through which we will discuss such things as hardware and software, how to set up a computer lab, staff in service, how to win over reluctant staff members, curriculum development, textbook selection, lab security, and how to encourage people from all subject areas to make use of the computer lab. I do not claim to have all the answers; it is my hope that we can learn from each other.
Wayne Ayers, WD6DKI, Culver City, CA

Print School
In response to Tim Johnson's letter in the November Open Discussion: Our school has a Dynax DX-15 printer with an Apple IIe, but with an Epson parallel interface. We also have two Apple DMPs with the Apple interface. The Dynax/Apple/Epson system works almost perfectly with *Apple Writer IIe* or the older *Apple Writer*. The all-Apple systems do not. Our Apple dealer has informed us that a chip in the interface is bad and he will replace it as soon as the chips have been received from Apple. I don't know if this is an isolated case or a common problem with the Apple interface, but it might be worth checking.

Also, Mr. Johnson should make certain he is accessing the special print features of the Dynax correctly. The procedure that works with *Apple Writer IIe* is control-V, escape, code symbol, control-V, space. The double-print code symbol is F, shadow print is W. Use the & code symbol with the above sequence to clear and return to the normal print mode.

We have had the Dynax for about five months and have been very pleased with it. Its only disadvantage seems to be that it is relatively slow for a printer. For us, its advantages far outweigh this disadvantage.
Bruce Faitsch, Guilford, CT

Hash Bash
I am writing in response to the letter from Roy C. Bennett (October Open Discussion). Yes, I have had *Screen Writer II* trash some files, and yes, I discovered a cure.

The best solution is to buy a second disk drive. The program uses the output file disk as virtual memory (that means they're making the computer think it has more RAM than it does by using the disk as RAM). This allows you to write files that are larger than the 48K in your machine (the program itself uses some of this). To avoid hash, just assign the output file to drive 2 and save all your files to drive 1. If you don't want to make that investment, you will have to do a little more work.

Never use the "s" command by itself; assign a file name as well. Also, do not save to your output file; choose another name for the finished document. It's safer if you save your document to a different disk entirely. This means that when the program asks if you want to save a file to the disk in S6,D1, you answer with "N." You will have to shuffle disks a bit as the program checks the virtual memory files for data and returns to the save disk with what it finds, even if there is nothing there.

The addition of a second drive is by far the smartest choice. As well as making the time you spend computing more enjoyable, it will make this program even more useful.
Donald Walker, Chicago, IL

This is directed to Roy C. Bennett, whose *Screen Writer II* files turn into hash, and to other users of that powerful but sometimes temperamental word processor. My earliest and most vivid memories of *Screen Writer II* are of the night my wife and I were late to a party at her boss's house because, just as we were about to leave, I had eleven pages of a research article turn into hash. I very nearly sent the whole thing back to Coarsegold on the spot, but since calling Sierra On-Line and taking their advice, I haven't lost a single file.

I hated to admit it, and you will too, Roy, but they're right when they say most scrambled files are due to user error. True, a really good system would be more forgiving of user error,

HELENA ON CREATIVITY.



Name:	Helena Paoli
Age:	9
Home:	Belvedere, California
School:	Bel Aire
Hobbies:	Drawing, playing with dolls, reading, swimming
Ambition:	To be a fashion designer
Favorite software:	Creature Creator™ by DesignWare

"I like *Creature Creator* because it's kinda like drawing – only the pictures are alive! I can make different creatures, and then make them do lots of different dances.

"Lots of games – well, you just keep shooting or dodging things until you learn the pattern. Then you can beat it easily, and you get bored.

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but if you follow the instructions Sierra On-Line gives you, you'll do okay. There are only four commands:

Keep your files small. *Screen Writer II* can use disk space as virtual memory to allow you to input a file longer than your Apple's memory space, but don't do it. Watch the sectors-left indicator and start another file when you get more than about thirty sectors long. You can easily link files for sequential printing with the .af (append file) embedded command.

Keep your file rationalized. Heavy editing puts a load on a linked list system, so enter a z from the command line periodically during editing. Takes literally five seconds.

Never save to your output file. All my text disks contain a file called "Dummy," which is always the output file and which stays in drive 2. When I'm ready to save, I use the sfilename,d1 command. With a single drive system you can do the same thing and put your saved file on the same disk as the output file—or say no when asked if you want to save to the disk in drive 1 and follow the prompts exactly.

Occasionally, in spite of all precautions, you may get the dreaded "Warning! During the attempt to save, your output file was deleted. Save your file to another disk!" message. Don't panic, just repeat the save and answer N when asked if you want to save your file to the disk in the drive, then follow the prompts.
Steve Cramer, Athens, GA

Regarding Roy Bennett's hashing of text files when using *Screen Writer II* (October Open Discussion), I have used the program for about a year with this same setup on my computer at home (Apple II Plus, one disk drive, 16K RAM card, and no eighty-column card). At times, I had the problem he reported. Files already on a disk would be more or less damaged with segments from a file I had worked on more recently. I could edit these damaged files or print them out; it was just that parts of them were overlaid with newer material. The overlay material would typically be several lines long, and there might be several overlays in a file a few pages long.

Recently, I haven't had any trouble as long as I've observed the simple rule of not taking the text disk out of the drive when *Screen Writer* is in the editor mode. (Of course, I have to have my input file there to start with, and I must make sure I have enough room remaining on the disk for my output file.) I also do not make multiple saves (to more than one output file name) of a given file that I am working on. The other things Mr. Bennett mentioned don't seem to make any difference in my setup. I use the simple "S" save command; I have worked with long (90- to 110-sector) files, and sometimes my disks get quite full.

I do all of my *Screen Writer* text file transfers from disk to disk using *Fid*. I make text backups that way before and after using *Screen Writer*. It's a little more work, but I've been rewarded with clean files.

As an aside, I think *Screen Writer II* is a marvelous piece of software for someone like me with a minimal system. More recently, I got an Apple IIe, two disk drives, and an eighty-column card for my office. I bought *Screen Writer II* for this system also. I have only compliments for the support Sierra On-Line has provided in helping me configure the program for the IIe. Twice, in response to my phone calls, they've mailed information immediately. Now I look forward to *Screen Writer IIe* so I can compare it to *WordStar*. I think both are fine word processors, working under different constraints and in different price ranges.
Jim Taylor, Sierra Madre, CA

Sweet Frustration of a Cat Lover

Being a Mockingboard owner (Sound/Speech I) and a soon-to-be modem owner, I found my interest piqued by a few of the letters in October's Open Discussion.

I think Steve L. Richter hit the nail on the head when he said that programming the Mockingboard has been "an exercise in frustration." The sound synthesis, albeit excellent, is simply too complex for the average user. Maybe Sweet would consider writing a program that uses the Mockingboard in the same way Electric Duet uses the Apple speaker and is as easy to use. The speech, however, has been blissfully easy. Just check the text-to-speech algorithm manual. It contains a simple program to produce almost any word in the English language. The manual states that a small portion of the speech section of the board is set aside for pitch but is unused because of the board's natural voice inflections. Can I access this portion to change the voice's pitch and make it "sing?" If so, can anyone tell me how?

I can sympathize with David V. Luzi, who asked about which modem to consider buying.

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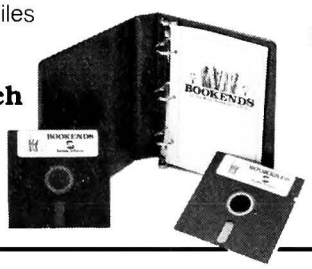
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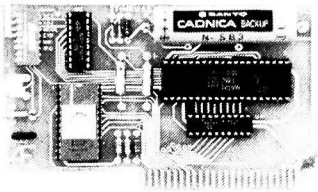
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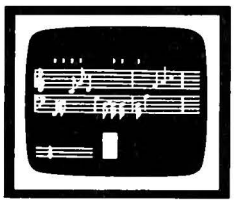
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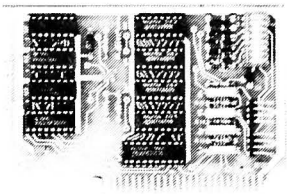
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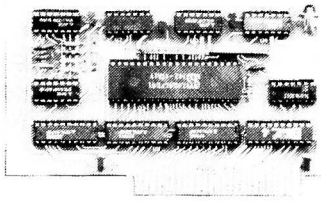




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SUP'RTERM	MORE	NO	YES	NO	NO	NO	NO	YES	YES
WIZARD80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
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VIDEOTERM	MORE	NO	NO	YES	NO	YES	YES	NO	YES

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I considered three modems before settling on the one I'm waiting for now. They were the Prometheus Pro-Modem 1200, the Novation Apple-Cat II, and the Hayes Micromodem IIe. The Pro-Modem has everything: a timeclock, 300/1200 baud, a mailing list, and specialized buffers. Well, I don't really need all of that stuff. Ditto for the Hayes modem. I would be paying a lot for extra features I'd probably never use. I decided on the Apple-Cat II mainly because of its wide variety of down-to-earth features like phone list, autodial, its many memory functions, the ability to print out data as it comes in, and the unattended answer mode—all for a very low price. Also, the Cat is the only modem I know of that can be expanded into an answering machine and a lawn gardener, just to name a couple of applications. It may or may not be able to switch over to another line, as described by Lewis S. Leclerc, Jr., but you could certainly leave a message for incoming callers with the other number and give them the option to leave their names and numbers for return calls. May I suggest you check with Novation or Hayes; with some of the modems I've seen, almost anything is possible!

There are a few things I'd like to know about the Apple-Cat II that aren't made too clear in the documentation. The manual states that you can control your computer from any remote Touch-Tone phone and tell it to turn on the sprinklers, dim the lights, turn on the VCR, and record the Three Stooges Filmfest—stuff like that. What hardware or software does this require? In an advertisement I read a while ago, it was stated that Novation was considering using a Votrax speech chip in its auto-answer mode so that you could have it say anything you wanted and then record the response on tape. Well, I have the Votrax chip in the form of Mockingboard. Does anyone out there know a way to wire the two together to create a complex answering machine with a computer voice?

Bear Braumoeller, Orinda, CA

Effectual Sounds

To use the Mockingboard Sound/Speech I with the sounds from the demo disk in a Basic program, one needs to follow several steps. The routines on the demo disk that the user will need are the Primary Routines file, the Table Access Routine file, and the Psgtable.obj file. The user must bload all three of these files into memory with his or her own Basic file. The way the Mockingboard works is that the Psgtable.obj file contains the sound data, which in turn is read and stored in the Mockingboard by the Table Access Routine file and the Primary Routines file. The sound is also executed after the reading and storing. The advantage is that the sound execution requires a fraction of computing time (or, in a higher sense, microprocessor time), yet the sound can continue as the Basic program goes on to do other things. It's like getting somebody else to do your homework for you so you can do better things. The only tricky parts are poking in the sound table addresses and calling the sound subroutine. An example follows that outputs a gunshot with the Sound/Speech I board: Bload Primary Routines, Table Access Routine, and Psgtable.obj.

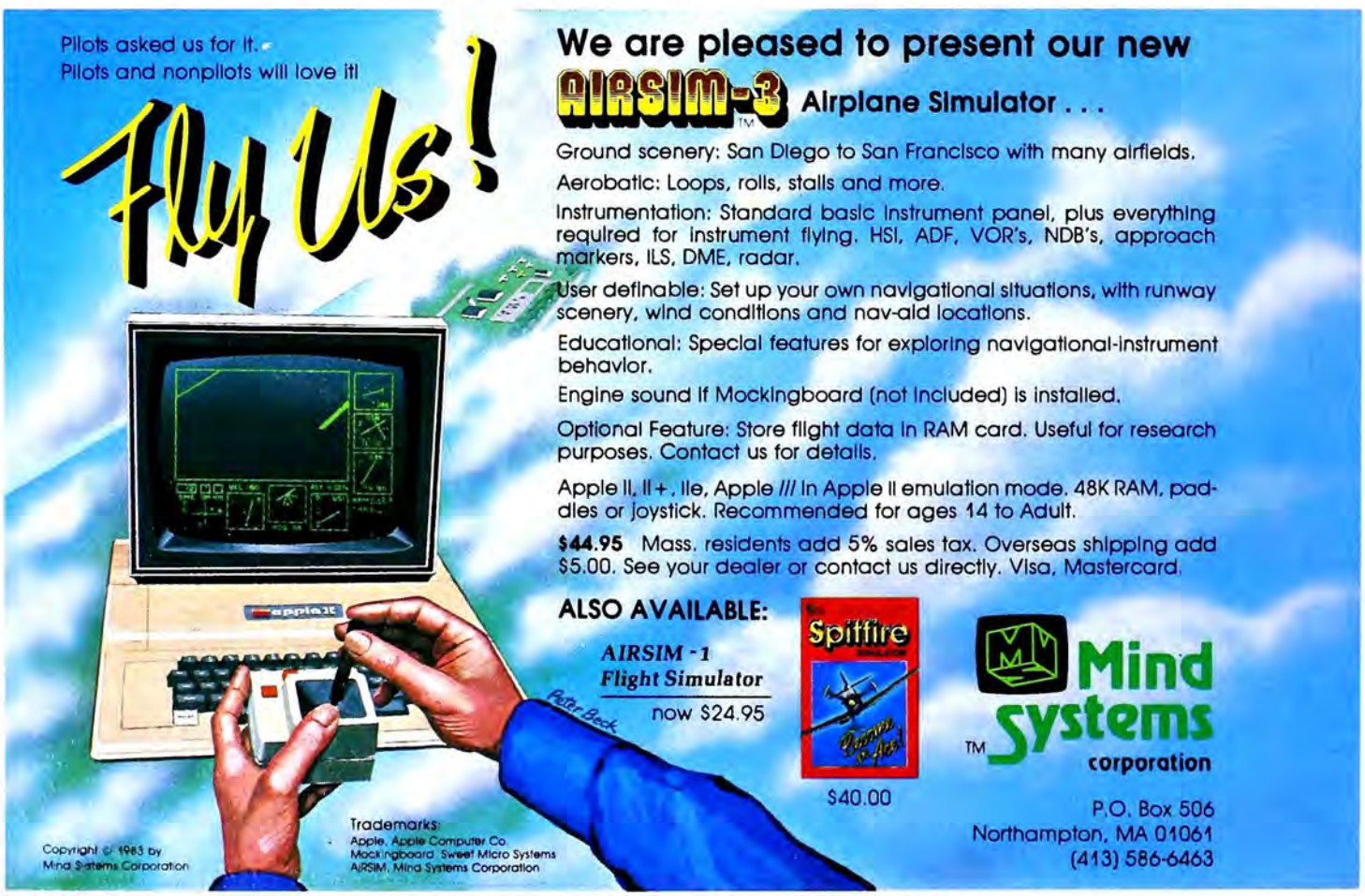
```
CALL -28672
CALL -28637
POKE 8,0
POKE 9,137
CALL -32748
```

This routine can be used in any Basic program and, of course, the files only need to be bloaded once at the start of the program no matter how many sounds are used. The first two calls do some setup work with the routines that needn't confuse or interest anyone except assembly language programmers who want to know more. The two pokes poke the addresses of the gunshot sound data into the data table. The last call finally executes the sound. Each sound in the table is sixteen bytes long, and the sound table starts at 35072 decimal or $8900 hex. It is easy to see that the gunshot takes bytes 0–15 on the table and that the second sound, the train, uses bytes 16–31. In simple English, this means that a new sound starts every sixteen bytes.

Here is a list containing some of the sounds on the sound demo program:

```
GUNSHOT – 00
TRAIN – 16
HELICOPTER – 32
EXPLOSION – 48
OCEAN – 64
SWISH – 80
PUMP – 96
CLOCK – 112
GENERATOR – 128
```

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grams, follow the procedure for the gunshot, but poke the number listed after each sound into memory location 8. Some sounds on the demo are combinations of certain sounds, such as the machine gun, which is simply a string of gunshots in succession. With this method, you can put any sound on the demonstration table into your own program. These methods are for the Sound/Speech I board in slot 4. The principles are the same for the other Mockingboards, but some of the locations and tables are at different locations. The Mockingboard is a great peripheral device, and I highly recommend the purchase of a Sound/Speech I board.
Chris Wheaton, Los Altos Hills, CA

Direct Address
Perhaps I can help some readers who use the Hayes Smartmodem. The D.C. Hayes Smartmodem doesn't accept commands like most modems. It must be addressed directly by the RS-232 serial port. There is a way to have the *ASCII Express: The Professional* program automatically dial a phone number until a connection is made, using its powerful macro feature.

How to use macros to auto dial a phone number with the Smartmodem 1200 isn't in the program's manual from Southwestern Data Systems. Of course, Southwestern Data Systems cannot be expected to be experts on all the modems used with the program. D.C. Hayes wasn't aware of how auto dialing could be done, either. The following is a sample macro that will auto dial a number until a carrier tone is detected.

When you boot up *ASCII Pro*, you will immediately be in the terminal mode. This is because the Smartmodem is addressable only by the RS-232 serial port, and the terminal mode is how you talk to the Smartmodem. The D (dial) command available in the *ASCII Pro* doesn't work with the Smartmodem because you are always in the terminal mode.

From the terminal mode, press control-Q to enter the command mode; press U to update macros; press D to display macros; press O to select macro #0; and type *?AT D T 534-1547' RT''AT H ' LO.*

It would be a good idea to use all capital letters. In fact, the Smartmodem requires that the AT be in caps. Macro number 9 should be left blank or be your log-on procedure. You can repeat the macro above for each phone number to which you want to have access.

Let me explain what the above macros mean:

?—this slows down the macro. It seems that the Smartmodem doesn't work right after the first attempt if the macro isn't slowed down.

AT—this is the command that tells the Smartmodem to get ready to accept a command.

D—this is the command that tells the Smartmodem to dial a number.

T—this is the command that tells the Smartmodem to use touch-tone dialing.

534-1547—this is a sample phone number. You can have as many digits as you like, and dashes are ignored by the Smartmodem.

'—this character sends a carriage return to the Smartmodem. A carriage return is sometimes necessary to send a command to the Smartmodem. One exception to this is the command /A, which doesn't need a carriage return.

(Space)—this character begins a conditional clause.

Before we go on, let me point out that the Smartmodem outputs certain messages. Two of the messages are of interest to us for use with this conditional macro. If the Smartmodem gets a carrier signal, it responds with "Connect." If the Smartmodem gets a busy signal, it responds with "No Carrier." The last character of these messages is what the conditional macro looks for—the T or the R.

RT9—these are also part of the conditional clause. The R is the character, if encountered last, that will continue on with the rest of the macro. In this example, the rest of the macro is to link back to the macro or to restart. The T is the character, if encountered, that transfers control to macro number 9, which right now is nothing. In other words, if you are connected, the macro halts.

(Space)LO—the space is the character indicating the beginning of a command sequence. The L is the link command. The O is the macro being linked to.

Bulletin boards are getting harder and harder to reach. It is important for a modem to be able to redial a number until a carrier tone is detected. Without the powerful macros of *ASCII Pro*, a user has to retype the dial sequence or the A/ sequence repeatedly until a connection is made. It is a shame D.C. Hayes didn't give the Smartmodem the smarts to auto dial a number until it connects. But they aren't alone. Few, if any, modems have this capability within their firmware.
Nick Anis, Jr., Fullerton, CA

Reader to Reader
To T.A. Reif (August Open Discussion): You can get your Epson FX-80 (and Gemini) to underline letters and words by typing *escape-1* to turn it on and *escape-0* to turn it off. (For some reason, the Gemini wants escape-@ [a control-@] instead of the 0.) I'm sure this will work with the MX-80 as well. You can do this with *Apple Writer* in the control-V mode or, more easily, with a glossary file into which you've previously inserted all the control characters you need. By the way, you can't enter the control-@ with the control-G glossary define sequence. You must clear memory, load your glossary file as a regular text file, insert your characters, then save it normally. When you then load it as a glossary file (control-Q5 file name), all your commands will be there.

To Evans Harrell (August Open Discussion): The problem you're having with changing type fonts is similar to the one I had some time ago. This may work for you. In order to change fonts with my Centronics, the command (in my case, an escape control-Q or other similar command) must appear as the first character after a carriage return. If you have a left margin set that is anything other than .1m0 (with the paragraph margin also set to .pm0), the command is not the first character on the line. The spaces you asked *Apple Writer* to insert at the beginning of each line are there before your command. To fix, issue an .1m0 as the first four characters on a line, go to the next line, and issue your control-I80N command. This precludes mixing type fonts on the same line. However, you can still use single-width, double-strike print intermixed on the same line. *Apple Writer*'s internal underline command works with no printer I've seen. Perhaps Paul Lutus can shed some light on this.

To Leanna M. Cole (August Open Discussion): My Centronics printer needs a control-I80N (or 132N, whatever the case may be) command; otherwise *all* its output will be forty-column. This is true for word processing, program listings, and printing from inside a Basic program. That infamous control-I is not just to turn off the screen for us Centronics users. To insert control characters with *Apple Writer II*, merely hit control-V, then your characters, holding control where necessary, then hit control-V again to terminate.

I would like some way of dumping graphics on my Centronics. The machine came with a boffo demo program including two hi-res screen dumps, but I'll be darned if I can find out how to take graphics I've drawn and dump them. *Zoom Grafix* doesn't cope with Centronics 739 printers, and the local Centronics office doesn't have a clue. Don't tell me it can't be done, for I can send you a copy of the printer demo done in my presence on the machine I now own.
David W. Sigetich, Markham, Ontario, Canada

Reader Paul Cullen's problem (October Open Discussion) might be solved by the machine language graphics dump routine contained on the demonstration disk that comes with the Apple Dot-Matrix Printer. The disk and program are not locked. I haven't tried that routine on an NEC printer (I have the Apple printer), but the two machines are extremely similar and the Apple program may work.

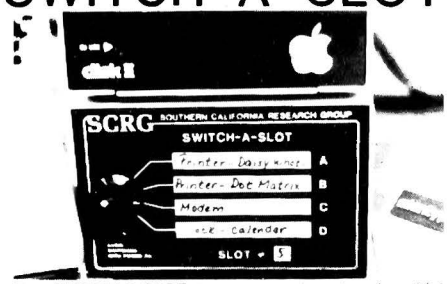
I can sympathize with Roy Bennett (October Open Discussion). I have recently been having the same problem with file scrambling in my *Screen Writer II* program. I think I may have identified the source of the problem. I had no troubles even with extremely full disks, prior to that time I began using *Diversi-DOS*, a modified DOS that features very fast program and file loading. I tracked a problem I was having with *Home Accountant* back to *Diversi-DOS*, and I am pretty sure that it is at the root of my problems with *Screen Writer II* as well. My experience in this regard should be a warning to all Apple owners: Use any nonstandard DOS with great caution, especially with locked commercial programs. The file-handling techniques may not be compatible and you may encounter file damage that will take you weeks to recover from.

Reader Alan Smolen's problem (October Open Discussion) is probably due to the printer control card. The control card is still expecting a maximum line length of eighty characters even though the control-O command to the printer has set it to handle a 132-character line. Adding control-I 132N to the setup string should take care of the problem if he has an Apple printer card, though some other cards may require a different sequence.

Louis Leclerc's proposal (October Open Discussion) seems unnecessarily complicated. I can understand why he would want to divert af-

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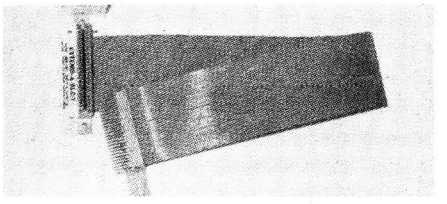
This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

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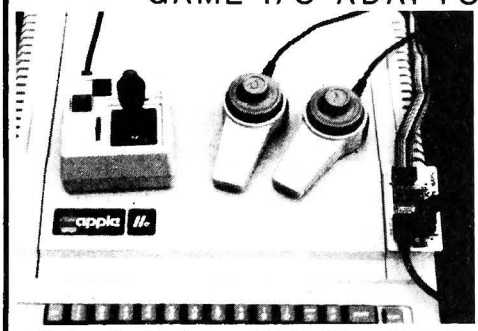
- Switch between TEXT & GRAPHICS
- Switch between Page 1 & Page 2
- Switch between HI-RES & LO-RES
- Turn disk drive ON or OFF
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- Protect or enable language card
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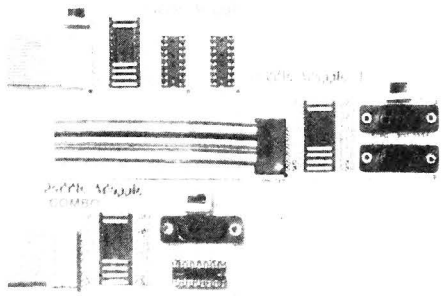
DMAnual controller allows all this while programs are running. Commands can be issued (via push-buttons) in the middle of a program, and the desired result occurs immediatly. The process used (known as CYCLE STEALING) allows immediate execution of these commands without interfering with the normal operation of the program. The card is slot independent, and is connected to a control panel by a four foot cable. DMAnual controller is fully described in the book "UNDERSTANDING THE APPLE][" by Jim Sather (copyright 1983 by Quality Software).

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ter-hours business calls to his home, but nothing he said shows a need for involving his Apple and modem in the task. The call forwarding service offered by Bell Telephone Company in our area seems to do what he wants without any extra hardware or software needed. The calls can be forwarded to any number he chooses, so that if he is visiting friends he could have the calls sent there instead of to his home.
Richard I. Bonser, Madison, WI

To John Flikeid: The NEC 8023A manual was first written in Japanese and then translated into English. (That's worse than translating Basic into machine language.) All of the printer commands to change fonts start with an "ESC," followed by the individual command to change that font. A one-line program illustrates how to change from pica to elite font:

```
10 PR# 1: PRINT CHR$ (27); CHR$ (69):
   PR# 0
```

In this case (69) sets the elite font mode. Other values are as follows: condensed = (81); pica = 78; proportional = (80); enhanced or bold = (33); clear enhance = (34); underline = (88); clear underline = (89); double width or enlarge = (14); clear double width = (15); ⅙-inch line spacing = (65); ⅛-inch line spacing = (66); normal ASCII characters = (36); Greek = (38); and graphic = (35). Whew! Note that after you select enlarge, enhance, or underline, you have to turn off or clear that mode to go back to the mode you were in before you invoked it.

Your Dip switches on the NEC should be set as follows: SW 1 — 1, 3, 4, 5, and 8 should be "open"; SW 2 — 2, 3, 4, 5, and 8 should be "open." You'll notice these switches under the front panel at the right-hand side. *Zoom Graphics*, *Image Printer II*, or the *Printographer* will all dump graphics to the printer, but you still have to bload the picture. All these programs show you how to do this easily.
Ron Moos, Birmingham, AL

To John Flikeid: The folks at NEC have prepared a special manual to help Apple owners use their printer, which incidentally is virtually identical to the Apple Dot Matrix Printer and to a C. Itoh model; both are versions of a TEC (Tokyo Electric Company) printer. All I had to do was call the Elk Grove, Illinois, office and ask for the manual. They have been very helpful in correcting a few interfacing problems that should no longer exist if you use an intelligent interface card.

One thing to note about the manual is that the Dip switch settings might be better set another way. I have to use my printer on both an Apple II Plus and an IBM PC. The switch settings I use are good for both: SW 1 — 2, 6, and 7 closed; SW 2 — 2, 6, and 7 closed. All I do to print graphics images is put them on the hi-res screen and use my Grappler's normal graphics screen dump command. That should solve John Flikeid's problem, but I can't help Paul Cullen, who drives his printer with an Epson APL board.

There is an excellent article in *Creative Computing* magazine's September 1983 issue that describes ways of using the NEC 8023A from Basic. This article by Susan Glinert-Cole is applicable to Apple owners.
Al Butler, Athens, GA

Those Incredible People
It's incredible! I would like to take this opportunity to thank everyone who wrote and called in response to my letter entitled "Wrong Computer" in the October Open Discussion. I think it's great that people are so willing to help others out with a problem such as mine.
John Flikeid, Annandale, VA

Switch It On for One
I use *PFS:File* frequently, and when I first tried to print my files with my Epson FX-80 I came upon the same problem as Sean Roberts reported in the October Open Discussion. So I looked in my trusty operator's manual and found out that I needed to switch DIP pin 2-4 to "on," which gives an automatic line feed. Now I can print all of my files with no problem.
Mike Laus, Birmingham, AL

If *PFS:File* is always printing on the same line, then that is correctable in the print options menu. Exact instructions are in the manual. If the problem is that the tail end of a line is printing on its beginning, then I have two solutions. The problem is that the printer is returning the carriage before *PFS* tells it to; therefore *PFS* doesn't advance the line. Solution one: Abbreviate—you have too much information on that line. Solution two: Change the print command to T. This will allow *PFS* to print the information as text.
Michael J. Marsh, Santa Ynez, CA

Perhaps I can help Sean Roberts and Alan Smolen (October Open Discussion) with their *PFS:File* problems.

First, the PFS programs assume that your printer automatically sends a line feed after each carriage return. If you are getting overprinting, try using the "L" option (instead of the default "P") when asked for an output device in the PFS programs. I have had no problems at all with an Epson MX-80 printer with Graftrax+ and Grappler+ interface, or with an Apple Silentype printer.

Second, to use printer control codes with *PFS:File* (or *PFS:Report*), you must set up your printer before booting the PFS disk. The *PFS:Report* manual includes a program to do this. With particular reference to Alan Smolen's problem, control-O turns on compressed print with the Epson but does not reset the default eighty-character right margin, which in my case is controlled by the Grappler interface card. To remedy this, I use control-I 132N to set the margin at 132 characters. This control code may differ for other printer/interface combinations.

I hope this will help you.
Susan W. Rollinson, Clifton Forge, VA

Twin Trouble
I have a partial answer to the question asked by Sean Roberts (October Open Discussion). He tried to use the print function on *PFS:File*; his printer would not advance a line and all the information was printed on the same line, with each overlapping. When you load *PFS:File* and the menu appears, type *control-L*. The message "set for printer without auto-linefeed" will appear. Unfortunately, when I use this my information comes out garbled. The letters are all changed. I have a Gemini 10X printer and would appreciate any help I could get to solve this problem.
Shaun Stuart, Fullerton, CA

A Reconnection
I recently made one of the wisest purchases of my life, an Apple IIe. With my purchase I was surprised to find a six-month trial subscription to *Softalk*. It has been one of the most beneficial parts of my entire investment. I find myself reading it thoroughly from cover to cover, and in the two months that I have been receiving it I have benefited immensely.

With the Amdek Color-I Plus monitor and Apple IIe eighty-column text card combination, I found Jerry Van Cleeff's suggestions (October Open Discussion) about making text more legible in the eighty-column mode very useful. Since I use this mode quite often when writing programs, I have found his short program to be very helpful. As a beginner, I was alarmed when I included his program lines in one of my programs and then discovered that I could not use any DOS commands without getting a syntax error. After a little work, and some help from a patient salesperson at my Apple store, I figured out the problem: As written, his lines were disconnecting DOS! To correct this problem, I changed the program as follows:

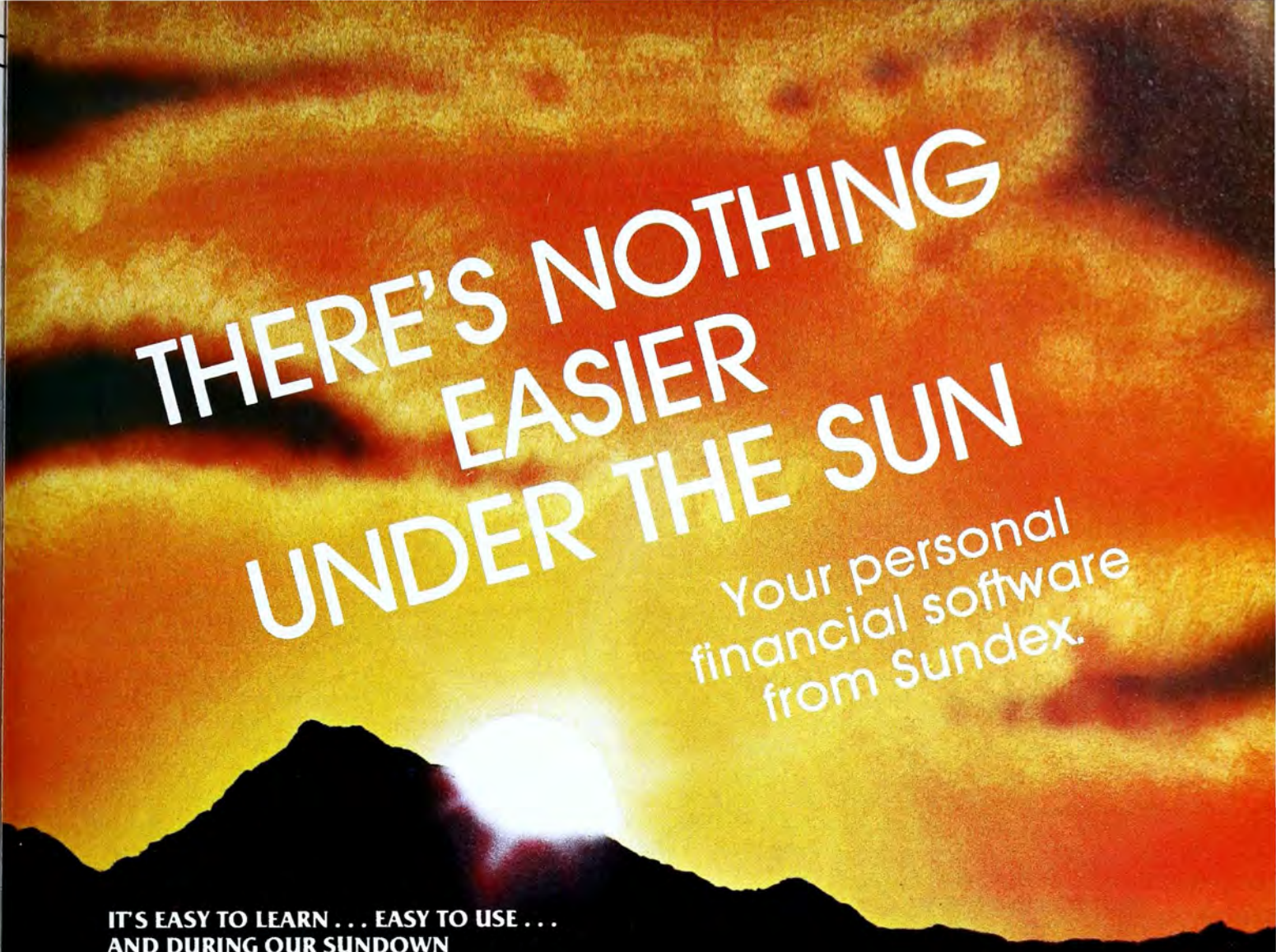
```
10 D$ = CHR$(13) + CHR$(4):REM
   CARRIAGE RETURN AND CONTROL-D
20 PRINT D$;"PR#3":REM ACTIVATE THE
   80-COLUMN CARD
30 PRINT CHR$(15):REM TURN ON
   INVERSE
40 PRINT CHR$(12):REM CLEAR SCREEN
   TO WHITE
```

The effect on the screen is the same, but with the change in line 10 you will not deactivate DOS.
Ray Woodson, Baton Rouge, LA

Garden-Variety Pokes
May I bring readers' attention to the fact that Matt Offenbacher's peeks and pokes can be found in almost any chart or computer book, or even your normal everyday Peeks & Pokes Chart from Beagle Bros. Moral for Matt: Don't go poking −49384,0 around where you shouldn't peek −16336 unless you want someone calling −155 when you're not waiting.
Bo Rutledge, Dallas, TX

In the October Open Discussion, Matt Offenbacher wrote about poke 214,255, which will rerun the program in memory no matter what you type. This causes you to have to reboot a disk to get rid of it, and that isn't always handy. Is there a poke that cancels this one?
Stephen Pace, Midland, TX

Those Lovable Beagles
I would like to compliment *Softalk* on the Beagle Bros Exec. Ever since I got my Apple two years ago, Beagle Bros has been my favorite software publisher. The first programs I bought were *DOS Boss* and *Utility City*, two ex-



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cellent disks. I especially like their policy of no copy protection. I have learned a lot about my computer by listing their programs and seeing how they work. The tip books that come with the disks are almost better than the disks themselves.

I also have a question: I need an accounting program that is specialized to handle an escrow account. If anyone knows of such a program, please tell me through Open Discussion.
Mike Harvey, O'Fallon, MO

Looking for a Way
I had an Apple II Plus that I was using quite extensively with *Apple Writer II* and *VisiCalc*. I was considering buying an eighty-column card to augment these programs. After checking and comparing the various costs and features, I decided instead to sell my Apple II Plus and buy an Apple IIe with an extended eighty-column card.

Now I find out that I can't use the eighty-column feature with either of these programs. If the eighty-column card is activated, I get forty letters separated by forty spaces. I understand that the Videx eighty-column preboot won't work either, as it was designed for the Videx eighty-column cards. There should be some way to access this card with these two programs. Can someone help me with this?
Marc Dodson, Mission Viejo, CA

Multilingual Computerists
I am writing to inquire about obtaining information on software for second-language education. Do readers have any recommendations in this area?
C. Bexte, Lethbridge, Alberta, Canada

Can anyone recommend some Russian language software programs? Is there a good program for teaching Russian? Do any word processing programs come with Cyrillic fonts so that Russian text can be printed on an Okidata 92 printer?
Herb Weisberg, Columbus, OH

Knowing the Score
I am writing to find out if anyone knows of a program that will enable me to print out music scores. That is, a program with which I can actually write music (the clef, the bars, and the notes) to the screen and then print it.
Randal J. Givens, Brussels, Belgium

Dissertation Dilemma
While working on my dissertation I found that a printout from a dot-matrix printer would be acceptable. However, the placement of page numbers and footnotes was a problem using *Apple Writer II* with a NEC 8023-A printer and Grappler Plus interface card. My departmental adviser preferred the use of Campbell's *Form & Style*, with the placement of footnotes at the bottom of each page of text, a 1.5-inch line separating the text from the footnotes, and one line of space between each footnote. The footnote problem was solved by the use of the footnote brackets enclosing a 1.5-inch line of dashes followed by the first footnote, then a return enclosed in the same symbols, followed by the next footnote and another return enclosed within the brackets, and so forth. If the footnote was longer than the length of the normal text line (sixty spaces), it was necessary to break the footnote into sixty-space segments to avoid printing into the margins; each segment was enclosed within the usual brackets. The text was first printed to the screen using the print destination "0" setting to determine where to insert the 1.5-inch line segments and the returns between footnotes that occurred on the same page.

If another reader has been able to determine how to place page numbers one inch in from both the upper right-hand corner and right margins, I'd appreciate knowing how this is done. Also, the printing of superscript numbers with the above-described printer/interface combination was something of a problem for me.
Jerry A. Neff, Ogallala, NE

To Be Compatible
I am interested in adapting an IBM PC-type disk drive (such as a Tandon TM 100-1) to work on an Apple IIe computer. What I want to do is use the same IBM-compatible disk drives on both my Apple system at home and on my IBM PC at work. I am not necessarily interested in using all of the storage capacity of the IBM-PC-type disk drives, just in achieving Apple II compatibility. If anyone knows how this can be achieved or where I can buy a board that will allow me to adapt a Tandon TM 100 drive to an Apple II, please write and let the world know!
Marcia Herweyer, Grand Rapids, MI

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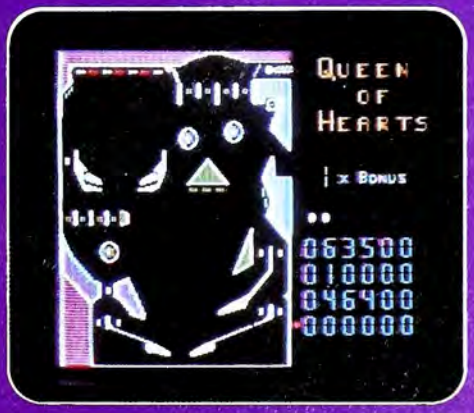
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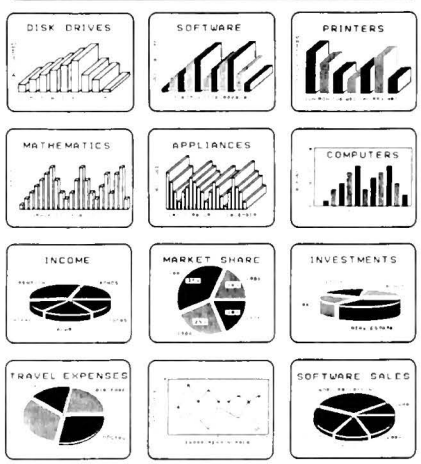
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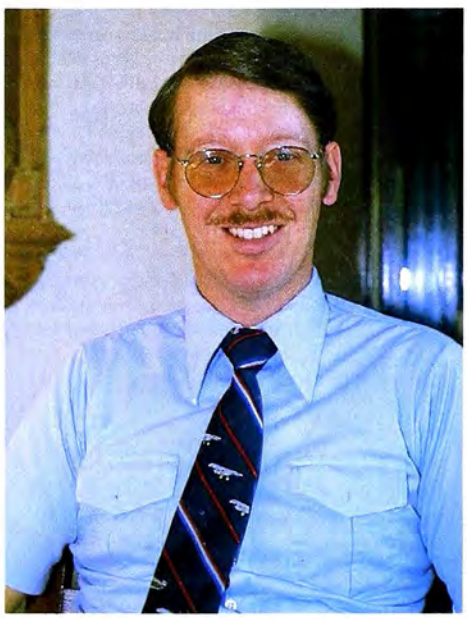
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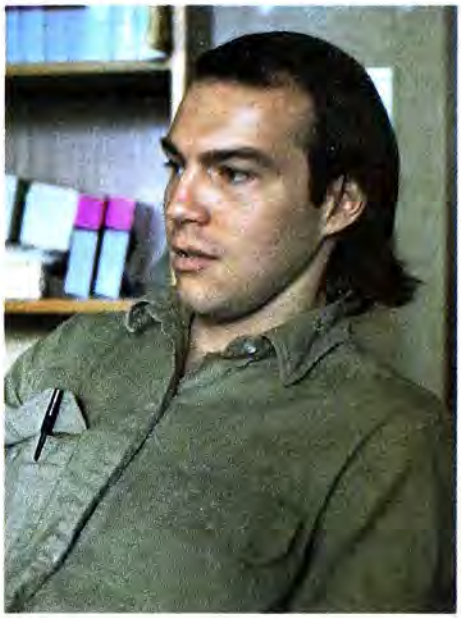


Exec Learning Company

A Goose, A Boot, and a Thing Called Excellence







by Christopher Cerf

It takes most ordinary mortals less than five minutes of conversation with Dr. Ann Piestrup, chairman and founder of The Learning Company, to realize two fundamental truths about her: They'll believe virtually anything this woman says, and, if she wants to lead them somewhere, they'll probably follow.

When she's talking about the use of microcomputers to provide learning environments for children—a subject she cares about with missionary zeal—it becomes instantly clear how her combination of charm, energy, inventiveness, and her desire to do something truly important have, in just a few short years, made her and her Menlo Park, California, firm an irresistible force in the software industry.

"The theme of our product is that it allows children the power to discover things for themselves," she enthuses. "We want to give them a chance to learn in an exploratory way." Those familiar with such TLC products as *Rocky's Boots* and *Gertrude's Puzzles* will know what she means by "exploratory." These innovative programs permit kids (and adults, too) to roam around a "world" of rooms presented graphically on the computer screen, finding simulated objects that can be manipulated, moved, and combined in fascinating ways.

The Exploring Spirit. Indeed, as Ann Piestrup, who converted to Catholicism as a fifteen-year-old and subsequently spent several years as a nun in Washington State, reminisces about her almost accidental entry into the computer world, it seems obvious that her life has been every bit as "exploratory" as the software her company produces.

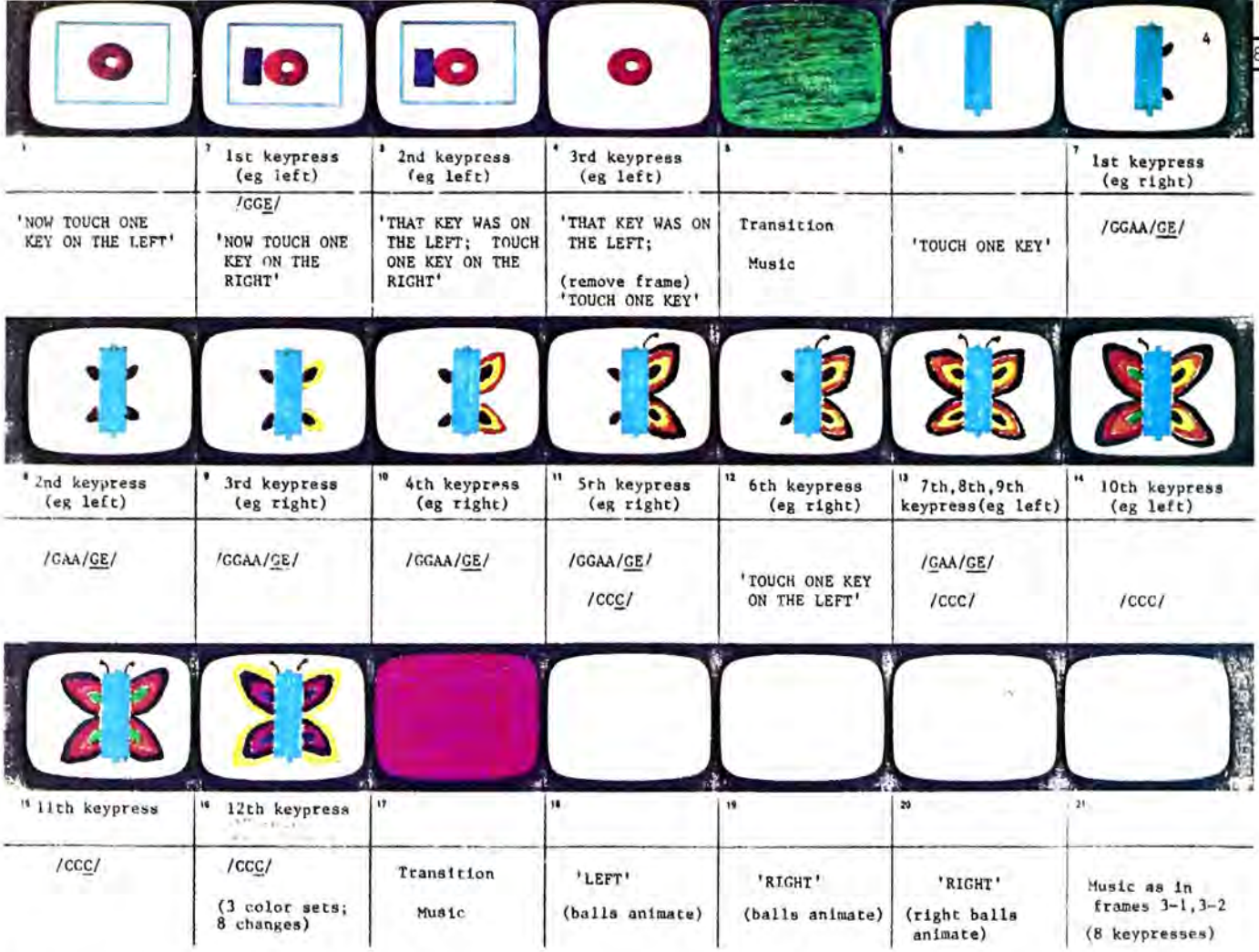
"The day I decided that the computer business was for me, I'd barely heard of microcomputers," she confesses. "After leaving the Sisters of Saint Joseph, I'd worked a long time as a teacher, often in poverty areas, and I'd earned a doctorate in educational psychology from the University of California at Berkeley. Through it all, I'd collected a closetful of educational materials. Many of them were cleverly designed, but somehow they didn't seem to inspire kids to learn. I'm afraid I was getting a bit discouraged.

"One night, a computer-programmer friend, George Rothbart, visited me and my husband, Mel, for dinner and told us about micros. Until then, I'd thought of computers as huge machines used primarily for statistics. I'd had no idea that they could produce pictures—in color no less!—and music, or that they could be made compact and relatively inexpensive, or that people could program them to be simple enough for young children to use. But as George talked, I became convinced that computers could really make a difference in the way kids learn."

From that point on, there was no stopping her. She immediately began preparing a grant application for funds to create an educational computer game in which "preschool children could learn such concepts as height and depth and left and right without ever being wrong. I decided on a preschool program because I had a preschooler." A few weeks later, as 1979 was drawing to a close, Piestrup submitted her finished proposal to Carolyn Stauffer at the Apple Education Foundation, which was still so new that it didn't yet own one of its namesake's computers. Did the foundation's lack of resources faze Ann Piestrup. "Hardly!" she laughs. "They might not have *owned* an Apple, but at the time we made our proposal, I'd barely even *seen* one!"

Piestrup's solution to her lack of computer literacy was a quick visit

This page (left to right): Teri Perl, conversion manager; Leslie Grimm, chief software designer; Warren Robinett, author of *Rocky's Boots*. Opposite page (clockwise from upper right): Marcia Klein, Learning Company's president; Shivonne Byrne, consumer marketing manager; Pete Rowe, research and development manager; Ann Piestrup, founder and chairman of the Learning Company



1	2 1st keypress (eg left) /GGE/ 'NOW TOUCH ONE KEY ON THE RIGHT'	3 2nd keypress (eg left) 'THAT KEY WAS ON THE LEFT; TOUCH ONE KEY ON THE RIGHT'	4 3rd keypress (eg left) 'THAT KEY WAS ON THE LEFT; (remove frame) 'TOUCH ONE KEY'	5 Transition Music	6 'TOUCH ONE KEY'	7 1st keypress (eg right) /GGAA/GE/
8 2nd keypress (eg left) /GAA/GE/	9 3rd keypress (eg right) /GGAA/GE/	10 4th keypress (eg right) /GGAA/GE/	11 5rh keypress (eg right) /GGAA/GE/ /CCC/	12 6th keypress (eg right) 'TOUCH ONE KEY ON THE LEFT'	13 7th,8th,9th keypress(eg left) /GAA/GE/ /CCC/	14 10th keypress (eg left) /CCC/
15 11th keypress /CCC/	16 12th keypress /CCC/ (3 color sets; 8 changes)	17 Transition Music	18 'LEFT' (balls animate)	19 'RIGHT' (balls animate)	20 'RIGHT' (right balls animate)	21 Music as in frames 3-1,3-2 (8 keypresses)

to ComputerLand of Los Altos, where she instantly befriended the store's owner, Sarkis Kasougian, and his associate, Steve Negretti. Within minutes,the pair had given Piestrup her first glimpse of Apple graphics ("Now I *knew* I was onto something!") and had become true believers in her cause.

Other converts were soon to follow. The board of the Apple Education Foundation—which consisted of such computer luminaries as educator Arthur Luehrmann of the Lawrence Hall of Science in Berkeley and businessman Tom Whitney—approved the proposal and awarded Piestrup an Apple and $1,000. Luehrmann also introduced her to one of his colleagues, Joyce Hakansson, herself one of the true pioneers of children's software. Hakansson promptly proceeded to get Piestrup together with Barbara Jasinski, who combined computer science experience with a public relations post at the firm of Regis McKenna (which just happened to handle the Apple account). Jasinski and Piestrup hit it off immediately and, at a table at the Stanford Coffee Shop ("Our first office!" remembers Piestrup), the two began mapping out the design for their first Apple program, *Juggles' Rainbow*.

"The key to our design was a storyboarding technique Barbara and I worked out," Piestrup explains, holding up a chart covered with dozens of brightly colored boxes. "Because we plotted everything so carefully in advance, we were able to create a game that was not only extremely playful, but also structured, guided, and sequenced."

As the work on *Juggles' Rainbow* progressed, Piestrup's Pied Piper—or, more accurately, "Pied Piestrup"—routine continued unabated. She talked Stanford University into allowing her to use its experimental Bing Nursery School, where her daughter Sarah was a student, as a research facility. As a result, she found herself with twenty-two kids on whom to try out her ideas. She also succeeded in persuading an old friend, Dr. Alice Chiang, to program *Juggles' Rainbow*. "Alice was a consulting programmer for IBM," Piestrup explains, "but, luckily, they allowed her to work with us on the side. Alice also provided us with her back room, which immediately replaced the Stanford Coffee Shop as our official office."

And what kind of programmer was Alice Chiang? "Incredible!" says Ann Piestrup. "In fact, I had to learn to withhold concepts from her until they were fully developed, because if I didn't, she'd have my half-baked ideas up and running on the Apple before I even realized she'd begun working on them!"

Meeting a Visifriend. At about the same time, Piestrup and Barbara Jasinski met Dan Fylstra, founder of Personal Software (now VisiCorp). Fylstra gave them a copy of a new program called *VisiCalc*, which, he suggested modestly, might help them plan the business side of their new venture. Of course, it's one thing to own *VisiCalc* and another to know how to use it to work out a detailed financial plan. So another acquaintance, Apple cofounder Steve Jobs, was soon persuaded to construct a spreadsheet model for the development and marketing of *Juggles' Rainbow*. Thus armed, Piestrup and Jasinski officially founded a new company, which they decided to call Advanced Learning Technology.

But one project—and no income—a company does not make. So, having heard that the Department of Education was soliciting proposals for computer-assisted instruction projects, Ann Piestrup decided to apply. "I'd never written a government grant proposal before," she says, "but I read the directions. And, with the help of a word processing specialist I hired using the weekend grocery money, I wrote up a request for funds to create playful 'logic and geometry programs for second- and third-graders.' " But, for once, luck was not with her. The application was accepted but tabled, and Advanced Learning Technology was forced into a state of suspended animation.

Ann Piestrup was undaunted. "My father told me that Babe Ruth had not only the highest batting average but one of the highest strikeout averages," she explains. "He just got up to bat more often than anyone else." She submitted a new proposal, and this time she was successful: She acquired $130,000, enough to fund the conpany's program development work through 1981.

Since her grant committed her to teach mathematical concepts, and because she desperately needed another hand (Barbara Jasinski had by this time involved herself in another educational software venture), Piestrup now recruited a Stanford-trained expert in mathematics education, Dr. Teri Hoch Perl. Perl, who, in addition to her research and design responsibilities, is currently directing TLC's efforts to convert its Apple products to run on other machines, brought with her a budding en-

thusiasm for computers. Even more important, she knew—to use Piestrup's phrase—"the meaning of the word *product*. And, above all, she understood that our program had to be fun, as well as educational."

Adventures in Learning. Just as Teri Perl was becoming Advanced Learning Technology's second full-time employee, an event occurred, a few miles south in Sunnyvale, that was to have enormous significance in the history of the young firm: Warren Robinett, the creator of Atari's *Adventure* game, strolled into the offices of Dan Fylstra's Personal Software and presented the plan for an adventure game based on a graphics utility program he'd developed for the Apple.

Personal Software, which by this time was primarily in the business of marketing "productivity" software, had no immediate use for such a game. But the company was greatly impressed by Warren Robinett's work and, perhaps, by his reputation. (Robinett had achieved notoriety in the programming community when, after being refused an on-screen credit for his work on *Adventure*, he succeeded in concealing his initials in one of the game's secret rooms.) And so it was that one of Fylstra's associates, Mitch Kapor, called Ann Piestrup and suggested that Robinett was someone she should meet. "Yes," Piestrup smiles, "it was the same Mitch Kapor who later achieved fame—and fortune—as the father of Lotus Software. Well, he may not have been the father of our company, but he was certainly its godfather."

Piestrup is hardly exaggerating, because Warren Robinett's graphics editor turned out to contain some of the most exciting educational software ideas that she—or anyone else—had ever encountered (one Apple executive later pronounced it "the *VisiCalc* of education"). It allows the programmer to trace out a world of up to sixty-four rooms, each of which can be connected to any of the others through doorways left in the room walls. Objects can then be drawn and animated with a joystick—objects that can easily be assigned a starting location, characteristic movement, and color with just a few taps on the keyboard. The result: Programs in which the user can move his or her cursor from room to room, picking up, dropping, connecting, and disconnecting objects by merely pressing the fire button or the space bar.

Foundation and Empire. Robinett's utility was just the tool Advanced Learning Technology needed to create the kind of playful logic games the fledgling company had promised in its National Science Foundation grant application. And Warren Robinett eagerly accepted Ann Piestrup's invitation to join ALT as a full-time software engineer. "I'm essentially a game designer at heart," he explained at the time. "My primary goal is to make fun programs. But video games don't have any intrinsic worth. The kind of games I'm interested in are problem-solving games that have some broad educational value."

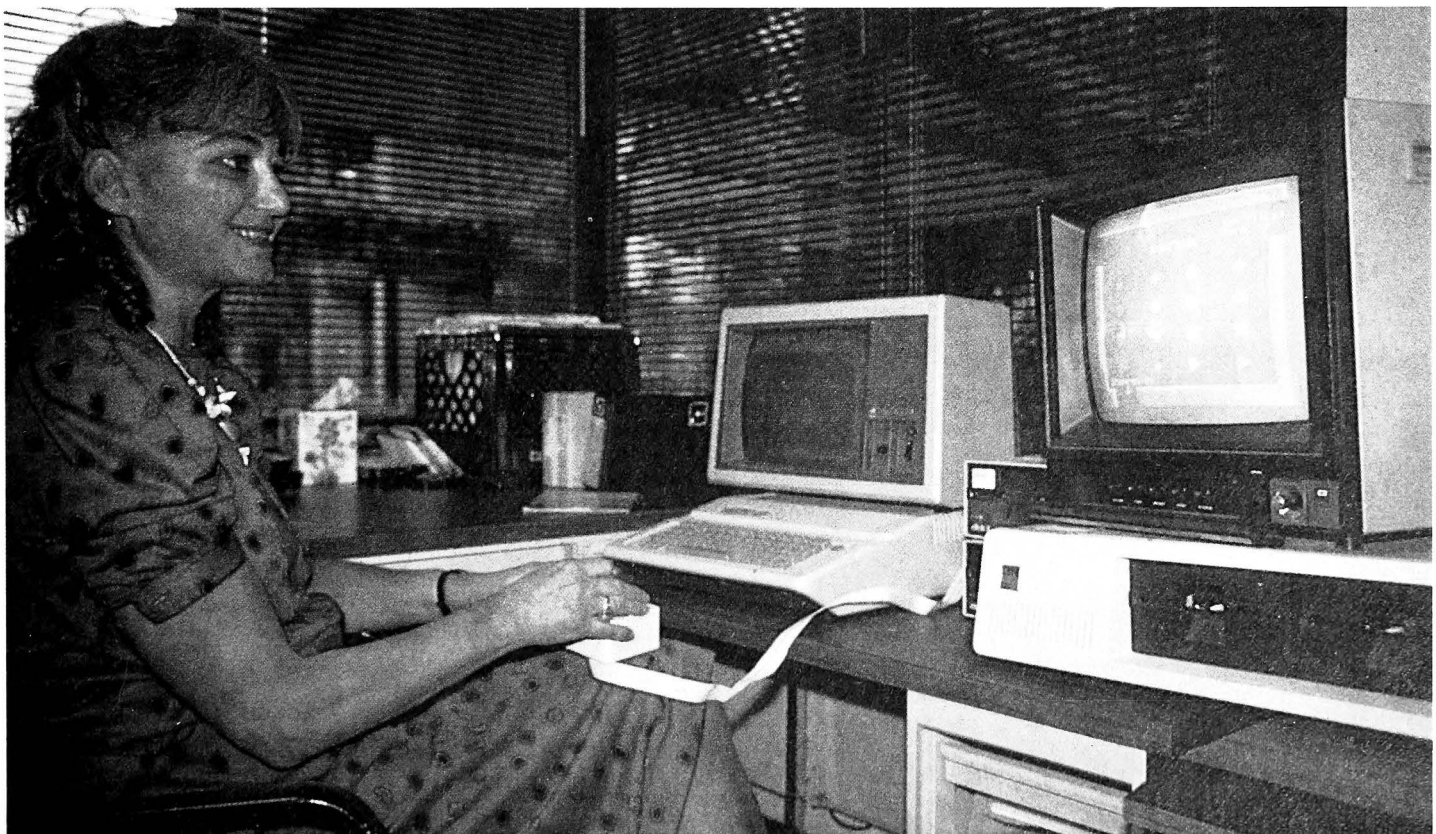
Over the ensuing months, Robinett, Piestrup, and Perl created a series of games to fulfill their NSF obligation—games such as *Logic Arcade*, in which kids were asked to fill rooms in the game with the proper combinations of different-colored squares, triangles, and circles; and *Logic Gate Adventure*, which, in its early versions, encouraged players to design simulated computer circuits with the goal of preventing a flock of hungry ducks from eating the cursor.

Child-testing of *Logic Gate Adventure* had not progressed very far before the ALT group realized they had produced something special. "The game contained material that's usually not presented until the second year of college," Ann Piestrup says. "But we began to see that kids seven years old and younger had little or no trouble understanding it."

As a result of such success, Piestrup was suddenly faced with a difficult decision: Should she accept the venture capital that Tom Whitney, her old friend from the Apple Education Foundation—now with Melchor Venture Management—insisted on thrusting at her? She would need the money if she wished to modify *Logic Gate Adventure* and her company's other offerings into products that could reach a broad audience of home consumers. "But," she explains, "my interest was not so much business as education, and I was nervous about having investors to be accountable to. If we became a real company, I wondered, would we still have the freedom to play in research?" Nonetheless, she made the plunge, and in January 1982 Advanced Learning Technology accepted $300,000 as capital, moved into new offices in Portola Valley, and changed its name to The Learning Company—TLC for short.

Warren Robinett shared Piestrup's anxiety about "losing control of the direction of the company." On the other hand, his assessment of the new setup was not entirely negative ("We might get rich," he observed) and he agreed to continue his work on *Logic Gate Adventure*. Gradually it evolved into *Rocky's Boots*, which, since its release a year ago September, has succeeded in imparting the secrets of Boolean algebra to thousands of kids from six to sixty. It has also garnered a shelfful of awards (including *Learning* magazine's "Software of the Year" citation) and has been acclaimed as a "software classic" by no less an authority than *The New York Times*. In the process, it has firmly established The Learn-

Opposite page, storyboard sheet for *Juggles' Rainbow*. Below, Teri Perl playing *Gertrude's Puzzles*.



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ing Company as a leading producer of educational computer programs.

Serendipitous Saga. If by now you've gotten the impression that serendipity has played more than a casual role in the saga of The Learning Company, that impression will be greatly strengthened by the story of Leslie and Cori Grimm and how they came to play an integral part in the firm's success. Leslie Grimm, a teacher at the Monta Loma School in Palo Alto, was chatting with a fellow faculty member, one day in early 1981, about the Apple computer she had recently bought. She was particularly excited about a story program she had begun creating with the aid of her ten-year-old daughter, Cori, who, it seemed, had developed quite a facility for drawing computer pictures using *Color Sketch*, an art program provided free on the Apple-DOS Master Disk. A third teacher at the school happened by and, overhearing Grimm's conversation, took the liberty of interrupting. "Pardon me for eavesdropping," said the teacher, "but what you're saying is terribly exciting. You should call my friend Ann Piestrup right away!"

As a result, Grimm set up an appointment with Piestrup to look at fragments of programs that eventually turned into such Learning Company standbys as *Bumble Plot*, *Moptown*, and *Magic Spells*. Piestrup was delighted, not only with Leslie Grimm's ability to combine play and learning in her programs, but with the charm and professionalism of Cori's graphics, which have since earned the youngster a feature article in the Children's Television Workshop's *3-2-1 Contact* magazine and a role in creating many of TLC's new programs.

"Cori's getting famous," says her mother proudly. "But she's only one of the many kids who've been contributing to our projects. My older daughter, Cindy, has done crash tests on many of our games, relentlessly searching for bugs. Then there's Shaun Gordon, a high school student who lives near my house, who got a part-time job with us doing odd programming assignments and turned out to be one of the most creative game designers we've ever found. And Ann's nephew, Mike McCormick, has done some nice work, too, using Warren's utility."

Leslie Grimm herself has done "some nice work" with Warren's utility—to say the least. In fact, her best-known game, *Gertrude's Secrets*, in which a "go-getter goose" named Gertrude presents kids with colored puzzle pieces that can be manipulated on the screen, was developed with the graphics editor and has been a bestseller for months. Grimm is also responsible for the highly acclaimed *How To Move* tutorials that introduce kids to many of TLC's most popular offerings.

When Warren Robinett recently left his full-time position with the company to write a book and pursue his dream of creating an adventure game in which players could "build machines to combat monsters," the chief designer's mantle fell to Leslie Grimm. To fill Robinett's shoes on the technical side, veteran programmer Pete Rowe joined The Learning Company as manager of research and development.

"It seems like everywhere I've been since 1979—meetings, computer fairs, whatever—I've run into Ann Piestrup or Teri Perl," explains Rowe, who had spent the last few years running his own consulting and programming business, Computer Aided Instruction. "Finally, the urge to come here and be part of a unique creative team like this became irresistible.

"What I like most about TLC is the energy of the people. They have an incredible amount of team spirit. No one's building empires here; everybody's concerned." And, as if to prove his point, he cuts short his remarks and dashes off to the reception desk, where he's promised to fill in for an employee facing an emergency trip to the dentist. In his absence, Leslie Grimm is free to talk about the enormous impact Pete Rowe has had on her work.

"I suffered a ruptured disk recently," she explains, referring to a spinal injury, not the destruction of one of her stored programs. "Until an operation finally straightened me out, I was forced to spend a lot of time lying down. I was sure my back problems were going to keep me from finishing *Reader Rabbit*, a kids' word game I've been developing. But Pete was able to make me a detachable keyboard for my Apple that let me program while I was lying flat on my back. In addition, he's shown me all kinds of programming tricks. In fact, whenever I come up with a problem I think is unsolvable, I just bring it to Pete. He usually just shrugs and says something like, "Oh, this is trivial," and in a few moments, he has me back in business."

Learning Company Components. As essential as Pete Rowe has become to The Learning Company, the firm made an even more significant addition early in 1983 when Marcia Klein, vice president of the con-

Ann Piestrup and her daughter Sarah play the soon-to-be-released Learning Company program *Pot 'o Gold*





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sumer clients group at Regis McKenna, left that post to become president of TLC. Klein, who took over responsibility for TLC's public relations soon after meeting Ann Piestrup in 1981, also was in charge of the Apple account. "The Lisa was introduced on January 19, and I was deeply involved in the launch right up to the last minute," says Klein. "I guess it's a measure of my excitement about TLC that I started here the very next day, January 20!"

"Marcia brings us the one essential thing we've always lacked," says chairman Ann Piestrup, "a deep knowledge of the marketing side of the business." And, with a valuable assist from Shivonne Byrne, a Regis McKenna colleague who joined her in making the switch to TLC, Klein also seems to have brought some order to the company's rapid, but haphazard, growth. Among her accomplishments thus far: orchestrating a redesign of TLC's packaging; engineering a smooth move of the company's offices to larger quarters in Menlo Park; negotiating a groundbreaking agreement with Simon and Schuster that will expand the company's distribution into bookstores; and, most important of all, putting the corporation solidly in the black for the first time in its short history.

Says Frona Kahn, who was hired away from Atari in 1981 to help TLC child-test its games and now heads a Marcia Klein-inspired effort to market the company's products directly to educational institutions: "Before Marcia arrived, we were a bit light on the business side of things. Ann, Warren, and Leslie are all geniuses in their way, but let's face it, creative people don't like to go to staff meetings. Now our development group will have the time to concentrate on what they do best." Teri Perl puts it even more directly. "Running a small company is a lot of junk," she says. "There will be more freedom in our work now."

What impelled Marcia Klein to give up her successful—and secure—job at Regis McKenna to come to TLC? She had this question hurled at her recently, as she and Shivonne Byrne emerged from a frantic, nonstop round of meetings with dealers, sales representatives, distributors, and, rumor has it, a venture capitalist or two.

"Why did I do it?" she repeated, shaking her head to achieve the maximum effect. "I don't know; tell me again, Shivonne, tell me why I did it!" But then she laughed—a laugh that made it clear that Marcia Klein knows exactly why she chose to join The Learning Company. "This place is really magical," she remarks, "very much like Apple was at the beginning. But the personal computer industry is maturing fast, and only products that are positioned properly are going to be able to succeed. That's where I'm confident I can make a difference. What the software world needs now is consumer marketing."



Silicon Valley guys and gals. Back row, left to right: Mike Wallace, Rick Lerenson, Warren Robinett; front row: Rita Levinson, Teri Perl, Leslie Grimm

These words inspired one listener to suggest that Burt Bacharach and Hal David should collaborate on a new tune based on Marcia Klein's philosophy: "What the World Needs Now Is Consumer Marketing!" TLC's new president smiles at this suggestion, amused at her own enthusiasm. But one thing seems unmistakable: Impossible as it may seem, Marcia Klein is every bit as excited about the future of The Learning Company as is Ann Piestrup. And it's hard not to marvel at the potential power of these two women, and their talented colleagues, to change—profoundly and permanently—the face of American education. ◨

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The Nonprogrammer's Programming Primer

The best thing about a record player is that you don't have to know a thing about music in order to listen to records. You don't even have to know anything about music to enjoy music.

Computers are like that; you don't have to know RAM from ROM, bit from byte, or chips from DIP in order to enjoy them. Programming is the stuff that makes computers go, and for most of us it's something that until now has best been left to those who are competent at it. As long as there's someone else to program computers, we don't need to know how to program in order to enjoy them. Video games are proof of this.

As with music, however, the more you do know about how programs are constructed and what separates the junk from the good stuff, the more you can appreciate a good program. This month, we're going to take a look at programming the Apple, beginning with some hows and whys of Basic.

In case the idea of programming causes panic, high blood pressure, and general hysteria, rest assured that we're not going to learn how to *program*, but rather how to input programs into the computer—programs already written by someone else.

Language Barriers. When planning for a vacation, it's often advisable to learn a few words or phrases in the native language of the country you're going to visit. Consider the plight of Klondike Putz of Middletown, U.S.A., who is vacationing in France:

Klondike: Excuse me, pal. Can you tell me how to get to the Eyeful Tower?

Jacques: *Comment? Repetez, s'il vous plait.*

Klondike: "Ray pay tay?" What kinda language is that? Look, I just want to find the Eyeful Tower.

Jacques: *Excusez-moi, monsieur, mais je ne comprends pas l'anglais.*

Poor Mr. Putz is in trouble here. He knows what he wants, and Jacques has the information. But unless one of them learns how to speak the other's language, nothing will happen. This isn't new to Klondike, though. Back home, he used to have the same problem with his Apple. When he first got it, he switched it on and typed *Soup is good food*. With the same indifference as Jacques, the Apple responded with beep and *?syntax error*.

Well, it didn't take long for Klondike to figure out that his Apple wasn't going to learn to speak English, so he decided to learn to speak the Apple's language. After poring through book after book, Klondike learned that the Apple speaks only one language: machine language. "Rats! Nothing on Earth resembling a human can possibly understand machine language," he thought. However, further reading brought enlightenment.

In the world of programming, there are low-level languages and high-level languages. Low-level languages are those closest to what the computer understands, such as machine language. High-level languages are those that resemble the way people talk and are easier for us to understand. Basic, Pascal, Fortran, and Logo are examples of high-level languages.

Basic seemed like a language Klondike could handle. After all, Blaise Pascal was some French mathematician, and Klondike wasn't too good in math. Besides, he knew that Pascal was used mostly for writing business-type programs, and being a rust repairman he didn't have much of an interest in business. Fortran got its name from *for*mula *tran*slation, which reminded Klondike of the horrifying days of high-school electronics and basic engineering (both of which he failed miserably). And Logo? Well, that's an introductory language for children, and Klondike was too proud to risk failing to learn a language his kids had already mastered.

So Basic it was. Klondike pulled up his chinos and got to work. An hour later, he quit.

He quit because, as easy as Basic is to learn and use, Klondike just couldn't get the hang of it. (Don't let that be discouraging. Klondike was real dumb. His whole reason for visiting France was so he could learn how to make "real" French fries.) However, he did get as far as realizing that he didn't need to understand Basic in order to type in program listings he found in books and magazines.

Klondike See, Klondike Do. One of his favorite books was *Programs in Basic for Numbskulls Who Think French Fries Come from France*. It consisted of nothing but Basic program listings along with descriptions of what each program did. Entering programs into the computer was simple enough for Klondike. All he had to do was type exactly what was shown in the book. Here's the first one:

```
10  CLEAR : TEXT : HOME
20  PRINT "When you're a Jet"
30  PRINT "You're a Jet all the way"
40  PRINT "From your first cigarette"
50  PRINT "To your last dying day."
60  END
```

This program does nothing but print a few words on the screen. As we said before, almost no knowledge of Basic is required to type this program in. Klondike typed in each line as it appeared on the page, starting with the number at the beginning of each line and pressing the return key at the end of the line. To run the program, all he did was type *run*.

Unfortunately, Klondike was a pretty lousy typist. Here's what the program printed on the screen when it was run:

```
When you're a Jeep
You're a net all the day
Fron your fist coggrattte
To your lxtd dbngng dqyey.
?SYNTAX ERROR IN 60
```

What went wrong? Though he was sure he had copied exactly what was in the book, Klondike examined his program by typing *list* and pressing the return key. This is what he saw:

```
10  CLEAR : TEXT : HOME
20  PRINT "When you're a Jeep"
30  PRINT "You're a net all the day"
40  PRINT "Fron your fist coggrattte"
50  PRINT "To your lxtd dbngng dqyey."
60  ENDD
```

Well, it looks like the program ran exactly as it should have. All misspellings in Klondike's program listing appear when the program is run. The *?syntax error in 60* refers to the *end* statement in line 60. Basic recognizes *end* as signifying the end of a program, but *endd* is totally foreign. That's why Klondike got an error message. As for correcting the program, there are several ways.

The first would be to start over. But for people like Klondike, that would mean running the risk of misspelling words again. Besides, it's a lot of typing.

The second way involves using the arrow keys to move the cursor over and duplicate most of what is already in the program listing. When

you type something at the Basic prompt, the cursor indicates where the message ends. For example, *catalog* will bring up the disk's catalog, and if we move the cursor back so it's over the *l* in *catalog*, it still says *catalog* on the screen; when we hit the return key, however, the command sent to the computer is *cata*.

This is because the cursor looks in only one direction—backward; it can see only what it has passed, not what is in front (to the right) of it. So when we type *catalog*, it sees *catalog*. When we move the cursor back to the *l*, it sees only what is in back of it: *cata*.

The cursor is also like a pencil in some ways. When we write, we lift the pencil off the paper to start a new word or write on a different area of the paper. If we didn't lift the pencil, we'd end up drawing lines all over the place. (Don't laugh; Klondike did this when he was a kid.)

The Great Escape. On a computer, in order to move from one place to another without leaving a trail of unwanted characters, we have to get out of the "write" mode. This is where the escape key comes in; it lets us escape from "writing" so we can move the cursor around. There are four keys that move the cursor—I, J, K, and M. You'll notice that they form a diamond on the keyboard, and for good reason. I is for upward movement, J for moving to the left, K for the right, and M for going down.

Normally, hitting these keys puts letters on the screen, so we have to get into the escape mode first. This is done by hitting the escape key once (it's the key marked "ESC"). Now we're in the escape mode, even though everything looks the same. In this mode, practice moving the cursor around by using the I, J, K, and M keys. Yes, it is possible to use the M key to move the cursor down indefinitely (causing everything on the screen to scroll out the top), but using the I key to move up doesn't bring it back. The I key moves only as far as the top of the screen.

Hitting any key besides I, J, K, or M on the Apple II Plus will put things back into the normal mode. On the IIe, any key besides I, J, K, M, and the arrow keys takes you out of the escape mode and puts you back in the typing mode.

Okay, escape works. Now what? Let's rejoin Klondike and his editing travails at the keyboard. Amazingly enough, line 10 is perfect. But by line 20, he started getting a little tired. *Jeep* should have been *Jet*. Since that's the last word in line 20, he decides to use the arrow keys to duplicate everything in front of that before he makes the change. Let's follow along.

First, he types *list* to display his program.

```
10  CLEAR : TEXT : HOME
20  PRINT "When you're a Jeep"
30  PRINT "You're a net all the day"
40  PRINT "Fron your fist coggrattte"
50  PRINT "To your lxtd dbngng dqyey."
60  ENDD
```

Next, he hits the escape key to get into the escape mode. Then he uses the I key to move the cursor up to line 20. There, one touch of the J key moves the cursor from the 0 in 20 over to the 2 in 20.

Klondike taps the space bar to get himself out of the escape mode and then uses the right arrow key to run the cursor over line 20 to the second *e* in *Jeep*. After he changes the second *e* to a *t*, he types a quote mark to close the print statement, and then he hits the return key. Now he types *list 20* to look at line 20 so he can see his change:

```
20  PRINT "When you're a Jet"
```

Laboriously, Klondike carries out similar procedures for each line until he has them all correct.

The Ambitious Mr. Putz. Let's suppose he gets real ambitious one day and tries to combine all the words into one sentence instead of breaking them up. Typing very carefully, he comes up with:

```
10  PRINT "When you're a Jet, you're a Jet all
    the way, from your first cigarette to your
    last ding day."
```

Rats! It was perfect up until the second to last word. Assuming the above line hasn't scrolled off the screen, Klondike can use the escape mode to move up and the right arrow to go over the whole thing until he gets to *ding*, which he'll change to *dying*.

Even if the line has scrolled off the screen, Klondike can still list line 10 to edit it. This is what he gets:

```
10  PRINT "When you're a Jet, you
      're a Jet all the way, from
    your first cigarette to your
      last ding day."
```

As before, he uses escape-I and J to get to the beginning of the line, and then he traces the line with the right arrow key, until he gets to *ding*, which he corrects. But when he runs this little program, the results are a bit confusing.

```
When you're a Jet, you      're a
Jet all the way, from       your f
irst cigarette to your      last
dying day.
```

The cause of all this confusion is in the way Applesoft lists things. For reasons of its own, Applesoft doesn't use up all forty characters per line on the screen when it lists programs. Instead, it breaks up program lines into seemingly inconsistent batches. The result is that there are several unused spaces on the screen.

Look at the way it listed line 10 in the one-line program. The line that begins with *'re a Jet* is indented. When Klondike used the arrow key to copy everything in line 10, it copied all the blank spaces in the indentation. That's why all those blank spaces appear between *you* and *'re a Jet* when the program is run.

You Can Take the Hard Way. As usual with computers, there are two ways to get around this problem—the hard way and the easy way. The hard way is to go over the first part of line 10 in the usual manner. Then, when the cursor gets past *you* in the first *you're*, use the escape-J to "lift" the cursor up and move it back to the beginning of the second line, beginning with *'re a Jet*. Continue this for each part of line 10 until *last dying day*.

What a pain. Don't do it this way.

The easy way is to do a bit of fiddling with Apple's memory. Clear the screen with the *home* command. Now type *poke 33,33*. This command displays program listings in thirty-three columns instead of the usual forty (the first 33 indicates the memory location; the second 33 indicates the number of columns you want the Apple to use in displaying its output).

Now when Klondike types *list*, line 10 will appear without any extra spaces, and he can edit the line by using the arrow keys without any problem.

To get out of the thirty-three-column mode and back into forty columns, type:

```
POKE 33,40
```

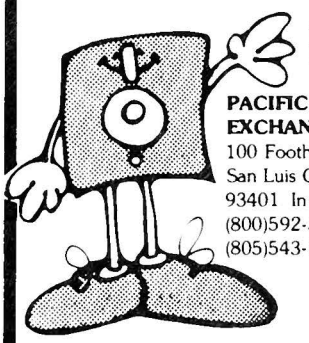
This puts the value of forty (the number of columns we want) into memory location thirty-three. (For some real fun, try poking various numbers into location thirty-three. *Poke 33,1* does some really strange stuff, as does *poke 33,90*. Don't worry; the grinding noises coming from the disk drive can't damage the disk—we think. To recover from all this, press control-reset or type *poke 33,40*.)

Why, It's Almost Human. One of the nice things about Applesoft is that it can tell where one "word" ends and the next begins. This is known as *parsing*.

Parsing means breaking a sentence into its parts and explaining the function of each part.

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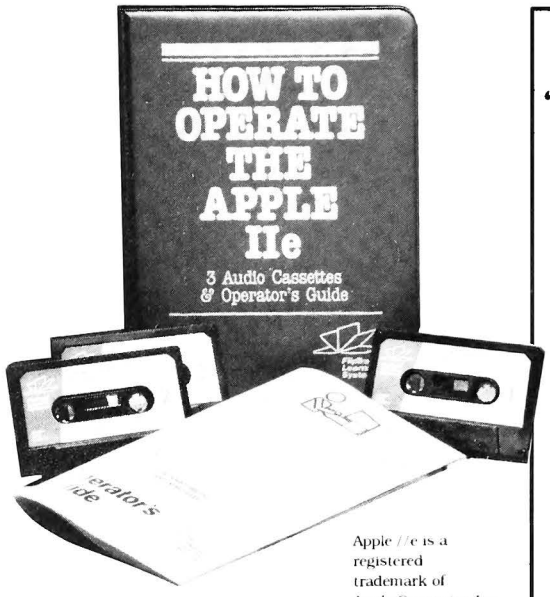
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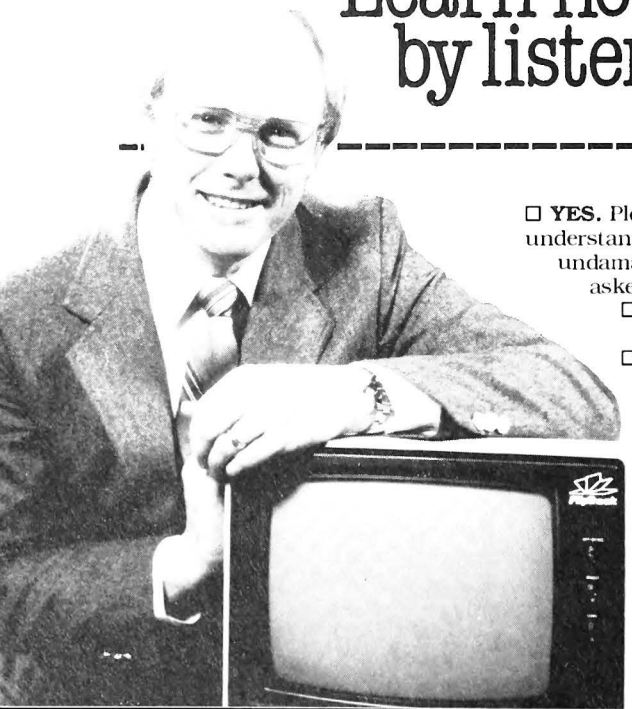
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Basic does something similar to what we type in at the keyboard; it finds words that it knows and inserts breaks between those words.

For example, suppose we type the following line:

```
10 I DON'T WANT TO GROW UP; I'M A
   TOYS R US KID
```

When we list it, it will appear on the screen like this:

```
10 ID ON 'TWANT TO GR OWUP;I'MA TO
   YSRUSKID
```

Yecch. What a mess. That's because we recognize it as an advertising slogan; but Applesoft, not having watched too much television, sees it as an Applesoft command. The words *on*, *to*, and *gr* are recognizable to Applesoft, so it puts spaces in front and in back of those words when it finds them. And where it doesn't recognize any words, it closes spaces up. That's why *I don't want* becomes *Id on 'twant*; the only set of letters Applesoft recognizes is the *on* in *don't*. So, it just separates *on* from the rest and glues everything else together.

What this means for people like Klondike Putz, who want only to be able to copy programs from a printed page into the computer, is that almost all spaces can be ignored when typing in programs. We can type the line:

```
10FORZ=0TO4:VTAB22:INPUTA$:
PRINTA$:NEXT
```

And when we list it, it will come out as

```
10 FOR Z = 0 TO 4: VTAB 22: INPUT A$:
   PRINT A$: NEXT
```

The only time we have to pay attention to spaces is when they occur between quote marks, usually in *print* and *input* statements. This is because characters between quote marks are ignored by Basic's parser. In other words, whatever appears in the quote marks of a *print* or *input* statement will appear exactly that way when the program is run. So if Klondike gets carried away in ignoring the space bar, the line

```
10 IFX=5THENPRINT"I'maToysRUskid."
```

will list as

```
IF X = 5 THEN PRINT "I'maToysRUskid."
```

and it will say

```
I'maToysRUskid.
```

when the program is run.

Quote marks are just as important in Basic programs as they are when quoting politicians (however, Basic programs can't sue you).

Why, It's Almost like Word Processing. Inputting programs is much like inputting data for almost any applications program, whether it's a word processor, spreadsheet program, or database management system. First, it's important to save your work frequently. Nothing short of fingernails on the chalkboard can match the agony of accidentally losing data after hours of hard work. Actually, there are no such things as accidents in programming. They're more accurately described as caused disasters.

For instance, last Tuesday Klondike spent an hour and a half inputting *The Bunny Hop*. Then, as he went to get a nice cup of Bosco, he tripped over the Apple's power cord, disconnecting it and causing an hour and a half of data entry to be lost. An hour and a half's work for Klondike amounts to just twenty lines of Basic code, but that's not the point. The point is that all this could have been avoided.

To begin with, the power cord shouldn't have been out in the open where someone could trip over it. Just as important, at the rate Klondike types, he should have been saving his program to disk every two lines or so. That way, if data in memory were lost, he would have had at least some of the program on disk. Now he has to start all over.

Inputting Basic programs is also similar to using applications programs in that it's possible to edit your Basic listing at random spots, just as you can update information in applications programs. Basic allows you to input lines in any order you wish because it puts them in the correct order for you. When Klondike was inputting *The Bunny Hop*, he began with line 100. Later, he realized that the program listing started on the previous page with lines 10 through 90. No problem. He later input 10 through 90, and Basic put them at the beginning of the program, where they belong.

Ever Wonder? While looking at Basic listings, you might have noticed that lines are usually numbered in increments of ten (10, 20, 30 . . . 120, 130, 140 . . .). This is to make programs easy to edit. Suppose Klondike finishes inputting *The Bunny Hop* and decides he needs another line between 550 and 560. No problem. He can add the line by beginning it with any number between (but not including) 550 and 560. Basic puts the line where it belongs—between 550 and 560.

Numbering program lines in steps of ten isn't a hard and fast rule; it's just a generally accepted practice. Programs that you think will undergo much revision might be numbered in increments of 50 or 100. When the program is finished, it's good practice to have all the line numbers increment by the same number, generally ten.

If you've done a lot of revising, you can renumber the entire program by running a program on the System Master called *Renumber*. Then when it goes back into Applesoft, issue the following commands from the Applesoft prompt:

```
LOAD filename
&FIRST 10, INC 10
SAVE filename
```

Filename refers to the program you want to renumber. *&First 10* tells *Renumber* that you want the new renumbered program to start with line number 10. *Inc 10* tells it to increase each line number by an increment of ten. When you list your program now, you'll see it start with line 10 and increase each line number by ten.

Of course, you can have it start with any number and increment by any number you want, but starting with line 10 and increasing by 10 is the conventional way of doing it. *Renumber* does a lot more than just this, and it's all fully explained in the *Renumber Instructions* program, which is also on the System Master disk.

Save the Bunnies. Saving programs is a relative easy process. The format for the save command is

```
SAVE BUNNY HOP
```

The only thing to pay close attention to is the choice of name you give a program. File names can be almost anything you want, as long as they start with a letter of the alphabet. Some nonletter characters work, but letters of the alphabet are usually the way to go.

File names can be as short as one character or as long as thirty. Whatever you name a program, be sure it's different from any other program already on the disk. Saving a program with the same name as an existing program will indeed save your program; however, it will also wipe out the program on disk that used to have that name.

No fair using commas in file names. This is because when DOS sees a comma, it thinks that's the end of the file name, and that what follows are disk and slot specifications. Consider some of Klondike's examples:

```
SAVE BUNNY HOP, D2
SAVE BUNNY HOP, S5
SAVE BUNNY HOP, S4,D1
BSAVE BUNNY.PIC, A$2000,L$2000
```

The first one tells DOS to save *Bunny Hop* to disk drive two, while the second one says to save it to the disk in slot five.

The third example instructs DOS to save the program to slot four, drive one. The last one is a little different. It *bsaves* a binary file, which starts at a hexadecimal memory address (A$2000) and runs for a specified length (L$2000).

That's why commas are out of bounds for file names; DOS thinks that everything after the comma has nothing to do with the file name, but rather with how to save the file.

Whew! In a nutshell, that's the bare bones of how to input Basic programs from listings. It's a relief to know that we don't have to be computer whizzes to input programs that someone else has written.

If you were crafty enough to copy off your neighbor's test paper in school, then copying Basic listings from a book or magazine should be a cinch. Most of the things we covered here are just meant to make things easier in case something goes wrong.

There's no rule that everyone with a computer is obligated to learn to program, just as there aren't any federal laws saying that anyone who buys a stereo system is obligated to learn to create music. But if the urge to become computer-lingual strikes, then go for it. Basic is really an easy language to understand, even if you can't program in it.

After all, not everyone who speaks English can write a novel, or even a short story. Right, Klondike? ◼





A Family for the III-Plus

BY DAVID DURKEE
FROM RESEARCH
BY ALBERT CHU AND BOB CUMMINGS

Two recent developments from Cupertino demonstrate that Apple hasn't forgotten its first business computer, or that computer's users, in the mad rush to introduce new machines. A new Apple III team, formed last July by directive of new Apple president John Sculley, will provide more far-reaching support for the installed user base of the Apple III than has heretofore been available. Apple has high hopes that this group, a strong influx of new software, and the upgraded Apple III Plus released last month will make the Apple III the computer of choice for more small and middle-sized businesses.

The new team, called the Apple III Personal Business Systems Group, is fully responsible for supporting the Apple III product line. It is independent of other departments at Apple, answering directly to Ken Zerbe, Apple vice president of finance. Previously, Apple III product support and development was handled by the same group that was in charge of the Apple II, and the II overshadowed the III. The new, independent group will be able to get things done for the Apple III without the delays that come with having every decision filter up and down through the ranks.

The group is composed of eight marketing, sales, and engineering specialists — the most experienced Apple III people in the company. The task before them is no trivial one: competing with IBM for a rapidly entrenching business computer market. The long-predicted shakeout has arrived, and Apple doesn't want the III to become one of the shaken.

To keep a computer alive in a competitive market, the manufacturer must walk a tightrope, balancing the users on one side and the developers on the other. Potential customers must be convinced that the machine will be supported, and that the software base will continue to grow and improve. Third-party software developers must be convinced that the user base will continue to grow — that there will be a viable market for their products. The tricky part for Apple's new group is to appease and convince both of these factions at the same time.

Easy as One New Three. The introduction of the Apple III Plus should help convince developers that Apple intends to stand behind the III. It should also persuade new customers that the Apple III is a living, breathing product without dispossessing the current user base — another neat trick. The Apple III Plus is an advance over what came before, but it is not as significant an advance as the Apple IIe was over the Apple II Plus; it won't leave older users behind.

The Apple III Plus has a handful of new features, only two of which will be unavailable as upgrades to the older Apple IIIs. Those features that current owners won't be able to get for their machines are a delete key and additional radio frequency interference shielding to meet FCC standards. The established user base can breathe a gigantic sigh of relief: The presence or absence of RFI shielding will have no effect on future

The Apple III Personal Business Systems Group: Back row from left to right: Albert Chu, Donald Koscheka, Ron Vitale, and Dave Burleigh. Clockwise from left seated around computer: Larry David, Brian Hass, Maxine Graham, Bob Cummings, Linda Goffen, Tom Carroll and Sid Hughes.

hardware or software compatibility. Software developers will be aware of the missing delete key on older Apple IIIs; most likely, they will assign its function to some other key on the keyboard. For instance, the latest version of *Apple Writer III* will use the backslash key as an alternate delete.

What's the Plus? The Apple III Plus will come with 256K of RAM (this has been the standard configuration of new Apple IIIs for about six months), a clock-calendar chip, user-switchable interlacing for higher resolution graphics and text on the Monitor III, a built-in port for the Silentype printer, and an accessory kit with tutorial disks and new manuals. There is also a new version of the operating system, SOS 1.3, which will come with the new III Plus.

All of these things are available for the Apple III, some even as free upgrades. The clock chip, which allows all versions of SOS to time-stamp and date-stamp files, will be free, as will SOS version 1.3, which has been available to Apple III owners from Apple dealers since last summer. The memory upgrade and the Silentype interface (although not a built-in one) have been available all along, of course. The screen interlacing will be available to Apple III owners for less than $100.

The screen interlace is an interesting development. What it means is that the Apple III's current vertical resolution of 192 pixels will be effectively doubled. Text and graphics are transmitted to the monitor by means of what is called a raster scan. That is, acting on a signal from the computer, the monitor passes an electron beam across the screen, scanning each of the 192 screen lines in sequence, and turning dots on and off. This scan happens so fast that our eyes can't distinguish the rapidly flickering dots from a solid image. Interlacing changes the raster scan from a one-step to a two-step process. That is, it provides a 384-line resolution by first scanning the 192 odd-numbered lines and then scanning the 192 even-numbered lines.

At the moment, the screen interlace gives the user more solid text characters and little else. A lot could be built from this development, however. The Lisa, for instance, depends on its very high resolution display for its advanced use of icons and windows. The higher your resolution, the more you can put on the screen.

Hi, Mickey! AppleMouse III is a new product for the III that will most likely be put to use in conjunction with the screen interlacing to produce some very Lisa-like effects. The mouse has been hailed as one of the most natural user interfaces currently available for small computers, and the flexibility of the SOS driver system should allow the AppleMouse III to be integrated into new software and updated versions of existing programs in short order.

Of new software, there will be plenty. Apple says that more than three hundred sixty developers are currently working on Apple III products. One company showing real promise is Haba Systems, which has a number of new programs for the III. One of these programs is an integrated spreadsheet, database manager, and word processor called *III E-Z Pieces*. Such integrated packages usually allow data transfer among the three applications, as well as easy access to the functions of one application from within another. If a package is extremely well integrated, all three applications may actually be running at once. Considering the great success of Lotus Development's *1-2-3*, a similarly integrated program on the IBM PC, the appearance of such a program on the Apple III is great news, but not a great surprise.

Haba Systems also has *Habanet*, *Habadex*, and *Habatel*. *Habanet* is a hard disk management system, like Quark's newly updated *Catalyst 2.0*. These programs allow you to copy programs onto a hard disk and call them up from a central menu. These aren't just sophisticated menu programs: They even let you copy protected programs onto the hard disk. Considering that much of the professional software used on the Apple III is protected, these programs make a hard disk significantly more valuable to the Apple III owner.

Habadex and *Habatel* are telephone accounting management programs. They maintain lists of phone numbers, perform automatic phone dialing, and beep at preset times to remind the user of appointments and meetings. Once run, they can sit in the computer in the "background," waiting to be called by a clock interrupt. *Habadex* is geared to a single user, while *Habatel* is set up for multiple-line phone systems like those used in hotels.

Other Apple III products now arriving or on the way include database management systems such as *Keystroke* and *AppleFile III*, and a wide range of communications software, such as an emulator for the IBM 3270 communications protocol. On the hardware side, a twenty-megabyte hard disk and a tape streamer hard disk backup unit are coming from Mountain Computer, and a 512K memory upgrade is coming from Macrotech. Apple has dropped its Unifile and and Duofile high-density disk drives for now, but high-density drives should be coming soon from other manufacturers.

It's Your Serve. The Apple III Personal Business Systems Group has been working with developers to help bring about these products for the Apple III and the new Apple III Plus. They've also been working to provide support directly to the user. The first two of a series of regular mailings went out to registered Apple III users last October and December. The purpose of these mailings was to announce new products and developments for the Apple III from Apple and other vendors.

Apple is also sponsoring Apple Serve III, a support program far more revolutionary (as in "computer revolution") than mere mailings. Apple Serve III is a network service that Apple will provide free of charge to all Apple III owners, at least for the next three months. After the initial period, Apple Serve III will probably be available at a discounted rate, subsidized by Apple.

Operated through a major established network, Apple Serve III provides an electronic mail service and a bulletin board system for exchanging hardware and software tips, user group locations and meeting information, and general interest news. In addition, the Personal Business Systems Group will act as editor-in-chief of an electronic newsletter on Apple Serve III to supplement the news mailings. The on-line letter will contain more up-to-date news on Apple III products, services, upgrades, and places to get them.

Apple III users are a pretty loyal bunch, and for good reason. The Apple III is a well-designed machine with a lot going for it, and SOS is an unusually flexible operating system. Nevertheless, the machine has suffered from a lack of software from developers, and of support from Apple. At the dawn of a new generation of computer and software technology, the Apple III could have died of neglect. That would have been a tragedy. It has never been Apple's way to sweep out the old as it ushers in the new, because older computers are also computers that have been tested, and that have earned the confidence of the user. With a new Apple III support group, Apple seems to be acting in character again.

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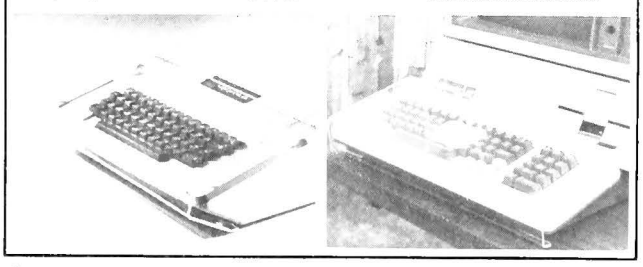
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IF

I have a problem. I accidentally discovered this while playing around with a way to save text screens in a manner similar to saving graphics screens. This question is directed especially to expert machine language programmers.

In order to convey my predicament with the greatest of proficiency, I must first ask all of you first-aiders to start up your Apples. Next, boot a normally initialized disk and load a Basic program. Make sure the disk has a minimum of ten free sectors. Now type *bsave any file name, A2024,L$7FF*. Clear the memory by typing *new*. Next, type *bload file name*. Make certain that you bload the same file name that you bsaved. Now type *list*. With any luck, the Basic program that you loaded before typing the bsave command has been retrieved. In order to make sure that it happened, I asked you to clear the memory. So, by analogy, what we have done here is save a Basic program as a binary file! And the interesting part is that, regardless of the Basic program's longevity, it'll be saved with a catalog register of ten! Hence, it'll take only a fraction of the time to load and save it.

Now for the disappointing problem: After bloading the binary Basic file (don't get confused), why won't it run properly? After all, if it will list properly, it should also run properly. In my experiments, about 99 percent of the time the first two or three lines ran the first time I typed *run*, but what of the remaining lines? Furthermore, consecutive attempts failed entirely. Any help in finding an explanation for this problem would be greatly appreciated. *Khurram Zafar, East Amherst, NY*

THEN

Shouldn't you be spending your time working on "normal" programming instead of trying all sorts of strange things to annoy your Apple and keep magazine columnists up all night? Now that you've gone and stirred things up, let's see if I can untangle them well enough to give an explanation (or at least confuse everyone enough to keep them busy for another month).

In solving any problem, one of the first steps is to isolate what the truly relevant aspects are. In this case the most important pointers are:

Beginning of Basic program:	$167,68
End of Basic "envelope":	$AF,B0
Beginning of variables:	$69,6A

We'll also keep in mind the following facts:

1. 2024 decimal ($800 hex) is just one byte before the address ($801) of the beginning of most (99.9 percent) Applesoft Basic programs.

2. The *Bsave Filename, A2024,L$7FF* command saves eight "pages" (256 bytes per page) of binary data from memory, starting at location 2024.

3. When a program is listed, Applesoft starts at the beginning-of-program pointer and translates data stored in memory into the listing you see on the screen. Important secret: Applesoft *does not* stop listing at the end-of-program pointer but rather only when it encounters a line number link field equal to zero.

(If you're unfamiliar with the link fields that Applesoft uses in each line of a Basic program, see the January 1982 Assembly Lines in *Softalk*. In general, the essence of the idea of link fields is that in memory, each line number actually begins with a two-byte address of the location of the next program line in memory. The list function uses these links to go from line to line and stops when the address indicated by the link field is zero.)

First, so we can all agree on what Basic program we're talking about, let's use this one as our test program:

```
10  FOR I=1 TO 10
20  PRINT I
30  NEXT
```

Before going any further, let's go into the Monitor and see what the important pointers say about how Applesoft views this program. Enter the Monitor by typing *call −151*. When you get the asterisk prompt (*), enter:

```
67 68 AF B0 69 6A
```

You should get:

```
67- 01
68- 08
AF- 1D
B0- 08
69- 1D
6A- 08
```

This tells you that the Basic program is stored from $801 to $81D in memory. Notice also that variables are stored starting at the end of the program, $81D also. Reenter Basic by typing a control-C.

Now, following your instructions, we'll bsave this program by typing:

```
BSAVE FILENAME, A2024, L$7FF
```

What happens here is that a block of memory from $800 to $FFF ($800 +$7FF=$FFF) is saved to disk. In our experiment the program is much shorter, so we're saving a lot more data to disk than necessary. But no matter for the moment.

A memory map of things is pictured in Figure 1.

When you then type in *new*, the computer, in unsuspecting innocence, resets the program pointers back to the smallest range possible—namely, a program three bytes long consisting of the two bytes zeroed out for the link fields (so that a list command produces nothing on the

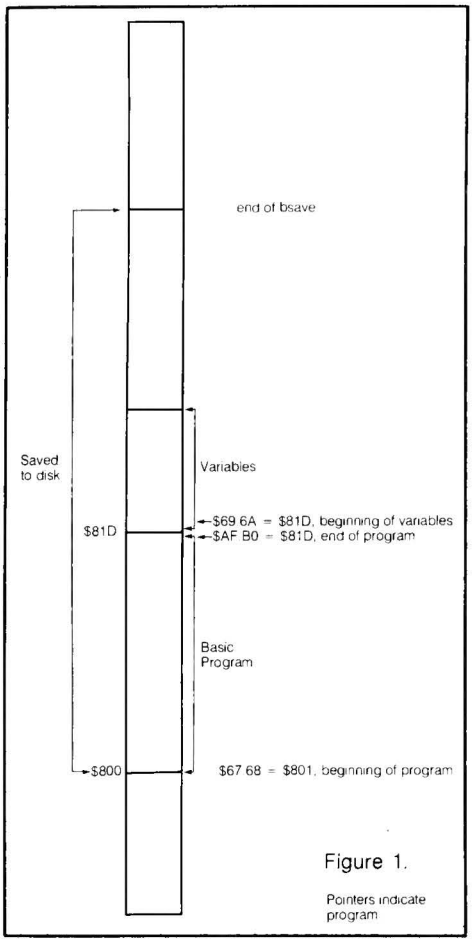


Figure 1.

Pointers indicate program

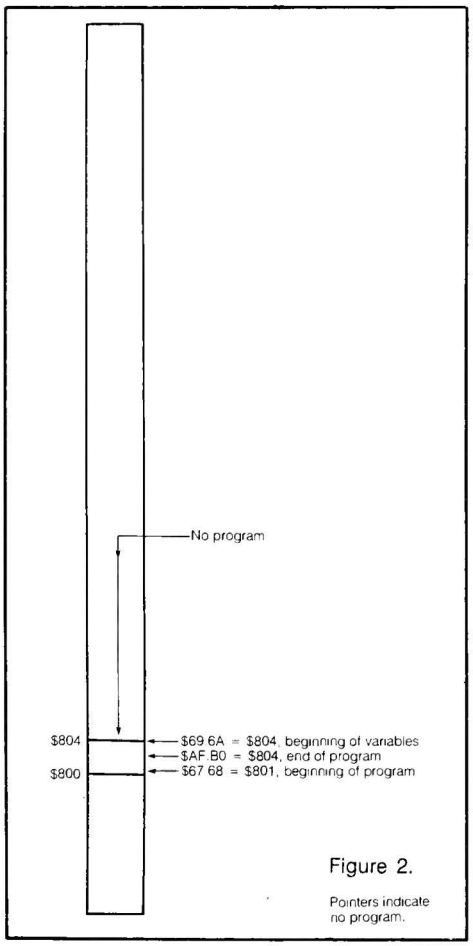


Figure 2.

Pointers indicate no program.

screen), and a third byte that we will find out about when someone writes a letter requesting more information.

You should now reenter the Monitor and list the pointers again for confirmation:

```
67 68 AF B0 69 6A
```

You should get:

```
67 - 01
68 - 08
AF - 04
B0 - 08
69 - 04
6A - 08
```

See Figure 2.

At last—the coup de grâce! You bload the data back into memory to end up with Basic data overlaid where the "null" program previously resided. See Figure 3 below.

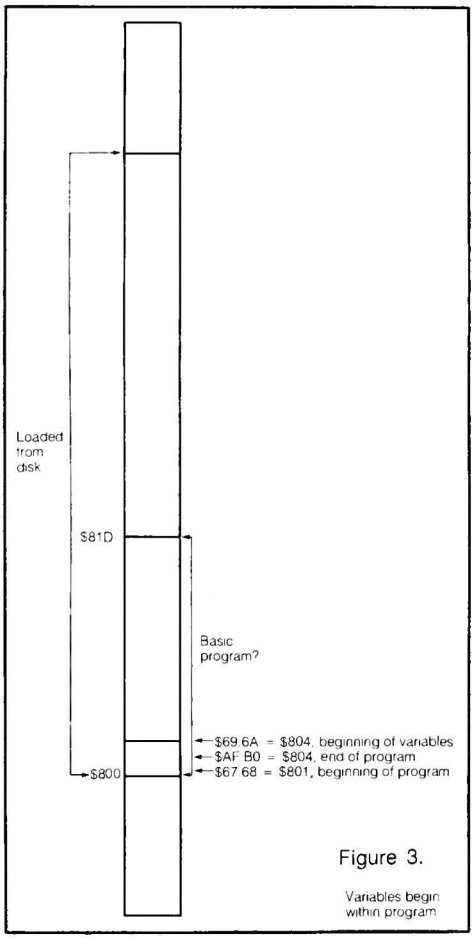


Figure 3.

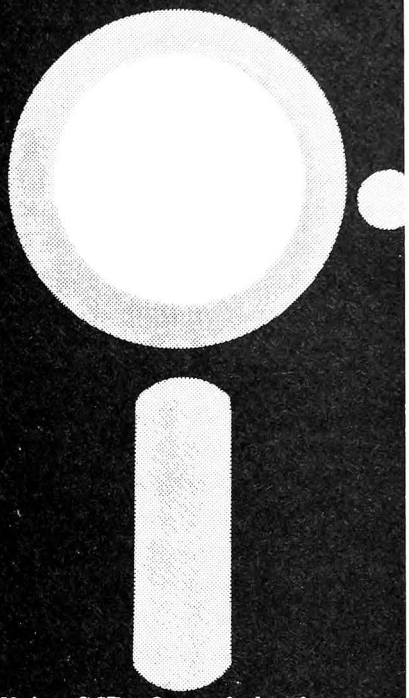
Variables begin within program

Even after the bload, you can confirm that Applesoft does not really recognize the new program's memory requirements by examining the pointers again and noting that they have not changed.

When you list the program, Applesoft in its ignorance starts listing the contents starting at $803, and since the index fields are in order it can at least list the text of each line.

Unfortunately, when you run the program, as soon as the first variable is defined, Applesoft overwrites memory starting at the begin-

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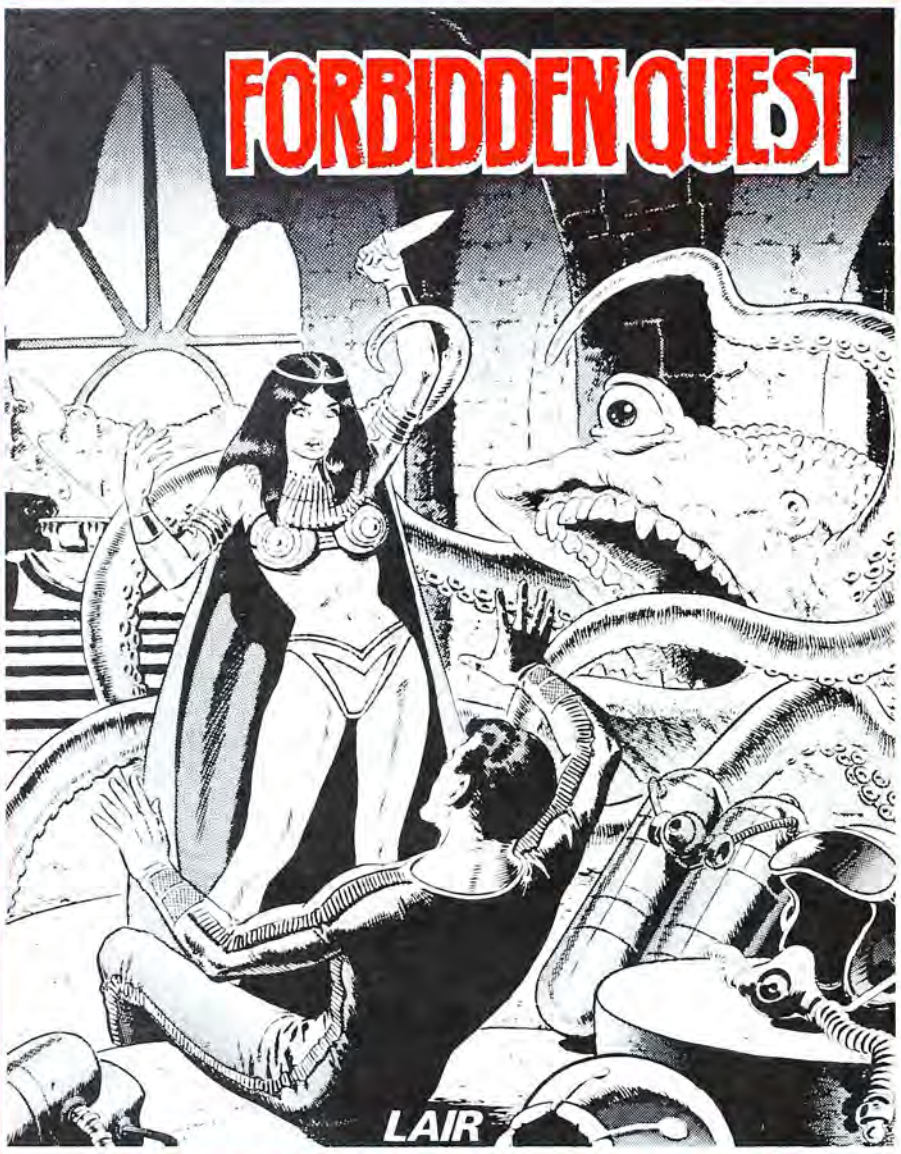
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ning-of-variables pointer location and thus scrambles a portion of the program.

You can confirm the variable-related nature of this problem simply by defining a variable in the immediate mode, without running the program. For example, after the bload, the program should list normally. Then type in *X = 1*. The program will now list as:

```
22538
20  PRINT I
30  NEXT I
```

The 22538 is a garbage line number created by the variable data for the value 1 being written into the program space.

There are a number of possible variations here. If no variables are defined, the program will run fine all the way to the end. If the first variable definition occurs early in the program, the variable table will write past the point currently being executed in the Basic text as in the example above, and the program will immediately crash. A third possibility is that the program will define variables late enough in the listing so that the variable table will damage only the lines that have already been executed at the beginning of the listing. If this happens, the program will continue to run, even though it is gradually eating itself up as new variables are defined. Because gotos and gosubs scan the entire listing on many occasions, these will also be affected by the deterioration of the listing.

The other possibility not mentioned so far is that the program might have been longer than ten sectors. In that case, the variable overwrite problem will remain, in addition to the question of how an apparently longer program can still be stored in ten sectors. The source of the illusion here is that for a long program, even after the *new* command, the data in memory past location $FFF is still there. When you bload the data back into memory, the two pieces are linked back together even though the program pointers are not changed. To verify that you have not really saved the entire program to disk, turn off the computer after the bsave, and then turn it back on to do the bload. You should find that the end of the program has now been lost and possibly has been replaced with garbage at the end of the remaining listing.

I hope it is now clear why the file is always ten sectors long. The bsave is always the same length, and what you're saving is really not related to the length of what you see listed on the screen with the list command.

For those who may be wondering why eight pages of memory take up ten sectors on the disk when a page of memory is exactly the same size as a disk sector, remember that it takes an extra sector on the disk for the track-sector list for the file (8 + 1 = 9), and that DOS adds a few bytes of its own to the file so that we just barely overflow onto the extra sector on the disk (9 + 1 = 10).

P.S. As long as we're both up this evening, think about this: With the program bloaded as before, immediately after the *new* statement, type in *del 0,1*. Now go into the Monitor and examine the program pointers again. Hmmmm.

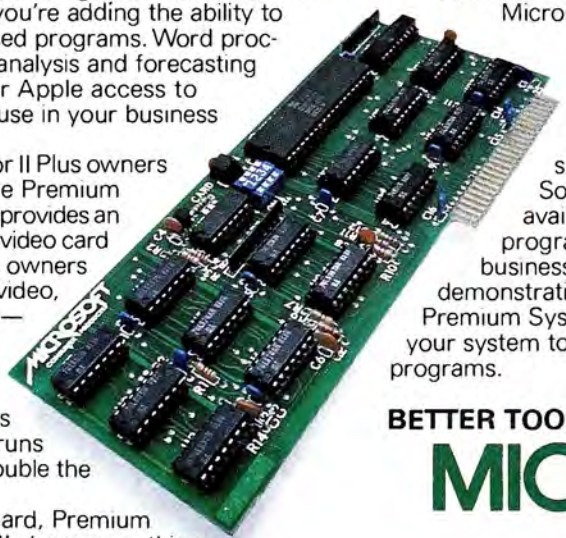
Roger Wagner ■



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The Schoolhouse Apple

by Jock Root

Steve Wozniak knows quite a lot about computers—he's one of the men who designed the Apple and wrote much of its original software—and he's interested in education. As a result, he worked on the Kids Can't Wait program, which (with some help from the California Legislature) has put nearly a thousand Apples into California's schools. We spoke to him recently about the future of computers in the classroom; he had some interesting things to say.

The most immediate problem is cost, of course—or, to look at it from another angle, availability. However, that will change with time (as it did with the digital wristwatch or the ball-point pen). There will come a time when every student will be able to spend several hours a day with a computer (via a terminal or something similar), and in order to be ready for that time we need to start writing new kinds of software.

The Ideal Learning Situation. From the student's viewpoint, the ideal situation would be to have one teacher all to himself during a whole course. That teacher would be immediately available all the time to help him whenever he had difficulty; even when teacher and student weren't interacting directly, the teacher would be observing the student, noting which material he had trouble with and planning teaching strategies to help him understand those areas.

This situation would also be ideal from an educational standpoint—and not just for the student. The teacher would be able to apply all her skills and attention to one subject, and she could really begin to *teach*—instead of just reading lectures, giving tests, and trying to stay in control of an unruly mob.

Unfortunately, as long as there are more students than teachers, this will not be possible.

Technology Today. Modern technology is helping in several ways. Educational TV and videodiscs are bringing information to more and more people, and computers are exploring the possibilities of interaction.

Videodiscs and TV can present information in attractive and interesting ways. When you reach that many students at once, the relative cost per student is low, and it becomes practical to do fancy and elaborate presentations. This can be a very effective way to present information; but as Wozniak points out, that's not the same thing as teaching.

The problem is, there is no feedback—the program cannot respond to the student's actions. The material is recorded (or broadcast) and must be exactly the same for each student; it will make a point and then roll blindly on, whether you understood the point or not (or it will repeat the point over and over, boring you stiff).

A computer can provide the missing interaction. It can change the flow of material, depending on your answer to each question it asks, and it can keep a record of what you had trouble with, as well as what was easy for you. Then it can provide extra review, and different teaching techniques, for the difficult stuff—letting you skim through the stuff you found easy.

But there is little software available now that actually does this for more than an hour or two's worth of material at a time; there's nothing that can handle a whole semester's coursework. Most of today's teaching programs are not at all sophisticated; as Woz puts it, in most classrooms the computer is no more than a fancy exerciser.

Worse than that, today's computers are too scarce and too expensive: Only a few students have any access at all, and most who do are restricted to a few minutes a week. The kind of interaction we want ideally requires several hours a day—that is, one computer (and software library) for each student.

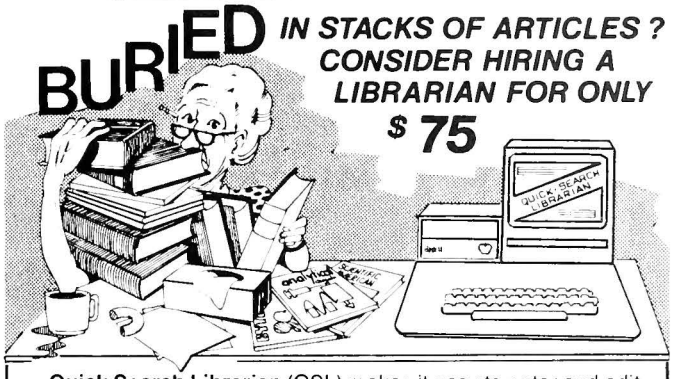
The Computer as Teacher. What we need is a "teacher" program—a program with significant artificial intelligence capabilities that could interact with the student as a real person would. Wozniak thinks this is very important. The program should have an actual "personality" that reacts with the student—not necessarily a "human" personality, but the personality of an intelligent being devoted to helping the student learn. This program, which we'll refer to here as *Teacher*, would administer a library of "course" programs, making selections on the basis of a student's current needs and keeping record of progress on several levels.

Most of the program's interaction with students would be in question-and-answer form: either about the course material being run, or between-course sessions on more general topics. A "general conversation" might go something like this:

"How am I doing, teacher?"

"You're doing fine here, Nancy, but you're not very good at subtraction yet. Shall we do some more of that now?"

Teacher would be able to understand a wide variety of inputs, even



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allowing for misspellings and bad grammar (which it would make note of for future correction). It would also have a call it could recognize from within a "course" program, so the student could talk to it at any time.

Whenever a student talked to the program, teacher would have available a record of all past student-*Teacher* transactions (in suitably edited and cross-referenced form). It would be familiar with the way each student expressed himself and would be able to "read between the lines"—to determine what was meant in ambiguous situations, and to help students make themselves clear. This would likely have a significant positive effect on motivation: students would probably try harder for a teacher who understood and appreciated them as individuals.

On the subject of motivation, Wozniak thinks the current interest in game-oriented teaching programs is exaggerated. Such programs can provide motivation for students to run them, but that's not the same as motivation to learn the assigned material. Students are quite capable of learning for the sake of learning—if the material is presented well. As Woz puts it, "I just don't think that Nature made us that way, that we have to be tricked."

It goes without saying that *Teacher* would also be too smart to be conned in the way a sharp student might try to con a human teacher. Its designers would be picked from our best teachers and would thus know all the tricks.

Teacher would keep track of all kinds of things, such as which quiz questions the student got wrong within a course (and even which wrong answers were chosen, if that's useful information) and which subject areas and teaching techniques proved most difficult—and even the time she asked, "Teacher, what's the real difference between men and women?"

Any information that would prove useful in shaping students' education would be available to the human teachers overseeing the process, enabling them to observe a clear and detailed picture of student progress, and to design review sequences and educational strategies to reinforce weak areas and challenge strong ones. Also, this information could protect the human teacher from being unduly influenced by first impressions, personality quirks, and the like.

Technology Tomorrow. By today's standards, of course, this would be impossibly expensive, requiring one computer per student full-time, or at least one *very* intelligent terminal per student, and an elaborate network system. In terms of technology, we would need at least three things to make it possible: increased system complexity, vastly increased onboard memory (plus more and faster mass-storage capabilities), and a factor-of-ten reduction in costs.

However, we're moving closer to all of that right now. Integrated circuits are being designed that put most of the functions of the Apple into a single chip. When they get into production, they will provide a considerable reduction in cost (or a vast increase in complexity for about the same cost).

Silicon memory is perhaps the most dramatic cost-shrink area in computers today: 64K machines for $300 are commonplace, and the price is continuing to go down. By the time we get the software written, we'll probably be able to put *Teacher* on a one-megabyte ROM chip for about five bucks. We already have the mass-storage capability in hard disks or videodisc data storage—it's just impossibly expensive. That will change, with time.

We're moving in the right direction, Wozniak believes—but we're still a long way away. Most school systems today would be hard put to spend a couple of hundred dollars per disk, even for a perfect system (if one were available). And the hardware alone, for the system we've described, would easily cost ten times that (never mind the software, which hasn't even been written yet).

It may take as long as ten years, but we're moving toward the place where each student can have a teacher all to himself. Not a human teacher, of course—but a teaching program designed by the best human teachers that can concentrate all its "attention" on that one student—surely a better deal than the estimated 5 percent of a teacher's attention that most students currently receive. ❑■

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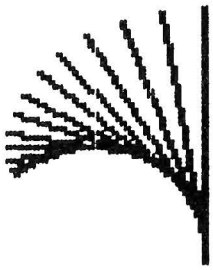
(This article contains excerpts from Polyspi Inspi, *a booklet of math activities on and off the computer, published by Martin-Bearden.)*

Have you ever looked closely at string art designs? Circles, ovals, and intricate patterns are created with multicolored threads. If you study the design carefully, or, better yet, do one yourself, you'll discover that the curves are actually created by straight lines crossing back and forth at different angles.

With a little imagination and clear thinking, we can probably figure out a way to teach the turtle to create curves from straight lines and then use those procedures to make intricate string art patterns on the screen.

Look at the ARCH procedure below:

```
TO ARCH :SIZE :ANGLE
IF :SIZE < 5 [STOP]
FD :SIZE
BK :SIZE -5
LT :ANGLE
ARCH :SIZE -4 ANGLE
END
```



In this example, the turtle will go forward a certain amount, go backward that same amount minus 5, and turn left a specified amount. The recursive line tells the turtle to subtract 4 from the input for SIZE. Each time the procedure is repeated, the SIZE is reduced by four.

The conditional line tells the procedure to stop IF SIZE <5. If you define the procedure with a conditional line that says IF SIZE < 0 [STOP], you will end up with a tail at the end of some of your designs (depending on which inputs you try). Follow the procedure through step by step and you'll discover why. Suppose we give the command ARCH 57 10. Each time the recursive line is reached, the computer will subtract 4. Thus, SIZE will go from 57 to 53 to 49 to 45 . . . to 9 to 5 to 1. Subtracting 4 from 1 will result in SIZE < 0, so the procedure will stop. But let's look at what happens when SIZE is 1. The turtle will go FORWARD 1 and then will go BACK 1 −5, or −4. Going BK −4 is the same as going FD 4, which results in the tail.

Try some variations of the ARCH procedure; for example, increase the angle by various amounts. Here are a few variations. Try others.

```
TO ARCH1 :SIZE :ANGLE
IF :SIZE < 5 [STOP]
FD :SIZE
BK :SIZE -5
LT :ANGLE
ARCH1 :SIZE -5 :ANGLE + 1
END
```

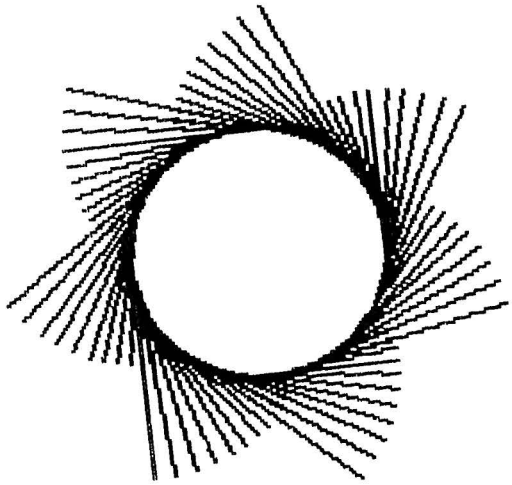
```
TO ARCH2 :SIZE :ANGLE
IF :ANGLE > 180 [STOP]
LT :ANGLE
FD :SIZE
BK :SIZE
RT :ANGLE
ARCH2 :SIZE :ANGLE + 10
END
```

```
TO ARCH 3 :SIZE :ANGLE
IF :ANGLE > 180 [STOP]
FD 5
LT :ANGLE
FD :SIZE
BK :SIZE
RT :ANGLE
ARCH3 :SIZE - 5 : ANGLE + 10
END
```

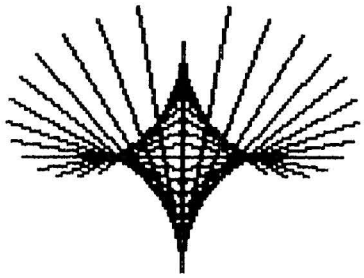
```
TO ARCH.SQ :SIZE :ANGLE
IF :ANGLE > 180 [STOP]
FD 6
LT :ANGLE
FD :SIZE
BK :SIZE
RT :ANGLE
ARCH.SQ :SIZE :ANGLE + 10
END
```

Experiment with each of these procedures and other variations. Compare what happens when you use the same inputs in the various procedures. Try lots of inputs, large and small, and make notes on what happens.

Try repeating the same procedure and inputs several times to create a circle. Here is ARCH 85 6 repeated seven times:

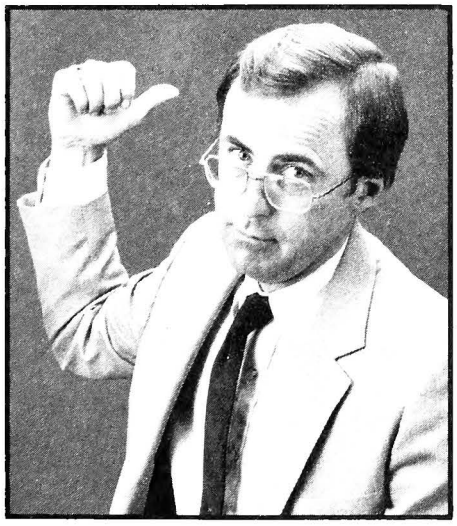


By defining procedures with the turtle turning to the right instead of the left, you can put the right and left procedures together to make mirror-image designs.



```
TO FLAME
ARCH3 100 10
HOME
ARCH3R 100 10
END
```

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Introducing **TIME IS MONEY.™**
A simpler, faster, more flexible personal accounting software package.

While people have been overjoyed by the prospect of having their very own personal computer accountant, so far they've been underwhelmed by the products. Some are too complicated; others are little more than toys; still others are too slow and rigid in format.

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Tracks up to 240 separate assets and liabilities. 240 types of income from 240 different sources. 240 expense categories with tax deductions.

And all you need is an Apple II, II+, //e, or compatible computer.

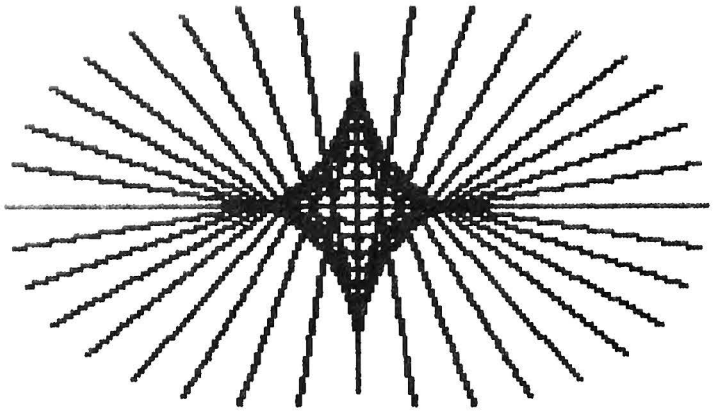
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```
TO SPACE.SHIP
ARCH2 100 10
HOME
ARCH2R 100 10
END
```

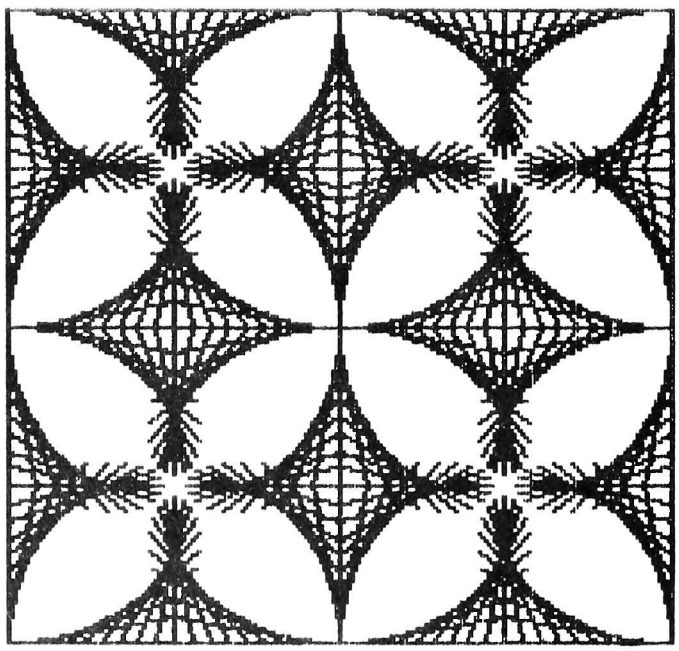
Suppose you took one of the procedures and rotated and repeated it enough times to make a certain polygon, say a square or a pentagon or a hexagon. Let's try a square first. Using ARCH.SQ, we could make a square by repeating the procedure four times and rotating 90 degrees between each rotation. Look at the following procedure:

```
TO SQUARE :SIZE :ANGLE
REPEAT 4 [ARCH.SQ :SIZE :ANGLE LT 90]
END
```

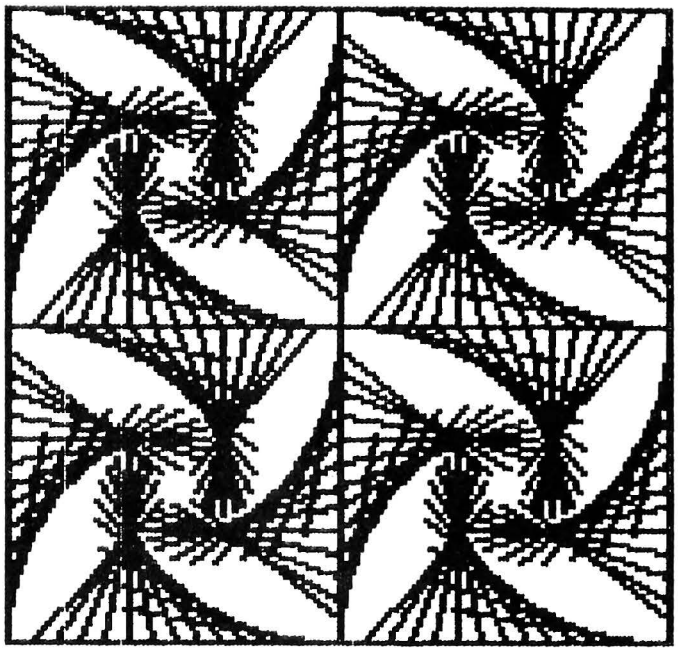
Experiment with SQUARE, using lots of different inputs. Compare what happens with large and small inputs for SIZE and ANGLE.

Write a procedure to put four SQUAREs together. Once again, experiment with lots of numbers. Some very interesting things begin to happen as you rotate and repeat figures. Here are a couple of examples using CROCHET:

```
TO CROCHET :SIZE :ANGLE
REPEAT 4 [SQUARE :SIZE :ANGLE RT 90]
END
```



CROCHET 50 10



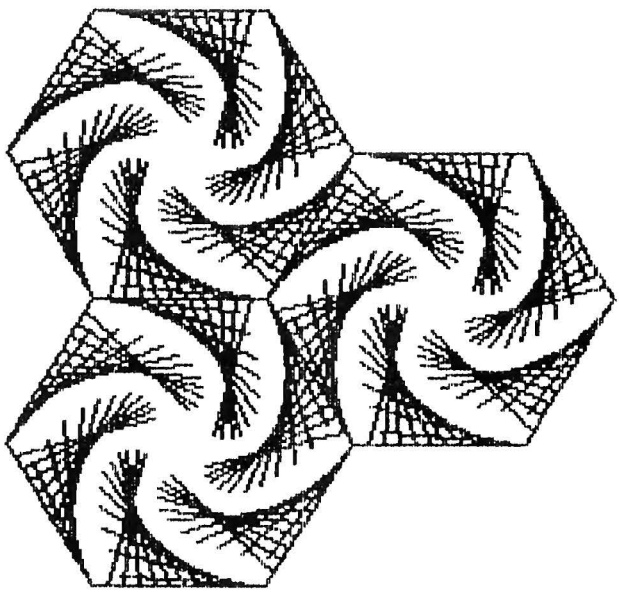
CROCHET 50 50

Using one of the ARCH procedures, let's define a hexagon. We know that to draw a hexagon the turtle must turn 60 degrees for each corner. So the ARCH.HEX procedure could be defined as follows:

```
TO ARCH.HEX :SIZE :ANGLE
REPEAT 6 [ARCH.SQ :SIZE :ANGLE LT 60]
END
```

To put three hexagons together, we could define another procedure:

```
TO HEXES :SIZE :ANGLE
REPEAT 3 [HEX :SIZE :ANGLE RT 120]
END
```



HEXES 55 75

There's another way to make hexagons. We can put six triangles together. Let's define a triangle with ARCH.SQ and then make a hexagon. First the triangle:

```
TO TRI :SIZE :ANGLE
REPEAT 3 [ARCH.SQ :SIZE :ANGLE LT 120]
END
```

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3 Thrillers for the game players in your family!



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Knock down buildings in your wrecker while dodging bricks, rocks, cans and tomatoes. 10 rounds. Poster, stickers, user's manual, vinyl binder included. Ages 8 and up. Only $39.95.

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Blow up

Gee whiz. Look what you've done.
Your big shiny Apple, destroyed.

And you thought you were just having a little fun?



Introducing our new home computer game Cavern Creatures.™ Where one false move, one mistaken twitch of the Joystick can do terrible things to an Apple. Like shut parts down.

Who knows which ones? Making it act awful funny and then... KA-BOOM!

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You can squirm. Beg. Plead. And moan. Nothing will save you, or your Apple, from being blown sky-high by this game. Don't worry. The effect's not permanent. Your Apple will recover. But will you?

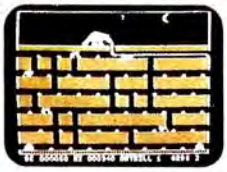


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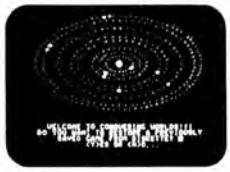
Argos™

And if you like to push people around, lay off your little brother and take on these aliens instead. Save the Domed City from doomsville.



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No, *Super Bunny* is not referring to all those Playboys stashed under the bed. It's a strategy/action game that just might turn your brains into carrot puree. Cover your burrow!



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Bilestoad™

Avoid violence, but be prepared. Incredible graphics make this rated R! But if you're a wimp, pass this game up. It's not for babies.

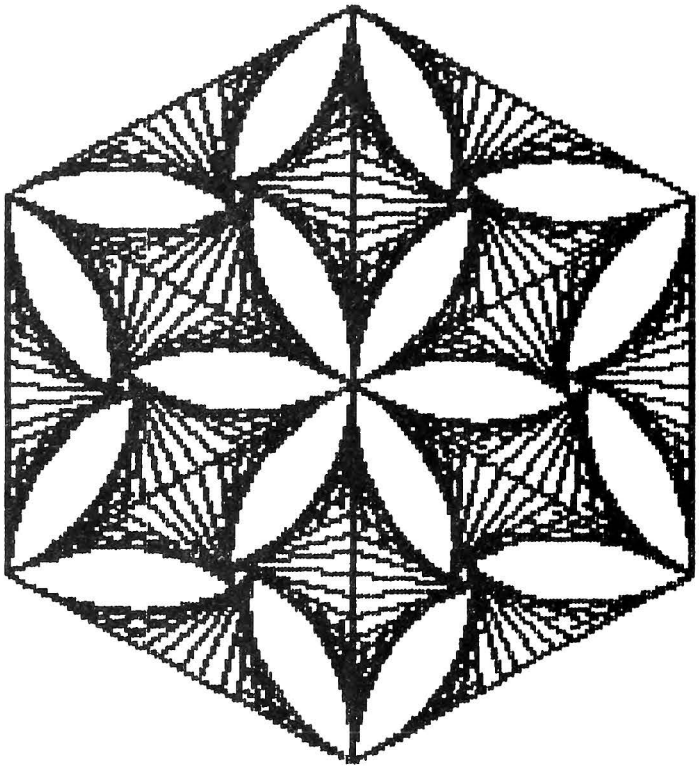
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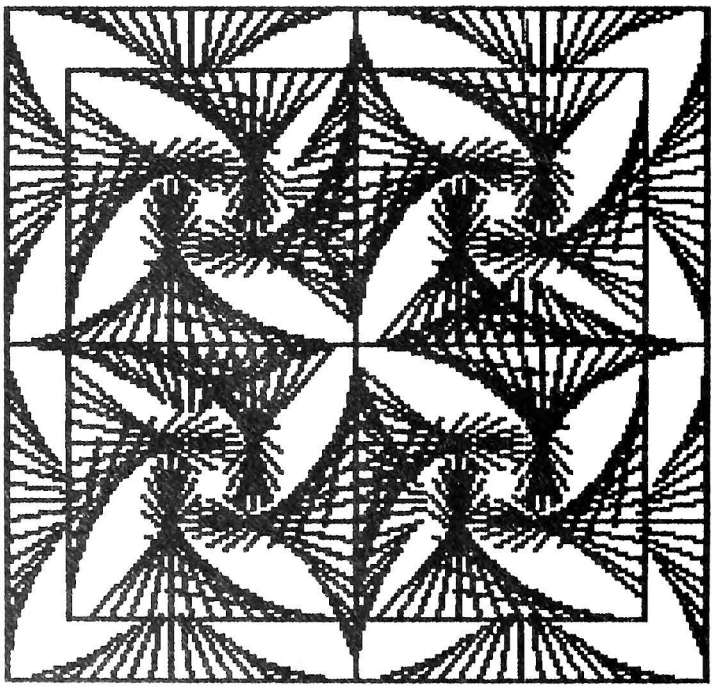
And then the hexagon:

```
TO TRI.HEX :SIZE :ANGLE
REPEAT 3 [TRI :SIZE :ANGLE RT 60]
END
```

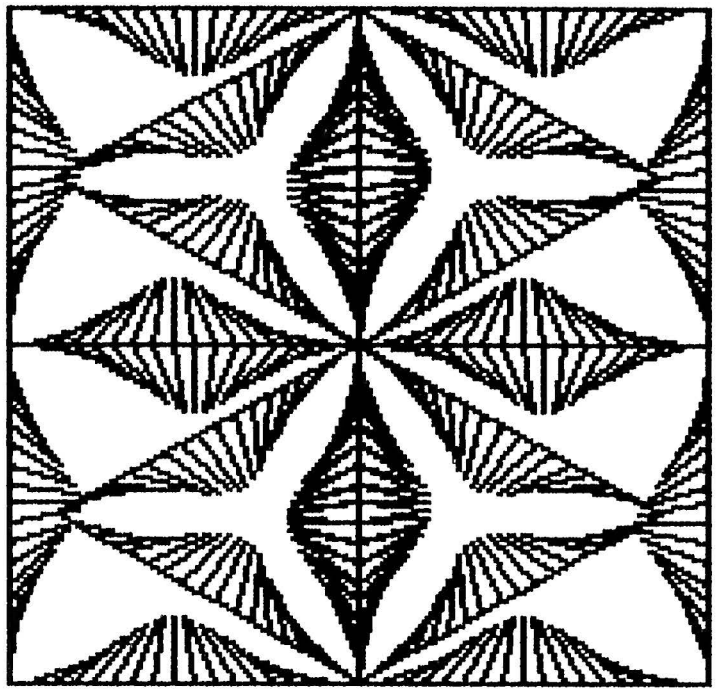


TRI.HEX 35 5

Try combining various patterns. For example, use various inputs of the same procedure or different inputs of different procedures to make pleasing designs. Here are two examples, leaving over a million and one for you to try on your own!

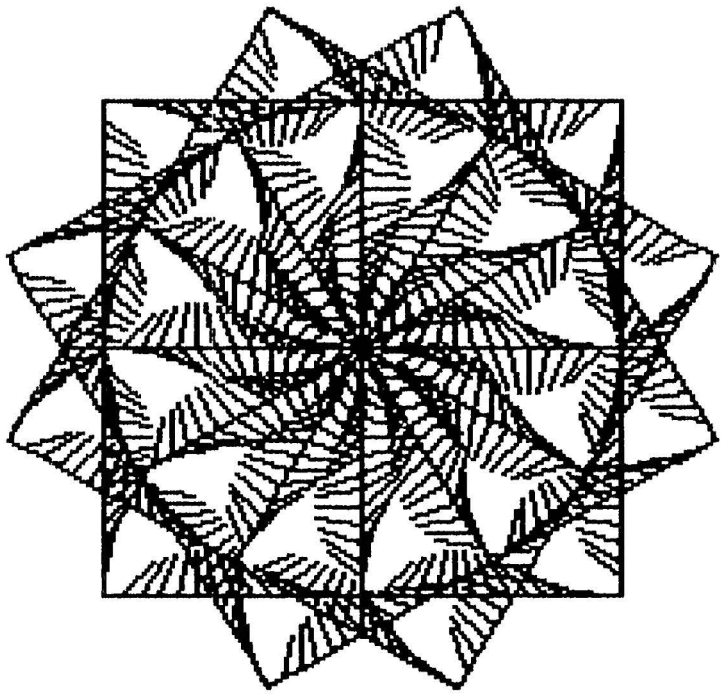


CROCHET 20 20
CROCHET 50 50



```
CROCHET 20 20
TRI 20 15
RT 60  TRI 20 15
RT 120 TRI 20 15
RT 60  TRI 20 15
```

And, once again, there's no end to what you can do with simple rotation.



```
CROCHET 15 50
RT 30
CROCHET 15 50
RT 120
CROCHET 15 50
```

If you haven't already done so, try adding color to your procedures. Then write a procedure that cycles through several of your creations and put on your own computer art show. ◨

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"I invented Topo for you--- whether you think of yourself as a programmer, robot hobbyist, or futurist."

Nolan Bushnell

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"A lot of Apple® owners are sure to appreciate all that Topo stands for, and all the things he can be programmed to do. They should get our first 500."



robot, available in a limited Signature Edition

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Three 8031 microprocessors serve as Topo's "brains." Two industrial-grade rechargeable batteries give him energy for hours of activity. His battery monitor provides voltage protection.

Topo's edge-mounted plug-in card cage system contains one board for motion control and another for two-way communication.

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You provide Topo's host computer: Any Apple® IIe, or II+ with RS-232 interface (super serial card) disk drive, and joystick.

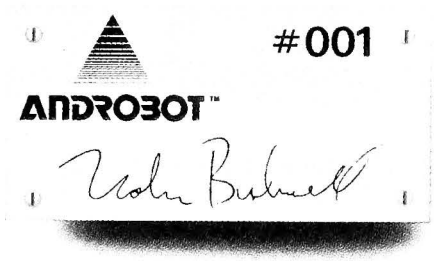
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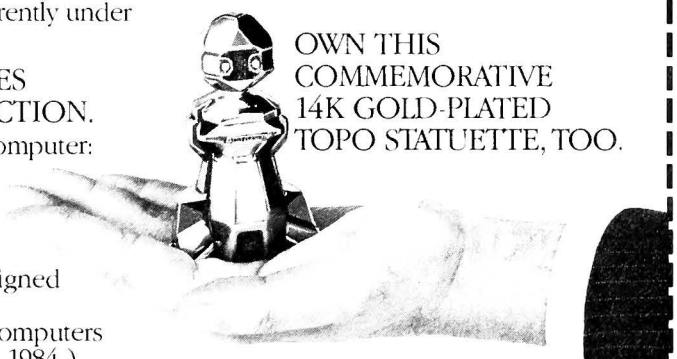
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Each Signature Edition Topo will bear an engraved plaque signed by his inventor, Nolan Bushnell. Your Topo will be numbered and registered in your name, commemorating your leadership in the Age of Androbotics.

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OWN THIS COMMEMORATIVE 14K GOLD-PLATED TOPO STATUETTE, TOO.

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___	And please add my name to the new Topo Users Group mailing list.	$ N/C
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Offer available only through participating Androbot dealers in the U.S. Signature Edition limited to the first 500 Topo personal robots produced for sale. This direct offer expires February 29, 1984. Specifications and prices subject to change without notice.

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ANDROBOT™

TRADETALK



☐ **Apple Computer** (Cupertino, CA) has announced the March debut of a disk drive system that will enable Apple II computers to run IBM software. The Rana 8086/2 will create Apple compatibility with IBM's MS-DOS operating system while retaining the ability to run programs based upon Apple operating systems. The new hardware, a plug-compatible coprocessor and dual disk drive, uses an 8086 microprocessor, with a double-sided drive providing 360K storage per drive. The coprocessor will provide 256K memory expandable to 512K. The product will be produced by **Rana Systems** (Chatsworth, CA), a manufacturer of Apple-compatible disk drives. "The Apple II is an open system, so we can take advantage of any standard that increases the value of the product to its users," said **John Cavalier**, vice president and general manager of Apple's personal computer systems division.

Apple has recently reversed a long-stated position by dropping the dealer price on the Apple IIe by 4.8 percent and the dealer price on the Apple IIe starter system by 11.6 percent. In an announcement to dealers made on November 16, Apple lowered the dealer price of an Apple IIe to $895 from $940, a $45 drop, and the price of the basic system, including disk drive, video monitor, eighty-column card, and 64K, to $1,145 from $1,295, a cut of $150. Apple Treasurer **Charles Berger** said the move was triggered by the desire to give dealers greater flexibility during the Christmas season. Other factors included a desire to spur Apple IIe sales and to make the Apple more competitively priced in the wake of IBM's introduction of the PC*jr*.

Apple also announced a pricing program that will allow schools to purchase Apple products at a 30 percent discount. In addition, if five units of the same product are purchased, Apple will contribute a sixth unit free. The Apple IIe Starter System will be available at a discounted price but is not included in the six-for-five offer. The program, which is called "Investment in Education," began November 1 and will continue until February 28, 1984. The discount will be available to all U.S. public and private schools, from elementary through college levels. The program covers most Apple hardware and software products except the Lisa and its software. Apple Computer is also wrapping up a holiday promotion that has provided a free $1,400 rebate package to everyone who purchases an Apple IIe or Apple III computer. The promotion, which will end January 15, features a package of rebate certificates and premium offers for more than ninety home and business-oriented products produced by Apple and other hardware and software developers. The certificates range in value from $3 to $100, with the total value of the package equaling $1,400. To receive rebates, buyers send the certificates and proof of purchase to a redemption company. Checks are sent directly to purchasers. The certificates are valid through July 31, 1984.

☐ **Simon and Schuster** (New York, NY) is making a foray into the world of personal computers with two new divisions: electronic publishing and computer books. The divisions were formed specifically to develop, market, and distribute software and books for personal computers. The electronic publishing division—which will publish its own software and distribute software developed by other companies—has already signed several distribution agreements including an agreement with The Learning Company to publish their entire educational software line. Other plans include the development of a game based on *Star Trek*, a joint effort with Henson Associates to develop educational games based on the Muppets, and development of an adventure game series based on Douglas Adams's bestseller, *The Hitchhiker's Guide to the Galaxy*. The division will be headed by president **Frank Schwartz** and vice president of sales and distribution **Alvin Reuben**. In addition, **James Korenthal** has joined the division as vice president of technical services. Simon and Schuster's book division, which will publish *A Loving Computer* by *InfoWorld* columnist John Dvorak, has scheduled twenty titles for release by spring and plans a comparable number of new releases each season. The division will be headed by publisher and editor-in-chief **Robert Eckhardt**, who was previously senior editor of Simon and Schuster's trade division.

☐ **CompuServe** (Columbus, OH) has announced a pilot program that will add advertising and direct marketing to the CompuServe videotex service. The program, scheduled to start this month, will give major advertisers and direct marketers their first opportunity to participate in a national test of CompuServe advertising. "We feel it's time to really test the advertising potential of the videotex medium," said **Jeffrey Wilkins**, president and chief executive officer of CompuServe. "Experiments are fine up to a point, but the local experiments being carried out in a couple of isolated areas around the country are not practical measurements of videotex advertising on a national scale." The pilot program, which will last for four months, is designed to test the degree of advertising acceptance among CompuServe's subscribers. CompuServe customers can place on-line orders for merchandise and specify delivery and payment information through their computers. Types of advertising used in the pilot program will include spot advertisements, one or two lines of text positioned on select menu pages; Adformation, advertiser-sponsored databases of in-depth product descriptions; and electronic catalogs, databases that identify products and provide brief descriptions.

☐ **Great Plains Software** has moved. Their new address is 1701 Thirty-eighth Street S.W., Fargo, ND 58103. Their new phone number is 701-281-0550.

☐ **Bantam Books** (New York, NY) has announced the formation of a new division, Bantam electronic publishing, which will be responsible for creating a line of software products and developing independent computer book-publishing projects. **Kenzi Sugihara**, former director of the electronic publishing division at Harcourt Brace Jovanovich, has joined Bantam as director of the new division.

☐ **Susan Goldberg** has been appointed vice president of **Micro Lab** (Highland Park, IL) and will be responsible for the firm's advertising, public relations, and marketing. She previously served as corporate secretary and is the wife of **Stanley Goldberg**, Micro Lab's founder and president. Micro Lab has also announced the formation of **MicroHome**, a new division that will produce software designed for home use. The first program in a line of what the company terms "lifestyle enhancement products" will be a word processor, *Home Writer*.

☐ **Steven Goldsworthy** has joined **Sorcim** (San Jose, CA) as vice president of engineering. In his new post, Goldsworthy will oversee development of the company's software products. He previously served ten years at Hewlett-Packard, where he was a software engineer and research and development manager.

☐ **Spinnaker Software** (Cambridge, MA) has announced that it has received $5 million in financing from the Hilman foundation of Pittsburgh and the GE Pension Fund. The proceeds of the financing will be used to "expand our already aggressive marketing and sales efforts, to build up the technological capacity to do translations from one computer to another, and to fund the working capital demands of a company that is growing 25 percent each month," said Spinnaker chairman **William Bowman**.

☐ **Larry Dunlap**, president of the new videogames-via-cable service **The Games Network** (Los Angeles, CA), has announced the appointment of **David DeJean** as chief operating officer. DeJean will be primarily responsible for financial management of the company but will also work in sales and marketing. He previously served as director of the Times Mirror Videotex Services.

☐ **Microsoft** (Bellevue, WA) has announced the formation of **Microsoft Press**, a new microcomputer book-publishing division. The

division, which expects to publish thirty to thirty-five books in its first year, will have its books distributed exclusively by the electronic publishing division of Simon and Schuster. The new Microsoft division will be headed by general manager and publisher **Nahum Stiskin**, who was formerly president and publisher of Autumn Press.

☐ The Great American Software Contest, sponsored by **Talmis** (Oak Park, IL), was canceled due to lack of participation. The contest offered programmers the chance to win $30,000 and was designed to bring together hundreds of talented software authors with more than two hundred fifty software publishers. Instead, only thirty-six programmers responded. Talmis attributes the contest's failure to a dearth of dedicated programmers and says they plan to revise their projection that the home computer would infiltrate nearly 50 percent of American households by 1988. "In planning the Great American Software Contest, we hoped to unearth the talented people working in their garages. What we learned instead is that the talented people are already out of their garages," said **Jeanne Dietsch**, Talmis's president.

☐ **Steve Cochard** has been named vice president of **Southwestern Data Systems** (Santee, CA). Cochard was previously an engineering supervisor at Bechtel Power Corporation.

☐ **Ashton-Tate** (Culver City, CA) has announced the appointment of **Charles Babbitt** as the firm's executive vice president and chief operating officer. Babbitt, who will oversee Ashton-Tate's operations division, was previously with the business services division of Computer Sciences Corporation.

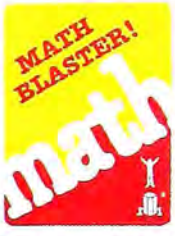
☐ **Thomas Towers**, former VisiCorp marketing vice president, has joined **Knoware** (Cambridge, MA) as president and chief executive officer. Knoware, an educational software publisher, has also announced the appointment of **J. Robert Hipps** as vice president and chief financial officer. Hipps previously served as vice president and treasurer of General Signal Corporation.

☐ **Monogram**, a division of **Tronix Publishing** (Inglewood, CA), has hired **Frank E. Mullin** as director of software development. Mullin, who designed Tronix's program *Dollars and Sense*, previously worked at TRW, where he was a project manager with the Defense and Space Systems Group.

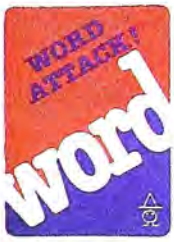
☐ Several employees of McTyre-Charles Associates, a computer advertising and marketing firm, caught the entrepreneurial spirit while working with their clients and have formed their own software publishing company—**Magnum Software** (Chatsworth, CA). During cooperative efforts with Datamost, Sierra On-Line, and Quality Software, the employees became fascinated by computers, said Magnum's president **Bob McTyre**. McTyre and his group raised funds for the company and, with the help of Datamost's **Dave Gordon** and **Sandy Wiviott**, located distributors and went into business. So far it has been very enjoyable, McTyre says: "I started out in TV in the early days and was almost ashamed to take my paycheck, it was so fun and exciting—that's where this computer thing is now." ◨



Educational Software That Works



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2 disks $49.95



2 disks $69.95

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VOTE For the MOST POPULAR Program Of 1983

These packages or programs are my favorites, in descending order, of all those released in 1983 or in November or December of 1981 with which I'm familiar:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

My favorite program of *all* time, so far, is: _____

_____

Name: _____

Address: _____

City/State/Zip: _____

Comments: _____

Please mail your postage-paid ballot before February 15, 1984. It needs no envelope.

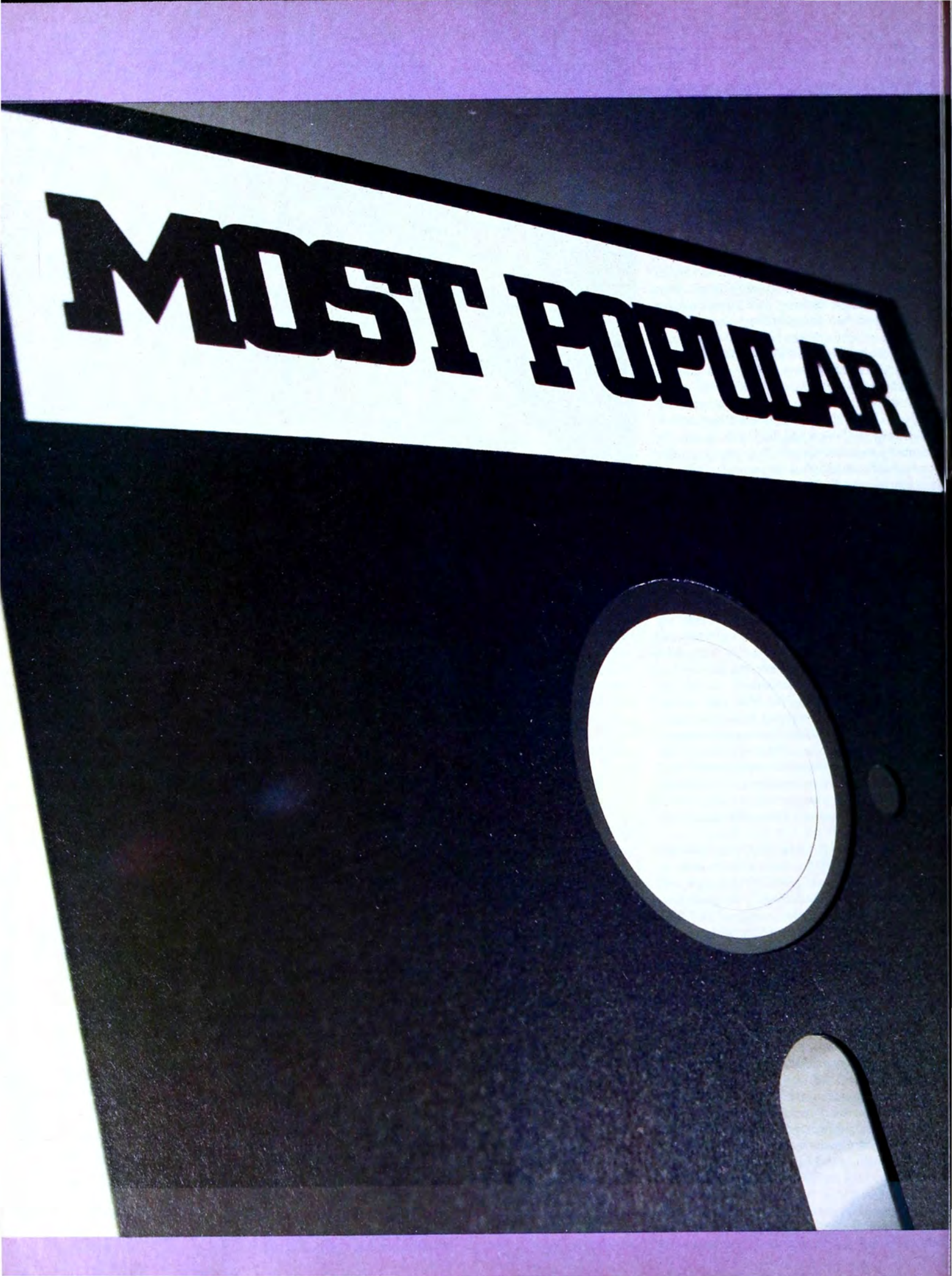
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MOST POPULAR

VOTE For the MOST POPULAR Program Of 1983

It's that time of the year again, the time when kids put away their holiday gifts and get their little keisters back to school. It's the time of the year when we make two-week efforts at keeping New Year's resolutions before we give them up, telling ourselves that resolutions are for the weak-willed. It's also the time of the year when we look back on the past year and reflect.

Hmm. What was the biggest change in our lives? What events made the biggest headlines in the news? And what was the best darn piece of software that came out in the Apple marketplace? Sure it's important. What had a bigger direct effect on our lives last year—a program we bought or the launching of a space shuttle?

While last November's space shuttle mission was a landmark in the history of space exploration, the new word processor that simplified life one hundred-fold for a writer is more important—to the writer, anyway. Such software gems deserve recognition, and that's where you get to help.

For the past three years, *Softalk* readers have voted for their favorite programs, and the industry has listened. Business programs, home applications, educational software, utilities, and, of course, games. They're all eligible to be selected as the most popular program of the year.

Be confident because your PowerType Daisywheel correspondence becomes you.

When you can't personally be there, only the clearest typed correspondence should be your substitute. With a PowerType Daisywheel printer your documents look highly professional. And so do you!

PowerType. It's "typewriter friendly." Using a simple drop-in ribbon cassette, it bi-directionally types executive quality correspondence at 18 cps with a print wheel that holds 96 flawless characters.

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Though the quality of a program (a subjective judgment, to be sure) is important to consider when voting, the "best" program isn't necessarily the most popular. While someone might use a three hundred-dollar spreadsheet wonder program that does everything but fry eggs, that same person might rather be playing a cheaply made adventure game.

So, we're not asking you to vote for what you think were the ten best programs released in 1983, but rather for your favorite programs. There are spaces on the ballot for you to list your ten favorite programs in order of preference. It's important to list them in order, because votes will be weighted. That means a program receiving three first-place votes will carry more "weight" than a program receiving five tenth-place votes. Just because a program receives more votes doesn't mean it will win; high rankings also play a part.

There's another blank on the ballot; it's there for your favorite program of all time. Maybe it'll be the same as your favorite this year; maybe not. Maybe it'll be the same one you voted for last year; maybe not. *Wizardry* won last year as the favorite all-time program. Will it take the honors again? Or can something unseat the champ?

In addition to the voting, we're interested in hearing what you think about various programs—the dogs as well as the winners. Anybody with money can run a flashy ad campaign for a program—including full-color magazine ads that sing and dance about why you should buy the program—instead of telling you what it does. Reviews of programs don't always do justice to them—good or bad. Sometimes reviewers, in the opinion of the user, will completely miss the point or be so far off base that it looks like they took a bribe.

Or you may feel that one of your favorites is underrated. Tell us which programs you think ought to receive more applause and why. Software producers get some of their best input from polls like this. The readers speak, and the software makers listen.

Here's how the voting works.

Any program released between October 1, 1982, and December 31, 1983, are eligible for the voting. The reason for the overlap is to include programs that were released at the end of 1982 but weren't out long enough to be noticed by the consumer marketplace.

To make things easier for everone, please use the enclosed ballot card that's obnoxiously sticking out between these pages. Just fill in your choices and drop it in the mailbox, postmarked by February 15, 1984.

Only one ballot per person can be accepted. If two or more ballots with the same votes are sent in by one person, only one will be counted. Ballots from the same person with different selections will fly straight into the nearest forest fire and be forgotten. Ballot-box stuffers, you have been warned!

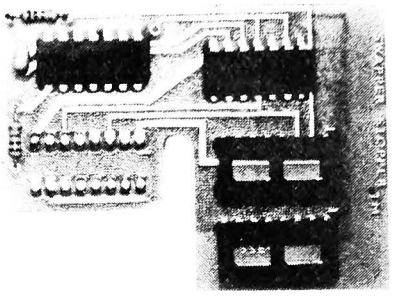
If there are two or more persons in your household who want to vote, or if some overzealous voter already ripped the ballot from the magazine, then write your choices on a piece of paper with your name, address, and comments and send it to Softalk Vote, Box 7039, North Hollywood, CA 91605, postmarked by February 15, 1984.

Votes will be counted by a privileged few on the *Softalk* staff. Nick and Bud's Accounting (est. 1983) will supervise to make sure there's no cheating (or ballot-box stuffing). The results will be locked safely away in *Softalk*'s safe-deposit cupboard, and the winner will be announced at the West Coast Computer Faire, where the author and publisher of the winning program will get all dressed up to receive the award for the Most Popular Program of 1983. If flying out to San Francisco just to find out who won doesn't sound inviting (it should, though), you can always read the results in the April issue.

Any professional software released between October 1, 1982, and January 1, 1983, is eligible for your vote. This list, made up of programs whose sales were trackable in the past year, is intended only as a memory jogger; it is not comprehensive—it's even possible that a package or two released before the eligible date could have snuck into the list; others may have been unwittingly omitted. Repeat: the programs you vote for *need not* be on this list. The list is *only* intended to get your memory cranking. Have fun reminiscing, and may the best product win!

A.E.
Airsim-3
Apple Cider Spider
Apple Writer IIe
Aquatron
Arcademic Skill Builders
Axis Assassin
Bank Street Writer
Bats in the Belfry
Beagle Bag
Beagle Basic
Bermuda Race

SWAPPER STOPPER $26.95



Automatic Game Port Expander for Apple II+ or IIe

The new Swapper Stopper plugs inside your Apple, and provides **automatic** switching between joystick and paddles. Simply pick up either joystick or paddles, and Swapper Stopper automatically passes control to that device.

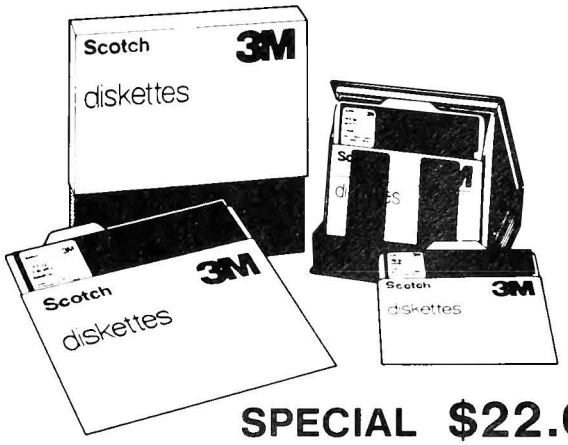
Swapper Stopper requires no unsightly externally mounted cables or switches, and installs in seconds.

Swapper Stopper is available from stock. Specify version (II+ or IIe).

Dealer inquiries invited.

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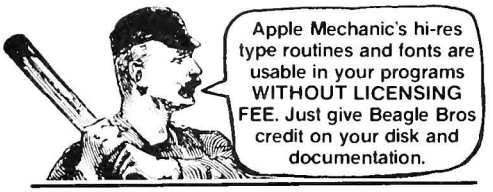


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APPLE MECHANIC

HI-RES SHAPE EDITOR / TYPE FONT DISK
by BERT KERSEY

$29.50. Includes Peeks/Pokes Chart & Tip Book #5.

SHAPE EDITOR: Keyboard-draw hi-res shapes for animation in your Applesoft programs. Access & create **proportionally-spaced hi-res Typefaces** with each character re-definable as you want. Six fonts are included on the disk. Excellent LISTable Applesoft demos show you how to animate graphics and create professional-looking Charts and Graphs.

BYTE-ZAP: Rewrite any byte on a disk for repair or alteration. Load entire sectors on the screen for inspection. **Hex/Dec/Ascii displays** and input. Educational experiments included for making trick file names, restoring deleted files, changing DOS, etc.

MORE: Useful music, text and hi-res tricks for your programs. Clear educational documentation.

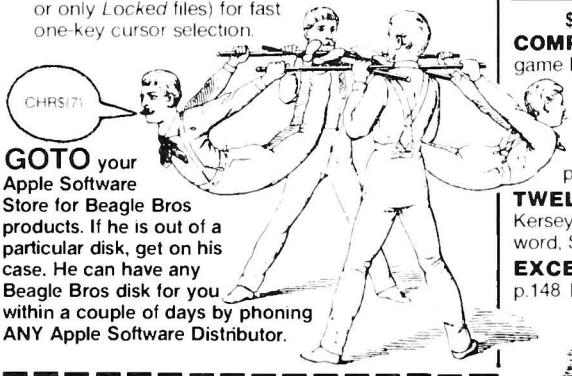
APPLE MECHANIC TYPEFACES

by BERT KERSEY

$20.00. Includes Peeks & Pokes Chart.

26 NEW FONTS for use with Apple Mechanic programs. Many different sizes and typestyles, both ordinary and ℭ*Artistic*. Every character—from A to Z to "★" to "□"—of every typeface—from "Ace" to "Zooloo"—is re-definable to suit your needs. All typefaces are **proportionally spaced** for a more professional appearance. People *do* notice the difference!

BEAGLE MENU: Display only the file names you want from your disks (for example, only *Applesoft* or only *Locked* files) for fast one-key cursor selection.



GOTO your Apple Software Store for Beagle Bros products. If he is out of a particular disk, get on his case. He can have any Beagle Bros disk for you within a couple of days by phoning ANY Apple Software Distributor.

RUSH the following disks by First Class Mail—

☐ Alpha Plot	$39.50	☐ Frame-Up	$29.50
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DOS BOSS

DISK COMMAND EDITOR
by BERT KERSEY and JACK CASSIDY

$24.00. Includes Peeks/Pokes Chart & Tip Book #2.

RENAME DOS COMMANDS & Error Messages—"Catalog" can be "Cat", "Syntax Error" can be "Oops" or almost *anything* you want it to be.

PROTECT YOUR PROGRAMS. An unauthorized Save-attempt can produce a "Not Copyable" message, or *any* message you want. Also easy List-Prevention and other useful Apple tips and tricks. Plus one-key program-execution from catalog.

CUSTOMIZE DOS. Change the catalog Disk Volume heading to your message or title. Omit or alter catalog file codes. Fascinating documentation, tips and educational Apple experiments.

ANYONE USING YOUR DISKS (booted or not) will be using DOS the way YOU designed it.



```
10 LIST: LIST: LIST: FOR ZZ=PEEK(175)+PEEK
(176)*256+36 TO 3072: POKE ZZ,216: NEXT
20 FOR XXX 1 TO 2: POKE-16299,0: POKE
-16300,0: XXX 1: NEXT: REM Experiment
with different length variable names.
```

BEAGLE BAG

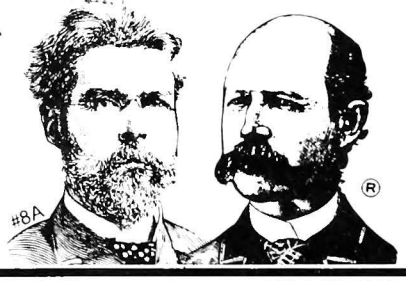
12 APPLE GAMES ON ONE DISK
by BERT KERSEY

$29.50. Includes Peeks & Pokes Chart.

COMPARE BEAGLE BAG with any single-game Locked-Up disk on the market today. All 12 games are a blast, the price is a bargain, the instructions are crystal clear, *and* the disk is COPYABLE. You can even *change* the programs or list them to learn programming tricks by seeing how they work.

TWELVE GAMES from the Applesoft Ace, Bert Kersey— TextTrain, Wowzo, Magic Pack, Buzzword, Slippery Digits, and many many more...

EXCELLENT REVIEWS—See Jan-83 *Softalk*, p.148. Beagle Menu too: see Typefaces description.



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Micro Software Inc.

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ALL BEAGLE DISKS ARE UNLOCKED, COPYABLE AND COMPATIBLE WITH APPLE II, II+ AND IIe.*
(Don't Settle for Less!)

*DISKQUIK requires Apple IIe.
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NEW! SILICON SALAD

INCLUDING TIP DISK #2
by BERT KERSEY and MARK SIMONSEN

$24.95: Includes Peeks/Pokes AND Commands Charts.

MANY MINI-UTILITIES: Disk Scanner finds bad disk sectors, **Key-Clicker** adds subtle sound as you type, **DOS-Killer** adds two tracks of space to your disks, **2-Track Cat** allows up to 210 file names per disk, **Program Splitter** makes room for hi-res pix with large Applesoft programs, **Text Imprinter** transfers text to the hi-res screen, **Onerr Tell Me** prints the appropriate error message but continues program execution, **Text Screen Formatter** converts text layouts into Print statements... plus much more Apple wizardry from the boys at Beagle Bros.

MORE TIPS ON DISK: Including fantastic programming tricks from Beagle Bros Tip Books 5, 6 and 7, plus programs from Tips/Tricks Chart #1.

TWO-LINERS TOO: From our customers around the world—and elsewhere. Little mind-blowers that will teach your old Apple some new tricks!

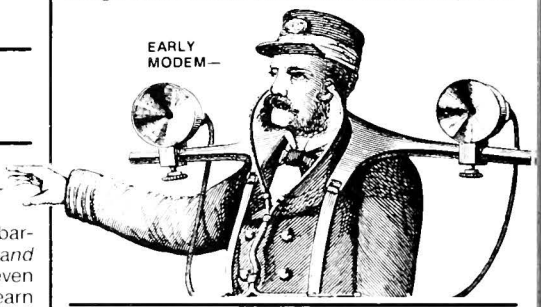
TIP DISK #1

100 TIP BOOK TIPS ON DISK
by BERT KERSEY

$20.00. Includes Peeks & Pokes Chart.

100 LISTABLE PROGRAMS from Beagle Bros Tip Books 1-4. Make your Apple do things it's never done! All 100 programs are LISTable and changeable for Apple experimentation.

COMMAND CHART INCLUDED: Free with each Tip Disk: an 11 x 17 poster of all Applesoft, Integer Basic & DOS Commands with Descriptions!



FLEX TYPE

(FORMERLY "FLEX TEXT")
VARIABLE-WIDTH HI-RES TEXT UTILITY
by MARK SIMONSEN

$29.50: Includes Peeks & Pokes Chart.

PRINT VARIABLE-WIDTH TEXT on both hi-res screens with normal Applesoft commands (including HTAB 1-70). Normal, expanded & compressed text with no extra hardware. (70-column text requires a monochrome monitor, not a tv).

ADD GRAPHICS TO TEXT or add Text to hi-res graphics. Run your existing Applesoft programs under Flex Type control. Fast, easy to use, and Compatible with GPLE and Double-Take.

DOS TOOL KIT* font compatibility, or use the supplied Flex Type typefaces. Select up to 9 fonts with control-key commands. A text character editor lets you redesign any Apple text character.

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FAST APPLE DISPLAY UTILITY
by TOM WEISHAAR

$29.50: Includes Peeks & Pokes Chart.

PROFESSIONAL PRESENTATIONS: Turn your existing Hi-Res, Lo-Res and Text frames into attractive Apple "slide shows". *FAST* hi-res loads in 2"-seconds! Paddle or Keyboard-advance frames.

UNATTENDED SHOWS are optional, with each picture arranged and pre-programmed to display on the screen from 1 to 99 seconds. Custom **Text Screen Editor** lets you create black-and-white text "slides" and add type "live" from the keyboard during shows. Mail copies of presentations on disk to your friends and associates (or home to Mom!).

NEW!

GPLE

GLOBAL PROGRAM LINE EDITOR
by NEIL KONZEN

$49.95: Includes Peeks/Pokes Chart & Tip Book #7.

A CLASSIC APPLE PROGRAM EDITOR GPLE lets you edit Applesoft program lines *FAST* without awkward cursor-tracing and "escape editing".

INSERT & DELETE: GPLE works like a word processor for Applesoft program lines. You make changes instantly by jumping the cursor to the change point and inserting or deleting text. No need to trace to the end of a line before hitting Return.

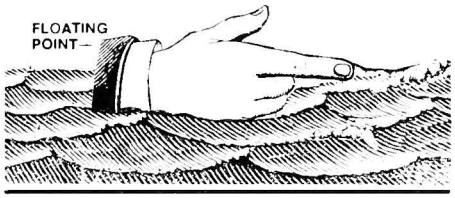
GLOBAL SEARCH & REPLACE: Find any word or variable in your programs, *FAST*. For example, find all lines containing a GOSUB, or edit or delete all lines with REM statements, or all occurrences of any variable. **Replace any variable**, word or character with any other. For example, change all X's to ABC's, or all "Horse" strings to "Cow".

80-COLUMN COMPATIBILITY: All edit & global features support **Apple IIe 80-column cards** and most 80-column cards on *any* Apple IIe, II+ or II.

DEFINABLE ESC FUNCTIONS: Define ESC plus any key to perform any task. For example, **ESC-1** can catalog drive 1, **ESC-L** can do a "HOME: LIST", **ESC-N** could type an entire subroutine... *Anything* you want, *whenever* you want.

GPLE DOS MOVER: Move DOS and GPLE to Language Card (or IIe upper 16K) for an EXTRA **10,000 Bytes** (10K) of programmable memory.

Plus APPLE TIP BOOK #7: Learn more about your Apple! Includes all new GPLE tips and tricks.



UTILITY CITY

21 PROGRAMMING UTILITIES
by BERT KERSEY

$29.50: Includes Peeks/Pokes Chart & Tip Book #3

LIST FORMATTER prints each program statement on a new line. Loops indented with printer Page Breaks. A great Applesoft program de-bugger.

MULTI-COLUMN CATALOGS, with or without sector and file codes. Organize your disk library.

INVISIBLE and trick catalog file names. Invisible functioning commands in Applesoft programs too.

MUCH MORE: 21 utilities, including auto-post Run-number & Date in programs, alphabetize/store info on disk, convert dec to hex or Int to FP, protect and append programs, dump text to printer...

LEARN PROGRAMMING: List-able programs and informative documentation. Includes Tip Book #3. Hours of good reading & Applesoft experiments.

ALPHA PLOT

HI-RES GRAPHICS/TEXT UTILITY
by BERT KERSEY and JACK CASSIDY

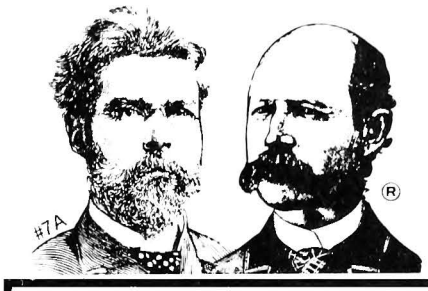
$39.50: Includes Peeks/Pokes Chart & Tip Book #4.

DRAW IN HI-RES on both Apple "pages" using easy keyboard commands OR paddles/joystick. Pre-view lines before plotting. Solid or mixed colors & Reverse (background-opposite) drawing. FAST one-keystroke circles, boxes & ellipses, filled or outlined. Add text for graphs & charts. All pix Save-able to disk, to be called from your Applesoft programs.

COMPRESS HI-RES DATA to 1/3 disk space (average) allowing more hi-res pictures per disk.

MANIPULATE IMAGES: Superimpose any two images, or RE-LOCATE any rectangular section of any drawing anywhere on either hi-res page.

HI-RES TYPE: Add text to your pictures with adjustable character-size and large-character color. Type *anywhere* with no Htab/Vtab limits. Type sideways too, for graphs. Includes Tip Book #4.



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* DISKQUIK requires Apple IIe
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BEAGLE BASIC

APPLESOFT ENHANCER
by MARK SIMONSEN

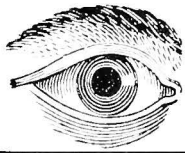
$34.95: Includes Peeks/Pokes Chart & Tip Book #6
Requires Apple IIe (OR II/II+ with RAM Card).

RENAME ANY APPLESOFT COMMAND or Error Message to anything you want. For program clarification, encryption/protection or even foreign translation. Plus add optional NEW COMMANDS:

ELSE follows If-Then statements, like this:
IF X=2 THEN PRINT "YES": *ELSE* PRINT "NO"

HSCRN reads color of any hi-res dot for collision testing. **SWAP X,Y** exchanges 2 variables' values. New **TONE** command writes music with no messy pokes & calls. **SCRL** scrolls text in *either* direction. **TXT2** lets Text Page 2 act exactly like Page 1.

PLUS: GOTO & GOSUB may precede variables, as in "GOSUB FIX" or "GOTO 4+X". Escape-mode indicated by special ESC CURSOR. Replace awkward Graphics screen-switch pokes with 1-word commands. Change ctrl-G Beep to any tone. **INVERSE REMS** too! All GPLE compatible.



```
1 FOR S=768 TO 773: READ A:
  POKE S,A: NEXT: POKE 232,0:
  POKE 233,3: DATA 1,0,4,0,5,0
2 HGR2: FOR R=0 TO 192: ROT=R:
  SCALE=96: XDRAW 1 AT 140,95:
  SCALE=30: XDRAW 1 AT 140,95:
  S=PEEK(49200): NEXT: RUN
```

PRONTO-DOS

HIGH-SPEED DOS / DOS-MOVE UTILITY
by TOM WEISHAAR

$29.50: Includes Peeks & Pokes Chart

TRIPLES THE SPEED of disk access and frees 10,000 bytes of extra memory by moving DOS.

Function	Normal	Pronto
BLOAD HI-RES IMAGE	10 sec.	3 sec.
LOAD 60-SECTOR PROGRAM	16 sec.	4 sec.
SAVE 60-SECTOR PROGRAM	24 sec.	9 sec.
BLOAD LANGUAGE CARD	13 sec.	4 sec.

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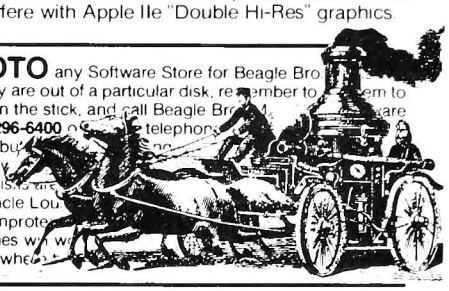
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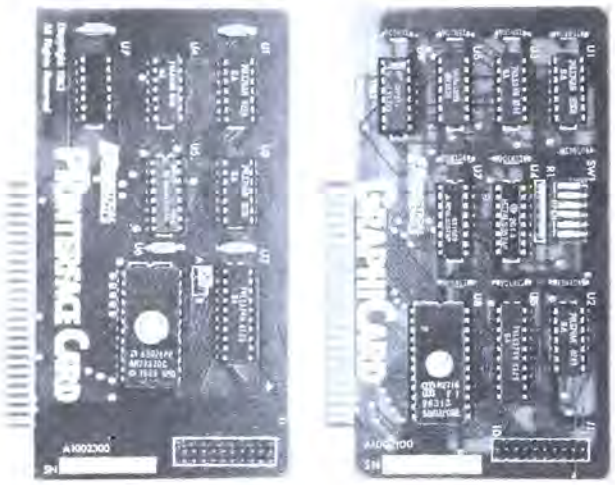
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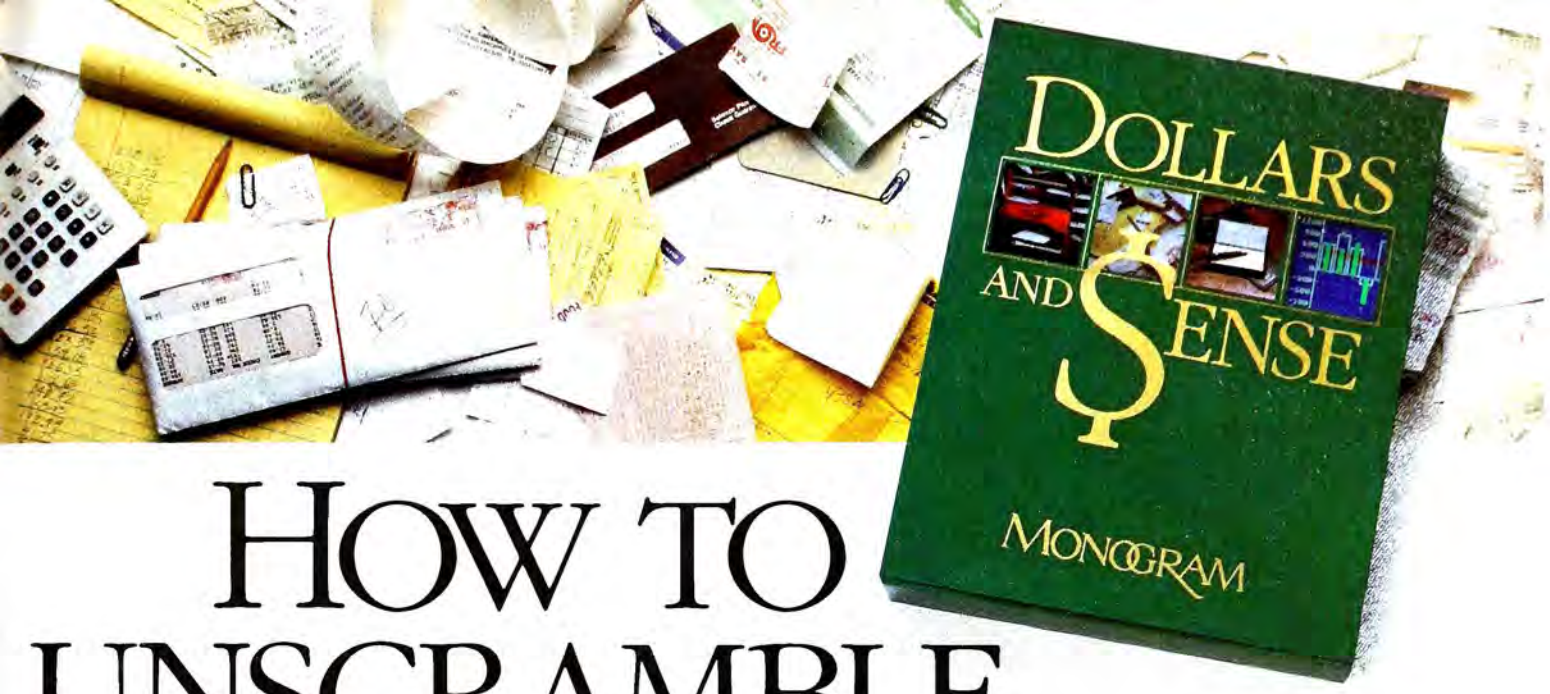
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String Is in the Air

At the close of last month's installment three exercises were offered as a way to sharpen your programming skills and put the principles discussed in the column to use. We'll look at two of those exercises here. If you did them yourself, your solutions probably won't look exactly like the ones shown here. If they work, however, they are probably just as good. In fact, they may be better.

There are several criteria for deciding what solution to a programming problem is best. It depends on what you need. The most important consideration is that it work. After that, it's worthwhile to consider whether it works fast enough for your liking, how efficiently it uses memory (the easiest measure of this is the program's catalog sector count—the number next to its name and file type when you catalog the disk), and how easy it is to understand and, if need be, modify. So don't worry if your answers don't look like our answers.

Friday's Child. Let's consider first the suggestion for how the Friday program from last month might be improved. Load *Friday.2* from your Floating Point disk. Here is what it looked like when last we saw it:

```
10  DIM ND(12), FF(12)
20  FOR M = 1 TO 12: READ ND(M): NEXT M
30  FOR M = 1 TO 12: READ FF(M): NEXT M
40  FOR M = 1 TO 12
100   FOR D = FF(M) TO ND(M) STEP 7
110   PRINT "Friday ";M; "/";D; "/83"
120   NEXT D
125   NEXT M
130   END
200   DATA 31,28,31,30,31,30,31,31,30,31,30,31
210   DATA 7,4,4,1,6,3,1,5,2,7,4,2
```

Some of you may have a renumbered version with the line numbers changed and the data statements following the read statements, based on the final exercise with *Renumber*. We'll be using the numbering from the older version, as shown, so if you saved the newer one you'll have to adjust the line numbers used in the example accordingly.

The Perpetual Calendar. The problem, you may recall, was to modify *Friday.2* to calculate the first Friday value (FF) for each month instead of reading all the values into an array. This calculation would be based on a knowledge of the date of the first Friday of the year and the number of days in each month. A crucial consideration, especially this year, is that the number of days in February is different in a leap year. Fortunately, there's an easy, mathematically oriented way to determine whether a given year is a leap year—see if it's evenly divisible by four. More on that later.

Let's start by putting in the necessary information for this year. Add this line:

```
5  YR = 1984: FF = 6
```

This will tell the program that the year is 1984 and the first Friday of the year is dated the 6th. Those of you who know anything about magazine lead times are aware that this article was written well before the beginning of the year, before any 1984 calendars were within easy reach. (Kindly refrain from pointing out that 1984 calendars were in the book and stationery stores as early as last August. Some people like to be surprised on Christmas.)

So how was the first Friday determined? Simple: We just took the date of the last Friday of December (30), added the number of days in the week (7, for a total of 37), and subtracted the number of days in December (31, leaving a difference of 6). You may have thought, "Count forward on a 1983 calendar from the last day of December until your finger hits Friday," but can you translate that to Basic? You can figure out the first Friday of the year for the computer, but the task at hand is to get the program to determine the first Friday of each month after January. Try finding an Apple that can read a calendar.

Math Imitates Life. Now try our way. You will find that after the *next D* in line 120 has fallen through, the value in D will be the date of the last Friday of the month plus 7 (the step defined in line 100). Half the work is done. Now all we have to do is subtract from D the number of days in the previous month. Until we hit line 125, the variable M conveniently will be pointing to the month we need, and we'll have the number of days in each month safely recorded in ND(M). So all we need is a line like:

```
123  FF = D - ND(M)
```

Exactly like it in fact. Pretty swift, huh? Now let's get rid of the stuff we don't need. There's nothing more embarrassing than showing someone your major programming opus, having him ask what line 30 does, and having to admit that it doesn't do anything but that it was a necessary part of the program three versions ago.

Most of the now obsolete portions of the program deal with the array variable FF(12). (Here and in the future we'll refer to an array variable by a combination of its name and, in parentheses, either its dimensions or its most common index variable. This style will help you distinguish an array variable from any simple variables of the same name.) Some references to the FF array should be eliminated and some should be replaced with the simple variable FF that we've just introduced in lines 5 and 123.

To start with, let's delete lines 30 and 210. These lines used to read the data into the FF(12) array. Not anymore. Next, we must change the remaining lines that refer to FF(12)—10 and 100—like so:

```
10  DIM ND(12)
100  FOR D = FF TO ND(M) STEP 7
```

Finally, line 110 should be changed to reflect the fact that the year is now also a variable:

```
110  PRINT "Friday "; M; "/"; D; "/"; YR
```

Now the only problem with the program is that February has twenty-nine days this year, not twenty-eight. This brings us back to our definition of a leap year, which states that a year is a leap year if it is evenly divisible by four. This is another case of learning to think about familiar concepts in mathematical terms. You don't have to be a mathematician to do this; you just have to think a little. What does "evenly divisible by four" mean? Consider the following examples:

```
10/4 = 2.5    11/4 = 2.75    12/4 = 3    13/4 = 3.25
```

Which of the numbers from 10 through 13 is "evenly divisible by 4?" The answer is 12, since 12 divided by 4 equals 3. No decimal point. The mathematical word for a number with no decimal places is an *integer*. Now you may recall from two months ago that we have a function we can use to turn a number into an integer: INT. Can we use this to our advantage? Sure thing—try this out in your head, with N equal to the numbers from 10 through 13:

```
IF N/4 = INT (N/4) THEN...
```

Which number will pass that test? You guessed it: 12, because twelve is evenly divisible by four.

Now that we have our test, we'll include it in the program so it will set the number of days in February equal to twenty-nine if it's a leap year. In Basic, that would be:

```
30  IF YR/4 = INT (YR/4) THEN ND(2) = 29
```

Adding this new line won't change the data in the data statement. There's no need to do that. What it will change is the data that has been read into the ND(12) array by line 20, which is why we put the test for a leap year in line 30.

There you have it. The program now looks like this:

```
5  YR = 1984: FF = 6
10  DIM ND(12)
20  FOR M = 1 TO 12: READ ND(M): NEXT M
30  IF YR/4 = INT (YR/4) THEN ND(2) = 29
40  FOR M = 1 TO 12
100  FOR D = FF TO ND(M) STEP 7
110  PRINT "Friday "; M; "/"; D; "/"; YR
120  NEXT D
123  FF = D - ND(M)
125  NEXT M
130  END
200  DATA 31,28,31,30,31,30,31,31,30,31,30,31
```

This revised program will give an accurate list of the Fridays in any year (unless they change the calendar on us), provided you give it correct data for the year and the first Friday of the year in line 5. Save this program as *Friday.3*.

The First Sign of Strings. The other problem from last month that we'll discuss now is the bubble sort routine. But first we'll look at something more interesting to sort than an array of random numbers: an array of words. We've hinted tantalizingly at the existence of string variables; here we'll begin to look at some solid facts.

In an earlier column, we defined a string as a series of characters or as a series of characters between quotes. Both definitions are accurate—consider the following one-liner:

```
100  PRINT "This is a string."
```

As you can see, in this context the characters we refer to as a string are indeed between quotes. When you run this program, however, you will find that the string will be printed on the screen without the quotes. The quotes are what are known as *delimiters*: They serve to separate strings from commands. Delimiters are used primarily when you are giving the computer information, such as a string, in a line of Basic. When the computer gives you back information in the form of a string, it will rarely be surrounded by delimiters.

Certain other characters are sometimes used as delimiters. In the data line (line 200) of the Friday program, for instance, each piece of data is delimited by commas. In this case, it isn't necessary to surround each item with a pair of commas, just individual adjacent items. In a way, the word *data* and the return you typed at the end of the line serve as the beginning and ending delimiters.

A string variable is a variable that can hold a series of characters instead of a number. It is named by the same rules as those that govern naming a numeric variable except that the name always ends with a dollar sign, which in this case is usually pronounced *string*. So A$ would be pronounced *A-string* and NAME$ would be pronounced *name-string*. The basic string variable assignment command functions as the simplest form of the numeric variable assignment:

```
100  LET NAME$ = "Fred Flintstone"
```

where the *let* is optional. A string can be as long as 255 characters.

Like numbers, strings can be added together. This isn't like adding two numbers together, although the statements look alike. What actually happens when strings are added to each other is that one is *concatenated*, or linked, onto the other. It's like attaching two Lego bricks together. Add these lines after line 100 above, run the program, and see what happens:

```
110  TITLE$ = "Mr. "
120  PRINT TITLE$ + NAME$
130  NAME$ = TITLE$ + NAME$ + ", esq."
140  PRINT NAME$
150  END
```

As you can see, strings can be added together in print statements or assignment statements. In a print statement the plus sign between two strings acts like a semicolon, causing the two strings to be printed right next to each other. You can also use a semicolon in such a case, or you can use a comma to make the strings tab into the three preset columns on the Apple text screen. Notice the space following the period in the string in line 110. This space becomes part of the string so that when *Mr.* and *Fred Flintstone* are concatenated, there will be a space between them.

String variables can be used in many of the same situations in which numeric variables can be used. As we've seen, you can add them together (after a fashion) and print them. No other arithmetic operations can be performed on them, but there is a whole slew of specialized string functions for reading part of a string, counting the characters in a string, changing numbers to strings and back again, and converting strings into the actual codes used to represent them inside the computer. We'll look at those next month. For now, let's concentrate on how the things you already know apply to strings.

You can input a string variable just as you would input a numeric one. For instance:

```
100  INPUT "Type your full name: "; NAME$
```

The user doesn't need to put the string between quotes when answering the prompt. By the way, although "Type your full name: " is in quotes in this example, you can't replace it with a string variable like so:

```
100  PROMPT$ = "Type your full name: "
105  INPUT PROMPT$; NAME$
```

In this situation, Applesoft wouldn't print out PROMPT$ in line 105. It would allow you to type in a string, but it would assign it to the variable PROMPT$, not to NAME$. Then there would be a syntax error when it tried to handle the semicolon.

A program can ask for two strings in one statement, but the names of the strings must be separated by a comma, not a semicolon, like so:

```
105  INPUT PROMPT$, NAME$
```

The user must respond to this request by supplying two strings separated by a comma; otherwise, the computer will ask for more by prompting with two question marks.

This brings us to a limitation on entering strings through the input statement; in a response to an input prompt commas can't be part of the string because the comma says to the input statement, "That's all for this string, now here comes another one." For example, with this input:

```
100  INPUT "Enter your name—last name first: "; NAME$
```

if the user types:

Flintstone, Fred

the computer will respond "extra ignored" and put only "Flintstone" into NAME$.

By the way, if a program asks for numeric input and the user types a string, Applesoft will prompt for the data to be reentered. Nevertheless, it's always a good idea when using the input command to use a prompt that makes clear the kind of input expected.

Strings of Great Value. What else can string variables be used for? Well, they can't be used as the index for a for-next loop or an array variable. They can be put into an array, however, and they can be compared with one another in an if-then statement. And all of the relational operators work: =, <, >, ><, <=, and >=. So how do you tell if "asparagus" is greater than "eggplant"? Obviously, the computer can't make a value judgment, but it can determine alphabetic sequence. And that leads us to our sorting routine.

But first we need to make the list of things to sort. This routine allows the user to enter as many as twenty words. That maximum isn't hard and fast: If you type in 50 every place in the program where it says 20 (lines 10, 20, and 40), you'll have upped the limit to fifty. (Note: Don't change the line number in line 20.)

```
10  HOME : DIM W$(20):NW = 20
20  FOR N = 1 TO 20
30  INPUT W$(N)
40  IF W$(N) = "" THEN NW = N - 1:N = 20
50  NEXT N: PRINT
60  PRINT NW;" WORDS ENTERED.": PRINT
```

The input loop is structured so that the user can break out of it at any time by hitting return to signal to the program that the list is completed. When you simply hit return as a response to a string input, the string created is empty (this is called a *null string*), and it can be tested for with a pair of empty quote marks, as shown in line 40. Notice that there must be no space between those quote marks; "" and " " are two different things to Applesoft.

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The variable NW stands for number of words. When we get out of the input loop we want to be sure that NW equals the number of words in the array W$(N). In line 40 NW is set to N − 1 because the last string entered (the Nth string), the null, doesn't count. If a full twenty words are entered, line 40 will never be executed, so NW will still be 20, as it was preset in line 10.

N is set to 20 in line 40 so the program can get out of the loop legally if the user hits return. It would have been possible to exit the loop with a goto 60 in the same place as the N = 20, but that's a bad way to exit loops. Under some circumstances it could lead to mysterious out-of-memory errors.

Rethinking For-Next. Resetting the index variable in the middle of the loop is perfectly acceptable, however. The statement *for X = 1 to 10* does not require that the loop be executed ten times; it merely states that X is incremented each time and that the loop will not be exited until X is greater than 10.

Line 60 verifies for us that the word count is correct.

Just to be sure that the list is where we expect it to be, let's "play it back." This task requires a much simpler loop:

```
70  FOR N = 1 TO NW
80  PRINT W$(N)
90  NEXT N: PRINT
```

Now we want to sort the list. The algorithm for a bubble sort, along with a detailed flow chart, was presented in the first installment of this column last September. Here's a brief recap:

Starting with the first item on the list, W$(1), and continuing through the next to last, we compare each item with the item that follows it. We want the item with the least value (that is, the earliest item in alphabetical order) to head the list and the rest of the items to follow in ascending order. If in comparing adjacent items we find a lower numbered item with a greater value than a higher numbered item—if W$(N) > W$(N + 1)—then we swap the values of the two items.

Capture the Flag. If upon the completion of a pass through the list no swaps have been made, we know that the list is in the correctly sorted order. Only when we can do one full pass without having to swap anything do we know for sure that the list has been sorted. If any swaps have been made, we can't be sure that the list has been sorted, so we must go through the list again.

You may wonder how the computer is supposed to know if swaps have been made. Of course it can't know unless we tell it. Applesoft has no intrinsic way of checking to see if any if-then condition was true or false the last few times through, so we use a flag.

A *flag* in Applesoft is just a variable used to indicate that something happened or didn't happen. Usually, it has one of two possible values: 1 or 0. By standard conventions, a value of zero means that the condition or event being checked for didn't happen; a value of one means it did.

Practically, this means that we set the variable, which we'll call FLAG for instant recognition, to 0 at the beginning of the loop. If the if-test passes, part of the result of that test will be to set FLAG to 1. FLAG may be set to 1 many times during the execution of a loop. It doesn't matter if one or ten swaps are made, FLAG will still equal 1 when we come out the other end.

But you can see all this for yourself. Here's the routine: pay special attention to how FLAG operates in lines 110, 130, and 150.

```
100  REM SORT THE LIST
110  FLAG = 0
120  FOR N = 1 TO NW - 1
130  IF W$(N) > W$(N + 1) THEN FLAG = 1:TEMP$ =
     W$(N):W$(N) = W$(N + 1):W$(N + 1) = TEMP$
140  NEXT N
150  IF FLAG = 1 THEN 110
```

The other variable of somewhat obscure purpose in this routine is TEMP$. Since there is no command in Applesoft to swap the values of two variables (there is a swap command in some other dialects of Basic), we first save the value of one of the variables in TEMP$, let that variable equal the other variable, and then put the value of TEMP$ into the other variable. It's as if you had two jars, one containing vinegar and the other containing turpentine, and you wanted to put the vinegar in the turpentine jar and the turpentine in the vinegar jar without mixing the liquids. The only way you can do it is to pour one of the liquids into a third container

first. Like FLAG, TEMP$ isn't a special command or reserved word, it's just a conveniently named variable used for temporary storage.

What's in a Name? You can make up these convenient variable names yourself, but you have to be aware of two things. The first is that a variable name can't be a command name, nor may it contain any command names. Even though you don't know all the command names yet, there is an easy way to test whether a variable name contains a command: Type it into a line and then list the line. If you tried to use the word *tomorrow* as a variable name in a for-next loop, it would look like this when you listed it:

```
500  FOR TO M OR ROW = 1 TO 10
```

To and *or* are *reserved words*—that is, words that Applesoft reserves for command names—so you would have to think up some other name for your variable.

The second thing to consider is that Applesoft recognizes only the first two characters in a variable's name. This means you can't name a variable MOTHER and another variable MOVE in the same program. You can, however, have an MO and an MO$; string variables are never mistaken for numeric variables in Applesoft.

All the program has to do now is show us the sorted list. This is the only real way we can be sure the sort routine works. Just repeat the print routine shown earlier, this time assigning higher line numbers.

```
160  REM PRINT THE SORTED LIST
170  FOR N = 1 TO NW
180  PRINT W$(N)
190  NEXT N
```

There are ways to avoid having identical lines appear twice in the same program. For instance, you can omit these last lines and enter:

```
160  GOTO 70
```

instead. But now we're in an infinite loop, because after printing the sorted list the program will feel compelled to sort it again and again because of the unconditional goto. How about if we use one of those flag variables to tell the program that we've already sorted the list and that we're finished? Try this:

```
95  IF F1 = 1 THEN END
160  F1 = 1: GOTO 70
```

omitting lines 170 through 190.

Programming with Pasta. This previous approach will work, but be warned that it leads to madness. This kind of programming logic is called spaghetti logic because it tends to develop very tangled loops. The program is okay now, but after a few more changes like this, you won't be able to keep track of which variable means what. This makes it hard to find bugs. Next month we'll go into a nice, structured way to call the same routine from different places in the program. Save this program as *Sort. 1* so you'll have something to work with next time. ◨■

GLOSSARY

Concatenate: To put together. With strings, to add two strings is to concatenate one string to the end of the other.

Delimiter: A marker that separates things. The standard string delimiter is the quotation mark, which appears at both ends of strings that appear in Applesoft programs. The standard data delimiter is the comma, which must only appear between two elements of data. This convention is used with both strings and numbers in data statements and in user response to input statements.

Flag: A variable used to indicate that a certain event happened or didn't happen. Usually, a value of zero indicates that the event didn't happen and a value of one indicates that it did.

Null string: An empty string; a string containing no characters. This is the normal starting condition of a string variable. It can also come about when a string input statement receives only a return or in an assignment statement like *A$* = "" with nothing between the quotes.

Reserved word: Any of the words that Applesoft reserves for exclusive use as command names. These words may not be used in or as part of names of variables.



ELECTRONIC PLAYGROUND
by Jeff Tunnell

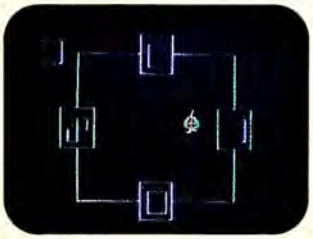
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KEYS TO THE WORLD BY MATT YUEN

Bridging the Communications Gap, Part One

Okay, we brought the personal computer home, plugged it in, whizzed through the *Apple Presents . . . Apple* disk, and learned to use various applications programs. Financial modeling, checkbook balancing, and word processing are somewhat easier (or harder) now that we have an Apple to help (or hinder) us.

Next, we got a modem and connected ourselves to the telephone lines, opening up a whole new world. Why, now it's possible to use the company computer at work from the privacy of home. We can even exchange programs, text files, *VisiCalc* DIF files, and so on with offices in different parts of the country.

Unfortunately, it's not that simple.

Communication protocol must be established before two machines can talk with each other. We've already looked at terminal programs and how they work. This time, we'll define some more terms, look at why some computers can't exchange information, and finally, consider a possible solution to that communication barrier.

Etiquetteman to the Rescue. Part of communication protocol involves setting up rules about which computer says what to whom, when, and how. The same rules exist in human communication. For instance, it's a generally understood rule that if two people are talking, each should take turns and not interrupt the other.

In a classroom situation the accepted behavior is that students shouldn't talk unless called on by the teacher. These kinds of rules are set up to avoid the possible confusion that could arise if more than one person were to speak at a time.

In telecommunications, the rules are stricter, since any deviation from standard behavior is sure to confuse things. A prime example is the mess that ace newspaper reporter Scoop Cromwell got himself into last week. Scoop was on assignment in Idaho covering the Late Great Potato Bash. When he got his story, he went back to his hotel room, typed it up on his Apple, and got ready to transmit the story by modem.

(The paper Scoop works for doesn't have the facilities to receive his story, so the plan was that he would send it to Lois, who has an Apple at home, and she would take the story down to the newspaper.)

He dialed the telephone. It answered. He used the transmit command of his terminal program to send his text file. Scoop could see the text print across his screen as it was being transmitted, so he assumed everything was going hunky-dory.

After the file had finished transmitting, he called Lois to make sure it all got there. She told him that either he was a horrible typist or else the file got scrambled along the way. Scoop tried to resend the file, but the results were the same: Everything on the receiving end was garbage. Uh-oh.

Scoop examined the phone line connection to make sure it was secure. He then asked Lois if her Apple was working properly. He checked the power cord on his own machine, he checked the phone line for excessive static, and he checked the test file for discrepancies. It dawned on Scoop how many imaginary problems there can be when one really hasn't the faintest idea what the real problem is. He finally gave up and dictated the story to Lois, who was no good at shorthand.

Let's take a look at what could have gone wrong.

If we were to grab a chunk of computer data being sent over the phone, the bits would look something like this:

00101001011101111001001100100010 1

and would not make very much sense even to the computer. But wait! Computers communicate over the phone in bits, which are represented by 1s and 0s, don't they? Sure do. And those *are* 1s and 0s, aren't they? Sure are. So what's the problem?

The problem is that the computer sees this string of bits the same way we see something like *Whatsthatintheroadahead*.Without proper spacing and punctuation, we might interpret the sentence as *What's that in the road ahead?* or as *What's that in the road? A head?* The difference in meanings is clear, which is why punctuation (or intonation when we speak) is so important.

A Bit of Variety. Within the Apple, eight bits is a byte. No more, no fewer. But when the Apple starts talking to other computers by phone, the number of bits in a byte can vary, because the eighth bit isn't as important when data moves through telephone lines as it is when information is traveling around inside the computer. (Remember, it takes only seven bits to create a character. The eighth bit is used by the Apple to define how the character is displayed on the screen; in communications, the eighth bit doesn't matter.)

So, bytes en route from one computer to another can be of seven or eight bits in length. Right away, it's easy to see one of the problems Scoop had with his data transmission. If his Apple is configured to send seven-bit bytes, the capital letter A will be represented as 1000001, which equals sixty-five in binary (sixty-five is the ASCII code for the capital letter A). In eight-bit form, A would be 01000001, which still equals sixty-five, but with an extra zero in front.

Lois, on the other hand, might have her Apple set up to recognize eight-bit bytes. Thus, if Scoop's Apple wants to send the word Idaho, it

sends the following seven-bit bytes, each of which stands for a letter in the word:

1001001 1100100 1100001 1101000 1101111.

The Apple, not knowing and not caring where one byte ends and the next one begins, will transmit Idaho as one string of bits, like this:

1001001110010011000011101000 1101111.

No problem so far. But when Lois's Apple receives them, it reads the string eight bits at a time:

10010011 10010011 00001110 10001101 111

(The final three bits represent the first three bits in the next byte.)

Obviously, the combinations that result are not the same. In fact, on Lois's Apple, those eight-bit bytes translate as control-S, control-S, control-N, and control-M, all of which are invisible. So, one of the first things computers have to agree on is the number of bits per byte.

Here It Comes, There It Goes. Another source of confusion could lie in *stop* and *start bits*. A start bit, usually 0, tells the receiving computer that the following bits (seven or eight, depending on the configuration) form an ASCII character. After that character is sent, one or more stop bits may be sent to indicate the end of that character before the beginning of the next. Stop and start bits act like spaces between the words on this page or like a good, strong *ahem* before the beginning of a speech.

Sometimes an extra bit is added to a seven-bit character for the purpose of detecting errors. This is called a *parity bit*. Systems can be set up to use even or odd parity for error detection. In odd parity, the sending computer counts the number of 1s in an ASCII character. The ASCII character A, represented by the byte 1000001, has two 1s in it. If there isn't an odd number of 1s, then a parity bit equal to 1 is tacked on the end of the character, making the number of 1s odd. If, when the character arrives at the receiving end, it has an even number of 1s, there has been an error during the transmission.

The same goes for even parity; if the number of 1s in the character is odd, an extra bit equal to 1 is slapped on to make an even total.

This method of error detection is not foolproof, though. Suppose we're using odd parity; if two bits in a character are changed, the number of 1s will still be odd when it reaches the other end, and the receiving system will assume the character has arrived intact when it really hasn't. The same goes for even parity—if two or even four bits are changed, the number of 1s in the byte will still be even.

It's not hard to eliminate all this confusion about the number of bits, odd or even parity, and start and stop bits. Most terminal programs provide options to configure your system the way you like it, or to conform to another system's setup. Thus, system mismatching, like Scoop and Lois's situation, isn't a big problem (a cursory glance at the program's documentation later told Scoop what he was doing wrong, and Lois kicked him for being unprepared).

More Headaches. The real problem in computer communications has always been the inability of dissimilar computers to communicate with each other. Setting up two Apples with the same terminal programs running on each end makes file transfer a breeze. But what if we're working with an Apple at home, and the company computer is an IBM Personal Computer?

These two machines have different microprocessors and different operating systems. In short, they don't speak the same language. Even if both machines are running their respective versions of the same terminal program, verified file transfer is still impossible because the computers are different.

At a lesser extreme, suppose that the company you work for finally buckles under pressure and trades the IBM for an Apple with CP/M. Unless the Apple at home also has CP/M, the two Apples still can't exchange information even though they're both Apples, because the operating systems are different. What to do?

Until now, there wasn't anything that anybody could do. If Fudd Corporation's Chicago branch needs to send sales forecasts to Fudd's Poughkeepsie branch, modem transmission seems the way to go. But if Chicago is using an Apple while Poughkeepsie is using an IBM, then the only way to send the information is through an express delivery service of some kind. You just can't force an Apple to exchange information with an IBM.

Now, there is a solution.

Entering a New Era. Imagine the most perfect communications package. It includes a modem, telephone connection, and communications software. Not only that, but the software allows you to exchange files with computers that are different from yours. This solves the problem Fudd encountered. Now, the two offices can swap information, even though their computers are virtually foreign to each other.

This is Era 2.

Appropriately named, Era 2 is a package from Microcom that could be part of the biggest step in computer communications since the introduction of the modem. The modem allowed computers to talk to each other; Era 2 allows them to exchange more than just text information. And it does so error-free.

Era 2 consists of communications software, a 1200-baud two-board modem, documentation, and a telephone cord. That's not much more than most communications packages consist of, but it's the details that make the difference.

First, the 1200-baud modem plugs inside the Apple. That's right—no bulky modem sitting on the desk; it all fits inside.

Second, the software lets the Apple communicate with another Apple or with any other microcomputer that uses the same protocol as Era 2 (more on this protocol in a bit).

Third, you can use Era 2 to make your Apple "look" like a mainframe terminal to remote mainframes.

Fourth, the price is good. The total cost of the package is $429. When you consider that most 110/300-baud modems cost between two hundred and four hundred dollars, and that most 1200-baud modems are in the neighborhood of seven hundred and nine hundred dollars, $429 isn't such a bad deal. And the price includes the software.

What's the catch? At press time, Era 2 wasn't available, but we will scrutinize the package in a few months. For now, let's look at what it's supposed to do.

Era 2 is compatible with Bell 212A or 103, both of which are almost standard in the microcomputer world. It's certified by the FCC and can accommodate full or half duplex transmission. It provides auto-answer, pulse, or tone dialing. So far, it looks like any other system. Now for the differences.

To begin with, three of the most popular mainframe terminals are the DEC VT52, DEC VT100, and the IBM 3101. Era 2 lets the microcomputer behave like any of them.

Next, remember the problem with Fudd Corporation? That's no longer a problem. Era 2 will be available for the Apple IIe and IBM PC, XT, and PC*jr* computers. Don't be surprised if it also becomes available for other, yet-to-be-developed computers. That includes 68000-based computers from Apple, if you know what we mean.

Keys to the Era. What makes Era 2 work is the Microcom Networking Protocol (MNP), around which Era 2's software is based. A logical conclusion would be that a computer using Era 2 software will function only with other systems equipped with software using the same protocol, MNP. (After all, that's the key to error-free file transfer. An Apple that's using *ASCII Express: The Professional* will perform verified file transfer only with another Apple that's also using the same terminal program.)

Such a conclusion is not entirely correct. Era 2's software does permit file transfer between computers, as other terminal programs do. But only if both systems are using Era 2 can files be transmitted in virtual format—which we'll get to shortly—with data transparency (text or binary files), flow control of information, and error correction. Well now, other than the fact that we have Apples talking with IBMs and other microcomputers, nothing about Era 2 seems like too big a breakthrough. So far.

MNP is already being used in several of Microcom's modems; the 1200-baud modem that comes with Era 2 is no exception. Currently, Era 2 is a package deal—you can't buy the modem or the software separately—because right now, the Era 2 software works only with the Era 2 modem. This might change, however, according to Microcom.

If Microcom is the only company that incorporates MNP in its software, there doesn't seem to be much reason for excitement.

The news is that Microcom isn't the only company using MNP. Far from it.

In July 1983, Microcom decided to take a big step toward setting some sort of standard in the telecommunications world. It began licens-

ing MNP to outside software developers to incorporate into their own software. You might recognize some of the companies who signed up right away: Apple Computer, VisiCorp, Lotus Development, Dow Jones Information Services, GTE Telenet, MCI Communications, and British Telecom (Great Britain's version of AT&T). This isn't just some pass ing fancy.

VisiCorp is incorporating MNP in its *VisiOn* software, Lotus Development's *1-2-3* will include it, and GTE's plans are to make MNP part of its Telenet network system. The outlook for retailers seems positive. If software publishers add MNP to their products, it won't matter what computer a person owns; the software will still run on that computer.

So, if MNP is such a great thing, where has it been all these years? Actually, MNP has been available to Apple III and TRS-80 Model 3 users for quite some time in the form of *Micro/Courier*, Microcom's electronic mail program marketed by Apple and Radio Shack for their respective computers. For Apple IIe and IBM PC, XT, and PC*jr* owners, Era 2 is available. IBM customers can also purchase the *Personal Communications Manager*, an MNP-based electronic mail package marketed by IBM. This means that an Apple IIe running Era 2's software can exchange files with an Apple III or TRS-80 Model 3 running *Micro/Courier*, or with an IBM using Era 2 or the *Personal Communications Manager*.

Whether you have the desire to communicate with any of these other machines isn't the point. The point is that it's possible. Let's take a look at how MNP works.

The Incredible MNP of All Trades. In a capsule, this is what MNP is about:

It can be used on any existing microcomputer system. It's also flexible enough to accommodate microcomputers that have yet to be developed.

MNP is independent of any microprocessor, personal computer, or operating system. For example, a 6502-based computer running DOS can exchange files with a 68000-based or 8088-based computer that's running CP/M, Pascal, or the Unix operating system, or any combination of microprocessor and operating system.

Communication can be synchronous or asynchronous. Various baud rates can be used, and communication can take place on leased or dial-up lines or in local-area networks, such as within a single office.

MNP is structured so that improvements can be made, and the newer version won't prove imcompatible with earlier versions.

Now let's consider each of these elements in a little more detail.

Any Computer? The best way to illustrate how MNP fits into the scheme of things is to imagine an English-speaking person trying to talk to a person who speaks Lishneg, an imaginary language that is sort of like English, except that everything is sideways. For example, the sentence *Give the bone to the dog* would translate into Lishneg as *Nebo teh vegi to dog teh* (*Bone the give to dog the*).

Not only are some of the words scrambled, but the *structure* of the sentence is altered as well. In the Lishneg version, the direct object (the bone) comes first, followed by the verb (give), with the indirect object (the dog) at the end. In this case, the preposition (to) is in the same place. Computers have similar differences among them. Sometimes the differences are small, other times vast.

Now imagine a translator facilitating the communication between the two people. Unlike a dictionary, which translates words of one language into words of another, this translator translates *ideas* from one language to another. The difference is that a dictionary indicates what each word means; it's up to the person reading the dictionary to figure out what the entire sentence (idea) means, even though the grammatical structure may be different.

In our example, the Lishneg speaker would look up *Give the bone to the dog* and come up with *Vegi teh nebo to teh dog*, which means nothing in Lishneg. Going the other way, the English speaker would translate the Lishneg sentence as *Bone the give to dog the*. What a mess.

Here's where the translator comes in. The translator takes the English sentence, changes it into the image of a person handing a bone to a dog, and then changes that image into Lishneg words that express the idea. Let's call this a *virtual* translation.

Virtual translation breaks a sentence down to its bare bones and transforms it into a sentence using different words and different formats. In a sense, virtual translation translates ideas and emotions, rather than the words that express them.

To see how this applies to MNP, replace the English and Lishneg speakers with Apple and IBM computers, and replace the translator with MNP. Microcom describes the communication between machines as "exchanging files using a virtual file format," which is similar to the translation of ideas instead of words.

Because MNP translates files in a virtual format, it is able to work between any two microcomputers, no matter how different they are. Just as the English-Lishneg translator doesn't have either of the two languages as a native tongue, MNP wasn't "raised" under the rules of any one microprocessor, computer, or operating system—it's independent. MNP favors no computer over another; it translates files. Period.

Future Computers? Now wait a minute, how can we be sure MNP will work on computers that haven't been developed yet? Well, we can't, but Microcom seems to think it will. The company's confident that MNP will accommodate future machines because of the way it's structured.

MNP is based on the Open Systems Interconnection (OSI) model, which is something like a multistory building. The OSI model consists of seven layers, each of which supports the layer above it but can work independently of the others. MNP has only four layers, three of which correspond directly to OSI and one that incorporates two of OSI's layers. Two of OSI's seven layers aren't currently present in MNP.

In MNP, the first layer's function is to handle the connection and disconnection between systems. The second layer guarantees accurate data transfer for the layers above it. Data can be sent in blocks for file transfer or in a stream, which provides an interactive link to public networks such as the GTE Telenet.

The third and fourth layers of OSI provide network functions, which aren't needed in MNP yet, since MNP is currently for communications between two computers only. However, these two layers can be added to MNP if necessary in the future.

MNP's layer three (OSI's layer five) determines whether translation services are needed. If the setup consists of identical systems, no translator is needed. For dissimilar machines or systems, MNP brings in the concept of virtual files that we discussed earlier. To personify, it's at this level that MNP pokes its head in the door to ask if the communicating systems need something to help them talk to each other.

In the case where a translator is needed, MNP translates the original file into a virtual file before it is sent. When the file reaches the receiving end, it is translated from the virtual format into the format the receiving computer requires.

Translations, then, are done at each end, which is why microcomputers that haven't yet been developed can be added to a network without changing the way MNP affects existing computers.

The fourth layer of MNP (OSI's seventh layer) is the application layer. This one handles the actual file transfer between systems.

Interior Decorating. The layered structure of MNP means that changes can be made to individual layers without changing the overall structure of MNP. It's sort of like remodeling a floor of a multistory building; changing the furniture around or adding new furniture can enhance a floor, while the floors above and below it remain unaffected.

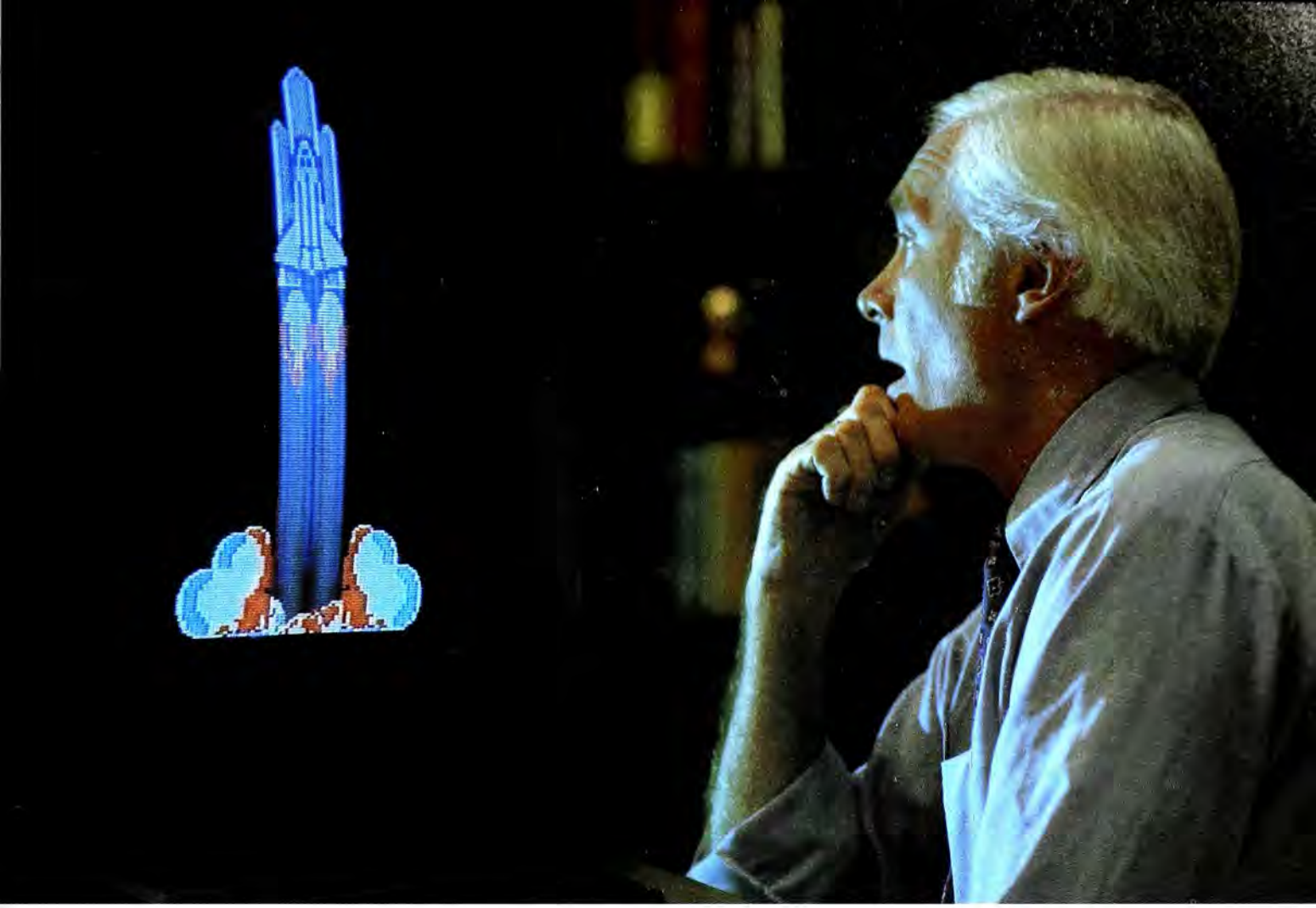
In a similar fashion, layers can be added without adverse effects. If Microcom decides to add layers in the future, then the earlier versions of MNP will still be able to work with the newer versions that have more layers; this is because everything in the earlier versions still exists in the newer ones.

But Will It Sing? Though MNP has already been endorsed by Apple, VisiCorp, Lotus, and other industry giants, its success as a standard remains to be seen. We should note that the use of a Microcom modem is *not* required to exchange files error-free between dissimilar systems; MNP, not the modem, is what makes it possible for different kinds of computers to communicate. Thus, whether you have a Hayes, Novation, Microcom, Universal Data, or Fudd modem makes no difference.

Microcom isn't the only company trying to make the telecommunications and microcomputer industries walk its way.

Imagine a file transfer program that allows dissimilar computers to exchange files error-free, as Era 2's software does. Now imagine such a file transfer program working on Apple, IBM, DEC, Texas Instruments, Hewlett-Packard, Kaypro, Altos, Burroughs, Sperry Univac, and more than thirty other computers. Wouldn't that be a blast?

Blast (*bl*ocked *a*synchronous *t*ransmission) is a new communications package that does all this. Stay tuned. ◨



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Breaking the Floppy Barrier:

An Introduction to Apple's ProDOS

BY TOM WEISHAAR

The Apple II is, above all else, flexible. It rides the space shuttle and it plays arcade games. It talks to other computers, big and small; it controls industrial machinery; it helps first-graders learn.

Along with its flexibility, the Apple has plenty of power for applications such as word processing and financial modeling. And since all its power is dedicated to a single user, the Apple's response time is usually faster than that of larger, multiuser computers.

More powerful than a locomotive, faster than a speeding bullet, able to leap tall competitors in a single bound . . . is there anything an Apple II can't do?

Well, there used to be. And it was a major weakness. The first thing most people expect from a computer is the ability to organize large amounts of data. But keeping even moderately sized inventory, mailing list, or accounting files on an Apple has always been very difficult.

Apple Crates. The Apple II, remember, was born in a garage. Its designers' primary goal was to develop a computer that individual people could afford to own; one of the things they clearly could not afford in 1976 was high-capacity computer storage devices. Thus, the primary storage device used with early Apples was the cassette tape recorder.

Later, the built-in flexibility of the Apple was called upon to support floppy disks. A disk operating system was developed, modified a few times, and ultimately named Apple DOS 3.3. In short order it became the most widely used disk operating system in the world.

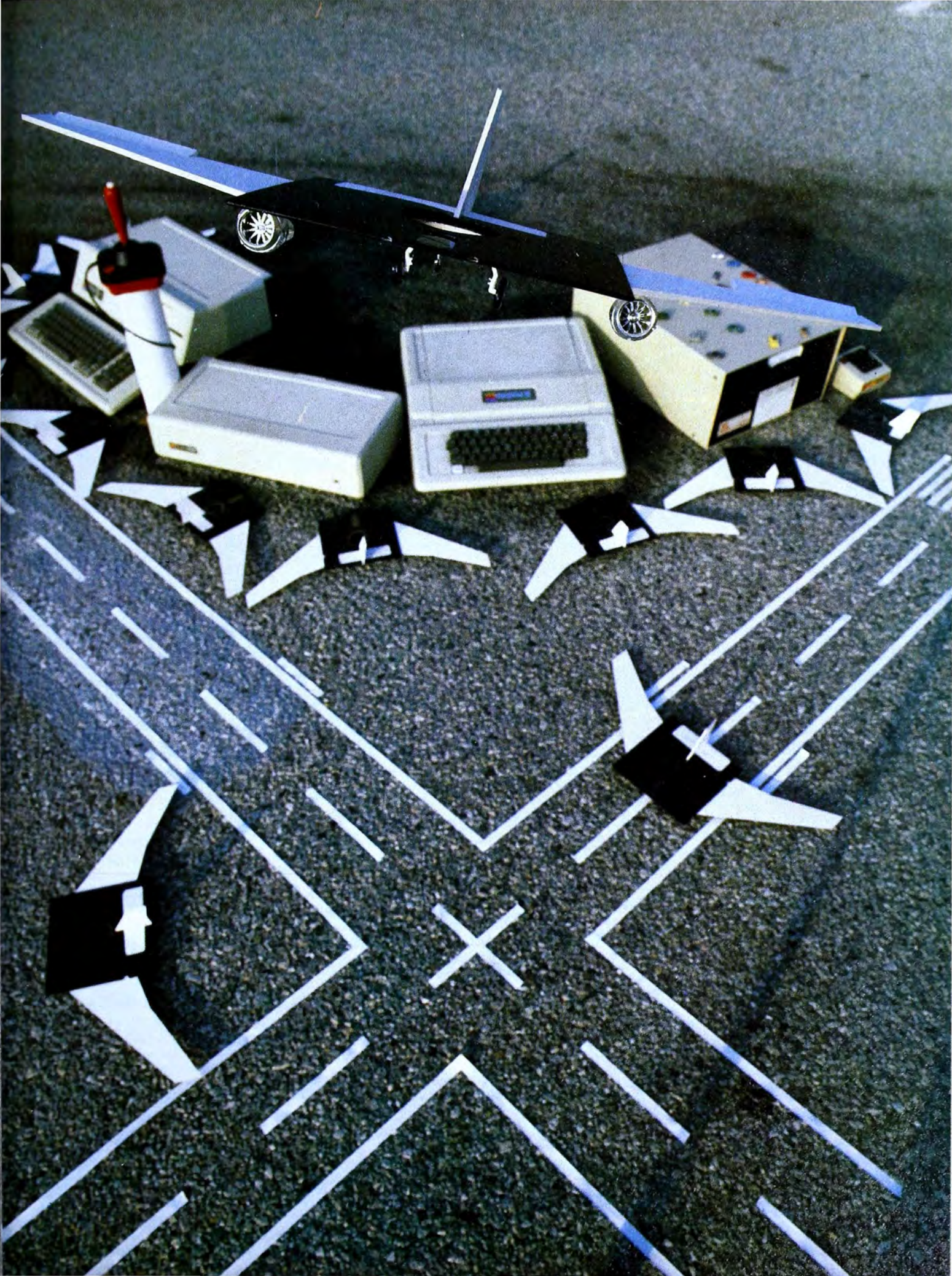
DOS 3.3 was optimized for 5¼-inch, single-sided floppy disks and for individual, nonprofessional computer users. It remains the best disk operating system anywhere for computer systems using one floppy drive.

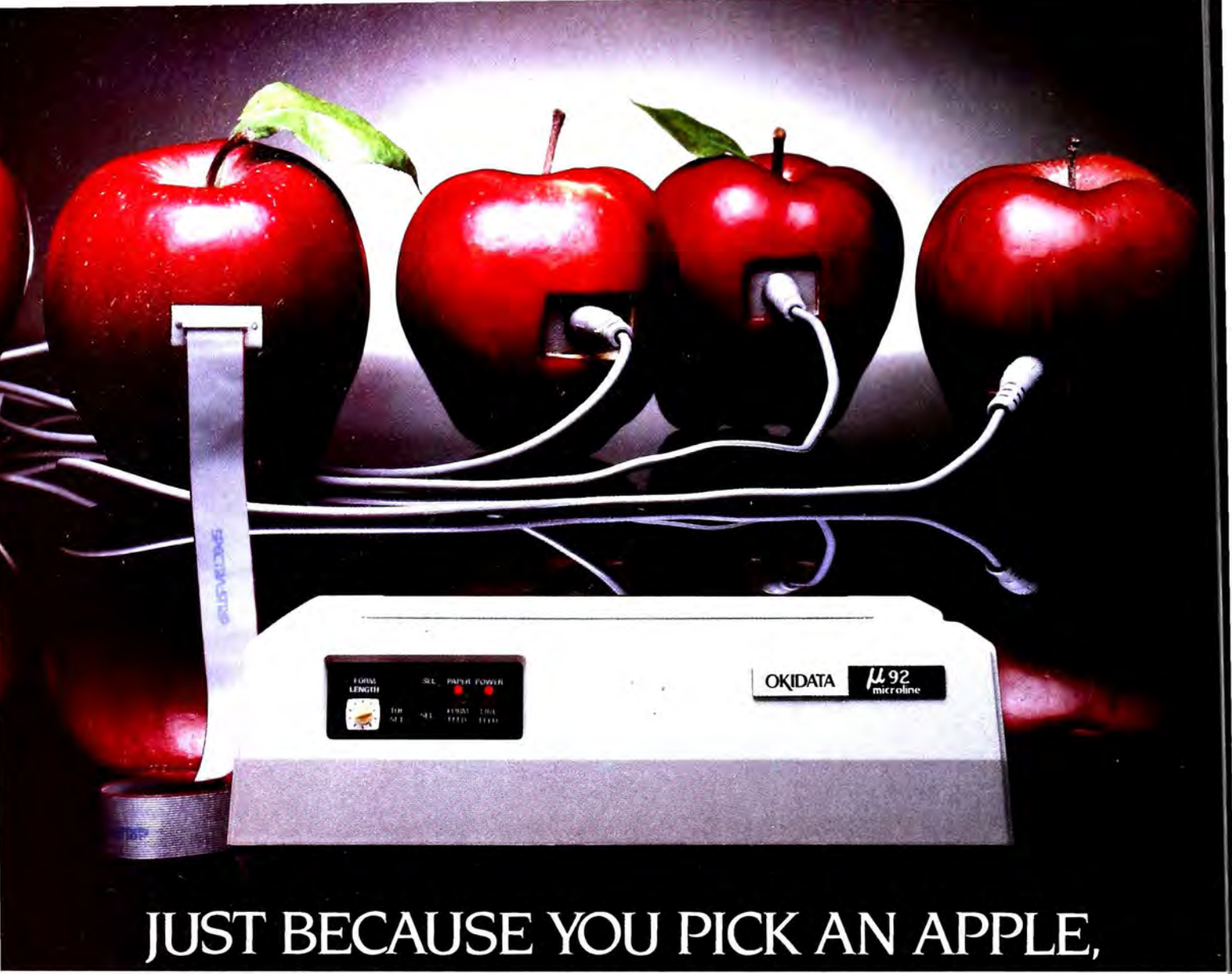
But the times, they keep a-changin'. Nowadays, high-capacity disk drives are no novelty. And nowadays, using ProDOS, the Apple II's newest disk operating system, the flexible little Apple can quickly and easily handle files containing more than sixteen million characters of information. This is the equivalent of more than 114 DOS 3.3 disks *in a single file*.

The floppy barrier has been broken. What people will do with Apples now will truly amaze us all.

"Say, Where Can I Get ProDOS?" ProDOS will be released this month in two forms. Purchasers of the Apple IIe will find ProDOS and its manuals packed with new disk drives. They will also find a DOS 3.3 System Master disk—but no DOS 3.3 manuals. For those who have already purchased an Apple II Plus or IIe, ProDOS master disks and manuals will be available in a separate package. DOS 3.3 will also be packaged and sold this way.

At the same time, Apple will begin to ship its ProFile hard disk, which until now has been available only for the Apple III and Lisa, in a





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package for use with the Apple II.

Apple released early versions of ProDOS to software developers last summer. A few developers have already released commercial software for the Apple based on ProDOS, and there is lots more to come.

The Four Musketeers. With the addition of ProDOS, there are now four major operating systems available for the Apple II series of computers. The others, besides DOS 3.3, are the Apple Pascal operating system and CP/M.

Each of the four has its own unique method for storing data on disks. This means that data stored on a disk by one operating system cannot be used by another without some kind of conversion program.

However, ProDOS is completely file-compatible with SOS, the Apple III's operating system. This means that Apple III disks can be used in an Apple II running ProDOS, and vice versa. It also means that Apple IIs and IIIs can use the same data files on a single hard disk. Since Apple is infamous for having products that are not only incompatible with what other computer manufacturers offer but even with each other, let's hope this sudden compatibility is an indication of things to come.

Unlike Apple's earlier change from thirteen-sector to sixteen-sector disks (DOS 3.2 to DOS 3.3), which necessitated the replacement of a firmware chip, using ProDOS requires no changes to Apple's disk drive or controller card from the current standard. ProDOS and DOS 3.3, as well as Apple Pascal and CP/M, can be used interchangeably on the same system. The system you operate under depends on what you boot or start up your computer with.

Like Apple Pascal and CP/M, ProDOS requires 64K of RAM memory. That means it requires a 48K Apple II Plus with a 16K RAM card or a stock Apple IIe. DOS 3.3, on the other hand, works with as little as 16K of memory.

The Dual Nature of ProDOS. When you look at the catalog of a bootable ProDOS disk, as we will do here, you always find a file called ProDOS. This is the central core, or kernel, of the ProDOS operating system. When ProDOS is active, this kernel resides in the language card area of the Apple's memory. The entire 16K of memory in this area is reserved for the ProDOS kernel.

The ProDOS kernel cannot interpret commands you enter at the keyboard or those used inside Basic programs. It does, however, have a complete, well-designed, and well-documented machine language interface.

The job of turning your commands into machine language calls is done by *system* programs. ProDOS comes with several system programs. *Filer* allows you to copy files and disks. It combines the functions of DOS 3.3's *Fid* and *CopyA* programs and the init command. *Convert* is used to convert ProDOS files into DOS 3.3 files, and vice versa. It's like DOS 3.3's *Muffin*.

By far the most important ProDOS system program, at least to Applesoft programmers, is the one called *Basic.system*.

Basic.system is treated as a part of ProDOS in Apple's manuals. You will probably make friends with it more quickly, however, if you think of it as a separate *system program* that extends and enhances the abilities of Applesoft Basic.

Not only does Basic.system provide the link between Applesoft and the ProDOS kernel, but it enhances Applesoft itself. On the other hand, Basic.system doesn't work at all with Integer Basic.

Basic.system can also be used to execute ProDOS commands from assembly language. However, Basic.system itself takes up as much memory space as all of DOS 3.3 (this may give you a feel for its power with Applesoft). Consequently, most assembly language programmers will probably not use Basic.system, learning instead to use the ProDOS machine language interface directly.

For the most part, Basic.system commands are compatible with DOS 3.3 commands. This means it is relatively easy to convert Applesoft programs from DOS 3.3 to ProDOS. However, a few of the DOS 3.3 commands have been deleted, some new commands have been added, and many commands have been enhanced.

Here's a complete rundown of the command differences between DOS 3.3 and Basic.system:

Out With the Old . . . Six standard DOS 3.3 commands are missing from the ProDOS Basic.system. They are init, int, fp, maxfiles, mon, and nomon.

Init is not a command, because the ProDOS kernel doesn't know how to initialize disks. *Filer* can do it, however. Apple has also given the source code for a machine language initialization program to software developers, so good commercial software can still include the ability to initialize disks.

Int and *fp* are not needed, since Basic.system does not support Integer Basic; since the language card is used by the ProDOS kernel, there is no place to load Integer Basic on the Apple II Plus and IIe.

Also note that although ProDOS will run on older Integer Basic Apples, Basic.system will not. This is because Applesoft isn't available and can't be loaded into the language card. However, system programs that do not require Applesoft (such as *Filer* and *Convert*) run just fine on these older Apples.

The maxfiles command is not needed. Basic.system keeps one general-purpose buffer open at all times, allocating and deallocating other buffers automatically as needed. Up to eight files can be open at once if enough memory is available.

The mon and nomon commands are not supported by Basic.system.

. . . And In with the New. Basic.system includes eight new commands not included in DOS 3.3. They are cat, flush, store, restore, dash, fre, create, and prefix.

Cat is a new, additional version of the catalog command; it returns a forty-column catalog showing each file's name, type, length in blocks (a block is 512 bytes, equal to two DOS 3.3 sectors), and a date showing when the file was last modified. An asterisk in front of a file name indicates that the file is locked, just as in DOS 3.3. Figure 1 shows a typical forty-column catalog.

```
]CAT

/DISK.NAME

 NAME            TYPE      BLOCKS      MODIFIED

*PRODOS          SYS           29      1-NOV-83
*BASIC.SYSTEM    SYS           21      1-NOV-83
 STARTUP         BAS            7      1-AUG-83
*FILENAME.PIC    BIN           17      3-JAN-84
 FILENAME.DATA   TXT            1      12-JAN-84

BLOCKS FREE: 198      BLOCKS USED:      82
```

Figure 1. Forty-column "cat."

ProDOS file names can have a maximum of fifteen characters. They must start with a letter. They can include only letters, numbers, and periods. Spaces and other punctuation marks are not allowed in ProDOS file names. Basic.system accepts commands in lower or upper case, but in file names small letters are automatically converted to capitals.

ProDOS has many more file types than DOS 3.3. A complete description of ProDOS file types will be presented later.

Note that, as indicated earlier, the files ProDOS and Basic.system appear in a disk's catalog. If a disk will be used only for data storage and not for booting, however, these files can be left off the disk, thus creating more room on the disk for data. This procedure is more difficult with DOS 3.3, since DOS isn't in a file but hidden in special tracks on the disk.

The fully spelled-out catalog command returns an eighty-column catalog display that shows, in addition to the information shown by cat, the time the file was last modified, the time and date the file was created, and its length. If the file is a binary file, the eighty-column catalog also shows its loading address; if it's a text file, its record length is shown. If you do a catalog on a forty-column screen, the lines wrap around and become nearly unreadable. On an eighty-column screen, Basic.system's catalog looks like the sample shown in figure 2.

Time stamping of files requires a Thunderclock card from Thunderware. If no clock is available, the date can be set with a utility program that comes with ProDOS. If the date isn't set manually and no clock is available, the date field will say <*no date*>, as shown on the first three files. Other clock manufacturers will no doubt devise ways to get their clocks to work with ProDOS too.

Flush is another of the Basic.system commands not in DOS 3.3. It forces any data located in a disk buffer to be written to the disk. *Close* also does this, but flush does it without closing the file.

Store quickly saves the current values of an Applesoft program's string and numeric variables. A new type of file, VAR, is used for holding this kind of data. The *restore* command reloads saved variables.

```
]CATALOG

/DISK.NAME

 NAME           TYPE  BLOCKS  MODIFIED          CREATED          ENDFILE SUBTYPE

*PRODOS         SYS       29  1-NOV-83  0:00  <NO DATE>            14336
*BASIC.SYSTEM   SYS       21  1-NOV-83  0:00  <NO DATE>            10240
 STARTUP        BAS        7  1-AUG-83 13:44  <NO DATE>             2762
*FILENAME.PIC   BIN       17  3-JAN-84 11:10    3-JAN-84 11:09     8192 A=$2000
 FILENAME.DATA  TXT        1 12-JAN-84  9:33   12-JAN-84  9:15      432 R=    0

BLOCKS FREE: 198      BLOCKS USED: 82      TOTAL BLOCKS: 280
```

Figure 2. Eighty-column catalog.

As they are reloaded, the variables overwrite all current variables and their values. The commands are quick and much easier to program than the standard procedure of saving variables in a text file. These new commands will be much loved.

The "dash" command, executed by typing a dash or minus sign, is an intelligent run command. It will run, brun, exec, or do whatever is needed to execute a file. It *must* be used to run the programs in system files such as *Filer* and *Convert*. When used, it looks like this:

```
-FILER
```

The three other new Basic.system commands—*fre*, *create*, and *prefix*—will be discussed later.

Parameter Pandemonium. Almost all of the remaining commands are enhanced in some way under Basic.system. Some of these enhancements involve new parameters or new uses for standard DOS 3.3 parameters.

For example, the A (address) parameter can be used under DOS 3.3 with bload, brun, and bsave. However, under Basic.system it can also be used with the in# and pr# commands to redirect input or output to a machine language program rather than to a slot. For example, the command:

```
PR#A$300
```

will send output to a machine language routine residing at byte $300. When a character is to be printed, its ASCII value is put in the accumulator, and the routine at $300 is called.

Similarly, the B (byte) parameter can be used with Basic.system's bload, brun, and bsave commands. Under DOS, B can be used only with read and write. Use of the B parameter causes the file to be loaded or saved the specified number of bytes beyond its beginning.

The bload, brun, and bsave commands also have a brand-new parameter under Basic.system: E (end). It is an alternative to the L parameter used with binary files under DOS 3.3. The E parameter is used to specify the end of a memory range rather than the length of the range. For example, both of the following are valid Basic.system commands; both save a high-resolution picture from graphics page two. The first tells Basic.system to save $2000 bytes of memory starting at location $4000. The second says to save the memory image beginning at $4000 and ending at $5FFF:

```
BSAVE PICTURE,A$4000,L$2000
BSAVE PICTURE,A$4000,E$5FFF
```

In addition, the L and E parameters can be used when bloading files under Basic.system. Under DOS 3.3, the L parameter is used only with bsaves. If used with bload or brun, the parameters make Basic.system load only a *part* of a binary file. If the B parameter is also used, the portion loaded can be anywhere within the binary file. For example, let's assume that a file called Pictures contains four high-resolution images. These can be loaded one at a time into graphics page one with the following four commands:

```
BLOAD PICTURES,A$2000,L$2000
BLOAD PICTURES,A$2000,B$2000,L$2000 (or ,E$3FFF)
BLOAD PICTURES,A$2000,B$4000,L$2000
BLOAD PICTURES,A$2000,B$6000,L$2000
```

The *run* command comes with a new parameter in Basic.system: @ (at). This parameter allows you to start a program running at some line other than the first one. Typing *run Happy,@400*, for example, starts execution of the designated program at line 400.

The @ parameter can also be used with the *chain* command. Unlike DOS 3.3, Basic.system allows you to chain Applesoft program files. This means you can load pieces of an Applesoft program over the top of one another without destroying the values in any existing variables. This allows the creation of very long programs that won't fit in memory all at once.

Another new parameter is F (field). Under DOS 3.3, the *position* command uses the R (relative field positon) parameter to skip over fields in a file. Basic.system still supports the use of R with position, but this is just for the sake of compatibility with DOS 3.3. Neither the command nor the parameter is necessary with Basic.system. The F parameter replaces R as it was used with position, and the fact that F can be used with the read and write commands makes position unnecessary.

The final new parameter is T (file type). This parameter can be used with the *create* command, which will be discussed later. It can also be used with bload, bsave, and open. By using the T parameter, you can bload any type of file directly into memory. Likewise, you can bsave an image of memory into almost any type of file, and any type of file can be opened and read as if it were a text file.

A Command Performance. In addition to the enhanced parameters, a new Basic.system commands are enhanced in other ways as well. We have already spoken about catalog's eighty-column display, chain's ability to handle Applesoft files, and open's automatic allocation of file buffer space.

Basic.system's *append* command works with random access files. Like open, it will also work with other file types when the T parameter is used. Under DOS 3.3, append opens a file and moves the file pointer to the end of the file. Basic.system's append command not only does this, but also issues an automatic write.

Basic.system's *verify* command hasn't been enhanced. In fact it's been downgraded. It doesn't verify the integrity of a file as the DOS 3.3 verify command does. Instead, it simply verifies the existence of a file. This is how most people have always used the command anyhow.

You Take the High Road and I'll Take the Low Road. A very significant difference between Basic.system and DOS 3.3 is the method each uses to identify commands within programs. With DOS 3.3, it is necessary to print a return followed by a control-D and the appropriate DOS command. DOS 3.3 watches the characters passing through the output link and responds to this particular combination.

Basic.system uses a similar approach but implements it in a completely different way. Basic.system begins by turning on Applesoft's trace mode. Each time Applesoft executes a new command, it sends the line number it is working on to Basic.system. Basic.system then looks at that command to see if it is print. If it is, Basic.sytem looks further to see if the first character to be printed is a control-D. If so, it assumes that a ProDOS command will follow.

There are several implications to this new technique. First, control-D does not have to be preceded by a return. This makes programming ProDOS commands much easier than DOS commands.

Second, the popular technique of defining D$ as a return plus a control-D doesn't work. If you do this, the first character printed will be the return, and Basic.system will assume that the print statement is not a DOS command.

The third implication of this technique is that the Applesoft *trace* and *notrace* commands work with Basic.system. These commands cause

great confusion when used with DOS 3.3 because they tend to prevent the execution of DOS commands.

The fourth implication is that, if you ever disconnect Basic.system from the input/output links by accident (using pr# or in# as a Basic command rather than a D$ ProDOS command), you will know it immediately—your program will begin to trace all over your display screen.

The fifth implication is that Applesoft programs run slightly slower under Basic.system than under DOS 3.3. The following little program, for example, runs about 7½ percent slower under ProDOS (60.4 seconds for ProDOS as opposed to 56.1 seconds for DOS 3.3):

```
10  BELL$=CHR$(7)
20  PRINT BELL$
30  FOR I= 1 TO 50000:NEXT
40  PRINT BELL$
50  END
```

Basic.system makes up for its slower program execution speed by refining the Applesoft garbage collection routines. Under Basic.system, Applesoft programs don't lock up for long periods while obsolete character strings are eliminated from memory. Garbage collection is handled by Basic.system rather than by Applesoft, using new, more efficient routines.

Consequently, even though Basic.system's line-by-line execution of Applesoft is slightly slower than normal, the total execution time of programs that use strings may in fact be faster than with DOS 3.3.

Basic.system's garbage collection happens automatically as needed. It can be forced with the new command *fre*. This command is used like this:

```
1010  PRINT D$;"FRE"
```

For most applications, however, Basic.system's garbage collection is so much improved that forcing it with the fre command is not necessary.

Early versions of Basic.system also included routines for automatically clearing Basic programs out of the high-resolution graphic pages. This is something that you have to do yourself under DOS 3.3. Unfortunately, the same now goes for the programmer using Basic.system. The routines outgrew their allotted space during testing and debugging and had to be eliminated.

Basic.system includes two features that will appeal to programmers who want to enhance Applesoft with machine language routines. First, Basic.system has a defined protocol for "hiding" machine language code within Basic.system. Hidden code can't be overwritten and destroyed by Applesoft.

Second, Basic.system can be extended easily by means of additional commands and includes a defined protocol for adding such commands. Apple used this feature to provide a *help* command for use with ProDOS and Basic.system. The help package is included on ProDOS master disks.

The ProDOS Inner Sanctum. Until now, the features we've looked at have been characteristics of Basic.system, the new system program that unites Applesoft with ProDOS. Now let's look at the characteristics of ProDOS itself as compared to DOS 3.3.

Several significant differences are immediately apparent. ProDOS handles files much more quickly than standard DOS 3.3, and it matches the speed of the enhanced versions of DOS 3.3 offered by several software companies.

As mentioned earlier, DOS 3.3 is optimized for floppy disks. ProDOS is optimized for high-capacity hard disks but still works well with Apples having two or more floppy drives. ProDOS was designed to work with storage devices as large as thirty-two megabytes (32,768K bytes; 33,554,432 bytes) per volume. A single ProDOS file can be as large as sixteen megabytes.

No storage devices currently available for the Apple are that large. Apple's own ProFile hard disk has a five-megabyte capacity. Hard disks from other manufacturers are available in 10-, 15-, and 20-megabyte sizes.

ProDOS includes a defined interrupt protocol. This makes routines using interrupt signals from peripherals easier to write and install. Like DOS 3.3, however, the amount of time it might take ProDOS to respond to an interrupt is unpredictable, since an interrupt request will be ignored while a floppy disk is being accessed.

ProDOS supports a much wider variety of file types than DOS 3.3. ProDOS file types are identified by three letters rather than the single-letter system of DOS 3.3. Ten ProDOS file types have been defined, with eight more reserved for user definition. The file types are listed in figure 3.

ProDOS	DOS 3.3	Use
TXT	T	text file
BIN	B	binary file
INT	I	integer basic program
IVR	–	integer basic variables
BAS	A	applesoft program
VAR	–	applesoft variables
REL	R	relocatable machine language program
SYS	–	system program
CMD	–	(unimplemented—may be used in the future for files that add commands to basic.system)
DIR	–	directory file
$F1/$F8	–	user defined (8 types)

Figure 3. ProDOS file types.

Changing with the Times. The most significant difference between DOS 3.3 and ProDOS is in the area of file structure. DOS 3.3 was designed to work well with disk drives that use *removable* floppy disks. The typical DOS 3.3 user has one or two floppy disk drives and ten to one hundred disks.

The user tells DOS 3.3 which disk he wants to use by selecting it from his library and inserting it in a drive. The simple fact that it is in the drive is indication enough to DOS that this is the disk the user wants to access.

ProDOS, on the other hand, works best with drives that don't have removable disks. Each drive is considered to be a *volume* and is given a name. The user tells ProDOS which drive he wants to access by using its name.

When ProDOS is used with drives having removable disks, the drive becomes a moving target. Since each disk in one's library is supposed to have a different name, the name associated with a drive changes every time a new disk is slipped in. Thus, ProDOS users with floppy drives can specify which disk should be accessed by putting it in the drive, but usually must specify it again by name. This redundancy can be bothersome.

Under DOS 3.3, each floppy disk has one catalog, or directory. It can hold up to 105 file names. This system works well on small floppy disks, although it gets very difficult to find individual files if a directory includes more than thirty to forty file names.

Imagine the difficulty one would have finding a file on a high-capacity hard disk if all files appeared in a single directory. ProDOS avoids this problem by allowing each volume to have many separate directories. In addition, each volume has one *root directory*, which can hold up to fifty-one files.

Some of the files in the root directory usually hold other directories. A special filetype, *DIR*, is used to indicate files that hold directories. Directories other than the root directory can be of any length. Just as the system programs ProDOS and Basic.system can be found in files, all ProDOS directories are also files. Not only do they appear as file names when you enter the *cat* or catalog commands, they can also be opened and read just like other types of files.

One directory can be a file inside another directory, which is a file inside another directory, which is a file inside another directory, and so on. The number of directory levels you can squeeze out of ProDOS is 64—far beyond the number needed in any real application.

The actual name of any particular file on a ProDOS volume starts with the name of the volume it is on and includes the names of all directories one must pass through to get to the file. The name indicates the path ProDOS must take to find the file. Thus, under ProDOS, files have *path names*.

Slashes are used to separate the different directory names within a path name. A file called *tue*, in a directory called *week1*, in a directory called *jan*, on a disk called *to.do*, for example, has the path name */to.do/jan/week1/tue*. Figure 4 shows how you might find tue in a vol-

ume's directories. Take note of how a path name is used with the catalog command.

A path name can be up to sixty-four characters long, including slashes. As you can imagine, it can be rather tedious to type in long path names, particularly if all the files you want to deal with are in the same subdirectory. Because of this, ProDOS allows you to set a *prefix*. A prefix points to a specific directory. After setting a prefix, you can refer to files in that directory, or that can be reached from that directory, using a partial path name.

Basic.system includes a *prefix* command that can be used either to set a new prefix or to find out what the current prefix setting is. In figure 4, you could set the prefix to */to.do/jan/week1*. After that, any file in the last directory shown can be called using only its name—just as if it were a DOS 3.3 file.

The major difference between a directory file and other types of files is that directories cannot be written to—ProDOS takes care of making all changes to directories. As we mentioned before, though, directories can be opened and read just like any other file. Another difference between directory files and other files is that a special command is used to create directory files. Under Basic.system, this command is *create*. Create can also be used to create other types of files by using the T parameter. The standard commands open, save, and bsave will also create files just as they do under DOS 3.3.

The system of directories and subdirectories that ProDOS uses is known as a *hierachical* file structure. This kind of structure is ideal for large-capacity storage devices. It can also be useful for organizing files on smaller devices, such as floppy disks. In some cases, the additional complexity of specifying a volume name or setting a prefix can be a maddening waste of time for floppy disk users. On the other hand, having received a proper path name, ProDOS will find the right disk no matter what drive it is in, so there are advantages and disadvantages to a hierarchical system.

A Tale of Two DOSs. Compared to ProDOS, DOS 3.3 continues to be the easier operating system to use on systems having a single floppy drive. (The ProDOS *Convert* utility requires at least two drives, for example.) DOS 3.3 uses far less memory than ProDOS, works with Integer Basic, and allows Applesoft to execute slightly faster. Apple users have tons of experience with DOS 3.3, volumes of documentation have been written about it, and virtually every commercial program for the Apple uses it. It continues to be a viable alternative to ProDOS.

ProDOS, on the other hand, is an exciting new development from Apple. It is an ideal operating system for people with high-capacity storage devices such as hard disks. It is an ideal operating system for database applications, providing Applesoft programmers with many new, valuable features. As Apple users become more accustomed to it, absolutely astounding things are bound to happen. ■

```
]CATALOG /TO.DO

/TO.DO

 NAME           TYPE  BLOCKS  MODIFIED         CREATED          ENDFILE SUBTYPE

*JAN            DIR        1  2-JAN-84  10:44  9-NOV-83  16:08      512
*FEB            DIR        1  29-DEC-83  8:10  9-NOV-83  16:08      512
*MAR            DIR        1  14-DEC-83 13:21  9-NOV-83  16:08      512
*APR            DIR        1  9-NOV-83  16:08  9-NOV-83  16:08      512
*MAY            DIR        1  9-NOV-83  16:08  9-NOV-83  16:08      512
*JUN            DIR        1  9-NOV-83  16:08  9-NOV-83  16:08      512
*JLY            DIR        1  9-NOV-83  16:08  9-NOV-83  16:08      512
*AUG            DIR        1  9-NOV-83  16:08  9-NOV-83  16:08      512
*SEP            DIR        1  9-NOV-83  16:08  9-NOV-83  16:08      512
*OCT            DIR        1  9-NOV-83  16:08  9-NOV-83  16:08      512
*NOV            DIR        1  9-NOV-83  16:09  9-NOV-83  16:09      512
*DEC            DIR        1  9-NOV-83  16:09  9-NOV-83  16:09      512

BLOCKS FREE: 213      BLOCKS USED: 67      TOTAL BLOCKS: 280

]CATALOG /TO.DO/JAN

JAN

 NAME           TYPE  BLOCKS  MODIFIED         CREATED          ENDFILE SUBTYPE

*WEEK1          DIR        1  2-JAN-84  10:05  9-NOV-83  16:09      512
*WEEK2          DIR        1  2-JAN-84  9:40   9-NOV-83  16:10      512
*WEEK3          DIR        1  9-DEC-83  16:17  9-NOV-83  16:10      512
*WEEK4          DIR        1  9-DEC-83  16:17  9-NOV-83  16:10      512

BLOCKS FREE: 213      BLOCKS USED: 67      TOTAL BLOCKS: 280

]CATALOG /TO.DO/JAN/WEEK1

WEEK1

 NAME           TYPE  BLOCKS  MODIFIED         CREATED          ENDFILE SUBTYPE

 SUN            TXT        1  9-NOV-83  16:15  9-NOV-83  16:15        0 R=      0
 MON            TXT        4  2-JAN-84  10:05  9-NOV-83  16:16     1169 R=      0
 TUE            TXT        1  2-JAN-84  9:25   9-NOV-83  16:16      322 R=      0
 WED            TXT        1  2-JAN-84  9:26   9-NOV-83  16:16       80 R=      0
 THU            TXT        1  2-JAN-84  9:30   9-NOV-83  16:16      445 R=      0
 FRI            TXT        1  2-JAN-84  9:33   9-NOV-83  16:16       88 R=      0
 SAT            TXT        1  27-DEC-83 16:01  9-NOV-83  16:16      212 R=      0

BLOCKS FREE: 212      BLOCKS USED: 68      TOTAL BLOCKS: 280
```

Figure 4. Finding /to.do/jan/week1/tue.



With 3M diskettes, your computer never forgets.

3M diskettes remember everything, every time. Because at 3M, reliability is built into every diskette. We've been in the computer media business for over 30 years. And we've never settled in. We're constantly improving and perfecting our product line, from computer tape and data cartridges to floppy disks.

3M diskettes are made at 3M. That way, we have complete control over the entire manufacturing process. And you can have complete confidence in the reliability of every 3M diskette you buy.

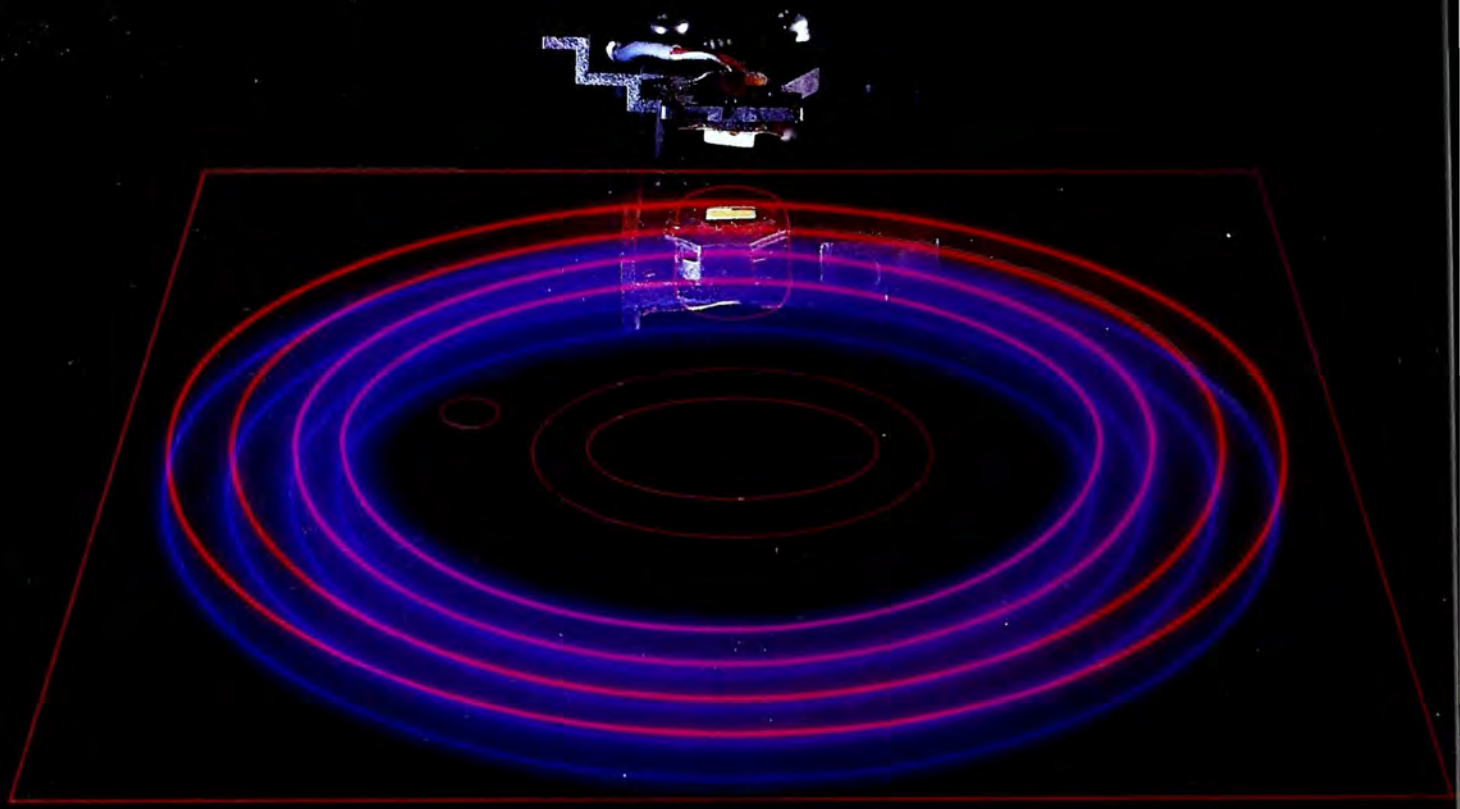
Look in the Yellow Pages under Computer Supplies and Parts for the 3M distributor nearest you. In Canada, write 3M Canada, Inc., London, Ontario. If it's worth remembering, it's worth 3M diskettes.



3M hears you...

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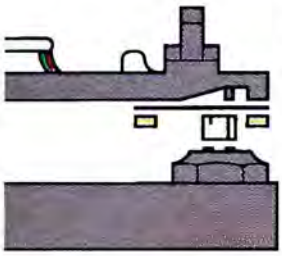
Rana's disk drive was twice as good as Apple's with one head.



Now we have two.

We added another head so you won't have to buy another disk.

That's the beauty of a double sided head. A floppy disk which allows you to read and write on both sides. For more storage, for more information, for keeping larger records, and for improved performance of your system. That's what our new Elite Two and Elite Three offers. It's the first double headed Apple® compatible disk drive in the industry. And of course, the technology is from Rana. We're the company who gave you 163K bytes of storage with our Elite One, a 14% increase over Apple's. And now with our high tech double sided heads, our Elite Two and Three offers you two to four times more storage than Apple's. That's really taking a byte out of the competition.



Rana s double sided heads give Apple II superior disk performance power than second generation personal computers such as IBM s

We put our heads together to give you a superior disk drive.

We designed the Elite Three to give you near hard disk capacity, with all the advantages of a minifloppy system. The double sided head operates on 80 tracks per side, giving you a capacity of 652K bytes. It would take 4½ Apples to give you that. And cost you three times our Elite Three's reasonable $849 pricetag.

It takes 4½ Apples to equal the capacity of our superior Elite Three



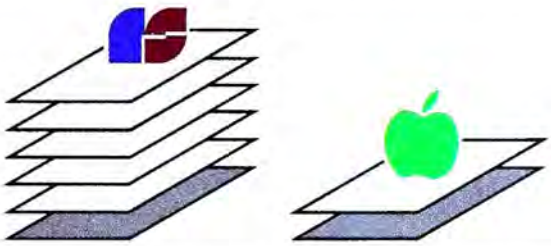
The Elite Two offers an impressive 326K bytes and 40 tracks on each side. This drive is making a real hit with users who need extra storage, but don't require top-of-the-line capacity. Costwise, it takes 2½ Apple drives to equal the performance of our Elite Two. And twice as many diskettes. Leave it to Rana to produce the most cost efficient disk drive in the world.

We've always had the guts to be a leader.

Our double sided head may be an industry first for Apple computers, but nobody was surprised.



They've come to expect it from us. Because Rana has always been a leader. We were the first with a write protect feature, increased capacity,



Your word processor stores 5 times as many pages of text on an Elite Three diskette as the cost ineffective Apple

and accurate head positioning. A first with attractive styling, faster access time, and the convenience of storing a lot more pages on far fewer diskettes. We were first to bring high technology to a higher level of quality.

So ask for an Elite One, Two, or Three. Because when it comes to disk drives, nobody uses their head like Rana.

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Back in 1979, Ken Williams was developing a Fortran compiler for the Apple II and Roberta Williams was just discovering the original Adventure from Microsoft.

By 1980, Roberta had convinced Ken to program an adventure she would write, an adventure with a new twist—graphics.

With an initial investment of $1,200, Ken and Roberta Williams formed On-Line Systems. They produced Roberta's first hi-res adventure game, *Mystery House*, in their Los Angeles home. Within a year, *Mystery House* had grossed an unexpected $167,000 in sales. Bolstered by their success, the Williamses took off for the wilderness, relocating in Coarsegold, California, on the edge of Yosemite National Park, with their sons, D.J. and Chris.

When *Softalk* first featured the company in a February 1981 Exec, three On-Line programs had already made it to the Top Thirty. One was Roberta's second hi-res adventure, *Wizard and the Princess*, a long-running bestseller that has sold more than sixty thousand copies. At that time, the company's only other products were graphic utilities, but Williams soon broadened its scope to action games (*Crossfire*, *Mouskattack*, *Jawbreaker*), word processing (*Screen Writer*), database management (*The General Manager*), and more ambitious adventures, like the twelve-disk-sided micro-epic *Time Zone*, which took Roberta Williams more than a year to write.

Upon incorporating, the company changed its name to Sierra On-Line. The staff of four at the time of the Exec has increased to more than a hundred people full-time, scattered over four separate buildings. Sierra On-Line posted revenues of approximately $10 million in 1982, making it one of the largest independent publishers of home computer software.

"Building Sierra On-Line has been a real learning experience for Ken and me," says Roberta, who's working on her sixth adventure. "Things were going so fast for a while that we didn't have time to think about it all. I think I've grown a lot as a person; I've learned that you have to change if you don't want to fall flat on your face."



Above, adventuress extraordinaire Roberta Williams reflects on how much she's grown as a person in the process of building Sierra On-Line into the successful company it is today.

As On-Line grew, the business took more and more of Ken Williams's time. Soon there was no time left for the programming he loved and did so well. The company by then could afford to hire programmers, but Ken missed working with the computer, and the product missed his touch. An influx of venture capital seemed to increase the administrative load rather than ease it, and Ken Williams decided to fire himself. He hired a new chief operating officer from outside the company, a man he had once worked for and whose abilities he admired. Dick Sunderland came into a company that had grown like a wildflower in the sun; like a wildflower, it was rangy and disorganized. He set out with a flourish to correct all this.

But the task was greater than supposed. Pioneers are properly wedded to their creations; it's hard to see them controlled by others and let them be. Ken Williams hired Sunderland so he could program. Instead, he fretted. And, in between, he and Roberta traveled to promote On-Line's products.

The situation couldn't last, and it didn't. Rumors of trouble at On-Line raged through the industry; concern for the couple crept into thousands of phone calls. On-Line was on the way down; On-Line was in trouble. What was the matter with Ken Williams? Where was his genius, his incisive business sense? But few could reach him, and to those who did he wasn't saying much.

Finally, after nearly a year, industry phones buzzed with a new message: "The age of oppression at On-Line is over," went the much repeated quote from one of On-Line's top execs. Sunderland was out and Ken and Roberta Williams were in—as copresidents.

With the long-predicted shakeup in the microcomputer industry just beginning to claim real victims, it's too soon to say for certain that Sierra On-Line has regained a solid footing in time; but the year-lost relaxation in Ken Williams's demeanor and the once-again enthusiastic plans of brother and marketing veep John Williams promise a return to the pioneer spirit of the old On-Line—a good direction to go.

Often the changes that success brings are not easy to accept; other changes are more than welcome. When the Williamses couldn't find a suitable home in the area they liked, they decided to build. Ken's only stipulation was that he have a raquetball court—the rest he left up to Roberta. Says Roberta about the result, "I think we overdid ourselves a bit."

Situated on five and a half acres on the Fresno River, the ten-thousand-square-foot two-story home is rustic, featuring lots of wood including hand-hewn beams, all cedar siding, and fireplaces of natural river rock. The front door is flanked by stained-glass windows depicting characters from the adventure game *Dark Crystal*. Stained-glass images of other Williams adventure characters appear throughout the house.

In the past year, Sierra On-Line has expanded its product line beyond the Apple market. Recent and upcoming products are aimed at Atari, IBM, Commodore, and Coleco computers as well as Apple.

In the works is an adventure based on the characters from the "Family Circus" cartoon strip. Other cartoon-strip-based scenarios, licensed from Sidney Development Corporation (Canada's largest developer of packaged software), feature the characters of "B.C." and the "Wizard of Id," developed by award-winning cartoonist Johnny Hart.

Since *Softalk*'s Exec,Sierra On-Line has also begun a growing commitment to educational software. Nancy Anderton, Sierra On-Line's manager of educational publishing, is enthusiastic about the new ways computers allow concepts to be presented. Anderton says the company's philosophy is that educational software should give skills learning and entertainment equal priority. She sees drill and response or flash-card-type programs as a waste of the computer's potential for teaching.

Earlier this year, Sierra On-Line acquired an educational product line developed by Sunnyside Soft. Included were *Dragon's Keep* and



Above, Ken Williams once fired himself so he could spend more time programming. Now he's back sharing the copresidency with his wife Roberta.

From Screen to Paper *at the Touch of a Button*

The new Apple * compatible printer interface card from Texprint literally unleashes your system's power for fast, easy printouts of *any* screen, at *any* time, with *any* program — in color and black & white.

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Troll's Tale, two vocabulary-controlled junior adventure games for kids at first-grade and second-grade reading levels, and another program, *Bop-A-Bet*, which teaches the alphabet.

The preschool *Learning with Leeper*, Sierra On-Line's first educational release developed in-house, stresses math, reading, and writing readiness skills and requires no adult supervision. This game won a CES Showcase award and was dubbed educational game of the year by *Electronic Games* magazine. The learning approach taken in this product continues in 1984 with *Learning with Fuzzy Womp*, now being field-tested with preschoolers.

Sierra On-Line is also moving into the area of creative play, in the form of story-construction-kit-type programs. The first offering of this kind will provide the tools for children to create their own stories with graphics and text that can be saved to disk.

Sierra On-Line's next goal is to make a dent in yet another relatively unexplored area—what Ken Williams refers to as "home productivity." The cornerstone of this new line is *Homeword*, an easy-to-use word processor for people who don't require the complex features of a program like *Screen Writer*. *Homeword*'s most distinctive feature is its use of icons. Other icon-based programs, planned to interface with *Homeword*, are *Homeword Filer*, a database management system, and *Homeword Speller*, a dictionary program.



With Sierra On-Line's first national television advertising campaign having begun on MTV, Ken and Roberta Williams are now very aware of the volatility of the industry they have helped shape. In the new age—with the Williamses sharing the leadership of their no-longer-tiny company—they believe they can survive and prosper. Says Roberta, "All you can do is your best." And On-Line's best has always been pretty damn good.

In May 1981, *Softalk* visited the Apple Education Foundation. Formed in August 1979, the foundation has provided hardware grants to individuals for developing educational software. In the past, the foundation also disseminated information about quality software through the *Journal of Courseware Review*. The foundation activities were overseen by Carolyn Stauffer and Peggy Redpath, with the help of area assistant Jo Plato. Today, the work of the foundation continues, but with changes in administrative staff and in the program's emphasis.

Since its inception, the foundation has provided 170 grants. The approach of giving small seed grants to single developers stimulated the growth of educational software development. Now that the educational software market is flourishing, the approach has changed. As of the current yearly grant cycle, about a dozen grants, each consisting of thirty computer systems (including printers and modems), will be awarded to colleges and schools collaborating on teacher training programs. The foundation is looking for programs that explore how microcomputers can teach others, through programming or drill and practice. The use of model simulations and the notion of microworlds are two promising areas.

Grant proposals submitted to the foundation are reviewed by an advisory board. Each year a set of guidelines is published for those wishing to submit proposals. Individuals or institutions may contact the foundation directly through Apple to obtain a copy of the guidelines.

Directing the foundation for the past year has been Barbara Bowen; before joining the foundation, she consulted with and helped train educators and dealers on the use of Logo in the classroom. Bowen is responsible for monitoring grantees and evaluating proposals for submission to the advisory board. Current board members are Wally Feurzeig, artificial intelligence expert and one of the original developers of Logo; Beverly Hunter of the Human Resources Research Organization; Joe Lippson of Wycat Systems; Bobby Goodson, former president of Computer Using Educators; Marc Tucker, director of the Carnegie-supported project on information technology and education; Steven Marcus, a previous grantee associated with the South Coast Writing Project; Bill Ship, the vice provost of Brown University; and Mary Bud Rowe, a professor of science education at the University of Florida and an expert on the design of conceptual learning environments.

The Apple Education Foundation is also collaborating with the National Science Foundation in a special program on software development in science and engineering education. The former staff members of the foundation are still very much a part of Apple. Jo Plato is area administrator for the publications department of Apple Personal Computer Systems Division, which produces manuals and documentation for the Apple II. Carolyn Stauffer and Peggy Redpath are involved in software product marketing, specifically of Apple's Pilot series.

The people who've succeeded in projects made possible through grants from Apple are the real story of the Education Foundation's contribution. One of the first grants went to Ann Piestrup; it was the seed for The Learning Company—which is casually mentioned elsewhere in this issue. ■

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It turned out to be the toughest case of your detective career. Clues have led to nothing but dead ends. Nobody is talking. Meanwhile, the crime boss you are after is still operating from somewhere. You're about to throw in the towel. But wait! Something breaks. You trail a stooge of the crime organization to a cheap, seedy hotel, hoping to pump some answers out of him. You break into the hotel room and with your trusty .44 magnum, you knock him cold. When he comes to, will he talk or is it just another bum steer?

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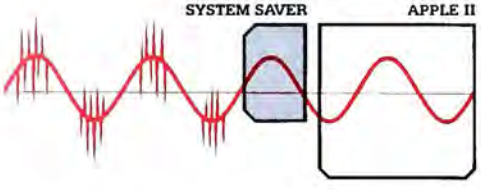
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70-90% of all microcomputer malfunctions can be traced to power line problems** Problems your System Saver guards against.

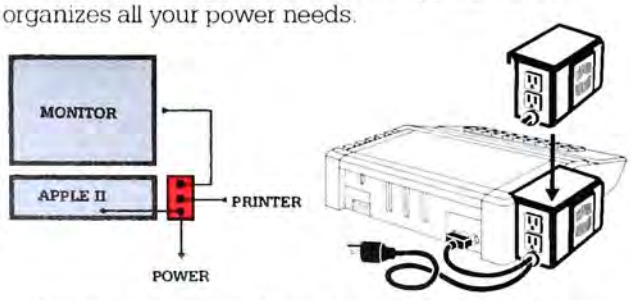
Power line noise can often be interpreted as data This confuses your computer and produces system errors. Power surges and spikes can cause severe damage to your Apple's delicate circuitry and lead to costly servicing

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System Saver makes your Apple more convenient to use.

No more reaching around to the back of your Apple to turn it on. No more fumbling for outlets and cords to plug in your monitor and printer. System Saver organizes all your power needs.

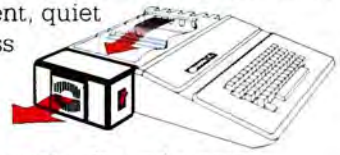


It functions as a multi-outlet power strip with two switched outlets. Plus System Saver offers the ultimate convenience; a front mounted power switch for fingertip control of your entire system.

System Saver lets your Apple keep its cool.

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Buttonwood Apples

BY KEN LANDIS



Recently, a friend and fellow investor suggested that Buttonwood Apples might have a worm in it. His feeling was that the tutorial section we've been offering recently may be too elementary for many of the column's readers. Bearing that possibility in mind, we'd like to have your help in refining the focus of the column.

The aim, of course, is to make Buttonwood Apples as informative and useful as possible. So if there is an advanced topic you'd like to see covered in the tutorial section, we'd like to hear about it. Or, if you have found the tutorial sections of the last few months helpful, let us know that too. Address your responses to Buttonwood, Box 60, North Hollywood, CA 91601.

This month's tutorial section is short and to the point. We're simply going to mention one of the most popular and respected books on basic investing ever published: *How To Buy Stocks* by Louis Engel and Brendan Boyd. It's published by Bantam Books and costs $3.95.

How To Buy Stocks probably has more investment value than any inside tip you'll ever get. Whether you're a beginning, intermediate, or advanced investor, you'll very likely enjoy this book and learn a great deal from it.

This month's review spotlight focuses on another informational product of sorts, Teleware's *Teleminder*.

Teleminder, Teleware (Box 729, 28 Bloomfield Avenue, Pine Brook, NJ 07058; 800-225-0076, in New Jersey 201-882-0466), $195.
Backup policy: Ninety-day warranty; replacements, $30 each.
System requirements: 64K Apple II Plus, IIe, or III, two disk drives, printer, Hayes Micromodem or Smartmodem.

Teleminder is a superb program that turns the Dow Jones News/Retrieval Service into a fully automated electronic clipping service. The Dow Jones log-on and retrieval products we've examined in the past have required the investor to man the keyboard throughout the connection period, entering instructions and requests. If the information you wanted took fifteen minutes to retrieve from Dow Jones, you had no choice but to spend fifteen minutes at the keyboard. *Teleminder* cuts that fifteen minutes down to two and requires only 1 percent of the effort other programs demand.

Because it is written in Pascal, *Teleminder* requires the same rigid placement of peripherals (printer interface card in slot 1, serial interface or modem controller card in slot 2) that is called for in other Pascal programs. When the program disk has been placed in the first drive and an initialized data disk in the second, the investor is greeted by a system parameter or initialization screen into which a Dow Jones password, local Telenet or Tymnet access number, choice of modem, and a printer setup string (if required) are to be entered. Once the system parameters have been saved to the data disk, the master menu appears. A vertical line down the middle of the display divides this menu screen into two sections. The left side of the menu screen contains the program's menu choices; the right side shows the files (called lists) stored on the data disk, along with their status (active or inactive—more on file status later).

From the main menu, you can create a list, change (edit) a list, and delete a list. From here you can also specify timed execution or no clock (immediate execution). Communications and utilities options are also available from the main menu.

The create-a-list function allows the investor to build a list of up to eighteen stocks, bonds, options, mutual funds, treasury issues, and news categories. Each list must be assigned a unique name (for example, Hitech, Bluchp; the only restriction is that the name of a list cannot be longer than six characters). If the investor attempts to use a name that has already been used, the program stops, displays a mesage at the bottom of the screen, and starts the naming process again. This makes it impossible to give two lists on the same disk the same name, thereby preventing potentially costly user errors.

Once a list has been given a name, the cursor moves automatically to the first symbol entry point. The symbols used in *Teleminder* are the ticker tape symbols used to identify securities on Dow Jones. (A complete list of these symbols appears in the Dow Jones Information Services Directory and is retrievable on-line from Dow Jones by entering the appropriate symbol at the system prompt.) The program does not check the validity of symbol entries, so if you've entered an incorrect symbol you won't know it until you log on to Dow Jones. The program will attempt to fetch information for that symbol and fail. At this point, Dow Jones will return a "symbol in error" message, which the program displays.

Teleminder prompts the investor to specify the type of security the symbol represents—S for stock, B for bond, O for option, M for mutual fund, T for treasury issue, and I for news category. The program checks for errors at this entry point and rejects any other symbols the user offers.

Next, the investor is asked to supply the earliest date for which *Teleminder* should fetch information. This date is referred to as the "access date." One of the first queries sent to the system at log-on is a request for the current date. Dow Jones responds by sending the current date and time. *Teleminder* then checks the access date and fetches all news stories from that date to the present, after which it updates the access date by changing it to the current date. From this point on, the access date reflects the last date on which the news stories list was updated.

The user must answer yes or no to four *Teleminder* parameters. These determine what will happen once the Dow Jones connection has been made.

The first parameter is news. In response to a yes answer from the user, the program fetches the news stories listed for all stocks and news categories in the investor's file.

The second parameter is quotes. If the investor answers yes to this prompt, quotes are retrieved and printed for all lists of stocks, bonds, options, mutual funds, and treasury bills (in other words, for everything except the news categories).

The third parameter is print. Answering yes here gets the investor a complete printout of the news stories retrieved during the current session. The printing of retrieved stories is done as soon as the quotes have finished printing.

The fourth and final parameter is headlines. Saying yes at this point informs *Teleminder* that you want to see only the headlines of the Dow Jones stories, rather than the whole stories. Why see only headlines? Because retrieving an entire news story can take a fair amount of time,

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DOS, CP/M, and PASCAL File Compatibility Combined In a Single Program

Softerm 1 incorporates an advanced file manager which provides compatibility with DOS 3.3, CP/M, and Pascal disk formats for all file operations including file transfers. And at speeds up to 5 times faster than standard Apple DOS! Built-in disk utilities provide *INIT, CATALOG, RENAME,* and *DELETE* commands for all disk formats. Wildcard match characters can be used whenever filenames are entered.

Local file transfers allow DOS, CP/M, or Pascal files to be displayed, printed, or even copied to another disk. For example, a file on a CP/M formatted disk in Drive 1 could be copied to a Pascal formatted disk in Drive 2 providing a complete format conversion capability. Numerous editing options such as tab expansion and removing unwanted characters allow easy reformatting of data to accommodate the variations in data formats used by host computers.

Multi-Protocol File Transfer Capability

Softerm 1 offers file transfer methods flexible enough to match any host computer requirement. These include the *character* protocol with user-definable characteristics to provide maximum flexibility for text file transfers to any computer. The CP/M User's Group standard *XMODEM* protocol may be used for binary file transfers with systems using the CP/M operating system. The intelligent *Softrans* protocol can be used to transfer *any* type file and provides automatic binary encoding and decoding, error detection and automatic retransmission, and data compression to enhance line utilization. A FORTRAN 77 source program is supplied with Softerm 1 which is easily adaptable to any host computer to allow communications with Softerm using the Softrans protocol. Specific host computer versions of the Softrans FORTRAN program are available on request.

Softerm file transfer utilizes an easy to use *command language* which may be executed interactively or from a *macro* command file which has been previously entered and saved on disk. Twenty-three high-level commands include *DIAL, CATALOG, SEND, RECEIVE, ONERR, MONITOR, HANGUP,* and others. A *SCHEDULE* command even allows file transfers at a specific date and time.

Softerm 2
The "Choice of Professionals"

Softerm 2 includes all features of Softerm 1 and provides an *exact* terminal emulation for a wide range of conversational and block mode CRT terminals. Special function keys, sophisticated editing features, even local printer capabilities of the terminals emulated are fully supported. In fact, your host computer won't know the difference! *All* of the following emulations are included in Softerm 2 and the list is growing...

ADDS Regent 20, 25, 40, 60 • ADDS Viewpoint • Data General D200 • Datapoint 3601 • DEC VT102, VT52 • Hazeltine 1400, 1410, 1500, 1520 • Honeywell VIP7205 • IBM 3101 Model 10 and 20 • Lear Siegler ADM-3A, ADM-5 • TeleVideo 910, 925

You'll Never Outgrow It

For the latest program enhancements, you can access the Softronics Online Update Service 24 hours a day, 7 days a week. New hardware support or terminal emulations are immediately available to all Softerm users.

Softerm 1—$135 Softerm 2—$195

Available now from your local dealer or Softronics, Inc.

*Apple is a registered trademark of Apple Computer, Inc., CP/M is a registered trademark of Digital Research, Inc., Dow Jones News/Retrieval is a registered trademark of Dow Jones, Inc., The Source is a service mark of Source Telecomputing Corporation, CompuServe is a registered trademark of CompuServe, Inc.



SOFTRONICS

6626 Prince Edward, Memphis, TN 38119, 901-683-6850

and time in this case really does mean money. Once you've scanned the headlines, you can use *Teleminder*'s communications module to retrieve the news stories you want to see. If you respond affirmatively to both the news and headlines parameters, the headlines response overrides news, and only headlines are fetched.

Once the symbols, list type, and parameters have been chosen, the list-building process is complete. *Teleminder* automatically saves the completed list to disk, then redisplays the main menu screen. The name that the investor gave the list now appears on the right-hand side of the screen, and the list's status becomes inactive until the user specifies otherwise.

Dow Jones retrieves symbols and news for active lists only. *Teleminder* will remember the status of each list when the investor finishes a session. The next time the program is used, it boots up with the lists in the same status as they were at the end of the previous session.

Editing lists is simple and straightforward. The change-a-list command can be used to edit any part of any list or to change one's responses to any of the four parameter queries.

The delete-a-list command erases from disk the list that the user specifies, along with any information pertaining to it. Since this command does away with a list forever, the user is asked to confirm this choice.

The next two menu choices—timed list and immediate execution—are essentially the same. The only difference between them is that the timed list execution command takes advantage of either a California Computer Systems card or a Thunderclock card in an Apple II to begin the *Teleminder* retrieval sequence automatically, whereas immediate execution is begun by the investor. In either case, *Teleminder* dials the local access number, logs on to the system, gets the information it was instructed to retrieve from each active list, logs off, and then sends the information out to a printer, to disk, or both.

Watching *Teleminder* in action is a pleasure. The program runs smoothly and makes excellent use of its time on Dow Jones. It even keeps a record of how much time was spent on-line, making it possible for the investor to calculate the cost of retrieving information.

Teleminder's communications capability turns the Apple into a semidumb, semismart terminal. It logs you on to Dow Jones automatically and asks you whether you want to go into the database, the news database, or one of the other Dow Jones databases. If you choose news, you're prompted to supply the appropriate symbol or category code. *Teleminder* then collects headlines for the symbol or category you've specified. It continues to collect headlines until it has retrieved all of them or run out of memory in which to store them (there's room in memory for about fifty-five headlines—about five pages of Dow Jones information).

If you want to retrieve more than five pages of information on a topic, you must specifically request that additional pages of headlines be retrieved. To retrieve the news stories themselves, you must key in the two-character Dow Jones identifier displayed on the headline. *Teleminder* will then get that information from Dow Jones and either display it on-screen or print it out.

Pressing control-Q from within the communications module brings up the quotes entry screen. Up to five quotes can be retrieved at one time. When the appropriate symbols have been entered, *Teleminder* formats the screen to display the quotes; retrieves and displays the high, low, close, and volume information; and calculates the amount of change that's occurred since the previous close.

To accommodate eighty columns of Dow Jones information on the Apple's forty-column screen, *Teleminder* flips between the first forty columns of data and the second, rather than wrapping the data around on-screen. This feature keeps display screens neat and easy to read; you just have to remember to flip the screens. An on-screen reminder that there are indeed more than forty columns of information to look at would be nice here.

In terminal mode, *Teleminder* provides access to any Dow Jones database and prints out any information retrieved. An 8,800-character buffer stores the captured information while the investor is on-line; this information can be printed or cleared out later on. Unfortunately, the buffer captures not only the information from the databases but also the information requests themselves. An editing feature or instructions on how to use a utility program to edit out this machine talk would be a good addition.

Like most of the programs we've examined, *Teleminder* provides for basic file creation, system maintenance, and housekeeping from within its utilities module. System configuration, printer setup, data disk formatting, backup, and optional clock-time setting are all handled from there.

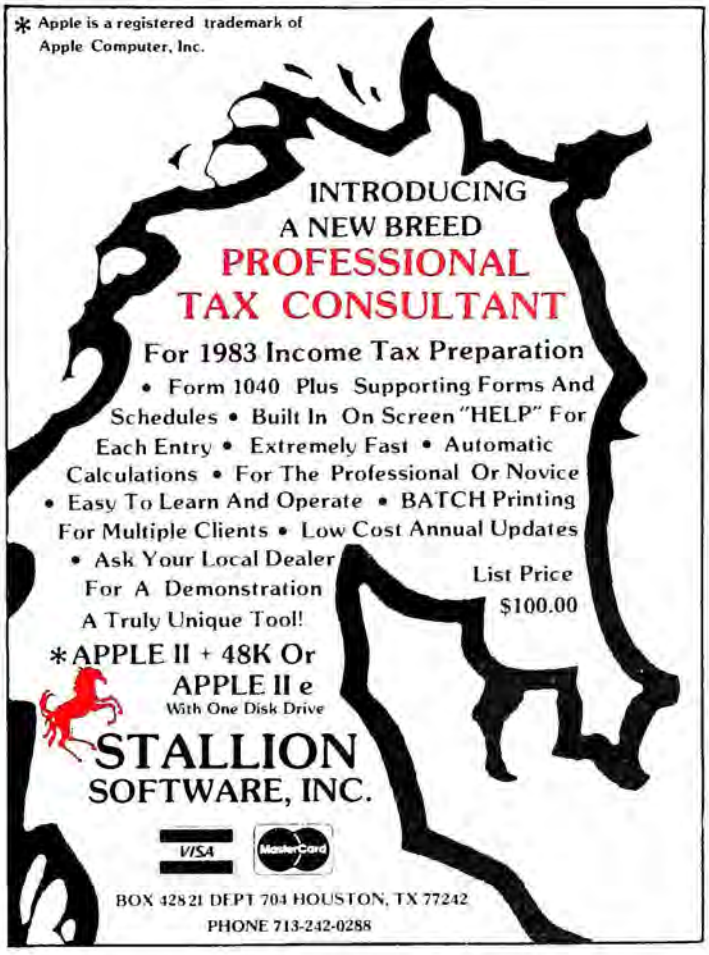
Teleminder also offers four unique utilities. The first of these allows the investor to print, erase, or display on-screen any news story or stories that have been saved to disk. The second can be used to print out the most recent set of quotes that have been stored on disk. The third utility, print headlines, permits the investor to print out the most recent set of retrieved and stored headlines. The fourth allows you to transfer quotes to a data disk, thus facilitating the creation of a historic quotes file containing up to a thousand quotes per disk.

Though it's easy to build a historic quotes file using *Teleminder*, it's not quite as simple to take advantage of one. More specifically, if you're using some other Dow Jones quote-based program, such as a technical charting program or portfolio accounting system, *Teleminder*'s news/headline retrieval abilities still work fine, but you can't expect to use the quotes you've retrieved via *Teleminder*'s quote-fetch option—they are not compatible. Fortunately, Teleware has come up with a remedy for this serious drawback.

The remedy is *TelePak 1*, a utility program priced at $30. *TelePak 1* takes the historic quotes files and makes them usable with Dow Jones software, *1-2-3*, *Multiplan*, and *VisiCalc*. (An option in the system configuration section that would automatically execute the quotes transfer routines would be a real plus. This way, an investor couldn't forget to do the transfer and lose the data that was stored in the daily quotes file when *Teleminder* was used again.)

It's safe to say that *Teleminder* is an exceptional program for any investor. If you want to use *Teleminder* to create a historic quotes file that's compatible with technical charting or portfolio accounting programs, you'll need to purchase *TelePak 1* as well, but if you're interested only in news/headline retrieval capabilities, the original program is all you need.

All in all, *Teleminder* merits the Buttonwood Apples seal of approval for its appealing program design and superior documentation. ◨



It's never too early to begin.

If you have children ages four to eight, give them a head start on the computer age with programs from ERIC Software Publishing.

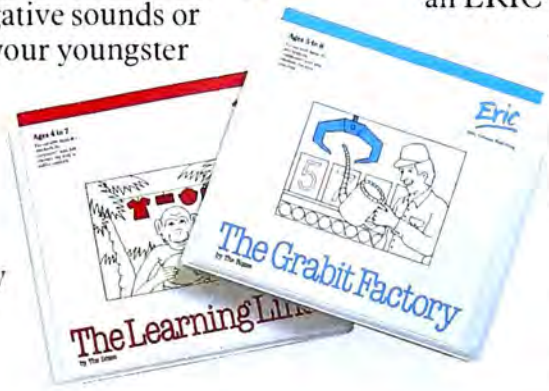


ERIC makes it fun to learn. In "The Learning Line," a curious monkey helps your child learn to recognize letters, numbers and objects, and to associate words with pictures. Your youngster operates a crane in "The Grabit Factory" to pick up number blocks that complete a simple addition or subtraction problem. Any child will have a delightful time learning to count in "The Sweet Shoppe." These programs are just the beginning of a complete library of fun, challenging games from ERIC Software Publishing.

ERIC makes it easy to learn. Once the program is loaded, your child only needs to use a joy stick or paddle and one key to operate any ERIC game. After just a few minutes of instruction, your child can take total charge of the computer.

ERIC makes learning positive. ERIC programs reward success, but if your child makes an error, there are no negative sounds or images to discourage your youngster from trying again.

ERIC is unconditionally guaranteed. Even a diskette clogged with peanut butter and jelly will be cheerfully replaced.



In our fast-paced world of technological change, it's important that a child's learning processes begin at an early age. With programs from ERIC Software Publishing, your youngsters can start now. It's never too early to begin.

Visit your local computer store for a demonstration. For the name of a store near you or for an ERIC brochure, call or write us.

ERIC programs are available for Apple II+, Apple IIe, Franklin, and Commodore 64 computers.*

*Apple II+ and Apple IIe, Franklin, and Commodore 64 are registered trademarks of Apple Computer, Inc., Franklin Computer and Commodore Computer respectively.

Eric

ERIC Software Publishing
1713 Tulare
Fresno, CA 93721
(209) 237-0989

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MARKETALK

News

Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

☐ **Michigan State University International Development Papers,** (Department of Agricultural Economics, Agricultural Hall, Michigan State University, East Lansing, MI 48824; 316-563-2400) recently released an annotated directory of statistics programs identifying and describing 150 microcomputer statistics programs. *An Annotated Directory of Statistical and Related Microcomputer Software for Socio-Economic Data Analysis* was written by V. Kelly, R.D. Stevens, T. Stilwell, and M.T. Weber. Information is provided on the thirty most frequently used general statistics packages and a description of many specialized statistics programs with special attention to Apples. $7.00.

☐ **FlipTrack Learning Systems** (999 Main, Suite 200, Glen Ellyn, IL 60137; 312-790-1117) has published a new conversational tutorial titled *How To Use Apple Writer*. The audio cassette trains first-time *Apple Writer* users to create files, edit, correct, and reorganize files, save documents, and print in a variety of formats. It requires a standard audiocassette player and no computer hookup. $57. *How To Operate Your Computer Under CP/M-86* provides a complete hands-on lesson in only six hours. The learner is guided through the most common CP/M-86 commands for formatting and copying disks, copying and erasing individual files, creating and editing documents, and using batch processing to run a series of application programs. $75.

☐ **CBS Software** (14 Fawcett Place, Greenwich, CT 06836; 203-869-5110) announced a logic and deduction game called *Mystery Master: Murder by the Dozen*. Up to four can play the game, which challenges the players to solve twelve cases of murder. $34.95. *MatchWits* is a challenging user-programmable game of memory, logic, and strategy for one or two players. Designed for players of all ages, *MatchWits* gives players an opportunity to test their knowledge of facts in any of six preprogrammed categories: words, sports, famous people, multiplication, cities, and animals. The program consists of three rounds in each of the six categories and eighteen puzzles to identify. $29.95.

☐ Apple Thermonitor is a liquid crystal thermometer designed for the Apple computer. Marketed by **Phillips Computer Systems** (8549 Zionsville Road, Indianapolis, IN 46240; 317-872-6712), the device indicates when the temperature in your computer is becoming dangerous to the machine. Three temperature-seeking units are supplied with each package to be placed in various spots on the computer. $3.95.

☐ **Management Contents** (2265 Carlson Dr., Suite 5000, Northbrook, IL 60062; 312-564-1006) has gone to press with its new publication, *The Computer Database Thesaurus & Dictionary*. The guide documents and explains how to access the Computer Database, an on-line database that provides comprehensive coverage of the computer, telecommunications, and electronics fields. *The Thesaurus & Dictionary* contains thirty-five hundred key computer, telecommunications, and electronics terms and definitions. $120.

☐ **Information System Resources** (1444 Balsam Street, Saint Paul, MN 55122; 612-452-7913) has announced a new mini *Sound Training Kit* for the business user. Current topics covering the use of software and hardware such as *Apple Writer* and Apple IIe. The user sits at the keyboard, turns on the audio cassette player, and works along, listening to the recorded voice of the instructor. $37.95.

☐ The **National Computer Camps** are being prepared for coed campers between the ages of nine and eighteen. The camps, directed by Dr. Michael Zabinski, are being held in various locations across the country. Campers will receive instruction on the use of Apple computers and may sign up for one or more weeks during June, July, and August. For further information, write the National Computer Camps (Box 585, Orange, CT 06477).

☐ **Apple Computer** (20525 Mariani Avenue, Cupertino, CA 95014; 408-996-1010) has announced several new products. A data management program called *AppleFile III* provides a system for organization, management, and maintenance of large files on the Apple III. It allows users to store, arrange, review, and print records in files up to sixteen megabytes in size. $325. *The Apple III Business System* provides hardware and system software components needed by professionals and small to medium-size businesses. $5,330. A listing of the software products available for the Apple III computer can be found in *Will Someone Please Tell Me What An Apple III Can Do?* It is a guide to more than three hundred application software products currently available for the III. $3. An electronic drawing board for creating computer graphics, *The Apple Graphics Tablet*, is now available. It may be used with Apple II series computers to develop and display block diagrams, architectural designs, logic diagrams, mechanical art, engineering schematics, and graphic art. $795. *Schoolbus* is a disk and printer sharing system for schools to use with the Apple II. It is designed to enhance the development of students' basic programming skills. $525. The *LisaTerminal* and the Apple Cluster Controller data communications products are now available. They give the Lisa personal computer the ability to interact with most mainframe and minicomputers. *LisaTerminal*, $295; Apple Cluster Controller, $4,500–$7,000. Retail dealers of Apple computers are giving their customers free copies of the *Apple Logo Tool Kit* and sample program disks. The Tool Kit disk provides users of Apple Logo the ability to save and print pictures on dot-matrix printers, to access and write machine language programs, and to create musical compositions. Some dealers may require customers interested in obtaining copies of the disks to provide the blank disks necessary for duplication.

☐ **Menu Database** (1520 South College, Fort Collins, CO 80524; 303-482-5000) is a comprehensive software reference that lists over fifty thousand software packages. The international software database contains information on software products including complete vendor and program details. Additionally, information is offered to customers in the form of a hard-copy publication, *The Software Catalog*. $25.

☐ *COINS (Computerized Inventory of Numismatic Stock)*, offered by **Compu-Quote** (6914 Berquist, Canoga Park, CA 91307; 213-348-3662), is a software program for coin collectors. It enables the collector to catalog an entire collection and obtain various reports that serve for personal investment information. *COINS* contains a disk with the *COINS* program and the latest market values of sixteen hundred different U.S. coins, a forty-four-page user's manual, complete operating instructions, and standard coin list. $10 to $95.

☐ The 1984 National Computer Conference (**NCC**) is scheduled for July 9–12 at the Las Vegas Convention Center. Sponsored by the **American Federation of Information Processing Societies** (AFIPS), Association for Computing Machinery, Data Processing Management Association, IEEE Computer Society, and Society for Computer Simulation, NCC's theme for '84 is "Enhancing Creativity." The program will cover a wide range of topics and address both the technologies of computing and the changes being brought about by these technologies. For more information, contact Ann-Marie Bartels or Marty Byrne (NCC '84, AFIPS, 1899 Preston White Drive, Reston, VA 22091; 703-620-8926).

☐ A new release from **Muse Software** (347 North Charles Street, Baltimore, MD 21201; 301-659-7212), *Antonym Antics* is a colorful word game for children ages six through thirteen. The program teaches children the meaning of antonyms by illustrating each selection in cartoon form. $39.95.

☐ **Comrex International** (3701 Skypark Drive, Torrance, CA 90505;

CONGRATULATIONS!

Well, pilgrim, it seems you've made it to 1984 intact despite everything the world could throw at you. That's no mean feat these days, but you probably don't need to be reminded of that. Or of what George Orwell predicted, or of what the government may have in store for us. Just forget you read that. Relax. Put your feet up. Comfy? Good. . . .

What we're going to do now is work through some of those little problems that are bothering you so you can concentrate on the better things in life. Let's see now. . . . Remember last year's office party? You swore you'd never do that again . . . Well, don't worry. Even if you do, nobody will notice, and even if they do, they probably won't remember. They didn't last year, did they? What else? Ah! New Year's resolutions right? You're going to quit smoking again, cut down on your drinking, start working out regularly, lose weight, learn how to play racquetball, take more interest in local affairs, and stop watching *Three's Company* if it kills you. It probably will.

Just kidding. Those are all wonderful aspirations, and we're behind you—puffing and panting—all the way. But now it's time to talk of finer things, of drives and DOS and nesting loops, of variables and strings. Mostly about *Softalk*, though.

That's right. *Softalk*. Probably one of the best things ever to happen to you. But you knew that all along. Well here's something maybe you didn't know. *Softalk* is getting better. Impossible, you say? Well, perhaps, but check this out:

Starting in January, *Softalk* will be available to Canadian subscribers the same way it is to Americans, including the free trial subscription for new subscribers who send their Apple serial number and address to our Canadian Subs department.

Also in January, *Softdisk* is going to start publishing our program listings on disk so you don't have to worry about spraining your button-pushing fingers while keying in our micro masterpieces. See their ad on page 226.

Not bad, huh? And we're not even going to mention all the other goodies we have in store for you. Some of life's greatest pleasures come in the form of pleasant surprises.

Softalk. We do it all for you.

Softalk Circulation
Box 7039
North Hollywood, CA 91605

Apple is a trademark of Apple Computer Inc.

213-373-0280), is offering a lightweight, compact personal plotter for users of Apple and most other personal computer systems. The Model CR-1810 ComScriber I plotter has the capability of making charts, graphs, and illustrations in several colors. The movement of the plotter is controlled with a simple twelve-key keyboard. $695. ComRiter CR-III by Comrex accommodates the advanced printing requirements of most word processing and data processing applications. One of the major features of the ComRiter CR-III is a fast print speed of twenty-three characters per second. Under $1,000.

☐ **Digital Learning Systems** (168 East Main Street, Danville, NJ 07834; 201-627-7917), a developer and publisher of educational software, has announced the development of a disk-based training workshop entitled Apple III Horizons—Getting Organized. Presently, the multimedia product training workshop is only available to Apple distributors and dealers for prospective and new Apple III computer owners.

☐ The new PC-800 Apple multichannel counter by **Columbus Instruments** (950 North Hague Avenue, Columbus, OH 43204; 614-488-6176) interfaces directly to the Apple II Plus and Apple IIe computers. The product is intended to help convert an Apple into a multichannel printing counter. $1,500.

☐ **Ellis Computing** (3917 Noriega Street, San Francisco, CA 94122; 415-753-0186) has released the Nevada Basic for CP/M based systems. Advanced features available in the interpreter include a built-in full-screen text editor wherein the cursor can be moved freely about the screen to make additions, deletions, and corrections. $39.95.

☐ *The Simple Tenant Billing System* comes from **Amphel Industries** (2888 Bluff, Suite 353, Boulder, CO 80301; 303-440-0411). The system can handle up to five hundred accounts per disk for apartments, miniwarehousing, and office buildings. Line items available are rent, past due, late charges, utility fee, miscellaneous charge, and payment. $99.95.

☐ *Pocket Guide to CP/M*, published by **Addison-Wesley** (Reading, MA 01867; 617-944-3700), covers the elements that programmers need to know to use CP/M. Part of the guide discusses the operating system's features, with ten sections illustrating how these features are used in program situations. The guide also includes a summary of CP/M commands and subcommands. $6.95. In addition, Addison-Wesley has announced the release of *Pocket Guide to Microsoft Basic*, by the same authors. Microsoft Basic is Microsoft's adapted version of the Basic language available on Apple and other computers. $6.95. Addison-Wesley also has released *Introducing Logo for the Apple II Computer*. It shows how kids, parents, teachers, and programmers can create stimulating projects. *Introducing Logo* covers commands and procedures used on the Apple, with extensive emphasis on turtle graphics. $12.95.

☐ **Opportunities for Learning** (8950 Lurline, Department L66, Chatsworth, CA 91311; 213-341-2535) is offering, free of charge, a new catalog of educational software. The catalog of home educational software features more than two hundred software programs and books for families with Apple and other computers.

☐ **Ashton-Tate** (10150 West Jefferson Boulevard, Culver City, CA 90230; 213-204-5570) recently published *Through the MicroMaze: A Visual Guide*. Written by Wayne Creekmore, the sixty-four-page pictorial introduction to computers is designed to help people understand the computer phenomenon without being intimidated. The guide provides comprehensive explanations of computer principles, as well as descriptions of basic hardware and software elements and how they work together. $9.95.

☐ **Howard W. Sams** (4300 West Sixty-second Street, Indianapolis, IN 46268; 317-298-5400) now offers a complete, start-from-scratch guide to the UNIX operating system. *UNIX Primer Plus* by Mitchell Waite, Donald Martin, and Stephen Prata is now available in a 228-page tutorial and reference guide. $19.95.

☐ Created by **Sierra On-Line** (Sierra On-Line Building, Coarsegold, CA 93614; 209-683-6858), *Homeword* is a slight reminder of Apple's Lisa computer. It is a word processing program that represents a major technical breakthrough because it is the first software designed for the home computer that uses icons, or symbols, to guide the user through the program. $49.95.

☐ **Learning Arts** (Box 179, Wichita, KS 67201; 316-682-6594) recently released its *Fall/Winter 1983-84 Microcomputer Programs Catalog*. The sixty-four-page catalog contains information on over thirty-four hundred selected programs of educational software. Free to educational

Apple II

CP/M

IBM PC

SPECTRUM

Professional Software Products

MATHEMATICS SERIES

The Series Includes These 4 Programs:

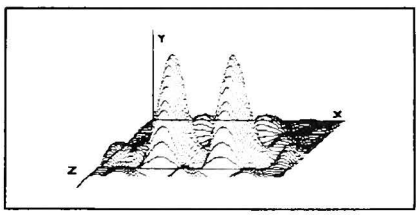
STATISTICAL ANALYSIS I: This menu driven program performs LINEAR REGRESSION analysis, determines the mean, standard deviation and plots the frequency distribution of user-supplied data sets.

NUMERICAL ANALYSIS: HI-RES 2-Dimensional plot of any function. Automatic scaling. At your option, the program will plot the function, plot the INTEGRAL, plot the DERIVATIVE, determine the ROOTS, MAXIMA, MINIMA and INTEGRAL VALUE.

MATRIX: A general purpose, menu driven program for determining the INVERSE and DETERMINANT of any matrix, as well as the SOLUTION to any set of SIMULTANEOUS LINEAR EQUATIONS.

3-D SURFACE PLOTTER: Explore the ELEGANCE and BEAUTY of MATHEMATICS by creating HI-RES PLOTS of 3-dimensional surfaces from any 3-variable equations. Hidden line or transparent plotting.

For APPLE II (48K) and IBM PC (64K) $50.00



BUSINESS SOFTWARE SERIES

Both Programs $250.00

A user-friendly yet comprehensive double-entry accounting system employing screen-oriented data input forms, extensive error-trapping, data validation and special routines for high speed operation. The series includes these two modules:

GENERAL LEDGER: A complete accounting system with these features:

- Up to 500 accounts and 500 transactions per month.
- Interactive on-screen transaction journal.
- Produces these reports:
  - Transactions Journal
  - Account Ledgers
  - Income Statement
  - Balance Sheet
  - Account Listings

For APPLE II and IBM PC $150.00

ACCOUNTS RECEIVABLE

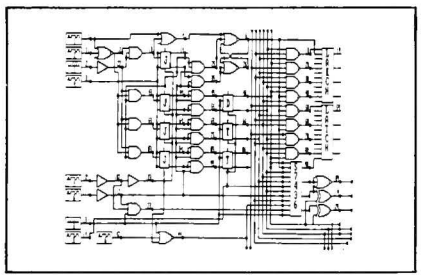
A flexible system with these features

- Up to 500 accounts and up to 500 invoices per diskette.
- Prints invoices, customer statements & address labels.
- Interfaces to General Ledger.
- Interactive screen-based invoice work sheet.
- Produces these reports
  - Aged Receivables
  - Sales Analysis
  - Account Listings
  - Customer Balances

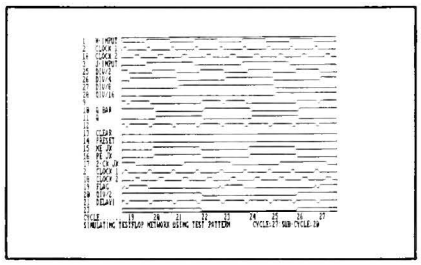
For APPLE II and IBM PC .... (2 DRIVES) .. $150.00

MICRO-LOGIC

An interactive graphics program for designing and simulating digital logic systems. Using the built-in graphics module, the user creates a logic diagram consisting of AND, OR, NAND, NOR, EX-OR, D, T, JK FLIP FLOP and powerful 16 pin user-defined MACRO functions. A typical page of a logic diagram looks like this:



Tne system provides on-screen editors for NETWORKS/MACROS DATA CHANNELS, CLOCK WAVEFORMS and GATES. GATE attributes include DELAY, TRUTH TABLE, NAME and I/O clocking.



The system is available for Apple II and IBM PC computers. A non-graphics version is available for CP/M 2.2 It uses the network editor to create netlists and text printer plots to display simulation results. All versions require 2- 5 1/4" disk drives.

For APPLE II, IBM PC (192K) and CP/M (70K) $450.00
MANUAL & DEMO DISKETTE $50.00

PERSONAL FINANCE MASTER

The premier personal and small business financial system. Covering all types of accounts including check registers, savings, money market, loan, credit card and other asset or liability accounts, the system has these features:

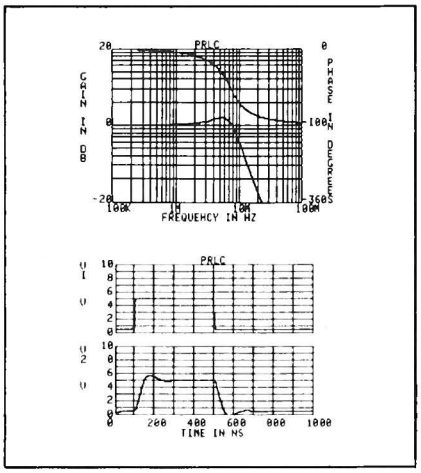
Handles 25 Asset/Liability Accounts
Monthly Transaction Reports
Budgets Income & Expense
Reconciles to Bank Statements
Prints Checks & Mailing Labels
Automatic Year-End Rollover
Prepares a Net Worth Reports
Searches for Transactions
Handles Split Transactions
User-Friendly Data Entry Forms
Fast Machine Language Routines
Extensive Error Trapping
HI-RES Expense/Income Plots

For APPLE II and IBM PC $75.00

MICRO-CAP

Microcomputer Circuit Analysis Program

Tired of trial & error circuit design? Analyze and debug your designs before you build them. With MICRO-CAP you simply sketch your circuit diagram on the CRT screen and run an AC, DC or TRANSIENT ANALYSIS. Your circuit may consist of RESISTORS, CAPACITORS, INDUCTORS, DIODES, BATTERIES, BIPOLAR or MOS TRANSISTORS, OPAMPS TRANSFORMERS, and SINSUSOIDAL or USER-DEFINED TIME DEPENDENT VOLTAGE SOURCES. MICRO-CAP can analyze any such network containing up to 40 separate nodes. Includes a user controlled MACRO library for modelling complex components such as OPAMPS and Transistors.



For APPLE II and IBM PC computers. A non-graphics version using an on-screen editor to enter networks and text printer plots to display simulation results is available for CP/M (2.2- 5 1/4" SSSD) systems. Requires 2 disk drives.

For APPLE II, IBM PC (192K) and CP/M (70K) $475.00
MANUAL and DEMO DISKETTE $50.00

ORDERING INSTRUCTIONS: All programs are supplied on disk and run on Apple II (64K) or IBM PC (128K) with a single disk drive unless otherwise noted. Detailed instructions included. Orders are shipped within 5 days. Card users include card number. Add $2.50 postage and handling with each order. California residents add 6 1/2% sales tax. Foreign orders add $5.00 postage and handling per product.

SPECTRUM SOFTWARE

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personnel when requested on institutional letterhead, $1 to others.

☐ **State of the Art** (3183-A Airway Avenue, Costa Mesa, CA 92626; 714-850-0111) has added a comprehensive *Payroll System* to its integrated small business accounting library. The new software module can automatically calculate up to 200 employees' earnings and deductions, figure payroll taxes, print payroll checks and vouchers—complete with year-to-date earnings and tax information. $495–$595.

☐ A software package for tax preparation has been introduced by **EZ Ware** (17 Bryn Mawr Avenue, Bala Cynwyd, PA 19004; 215-667-4833). *TAX-PREP* is a personal income tax preparation system designed for users of the *Multiplan* interactive electronic spreadsheet. The package will be provided with nineteen income tax forms and schedules, reflecting all new 1983 tax laws and IRS regulations, and is available for 64K personal computers including Apple II, II Plus, and IIe. $89.95.

☐ Now available are the *French Achievement II* and *Spanish Achievement II*, through **Microcomputer Workshops** (225 Westchester Avenue, Port Chester, NY 10573; 914-937-5440). *French* and *Spanish Achievement IIs* are enhancements to *French* and *Spanish Achievement I*; they are a grammar format of the College Entrance Examination Achievement tests. Both disks use full character sets and upper and lower case. $49.95.

☐ **Osborne/McGraw-Hill** (2600 Tenth Street, Berkeley, CA 94710; 415-548-2805) has just released the revised, second edition of the *Apple II User's Guide*, in response to the popularity of the Apple IIe and II Plus. The book covers the Apple IIe and its capabilities, as well as describing earlier models of the Apple II in depth and discussing commonly used external devices and accessories such as disk drives and printers. 482 pages, $17.95.

☐ **Datasoft** (9421 Winnetka Avenue, Chatsworth, CA 91311; 213-701-5161) has adapted the computer game *Sands of Egypt* for the Apple II series. The game features a combination of "who-done-it" questions, animation, and extensive word vocabulary. It also displays a selection of hints and riddles that must be answered in search of hidden treasure. $29.95. Datasoft's *Pooyan* arcade-style game is all about desperate wolves who hunt defenseless piglets roaming the forest. The game has been adapted for the Apple II, IIe, and II Plus. $29.95.

☐ **Aardvark/McGraw-Hill** (1020 North Broadway Street, Milwaukee, WI 53202; 414-289-9988) has announced the release of the new *Personal Tax Planner*. The program is designed for the home computer user who wishes to calculate and reduce personal federal income tax. $99.

☐ **Princeton Educational Software and Dorothy Rubin Enterprises** (195 Nassau Street, Box 1317, Princeton, NJ 08540; 609-683-0044) has introduced *Mind Bind*, an educational game, for the Apple II, II Plus, and IIe. Offered in both home and classroom versions, *Mind Bind* revolves around a variety of word-definition and verbal-reasoning puzzles presented in graphic format. The classroom version includes a feature called TAD (Teacher-Assist Diagnostics), which provides the teacher with an evaluation of the students' performance and suggestions by the author of the game. $39.95, home version; $64.95, classroom version.

☐ Tested recently on Apple II Plus and IIe and the Apple Pascal System were 112 programs now found in *Pascal Programs in Science and Engineering*. Written by Jules H. Gilder and J. Scott Barraus and published by the **Hayden Book Company** (50 Essex Street, Rochelle Park, NJ 07662; 201-368-2202), it is a book of programs that solve problems encountered by students, scientists, and engineers. Each application includes a brief introduction to the program's theory and algorithm, a complete program listing, a sample run, and an explanation of the results. $18.95.

☐ A word processor with mail merge, the *MegaWriter* for the Apple II and IIe has been released in an updated version by **Megahaus** (5703 Oberlin Drive, San Diego, CA 92121; 619-450-1230). Improvements in the new version include a faster boot time, settable tabs, and the ability to read and write both Apple DOS files and Pascal files. $99.95.

☐ **Knoware** (301 Vassar Street, Cambridge, MA 02139; 617-576-3821), producer and marketer of educational software for personal computers, announced its first software package, *Knoware*, an educational software product designed to integrate learning with applications programs. The product's target groups are business people; it teaches the fundamentals of how to use a personal computer with an optional keyboard tutorial included. The package also includes eight introductory applications programs. $95.

☐ *Getting Started with Logo* is a new program of print materials produced to give children a head start in learning how to use a computer. **DLM Teaching Resources** (One DLM Park, Allen, TX 75002; 214-248-6300) is offering the program, which is designed for use with the user's Apple Logo program. Included in this instructional program are a 152-page training manual, sixty-four pencil-and-paper activities, and five Logo posters. $39.

☐ February 25–26 are the dates set aside for the Computer Supermarket Personal Computer Show, to be held at the San Mateo County Fairgrounds, San Mateo, California. Retailers, manufacturers, and distributors will offer savings on a variety of personal computers, software, and accessories for various uses. For more information, call or write **Microshows** (Box 4323, Foster City, CA 94404; 425-571-8041).

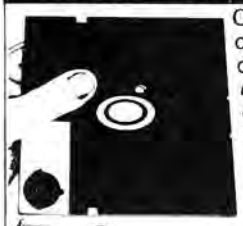
☐ **Computer Expo '84** is being slated for Orlando, Florida, February 17–19. Approximately one hundred forty microcomputer hardware and software exhibitors will demonstrate their wares at Orlando's Expo Centre, and seminars and hands-on workshops will be offered. For more information, contact **Computer Expo '84** (Box 3435, Longwood, FL 32750; 305-662-6917).

☐ **H & H Trading Company** (Box 549, Clayton, CA 94517; 415-672-3233) has released an automatic telecommunications program for use with its *Stock Tracker*. This new program uses the Dow Jones News/Retrieval Service to acquire either daily or historical quotation data, then prepares and automatically feeds it to the *Stock Tracker* program. $195.

☐ A new drawing software program called *Charts Unlimited* has been devised by **Graphware** (5084 Mosiman Road, Middletown, OH 45042; 513-424-6733). The package combines machine language speed and a sixteen-screen drawing area. The program may be utilized to draw flow charts, floor plans, office layouts, organization charts, forms, PERT charts, and business charts. $195.

☐ **Transend Corporation** in conjunction with **Computer Aids Corporation** (4929 South Lafayette Street, Fort Wayne, IN 46806; 219-456-2148) is offering communications software for visually im-

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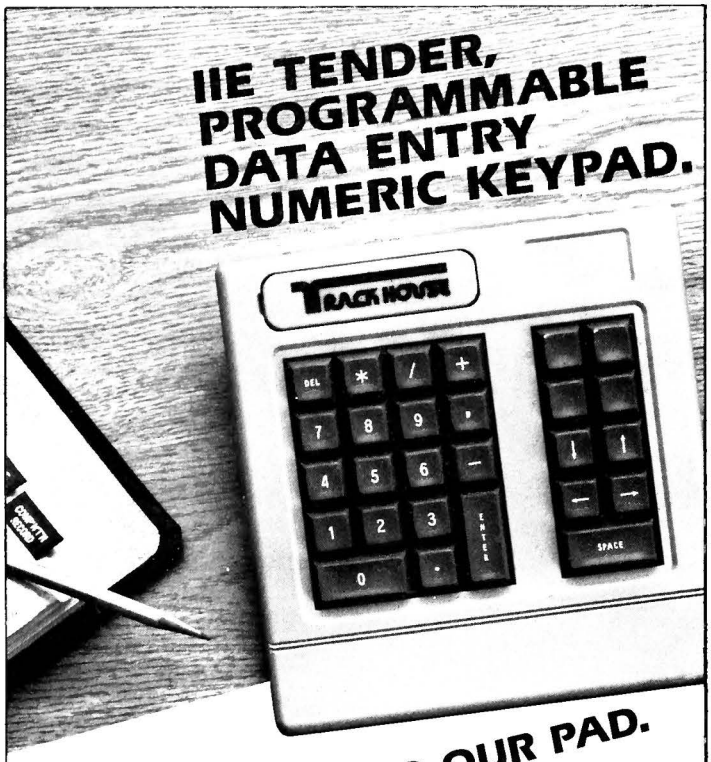
He's aware. He's concerned. He takes chances, but he covers his bets. He can hold his liquor. He's covered with purple scales. He looks out for his friends. He flies over the countryside, laying waste to entire townships with a single gout of flame.

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paired computer users called *Talking Transend*. The talking system was developed for Apple II and Apple IIe as well as other computer systems. $175.

☐ *The Spreadsheet Auditor* has been announced by **Consumers Software** (Suite 106C, 314 East Holly Street, Bellingham, WA 98225; 800-645-5501). The program audits *VisiCalc*, Lotus's *1-2-3*, and *SuperCalc* spreadsheets. $99.

☐ **Broadway Software** (642 Amsterdam Avenue, Suite 136, New York, NY 10025; 212-580-7508) is offering the *Diskinvoice System*. The invoicing/accounts-receivable package is designed for the small business person, free-lancer, or professional who normally sends out fewer than three hundred invoices per month. $55.

☐ *VideoSprite*, from **Synetix** (10635 Thirty-eighth Place N.E., Kirkland, WA 98033; 206-881-8440), is a graphics card that plugs into the Apple II computer and introduces animated graphics and text to video programming. It also allows a composite overlay of two video signals for applications such as subtitling, cartoons, and educational software. $795.

☐ *Critic's Guides to Microcomputer Software* has been released by **Chilton Book Company** (Radnor, PA 19089; 215-964-4000 or 800-345-1214). The guides include *A Critic's Guide to Software for Apple and Apple-Compatible Computers*, which examines and evaluates spreadsheet, word processing, and data management packages on the market. $12.95. *Handbook of Computer Applications for the Small or Medium-Sized Business* has also been published by Chilton. The book was written for business owners and managers with little or no background in computers. $19.95.

☐ **Patton & Patton** (340 Lassenpark Circle, San Jose, CA 95136; 408-629-5044) has announced a new program entitled *Flow Charting* for the Apple computer. The software package enables the user to construct and print out either flow charts or personnel charts. $138.

☐ The Floppy Disk Storage System has been designed by **Micro Development** (2013 Orange Street, Alhambra, CA 91803; 213-282-0563) to store up to twenty-five disks. With each file there are forty-eight labels and one hundred sixty-eight tabs supplied. The file will accommodate 5¼-inch floppy disks. Less than $40.

☐ **Haba Systems** (15154 Stagg Street, Van Nuys, CA 91405; 213-901-8828) is offering a comprehensive software package called *Habadex*. It enables Apple II Business System users to track telephone costs; to store as many as six thousand names, addresses, and phone numbers; to automatically dial numbers; to develop mail lists; to keep track of calendars/appointments and more. $595. The company also has introduced an integrated software package for Apple III called *III E-Z Pieces*. The package includes a desktop manager, word processor, database manager, and spreadsheet. $295.

☐ An Australian-developed word processing package is available through **Computer Solutions** (260 Madison Avenue, New York, NY 10016; 212-683-4900). Called *Zardax*, the software is simply constructed and thus can be used by people who have had no contact—or limited experience—with word processors. $215.

☐ **SouthWest EdPsych Services** (Box 1870, Phoenix, AZ 85001; 602-253-6528) has developed a series of twenty games for children ages three through twelve. *Games for Kids* operates on Apple II Plus or IIe and features music, sound effects, and color graphics. $39.95.

☐ *The Computer Phone Book* is a new offering from **Plume** (New American Library, 1633 Broadway, New York, NY 10019; 212-397-8000). The phone book is a comprehensive directory for personal computer uses such as games, dating services, stock market reports, sports news, and so on. $12.50.

☐ *Computers for Everybody—1984 Buyer's Guide* has been released by **dilithium Press** (8285 Nimbus S.W., Suite 151, Beaverton, OR 97005; 503-646-2713 or 800-547-1842). Written by Jerry Willis and Merl Miller, the book gives facts that will help when making a computer purchase; 143 computer models are described in detail. $19.95.

☐ **Avant-Garde** (Box 30160, Eugene, OR 97403; 503-345-3043) now has on the market a sports software program called *Hi-Res Computer Golf 2* that is being translated into Japanese for a Tokyo, Japan-based computer firm. $34.95.

☐ **Broderbund Software** (17 Paul Drive, San Rafael, CA 94903; 415-479-1170) has released *Bank Street Speller*, designed specifically as an easy-to-use spelling checker for the *Bank Street Writer*. $69.95.

☐ **Marshfilm** (Box 8082, Shawnee Mission, KS 66208; 816-523-1059) has introduced two computer software packages. *Energy Series* and *Body*

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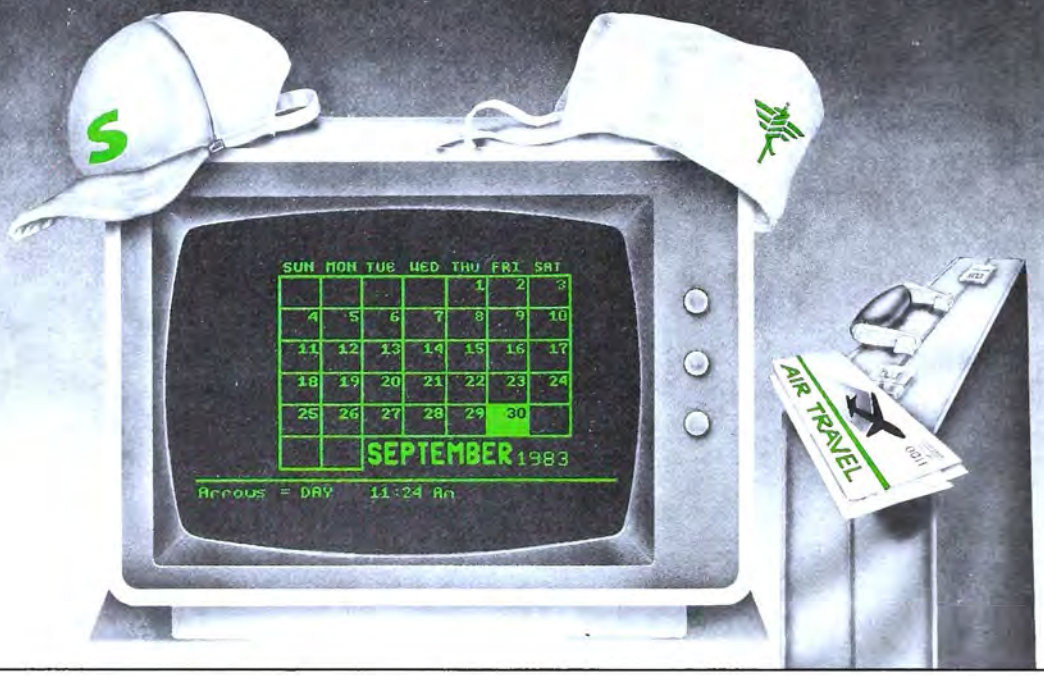
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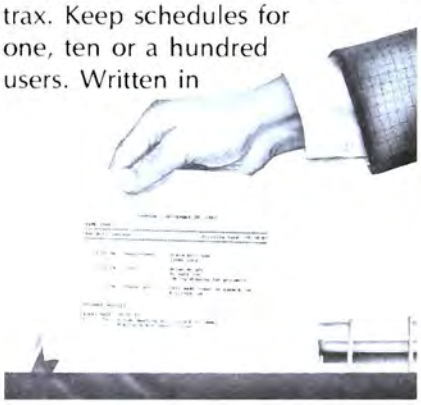


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Systems Series are concepts in computer-assisted instruction to be used before, after, with, or without the Marsh Filmstrip Series. The *Energy Series* retails for $106, the *Body Systems Series* for $135.

☐ *The Wire Tree* was developed by **Network** (203 Harrison Place, Brooklyn, NY 11237; 212-821-7555) and was engineered specifically for the personal computer. It provides protection against voltage surges, spikes, and radio frequency interference that can damage circuitry and affect computer memory. $69.95.

☐ **Magellan Computer** (4371 East Eighty-second Street, Indianapolis, IN 46250; 317-842-9138) has introduced the Magellan Light Pen System. The light pen does not require mental translation but interacts directly with the monitor or television screen. It allows single-dot editing on the Apple's hi-res display. $189.95.

☐ **The Apple Computer Clubs** (Box 948, Lowell, MA 01853; 617-452-9979) have been designed to bring together elementary- and secondary-school students wishing to share their experiences in computing. Over ten thousand schools are expected to organize an Apple Computer Club.

☐ *CAD from Centerpoint* is by **Centerpoint Computer Applications** (500 North Michigan, Chicago, IL 60611; 312-467-0333). The picture-drawing program allows the user to create, store, and plot any shape on the plotter. *CAD from Centerpoint* is designed to create custom shapes, designs, logos, diagrams, layouts, or schematics. $149.

☐ **Micro Library Software** (450 North Belt, Suite 292, Houston, TX 77060; 713-820-5770) has announced an acquisition of *Computer Cat* as part of its line of library/information-management software. An integrated circulation module for *Computer Cat* includes optional bar-code capabilities. $995–$1,200.

☐ **The Delaware Computer Faire** (51 Lockwood Road, Elkton, MD 21921; 302-736-4885) has been scheduled for March 17 from 8:30 a.m. to 3:30 p.m. The Computer Faire is being cosponsored by the various computer and education organizations and is targeted for kindergarten through twelfth-grade teachers and administrators, as well as parents and others interested in the current technology for the classroom and personal use of the computer. Registration fee for exhibitors is $30 per table.

☐ **Research Press** (4500 West Seventy-second Terrace, Prairie Village, KS 66208; 913-362-9667) has released a book for computer buyers entitled *Tax Breaks for Computer Buyers*. The author of the book explains in detail how computer owners and potential computer buyers can deduct their computer from their annual taxes. $9.

☐ **Micro D** (17406 Mount Cliffwood Circle, Fountain Valley, CA 92708; 714-540-4781) has announced two products. The Pro-Modem 1200 is a baud modem with a real-time clock/calendar that can monitor the duration and costs of calls being sent out over the modem. Other features include an automatic answering system, touch-tone and pulse dialing, and programmable dialing. $495. In addition, the Indus GT disk drives have been introduced. Features included on the Indus GT are a smoke-glass dust cover, LED CommandPost, metal type GT CruiseControl, GT DrivingSystem, push-button control for file protection, and removable cables. $217-$263.

☐ **Diversified Educational Enterprises** (725 Main Street, Lafayette, IN 47901; 317-742-2690) has several recently announced products on the market. *A Beginner's Basic Link* is a book written for fourth-, fifth-, and sixth-graders who are participating in computer-literacy classes. This manual introduces computers, computing history, flow-charting, and elementary Basic language programming. $8. *Balance* is a student interactive simulation that explores the interrelated variables affecting predator/prey relationships. Through the use of this program, students develop scientific problem-solving skills as well as skills of tabulation, graphing, and interpretation. $70. *Niche* is a program exploring the concept of an ecological niche. Students must attempt to correctly place one of five organisms in its proper ecological niche by specifying the environment, range, and competitor for the organism. $60. *Pirate* and *Rounding* are elementary math programs. *Pirate* is a search game requiring students to use deductive logic and math skills to find a hidden treasure in a matrix. *Rounding* is a program that gives practice in rounding numbers. If the student makes a mistake, the program uses a line to explain the correct method. $40.

☐ *The Microcomputer Software Directory* from **Computing Publications** (Princeton-Forrestal Center, 101 College Road East, Princeton, NJ 08540; 609-452-8090) contains information on software for the commer-

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cial, industrial, administrative, and educational environments. It is also aimed at both the current microcomputer user and executives who are considering buying computers. $35.

☐ Publication of *The Optical Memory Report* by **Rothchild Consultants** (Box 14817, San Francisco, CA 94114; 415-621-6620) has recently been announced. A worldwide source of information on computers and software is included in this annual service. $1,195.

☐ **CyberLynx** (4828 Sterling Drive, Boulder, CO 80301; 303-444-7733) is offering *Smarthome I*, an application for the Apple. It allows the computer to monitor a security system and control lights and electrical appliances in the home or office without tying up the machine. The product is sold in a basic starter-kit hardware/software package. Under $600.

☐ **MAG Software** (21054 Sherman Way, Suite 305, Canoga Park, CA 91303; 883-3267) has introduced *MAG/base 1*, *2*, and *3*, a database management software for micros and personal computers. *MAG/base 1* is used for list-oriented applications and report and forms generation. *MAG/base 2* is a business information management system with fully relational report and file processing capabilities. *MAG/base 3* is a comprehensive application development system with an interface opening the system to user-written programs. Prices for the three MAG/base products are $295, $495, and $795.

☐ **Beck** (Box 111, Main Street, West Peterborough, NH 03468; 603-924-3821) has announced its entry into the 5¼-inch floppy disk marketplace. Beck is manufacturing both single- and double-sided density disks. The Beck single-sided disk is $2.19, the double-sided disk $2.79.

☐ **Chang Labs** (5300 Stevens Creek Boulevard, Suite 200, San Jose, CA 95129; 408-246-8020) has introduced *FilePlan*, an electronic filing system that allows information to be entered in a spreadsheet format. The system uses rows to represent individual data records and columns to represent categories of information, or fields. $295.

☐ **Window** (469 Pleasant Street, Watertown, MA 02172; 617-923-9147) has announced the publication of *Mini-Songwriter*, a program designed for composing and playing melodies on a piano keyboard. *Mini-Songwriter* appears on-screen as a graphic representation of a piano keyboard. The user can change, erase, and add notes. $29.95.

☐ **Harcourt Brace Jovanovich** (1250 Sixth Avenue, San Diego, CA 92101; 619-699-6555) has released *Computer Preparation for the GRE*. The program is a learning system that helps students raise their test scores by diagnosing their strengths and weaknesses, outlining appropriate drills and review, and giving automatic scores and other features. $89.95.

☐ *Microzine*, a children's magazine in computer format, is now available from **Scholastic** (730 Broadway, New York, NY 10003; 212-505-3000). The magazine is committed to helping children use the home computer as a creative learning tool. *Microzine* is targeted to children aged ten and older. $39.95 an issue.

☐ **The Hayden Book Company** (50 Essex Street, Rochelle Park, NJ 07662; 201-843-0550) has announced a book/software package entitled *Pascal Programs for Games and Graphics*. The package includes two disks containing a collection of twenty-two arcade-style video programs and provides programming techniques and turtle graphics to show graphic utilities. $49.95.

☐ *Masterchart from* **Spectral Graphics Software** (540 North California Street, Suite 22, Stockton, CA 95202; 209-463-7309) is a business graphics program that can be used to create pie or bar charts; included is a color printer. $10.95.

☐ **Aames-Allen Publishing** (924 Main Street, Huntington Beach, CA 92648; 714-536-4926) has published *Word Processing Profits at Home*. The 210-page book gives the reader steps to establish and run a successful word processing business at home. $14.95.

☐ **Fountain Computer Products** (1901 Kipling, Lakewood, CO 80215; 303-232-8346) has introduced **Master Cat**, a program that makes a combined catalog of all the files on the user's disks, organized alphabetically. Once the master catalog is created, it may be printed out for everyday use. It is a system for organizing your disk collection so that program files are easy to locate. $39.95.

☐ **Readers Digest** (Pleasantville, NY 10570; 914-679-7000) has introduced *Learning Games* for the home computer. The software programs are designed to provide learning experiences from preschool through adult levels. Included will be word and vocabulary games, as well as games of strategy. $35–$40.

DIVERSI-DOS IS THE BEST

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READ**	42.2 sec.	12.4 sec.
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LETTERWRITER is an easy program to master, with all commands available to the user, always explained on the screens. After reading the manual for 15 minutes you should be ready to start, and the first perfect letter should come out from the printer in another 15 minutes. This is possible only because LETTERWRITER is designed not to be a sophisticated Word Processor but an efficient tool for producing letters.

HARDWARE REQUIREMENTS

Apple II + or IIe with 48K and 1 disc drive.

NAME & ADDRESS FILE

Time and efforts are often wasted on looking up correct spelling of the name, and accurate address. LETTERWRITER has therefore an accumulative file for more than 400 records, which can be accessed directly. A search typically takes 2 seconds, and can be alphabetical, numerical or any combination. As there is no re-typing involved the name and address is always correct.

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Certain parts of letters involve a lot of repetitive typing. It is therefore useful to have a selection of phrases to call up. With LETTERWRITER you make your own phrases and signing patterns, to be used for different types of letters.

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Name and address on letterhead or envelope or both; Left and right justification, underlining and dummy spaces; Country in address format; Mail-Merge with manual selection; Utility programs for making back-up disk copies and purging Name file, and more.

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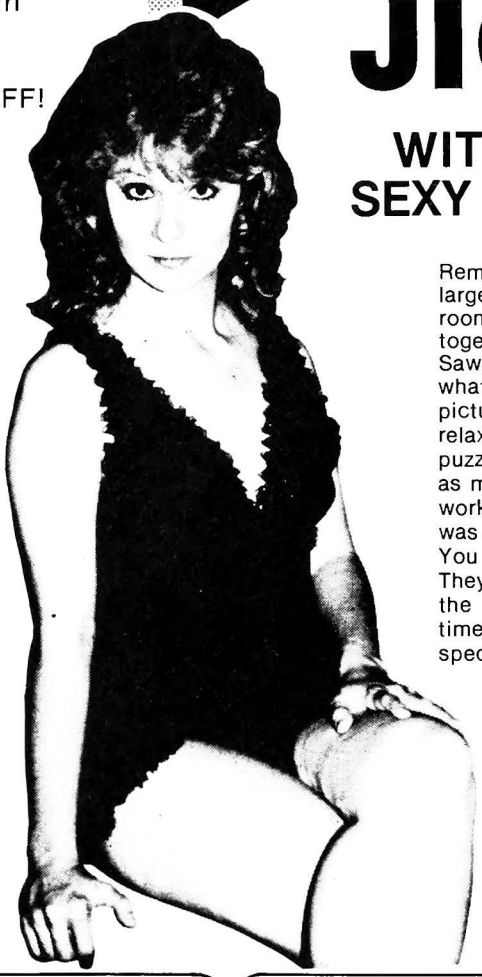
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You get all these features to choose from.

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3. Winning names are saved on disk to challenge future players.
4. The program comes with 10 Beautiful Colorful Sexy puzzles.
5. A save buffer on the disk is provided to save your picture and score so one puzzle might be worked over many evenings.
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☐ **Car Soft Company**, computer software for auto and aviation enthusiasts (Box 28313, Tempe, AZ 85282), has devised a program for the collector car owner. The *Restoration Record* program gives the owner of a collector's car the ability to retrieve past historic data of the automobile including information on parts or service obtained, where parts were purchased, the purchase price of the automobile, and from whom the automobile was purchased. The program also keeps track of car shows or events attended, whether for competition or display only, trophies received, and points awarded. $34.95.

☐ **Scarborough Systems** (25 North Broadway, Tarrytown, NY 10591; 914-332-4545 or 800-882-8222) has introduced two microcomputer software programs, *Songwriter* and *Picturewriter*. *Songwriter* is designed for users, ages four through adult, to compose music and learn music theory. *Picturewriter* teaches children ages four through twelve to draw lines, shapes, and pictures. Both programs are priced at $39.95.

☐ **Rosen Grandon Associates** (7807 Whittier Street, Tampa, FL 33617; 813-985-4911) has revised its general-purpose statistical analysis and database system, *A-Stat 83*. The package is designed to optimize the power of the micro by employing many mainframe design concepts. $200.

☐ *The Tax Advantage* by **Continental Software** (11223 South Hindry Avenue, Los Angeles, CA 90045; 213-417-8031) is available for Apple II and IIe. A tax-planning and assistance program, it helps in filling out U.S. form 1040 and related tax schedules. $69.95.

☐ *Copy-Cat* is by **Southwestern Data Systems** (10761 Woodside Avenue, Suite E, Box 582, Santee, CA 92071; 619-562-3670). A copy and catalog-editing utility, features include file copying, converting, comparison, locking, unlocking, deleting, undeleting, and verification. It will also initialize disks, copy DOS, change greeting program names, test active sectors, and graphically display the VTOC map. $29.95.

☐ *How To Use Your Apple IIe in 10 Easy Video Lessons* has been introduced by **Kennen Publishing** (150 Shoreline Highway, Building E, Mill Valley, CA 94941; 415-332-5825). The fourth in a series of instructional video tapes designed to conquer computerphobia and make computer literacy an easily achieved skill, the Kennen tape incorporates more than sixty opportunities for the student to learn at the actual keyboard/screen, comparing performance and accuracy with the cassette's visuals. $69.50.

☐ **Computer Technology Associates** (New Products Division, 1704 Moon N.E., Albuquerque, NM 87112; 505-298-0942) now has an expansion card that turns the Apple into an erasable/programmable read-only memory (EPROM) programmer. CTA's Apple-Prom programmer system includes hardware and software to program all common EPROM types without use of "personality modules" or other hardware modification. $149.95.

☐ **Electronic Protection Devices** (54 Sun Street, Waltham, MA 02254; 617-536-3003) unveiled its new Fastrain product recently. Fastrain is designed to help users learn today's most popular software packages without struggling through complex documentation or attending lengthy training sessions. Using audio cassettes and software simulations, Fastrain teaches people to use popular software packages for microcomputers through a unique combination of sight, sound, and hands-on experience. $149–$498.

☐ **Sterling Swift Publishing Company** (7901 South IH-35, Austin, TX 78744; 512-282-6840) has announced a new courseware package, *The Money Manager: A Personal Finance Simulation*. The package provides a basis for personal finance activities. Guides and workbooks range from $4.95 to $74.95. Disk $9.95. *Super Quiz II*, also by Sterling Swift Publishing, is part of the ETTA series (Educational Tools for Teachers and Administrators). The objective of the ETTA series is to provide teachers, administrators, and counselors with assistance in the use of microcomputers to perform tasks more efficiently and effectively. $49.95.

☐ *Bibliography of Computer Periodicals* is a six-hundred-page book that serves as a comprehensive directory of magazines and newsletters serving the computer and software industries. The reference book, which can be ordered directly from **Data Courier** (620 South Fifth Street, Louisville, KY 40202; 800-626-2823 or 502-582-4111), contains information on 533 publications and serves as a reference guide for identifying specific industry periodicals for library, public relations, or publishing purposes. It also contains a publisher index with cross-references to locate publications with title changes. $50.



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ONLY A DAY AWAY



Industry Leaders Talk about Tomorrow

COMPILED BY TOMMY GEAR

At the end of 1981, *Softalk* asked a number of people at the forefront of the Apple world to look into the future and share with readers what they saw. Many of them told of things that seemed surprising and far-fetched at the time. In retrospect, it seems even more surprising that many of the things that were pondered then have already become realities.

It's a couple of years down the line now. Once more, *Softalk* has ventured to ask the cogniscenti of Appledom to become seers. But seers usually speak only of what will be—our voices speak also of the challenges we face right now.

The points of view are various. Each individual offers a unique perspective on the changes taking place in the microcomputer world. Note well, for these are the movers and shakers—together they will shape the way those changes take place.

Certain themes appear to emerge. A new breed of computer is on the horizon—one that many will be able to relate to more easily, one that can respond more like a person, and one that won't cost any more even though it offers more. Along with that will come some stiffer competition—the bigger, more powerful companies will try to eclipse many smaller ones. We're warned to hold on for the dreaded industry shakeup.

But, from all this, standards will evolve that will make it easier for creative programmers to reach the growing number of users and the expanded vertical markets. There's concern over the effectiveness of our education establishment to teach the skills that will enable our boys and girls to play an effective part in our increasingly information-processed society.

Finally, there are dreams of games yet to be written, fantasies we have yet to create, for which the technology is barely within our grasp. Like a partially rendered connect-the-dots picture, the future takes shape through imagination.



Stan Goldberg

Up to now the software industry has provided real creativity, a lot of it from companies that operate like cottage industries. Now the creative people who started out on their own must find environments they can exist in while still being creative, without having to be party to more establishment-type companies that might crush their creativity. That's going to be a big challenge. Without question, many small companies will go out of business. The distributors in this industry have preordained it by the way they have chosen to define their margins. The actions of the retail industry people have set the stage for the massive shake-up that we're seeing now. As a result, we'll be seeing fewer software products on the market, but the ones we'll see will be of higher quality.

Schools in the inner city are not doing all they should to introduce their students to computers. They must, if our society is to be viable and remain strong economically. This is an area in which the microcomputer industry might be able to do some good, a way we could pay back society for giving us the possibilities for making a good living, a way to show our gratitude by helping in these areas. It's our responsibility as citizens, and it's also the responsibility of the schools and the people in the inner cities, to make their needs known. Back in the early sixties, all of us growing up felt that tomorrow was going to be better. In the last twenty years we've lost that feeling. The population as a whole doesn't think that tomorrow is going to be better. I think computers can give us a chance to rekindle that old American dream, but I don't think it's going to be easy.



Bruce Artwick

Christmas 1983 kind of marked the end of an era for what I call the 1977 class of computers, such as the Apple, the Atari, even the Commodore 64—the simple one-megaHertz 6502 type of machines of the 48K to 64K range. Toward the middle and end of 1984, we'll see a new class of computer with five to ten times the processing power and with graphics displays that are much better.

We can expect to see more in the way of custom large-scale integration, especially in the area of graphics controllers that bring high performance at a low price. I don't think that especially means thirty-two-bit, but high performance sixteen-bit and also custom graphics chips. We will see chips that will have built-in spectre generators and shading devices.

I think a few upcoming machines from Apple are going to fall in the thousand-dollar price range and those will start coming out next year. But Apple II is not a dead machine. It's going to find its place a little further down the price scale because performance-wise it's not going to be able to compete with the newer machinery. A lower-priced version that is rumored to be in development—a repackaged Apple II with not as many or no expansion slots, and more custom LSI, a smaller package selling for about $600 or $700—might happen in the coming year.

I think it's Apple's goal to develop something vastly superior to their old model, and then have it be in their product line for many years. Instead of making a lot of little changes along the way, Apple would rather take gigantic steps all at once, and I think that's a good approach.

In software especially for entertainment, the emphasis is going to be on more depth rather than on speed: better graphics, more sophistication in game strategy, and much better sound. A lot of game designers are having problems when faced with a new machine because all the tricks they use to make their regular games go so fast aren't needed. The question is not how to squeeze all the processing power and memory out of it, but what to do with the processing power available. Games that give you a big world inside the machine to explore are more possible with lots of memory and processing power.



John Sculley

I think one of the important trends will be the thirty-two-bit processors. It has started with Lisa, the first really affordable thirty-two-bit-processor microcomputer. Apple will have other products, too, at lower price points. We expect that other people will also have thirty-two-bit processors.

We believe that the thirty-two-bit-processor products are probably going to be the standard for the rest of this decade, particularly with the business market. They may very well play an important role in the consumer market too, because of the power of thirty-two-bit hardware and the amount of firmware we're building into our products.

Something new that is going to be important with thirty-two-bit products that hasn't been apparent with eight- or sixteen-bit products is that the application environment will reside on top of the operating system. And the application environment will have all the hooks in it that programmers need to develop their own programs, but it will allow them to develop programs with greater simplicity. We think this will probably open up a whole new range of software opportunities, both in the business market, in colleges, in schools, and at home.

The Apple II will be an important mainstream product for at least another four or five years. We're spending a lot of time and money to keep it up to date, bringing to it many of the things we're developing with our

higher performance products.

The fact that the computer industry is going through a shake-out right now isn't surprising. Every other large, fast-growing consumer-based industry has gone through a shake-out of some sort. I expect that the shake-out is going to take a lot of the volatility out of the industry. While there are virtually hundreds of different vendors offering personal computers, there really are very few that are offering significant breakthrough products.

We're going to support the MS-DOS option with Lisa over the next year, and recently we authorized the development of an MS-DOS accessory by Rana Systems that will work with the Apple II. We want to provide gateways for people who want some level of compatibility between Apple and IBM products. But we don't really believe that's where the market is going to take us over the next couple of years. The technology isn't frozen; it moves very rapidly.

We think Apple's role in the industry is to be the prime innovator technology. It's a role that IBM doesn't need to play because of its size; it can wait and see how successful Apple is and decide whether it wants to participate in a market, as it did with personal computers in the first place. Apple wants to play a very major role in determining what the operating standards are going to be for thirty-two-bit personal computers, because there we can be active—rather than reactive in trying to catch up in the sixteen-bit world.



Gene Sprouse

It's coming down to a race with very few horses in it. Certain compromises that IBM made in the Junior will make that machine less desirable for a lot of people, so I don't think it's going to hurt Apple, but it could hurt a lot of other people.

Still, the PC*jr* will bring respectability into the market. I don't see this development as ominous at all; they're going to open the market for everybody. They're going to make us more legitimate.

The only thing that will come close to an operating standard will be IBM's. I think it's a crummy standard, but it exists: MS-DOS will become a standard whether you like it or not.

In software you're going to see more and more of the big players coming in. Many smaller entrepreneurial specialty software houses will be bought by the big guys. You'll see that all over the place, all the entertainment companies—RCA, CBS, Milton-Bradley—are buying up many small software businesses. Once the controlling companies get large enough, innovation will be stifled and quick reactions to the market will become difficult to get because more layers of bureaucracy will exist.

Computers will cut down a heck of a lot of commuting because a fair amount of people will be working at home. Telecommunications is going to become a bigger and bigger thing, especially with computers in the home.

I think the next rage is going to be home-controlled robots. A robot that does the floors will open the market. Homes will have to be designed for robots. Designers will include circuitry in the walls, plugs, and other things to permit other kinds of control with or without the robots.



Scott Adams

I think there's going to be a bit of an industry shakedown in hardware. In the future we may only have five brands of machines to choose from. It looks pretty obvious that the IBM PC*jr* is going directly to the Apple IIe market. IBM's going to give Apple a definite run for the money with that machine. It's already happened as a matter of course that IBM has set a standard in the industry. Eighty percent of business software being written today is MS-DOS-compatible.

Once the giant steps in, it sets the standard. I think that's good for the industry. It makes it harder for others to retain an individual image, but the more standards there are the easier it is to bring out software.

Apple is starting to become the Cadillac of machines, but less and less of the market share is carrying it.

Twenty-five or thirty years from now computers will be completely accepted. They'll be just another tool, like pencils, paper, or calculators. The computer is going to be the equalizer, bringing people to the same information level. You can go out and buy a Vic-20 now for eighty dollars, the TIs sell for fifty dollars. I think computer power will be affordable by all.



Bill Budge

Computers are obviously going to get more powerful in the next five years. I personally would like to build huge programs that actually do useful things. The home is the perfect place for larger expert systems because there you want a program that doesn't require a lot of knowledge to use.

There's certainly a trend toward building plug-ins for the Apple II. Right now the Apple II is sort of useful, but it's got a life span. There are some things being developed now to make sure the Apple will still sell, but as manufacturers can build better systems cheaper this may change. They'll have to do things to upgrade the Apple II because of all the software out there. People will stop writing software for the Apple II at a certain point when it becomes impossible to get a better word processor or a better database. People will be migrating to other computer systems, to more powerful machines. Within five years, everyone who has an Apple II now will have a Macintosh; it's better.

In twenty years, modems will be built in with color graphics. There will be peripherals like you can't imagine. The only reason the mouse exists is because you can't tell the computer what you want it to do. In twenty years, you'll just talk to your computer. Your whole desk will be a screen. You'll be able to write on it, type on it. You'll be able to see a whole document laid out in pages. The screen will be really big or horizontal, or maybe even like a whole wall at an angle.



Bob Christianson

Things will continue to be good for software people; no matter how hard the times get for hardware people, software will always be in demand. And people who are coming out with small computers are going to have a lot of trouble.

The influence of the Apple II and IIe will probably drop off dramatically in 1984; Apple's best hope is that the Macintosh will do well. Obviously, the Lisa hasn't come up to expectations so far. I hear a lot of enthusiastic things coming out of Apple, and those of us who are Apple-wise certainly hope that Apple continues to do well. They've been one of the best companies for recognizing and appreciating efforts of third-party software and peripheral manufacturers. Continuing that attitude will go a long way toward Apple's succeeding with whatever hardware it comes out with. That attitude is one of the main reasons Apple has been so successful.

With an overall decrease in computer anxiety and other phobias and fables about computers, more people will be coming into the market. This will help create a much better vertical market. The game market will pretty much go to the larger companies and you'll get poorer games in general as a result. On the other hand, several games will be better. There will always be a place for very good versions of the more sophisticated computer games. Playing games over modem, games with

really sensational graphics and quick response, is a very natural and likely way for the technology and general game market to improve.

I think the computer's impact on our daily routine will be gradual rather than an overnight phenomenon. Until a younger computer-wise generation starts to run their own households, it will be very difficult for the public to accept shopping or communicating by computer.

I'm not sure computers are going to contribute a great deal to our ability to communicate, but they will allow us, perhaps, if we choose, to communicate in a more effective manner.

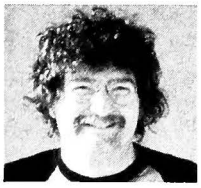


Mark Simonsen

The general trend for the future will be smaller, faster, and cheaper on everything.

We'll see more memory in microcomputers generally: Pretty soon 128K is going to look like 64K does now. Bit-mapped text screens like on the Lisa will become more of a necessity too. There probably won't be such a thing as a text screen per se. There will be higher resolution monitors like on the Lisa. You'll also be able to have color at every pixel, unlike the way the Apple II now works. Whatever somebody will dream up and integrate into any of the other new computers, somebody else will develop a board that you can put in your Apple II to closely approximate that new feature.

If it's not possible to run Apple II software on the Macintosh, somebody will certainly write an emulator for it.



Mark Pelczarski

With the Apple, the trend will continue toward much more friendly software—very easy to use for a person who doesn't know anything about computers. I think we'll see easy-to-use, Lisa-type stuff on the Macintosh and the Apple IIe. That's going to be the biggest trend in terms of software.

I tend to think that Apple's in a real good position. I have had no better dealings with any computer vendor than with Apple. And I think the IBM machines are very disappointing compared to what they could have been. If you compare the Apple machines and the IBM machines, the Apples are far superior and more advanced technically.

Every computer is going to be hooked up to a phone within ten years, easily. There'll be a lot of local networks all over the place, and probably networks of networks. Being able to communicate with people and leave messages and get special interest groups together via networks would be a way for people to get interested in solving a problem, to get together to share information and work together.

Right now computers are a significant new toy. They're very useful in a small business or for people who work free-lance for one reason or another. But most people don't need computers. When we get to the stage where there's a lot of networking involved, electronic mail and so forth, then you start adding a lot of new capabilities that people will actually be able to use.



Paul Warme

Software development is significantly behind hardware development. I don't think we've tapped the potentials of even the least powerful computers.

As the market develops we'll see an increased concentration on specialized software. Right now most software is very general, and because it's general it's not as easy to use. As we concentrate on specific applications, the software can be tailored more to the user and it will become easier to use. The breadth of users will increase, but there will be more users who have less experience.

The limiting factor in using a computer now is the rate of input and output. I think that voice input will become a major form of input in the near future, but even that will be limited by speed of input; so various forms of shorthand will arise. First, these may take the form of short vocalized sound cues, grunts, or whistles.

Some people will become virtuosos in using sounds to input commands to a computer; they'll be able to do so very quickly. Consequently, there'll be a desire for an even closer linking of the computer to the human brain. In the long term, computers will be directly connected to certain nerves—already we've learned that it's possible to control artificial limbs by tapping some of the nerves in the arm.



Ron Unrath

I think there are enough users now in the marketplace that it will be cost-effective to reduce prices, and we'll see a general trend of prices coming down across the board.

In the next few years a good deal of the work force will be working out of their homes on microcomputers hooked to companies via telecommunications. Telelinks to banks, grocery stores, shopping centers, and department stores will proliferate dramatically. The bottom line is that we'll be able to do more than ever from the comfort of our own homes, via the computer.

Widespread computer use is certainly going to start in the upper income groups, just as television did in the fifties. But it will filter down as prices drop, and we'll see it spread into more and more homes.



Ed Zaron

The big issue to me is the marketing situation. A hot technical product can still make it these days, but not unless you have a couple of million dollars behind you to help market it, as is the case with Lotus's *1-2-3*. The big battles this year have to do with getting shelf space and trying to capture the market at the level of the mass merchandisers as well as the independent retail stores.

There hasn't been enough emphasis on using the computer as a communications device in the home. Telecommunications is going to be a very important area.



Andy Thompson

There will be a great sophistication of software. Lisa is the prototype. There'll be much more intelligent information processors, database programs, and engineering programs and more sophisticated data input relational query systems and user interfaces.

Users will be more able to describe exactly what they want computers

to do. Data entry will be much closer to the way people think or talk. Preprocessors will be able to figure out what users want from simple dictionaries of natural language input statements. We will see more intelligent data entry tools in general.

The technology for voice recognition is around, but I don't think it'll come around in a big way in 1984—although it will by 1985. Who wouldn't rather talk to a machine than type to it?

The computer will become an absolute necessity as opposed to simply a convenience. I also think we'll see an increasing trend toward people doing their work outside of the traditional business environment. People with jobs based upon knowledge and access to knowledge bases won't need to be organized around large corporate environments.

The thing about predicting the future is that some of the things that seem outlandish will come true, and other things that seem straightforward may never occur.



Bert Kersey

I'd like to see typesetting become as cheap as word processing. I also wish floppy disks would die in favor of some more practical medium, something more durable that you can throw around and not worry about, like we do paper. I'd like to see a grammar checker built right into the microcomputer, and printers with switches on the outside for enhanced type or different fonts. I'd like to see 2-D movies in books, and animated advertisements. You could flip through a magazine, and looking at an ad would be like looking at a movie.



Terry Bradley

In the long run there has to be a cheaper way of getting software, especially entertainment software, into the hands of the end user. One way would be through systems that use a master computer with all the games on it. The customer could ask for a game and it would be manufactured on the spot. The documentation could come off of a printer.

It's claimed that every fifty years we make as much progress in technology as the whole planet has made in its entire history to that point. Many times a product is outdated as it's coming off the drawing board. Atari, when it produced the 600, found itself with a machine already surpassed by existing technology.

Standards are starting to emerge in personal computing. When we finally settle on two or three hardware standards, we'll start to see software being standardized. Five years ago, this would not have been desirable. Standardizing an infant industry early cuts off any real growth. But where would the light bulb industry be if they never started standardizing? Where would the automobile and tire industries be if they hadn't started standardizing?



Steve Wozniak

Within the next year or so a lot of standards will have to evolve. The swing these days is toward IBM because people know that will be a for-sure standard—in operating systems, for one. Technology now makes it doubtful that the most efficient standard was chosen even for things like the RS-232 connection. It may be that printers are standardizing, becoming Centronics-compatible, and it might take several years for these issues to evolve fully.

Obviously anyone that sees or uses the Lisa/Macintosh user interface style realizes that it will be the only choice for computers by the end of the decade. And this is a good direction for the Apple II to be in—it's happening already with the use of a lot of hi-res screens, even for text in different fonts, treating the screen as bits rather than characters, and with windowing. It's more efficient.

One problem we've got is that there are about twenty video modes in the Apple IIe. In the Lisa or Macintosh there's one video mode and it does everything. That's a level of simplification that becomes very affordable when RAM costs come down. You really will want the one video mode and just have graphics and text all on the same screen. Performancewise the eight-bit machine would just be running those high-speed versions of the processor as a way to get higher performance.

For nearly ten years, the cost of the typical system that the end user wants has remained about constant, but the functions have gone up. It's pretty obvious that the prices of microcomputer systems aren't going to go up in the next year to two years, but by two years from now 256K will be the standard in every single micro.

Taking a look at the major peripherals on the IIe that are doing well gives a good idea of the directions it could go in. First there's higher speed, like the Saturn accelerator board provides, better eighty-column capability, and some built-in accessories. In the Apple II line we ought to head toward things like speech, music generation, all the arcade boards—but I don't think sprites are needed just yet.

In ten years we'll be able to have the equivalent of the Apple II for maybe a couple of hundred bucks. In other words, we won't be spending more than a couple of hundred bucks per student. There is no way to imagine a thousand-dollar computer per student, because today there is nothing available that's near a thousand dollars for students.

We could actually get by okay without too many computers in school. I hate to say it, but the computer is not the only key or the only way to live your life. Only a small segment of people will have to talk very well to computers, and they'll be largely computer programmers and developers. Other than that, we should be able to get the basics in school. Will computers make IQs go up? I have doubts, it's not clear to me.



Doug Carlston

The future is reasonably foreseeable, at least in the short run. Computers are going to be used for a pretty predictable set of uses, mainly because computers aren't really that novel an idea—they've been around for a hundred years. What we will experience is a change in their level of penetration into our lives.

One thing that isn't happening and isn't likely to happen in a major way is people working at home and using the electronics to communicate with the workplace. People will use electronic mail to the extent that they previously used the regular mail. They'll live in remote places if they're oriented to living in remote places. Most people don't find that choice particularly appealing; they want a workplace. The suggestion that microcomputers will be changing the cities because people are going to move out of the urban environment is probably a lot of bunk.

In a lot of ways the most dangerous consequence of the computer's evolution is the segregation of the population into classes based on an ability to control their environment. People who understand computers will have an enormous advantage over people who don't. People who can control computers will have an even greater advantage. More and more substantive work is being processed by computers, and people who are uncomfortable or unfamiliar with them are being excluded from the work marketplace in job after job. That creates an enormous barrier, but not a novel one. The same thing happened with literacy when ours became a written society. People had to be able to read to hold major jobs; the illiterate found themselves at an increasing disadvantage. That was the initial impetus for mass education. It became apparent that if you

couldn't have reading skills you were at an enormous disadvantage in the marketplace. Computer literacy is of a different kind, but it works the same way.

The computer revolution is novel only in one respect: in this country, and in this country alone, you find that an enormous percentage of the successful software programmers are self-taught. And it's because the school system is incapable of teaching them. In other countries it's reasonable to expect to get a computer education through the school system. Apparently, that's not a reasonable expectation in the United States.

We aren't turning out a large number of people who have the basic tools to understand the computer revolution and make proper use of it. Americans are always looking for an easy way to do things. Learning higher math, for example, involves a lot of hard work. Even if you find a way to make it a little easier, it's still going to be a lot of hard work. To the extent that sugar coating and shortcuts are valued as solutions, people are going to be misled; they'll expect these simplifications to make hard subjects easy, and hard subjects are never going to be easy. Even if you understand the principle behind finding areas under curves, you're still going to have to learn how to do it technically. Understanding the principles behind some technique gives you a framework for organizing information, but there is still an enormous amount of straight information you have to learn to do it.



Bob Clardy

During this last year I have seen people buying micros who had never before considered getting one. They are people who have no interest in programming whatsoever. The era of the user has really hit. Two or three years ago if you bought a computer you probably had it in your mind to do programming. Now people that are strictly users are buying them. As a result software will get easier, simpler, and more idiotproof.

This is going to change the industry—it's already begun. The ads aren't aimed at the hobbyist anymore; they're aimed at the users who don't want to know much about their systems.

At the same time there's more effort to get computer literacy into the high schools and grade schools. This effort is noble, but it hasn't been very successful so far. It's disorganized and schools don't seem to have any idea where they can get good educational software.

We're becoming an information society, an information-processing society. The schools aren't preparing enough kids well enough for the large number of jobs that will require working with computers.

Education is getting better, but it's still way behind where society itself already is. An enormous number of people in our society are already converted to being information processors. We no longer make products; we massage information and put it back out there. Hopefully the schools, the newspapers, and the magazines will catch up with this information distribution problem.



John Victor

The school market has pretty much taken itself out as a viable market for educational software. There's no way a vendor can make money selling to the schools. The people who have a chance of making any money are selling educational software to home users. This means the manufacturers themselves have to encourage educational home use of the computer rather than institutional use. In the long run schools are going to have to use the same home software everybody else is using, set up not with the classroom in mind but with home use in mind.

Eventually, this will mean that schooling will be more like home education. The classroom method of instruction is probably the least effective method we have at our disposal. Schools—and parents—are wedded to it from blind tradition. Schools aren't given much choice in a lot of cases, politically, to break out of it.

There are two conflicting theories. If you define your educational objectives sufficiently, the better your definition the more rigid your educational system is going to be. In the B.F. Skinner approach, you're essentially teaching kids to memorize and have very clearly defined objectives. On the other side is the Dewey approach, with very vaguely defined objectives; education is almost accidental. There's always going to be a conflict in education between those two poles.

The conventional wisdom in the computer industry is way over on the Dewey side. We're getting educational products that have very poorly defined educational objectives. I term these products fluffware. Whether they teach anything is a very serious question. For people to know they're getting somewhere, there has to be a better definition of what's being taught. That's going to push it back, to some extent, toward the Skinnerian approach.

We'll still see both approaches. Nobody wants to get tagged with the label "drill and practice," because drill and practice is currently anathema. But if you're transmitting a set body of knowledge, like the rules of algebra, having people discover a rule of algebra by accidental play is a time-consuming process. It can better be taught straight out. The discovery approach works well for certain kinds of things; it does not work well for straight transmission of factual information—a programmed instruction approach. You could teach the ground rules of, say, international relations by programmed instruction. Then you could use simulation to teach the process. To have the student learn both the ground rules and the process by simulation is very inefficient.



Virginia Lawrence

I have great fears for women in computing. We all know that if you have a boy, he has a friend for life in the computer. Girls are not signing up for computer classes and computer camp. I think that's simply because ads are showing more girls than boys now. Parents should start pushing girls into it a little more or they will be left behind.

It's very hard to reach the homes to get the parents to encourage girls, or even to think it would be as important for a girl. I would like to see enough computers in schools so girls could learn programming, along with a feeling for what they could program. Girls should not necessarily just be pushed along with the boys in the same direction.

If some computer work could be made compulsory in every school, computers might be a step toward solving problems that separate the classes.



Roger Wagner

There's a misconception on the public's part about how much they know about computers and how much they need to know. People draw analogies to things like cars and stereos, saying that computers should be as easy to use. What they forget is that high schools put sixteen-year-olds in driver's training for a semester. But with computers, some people either see them as a threat or they want to understand them instantly. They forget that they don't comprehend anything in life instantly. If you want to learn Spanish, is it really a universal injustice that you have to spend two years to learn how to speak it? Is it the fault of language teaching that it hasn't been reduced to a five-minute process? Over the next fifteen years, when all the people now learning to use computers in school grow up they'll look back at magazine articles about how hard the stuff was to use and they just won't comprehend it.



Warren Robinett

I think one reason personal computers have been so popular is that they provide an interaction that is a function of how much sensory stimulation is possible in a short period of time. That's one reason that video games are so attractive to kids. When you cut out the colors you cut out a lot of that. This is just based on my gut feeling about what's wonderful and what's not. Color is important.

I'm interested in interactive graphical simulation. I think that phrase sums up what graphic video games and a lot of other personal computer programs are all about. I include *VisiCalc* and word processors under that umbrella.

VisiCalc is a graphical simulation. It's a simulation of two things: It has a space larger than the screen, so you can get rows and columns that continue off the screen; and it's a simulation of a network of equations. Word processing is a simulation of a typewriter combined with scissors and paste. And just about every video game you can name is a simulation of something.

Interactive graphical simulation describes the most important, the most interesting, and the most successful microcomputer programs and video games of the past five years. And there are still unexplored realms to be simulated that will prove to be just as exciting, if not more so.

It seems that video games are ready to branch out into things like satire, for instance. If people want to make games about subjects like nuclear war, I think they certainly should do so. Games should be free to put forth different views on a subject. It's like literature where we presumably arrive at some sort of balanced opinion by letting different people state their cases, and judging which is the most meritorious. I am violently opposed to censorship in any form.



Joel Billings

I look forward to the day when one can just get on a network and play games with people, and that's maybe five years away. I'd see that as a real innovation in game playing, to be able to start playing the majority of computer games against other people instead of just against the computer.

There's no doubt that there's a glut in the marketplace of certain kinds of items. Only a very few people will be competing in the area of strategy games. Those that will be competing are coming in from traditional board game companies. Our market is going to continue to grow because we're going to grow in direct proportion to the number of computers bought by war gamers and strategy gamers. Whenever these people buy a computer, they're going to switch over and start playing computer games, and game boards are in trouble. We still have a long way to go before everybody has a home computer.

I certainly hope American manufacturers figure out what the Japanese have figured out: To standardize their hardware. I don't see it happening, though. Americans are too individualistic to standardize on one system. From the software end it's really a disadvantage. We spend half of our resources converting ideas that've already been executed on one computer to run on another machine. With standardized hardware, that talent could go into making better games, better products.



Dan Gorlin

Computer games will become more meaningful to more people. As they become more interesting, they'll get closer to other fine art forms and become something that appeals to the higher sensibilities of man, his aesthetic values. I see them as being like interactive movies. Imagine taking the visual impact of a Kubrick film, adding the complexity of a Dostoievsky novel, putting that with the attraction of a real-life situation.

I could foresee the development of a kind of home video cubicle that integrated a lot of different functions. It would provide a connection between user and machine as much like the real world as is technologically possible. For example, it could have stereo optical effects with parallax so that when you turned your head everything would change as it does in real life.

Once a hardware unit like this becomes accessible to everyone, we'll also use it for other things, like learning to find your way through a strange city; it will become a very powerful educational tool. Ultimately, if an interface is developed to connect these machines directly with the human brain, what we'll have is a controlled reality by consensus, rather than reality by reality. That's just what everyone wants: The perfect user-to-machine input, perfect knowledge for everybody, instant access to information, and instant control over the environment. It might end up that the simulated reality will become so appealing that people will stop being so concerned about actual reality. This computer medium that was originally intended to control the environment may eventually wind up replacing the environment. I don't necessarily advocate this, but from a programmer's point of view it's certainly a titillating prospect.



Mike Berlyn

We'll see attempts to get software to work more the way a person thinks. This will have a lot of ramifications. If we're wrong about the way we think that people think, it could be disastrous for the computer interface. Windowing is heading in a different kind of interfacing direction than we've had before, trying to get things as close to a human level as possible. That's good, but it's only the first step. I think we're going to see software that thinks and understands and knows about the person who's using it.

We're developing the capability now of doing things that allow games to transcend their traditional boundaries. I think the computer, used thoughtfully as a participant in a game, can be absolutely mind-boggling. The thrills, excitement, and emotional reactions one gets from living can be experienced through gaming now or in the future.

Computers are like pets, you know; at some point everybody's going to have one to interact with because they're cute. And they can do stuff. When people start treating computers as pets or as surrogate friends, a new, broader, stronger idea of what a game can be will come into play.

Think what kind of environments could result—computerized environments in which you could exist for years, games in which you're doing things you could only do on the computer.

Picture yourself sitting in an overly large chair that wraps around you. You close your eyes and the chair actually stimulates your nervous system. It makes you think, and see, and experience being on a roller coaster. Are you there or aren't you? Think of the places that you could go, the adventures you could have.

The real question in everyone's mind is, when are these things going to start to think? With more memory, faster processors, and more sophisticated programming techniques, we'll end up with awareness in the computer. Everybody's pushing for it, and it's going to be here soon.

Scott Adams, creator of the SAGA adventures, is cofounder and president of Adventure International; Bruce Artwick, creator of the original *Flight Simulator*, is president of SubLogic; Michael Berlyn writes science fiction novels and adventures for Infocom; Joel Billings is founder and president of Strategic Simulations; Terry Bradley is cofounder of Sirius Software; Bill Budge, president of BudgeCo, creates games for Electronic Arts; Doug Carlston is founder and president of Broderbund Software; Bob Christianson is cofounder and executive vice president of Quality Software; Bob Clardy, creator of *Wilderness Campaign* and *Odyssey*, is founder and president of Synergistic Software; Stan Goldberg is cofounder and president of Micro Lab; Dan Gorlin created *Choplifter*; Bert Kersey is founder and president of Beagle Bros; Virginia Lawrence is chief executive officer of Human Systems Dynamics; Mark Pelczarski, creator of *The Camplete Graphics System*, is founder and president of Penguin Software; Warren Robinett created *Racky's Boots;* John Sculley is president of Apple Computer; Mark Simonson created Beagle Basic; Gene Sprouse is president of Rainbow Computing; Andy Thompson is founder and president of Spectrum Software; Ron Unrath is founder and president of Phoenix Software; John Victor is founder and president of Program Design; Roger Wagner is founder and president of Southwestern Data Systems; Paul Warme is founder and president of Interactive Microware; Steve Wozniak, designer of the Apple, is cofounder of Apple Computer; Ed Zaron is founder and president of Muse. ■

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SCREEN WRITER II™	2
PIE WRITER™	3
WRITE AWAY™	4
LETTER PERFECT 5™	5
WORDSTAR™	6
MEGAWRITER™	7
APPLE WRITER II™	8
PERFECT WRITER™	9
CORRESPONDENT™	10
SPELLBINDER™	11
MAGIC WINDOW II™	12
ZARDAX™	13
SUPERTEXT 40/80™	14
GUTENBERG™	15
WORD HANDLER™	16
SELECT™	17
SANDY™	18

Reviewed by John Martellaro, September 1983

In the words of the Peelings II reviewer: "This is the best program I have seen for people who do a lot of work with mailing lists, form letters and short correspondence."

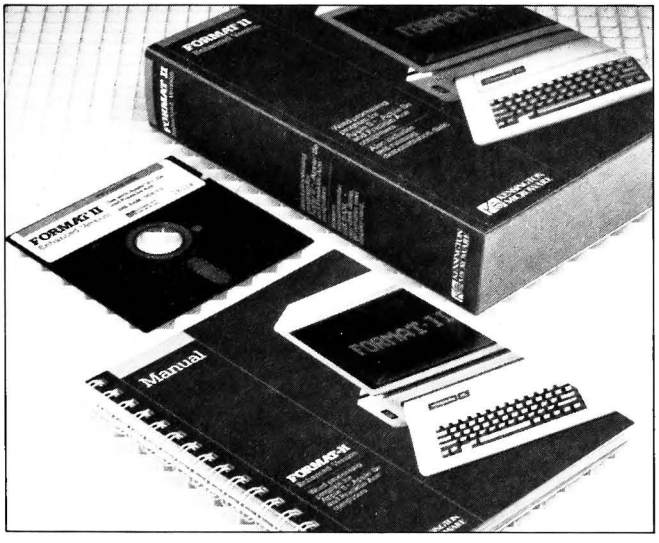
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MARKETALK

Reviews



Unless otherwise noted, all products can be assumed to run on either Apple II, with 48K, ROM Applesoft, and one disk drive. The requirement for ROM Applesoft can be met by RAM Applesoft in a language card. Many Apple II programs will run on the Apple III in the emulator mode.

If the cryptic initials at the ends of reviews don't fit staff (listed on page 4), then they refer to guest reviewers—this month, Michael A. Banks, Forrest Johnson, Patricia R. McClelland, William H. Harrington, and Todd Zilbert.

The Mad Poet. By Michael North. *The Mad Poet* is an unpretentious little program that entertains by randomly generating couplets and illustrating them with interesting and colorful patterns. The results are haiku-like computer poems, often nonsensical, usually humorous, and occasionally profound. These are accompanied by truly obnoxious sound effects that only detract from the program. If your Apple is hooked up to a printer, you can even print your favorite poems for posterity.

The best way to enjoy *The Mad Poet* is to boot it up when you need to unwind, turn off the sound effects (unless a headache is your idea of relaxation), put on some music, and turn off all the lights. A soothing fog of poetry and colorful designs will lull you away from your cares.

Unfortunately, mad poetry is a passive entertainment. While you can stop the program at any couplet that demands further contemplation, you don't have the option to stop it and add a couplet of your own and be madly poetic too. Sometimes one of *The Mad Poet*'s couplets cries out for a witty rejoinder or an enigmatic addendum, and it is frustrating not to be able to put one up on the screen.

Oh yes—if you don't have a color monitor, forget the whole thing. *The Mad Poet* loses its muse on monochrome.

The Mad Poet is copy-encouraged. The publisher urges anyone interested to copy the program and mail in $14.95. A shining example of the honor system keeping overhead low. TZ

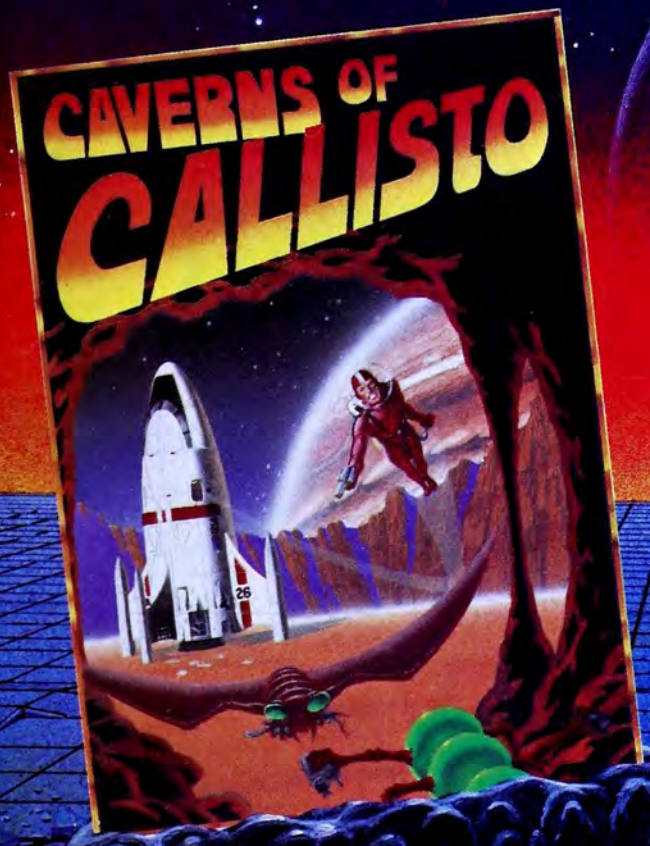
The Mad Poet, by Michael North, Matrix Information Systems (11728 Avon Way, Los Angeles, CA 90066; 213-391-0243). $14.95.

Fortress. By Jim Templeman and Patty Denbrook. Combining elements of the classic oriental strategy game go with the tactical insight of chess, *Fortress* represents a new and interesting innovation in computer gaming. Like go, *Fortress* is deceptively simple to learn yet a real challenge to play and master. The game's object is simplicity itself. Both you and your opponent build fortresses while seeking to dominate the area

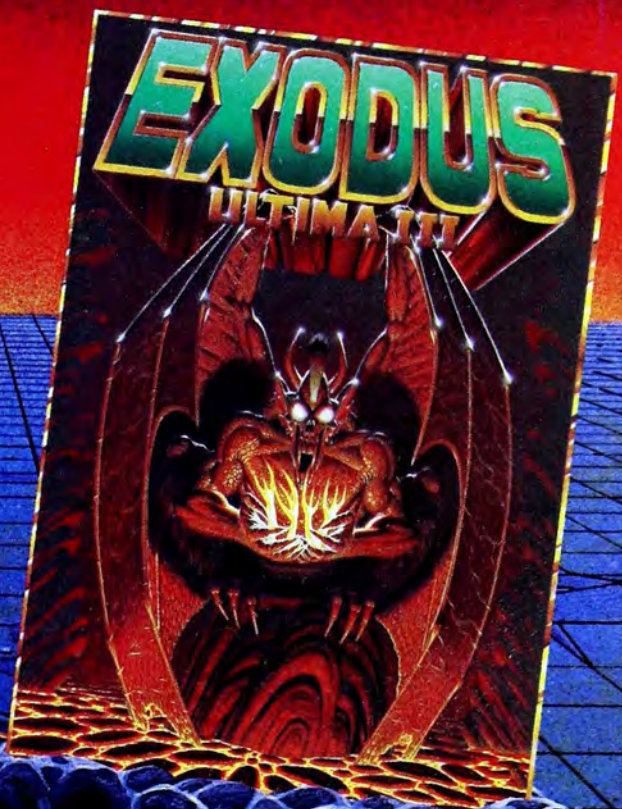
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Softline, November/December 1983

"Caverns of Callisto is a very challenging and enjoyable arcade game. I hope Origin Systems can continue to provide products of such quality." Core, December 1983



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represented by the game board. Well, maybe *Fortress* isn't quite that simple. Both you and your opponent can either build new fortresses or strengthen existing ones, and at a single stroke turn your opponent's position into a shambles. It's kind of like playing a game of chess where the pawns can suddenly become rooks or knights.

Fortress may just be the first strategic board game designed solely for a microcomputer. Yet it is distinguished by more than this. It employs a sophisticated artificial intelligence capability that enables the computer players to "learn" from their mistakes and to grow in both capability and competence. Just like a human opponent, your computer adversary will study your tactics and style of play and learn from the experience! A few games of *Fortress* can change your whole relationship with your Apple. Remember H.A.L., from Arthur C. Clarke's *2001*?

Fortress requires that you learn only a handful of rules, yet it provides hours of challenging play. The game begins with a famous Welsh battle song, "Men of Harlech." SSI has even thoughtfully included the words in case you want to sing along. Players may then select their opponents from among five unique computer characters, or they may choose someone of the human persuasion. Each computer opponent possesses a distinct style of play. The Squire is a rank novice, eager to learn, while Count Vauban is a sophisticated and capable opponent. Sir Galahad, Genghis Khan, and Lord Maginot round out the list. In addition to selecting an opponent, the player may alter the length of each game in the tournament, copy or create new computer opponents, and even eliminate the sound effects for more sedate play. For a unique challenge, computer players can be created, trained, and matched up by their human coaches for an all-computer tournament!

Fortress is played on a 6 by 6 grid, with players issuing commands through the computer's keyboard. Players alternate placing their hi-res fortresses on squares of their choosing. At each turn players may place additional fortresses on the board or strengthen existing fortresses. A "zone of control" represented by matching-colored flags extends out from the four corners of each fortress. Conflicting "zones of control" from adjacent fortresses effectively cancel each other out while friendly adjacent fortresses combine their strength in attack or defense. Each player tries to gain as much territory or board space as possible within twenty-one moves. Players win territory and game points by staking out unoccupied territory or successfully attacking their opponent. Isolated enemy castles may be attacked, placed under siege, and when outnumbered, destroyed and removed from the board. To assist *Fortress*'s human players in recognizing impending danger, a fortress under siege raises its drawbridge. Should you find yourself at a loss for your next move, there's even a "kibbitz" command to enable the computer to suggest a possible move. At the conclusion of each game, points are totalled and it's on to the next round in the fifteen-game tournament. At the end of each tournament the players may review their tournament history and record the tournament play to disk while updating their computer opponent's learning routines.

Combining the elegance of a simple, easily learnable game with real strategic sophistication and an opponent who learns, *Fortress* provides fast-paced play, considerable challenge, and not a few surprises for board game enthusiasts. WHH

Fortress, by Jim Templeman and Patty Denbrook, Strategic Simulations (883 Stierlin Road, Building A-200, Mountain View, CA 94043; 415-964-1200). $39.95.

MegaSpell. There's good news for people who, for whatever reason, are using *MegaWriter*. It's *MegaSpell*, a spelling checker that complements *MegaWriter*.

Megahaus could have saved itself some money by eliminating *MegaSpell*'s manual. The program is so simple to use that it barely needs one. That's the strong point of *MegaSpell*, which lives up to the company motto: "We make computers work easier."

MegaSpell consists of two disks—a program disk and a forty-thousand-word dictionary disk that can accommodate ten thousand more words. Anyone who can use *MegaWriter*, as difficult and slow as it is, will be able to master *MegaSpell* with relative ease. The formats and commands of the menus in both programs are the same.

Here's how it works. First, it makes a list of all the words used in a document. Then it checks the list against words found in its dictionary, making note of words that don't appear in the dictionary. Finally, it displays words one at a time for you to correct or skip.

Words are displayed by themselves and in the context of sentences and paragraphs, making it easier to figure out if they're really misspelled or not. For example, *MegaSpell* will flag the word Mon. as being misspelled, since it doesn't appear in its dictionary. However, if the word is being used as an abbreviation for Monday, then it is correct as used. At this point, the user can skip the misspelled word (leave it uncorrected) or ignore it (tell *MegaSpell* that the word is supposed to be spelled that way and not to bring up any more occurrences of the word). If the word is indeed misspelled, *MegaSpell* offers the option of correcting either a specific occurrence of the word or all occurrences.

A few words about disk drives: Be sure to have at least two of them. If *MegaWriter* is difficult to use with just one drive, *MegaSpell* is nearly impossible. The disk that holds text files resides in drive 2, while the program and dictionary disks take turns being swapped in and out of drive 1.

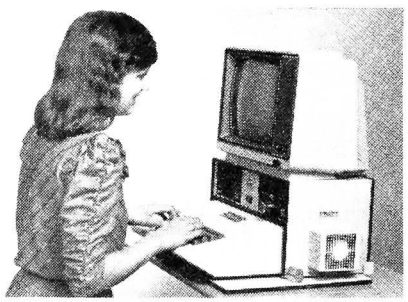
It's not clear what dictionary Megahaus used in creating the dictionary disk. How much confidence can you have in a computerized spelling checker that doesn't have "mainframe" or "microcomputer" as part of its vocabulary? And what can you say about a spelling checker that boasts knowing how to spell "super-cali-fragil-istic-expi-ali-docious," then *misspells* it? It's a trivial point but a possible indication of how thorough (or unthorough) the program's designers were.

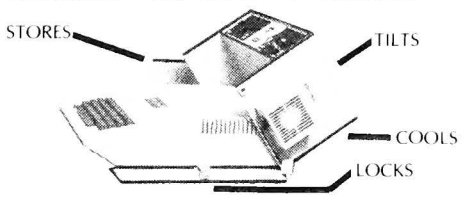
Yes, there are spelling checkers with fifty-, eighty-, and one hundred-thousand-word dictionaries, but they cost up to twice what *MegaSpell* costs. And as is true with most spelling checkers, it's not possible to compare *MegaSpell* to any others, since most are tailored to specific word processors. For its low price, forty thousand words on a disk seems about right. Just be prepared for the program to see some correctly spelled words as misspelled.

The dictionary disk can be expanded; it allows you to add up to ten thousand words of your own, a feature that will come in handy to anyone who frequently uses jargon—lawyers, doctors, and computer programmers.

Simplicity is a good word to describe *MegaSpell*. The accompanying

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reference manual is for just that—reference. *MegaWriter* users will be able to boot *MegaSpell* and use it with no problems at all. MTY

MegaSpell, Megahaus (5703 Oberlin Drive, San Diego, CA 92037; 619-450-1230). $59.95.

Practical Accountant. By North Forty Software. Ideally suited for small businesses, the *Practical Accountant* is deceptively simple to learn for such a powerful package. It is designed for use with a 64K Apple and two disk drives. The program's only visible drawbacks are minor incompatibilities with the hardware. The program will only work with an Apple brand 80-column card on the Apple IIe and will not support any kind of 80-column card on other Apples. And while the program was designed to take full advantage of the two apple keys on the IIe, these keys do not always work, and the user must resort to control characters.

These are minor inconveniences, however, compared to the program's capabilities. With two disk drives the user can maintain approximately six hundred transactions in the cash record, the system that accepts income and expense data. And with four disk drives (the maximum allowed), the number of recorded transactions can be quadrupled.

The *Practical Accountant* is based on accrued single-entry accounting and records every single transaction, even if cash doesn't actually change hands. Regardless of the order in which you enter records, the program automatically organizes them into chronological order. The report generator then allows the user to sort the records in a variety of ways; records can be incorporated into a multitude of reports including cash flow reports, reconciliations, listings, and tax reports.

Each record can also be posted to a chart of accounts. This chart enables the user to categorize transactions or group similar records together. This is an excellent feature that can be extremely flexible. There are countless uses for it, since the chart of accounts is comprised of both categories and subcategories. The maximum number of categories is fifty, while there are as many as three hundred subcategories available. Examples of ways in which the chart of accounts can be used are to list all sales generated by a particular salesperson, to generate reports regarding a specific customer or group of customers, and to maintain individual vendor information. Because of the accounting method it utilizes, the *Practical Accountant* also makes bank reconciliation a simple matter that saves a lot of time.

The *Practical Accountant* is an excellent program for figuring taxable income and deductions. Using the same method as the chart of accounts, tax items can be categorized and subcategorized. And because the user enters items as they occur throughout the year, the only work necessary at tax time is printing a report.

The *Practical Accountant* can also maintain payroll. It generates checks and categorizes them as payroll transactions or bill-paying transactions, and also handles credit card transactions. In addition, the *Practical Accountant* can edit records one at a time or globally.

With all the program's capabilities, you might wonder if it wouldn't be easy to get lost in the depths of the *Practical Accountant*. Fortunately, this is not the case. The *Practical Accountant* is menu-driven, straightforward, and easy to learn. Options are frequently displayed on the screen to guide the user to the next logical step. Some familiarity with accounting procedures helps in the utilization of this program, but you don't have to be a C.P.A. in order to use it.

In addition, the two-section manual is well written and well designed. The first half, "Before You Start," leads the beginner through every aspect of the program in a surprisingly easy-to-read and easy-to-follow text. The second section, "Reference Guide," is an excellent information source when you want to find the answer to a specific question quickly. Software manufacturers and publishers should take note of the *Practical Accountant*'s manual; it sets a high standard that readers and software users will surely appreciate. Quite simply, the *Practical Accountant* is an excellent, multi-faceted software package for the novice or expert. PRM

Practical Accountant, by North Forty Software, Softlink (3255-2 Scott Boulevard, Santa Clara, CA 95051; 408-988-8011). $149.95

Regatta. By Joe DeMuth and Eric Peterson. Racing a small sailboat can be challenging. It takes strategy, knowing when to tack, when to reach, and when to run with the wind. It takes patience, putting up with the wind's vagaries. And it takes nerve; at any moment you may be thrown into the water. (A sailor who has never been dunked probably hasn't been out much.) DeMuth and Peterson have created a program that captures all these aspects.

One player starts a race by selecting a course. There are four to choose from, and the last is much more difficult than the first. Each course is quite pretty, consisting of a lake drawn with sharp, assembly language graphics. You can choose light or heavy winds. Go boating by yourself or compete with another player. The sail is controlled from the keyboard, while the tiller can be controlled by either keyboard or paddle.

Your boat sets out from a dock. You have about ten seconds to adjust your sail before the race starts. Then you're off, racing around the buoys, trimming your sails to take advantage of every shift in the wind, trying to avoid the shore and the menacing shoals that lurk just out of sight. At the bottom of the screen there are different indicators to measure the direction and speed of the wind, the position of the sail and tiller, and the heel of the boat. (This last is often in a horizontal position, meaning that you're in the drink.) There are time penalties for running around, hitting a buoy, or capsizing your boat.

At the end of the race, the program tells you your finishing time. A slow time includes the message, "Blame it on the crew." A record time gets you, "Good sailing, Captain!" and is saved to disk.

Regatta is a simple, well-designed game, and a good simulation. Old salts will enjoy it; lubbers will find it a useful introduction. FJ

Regatta, by Joe DeMuth and Eric Peterson, Howard W. Sams (4300 West Sixty-second Street, Indianapolis, IN 46268; 317-298-5400). $29.95.

Factor Blast. By Joe DeMuth. Math is a subject considered to be more than a little dry by most kids. After all, it's difficult to relate linear equations to anything in the real world when you're in junior high school and your biggest concern is how not to be seen with your parents.

Factor Blast is an excellent example of how to make students want to study a dry subject. The game combines color graphics, animation, and sound with the challenge of playing against a computerized or human opponent. That competition provides a strong incentive for learning about factors and prime numbers. As it says on the package, "Math skill is your most effective weapon."

The program opens with simple menus providing options for three



difficulty levels, penalties for missing factors, keyboard or paddle control, sound, and a one- or two-player mode. After you select your options, a grid of numbers appears along with a tripod-mounted radar dish, a scoreboard, and a billboard. The first player positions the cursor over one of the numbers on the grid, and the dish blasts the number, adding that amount to the player's score. This done, your opponent is required to blast the factors of the number selected by the first player. If the chosen numbers are correct, the second player's score increases by their total. Thus, there is a need for strategy in selecting the numbers to be factored. Selecting the number twelve, for example, may result in one's opponent gaining seven or eight points, while selecting forty-eight may result in a gain of more points. Players looking to gain the maximum number of points while keeping their opponent's potential for points to a minimum will have to factor in advance the numbers they select. This is especially important when playing against the computer, as the latter never misses a factor and always gets the points.

Numbers that have been blasted do not return. This only makes the game more challenging as it progresses, since the most desirable numbers are taken early. The overall strategy required for the game is a combination of looking several moves ahead as in chess, and considering all posible factors of any number. For this reason, students playing *Factor Blast* have found it expedient (and fun) to memorize the prime numbers up to one hundred and the factors of each number through one hundred. Playing *Factor Blast* repeatedly results in memorization, as well as enhancing the student's ability to perform mental calculations. Of course, these benefits aren't gained without effort, but the game does provide the incentive and the technique. MAB

Factor Blast, by Joe DeMuth, Hayden Software (600 Suffolk Street, Lowell, MA 01853; 617-937-0200). $29.95.

Alphabet Zoo. By Dale Disharoon. This program, part of Spinnaker's Early Learning Series, is really two in one. First, it's a computer alphabet that can help little kids match letters with sounds. In this option, called ABC Time, the computer draws a hi-res picture, shows a letter in upper and lower case, and then flashes a word that begins with that letter on-screen. The child's only computer interaction is pressing a key to speed up the orderly procession through the alphabet; the program will otherwise go on to the next letter after several seconds. In succeeding cycles through the alphabet, the picture varies, although four times in a row "X" stood for x-ray and "Q" for queen. (Maybe it's sacrilegious even to suggest it, but, just once, could "A" *not* stand for apple?)

The second purpose of the program is to teach school-age tykes to spell the words describing the creatures, people, and objects encountered in ABC Time. It does this by involving them in two maze games, playable by one or two, which are much more challenging than they appear at first. Both are quite engaging.

The computer begins by drawing a maze on the screen with a picture in the center. Scattered throughout the maze are letters that make up the word associated with the picture. In Letter Game, the player, represented by any of six animated vegetables, searches and pounces on the first letter of the word. Getting the letter right causes the word to print on the screen. Additional first letters are worth ten points; choosing incorrect ones costs the same amount.

Movement through the maze is controlled by letters used as directional keys; plump baby fingers might have trouble with this. You can move around extra quickly by jumping on a "hyperspace" dot, but there's no telling where you'll reappear. And you do so at your own risk, as the letters will also move around at random.

The Spelling Zoo is similar in play. In this one, you must find in order all the letters that spell the name of the object shown. This task requires more literary ability, but the letters compensate by holding still. If you can't complete the word, it will not appear in its entirety.

In the Letter Game you can use all caps, no caps, or a mixture; Spelling Zoo employs lower case only. The Letter Game is always timed; Spelling Zoo can be used with or without a time limit. Both are arranged in six levels of difficulty corresponding to the relative familiarity of letters and the varying lengths of words to be spelled. Although the maze pattern changes every five turns, it stays at a relatively constant level of difficulty.

The sound used in *Alphabet Zoo* is a definite plus. All three games make clever use of the Apple's naturally tinny voice by trilling snippets by classical composers such as Bach and Handel, both of whom wrote music for the metallic-sounding spinet. Unfortunately, there is no sound-off option.

The quality of the graphics, while generally excellent, is uneven. Some objects, such as a vest and a needle and thread, are difficult for even an adult to recognize. Others, particularly a blue-and-white zebra and a lavender rose, are imaginatively and attractively reproduced.

The theme of animals, as stated in the title, is not completely carried out when considering the program as a whole. Most of the words and pictures are of familiar beasts, but interspersed among them are archetypal grownups—kings, nurses, jugglers—and objects, including a few in questionable taste—it's hard to appreciate "D is for dice" and "B is for bomb" in software intended for three- to eight-year-olds.

The spelling-game aspect of this package is reasonably good; however, those interested in turning their kids on to an electronic ABC may do better elsewhere. JP

Alphabet Zoo, by Dale Disharoon, Spinnaker Software (215 First Street, Cambridge, MA 02142; 617-868-4700). $29.95.

The Grabit Factory. By Bob and Carolyn Box. Sifting the good from the mediocre in educational software is confusing. All manner of characters, from bears to clowns, perform on monitors all across the country. All claim to be the perfect instrument through which mathematics, English, and other essentials can be taught to our children. Unfortunately, not all of these software offerings come up to the hype projected by their advertisements.

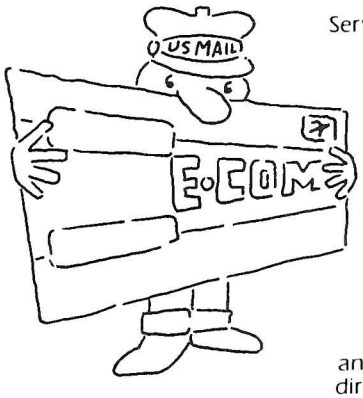
One common problem area is the child's interaction with the computer. Often, the student must commit too much time to learning the combination keypresses or other commands necessary to interact with the software.

This certainly is not the case with *The Grabit Factory*, which can be controlled with only a joystick and the escape key. A mathematical program for ages five to eight, *The Grabit Factory* offers simple but entertaining graphics with definite "kid" appeal.

A factory work day commences on screen with a mechanic opening a door, revealing the interior of the factory. A crane controlled by the student sits mid-screen above a conveyor belt that contains blocks repre-

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senting addition, subtraction, and number recognition. To select the desired subject, the child simply lowers the crane to the correct block and carries it to the work area. Then the mechanic who opened the day appears and oils the crane, affording faster operation.

Number recognition consists of the student selecting a number from the conveyor belt that corresponds to a number revealed in the screen's upper right-hand corner. The same procedure is used for single digit addition and subtraction problems. And there's no need to worry over what might happen should an incorrect key be pressed. The program is completely error-trapped. Pressing the escape key removes the child from the current study area and redisplays the menu.

The Grabit Factory may also be run without sound, allowing the child to use the program on Saturday mornings without disturbing a sleeping Mom and Dad. Kids should be able to manage this program's operation with little coaching from their parents, encouraging good, independent study habits. With *The Grabit Factory*, young students can improve their math abilities through continued reinforcement of number recognition, addition, and subtraction, and Mom can feel confident she bought a program that delivers what it claims. This educational program's a grabber, any way you look at it. HGL

The Grabit Factory, by Bob and Carolyn Box, Eric Software (1713 Tulare, Fresno, CA 93721; 209-237-0989). $39.95.

Cavern Creatures. By Paul Lowrance. *Shoot. Shoot. Shoot. Wipe out. Shoot. Shoot. Shoot. Wipe out. Shoot. Shoot. Shoot. Wipe out. . . .*

In this arcade game, the player starts with ten ships and will probably lose them all before reaching the end. The caverns are deadly, and their dangers take many forms. You might be glomped by a monster (there are dozens), or you might be bitten by a snake (these look rather like the "worms" from *Space Invaders*). Even if you avoid all your enemies, you will find it distressingly easy to run into a cavern wall or a force field. And if nothing else destroys you, your ship will probably run out of fuel.

Of course, it's not entirely one-sided. Your ship is fast and maneuverable, and the joystick gives excellent control, for what it's worth. Your guns fire in three directions simultaneously, and there are fuel dumps scattered along the way. Finally, to distract you from the tedium of being destroyed, there is some novel scenery provided by sharp, colorful graphics.

Unfortunately, the game isn't all good news. There is no pause feature, and the sound can't be turned off. High scores cannot be saved. Worst of all, you can get killed in some ways that are very frustrating indeed—for example, when the cavern scrolls by faster than your ship can maneuver. To top it off, the fire button on the joystick is also used to position your replacement ships. Unless you're careful, you can lose a series of ships to the same deathtrap.

While it has its drawbacks, *Cavern Creatures* certainly delivers the goods for the shoot-'em-up fan. Despite its faults, it is probably worth the price Datamost asks for it. FI

Cavern Creatures, by Paul Lowrance, Datamost (8943 Fullbright Avenue, Chatsworth, CA 91311; 213-709-1202). $29.95.

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Super Bunny. By Vic Leone. Ancient myths and legends gave us heroes like Beowulf, Odysseus, Joan of Arc, King Arthur, Robin Hood.

Comic books afforded an even greater proliferation of heroes, from Superman and Spiderman to The Hulk. But we still didn't have any computer heroes—until now.

Mightier, faster, stronger, and hoppier than any before him comes *Super Bunny*, a Datamost creation designed to fill the void. It all started with a horrendous attack on Bunnyville by a fearsome horde of wolves, snakes, and other beasts that left few fluffy inhabitants alive. Those that managed to escape lived as best they could in burrows hidden deep beneath the ground.

Into that environment was born one called Reginald. He seemed different somehow. During his postpubescent years Reginald was surprised by a vision of Lapinus, ancestor of all rabbits. Special carrots were given to Reginald along with a warning that they be used sparingly. Each carrot will give our hero superpowers, enough to destroy any enemy, but they only last for a limited time.

As did Clark Kent, Reginald had to keep his carrot power a secret. So to you, the player, befalls the task of helping Reginald become Super Bunny. Upon booting the game, a delightful title screen and credits scroll up and lead into a short graphic moment in which Reginald eats the carrots and becomes a superhero. Then it's into the play, which is a lot more difficult than first appearances might suggest.

Reginald awaits your assistance in a cave. In order to become Super Bunny, he must reach the right side of the screen, where a gremlin holds the special carrots. To accomplish this, Reggie must hop across five rows of elevators. Naturally, the elevators don't all move in the same direction. Some move up, others move down, and several are occupied with dangerous beasts who have already proven their hostility by consuming most of Reggie's kinfolk.

The elevators are not the only impediment to getting at the carrots.

Chances are good that just as Reggie is about to pounce from a moving elevator onto the gremlin, the little nitwit will move. In this case, a miss is as good as a mile; if you lose a "Reggie," you must start again from the left side of the cave.

Once a few of those carrots have been ingested, however, watch out! Super Bunny can hop from elevator to elevator, bopping those hungry hostiles right out of action. Time is of the essence; during first-level play, each carrot lasts for only forty-five seconds. The sixth and highest level only affords the player twenty seconds of activity as Super Bunny. Movement from elevator to elevator is also critical. Players garner points by hopping as close to the elevator floor as possible. A slight miscalculation, and Reggie has lost that particular round. The third and fifth levels are especially tough, because Reggie's ears have grown.

The game awards bonus points according to the speed with which Reggie manages to cross the cave and obtain his carrots. Levels three and six provide a bonus bunny. And, of course, the higher the level attained, the more points you receive. In order to win those points, you must play a mean game; elevators seem to approach the speed of light, and the antagonistic animals become even more hostile.

So punch out those parasites and cream those critters! Help Reggie save his bunny brothers from total annihilation. Just take on *Super Bunny* and you can become a hero, too, hopping your way to fame and fortune. HGL

Super Bunny, by Vic Leone, Datamost (8943 Fullbright Avenue, Chatsworth, CA 91311; 213-709-1202). $29.95.

The Eating Machine. By Barbara S. Thorne. *The Eating Machine* is not a science fiction robot that devours Cleveland. This is a system designed to teach the analyzing and planning of meals. The program was created by four nutritionists whose qualifications range from a professorship in nutrition at the University of Pittsburgh to a nutrition advisory post with the county health department in Pittsburgh.

The Eating Machine is packaged with two disks; one is a program disk and the other is for storing data. After indicating your sex and age group, a calorie range is provided for the user. A lo-res happy face smiles at you at the start of the program. This face comes to be a familiar sight as you progress through the program.

More than five hundred foods are listed in the program's database, from which the user indicates what was consumed on a given day. The face will smile at you if you manage to stay within your indicated calorie limit. If you exceed this, the smile is gone—replaced with a disconcerting frown.

Bar graphs are also incorporated into the program, indicating the nutritional values of protein, vitamin A, and vitamin C found in the foods consumed. A second bar graph reveals the levels of calcium, iron, and sodium in the indicated foods as compared to the recommended daily allowances for these nutrients. *The Eating Machine* also uses bar graphs to show what percentage of your total calories came from proteins, carbohydrates, fat, and alcohol respectively.

The program summarizes your inputted data in addition to listing foods high in the nutrients you seem to be lacking. For example, if you are low in vitamin A, the program tells you about a food group high in that vitamin. You can average your calories by a single day, several days, or a week simply by using your personal file.

The Eating Machine's database may also be customized by adding approximately two hundred foods to the installed database of five hundred.

Entries may also be deleted or changed. If you want the nutritional analysis of a particular recipe, this information can be displayed or printed.

Unfortunately, the data obtained through *The Eating Machine* cannot be saved to disk, thereby depriving you of a running record of your nutritional history. A printer will give you a hard copy of the data, but the manual warns that a complete printout may take as long as thirty minutes. Answers to the program's questions require a "Y/N" response rather than the customary "return" input, which might take some getting used to.

One positive note is the well-written documentation that helps make the program easy to use as well as to understand. The less than state-of-the-art graphics might be crude, but the lessons contained within this nutritional program are certainly interesting and educational. Here's to your health! PJL

The Eating Machine, by Barbara S. Thorne, Muse Software (347 North Charles Street, Baltimore, MD 21201; 301-659-7212). $49.95.

The Networker. It lets you communicate with other computers by phone and doesn't cost two arms and a leg.

Not much more needs to be said. Other modems give you the same thing the Networker offers, and they usually cost three times as much.

This modem supports touch-tone dialing; it communicates at 300 baud, the most common speed in low-priced modems; and terminal software is included. The software allows you to transfer text files to other Apples and to transfer any DOS file error-free to another modem. If it sounds like the Networker offers the same features as most other modems, that's because it does. But for far fewer bucks.

Much of the hardware has been eliminated here by excluding a dialer. The modem plugs into any phone jack in the wall, and your phone plugs into the modem. To call a remote system, it's necessary to dial the number on the telephone (not on the modem) and then flip an external switch that plugs into the modem. It's a lot easier than it sounds. The point is that all dialing is done with the telephone. This means you can't use any redial functions of other terminal programs to keep dialing a number until you get connected.

There's no hefty manual to muddle through; all instructions for using the modem and the accompanying software are included in a pocket-sized sixteen-page booklet. It's obvious that Zoom Telephonics intends this modem for nontechnical users who know what they want and don't want to spend a lot of time learning how to do it. Opening the box, installing the modem, and making the first call takes no more than about ten minutes for even the greenest of novices.

Companies like Hayes Microcomputer Products, Novation, and Microcom will be around for a long time producing sophisticated, expensive modems. For someone on a limited budget, though, Zoom Telephonics puts out the perfect modem. Pound for pound, feature for feature, and chip for chip, it's an unbeatable bargain. MTY

The Networker, Zoom Telephonics (207 South Street, Boston, MA 02111; 617-423-1288). $129.

The Operator. This is a full-featured direct-connect modem at a very, very affordable price. Designed to emulate electronically the popular Apple Communications Card, The Operator is fully compatible with standard communications software including *ASCII Express: The Professional*, *Data Capture*, *Modem Magic II*, *Term Exec*, *Transends I*, *II*, and *III*, *VisiTerm*, and *Z-Term*.

Despite the deceptively low price, The Operator, produced by The International Modem Exchange, is remarkably full-featured. The user may transmit or receive data at 110 or 300 baud. The modem supports both full and half duplex modes and rotary, Touch-Tone and key-set phones may be used with the system. Even auto answer with a disconnect capability has been included. And to make the deal a little sweeter, The Operator includes a surprisingly capable communications package called *The Connection*. *The Connection* is entirely menu-driven and simple to use with an extensive on-screen help section. The program includes a utility to assist users in creating their own automatic log-on procedures for electronic bulletin boards and another utility to help transfer text files from your Apple to another system, anywhere! The authors have even thoughtfully provided preconfigured auto-log-on procedures for the Source and CompuServe.

Installing and using The Operator is straightforward. The modem may be placed in any slot except 0 but most modems including T.I.M.E.C.O.R.'s expect the traditional slot two. Next, the switch plate that turns the modem on or off, and selects originate or answer mode is placed in the rear of the Apple. Finally, the cables are connected and your Apple is in communication with the world. The Operator's command functions are both simple to use and remember. And an on-board ROM enables a series of control sequences to convert lower-case transmissions to upper case for Apple's without lower case, exit the terminal mode, change duplex, or simply hang up the phone. Unfortunately, *The Connection* supports only Apple's 80-column card on the IIe, and won't support any brand of 80-column card on an older Apple.

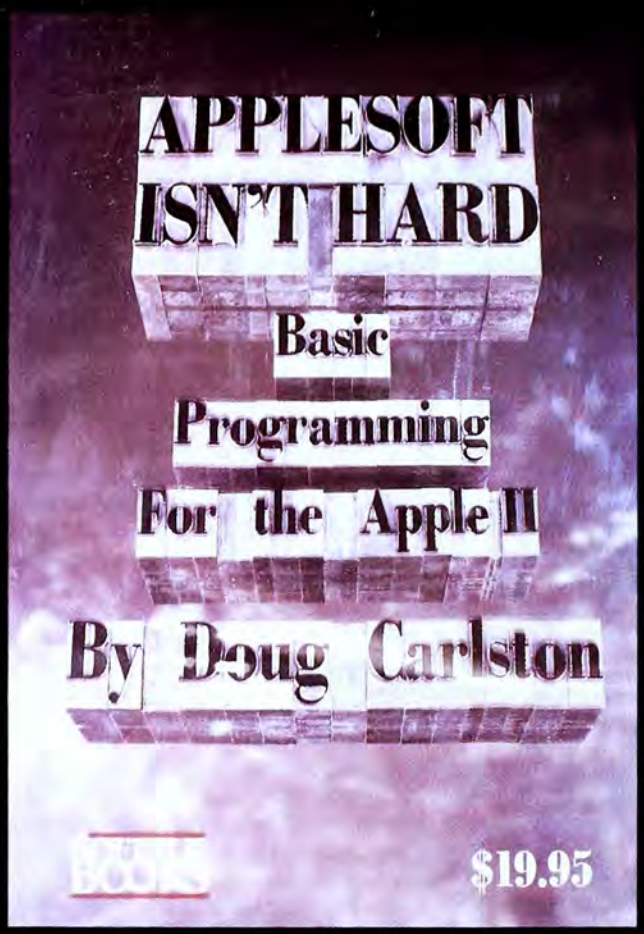
A word or two is in order concerning support from the manufacturer. In short, it is responsive and quite impressive. The first modem obtained for this review did not function properly after several frustrating hours. However, a quick telephone call to the enclosed support number produced a courteous and knowledgeable technician who diagnosed the problem, apologized for the inconvenience, and offered to exchange the defective modem at no charge. And all of this on a Saturday! Combined with an impressive six months warranty, T.I.M.E.C.O.R's customer support is fast, polite, and professional. Enough said.

If this remarkably full-featured modem package has one serious flaw it's in the documentation, or more precisely the lack thereof. The manual consists of nine 8 by 11 pages printed with a dot-matrix printer and is stapled at the top. The manual's introduction claims that "while primarily intended for the avid Apple user, it is clear and precise enough to aid the novice computerist enter the world of communications." Really? In nine pages? An expanded manual typeset with clear, extensive documentation, examples, and pictures or diagrams would go a long way toward enhancing the value and utility of this package.

In spite of that, The Operator is quite simply a best buy for those interested in entering the world of Apple telecommunications. While not as full-featured as some of its more expensive competitors, The Operator combines all the essentials necessary for real communications capability at a fraction of normal cost. Combined with its telecommunications software and extensive compatibility with other third-party software, this is an almost irresistible addition to your Apple II at a very irresistible price. WWH

The Operator, T.I.M.E.C.O.R. (4 Longfellow Place, Box 8928, Boston, MA 02114; 617-720-4090). $159.95.

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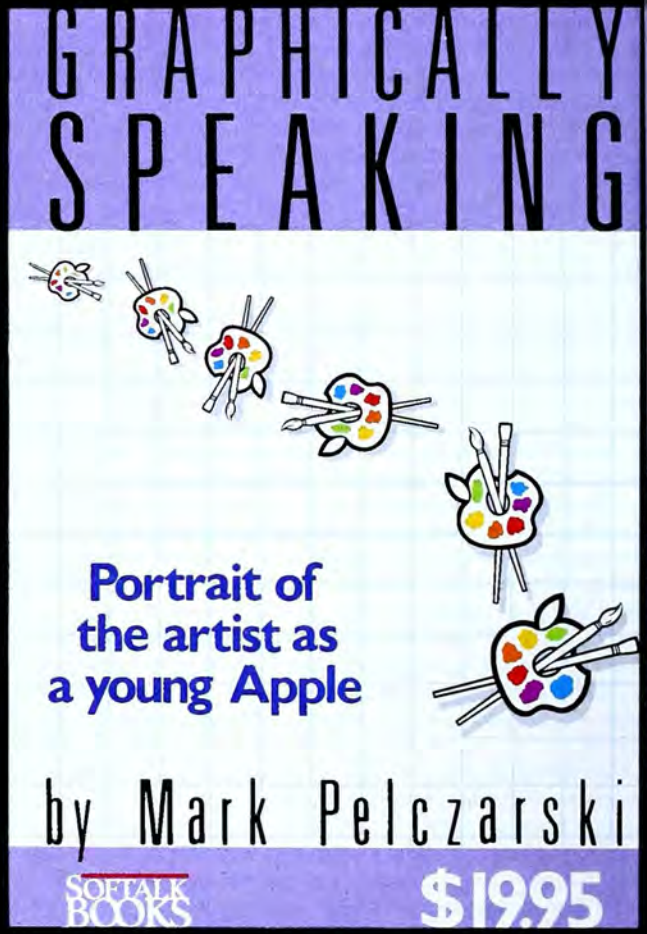


APPLESOFT ISN'T HARD: Basic Programming for the Apple II

By Doug Carlston

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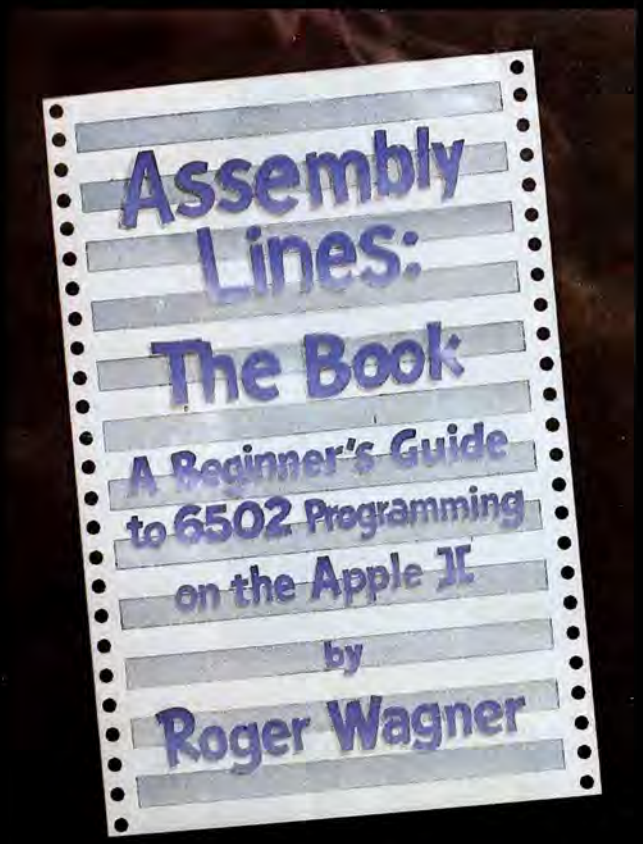
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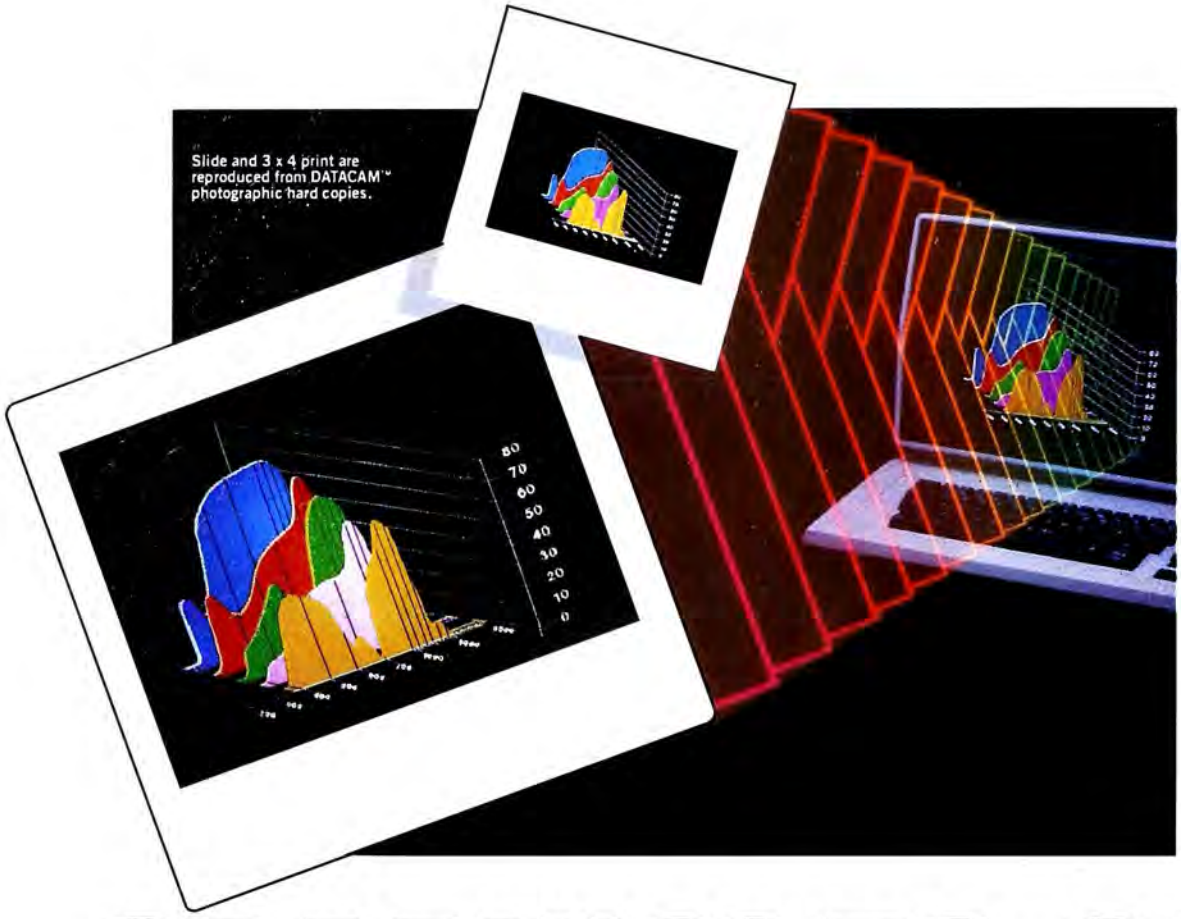
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The Apple For Your Basic Kid, her first book, is the result of her Workshop experiences. In it she describes the ins and outs of Apples in a nonintimidating style that kids will enjoy, and even grownups can understand.

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Spellakazam. This is a big, well-designed home education program with lots of depth and all the user-definability you could possibly want.

The basic setup finds you and a magician in a maze containing the letters of the alphabet. At the bottom of the screen is a sentence with one word missing. You have to race around the maze, picking up the letters of the word in order, then go to the top hat at the end of the maze. Your correctly spelled word will cause a random creature to jump out of the hat, place the word in the sentence, and reward you with a satisfying number score. If the magician gets to the hat first, you get fewer points. If you spell the word wrong, you are shown the correct spelling and allowed to try again.

Based on the spelling texts of Silver Burdett Company, *Spellakazam*'s word lists are arranged according to categories of vowel sounds and similar consonants a la *Sesame Street*. You can make data disks with this method or make categories of your own. This leads to the program's most impressive feature—that it can be used for purposes other than the teaching of spelling. The trivia game possibilities are limitless.

A single caveat: *Spellakazam* is written in Forth, which allows the storage and juggling of vast regions of data, word lists, sentence files, menus, submenus, and sub-submenus with cool dispatch. Forth, however, is not the optimal game-writing language, and the game is the most visible part of the program. Player and computer-controlled magician, though in the same race, cannot move at the same time. The result is that the computer will randomly freeze your current directional input in order to move the magician—a situation bound to cause frustration in younger players (and some older ones).

On the one hand, *Spellakazam* will never vie with *Pac-Man* in the thrills department; on the other hand, there are those stern defenders of the educational establishment who warn against educational games being overly "game-y" at the expense of education. Between the rock and the hard place, DesignWare has taken pains to see that accuracy is rewarded over speed: Winning the race and spelling the word wrong will cost you more points than losing if you spelled the word correctly. You also have a cheerful little cheat option: A keystroke or button-press when you land next to one of the many magic dove icons scattered throughout the alphabet maze will send the magician back to the beginning if you're still hunting and pecking and he's getting too close to the finish. This feature is bound to please kids of all ages who hate to lose.

You can also heighten the competitive element by increasing the skill level, making the maze harder to get through and speeding up the magician, or play up the educational component by leaving the skill level at one and selecting more difficult words.

Aside from a few play deficiencies in the game itself, the extreme flexibility and expandability of the program, little grace notes like a two-player option, and the ability to quit one game without having to reboot to get into another one make this a class entry in its field. AC

Spellakazam, DesignWare (185 Berry Street, San Francisco, CA 94107; 415-546-1866). $39.95.

Pixit. By Michael Darooge. To state that Apple hi-res graphics are simple is a contradiction in terms. Simplicity and Apple hi-res graphics are not analogous, unless one has spent many hours in total hibernation studying the complexities of illuminated thought and pixels. Programming concerns are many: which colors can appear side by side with a different color, which one is in harmony with background hues, drawing and xdrawing a particular shape and erasing it from the screen, the rotation and scale of a required shape. . . . All this could leave a non-programmer breathless. The hassle of creating a shape table, as well as wondering what on earth vector plotting is all about, could well leave the prospective graphics user with a migraine headache the size of Gibraltar.

Pixit is the graphic user's Excedrin, an assault on the fortified tower of complexity known as Apple hi-res. This program's documentation is short and sweet. On-screen prompts really are all one needs to pass from main menu to auxiliary menu in order to activate the program's features. Included in the 38-page instruction manual is a short course on the Apple's hi-res screen, vector plotting, and color grouping. But the true crux of the program is the belief that primarily through actual use of the routines, the user will learn a great deal about the hi-res capabilities and not-so-friendly perplexities inbred in the Apple.

Although it incorporates a nonstandard, fast-loading boot program,

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Pixit's program disk may be backed up by the user. The package even includes instructions on how to do the copying. Trust and an excellent program combine to make this an attractive package for almost any plier of the graphic arts.

Using *Pixit* isn't difficult. Left and right arrow keys indicate chosen entries from any of the menus and also select programs from either disk 1 or 2. The *Pixit* program resides in drive 1, and data disks rest in drive 2. Shapes—created with either the program's Create-A-Shape routine or another product—are easily manipulated on-screen. These shapes may be combined into a single picture, rotated, xdrawn, and their color changed, rescaled, or filled with a variety of hues (including one named "red bricks"). Line drawing and automatic circle creation are other capabilities found within this particular routine. All it takes to plant a shape on-screen is a single keypress. And if you happen to own an Epson printer with the Graftrax option, your hi-res creations may be dumped into hard copy. A handy help screen that is available through a single keypress allows the user to review the editor commands without destroying a potential masterpiece.

Pictures created with text and graphics, circles and lines, colorfill and shape tables aren't the program's only capabilities. Once into the Create-A-Shape routine, keyboard entry allows for hi-res shape creation with real flair. The user selects drawing scale (with or without grid), as well as the starting location of a particular shape. The cursor and plotter are controlled by one of two sets of keys. Pressing control-E at the beginning or middle of a shape file retraces the graphic creation until you press the space bar. The right arrow key moves you through the shape one pixel at a time, while the left arrow key moves backward through those movements. This function lets you see wasted plotting and enables you to edit to maximize shape-creation efficiency. When you complete the vector table, it may be compiled into an Applesoft shape table. You can also analyze or modify any shape in a table by using a routine called the Shape Sourceror. This routine automatically plots shapes at an optimum drawing scale, color, and starting location.

Pixit's shape table editor allows original shapes or those from *Pixit*'s tables to be added to another shape table. The user can scan any shape table for possible inclusions, as well as delete or add shapes without fuss.



A brief tutorial explains how to use shape tables in your own programs. The documentation also encourages users to list the animation and other Applesoft examples on the *Pixit* disk so they can learn how hi-res graphics operate.

Pixit's reasonable cost, efficient programming, user trust, and simple key commands all add up to a purchase that you might strongly consider if you're involved in the creation of Apple hi-res graphics. A tidy package, this. HGL

Pixit, by Michael Darooge, Baudville (1001 Medical Park Drive S.E., Grand Rapids, MI 49506; 616-957-3036). $49.95.

The Fourth Leg of the Apple. By Ray Brinker. Getting one's feet wet requires some basic equipment. Speaking literally, a bathtub is by far the best device, as little more than ankle-high water is required. A swimming pool may be overdoing things a bit, as total immersion is not exactly what is sought. Temperature may vary to taste, and by testing the water every now and then one's favorite temperature can be discovered.

When discussing the Apple computer, getting one's feet wet means obtaining a little information about most of the machine's operations. This encompasses a great deal of territory. Not until you have tested the water every now and then can you identify the area you'd like to investigate further.

Such areas as the Apple's integrated circuitry, programming languages, the disk operating system, and hardware add-ons are just a few of the topics you could investigate initially.

Basic equipment needed? Not a bathtub, but a combination text and disk tutorial known as *The Fourth Leg of the Apple*. This product scratches the surface of many significant computer regions. A light and conversational style helps the reader wade through most of the heavier material. The included disk contains several interesting tutorial aids and applicable programs. A feature most appreciated is that each page in the three-ring binder places text on the left and leaves open space on the right for such necessities as notes.

Have you had problems understanding or learning the hexadecimal system? This tutorial manages to make conquering the system rather painless and reveals a method for easily converting a binary number to its decimal equivalent. Once the reader has become acquainted with a specific point in the text, a program is run from the disk to reinforce that particular issue. For instance, four programs accompany the first chapter, which deals with hexadecimal notation.

A rather hasty discussion of the Apple's circuitry gives way to a fully detailed explanation of the computer's memory and a light examination of RAM and page usage. The disk operating system is covered in Chapter 4. There, informative text details what actually occurs during booting, the whats and wheres of the VTOC, disk maps, and embedded control characters which prevent file copying by unauthorized persons.

The 6502 microprocessor is discussed in the subsequent chapter. The processes of each of the seven internal registers are explained, and examples of register operations are run from disk, revealing simulated 6502 operations on screen. Then it's onward into the Apple Monitor, examining Basic's decimal commands and changing values in memory at will. Next, a chapter dealing with various utility programs and peripheral cards functions as an introduction to the computer's abilities to inform you about itself. Of particular note is a three-page discussion on how to examine an Applesoft program byte by byte.

A chapter dealing with languages certainly leaves little doubt as to the author's preference for Forth, which could also be deduced from the title of this software/book combination. A bare-bones, public domain version of Forth is included on the disk. This version skims the surface, though it does include several valuable operations that can assist the reader in determining whether he or she would like to become involved in this language. The Forth tutorial is the most extensive chapter in this program and is by far the most informative for the uninitiated programmer.

The final chapter deals with assembly language programming and includes a stripped-down assembler. Simple source programs such as this either whet your appetite for additional study or lead you to the conclusion that assembly language programming isn't for you. An annotated bibliography imparts additional information for those who want to continue with a specific area studied in this tutorial.

For those who are already acquainted with their Apple, there is little need of such a tutorial, but for the many who have just purchased their first computer and want to delve lightly into its capabilities, this product

could prove useful. Although the cost seems somewhat high, spending the admission price is better than wasting money on products not suited to your computing taste. And for those who've wanted to know what Forth is all about, this might be an inexpensive way to taste-test the language. You'll certainly not drown in *The Fourth Leg of the Apple*, but you will manage to get those tootsies wet. WGL

The Fourth Leg of the Apple, by Ray Brinker, Brinker Computing (2775 Tessmer Road, Ann Arbor, MI 48103; 313-662-6386). $49.95.

Success with Math. By Don Ross. Here's a series of math programs that cuts through all the cute music, flashy colors, and window trimmings and gets right down to business—teaching math.

Don Ross, who is a school district supervisor for computer instruction and a former math teacher, wrote the programs as tutorials for basic skills reinforcement and remedial learning. The series contains four programs, *Addition and Subtraction*, *Multiplication and Division*, *Linear Equations*, and *Quadratic Equations*.

Success with Math relies on neither rewards nor penalties, but rather on the student's willingness to learn. As the title implies, the student's feeling of success is the key to motivation.

Each program in the series uses the same workbook format in which the student can choose to work on as many as nine problems in one sitting. Nine problems usually aren't enough, so *Addition and Subtraction* and *Multiplication and Division* offer the option of working on more problems at the end of each session.

That's not so with *Linear Equations* and *Quadratic Equations*. At the end of a session, these two assume that the student has had enough, then exit to the Basic prompt. If more practice is desired, or if another student wants to use one of the programs, typing *run* starts it over again.

Addition and Subtraction is aimed at students in the first through fourth grades, introducing the concepts of carrying in addition and borrowing in subtraction. Borrowing is usually a stumper, so it's possible to select subtraction problems that don't require borrowing, depending upon the student's abilities.

Multiplication and Division, which is meant for students at the junior high school level, lets users select one-, two-, or three-place multipliers and divisors. As with *Addition and Subtraction*, this program simulates practicing problems in a workbook. A flashing cursor lets the student know what to enter next (product, sum, carry) by showing where it expects the next input to appear.

Linear Equations and *Quadratic Equations* include menus that list possible procedures. Options include such functions as adding or subtracting terms from both sides of the equation, multiplying or dividing each side of an equation, factoring to zero, and simplifying.

All of the programs walk through each equation one step at a time, offering assistance if two successive errors occur; however, in the nonalgebraic programs, help is almost nonexistent. If the student enters an incorrect number twice, the program gives the answer and tells the student, "When you understand your error, type in the correct answer." Apparently these two introductory math programs aren't meant to teach adding, subtracting, multiplying, and dividing; they're meant to exercise the student's already existing knowledge about those areas. It's assumed that given the correct answer, the student will realize where the error occurred.

Linear Equations and *Quadratic Equations* do offer help (of a sort) by telling the student what the preferable procedure is if the wrong one was chosen. The idea that one procedure is preferable is important to note here. Though it's possible to solve equations by using the same procedures in a different order, these programs force the student to follow procedures in a set order. At the end of each problem and session, the number of procedural errors is given in addition to the number of computation errors.

Students who need little motivation to learn are the ones who will get the most out of *Success with Math*. It doesn't force learning upon them; rather, it provides an environment in which they can practice using what they know.

Because it provides hints on what to do next in each problem, and because it has the unlimited patience of a computer program, *Success with Math* comes very close to being as helpful as having a personal math tutor. MTV

Success with Math, by Don Ross, CBS Software (1 Fawcett Place, Greenwich, CT 06836; 203-622-2503). $24.95 each.

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TEACHERS TEACHING TEACHERS

BY ELIZABETH RAY ANDERS

It's a busy afternoon at Independence High School in San Jose, California. The gymnasium is jammed. Standing-room-only crowds occupy the lecture halls. Classrooms across the sprawling hundred-acre campus are full. The surprise is that there are no high school students left on the grounds. The eager learners are all teachers. They're all members of CUE (Computer Using Educators), a California teacher organization. They're enthusiastic and ready to work—ready to listen to leaders in the field of computer education, to talk to exhibitors from major hardware and software firms, to visit industry sites all over Silicon Valley, and to participate in more than two hundred workshops. Most of all, though, they are here to learn from one another.

CUE's members consist of classroom teachers who've been leaders in implementing microcomputer-based instruction in their schools. Founded in 1978 with a membership of twenty-five, CUE now has more than six thousand members. They come from every state, four provinces, and twelve foreign countries. At this Fourth Annual Fall 1983 CUE conference in San Jose, more than three thousand of them have come to share their ideas about computer learning.

CUE provides a unique opportunity for teachers. Bobby Goodson, one of the dozen teachers who founded CUE in 1978, puts it this way: "CUE supports teachers in their search for the best ways to use computers in their classrooms. CUE facilitates dialogue between teachers and provides answers to questions they're really curious about."

Over and over again teachers report their dependence on other CUE members for help in dealing with such problems as tight budgets, unfamiliar equipment, lack of support from hardware salespeople, and lack of expert in-service training. When the question of whom to trust comes up, most educators figure, "Unless you're an educator and you've had the problem, how would you know what to do?"

The Joy of Teaching. CUE teachers are serious about using computers in their classrooms, and their conversations cover a range of practical and philosophical concerns about the new technology. The CUE teachers are excited to have found a teaching aid that really turns kids on. They describe seeing faces light up and talk about the positive effects of learning along with the kids. An elementary teacher from Mount Diablo, California, says, "You're on a different level with the children when they can show you something. . . . Teaching the teacher can really raise a child's self-esteem."

Goodson thinks that teachers' commitment to the new technology goes beyond the kids' enthusiasm for the computers. "Microcomputers are doing things to teaching beyond the kids or the technology itself. For the first time in years, teachers are reexperiencing the pure joy of learning. It's healthy!" Goodson doesn't hesitate to term the widespread use of computers and the sharing of ideas a revolution in education.

Goodson believes that computers have given teachers a renewed respect for themselves. "For once in our lives as educators, we have something we're in control of. We've taken a technology that was not made for us and turned it into something we can use. We've led the way in hardware and software. We're the ones being listened to." This one-time classroom math teacher is now the spokesperson for an entire movement of classroom teachers. Her voice is heard from Sacramento to Washington, D.C. An opinion leader about the use of computers in schools, she sits on boards, testifies at hearings, and advises computer companies and the legislature.





A
Schoolhouse Apple
Feature

It's true—teachers are used to being told what and how to teach by everybody, including administrators, consultants, and publishers. It's also true that teachers have taken charge of computer education in the schools. They are the ones who are asking for and selecting hardware, reviewing software, and designing computer curriculums.

The growing confidence in teachers as computer experts is new. After all, only a few years ago many teachers "didn't know what a computer looked like and didn't want to." Workshop presenter Don Gazaway, for example, was once a junior high school librarian who saw the computer as "just one more device to be dumped into the library." Fortunately, Gazaway's school was in the district where Bobby Goodson gave one of her first computer literacy workshops. At this year's conference, it is Gazaway who leads a hands-on seminar designed to combat fear of computers.

Where the Action Is. The two annual CUE conferences are considered "the place to be" by publishers, hardware manufacturers, and leading computer education thinkers. The United States Department of Education has sent Dr. Linda Roberts to give the preconference keynote speech. IBM's Dr. Harvey Long is giving the evening keynote speech.

In total, more than one hundred exhibitors and two hundred workshop and seminar presenters are involved in the conference, some from as far away as Florida, Pennsylvania, and Michigan. Industries all over Silicon Valley open their doors to the visitors. Apple, Atari, and other companies provide transportation to their plants. There's even a well-attended field trip to Nolan Bushnell's Pizza Time theater.

Hardware companies give demonstrations of their hardware during the day. IBM provides twenty-five PCs and six well-trained demonstrators from California and Boca Raton to give hands-on lessons in IBM's version of Logo.

Apples seem as plentiful at the conference as they are in local orchards. Demonstrations on networking with hard disk systems, using graphics tablets, and programming in Basic are all done on one model of Apple or another.

In a bus containing sixteen Atari 400s, teachers from Napa Valley give hands-on computer demonstrations to interested conferencegoers. Excluding the minimal cost of the old school bus itself, this rolling computer lab was outfitted for $17,000. Last year it served more than three thousand fourth- to sixth-graders in twenty-two elementary schools. From among the crowd gathered around the bus, a teacher from Sabastopol, California, gives an impromptu seminar on the computer van project in his district. More than twelve hundred kids are served by fifteen Hewlett-Packard 86s, which are transported in a van from school to school and rolled into the classrooms. The cost of this computer education is approximately $1.25 per student hour.

Besides participating in practical teacher-led workshops, conference participants consider various computer education issues. One of the big draws at the conference is author Arthur Luehrmann.

Reading, Writing, and REM Statements. Luehrmann is the leading spokesperson for teaching Basic as an approach to computer literacy. In an easy and erudite way, he defines computer literacy as simply "the ability to compute." He draws an analogy between computer education and driver education. In driver education, says Luehrmann, students are not expected to master the history of the automobile or how the engine works. Students simply learn to drive a car. So should it be with the computers.

Luehrmann and Herb Peckham, another opinion leader in computer education, give sessions on programming. To Luehrmann, it's not the language itself that is so important, but the powerful ideas of computing. "Problem-solving can be taught in Logo or Pascal or Basic—or even English," he believes. To be able to use a computer to solve problems is to be computer-literate.

Discussions about literacy go on throughout the conference in one form or another. Four years ago, teachers were most concerned with hardware—what kind and how to afford it. Now most hardware questions have been answered and teachers are interested in applications and computer literacy issues.

The pioneers of the computer education movement are already moving beyond these interests. Bobby Goodson is eager for the computer literacy question to be settled; like Luehrmann, she sees using computers as the important thing.

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The issue of staff development and training also concerns CUE teachers. Right now, schools typically spend 95 percent of their dollar for hardware and less than 5 percent for training. Several kinds of training methods exist, including staff centers, part-time computer experts, and, more recently, resource specialists who are both teachers and computer experts.

The difficulty with the computer centers is lack of follow-up. Teachers who drop in for a few two-hour sessions need coaching, or guided practice, once they get back to the classroom. The problem with relying on computer experts and outside consultants is that they don't seem to make the best trainers. Teachers themselves usually teach each other computer skills better than anyone else. Whoever does the teaching must remember that effective training must be slow-paced, nontechnical, and clearly related to specific classroom use.

Unfortunately, while teachers are busy training each other, administrators are being left out. That's why CUE chose to have a special session for administrators who may soon find themselves in the position of knowing less about computers than their teachers, office staff, and kindergartners.

New Revolutions. The future begins today—and today, according to IBM's Dr. Long, "eighty-five percent of all jobs are directly or indirectly tied to computers," and 17 percent of all Visa cardholders own a computer. Long believes that the use of computers and video will be the next "revolution" and that teleconferencing will become more common as a result of cheaper satellite and cable communications. He suggests that teachers will have administrative terminals at their desks and that computers will be used in the schools more extensively for administrative purposes, to do such things as seating charts, daily attendance, lesson plans, and announcements. He also believes that the number of programming jobs will decrease as computers become more transparent learning devices that program themselves, while the number of computer-related jobs will increase.

Ramon Zamora, computer education author and founder of Childware Corporation, takes the question of future trends even further. He believes that software will soon adapt to each learner. In fact, he tells his listeners, there's already a game that adapts to a child's mode of learning. The game discovers whether the child is playing more by sight or sound and adapts accordingly.

Zamora thinks that schools will eventually become social places, good places for touching base with "learned people." Speaking on the effectiveness of microcomputers in schools, he suggests that it will be ten or fifteen years before we can really evaluate the role of computers in education.

Still To Come. . . . Bobby Goodson wants CUE to continue as a major force in the marriage of school and microcomputer. But, like every successful endeavor, the organization is experiencing growing pains. CUE is too big to continue operating on a purely volunteer basis. Soon it will need professional administration. Goodson is determined to see CUE make the transition with all its benefits—and its pioneering spirit—intact.

And so it goes. Teachers learning from other teachers. Teachers becoming experts. Teachers sharing their ideas, talking over their concerns, and suggesting solutions to classroom computer problems.

Of course, if the conference predictions of various experts hold true, the CUE network of the future will be an electronic one that allows teachers to chat over morning coffee via modem. ◨■

The Cue for CUE

Computer Using Educators (CUE) is the largest of the forty-four affiliated organizations of the International Council of Computer Educators (ICCE). Unlike its sister organizations in other states, CUE receives no state support and has no paid staff. Dues, fees, and volunteer help entirely support its twice-yearly conferences and bimonthly newsletter, and an unpaid but dedicated board of directors runs the organization efficiently.

CUE encourages teachers to organize regional groups and chapters and to hold local conferences. The organization has often been urged to go national, but so far the membership has voted to remain focused on concrete, local concerns—the practical needs of classroom teachers working in kindergarten to college level settings.

Bobby Goodson, one of CUE's founders, favors this local emphasis. Nevertheless, she also sees a need for an organization that will have the same kind of influence at the national level as CUE does at the state level, and she hopes that the role of the ICCE will broaden to fill this gap.

Its affiliation with ICCE gives CUE itself a certain amount of national influence. Last year, several CUE members, including board members Leroy Finkel, Marian Kenworthy, and Dr. Sandy Wagner, drafted the ICCE policy statement on network and multiple machine software. This statement outlines the responsibilities of educators, hardware developers, and software developers with regard to copyright protection and infringement and provides valuable guidance to school districts across the country.

CUE also boasts accomplishments closer to home, in Sacramento and in the Silicon Valley. Last year, for example, CUE advised Apple Computer on how to implement the Kids Can't Wait program. Apple's goal was to put a computer in every school, and, indeed, some nine thousand California schools received computers before the fall of 1983.

CUE also had an impact on the design of the twenty-one regional Teacher Education Computer Centers (TECCs) in California. Testifying not long ago before the House of Representatives Ways and Means Committee, former Governor Edmund G. Brown, Jr., spoke of how easy it was to implement his computer initiative (Imbrecht, AB 3194) in California. According to Brown, the grassroots movement was already in place, and CUE pioneers Ann Lathrop and Leroy Finkel had provided the model for the first TECC in their own San Mateo Center. In addition, Lathrop had already started a statewide software evaluation project (Softswap), which was subsequently written into the Imbrecht bill.

More recently, CUE played an important role in making technology a part of the California Education Reform Bill, AB 803. This is the first time an education bill not directly concerned with technology has recognized the importance of computer literacy.

The CUE Newsletter. Between conferences, CUE members keep in touch with one another via the organization's bimonthly newsletter—thirty pages or so of announcements, letters, opinions, programs, teaching ideas, and reviews.

To subscribe to the newsletter, contact Computer Using Educators, Box 18547, San Jose, CA 95158.

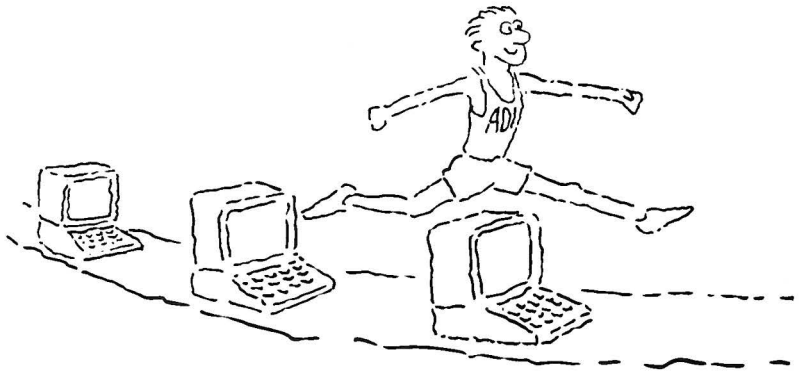
Public Domain Software. The CUE-sponsored exchange of teacher-written, public domain educational software is called Softswap. Currently, CUE's library, housed at the San Mateo County Office of Education in Redwood City, contains about seventy disks, with more than four hundred public domain programs for the Apple, Atari, Pet, TRS-80, and Compucolor computers; disks for the IBM PC and the Radio Shack Color Computer are being developed.

Programs are available for a nominal charge or as a trade. The income generated from the fees is put back into Softswap and used to pay student programmers and office help. No fee is involved when Softswap disks are exchanged for original programs written by teachers, which are then evaluated and edited by CUE volunteers. Schools and user groups who'd like to develop complete Softswap disks of their own can obtain a program standards check list and release form from Softswap.

To contact Softswap, write to Ann Lathrop, Softswap, Microcomputer Center, SMERC Library, San Mateo County Office of Education, 333 Main Street, Redwood City, CA 94063. ◨■

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THE BASIC Solution

By Wm. V. R. Smith

Finally, we have arrived. It's January 1984 and we seem to have avoided falling into the political trap foreseen by George Orwell. Technology has not brought about a state of all-encompassing government control. Instead, by providing us with powerful but inexpensive personal computers, it has given private citizens access to information-handling capabilities that were once the privilege of government and of big business. Let's hear it for the personal computer.

In the last year we've seen a new trend in powerful but easy-to-use personal computers. First we saw Lisa with its windows, icons, roll-down menus, and the mouse to control them. Now Microsoft and VisiCorp are developing window-based systems for the IBM PC. Soon we can expect to see this new software technology on all Apples.

In this month's article, we're going to take a look at just what makes the Lisa-like user interface so attractive, and we'll see how we can have some of those same features on our Apple IIs now.

The Lisa's most characteristic feature is the visual appeal of its menus and screen displays. The Lisa uses graphic symbols to represent the available application programs or features within a program. Of course, the Lisa has an extremely high-resolution screen so it can display very small icons that still have considerable detail.

The user moves a mouse to select the desired program or function. Since there's no mouse on the Apple II, we must settle for cursor control keys or joysticks. This month's program will use keyboard controls.

The use of icons can make it easier to run a program, because you don't have to read a complicated menu. You simply look for the symbol of the function you wish to execute and point at it. This makes the system much easier to learn, because DOS commands aren't required. It also minimizes the need for typing.

Another advantage of icons is that they can depict everyday objects that represent the function they activate. On the Lisa, for example, the icon for deleting a file is a wastebasket. Thus, the user no longer needs to think in terms of deleting a file; instead, he is throwing away a document. This is a big advantage over most menus, which tend to use too many technical terms for the average user and are often ambiguous as well.

The age-old saying holds true for computers: A picture is worth a thousand words. In the next few years, we are going to see many programs use icons or graphic depictions. This month's Basic Solution will present an example of how you can do graphic menus on your standard Apple IIe.

Since the majority of information in the standard office is held in a file cabinet, the program begins by displaying a three-drawer cabinet. Each drawer has a label describing the information that is stored within.

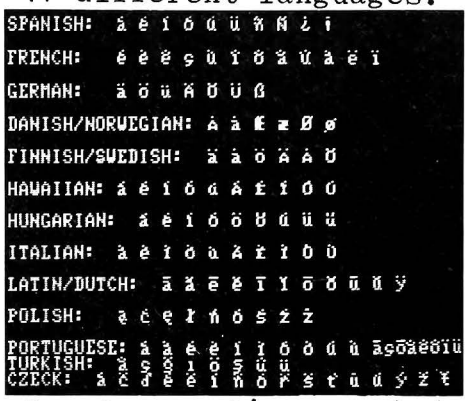
The left and right arrow keys can be used to move an inverse bar from file drawer to file drawer. Once a file drawer has been selected (by placing the inverse bar over the drawer name), pressing return will open the drawer. This corresponds to running a particular program. It is important to note that only the top drawer contains information in the Basic Solution example. The bottom two drawers are for your own programming improvements.

Select the top file drawer, called Stocks, and press return. When the drawer is opened, the user is presented with seven file folders inside the drawer. Each folder has a top tab with a name on it. Once again, the arrow keys are used to move the inverse bar up and down the tabs on the file folders. If you wish to close the drawer and go back to the file cabinet, simply press the left arrow key to move the bar above the top folder tab. If you wish to open one of the folders, simply place the inverse bar on the folder and press return.

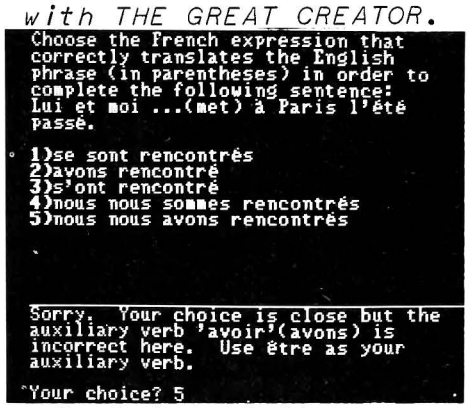
Once a file folder has been selected and opened, the contents are displayed on the screen. At the top of the display, you will still see the tab format of the file folder. Each file folder contains information about your purchase of a particular stock from the stock exchange. At the bottom of the display you are given three options: to edit the file, move the table up, or

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move the table down. We'll explain this later.

Let's first edit the file. Select the first option, and you'll be asked for the stock title. Enter Apple Computer. You will then be asked for the purchase date and then for the price per share. The date can be entered in any format that doesn't use commas. If you wish, you can look up the current price of Apple and enter that value, followed by the number of shares you decided to purchase and the amount of commission the stockbroker charged you. Then enter the current interest rate you were receiving for the money in your savings account. This should be in decimal format. For instance, a 5¼ percent interest rate would be entered as .0525.

After you've entered these values, the display will be redrawn with the information that you put in.

At the bottom of the folder there is a table containing the price of the stock, your thirty-day profit, your ninety-day profit, and your one hundred and eighty-day profit based on selling the stock at the prices indicated on the left. As you can see, you have immediately lost money. This is because you paid a commission on the purchase, but the table assumes that you're selling the stock for the same price you paid, excluding the commission. By selecting the other options available to you, table up or table down, the selling price of the stock can be increased or decreased so you can find your break-even and profit points. In other words, the program will tell you how much the stock has to increase in value before you will actually be making any money.

Notice that the longer you keep the stock, the more interest you have lost. This is because the money is not in a savings account, and the stock will have to go higher in order for you to get your money back. Once you have entered all the values, simply press return and the folder will be placed back into the file cabinet. It is also saved on disk. You will again be presented with the open file drawer. The name of the stock you entered is now on the top of the tab. You can close the file drawer and exit the program, or else enter, edit, or examine data on some other stock.

This entire program could have been done with normal text menus, and it probably would have taken up less disk space. However, the graphic presentation of the file cabinet and folders should make the program easier to use and a little more enjoyable.

```
10  REM ************
20  REM * STOCK FILE CABINET
30  REM ************
40  GOTO 2180
50  CLEAR : DIM I$(7,8)
60  D$ = CHR$ (4)
70  FT$ = "STOCK FILE DRAWER"
80  MM = 7: GOSUB 160
90  GOSUB 760
100  GOSUB 450
110  GOSUB 1300
120  GOSUB 510
130  IF FL = 0 THEN 90
140  FL = 0: GOSUB 270
150  GOTO 90
160  REM ** DISK I/O
170  ONERR GOTO 360
180  PRINT : PRINT D$;"OPEN STOCKS"
190  PRINT D$;"READ STOCKS"
200  FOR X = 1 TO 7
210  FOR Y = 1 TO 8
220  INPUT I$(X,Y)
230  NEXT :M$(X) = I$(X,8): NEXT
240  PRINT D$;"CLOSE"
250  POKE 216,0
260  RETURN
270  REM *** DISK OUT
280  PRINT : PRINT D$;"OPEN STOCKS"
290  PRINT D$;"WRITE STOCKS"
300  FOR X = 1 TO 7
310  FOR Y = 1 TO 8
320  PRINT I$(X,Y)
330  NEXT : NEXT
340  PRINT D$;"CLOSE"
350  RETURN
360  REM  ONERR
370  POKE 216,0
380  HOME : VTAB 10
390  PRINT "SHALL I CREATE A": PRINT
     "STOCK FILE FOLDER?";: GET A$
400  IF A$ = "Y" THEN 420
410  END
420  FOR X = 1 TO 7:I$(X,8) =
     ".      UNTITLED": NEXT
430  GOSUB 270
440  RUN
450  REM
460  FOR X = 1 TO 8
470  R$(X) = I$(MS,X)
480  NEXT
490  SP$ = I$(MS,7)
500  RETURN
510  REM
520  FOR X = 1 TO 8
530  I$(MS,X) = R$(X)
540  NEXT
550  RETURN
560  C$(1) = "  _____          "
570  C$(2) = " |\              \  "
580  C$(3) = " | \              \ "
590  C$(4) = " |  \_____________\"
600  C$(5) = " |  |             |"
610  C$(6) = " |  |    [____]   |"
620  C$(7) = " |  |_____________|"
630  C$(8) = "    |             |"
640  C$(9) = "    |_____________|"
650  FOR X = 1 TO 4: GOSUB 720: NEXT
660  FOR Y = 1 TO 3
670  X = 5: GOSUB 720
680  FOR X = 5 TO 7: GOSUB 720: NEXT
690  NEXT
700  FOR X = 7 TO 9: GOSUB 720: NEXT
710  RETURN
720  REM
730  POKE 36,10
740  PRINT C$(X)
750  RETURN
760  REM **********
770  REM * FILE FOLDERS
780  REM **********
790  REM VX= VIDEO X POSITION
800  REM VY= VIDEO Y POSITION
810  REM MM= NUMBER OF FOLDERS
820  REM OM= LAST FILE
830  REM M$(?)= FOLDERS TITLES
840  REM MS= CURRENT FOLDER
850  REM SW= TITLE WIDTH
860  IF B$ = "" THEN B$ = "
                ": REM 31 SPACES
870  IF FT$ = "" THEN FT$ =
     "UNTITLED"
880  HOME
890  INVERSE :SW = 29: IF MM > 7 THEN
     SW = 68
900  PRINT LEFT$ (B$,10); LEFT$ (FT$ +
     B$ + B$ + B$,SW): NORMAL
```


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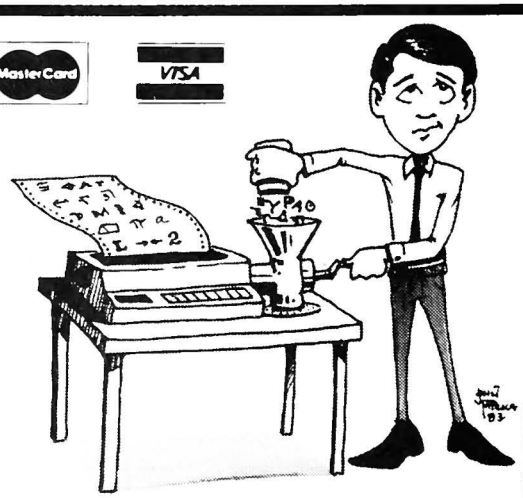
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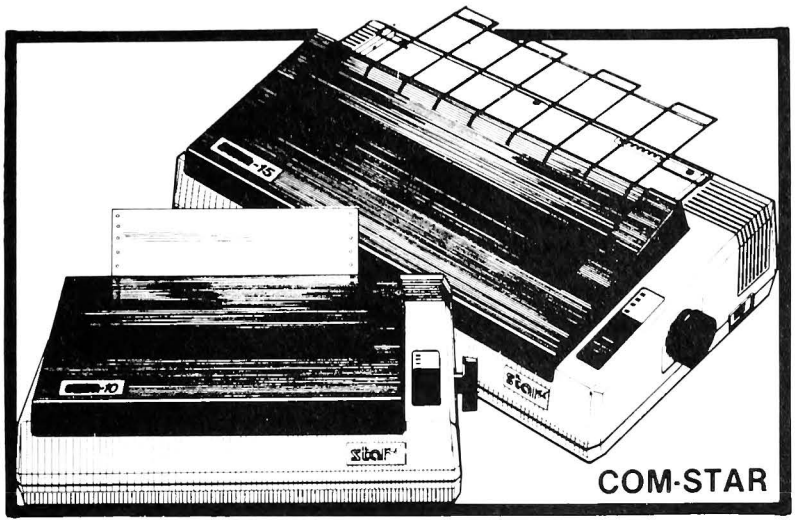


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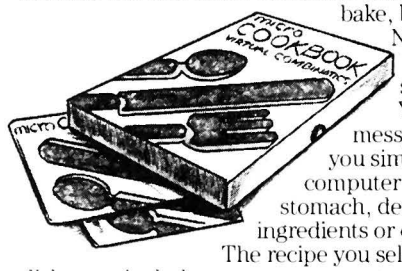
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```
910  IF MM = 0 THEN MM = 2
920  FOR MS = 1 TO MM
930  GOSUB 1160
940  NEXT
950 MS = 1
960 VY = (MS * 2) + 2: IF MS > 7 THEN
     VY = VY - 14
970 VX = (MS + 4): IF MS > 7 THEN VX =
     VX + 24
980 OM = MS
990  GOSUB 1110
1000  GET A$
1010  IF A$ = CHR$ (21) THEN 1030
1020  IF A$ < > CHR$ (32) THEN 1050
1030 MS = MS + 1: IF MS > MM THEN
     MS = 1
1040  GOTO 1100
1050  IF A$ < > CHR$ (8) THEN 1080
1060 MS = MS - 1: IF MS < 1 THEN 2170
1070  GOTO 1100
1080  IF A$ < > CHR$ (13) THEN 1000
1090  RETURN
1100  GOSUB 1120: GOTO 960
1110  INVERSE
1120  VTAB VY: POKE 36,VX
1130  PRINT LEFT$ (M$(OM) + B$,20);:
     NORMAL
1140  VTAB 22: PRINT
1150  RETURN
1160  REM *********
1170  REM * FILE FOLDERS
1180  REM *********
1190 VY = (MS * 2) + 1: IF MS > 7 THEN
     VY = VY - 14
1200 VX = MS: IF MS > 7 THEN VX = VX
     + 24
1210 A$(1) = "  ----------"
1220 A$(2) = " -/ " + LEFT$ (M$(MS) +
     B$,21) + "\__"
1230 A$(3) = "|                          |":
     REM 27 SPACES
1240 A$(4) = "|__________________________|":
     REM 27 UNDERSCORE
     CHARACTERS
1250  VTAB VY
1260  FOR X = 1 TO 2: POKE 36,VX:
     PRINT A$(X): NEXT
1270  FOR X = 1 TO 3. POKE 36,VX:
     PRINT A$(3): NEXT
1280  POKE 36,VX: PRINT A$(4)
1290  RETURN
1300  REM *******
1310  REM * SHOW STOCK
1320  REM *******
1330 P$(1) = "PURCHASE DATE"
1340 P$(2) = "PRICE PER SHARE"
1350 P$(3) = "# OF SHARES"
1360 P$(4) = "COMMISSION"
1370 P$(5) = "TOTAL PRICE"
1380 P$(6) = "CURRENT INT RATE"
1390 P$(8) = "STOCK TITLE"
1400  HOME
1410  PRINT "      ----------
     ----------"
1420  PRINT "___/"; LEFT$ (M$(MS) +
     B$,25);"\_________"
1430  VTAB 20: PRINT "_____________
     ________________________"
1440  VTAB 4
1450  FOR X = 1 TO 6
1460  GOSUB 2120
1470  NEXT
1480  VTAB 10
1490 SP$ = R$(7)
1500  PRINT "-------------------------
     ---------------"
1510  PRINT " PRICE     30 DAY     90 DAY
     180 DAY"
1520 DI = ( VAL (R$(6)) / 356)
1530 I(1) = 1 + (30 * DI) * VAL (R$(5))
1540 I(2) = 1 + (90 * DI) * VAL (R$(5))
1550 I(3) = 1 + (180 * DI) * VAL (R$(5))
1560 F$(0) = "    ":F$(1) = "1/8":F$(2) =
     "1/4":F$(3) = "3/8"
1570 F$(4) = "1/2":F$(5) = "5/8":F$(6) =
     "3/4":F$(7) = "7/8"
1580  FOR S = 0 TO 7
1590 SP = VAL (SP$)
1600  PRINT RIGHT$ (B$ + STR$ (SP) + "
     " + F$(S),8) + " ";
1610 SP = SP + S / 8:SP = SP * VAL
     (R$(3)) - VAL (R$(4))
1620 SP = SP - VAL (R$(5))
1630  FOR Z = 1 TO 3
1640  PRINT RIGHT$ (B$ + STR$ ( INT ((SP
     - I(Z)))),9);
1650  NEXT
1660  PRINT
1670  NEXT
1680  VTAB 21
1690  PRINT "1 - EDIT FILE 2 - TABLE UP
     3 - TABLE DOWN"
1700  GET A$: PRINT
1710 X = VAL (A$): ON X GOTO
     1730,1910,1960
1720  RETURN
1730  REM ** EDIT
1740  VTAB 21: PRINT LEFT$ (B$ + B$,39)
1750  IF R$(2) = "" THEN 1790
1760  VTAB 21: PRINT "SHALL I EMPTY
     FOLDER?";: GET A$: PRINT
1770  IF A$ < > "Y" THEN 1790
1780  FOR X = 1 TO 8:R$(X) = "": NEXT
     :FL = 1: GOTO 1300
1790  VTAB 21: PRINT LEFT$ (B$ + B$,39)
1800 X = 8: GOSUB 2020
1810 M$(MS) = R$(8)
1820  VTAB 2
```


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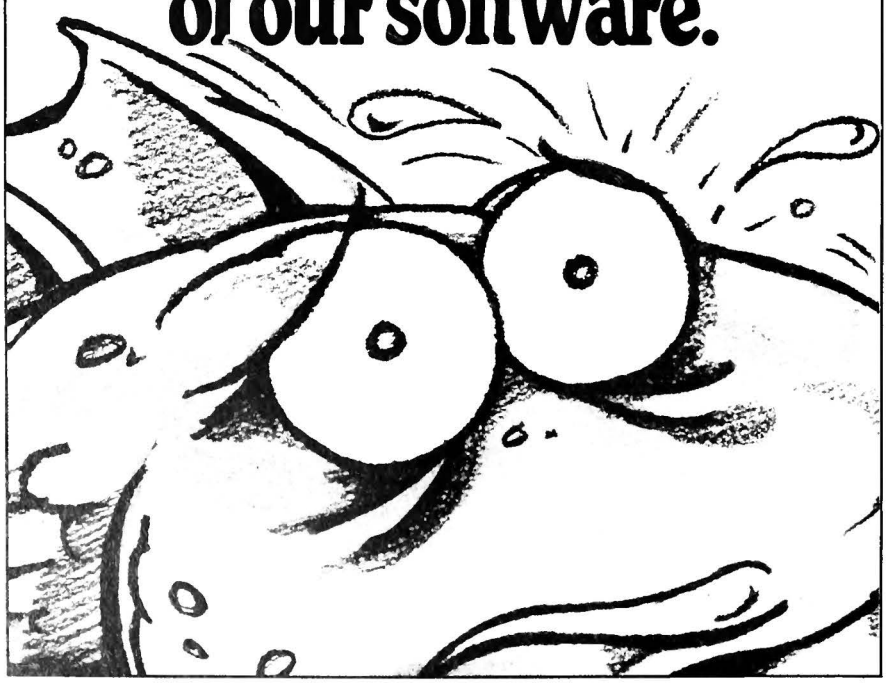
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```
1830  PRINT "___/"; LEFT$ (M$(MS) +
      B$,25);"\_________"
1840  FOR X = 1 TO 4
1850  GOSUB 2020
1860  NEXT
1870 X = 6: GOSUB 2020
1880 H = ( VAL (R$(2)) * VAL (R$(3))) +
      VAL
      (R$(4)):R$(5) = STR$ (H)
1890 R$(7) = STR$ ( INT ( VAL (R$(2))))
1900  GOTO 1300
1910  REM
1920 FL = 1
1930 R$(7) = STR$ ( VAL (R$(7)) + 1)
1940  GOTO 1480
1950  RETURN
1960  REM
1970 FL = 1
1980 X = VAL (R$(7)): IF X = 1 THEN 1300
1990 R$(7) = STR$ (X - 1)
2000  GOTO 1480
2010  RETURN
2020  REM
2030  VTAB 21: PRINT LEFT$ (B$ + B$,39)
2040  VTAB 21: PRINT LEFT$ (P$(X) +
      B$,19);R$(X)
2050  VTAB 21: POKE 36,19
2060  INPUT "";A$
2070  IF A$ = "" THEN RETURN
2080 FL = 1
2090 R$(X) = A$
2100  IF X < 7 THEN GOSUB 2120
2110  RETURN
2120  REM
2130  VTAB X + 3
2140  PRINT LEFT$ (P$(X) + B$,20);
2150  PRINT RIGHT$ (B$ + R$(X),19)
2160  RETURN
2170  REM *******
2180  REM ******
2190  REM * FILE CAB
2200  REM ******
2210 F$(1) = "STOCKS"
2220 F$(2) = "CREDIT"
2230 F$(3) = "SAVINGS"
2240  HOME
2250  POKE 36,10
2260  PRINT "PERSONAL FILE CABINET"
2270  PRINT
2280  GOSUB 560
2290  FOR MS = 1 TO 3
2300  GOSUB 2450
2310  NEXT
2320 MS = 1
2330  GOSUB 2440
2340  VTAB 22: GET A$: PRINT
2350  IF A$ = CHR$ (13) THEN 2490
2360  IF A$ < > CHR$ (8) THEN 2390
2370  IF MS = 1 THEN VTAB 23: END
2380  GOSUB 2450:MS = MS - 1:
      GOTO 2330
2390  IF A$ < > CHR$ (21) THEN 2420
2400  IF MS = 3 THEN GOSUB 2450:MS =
      1: GOTO 2330
2410  GOSUB 2450:MS = MS + 1: GOTO
      2330
2420  IF A$ = CHR$ (32) THEN 2400
2430  GOTO 2340
2440  INVERSE
2450  VTAB 4 + (MS * 4): POKE 36,18
2460  PRINT F$(MS)
2470  NORMAL
2480  RETURN
2490  REM
2500  ON MS GOTO 50,2510,2510
2510  HOME
2520  VTAB 10
2530  PRINT "FILE DRAWER IS EMPTY";:
      GET A$: PRINT
2540  RUN
```


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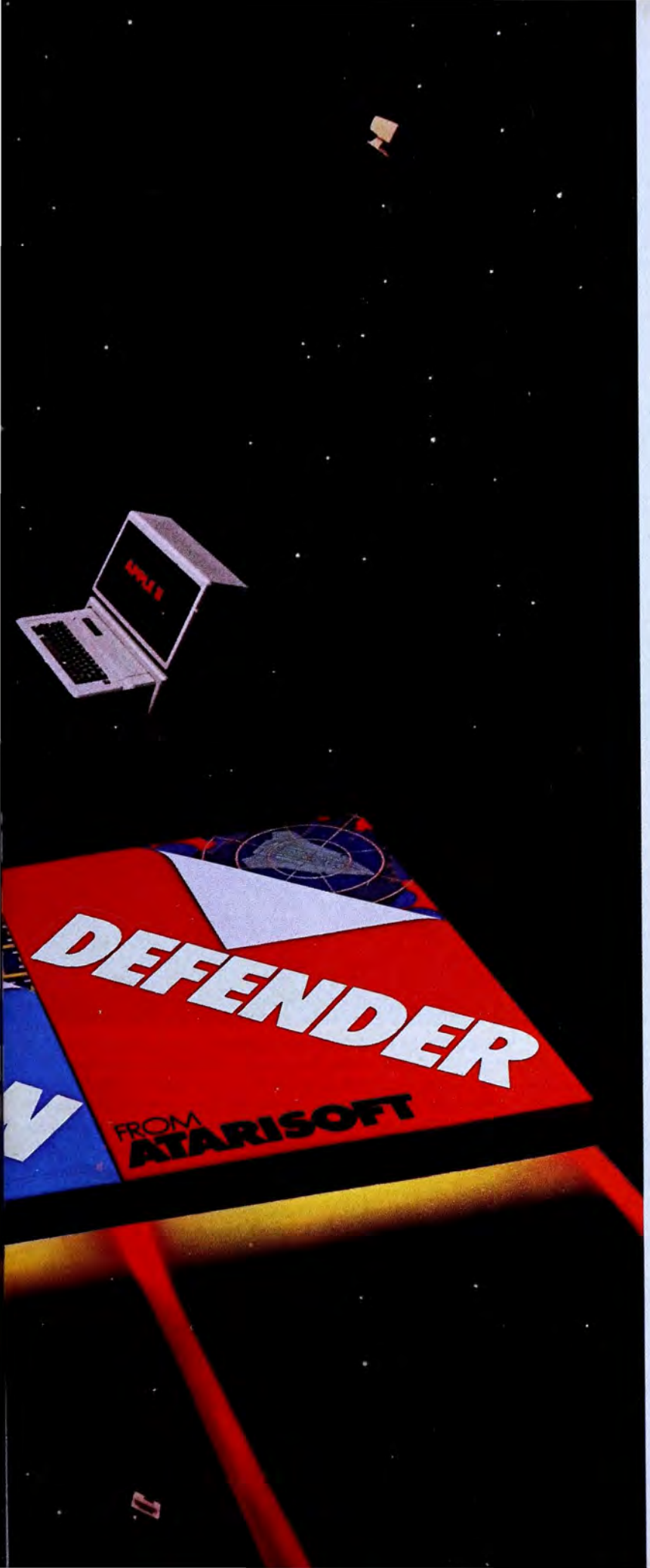
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ASM 18



Apple recently released version 1.1 of Apple III Pascal. The new version has a number of significant improvements and enhancements, one of which is a special utility program to change the Pascal system volume designation. The system volume is the disk that contains System.Pascal and System.miscinfo in its root directory.

Formerly, in version 1.0, the Pascal floppy disk that was used to boot the system was automatically designated the system volume. That particular disk had to remain in Apple III's built-in drive; if you removed it, Pascal soon demanded its return. In practice, this constant swapping of disks effectively rendered the built-in floppy drive useless for any other purpose. Most programmers simply gave up and bought an extra drive.

Pascal 1.1 solves that problem. Version 1.1 comes with a program called *Pmove.code* which allows you to assign the system volume to any block device you own. Normally you will want to designate a hard disk such as ProFile. It is desirable, of course, to have all the system files on hard disk because execution is faster and all the files are immediately available when needed.

The only drawback is that most system files—all those with the prefix "System." and a few others—must reside within the hard disk's root directory, where they are constantly in the way. There is, in fact, scarcely ever any need to look at the names of system files. You already know where they are located, and they are accessed only by single-key commands within the Pascal system. But every time you catalog the hard disk directory, there they are, forcing you to hunt around among all those extra file names to find the files you seek.

The accompanying patch program permits you to move all system files into a subdirectory where they remain bundled together, out of the way. It is similar to a patch for version 1.0 published in the February 1983 *Softalk*, but much simpler. The previous patch also had to reassign the system volume, a task now accomplished by *Pmove.code*. In version 1.1, moving the files into a subdirectory is easy—so easy, in fact, that it's surprising that Apple did not include this option in *Pmove.code*.

File	Block	Bytes
PASCAL	25	188
	26	218,248,278,306,332
	27	218,250
	35	216
	44	58
FILER	50	316
COMPILER	53	104
LINKER	4	500
	5	122
LIBRARY.CODE	1	446
	6	204
	7	204
	8	204
LIBMAP.CODE	5	254
SETUP.CODE	6	504
SOS.INTERP	(in strings beginning at)	
	6	359,394,429

Locations changed from "." to "/."



Back to The Old Apple III Patch

BY JOHN JEPPSON

The patch changes file name strings in a number of Pascal system files from "System.xxxxx" to "System/xxxxx," thereby tricking Pascal into looking for its system files in the subdirectory "System."

The accompanying table summarizes the locations involved. These changes do *not* affect the various work files. Pascal will still place all work files in the hard disk root directory. Furthermore, the system volume is not reassigned to the subdirectory. It remains the root directory of your hard disk, but that root directory will contain only a single listing for the subdirectory named System. Finally, as a small bonus, the program changes the error message displayed when the hard disk is not yet on-line during boot.

Instructions. The first step is to execute the program *Pmove.code* following the instructions contained in that program. *Pmove.code* will modify the Pascal boot file SOS.interp to reassign the Pascal system volume to the hard disk. It's a good idea, at this point, to place all Pascal system files temporarily into the hard disk root directory and to confirm that the system boots and runs correctly.

Next, make a subdirectory called ".name/system," where ".name" is the SOS device name of your hard disk, and copy all Pascal system files (except SOS files) into this subdirectory. Remove the prefix "System." from all file names that contain it, with the exception of System.syntax. Leave System.syntax and the remaining file names unchanged. It's okay to have both of the following files in the subdirectory at the same time. Pascal will not confuse them:

file Library	(derived from System.library)
file Library code	(a program that always had that name)

The directory structure should now appear:

```
/PROFILE                        (volume name of hard disk)
   SYSTEM                       (subdirectory name)
      PASCAL                    (files in subdirectory)
      MISCINFO
      EDITOR
      FILER
      LIBRARY
      SYSTEM.SYNTAX
      ERRORS.6502
```

and so on.

Upon running this patch program, you'll be asked for the same information required by Apple's program *Pmove.code*: the SOS device name of your hard disk (the new system volume), and the SOS device name of the disk containing SOS.interp (already modified once by *Pmove.code*). The patch makes a second modification to SOS.interp and also modifies the following system files: Pascal, Filer, Compiler, Linker, Library.code, Libmap.code, and Setup.code. All these files (except SOS.interp) must be present in the System subdirectory.

After successful execution of this program, you may reboot your Apple III with a Pascal first-stage boot disk containing SOS.kernel, SOS.driver, and the twice-modified SOS.interp. Pascal will look for its system files in the subdirectory. You may remove the old, unmodified files from the hard disk's root directory.

```
(*                    Patch Apple III Pascal Version 1.1
                      Alters Pascal System Files for Use in a Subdirectory *)
program patch; (* must be compiled under Pascal Version 1.1 *)
uses chainstuff;
var
  buf: packed array [0..511] of 0..255;
  oldPrefix, source, devname: string;
  prefixSet: boolean;
procedure getinfo;
  var
    i: integer;
    subdir: string;
  begin
    writeln (chr (28));
    writeln;
    writeln ('Pascal Version 1.1 - Move System Files to Subdirectory');
    writeln;
    writeln;
    write ('SOS device name assigned to hard disk drive: ');
    readln (devname);
    for i := 1 to length (devname) do      (* to upper case *)
      if devname[i] in ['a'..'z'] then
        devname[i] := chr(ord(devname[i]) - 32);
    writeln;
    write ('SOS device name of diskette containing SOS.INTERP file: ');
    readln (source);
    source := concat (source, '/SOS.INTERP');
    writeln;
    subdir := concat (devname, '/SYSTEM');
    prefixSet := setprefix (subdir);
    if not prefixSet then
      begin
        writeln ('Subdirectory ', subdir, ' not found');
        exit (program);
      end;
  end; (* getinfo *)
procedure getblock (s: string; blk: integer);
  var
    iofile : file;
    count: integer;
  begin
    writeln ('altering block ', blk:2, ' in ', s);
    (*$iocheck- *)
    reset (iofile, s);
    (*$iocheck+ *)
    if ioresult <> 0 then
      begin
        writeln (chr(7), 'Unable to find ', devname, '/SYSTEM/', s);
        exit (program);
      end;
    fillchar (buf, sizeof (buf), 0);
    count := blockread (iofile, buf, 1, blk);
    close (iofile);
  end;
procedure chg (n: integer);
  begin
    buf[n] := ord ('/');
  end;
procedure wrtblock (s: string; blk: integer);
  var
    iofile : file;
    count: integer;
  begin
    reset (iofile, s);
    count := blockwrite (iofile, buf, 1, blk);
    close (iofile);
  end;
procedure interp;
  var
    i: integer;
    tempname, message, ctrls1, ctrls2: string;
  begin
    getblock (source, 6);
    tempname := concat (devname, '/SYSTEM/PASCAL');
    buf[359] := length (tempname);
    for i := 1 to length (tempname) do
      buf[359 + i] := ord (tempname[i]);
    tempname := concat (devname, '/SYSTEM/MISCINFO');
    buf[394] := length (tempname);
    for i := 1 to length (tempname) do
      buf[394 + i] := ord (tempname[i]);
    (* create new error message - includes controls *)
    ctrls1 := 'xxxx';              (* move cursor to (0,23) and beep *)
    ctrls1[1] := chr (26); ctrls1[2] := chr (0);
    ctrls1[3] := (23); ctrls1[4] := chr (7);
    ctrls2 := 'x';                 (* clear to end of line *)
    ctrls2[1] := chr (31);
    message := concat (ctris1, 'Press RETURN when''',
                                    devname, '''is on-line', ctrls2);
    buf[429] := length (message);
    for i := 1 to length (message) do
      buf[429 + i] := ord (message[i]);
    wrtblock (source, 6);
  end; (* interp *)
procedure pascal;
  begin
    getblock ('PASCAL', 25);
    chg (188);
    wrtblock ('PASCAL', 25);
    getblock ('PASCAL', 26);
    chg (218);
    chg (248);
    chg (278);
    chg (306);
    chg (332);
    wrtblock ('PASCAL', 26);
    getblock ('PASCAL', 27);
    chg (218);
    chg (250);
    wrtblock ('PASCAL', 27);
    getblock ('PASCAL', 35);
    chg (216);
    wrtblock ('PASCAL', 35);
    getblock ('PASCAL', 44);
    chg ( 58);
    wrtblock ('PASCAL', 44);
  end; (* pascal *)
procedure others;
  begin
    getblock ('FILER', 50);
    chg (316);
    wrtblock ('FILER', 50);
    getblock ('COMPILER', 53);
    chg (104);
    wrtblock ('COMPILER', 53);
    getblock ('LINKER', 4);
    chg (500);
    wrtblock ('LINKER', 4);
    getblock ('LINKER', 5);
    chg (122);
    wrtblock ('LINKER', 5);
    getblock ('LIBRARY.CODE', 1);
    chg (446);
    wrtblock ('LIBRARY.CODE', 1);
    getblock ('LIBRARY.CODE', 6);
    chg (204);
    wrtblock ('LIBRARY.CODE', 6);
    getblock ('LIBRARY.CODE', 7);
    chg (204);
    wrtblock ('LIBRARY.CODE', 7);
    getblock ('LIBRARY.CODE', 8);
    chg (204);
    wrtblock ('LIBRARY.CODE', 8);
    getblock ('LIBMAP.CODE', 5);
    chg (254);
    wrtblock ('LIBMAP.CODE', 5);
    getblock ('SETUP.CODE', 6);
    chg (504);
    wrtblock ('SETUP.CODE', 6);
  end; (* others *)
begin (* main program *)
  getprefix (oldPrefix);
  getinfo;
  interp;
  pascal;
  others;
  prefixSet := setprefix (oldPrefix);
  writeln;
  writeln ('SUCCESSFULLY COMPLETED');
end.
```

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EVERYONE'S GUIDE TO ASSEMBLY LANGUAGE



BY JOCK ROOT

Words and Actions

"Assemby Language Spoken Here." There is a place in your Apple where assembly language, or something very much like it, is the normal working language for all activities. If the Apple can be said to "think to itself" in a "language"—and in one sense, that's a literal description of what actually goes on in running a program—then the language it thinks in is similar to assembly language. Not similar in form, of course—the Apple thinks to itself in electric pulses—but similar in structure: using almost the same rules of logic and syntax and handling information in the same ways.

In a human mind, assembly language is a set of logical blocks that can be assembled into a program. In a machine "mind"—the circuit board of the Apple—assembly language becomes a set of electronic signals that open or close gates in various integrated circuits on the board and steer other electronic signals from one place to another.

This similarity of structure between assembly language and machine language is what makes assembly language so powerful—and so difficult to learn. It's difficult because it's very different from any human language; in fact it's not really a "language" at all but rather a set of instructions (and the rules for using them). However, these instructions are the ultimate building blocks of any program (or "language") that your Apple can understand: If you know how to use these instructions, you can control any and all of the capabilities of the system.

Note to experts: This month, in honor of January and beginnings, we are going to cover some background material: how information gets around in the Apple and what really happens while running a program. If you're into electronics already, this may be old stuff to you; but if not—and especially if you wonder what the Apple is actually *doing* with those funny numbers you type in through the Monitor—then this is for you.

The Microprocessor. Most of the activities in the Apple are directed by a single integrated circuit, called a *microprocessor*. This chip reads instructions from the system's memory, decodes them, and moves data around (or modifies them) accordingly. The type of microprocessor used in the Apple is called a 6502; and assembly language, for the Apple, is simply the set of instructions that the 6502 can understand and execute.

The microprocessor can do four different kinds of things: It can read a number from memory, it can write a number into memory, it can change a number (by adding another number to it, for example), and it can test a number and do something based on the result of the test. Oh, it does other things as well, but never mind them—these four are the capabilities you can control with assembly language instructions.

That may not sound like much—read, write, modify, or test a number; but if you think about it, that's all you need. If the information you're working with can be expressed in the form of numbers, those four capabilities will let you do anything you want with the information; store it, retrieve it, sort or classify it, modify it in any way you can define, or whatever. And of course we can express letters in the form of numbers (there's a well-established set of rules for that, called ASCII code), so the system can handle text as well as numbers.

Several Kinds of Numbers. You have probably heard the Apple described as an *eight-bit system*. That means that the microprocessor thinks to itself in *words* that are eight bits long. A *bit* (short for *binary digit*) is a two-valued number: It can be either 0 or 1, but nothing else.

What good is a number that can have only two values? More than you might think. For one thing, it's useful as a yes/no indicator: It can be used to record whether or not something has happened or to select whether or not something will happen. It can reflect any kind of two-valued situation: light or dark, hot or cold, stop or go, ready or not, you name it.

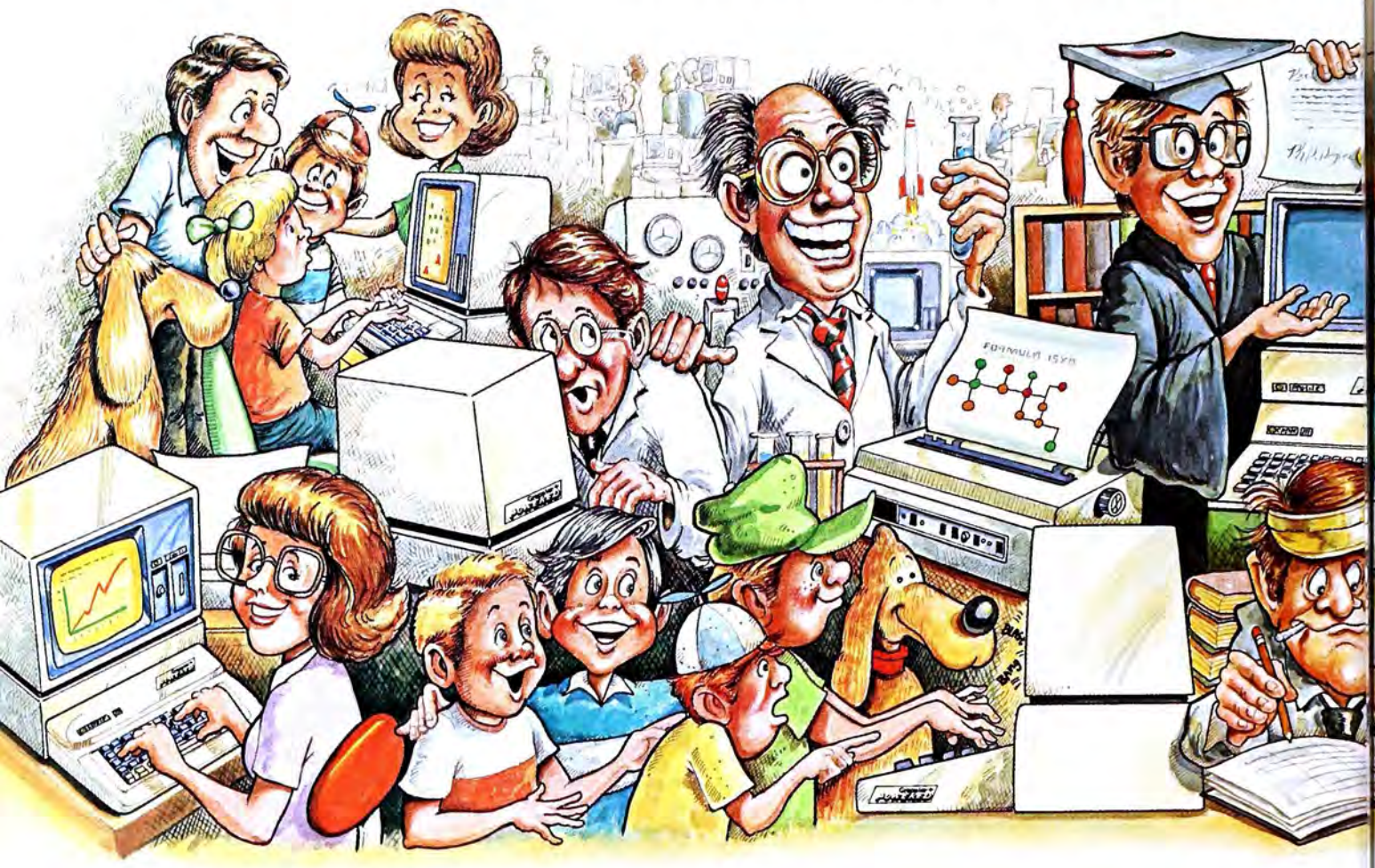
One bit, all by itself, is not much use for counting (which is what we normally use numbers for); but it's not all by itself—there are eight of them in a word, remember. With one bit, you can only count two possibilities, "something" or "nothing"; but with two bits you can count something or nothing *here*, and something or nothing *there*—a total of four possibilities. Add a third bit and you will be able to keep track of here and there yesterday, and here and there today—eight possibilities. And so on—each bit you add to the string doubles the quantity of things you can count. With eight bits, you can count from 0 to 255.

If you put two eight-bit words together to get sixteen bits (the Apple does this automatically in some situations), you can count up to 65,535—which is why we say that the Apple has a 64K address space (K means thousand, from the Greek *kilo*; we don't call it 65K because 65 is hard to divide in half or quarters or eighths, which you sometimes need to do with memory areas).

The reason we use binary (two-valued) numbers is that they're easy for the electronic circuits to work with. It's easy to test whether an input is high or low (voltage measurement); but to discriminate among high, low, and intermediate can be very tricky. In electronics, tricky usually means both expensive and error-prone; so we designed the hardware to run on binary numbers and then wrote software to convert the results to decimal numbers, which we're more used to.

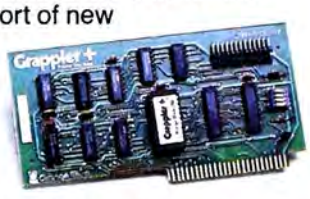
That's fine, if you're using Basic; but if you're working in assembly language, you need (sometimes) to look at a number the same way the

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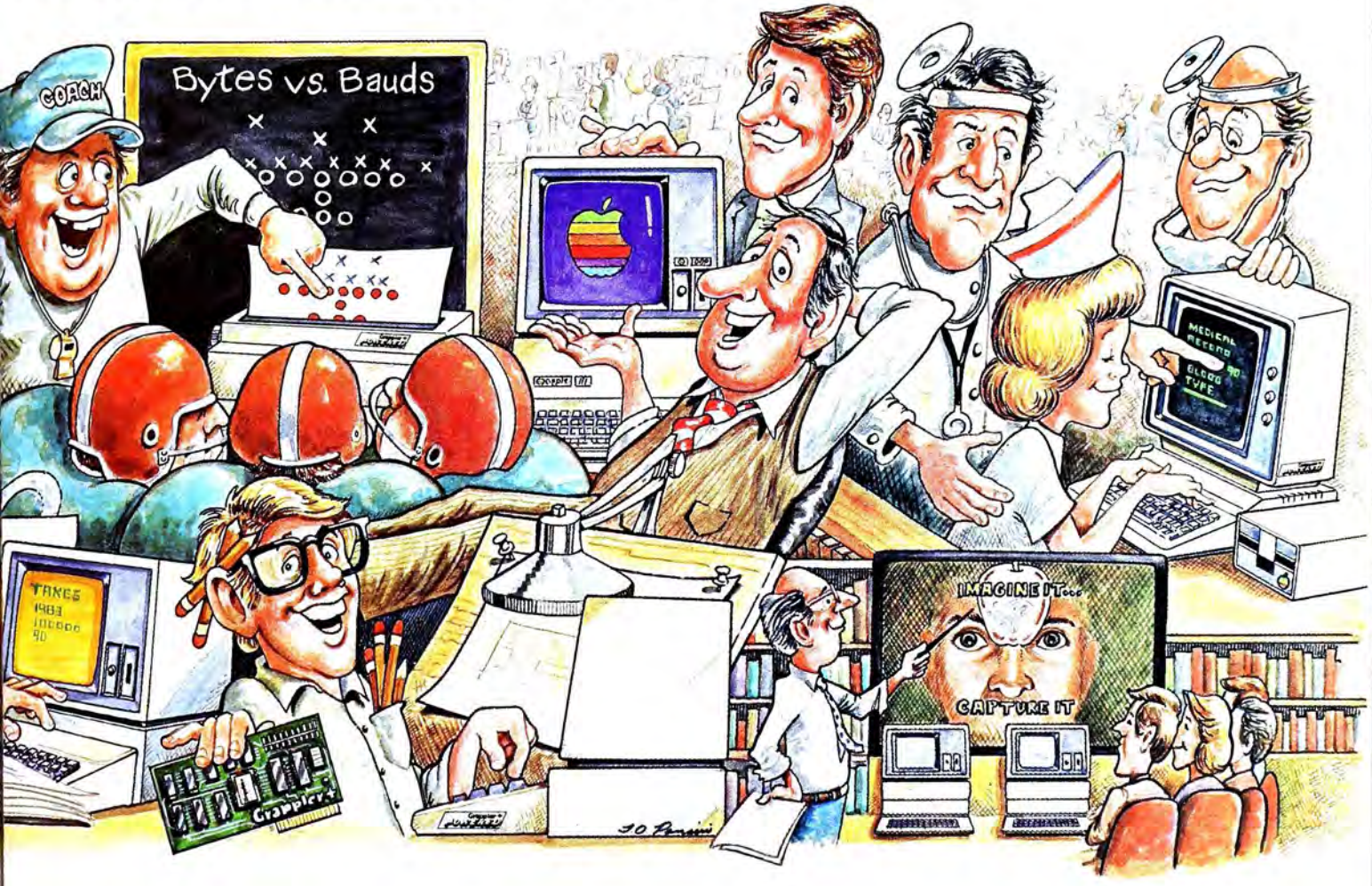
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microprocessor will—bit by bit. Most of the branch instructions, which control the sequence of your program, are activated by single bits (BPL and BMI, for example, depend on bit seven). There is no direct way to tell, from the decimal number, which bits will be set in the binary version: you have to look it up on a chart.

Of course we could report all numbers in binary form, when writing assembly language; but there are a couple of problems with that. We usually write eight-bit binary numbers in two groups of four digits, like this: 0001 1001. That uses a lot of space, and it doesn't make much sense (would you recognize it as 25?).

Instead, we use a compromise between the human-recognizable decimal system and the machine-recognizable binary system: *hexadecimal* numbers. This is a number system to the base sixteen (as decimal is to the base ten, and binary is base two). What that means is that you have sixteen single-digit numbers (including zero) before you get to 10 the first two-digit number, like this: 0 1 2 3 4 5 6 7 8 9 A B C D E F 10 (in this system, "10" equals the decimal number 16). We usually indicate hexadecimal numbers with a dollar sign, thus: $10 = 16.

This may seem like a strange approach. We're stuck with binary, because the hardware requires it; but why bother with this hexadecimal stuff? Why not just learn binary and be done with it? There's a good reason: It turns out that hexadecimal makes a very convenient bridge between binary and decimal.

Converting between hexadecimal (commonly called "hex") and decimal is relatively simple: not easy—and beyond the scope of this month's column (we usually use a lookup table, anyway)—but easier than converting between decimal and binary. And the conversion between binary and hex is so easy it's almost trivial: Each group of four digits in the binary number corresponds to one digit in the hex number. That is, 1111=$F = 15, or 0001 0000 = $10 = 16. By using hex as a transition system, we only have to learn the binary numbers up to 1111 (decimal 15) instead of up to 1111 1111 (decimal 255).

In the Hardware. Earlier, we mentioned that the Apple thinks to itself in eight-bit "words"—that is, it deals with information in units of eight bits at a time. This eight-bit unit is usually called a *byte*.

This number, eight, occurs in many places in the Apple. The accumulator is eight bits wide, and so are most of the other registers (X, Y, stack pointer, and status register); the memory is eight bits deep (each memory address represents eight one-bit storage locations); and in several places on the circuit board there are eight silvery lines side by side—parallel conductors that can carry eight bits at a time.

These parallel conductors are very important: They take care of most transfers of information within the system. They are called the *data bus* because of the way they carry all eight bits of a data byte from one place to another. The eight bits all get on together, stay on the bus until they come to a place where the doors open, and then all get off together.

What actually happens is more like this. In a read-memory operation, such as LDA $300 (read memory address $300 and put the value stored there into the accumulator), the microprocessor sends out two signals: A read signal goes to all the ICs connected to the bus (memory, input/output, and others), and a special "this means you" signal goes out to address $300.

In response, the memory chips that handle address $300 "take over" the bus lines, and all the other chips "let go": the eight lines are pulled high or low to match the eight bits of the byte stored at $300. Next, the microprocessor tests the eight lines (this is where the doors open and the data gets off the bus) and sets the eight bits in the accumulator to match. Thus, the information at address $300 has been copied into the accumulator.

Note that the microprocessor can use the same set of wires to read from many different ICs, as long as it is careful with the "this means you" signals (technically called *address enable* signals). It can even send data over the bus itself, by having all the other chips let go and driving the data lines itself. Then it sends a write signal (instead of a read signal), and the bit pattern on the bus is copied into the address-enable location (this corresponds to a STA instruction, "store contents of accumulator").

Addressing. As we noted earlier, the Apple has a 64K address space: In other words, it can specify sixty-four thousand different addresses (approximately). Technically speaking, it can address any one of 65,536 different locations.

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To represent that many different addresses, you need a binary number sixteen bits long: two bytes side by side (or, to put it another way, a bus network with sixteen parallel conductors). There is such a bus system in the Apple, serving all the ICs on the data bus; it's called (surprise!) the *address bus*. The microprocessor chip has sixteen address output pins, which drive the address bus lines; and various chips on the board decode the address bus signals into the necessary enable signals.

Thus, in order to read a location in memory, the microprocessor drives the address lines to indicate the address it wants to read and pulls the read/write line high; then, a moment later, it tests the data lines for high or low and sets an internal register accordingly. In the meantime, the address decoding logic has enabled the proper memory address and set the data lines to match the byte stored there; so the microprocessor gets an exact copy of the addressed byte.

The process for writing to a memory location is similar, except that the read/write line is pulled low and the data lines are driven by the microprocessor and copied by the memory logic.

In case you're wondering what a memory location consists of, you can think of it as eight flip-flops (believe it or not, *flip-flop* is a technical term in electronics), one connected to each line of the data bus. These flip-flops have an input, an output, and an enable line. They work like this: When a pulse is sent to the enable pin, the output is set to match the current state (high or low) of the input pin and is locked there. It will stay in that state, regardless of any changes at the input pin, until another enable pulse comes along. In other words, it "remembers" the state of the input pin whenever it's told to.

That's one flip-flop. An eight-bit register, or a memory location, uses eight of them: one for each bit. The enable lines are connected together, so all eight flip-flops react at once—storing the bit pattern that was on their inputs when the enable pulse went by. Note that you can read information out of a register without changing it—just test the output pins. The only thing that will change the information in a register is to write something on top of it, by pulsing the enable line.

An Instruction. Let's follow an assembly language command through the system and see what happens to it. We'll use a simple load accumulator instruction, LDA $1234: This will get the value stored in location $1234 and copy it into the accumulator.

This is a "load absolute" instruction, which is the simplest kind: It means "load the value stored at the following address." The machine language form of the LDA absolute instruction is $AD. This must be followed by the address you want to load from, $1234; but here there is a complication.

First we need some labels. An address like $1234 is made up of two bytes: in this case, the bytes $12 and $34. We call the byte on the left, $12, the *most significant byte* (MSB), or simple the high byte; and the other byte, $34, the *least significant*, or low, byte (LSB). If the reasoning behind those names isn't obvious, we can only refer you to a math textbook on positional notation.

Right, then: The address of the location we want to read from takes up two bytes, MSB and LSB, and we know which is which. We usually write them high byte first, then low byte: MSB,LSB; or $1234. Now we come to the tricky part.

For various reasons, the 6502 microprocessor doesn't use this arrangement: It likes to get addresses in reverse order, low byte first. Thus our assembly language command LDA $1234, translated into machine language, becomes $AD $34 $12.

Actually, that isn't machine language—that's machine-language-on-paper. "Real" machine language, as it is "spoken" and understood by real machines, consists of electronic pulses. However, we can't see electronic pulses (and anyway, these pulses last only for a fraction of a microsecond), so we need to represent them in some other form. The bit pattern corresponding to $12 is 0001 0010, and that pattern is also what you'd find if you measured the voltages in the LSB lines of the address bus (at the right moment); so we use $12 to represent, on paper, what the machine is saying with its pulses.

Now that we have the hex numbers that represent the machine language form of our assembly language command, we will stow them in memory, starting at address 300. $AD (in its binary form, 1010 1101) goes into the eight flip-flops at $300, $34 (as 0011 0100) goes into $301, and $12 (0001 0010) goes into $302.

Running It. Now that we've got our instruction loaded into memory, let's see what happens when it runs. First we get to it, from Applesoft, by typing *call 768*—768 is decimal for $300. The end result? The microprocessor will put the number $300 into its program counter and send that out over the address lines while it pulls the read/write line high.

Out on the circuit board, the address decoding chips will read the address lines and send out the proper enable signal; the contents of location $300, 1010 1101 (or $AD) will be put on the data bus.

When the microprocessor reads that byte, it recognizes that this instruction should be followed by an address; so it increments the program counter to address the following byte and puts it out on the address bus again. This time, memory responds by putting 0001 0010 ($12, the address low byte) on the bus.

The microprocessor reads that, increments the program counter again, and asks for the high byte. In the meantime, it can do a little work on the low byte, which it already has: It can add an offset from the X or Y register, compute a branch according to a test-and-branch instruction, or something similar. This is why it likes to get the low byte of the address before the high byte: to give itself time to make these changes while something else is happening, so as not to hold up the program.

Finally, the microprocessor has read the complete address and modified the low byte if the instruction required it (not required, in our case). Now it disconnects the program counter from the address bus and puts this address out on the bus instead, together with a read command on the read/write line. That will direct the memory logic to put the addressed byte—that is, the contents of memory location $1234—on the bus. At this point, the microprocessor simply copies the bit pattern from the data bus into the accumulator, and LDA $1234 has been accomplished.

The operation of a STA command is very similar, except that the read/write line is low; so the microprocessor drives the data lines and the memory flip-flops store the bit pattern. LDX and STY are also similar, except that the X or Y register is used instead of the accumulator.

Are you beginning to be able to visualize the processes that go on in response to these instructions? Wonderful—now you're learning to think like a 6502 microprocessor! ■

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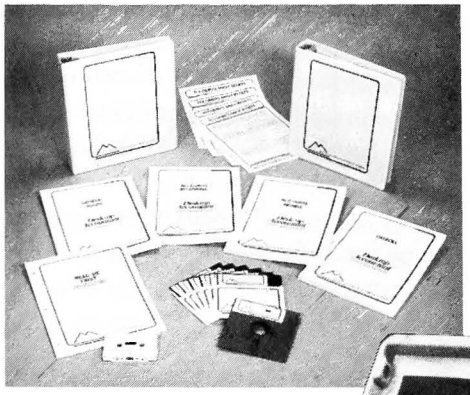
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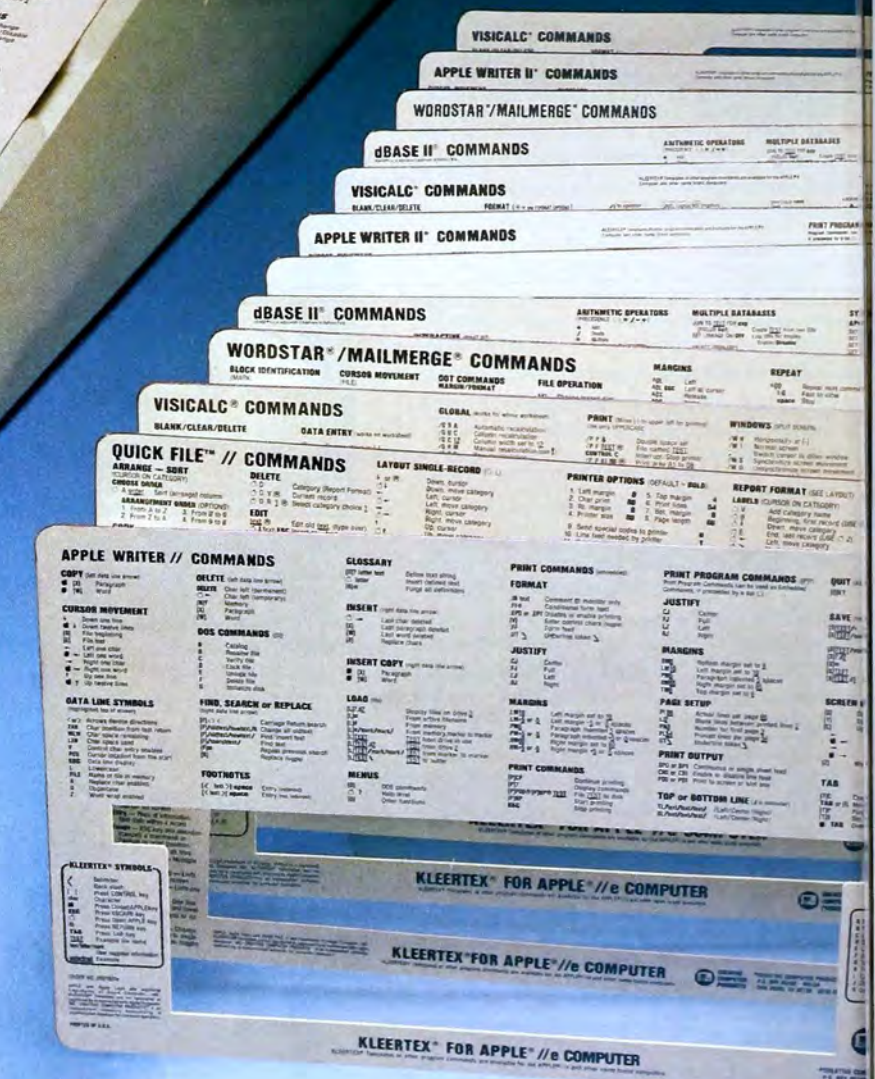
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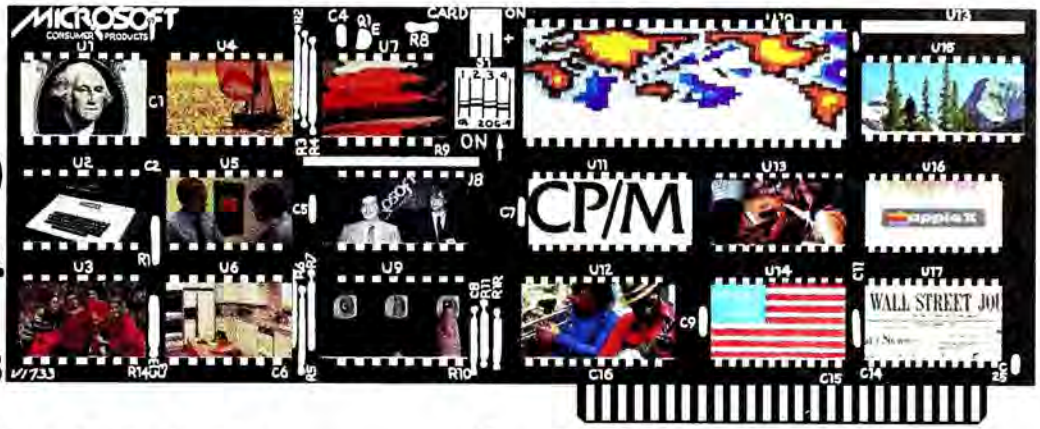
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SOFTCARD Symposium

by Greg Tibbetts



Welcome to SoftCard Symposium for January. This month we'll continue our examination of the BDOS system calls and the building of a subroutine library to use them. As you'll recall, we left off last month after discussing direct console I/O (function 6). We'll begin this time, therefore, with the next character I/O function, *print string*:

BDOS function no:	9
Function name:	Print string
Function purpose:	Send string to current console device
Entry parameters:	[C] = 09H
	[DE] = Address of string
Exit parameters:	none

The print string function is the means by which an entire collection of characters (a string) may be sent to the console device in a single operation. The alternative would be to output each character of the string individually, using BDOS console output (function 2), which we examined last month. Before we look at print string, can you think of an instance in which we might wish to use single-character printing in place of the print string function?

One that comes to mind immediately is the situation in which we've been using direct character output to prevent the user from prematurely aborting our program. In such a case, using print string would allow BDOS to begin trapping keyboard input again, and thus our total control of the system would be lost. Another situation in which single-character printing should be used is when we want to print partial strings—everything up to a certain character, for example. Printing the characters one at a time allows us to test for that certain character and to stop printing when it is reached. Although single-character printing is occasionally necessary in these and other situations, it is much more efficient to use the print string function where possible.

Using print string requires that you have the string in memory at a location known to your program. Further, the string must be terminated by a dollar sign character ($)—that is, the dollar sign must be the last character of the string. Register pair [DE] is then loaded with the memory address of the string, and the function number (9) is loaded into register [C]. When the BDOS command processor is invoked (by calling or jumping to location 0005H), BDOS proceeds to output each character in sequence, stopping as soon as the dollar sign is encountered. Tabs are expanded to some number of spaces (just as they are in BDOS function 2), and the BDOS process of testing for input is active. Contrary to what the CP/M documentation states, control-P (the printer on/off toggle character) is not tested for. Only control-S is noticed—and then only if it is the first character typed; this is also set up just the way it is in function 2.

The string won't be printed automatically with a trailing carriage return (0DH) or a line feed (0AH). Should you wish to incorporate either a carriage return or a line feed, you'll have to include them as part of the string or send them out separately. Our subroutine for function 9 takes this into account; consequently, it is a little more complex than it would otherwise be. This subroutine is integrated into our collection as follows:

```
CRMSGQ:  CALL  CARLF     ; Print leading CRLF
MSGOUQ:  JR    STROUT
;
CRMSG:   CALL  CARLF     ; Print leading CRLF
MSGOUT:  CALL  STROUT    ; Print string
CARLF:   PUSH  DE        ; Save possible string address
         LD    DE,CRLF   ; [DE]->return and line feed
         CALL  STROUT    ; Go print them
         POP   DE        ; Restore any string address
         RET             ; Return to caller
CRLF:    DB    0DH,0AH,'$' ; CR,LF and termination
;
DIRIN    LD    E,0FFH    ; Direct console input entry
         CALL  DIROUT    ; Get character from keyboard
         OR    A         ; Get one?
         JR    NZ,DOCHAR ; Yep, go process it
         LD    A,(LOOP)  ; No, get loop flag
         OR    A         ; Keep looping?
         RET   Z         ; No, return now
         JR    DIRIN'    ; Yes, go try again
LOOP:    DB    00        ; Z=1 pass, NZ=loop
;
DOCHAR:  AND   7FH       ; Yes, strip any high bit
         CP    61H       ; Is it L/C?
         JR    C,CTRL?   ; No, skip conversion
         CP    7BH       ; Maybe, is less than 'z'+1?
         JR    NC,CTRL?  ; No, skip conversion
         AND   5FH       ; Yes, convert to U/C
CTRL?:   PUSH  AF        ; Save it for caller
         CP    20H       ; Is it printable?
         JR    NC,ECHO   ; Yes, go echo it
         CP    03        ; No, is it control-C?
         JP    Z,ABORT   ; Yes, then abort
         PUSH  AF        ; Save it again and...
         LD    A,5EH     ; ...replace it with '^'
         CALL  ECHO1     ; Print '^'
         POP   AF        ; Get orig char instead of '^'
         ADD   A,40H     ; Make it U/C ASCII and...
         JR    ECHO      ; ...go print it
;
ECHO1:   PUSH  AF        ; Init stack with dummy value
ECHO:    LD    E,A       ; Into [E] for DIROUT
         CALL  DIROUT    ; Send character to screen
         POP   AF        ; Restore char or dummy value
         RET
;
STATUS:  LD    C,0BH     ; Console status function
         CALL  0005H     ; Call BDOS
         INC   A         ; 00 -> 01, 0FFH -> 00
         RET   NZ        ; NZ=no character, so return
GETCHR:  LD    C,1       ; Console input function
         DB    21H       ; Skip 2 bytes with LD HL,nnnn
PUTCHR:  LD    C,2       ; Console output function
         DB    21H       ; Skip 2 bytes
RDRIN:   LD    C,3       ; Reader input function
         DB    21H       ; Skip 2 bytes
PUNOUT:  LD    C,4       ; Punch output function
         DB    21H       ; Skip 2 bytes
LSTOUT:  LD    C,5       ; List output function
         DB    21H       ; Skip 2 bytes
DIROUT:  LD    C,6       ; Direct I/O function
         DB    21H       ; Skip 2 bytes
STROUT:  LD    C,9       ; String output function
         JP    0005H     ; Go BDOS, RET to caller
```

We have added routines in two places this time. The actual print string function call, which we have labeled STROUT, is placed in line with the other functions, just after DIROUT. The remainder of our addi-

tions are separate and are included to provide some flexibility in screen output.

There will be many occasions when you'll want your programs to output a carriage return/line-feed sequence—to skip a line on the screen or perhaps to move to the next line after the user has responded to a question. Outputting these characters using function 2 at each such place in your program is tedious and inefficient. As an alternative, we have created a subroutine that simply prints this combination. It is labeled CARLF in our listing, and it may be called from any point in your program.

The CARLF subroutine works by using the STROUT entry to print a string consisting of a carriage return (0DH), a line feed (0AH), and the termination character ($). This sequence will hereafter be called a CRLF. You'll notice that register pair [DE] is being preserved by the CARLF routine. This is being done because we'll be calling CARLF from other routines where [DE] contains valid data that must not be lost.

Now that we have the CARLF subroutine, we can use it to create a very flexible system of screen output. Essentially, there are four conditions of string printing that should be allowed for: the need to print both a leading CRLF and a trailing CRLF; the need to print only a trailing CRLF; the need to print only a leading CRLF; and situations in which there's no need for CRLF to be printed.

A leading CRLF is required during normal output when it is desirable to skip a line between output strings or when we simply wish to ensure that we are starting at the beginning of a line. A trailing CRLF is necessary to ensure that, after our string is printed, the cursor moves to the beginning of the next line. Obviously, there will be times, such as when our programs are asking questions, that we'll want the cursor to remain on the same line as the question. In such cases, we won't want the trailing CRLF. Similarly, there will be times, such as when we have printed the first item after a clear screen/home cursor function, that we won't want the leading CRLF. The screen output subroutines shown in the example satisfy all of these conditions.

Calling the CARLF subroutine prior to printing the string results in a leading CRLF. A trailing CRLF is obtained by falling through to CARLF after the string has been printed. The subroutines are labeled according to how they perform. Those that print a leading CRLF have labels starting with CR (CRMSG and CRMSGQ). Those that don't print the leading CRLF have labels beginning with MSG (MSGOUT and MSGOUQ). Finally, the ones that don't print the trailing CRLF are identified by the use of a Q, for question, as the last character in their labels (CRMSGQ and MSGOUQ). This arrangement makes it easier to remember which of the print subroutines to use to obtain the appropriate format, and there are enough subroutines to allow for the printing of virtually any combination of questions, responses, and messages.

The next character function we'll examine is the *read console buffer* function:

BDOS function no:	10
Function name:	Read console buffer
Function purpose:	Obtain string from console device
Entry parameters:	[C] = 0AH
	[DE] = Address of buffer
Exit parameters:	Console characters in buffer

The read console buffer function allows you to have BDOS collect and process large amounts of input with a single system call. The alternative is to use BDOS console input (function 1) within a very complex routine. A routine using function 1 becomes complex because a user entering input is apt to mistype characters, backspace, start new lines, and so on. Your routine would therefore have to be capable of recognizing each of these special characters and performing on-screen editing to handle them, as well as deciding which to keep as valid input and which to discard as edit characters. The read console buffer function forces BDOS to handle all that business for you. It gets BDOS to obtain characters from the keyboard, place them in an area of memory you choose, perform all screen echo, process any editing characters, and, finally, to return to you either when a carriage return is entered or when the maximum number of characters you specify has been received.

Using this function requires that you designate an area in memory to use as the input buffer. The area most often chosen is the 128-byte space between 80H and the beginning of the TPA at 100H. It's important to remember, however, that this area is also the default disk buffer. This means that you cannot leave buffered console input in this area, perform

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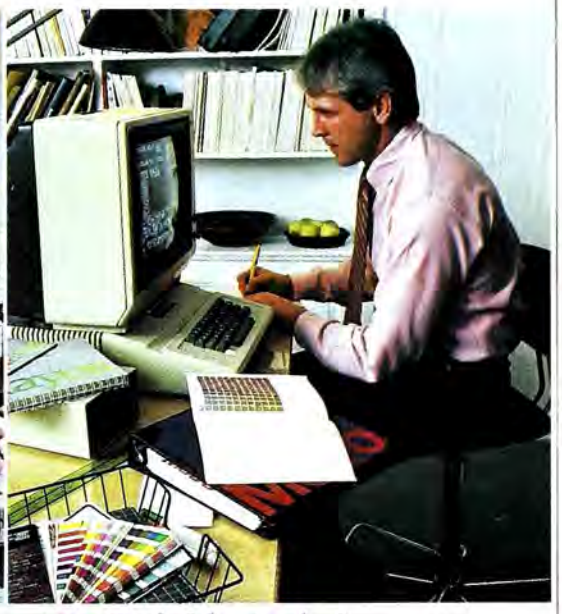
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disk I/O, and then expect the console characters to still be there. You should either move characters received to a safe place before any disk activity, or get in the habit of defining your own disk I/O buffers.

After the console buffer has been designated, it must be initialized. All you must do in order to initialize the buffer is to determine the maximum number of characters you'll accept from the user and inform BDOS by placing that value in the buffer's first memory location. BDOS will use this value to decide when to terminate the function if the user does not type a carriage return. Once the maximum input value has been stored in the buffer, the buffer address is loaded into the [DE] register pair, a 0AH is loaded into the [C] register, and a call to BDOS is made.

During BDOS's input operation, a number of special characters are recognized and acted upon as shown in the accompanying list.

Character	Purpose
rubout/delete	This character removes the character preceding it from the input buffer. It is similar to a normal backspace, but it also echoes the removed character to the screen. For example, when corrected with rubout, a mistype such as DI5 instead of DIR appears as DI55R.
control-C	This causes a warm boot to be performed when and only when it is entered as the first character of input.
control-P	This is the printer on/off toggle and activates the system printer until another control-P is typed. It does not affect the input and needn't be the first character typed.
control-E	This character causes the cursor to drop to the beginning of the next line. It *does not* cause the input function to be terminated, nor does it affect input in any way.
control-H	This is the backspace character; it causes the cursor to move back one character position. That character is then removed from the buffer and the screen.
control-J	This character causes a line feed and terminates the input sequence the same way a carriage return does.
control-M	This is the carriage return character (the same as the return key). It terminates the input line.
control-R	This character causes BDOS to print a # on the line, then a CRLF sequence, and finally the contents of the edited buffer. The cursor is left on the new line following the buffer contents, and input is not terminated. This character is normally used to remove the echoes and deleted characters left on the screen when the delete or rubout character has been used for editing.
control-U	This character performs the same action as control-R, except that the buffer is cleared, no characters are printed on the new line, and input is started from scratch.
control-X	This character removes all input from the buffer and the screen by backspacing to the column the cursor was in when the input function was called.

You can examine the special characters list for yourself simply by looking at the CCP. It uses the read console buffer function in obtaining all of its input.

When control returns to your program, your value for maximum input will still be in the first memory location of the buffer. In the buffer's second location, BDOS will have placed the number of characters actually received, with the characters themselves stored in sequential memory locations following that value. None of the special characters mentioned in the previous list is stored in the buffer or counted in the total, not even the carriage return or line feed that terminated input. If fewer than the maximum number of characters were received, the memory locations in the remaining portion of the buffer will be left untouched by BDOS. For this reason, it is often useful to initialize the buffer to zero or some rare value, such as 0EEH, before making the call. Your program can then find the end of input by calculating the last character position from the value passed back by BDOS, or by testing for the rare character, whichever best suits your situation.

Our subroutine for the read console buffer function is relatively straightforward. We'll add the function itself to our other functions and create a setup subroutine to control it as follows:

```
GETSTR:  PUSH   DE          ; Save buffer address
         LD     (DE),A      ; Set maximum characters
         CALL   BUFFIN      ; Get input
         POP    DE          ; [DE] = buffer address
         INC    DE          ; [DE] -> chars received
         LD     A,(DE)      ; [A] = chars received
         INC    DE          ; [DE] -> first character
         OR     A           ; Set Z-80 zero flag
         RET                ; Return to caller
;
CRMSGQ:  CALL   CARLF       ; Print leading CRLF
MSGOUQ:  JR     STROUT
;
CRMSG:   CALL   CARLF       ; Print leading CRLF
MSGOUT:  CALL   STROUT      ; Print string
CARLF:   PUSH   DE          ; Save possible string address
         LD     DE,CRLF     ; [DE] -> return and line feed
         CALL   STROUT      ; Go print them
         POP    DE          ; Restore any string address
         RET                ; Return to caller
CRLF:    DB     0DH,0AH,'$' ; CR,LF and termination
;
DIRIN:   LD     E,0FFH      ; Direct console input entry
         CALL   DIROUT      ; Get character from keyboard
         OR     A           ; Get one?
         JR     NZ,DOCHAR   ; Yep, go process it
         LD     A,(LOOP)    ; No, get loop flag
         OR     A           ; Keep looping?
         RET    Z           ; No, return now
         JR     DIRIN       ; Yes, go try again
LOOP:    DB     00          ; Z=1 pass, NZ=loop
;
DOCHAR:  AND    7FH         ; Yes, strip any high bit
         CP     61H         ; Is it L/C?
         JR     C,CTRL?     ; No, skip conversion
         CP     7BH         ; Maybe, is less than 'z'+1?
         JR     NC,CTRL?    ; No, skip conversion
         AND    5FH         ; Yes, convert to U/C
CTRL?:   PUSH   AF          ; Save it for caller
         CP     20H         ; Is it printable?
         JR     NC,ECHO     ; Yes, go echo it
         CP     03          ; No, is it control-C?
         JP     Z,ABORT     ; Yes, then abort
         PUSH   AF          ; Save it again and...
         LD     A,5EH       ; ...replace it with '^'
         CALL   ECHO 1      ; Print '^'
         POP    AF          ; Get orig char instead of '^'
         ADD    A,40H       ; Make it U/C ASCII and...
         JR     ECHO        ; ...go print it
;
ECHO1:   PUSH   AF          ; Init stack with dummy value
ECHO:    LD     E,A         ; Into [E] for DIROUT
         CALL   DIROUT      ; Send character to screen
         POP    AF          ; Restore char or dummy value
         RET
;
STATUS:  LD     C,0BH       ; Console status function
         CALL   0005H       ; Call BDOS
         INC    A           ; 00 -> 01, 0FFH -> 00
         RET    NZ          ; NZ=no character, so return
GETCHR:  LD     C,1         ; Console input function
         DB     21H         ; Skip 2 bytes with LD HL,nnnn
PUTCHR:  LD     C,2         ; Console output function
         DB     21H         ; Skip 2 bytes
RDRIN:   LD     C,3         ; Reader input function
         DB     21H         ; Skip 2 bytes
PUNOUT:  LD     C,4         ; Punch output function
         DB     21H         ; Skip 2 bytes
LSTOUT:  LD     C,5         ; List output function
         DB     21H         ; Skip 2 bytes
DIROUT:  LD     C,6         ; Direct I/O function
         DB     21H         ; Skip 2 bytes
STROUT:  LD     C,9         ; String output function
         DB     21H         ; Skip 2 bytes
BUFFIN:  LD     C,10        ; Read buffer function
         JP     0005H       ; Go BDOS,RET to caller
```

As you can see, we have labeled the function entry point BUFFIN and placed it just after STROUT. The controlling subroutine has been labeled GETSTR and placed just ahead of the string-print subroutines.

GETSTR is used by loading the address of the console input buffer into register pair [DE], loading the maximum characters desired into register [A], and calling GETSTR. GETSTR, in turn, sets the maximum input value into the buffer, saves the buffer start address for later, and calls the function entry point at BUFFIN. Upon its return, GETSTR restores the buffer address and increments [DE] to point to the actual number of characters received. Register [A] is then loaded with this value, and a logical OR of [A] with itself is performed to set the Z-80's zero flag before returning to your program. The zero flag reflects either no input received (Z) or some input received (NZ). GETSTR then returns to the portion of the program calling it, which will know immediately from the zero flag status whether or not input was received, and thus whether or not to attempt processing.

In cases where you wished always to receive input, you could add additional instructions prior to the RET that would decrement [DE] back to the buffer start address and jump to GETSTR again. Or, in the manner of our STATUS subroutine, you could add a test of a loop variable to decide whether to return without input and thereby make loop/no loop a variable feature controlled by your program.

The next functions we'll examine are *get IOBYTE* and *set IOBYTE*, the final character I/O functions:

BDOS function no:	7
Function name:	Get IOBYTE
Function purpose:	Obtain the current value of IOBYTE
Entry parameters:	[C] = 07H
Exit parameters:	[A] = IOBYTE value

BDOS function no:	8
Function name:	Set IOBYTE
Function purpose:	Install new IOBYTE value
Entry parameters:	[C] = 08H [E] = New IOBYTE value
Exit parameters:	none

These two functions are very simple. They are used to read and modify the IOBYTE value located at 0003H in the system data page. As we have discussed in the past, this value is used by the BIOS to determine which of several physical devices is active for each of the logical devices—namely, CON:, LST:, RDR:, and PUN:. Manipulation of this value, therefore, is necessary in order to switch between one physical device and another—say, between the CRT: device and the TTY: device for the logical console (CON:).

The IOBYTE value is a single byte that is separated into four parts to match the four logical devices. The high-order two bits (6 and 7) correspond to the list device (LST:), the next two (bits 4 and 5) to the punch device (PUN:), the next two (bits 2 and 3) correspond to the reader device (RDR:), and the low-order two bits (bits 0 and 1) to the console device (CON:). Since only four values (0, 1, 2, and 3) can be represented in a two-bit number, it is apparent that only four choices of physical devices can be made. Since we covered this process thoroughly in our discussion of the BIOS, we'll just list the four physical devices for each logical device and not go into further explanation here. The physical devices are listed here in order of their associated two-bit values in the IOBYTE field:

Logical Device	Physical Devices
CON:	TTY:, CRT:, BAT:, UC1:
RDR:	TTY:, RDR:, UR1:, UR2:
PUN:	TTY:, PUN:, UP1:, UP2:
LST:	TTY:, CRT:, LPT:, UL1:

The get IOBYTE and set IOBYTE functions are added to our subroutine library in the same way as the other functions and become just two more labels in the list. They are shown in the final version of the listing in this installment, but in the interests of space we'll refrain from duplicating the entire listing here.

This completes our discussion of the character I/O functions. Before going on to the miscellaneous and disk I/O functions, however, let's put some of the knowledge we've gained to use and design a few character I/O subroutines for inclusion in our library.

One of the more useful collections to include, especially if you're doing formatted screen output, is the group of special character strings that make up the BIOS terminal screen functions. (Note: These must not be confused with BDOS functions! As we saw in our discussions on the BIOS, the screen functions are the small groups of one to four characters that cause BIOS to clear the screen, select inverse or normal mode, position the cursor, and so on.)

Even if you have changed the specific characters in your BIOS screen function tables with the CONFIGIO program, you can still use these subroutines just by modifying the values in the table we'll create. For this column, we will use the default values contained in the BIOS software screen function table when the SoftCard is shipped—the SOROC IQ 120/IQ 140.

Most of these screen function subroutines can be created simply by making the characters into strings in memory and using a single call to MSGOUQ to print them. The only exception to this is the cursor-positioning function. Since the values for the various line and character positions must be transmitted as simple binary numbers, it is possible for one of those numbers to equal the value of the string termination character ($). In such a case, BDOS quits printing the string early, and BIOS is waiting for the final value(s). BIOS will, of course, take the final value(s) from whatever the next output happens to be. To correct this problem, we have created a separate routine to print the cursor-positioning function that sends the lead-in characters via MSGOUQ and then transmits the X and Y coordinates individually through PUTCHR.

Our completed screen function subroutine package contains all nine of the standard terminal functions plus two special functions that enable the user to move the cursor to the bottom left corner of the screen (BOTTOM) and to clear an entire line (CLRLIN).

In source code form the screen function subroutine package looks like this:

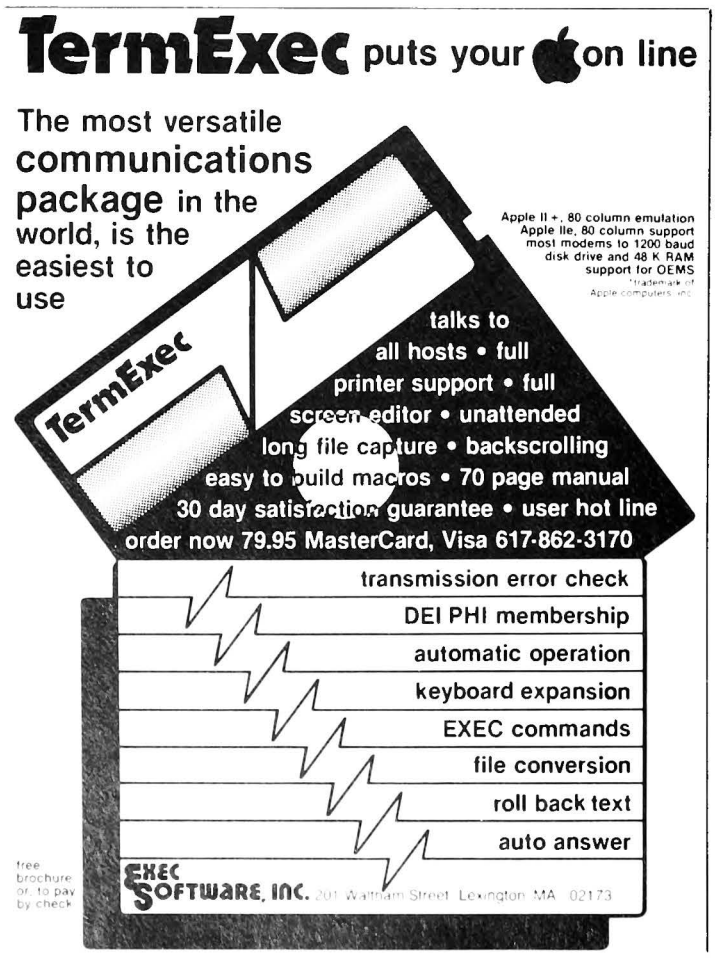
```
BOTTOM: LD      HL,0017H        ; Bottom left of screen
CURPOS: LD      DE,CPOS         ; [DE] - > lead in
        PUSH    HL              ; Save position
        CALL    MSGOUQ          ; Print it
        POP     HL              ; Restore position
        LD      A,L             ; Line position
        ADD     A,20H           ; Add offset value
        LD      E,A             ; Into [E] for BDOS
        PUSH    HL              ; Save horizontal
        CALL    PUTCHR          ; Send it
        POP     HL              ; Restore horizontal
        LD      A,H             ; Horizontal position
        ADD     A,20H           ; Add offset value
        LD      E,A             ; Into [E] for BDOS
        JP      PUTCHR          ; Send it and return to caller
;
CLRSCN: LD      DE,CLEAR        ; Clear screen sequence
        JR      PFUNCT          ; Print it
CLREOS: LD      DE,CLEOS        ; Clear to end of screen
        JR      PFUNCT          ; Print it
CLRLIN: LD      DE,CLRLN        ; Clear entire line
        JR      PFUNCT          ; Print it
CLREOL: LD      DE,CLEOL        ; Clear to end of line
        JR      PFUNCT          ; Print it
NORMAL: LD      DE,LOLIT        ; Normal characters
        JR      PFUNCT          ; Print it
INVERS: LD      DE,HILIT        ; Inverse characters
PFUNCT: JP      MSGOUT          ; Send it and return to caller
;
CPOS:   DB      1BH,'=$'        ; Cursor position sequence
CLEAR:  DB      1BH,'*$'        ; Clear entire screen
CLEOS:  DB      1BH,'Y$'        ; Clear to end of screen
CLRLN:  DB      0DH             ; Go start of line
CLEOL:  DB      1BH,'T$'        ; Clear to end of line
LOLIT:  DB      1BH,')$'        ; Low lite (normal)
HILIT:  DB      1BH,'($'        ; High lite (inverse)
;
HOMCUR: LD      E,1EH           ; Single char home
        DB      21H             ; Skip 2 bytes
CURSUP: LD      E,0BH           ; Single char up
        DB      21H             ; Skip 2 bytes
CURFWD: LD      E,0CH           ; Single char forward
        JP      PUTCHR          ; Send it and return to caller
;
```

As you can see, for those three screen functions that require only a single character (HOMCUR, CURSUP, and CURFWD), we use the PUTCHR entry point to send the character to BDOS, and we employ the technique of skipping two bytes with the 21H op-code. For multiple-character screen functions, such as CLRSCN and CLREOL, we use the BDOS print-string system call via MSGOUQ. For this reason, the multicharacter screen functions can be of any length and in tabular form, as we have shown. While this is the most flexible method, there are two other ways to organize these subroutines to save further space. The subroutines will not be as flexible when organized in either of these other ways, but in your own environment that may not be a disadvantage.

The first method requires that the multicharacter screen function table not cross a page boundary—that is, the table must be contained completely within a single page of memory. In more specific terms, this means that the addresses of all the table entries must fall between *nn*00H and *nn*FFH, where *nn* is the high byte of the address—also known as the page number. Using the first memory page of the TPA (page 1) as an example, all the table addresses must fall between 0100H and 01FFH.

If we can make sure that no page boundaries have been crossed, then we will know for certain that all table entries have the same high address byte, and we won't need to load the [DE] register pair with the entire table address of the function. Rather, we can simply load the [E] register with the low byte of the address, use our 21H op-code trick to skip the remaining two-byte loads of [E], and then load the [D] register with the high byte of the table. It should be noted that this somewhat defeats the purpose of a general subroutine library. We lose a lot of generality when we are forced to ensure specific memory usage. In case you wish to use this method, however, an example of how it would look for the last few screen functions is shown here:

```
CLREOL:  LD    E,LOW CLEOL   ; Clear to end of line
         DB    21H           ; Skip 2 bytes
NORMAL:  LD    E,LOW LOLIT   ; Normal characters
         DB    21H           ; Skip 2 bytes
INVERS:  LD    E,LOW HILIT   ; Inverse characters
         LD    D,HIGH CPOS   ; Beginning of table
         JP    MSGOUT        ; Send it and return to caller
```

If you do plan to use this method, it's a good idea to place a page boundary test in the source code for your table that will inform you at assembly time whether the table is still within a single page. The specific test itself will depend on the assembler you are using and its abilities; the test shown following the screen function table below is correct for Microsoft's *Macro-80* assembler:

```
CPOS:    DB    1BH,'=$'      ; Cursor position sequence
CLEAR:   DB    1BH,'*$'      ; Clear entire screen
CLEOS:   DB    1BH,'Y$'      ; Clear to end of screen
CLRLN:   DB    0DH           ; Go start of line
CLEOL:   DB    1BH,'T$'      ; Clear to end of line
LOLIT:   DB    1BH,')$'      ; Low lite (normal)
HILIT:   DB    1BH,'($'      ; High lite (inverse)
;
         IF    (HIGH HILIT+2)-(HIGH CPOS)
         .PRINTX * OOPS! Table crossed page boundary! *
         ENDIF
```

This test prints the message, * *OOPS! Table crossed page boundary!* * to the screen at assembly time if the beginning of the table extends into the previous page or if the end of the table extends into the following page. This is accomplished by means of the *Macro-80* pseudo-op (a non-Z-80 op-code that the assembler understands) .PRINTX, which means "print to terminal." Enclosing this pseudo-op inside a conditional IF...ENDIF pair ensures that the message will be printed only if the argument to IF is true.

The argument in this case is an expression made up of a single subtraction—the high byte (page number) of the start of the table and the high byte of the end of the table. HILIT+2 is the address of the terminator ($) in the HILIT sequence and thus the last byte of the table as well. Obviously, if the entire table is contained in a single page, the high bytes of these two addresses will be identical. By subtracting them, therefore, we'll either get 00 (False) or some nonzero value (True). If the value is nonzero, we know that the page boundary has been crossed and that the message will be printed.

The second method of shortening the screen function subroutines is to count on the individual functions always being two bytes or less. In that case, we wouldn't print the screen functions as strings; rather, we would simply print the two bytes individually using PUTCHR. The cursor positioning function is still treated as a special case, and all four bytes are printed using PUTCHR.

The subroutines as they would appear using this scheme are shown here:

```
BOTTOM:  LD    HL,0017H      ; Bottom left of screen
CURPOS:  PUSH  HL            ; Save position
         LD    HL,3D1BH      ; [L]=1BH, [H]='='
         CALL  SENDEM        ; Print them
         POP   HL            ; Restore position
         LD    A,L           ; Line position
         ADD   A,20H         ; Add offset value
         LD    L,A           ; Back to [L]
         LD    A,H           ; Horizontal position
         ADD   A,20H         ; Add offset value
         LD    H,A           ; Back to [H]
         JR    SENDEM        ; Print them
CLRSCN:  LD    HL,2A1BH      ; [L]=1BH, [H]='*'
         JR    SENDEM        ; Print them
CLREOS:  LD    HL,591BH      ; [L]=1BH, [H]='Y'
         JR    SENDEM        ; Print them
CLRLIN:  LD    E,0DH         ; Carriage return
         CALL  PUTCHR        ; Go to start of line
CLREOL:  LD    HL,541BH      ; [L]=1BH, [H]='T'
         JR    SENDEM        ; Print them
NORMAL:  LD    HL,291BH      ; [L]=1BH, [H]=')'
         JR    SENDEM        ; Print them
INVERS:  LD    HL,281BH      ; [L]=1BH, [H]='('
         JR    SENDEM        ; Print them
HOMCUR:  LD    H,1EH         ; [H]=Single char home
         DB    21H           ; Skip 2 bytes
CURSUP:  LD    H,0BH         ; [H]=single char up
         DB    21H           ; Skip 2 bytes
CURFWD:  LD    H,0CH         ; [H]=Single char forward
         JR    SENDIT        ; Print only one
SENDEM:  LD    E,L           ; Get first character
```

```
        PUSH  HL        ; Save second character
        CALL  PUTCHR    ; Send first
        POP   HL        ; Restore second
SENDIT: LD    E,H       ; Get second
        JP    PUTCHR    ; Send it
;
```

Using this method, we have eliminated the table altogether and combined a few things; the result is a reduction of 20 percent in the size of the screen function subroutines. Although the reduction is significant, we achieve it at the expense of flexibility and ease of alteration. It will be far harder to change this routine to reflect changes in the terminal screen function codes.

The final code we'll install in our subroutine library is the ABORT subroutine we mentioned last month, which is referenced in the direct console input subroutine we created then. As you'll recall, we said the ABORT subroutine was necessary for those cases in which we needed to perform some tasks of our own prior to allowing the system to warm-boot.

In its simplest form, the ABORT routine simply prints a message to the screen and jumps to location 0000H to perform the warm boot. The ability to perform more complex tasks, such as clearing the screen, asking the user to confirm his intentions, and telling the user to reinstall a system disk in drive A:, could be added. For demonstration purposes, we'll perform the system disk reinitialization.

The entire subroutine library we've created so far appears below. The screen function package, the ABORT subroutine, and the get/set IOBYTE BDOS functions have been added. Note that the last form of the screen function package is the one used here, and that titles have been added for clarity.

```
;*************************************
;*    GENERAL-PURPOSE SUBROUTINES    *
;*************************************
;
ABORT:  LD    DE,SYSDSK     ; Reinsert system disk message
        CALL  MSGOUQ        ; Inform him
        CALL  GETCHR        ; Get ack, any char will do
        JP    0000          ; Go warm-boot
;
SYSDSK: DB    'Place System Disk in Drive A; and '
        DB    'Hit RETURN...$'
;
;*************************************
;*     TERMINAL SCREEN FUNCTIONS     *
;*************************************
;
BOTTOM: LD    HL,0017H      ; Bottom left of screen
CURPOS: PUSH  HL            ; Save position
        LD    HL,3D1BH      ; [L]=1BH, [H]='='
        CALL  SENDEM        ; Print them
        POP   HL            ; Restore position
        LD    A,L           ; Line position
        ADD   A,20H         ; Add offset value
        LD    L,A           ; Back to [L]
        LD    A,H           ; Horizontal position
        ADD   A,20H         ; Add offset value
        LD    H,A           ; Back to [H]
        JR    SENDEM        ; Print them
CLRSCN: LD    HL,2A1BH      ; [L]=1BH, [H]='*'
        JR    SENDEM        ; Print them
CLREOS: LD    HL,591BH      ; [L]=1BH, [H]='Y'
        JR    SENDEM        ; Print them
CLRLIN: LD    E,0DH         ; Carriage return
        CALL  PUTCHR        ; Go to start of line
CLREOL: LD    HL,541BH      ; [L]=1BH, [H]='T'
        JR    SENDEM        ; Print them
NORMAL: LD    HL,291BH      ; [L]=1BH, [H]=')'
        JR    SENDEM        ; Print them
INVERS: LD    HL,281BH      ; [L]=1BH, [H]='('
        JR    SENDEM        ; Print them
HOMCUR: LD    H,1EH         ; [H]=single char home
        DB    21H           ; Skip 2 bytes
CURSUP: LD    H,0BH         ; [H]=single char up
        DB    21H           ; Skip 2 bytes
CURFWD: LD    H,0CH         ; [H]=single char forward
        JR    SENDIT        ; Print only one
SENDEM: LD    E,L           ; Get first character
        PUSH  HL            ; Save second character
        CALL  PUTCHR        ; Send first
        POP   HL            ; Restore second
SENDIT: LD    E,H           ; Get second
        JP    PUTCHR        ; Send it
;
;*************************************
;*    CHARACTER I/O SUBROUTINES      *
;*************************************
;
GETSTR: PUSH  DE            ; Save buffer address
        LD    (DE),A        ; Set maximum characters
        CALL  BUFFIN        ; Get input
        POP   DE            ; [DE] = buffer address
        INC   DE            ; [DE] -> chars received
        LD    A,(DE)        ; [A] = chars received
        INC   DE            ; [DE] -> first character
        OR    A             ; Set Z-80 zero flag
        RET                 ; Return to caller
;
CRMSGQ: CALL  CARLF         ; Print leading CRLF
MSGOUQ: JR    STROUT        ; Print string
;
CRMSG:  CALL  CARLF         ; Print leading CRLF
MSGOUT: CALL  STROUT        ; Print string
CARLF:  PUSH  DE            ; Save possible string address
        LD    DE,CRLF       ; [DE]->return and line feed
        CALL  STROUT        ; Go print them
        POP   DE            ; Restore any string address
        RET                 ; Return to caller
;
CRLF:   DB    0DH,0AH,'$'   ; CR,LE, and termination
;
DIRIN:  LD    E,0FFH        ; Direct console input entry
        CALL  DIROUT        ; Get character from keyboard
        OR    A             ; Get one?
        JR    NZ,DOCHAR     ; Yep, go process it
        LD    A,(LOOP)      ; No, get loop flag
        OR    A             ; Keep looping?
```


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```
        RET   Z          ; No, return now
        JR    DIRIN      ; Yes, go try again
LOOP:   DB    00         ; Z = one pass, NZ = loop
;
DOCHAR: AND   7FH        ; Yes, strip any high bit
        CP    61H        ; Is it L/C?
        JR    C,CTRL?    ; No, skip conversion
        CP    7BH        ; Maybe, is less than 'z' + 1?
        JR    NC,CTRL?   ; No, skip conversion
        AND   5FH        ; Yes, convert to U/C
CTRL?:  PUSH  AF         ; Save it for caller
        CP    20H        ; Is it printable?
        JR    NC,ECHO    ; Yes, go echo it
        CP    03         ; No, is it control-C?
        JP    Z,ABORT    ; Yes, then abort
        PUSH  AF         ; Save it again and...
        LD    A,5EH      ; ...replace it with
        CALL  ECHO 1     ; Print '^'
        POP   AF         ; Get orig char instead of '^'
        ADD   A,40H      ; Make it U/C ASCII and...
        JR    ECHO       ; ...go print it
;
ECHO1:  PUSH  AF         ; Init stack with dummy value
ECHO:   LD    E,A        ; Into [E] for DIROUT
        CALL  DIROUT     ; Send character to screen
        POP   AF         ; Restore char or dummy value
        RET
;
;*****************************************
;*          BDOS SYSTEM CALLS            *
;*****************************************
;
STATUS: LD    C,0BH      ; Console status function
        CALL  0005H      ; Call BDOS
        INC   A          ; 00 -> 01, 0FFH -> 00
        RET   NZ         ; NZ = No character, so return
GETCHR: LD    C,1        ; Console input function
        DB    21H        ; Skip 2 bytes
PUTCHR: LD    C,2        ; Console output function
        DB    21H        ; Skip 2 bytes
RDRIN:  LD    C,3        ; Reader input function
        DB    21H        ; Skip 2 bytes
PUNOUT: LD    C,4        ; Punch output function
        DB    21H        ; Skip 2 bytes
LSTOUT: LD    C,5        ; List output function
        DB    21H        ; Skip 2 bytes
DIROUT: LD    C,6        ; Direct I/O function
        DB    21H        ; Skip 2 bytes
STROUT: LD    C,9        ; String output function
        DB    21H        ; Skip 2 bytes
BUFFIN: LD    C,10       ; Read buffer function
        DB    21H        ; Skip 2 bytes
GETIOB: LD    C,7        ; Get IOBYTE function
        DB    21H        ; Skip 2 bytes
SETIOB: LD    C,8        ; Set IOBYTE function
        JP    0005H      ; Go BDOS, RET to caller
```

The subroutine library shown takes up considerable memory, and it is doubtful that you'll use all of these subroutines in any given program. Given that, it may appear that the library is of little value to you. However, most of the collections are structured in such a way that unneeded, individual subroutines can simply be deleted. The recommended practice is to use the library as the starting kernel of each assembly language program you write, adding the specific routines to perform your program tasks. Then, when your program is finished, you can delete any unused subroutines, thereby making the most efficient use of memory. In addition to sparing you considerable typing efforts with each new program, using the library will give you standard mnemonic names for each separate operation. In order to get a character of user input, you simply call GETCHR. No more having to look up the BDOS function numbers or wondering how a particular system call operates.

This completes our discussion of the BDOS character I/O functions. Next month we'll examine the miscellaneous functions and make a start on the disk functions as well. By the time we're finished, you should have a clear understanding of how to use BDOS effectively and a complete subroutine library to speed your programming. Until then. . . .□■



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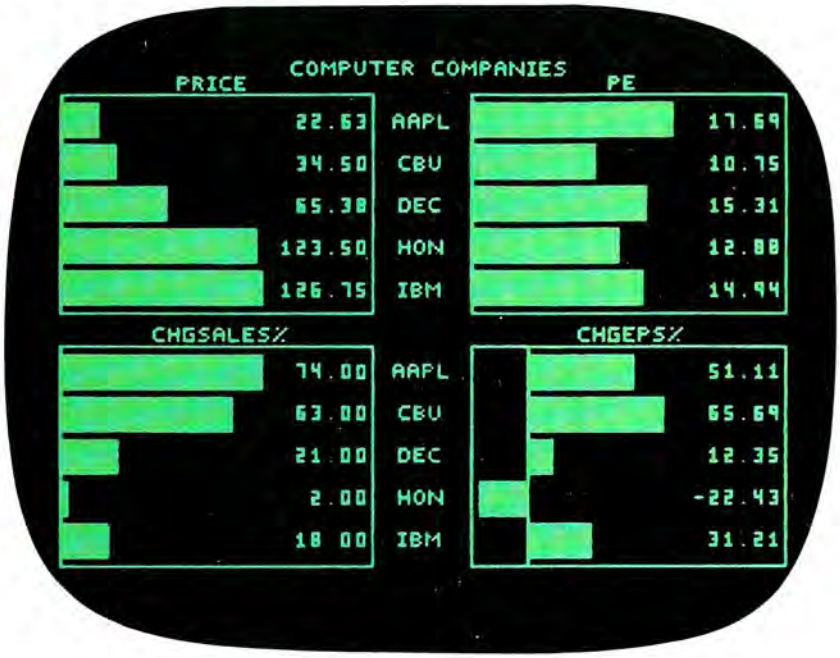
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TV Programmer

BY JOHN MACGIBBON

Because of their isolation Down Under in the Antipodes, New Zealanders often have to find home-grown solutions to problems. New Zealanders have become a versatile and inventive lot. Do-it-yourself is as firmly entrenched in the country's national ethos as the game of Rugby union football.

Cycling enthusiast Rex McIntosh needed a new ten-speed bicycle, but he didn't go to a cycle shop. He designed the ten-speed on a computer and then built the bike himself. Similarly, when McIntosh wanted to introduce computer graphics at Television New Zealand, he developed his own system. Money was not available for a fancy standalone setup, nor was management. So Rex McIntosh built a complete system based on equipment that wasn't supposed to be suitable: the humble Apple II.

Down Under the Apple Graphics Tree. That was three years ago. Today viewers of New Zealand's two television networks cannot escape computer graphics. The output of Apples crops up everywhere: on news and magazine programs, children's shows, and one-shot events like the Miss New Zealand show or national elections. And the graphics are not just simple captions or electronic scorecards for sporting events. They're animated, colorful, and sometimes include Apple-generated sounds.

This story has its genesis in 1979, when McIntosh, a technician hired to service video equipment at the Avalon television studios in New Zealand's capital city of Wellington, was sent on a training course. It was a good excuse to buy a Hewlett-Packard HP-25 programmable calculator.

"I didn't finish the course but I kept the calculator, and that got me into programming," McIntosh recalls. The TV studios had installed a Digital Corporation PDP-11 to schedule on-air programs, but it was somewhat underutilized. "It looked interesting, so I started fiddling with it."

Soon he was fixing software problems and even added a floppy disk system, which was a big improvement on paper tape input. But the event that changed McIntosh's life (as it did most of ours) was buying his own Apple II. Back in 1979 the Apple was a revelation to the fledgling computer hacker.

"I thought this was really for me," remembers McIntosh. "It had Integer Basic, and that was just fine. It had 16K, a tape input, a miniassembler, a floating point routine, and so on. And they told all about it! They gave circuit diagrams, which were wrong, and they really wanted the owner to know what was inside.

"This really appealed to me. I spent most of my time mucking around in the monitor, and I'd sit up in bed at night studying the listings."

McIntosh did some limited graphics work on his own machine for the television studios, but there were problems synchronizing the Apple to the TV system. McIntosh thought he could see a solution but told the studios he wasn't prepared to butcher his own computer in the process. They bought him one, and that was quite a breakthrough. Taking on a micro was a big step for the broadcasting bureaucracy.

The hardware problems McIntosh had to overcome included syncronizing the screen horizontally and vertically to the television signal and producing PAL broadcast standard video output from the Apple.



Bit by Forth. Emerging unscathed from its modification ordeal, the Apple was put to work. Initially McIntosh programmed in Basic, though he was frustrated by its slowness and lack of flexibility. But along came another of those significant events that shaped this computerist's career. It was buying the August 1980 issue of *Byte* magazine, which had a special feature on Forth.

Actually McIntosh had been shown a primitive version of Forth just before the magazine arrived, but he hadn't been able to make any sense out of that early version. From the pages of *Byte*, Forth appeared as manna from heaven.

It was hard-earned manna.

"I sat there with pages and pages of listings and disassembled the language, writing down in longhand what I thought every word did," says McIntosh. "After that I could see that the version I had wasn't the answer."

Finally McIntosh heard of a version of Forth being distributed by the Forth Interest Group. He sent for a listing and typed it up in assembly language.

"From there I've never looked back," says McIntosh.

It took a while to get the FIG Forth up and running. There were some bugs, which McIntosh had been warned of.

"The FIG people said, 'There it is, you're on your own. Do what you like with it: Tart it up and sell it if you like.' "

Once refined, the language worked fine for the studios' purposes. Growing dissatisfied with the Apple II's graphics resolution and limited memory, McIntosh graduated to an Apple III for most of his work. McIntosh reassembled the language for the larger computer, then decided to rewrite his Forth using the Forth language instead of assembler.

"That allows you enormous flexibility in compiling it," he says. "The problem with writing the language in assembler is that you tend to leave it alone once it is completed.

"Now that it's written in Forth I can make changes very easily. In fact I tend to toss off new versions once a week when I really get into it."

These days the Avalon Apples are totally Forth-based: even their operating systems.

"If you're using Forth you should also write the operating system: Forth has its own DOS, which is relatively simple and very easy to build on. Forth's theory is that you can have whatever you like, providing you're prepared to write it yourself."

Staying Off the SOS. McIntosh has never used the Apple III's Sophisticated Operating System (SOS), even though it can handle a variety of languages including Forth. He says Apple was very close-mouthed about the ins and outs of SOS, and it was quicker and easier to write a Forth DOS than to discover how to bend SOS to his wishes.

Opposite page, New Zealander Rex McIntosh and his ten-speed bike outside the Avalon TV studios. This page, clockwise from upper right: an early demo using the GRFX-A2 graphics board for the Apple, one of the things you can do with the Apple III demo program (see listings on the following page), a graphic produced for the Money Report TV show (see listing).



He now considers Forth ideal for work in real-time commercial television graphics.

"In Forth you're programming all the time. You're actually adding to the language, unlike Applesoft—where on the one hand you have a language and on the other you have a program. With Forth it's all in there together.

"Forth can't distinguish between words it already knew, like *if* and *then*, and words you've only just defined. So what you've just typed has as much relevance as something that's always been there."

After continuous revision McIntosh now considers his version to be right up with the commercial versions of Forth and considerably better for graphics production than the much-touted *GraForth*.

"You can write rubbish, which *GraForth* will happily accept and then go out for lunch when you try to run it. *GraForth* also runs very slowly—three to four times slower than a proper Forth."

Today's studio system has a couple of extra hardware refinements. A McIntosh-designed card effectively doubles vertical resolution on the Apple III by a procedure known as interlacing. Vertical resolution is now 384 pixels, while the horizontal resolution remains 560 pixels.

The old Apple II, with its 192 by 280 pixels and smaller memory, doesn't get used much now for graphics, but it still has an important role in the studios. It's part of a frame-grabbing system that converts analog signals from a video camera into digital information, very useful for converting artwork into digital on-screen graphics.

It's not surprising that McIntosh's insistence that he needed a frame-grabber got a blank response from management. "Don't worry about it," they told him. But to irrepressible Rex McIntosh, "It seemed like a good idea, so I thought forget 'em. I'll have a crack at building my own frame-grabber."

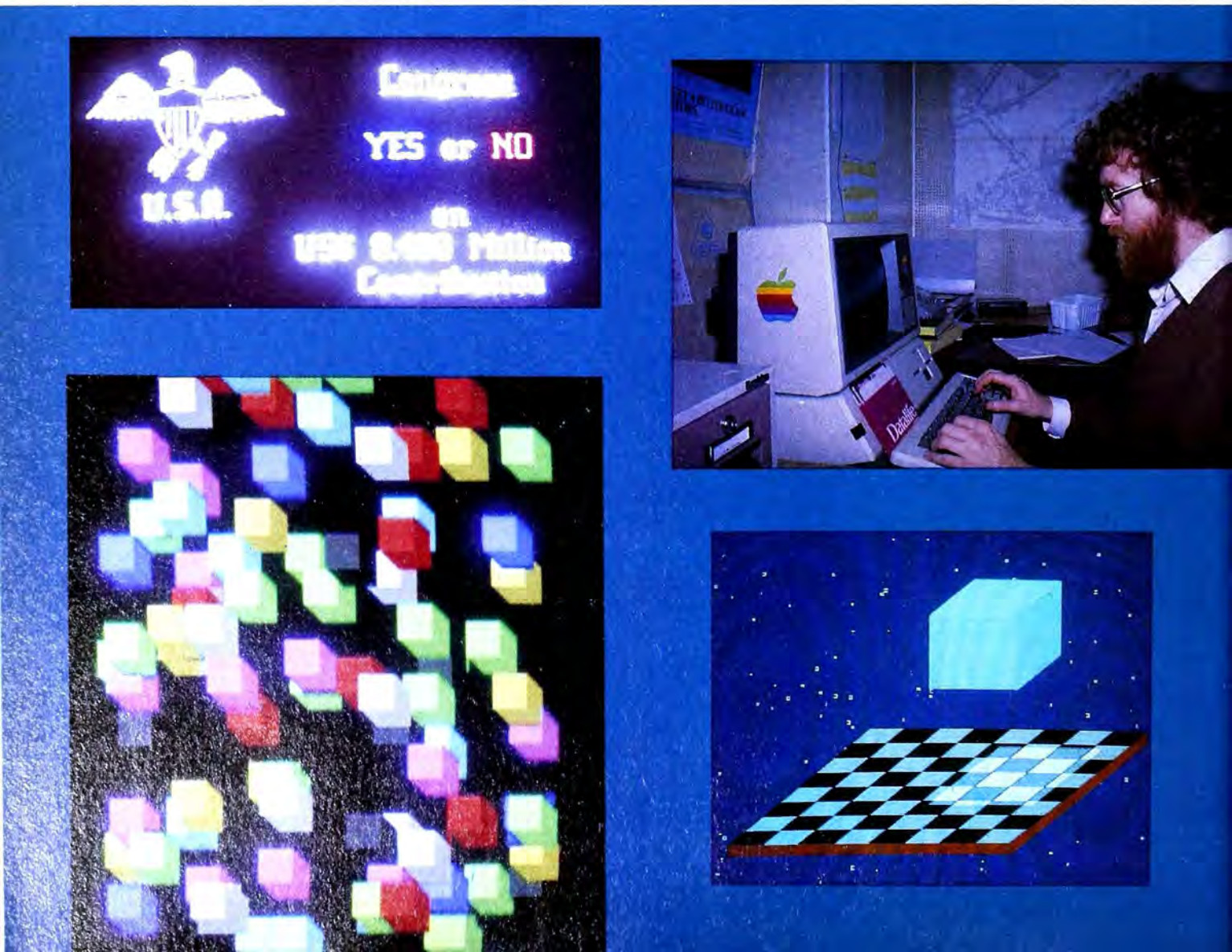
With a colleague he built a model that "worked a treat." Today even the skeptics admit that having a frame-grabber is no luxury but an "absolute necessity."

Green Graphics. Consider production on a weekly financial program called *Money Report*. McIntosh works in a spartan office housing his Apples II and III, printer, television monitor, camera, and various electronic black boxes. The walls are liberally decorated with digital printout art, including the obligatory Winston Churchill portrait, the Mona Lisa, and a giant eight-by-four-foot reproduction of an Escher drawing. A large poster advertising Hewlett-Packard calculators celebrates the inspiration that started it all for McIntosh.

Everything has to be done on the night of the show, because the *Money Report* is essentially a timely news service. It goes on the air at 10:30 p.m.; work on the graphics begins at 7:00 p.m. By 9:00 p.m. McIntosh has usually completed several graphics screens to the director's satisfaction, and the Apple III is trundled down the corridor to the production suite.

McIntosh sets the graphics up so that he only needs to press the space bar to run each one at the director's cue. The graphics may include illustrated charts, animated line graphs, and three-dimensional bar graphs that grow on the screen to their appointed height.

Clockwise from upper right: McIntosh at work in the studios; an early demo using the GRFX-A2 board; Apple III cube demo program (see listings); another early demo using the GRFX-A2 board from Number Nine.



The following program listings in the Forth language are examples of some of the graphics routines that McIntosh has created on the Apple III. Implementing these routines requires the specific tools that McIntosh has created. As such, the listings are not usable except as inspiration to those graphics programmers familiar with Forth.

```
SCR# 12
 0  ( CHEQUER BOARD                                        PRM )
 1
 2  : CHEQUER                          ( draw slanted chess board*)
 3   -1 -1 -1 -1 HATCH-PATTERN 8 0
 4  DO 8 0
 5     DO J 20 * 16 + DUP 50 + SWAP I 40 * + 8 + POSN
 6        J I + 2 MOD 1+ COL# 39 19 2 (SLHATCH)
 7     LOOP
 8  LOOP
 9  DRED 50 24 POSN 65 344 HATCH
10  50 344 POSN 160 16 3 (SLHATCH)          ( red edge of board)
11  ;
12
13  - - >
14
15

SCR# 13
 0  ( STARS                                                PRM )
 1
 2  : STARS      ( n,... ) ( draw n stars random stars, random posns*)
 3  0
 4  DO 15 COL# 508 RND 508 RND  POSN
 5  3 RND 1+ DUP 1 (FRAME)
 6  LOOP
 7  ;
 8
 9  : DRCUBE                                    ( Draw a cube*)
10  8 COL# 280 250 POSN 380 350 HATCH
11  9 COL# 380 250 POSN 100 50 2 (SLHATCH)
12  10 COL# 280 350 POSN 50 100 3 (SLHATCH)
13  ;
14  - - >
15

SCR# 14
 0  ( CUBE DEMO COLORS                                     PRM )
 1
 2  : CUBE-COLS                        ( set color map for picture*)
 3  0 0 3 0 SET-COLOR
 4  0 0 0 1 SET-COLOR
 5  4 5 5 2 SET-COLOR
 6  0 0 0 4 SET-COLOR
 7  3 4 4 5 SET-COLOR
 8  7 8 8 6 SET-COLOR
 9  0 8 8 8 SET-COLOR
10  0 9 9 9 SET-COLOR
11  0 7 7 10 SET-COLOR
12  6 8 8 15 SET-COLOR
13  ;
14  - - >
15

SCR# 15
 0  ( CUBE-DEMO                                            PRM )
 1
 2  : SPOT-LIGHT                ( draw light patch on chess board*)
 3  4 COL# ORDRAW 120 250 POSN 120 80 2 (SLHATCH)
 4  ;
 5
 6  : CUBE
 7  HCLEAR REDRAW CUBE-COLS                          ( set up)
 8  100 STARS CHEQUER DRCUBE
    SPOT-LIGHT                       ( draw picture elements*)
 9  ;
10
11
12  ;S
13
14
15
```

```
SCREEN # 22
 0  ( IMF                                    PRM 21:57 26-SEP-83)
 1
 2  : IMF
 3  MEDRES HCLEAR 2 FONT
 4  100 10 POSN 8 SHTABLE GREY FORECOLOR 1 SHAPE
 5  HCR 41 XPOSN WHITE FORECOLOR H" U.S.A."
 6  RPOSN 8 HLINES  CU" Congress"  CUE
 7  HCR HCR 163 XPOSN BLUE FORECOLOR H" YES"
 8  WHITE FORECOLOR H" or " RED FORECOLOR H" NO"
 9  WHITE FORECOLOR HCR HCR C" on" HCR R" US$ 8,400
    Million"
10  HCR C" Contribution"
11  ;
12
13
14
15


SCREEN # 73
 0  ( 3D OVERLAY BLOCK DEMO                  21:25 20-12-82)
 1
 2  : 3D-BLOCKS
 3  MEDRES HCLEAR
 4  BEGIN HCLEAR 150 0
 5        DO 8 RND 8 + FORECOLOR 172 RND 265 RND POSN 14
          3DBAR.OVLY
 6        LOOP 5 WAIT ?TERMINAL
 7  UNTIL TEXTSCR
 8  ;
 9
10
11
12  ;S
13
14
15


SCREEN # 74
 0  ( 3D OVERLAY BLOCK DEMO                  21:44 20-12-82)
 1
 2  : 3D-BLOCKS2
 3  MEDRES HCLEAR
 4  BEGIN HCLEAR -1 5
 5        DO I 19 0
 6           DO DUP 7 * I 14 * POSN
 7                 8 RND 8 + FORECOLOR DUP 20 * 50 + RND
                   1+ 3DBAR.OVLY
 8           LOOP DROP
 9        -1 +LOOP 5 WAIT ?TERMINAL
10  UNTIL TEXTSCR
11  ;
12
13
14  ;S
15


SCREEN # 139
 0  ( money prog - new NZUC index ( Filled )    21:51 26-SEPT-83)
 1  : NZUC2                                  ( # shares bar graph *)
 2  MEDRES HCLEAR 2 FONT WHITE FORECOLOR
 3  178 80 POSN H" SHARES TRADED"                  ( title top line)
 4  240 XPOSN YELLOW FORECOLOR 7 3DBAR        ( yellow block)
 5  162 80 POSN WHITE FORECOLOR H" VALUE" ( title second line)
 6  240 XPOSN RED FORECOLOR 7 3DBAR GREY FORECOLOR 3
    FONT                                          ( red Blk)
 7  80 0 4 YSCALE                                 ( Y scale)
 8  XSCALE" Wed Thu Fri Mon Tue Wed"              ( X scale)
 9  RED FORECOLOR                                  ( value)
10  27 0 1 GR3D  24 1 1 GR3D  22 2 1 GR3D
11  21 3 1 GR3D  27 4 1 GR3D  73 5 1 GR3D
12  YELLOW FORECOLOR                              ( volume)
13  17 0 0 GR3D  19 1 0 GR3D  17 2 0 GR3D
14  14 3 0 GR3D  19 4 0 GR3D  50 5 0 GR3D
15  ;
```

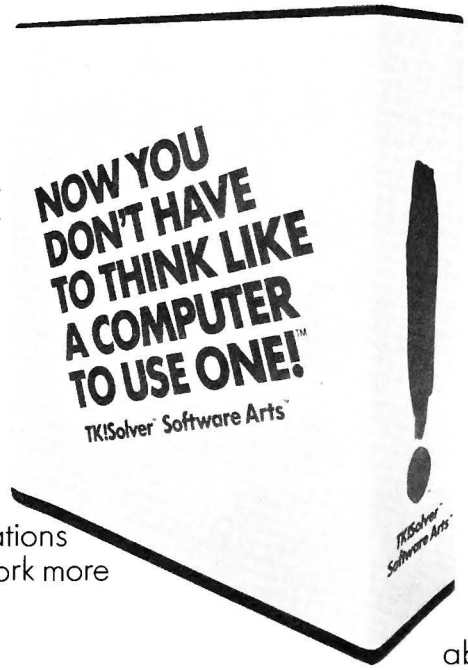
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It's now a pressure situation: one hour in the studio to construct a show that goes on the air in an hour and a half. Even though the graphics are already in the can, the director may still ask for changes. If he does, the computer still has all its Forth-based utilities loaded, and the changes are made swiftly and with no fuss.

For example, one graph employs three-dimensional piles of coins to denote quantities of money. Some adjustment is requested, and this is achieved *toute de suite* by typing "−3 coins." (Creating the pile in the first place was just a matter of typing "10 coins.")

Rex McIntosh and his Apple-generated graphics are an integral part of *Money Report*. The computer-generated look of the graphics lends the program a sense of immediacy and modern relevance. Just as important, there is no other way to produce so many graphics in such a short time. A studio graphic artist comments that regular art production would have taken ten hours to complete the same amount of work—five times as long as McIntosh takes—on an easy night. In the past, he has produced thirty graphics screens in two hours.

Money Report uses a house typeface, but a library of twenty-two fonts in a variety of sizes is currently available. In a month or two there could as easily be thirty fonts. A complete new set can be created in less than a day simply by aiming a video camera at a printer's book of font styles, transferring a complete set to the computer with the frame-grabber, then polishing things up with an editing package.

South Seas Apple. Children's magazine programs are another area where Apple graphics are being used to advantage in New Zealand. The programs, produced in Christchurch on South Island, include plenty of zany graphics and sound effects that appeal to today's kids raised on video arcades. The software is Rex McIntosh's.

The first big real-time test for the Apple graphics system occurred during coverage of the last New Zealand national elections in November 1981. For the continuous election night coverage, McIntosh wrote programs that allowed easy access to the results—displayed in a variety of formats—for individual electoral districts and for the nation as a whole.

The director could, for example, say, "Let's look at Wanganui, One-hunga, and Piako." The program would then extract the latest information from raw figures collected by the studio's Burroughs mainframe.

The information would then be fed into an Apple II, and the operator, with single keystrokes, could display the information as a table of figures, line graph, three-dimensional bar graph, or as a graph comparing the latest results with the previous election (including the percentage of the voting swing). Other keystrokes allowed the operator to move on to the next electoral district or to see the national total in all the display options.



A digital rendering of Rex McIntosh, cycling enthusiast, graphics magician, and adventure player

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Management still didn't trust a home computer to last the distance and put two Apple IIs on standby. They weren't needed. In fact the networks have never had a breakdown in their Apple computers, even though the machines are regularly trundled around studios and flown around the country. In Rex McIntosh's words, "They're as solid as a rock."

The TVNZ Apple graphics system is not so friendly that noncomputerists such as graphic artists can use it comfortably. McIntosh would like to see the package develop into a friendlier tool. A number of other people in the network are using McIntosh's system successfully at a fairly basic operator level. But programming for things as complex as the election night coverage, or for animation, still requires a fair deal of expertise.

Apple's New Zealand distributors recently sent a demo disk to television networks in South Africa, West Germany, and Australia. There was some initial interest, though nothing has come of it yet.

"The things you can show on a demo are pretty much the same as the customer has probably already seen or is already doing," McIntosh says. "The demo disk doesn't really bring out the strength of my system, which is to let you produce things very quickly and change them easily in a real-life broadcasting situation."

Dramatic Apples. While his computer graphics are up and running on New Zealand television, McIntosh still sees plenty of challenge ahead. He's already taken Apples into the drama studios to control special lighting effects.

His chief problem in graphics production is now limited memory capacity, even with the Apple III. Sometimes he even has heretical dreams of bigger computers. "There comes a time in graphics when you really need horsepower. When you have half a million pixels on the screen and about 256 colors, that's a lot of memory to be moving around with a little 6502," he says.

But McIntosh is likely to stay with Apples for a while yet. That's because he's discovered the new GRFX-A2 graphics board (produced by Number Nine). The GRFX-A2 is based on an NEC 7220 VLSI graphics display controller and includes 128K of memory to control the on-screen graphics. It gives a screen resolution of 512 by 512 pixels with four thousand colors (sixteen separate colors on the screen at any one time), or up to 1,024 by 1,024 pixels with two colors.

McIntosh recently imported a GRFX-A2 board, with the intention of doing free-lance work for film studios and ad agencies, and is excited about its potential. He hopes to persuade his employers to get one for television graphics, but at a landed cost of $NZ2,500 that won't be easy. Eventually he'd like to run two or more boards in parallel, but unfortunately they only fit the Apple II at present, and there's still that memory problem. . . .

"If you got at it with a hacksaw you'd get a board in an Apple III, but it would stick out the side," McIntosh says. He'd like Number Nine to remake their product to fit an Apple III. He reckons the combination would be a far more cost-effective route to top-line television graphics than a high-priced standalone custom system.

New Zealand *Zorker*. When he's not trying to coax the last little graphics bit from his Apples, McIntosh is still likely to be found at the keyboard, adventuring. A long-time fan of the original *Adventure*, he's also fond of the *Zork*s. But he is completely unmoved by graphics adventures: "There's no way an Apple graphics screen can compete with the rich pictures your own mind can conjure up from a text description."

Another of McIntosh's passions is music. An accordionist from way back, he now spends a good deal of time making Apple music with a Mountain Music System. Which, not surprisingly, he has modified.

But every so often McIntosh likes just to climb aboard that homemade ten-speed and pedal as far away as possible from high tech. A regular bicycle commuter, he goes on weekend jaunts and makes a five-hundred- to seven-hundred-mile tour every summer through New Zealand's spectacular bush, mountain, and lake scenery.

"I wake up when the sun comes up, go to sleep when the sun goes down, and rely entirely on my own motive power."

McIntosh pauses, a broad grin crosses his face, and his eyes twinkle. "It's really primitive, and that's great." ◻■

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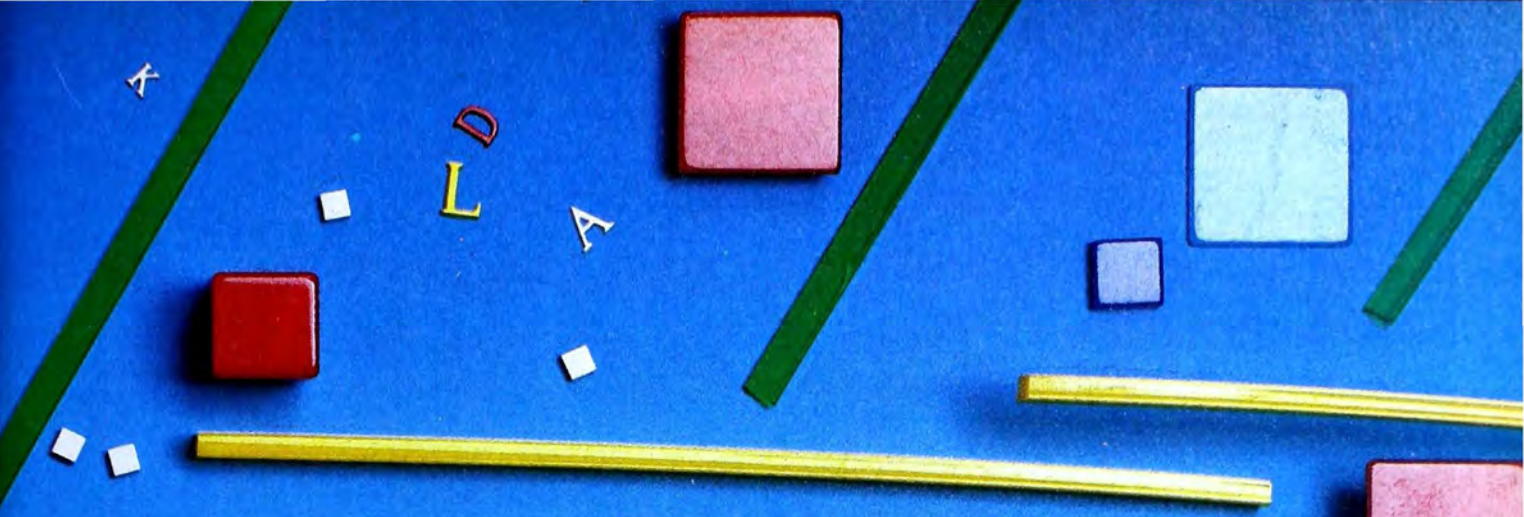
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THE PASCAL PATH

By Jim Merritt

Jungle Fever, Part 11

Before we begin this month's explorations, we'd first like to report a minor error in the last installment. Actually, it was a blatant falsehood. Your Pathfinder is not sure what he was thinking at the time. In the first paragraph of page 90, the form of the "resident" compiler directive was given as (*$R *filename* *). The proper form is (*$R *identifier-or-segment-number* *), as covered in September 1983.

Toward a Rational 1984. When it comes to arithmetic calculation, digital computers have a reputation for being both fast *and* accurate. Fast they most certainly are: calculations that used to take hours or days to complete by hand are now performed in far less than a second by even the least capable of today's personal computers. Accuracy, however, is entirely another matter. For instance, most computers (including the Apple running Pascal) will tell you that three times one-third is *not* equal to one! Instead, 3*(1/3) is equal to as many nines to the right of the decimal point as the system's design permits (.999999 for Apple Pascal).

You're well aware that, expressed as a decimal number, the fraction 1/3 becomes something like 0.333333. Of course, this is only an approximation to the actual value. On paper, we can put a bar above the string of threes (or an ellipsis after it) to indicate that this particular number is a "repeating decimal"—an infinite sequence of digits that represent the original fraction *exactly*. A computer, of course, has a limited amount of memory and so cannot possibly store an infinite, "repeating decimal." A number such as the decimal representation of 1/3 must therefore be "rounded" to fit into a storage space (a variable) that can hold at most only a relatively small cluster of digits at one time.

Even fractions having finite decimal equivalents may be represented within a computer inaccurately if the exact decimal form includes more digits than can be accommodated by the machine's numeric format. For example, on a computer that can store only six digits per number, the fraction 49/128 would probably be represented as .382813, since its exact decimal form, .3828125, involves one too many digits. The inaccuracy introduced by settling for such an approximation is known as *roundoff error*. As you might imagine, this kind of error can be propagated and increased through long chains of arithmetical operations and can cause the final results obtained by a program to be very inaccurate.

As a matter of course, conventional computer arithmetic involving fractional (that is, Real) numbers often suffers from the effects of approximation and roundoff error. (Fortunately, the inaccuracies are usually so small that most people may ignore them.) On the other hand, we know from elementary school that a fraction may be expressed not only in decimal notation but also as the ratio of two integers. Since integer computer arithmetic is always *exact*, many a programmer—Your Pathfinder included—has been inspired to write software that represents a fractional value "naturally" and exactly, as an integer ratio.

The accompanying listing is the compiled source text for Rational, an INTRINSIC UNIT that performs *rational* number arithmetic and data conversion.

Rational Revealed. Rational demonstrates how a UNIT, especially an INTRINSIC one, may be used to add an entirely new, custom-designed data type to your personal copy of Apple Pascal. Today's computer scientists agree that a complete *data type definition* must include descriptions of the abstract nature of the data in question; the physical representation of the data within the computer; the operators (if any) that may be used to manipulate the data; and the correspondence (if any) between the data being defined and data of other types.

In order to appreciate these points more fully, consider Apple Pascal's Integer data type. A formal definition of Integer would certainly mention the numeric nature of Integer data, as well as the fact that an Integer value is stored in a "two's-complement" format that occupies two bytes (one word) of your Apple's RAM memory. Additionally, the type definition would list and describe several operators, such as + (addition), − (subtraction), * (multiplication), DIV (truncating division), and MOD (the remainder when one Integer is divided by another). Finally, the Integer specification would mention the criteria for producing a character-string representation of an Integer value, for building a Real value that corresponds to an Integer, and so forth. In other words, the type definition would identify other types of data with which Integers are compatible, then prescribe the methods or rationale that should be used in converting between Integer data and corresponding values from the other types.

The UNIT Rational manages to satisfy the four criteria for a format data type definition. First, the numeric nature of rational data is clearly declared, at least in the UNIT's commentary. Second, the physical form of a rational Number is defined as consisting of two (potentially huge) Integers. Next, operations are defined that invoke well-known arithmetic recipes to transform individual Numbers or to combine two Numbers into a third. Also included in the package is an operation for evaluating the equality or inequality of two Numbers. Finally, conversions between Numbers and character strings are defined in the form of special subroutines.

Although Rational is successful in defining a new numeric data type for your Apple Pascal system, its design (and the compromises that led to the design) identify certain weaknesses of Apple Pascal—particularly as regards the UNIT mechanism. We will consider some of those shortcomings after examining the implementation of rational Numbers in detail.

To Make a Short Story Long. . . . As mentioned above, each rational Number consists of two potentially large Integers. One is the numerator; the other is the denominator. Rational treats all numbers as fractions and manipulates them using much the same methods as you learned in elementary arithmetic class. (Some short cuts are taken here and there, but the methods should not be totally unfamiliar to you.)

Assuming that you know nothing more about Apple Pascal than the material presented in this column over its three-year history, you are no doubt confused by the definition of the RatInt data type (which, in turn, is used to define the Numerator and Denominator fields in the Number structure).

RatInt is a "Long Integer," as opposed to a regular one. The constant

in brackets, concatenated to the identifier Integer in the RatInt definition, specifies the desired maximum number of digits we want the Long Integer to hold (up to 36). To illustrate, the type descriptor Integer[10] specifies a Long Integer that can hold a number that is at most ten digits wide. The number 12,345,678,901 would be too large to squeeze into a variable of that particular type, but it would fit snugly into a variable declared as Integer[11]. In specifying the size of a RatInt, we used a named constant between the brackets. The explicit Integer constant 16 would have served as well—from the compiler's point of view, at least. However, several of Rational's subroutines must also know the maximum number of digits in a RatInt, so it seemed best to give a specific name to that value. That way, if someday we want to extend (or restrict) the maximum number of digits accommodated by a RatInt, we need only change the declaration of MaxRISize, then recompile the UNIT.

Long Integers are only partially compatible with regular Integers. For instance, the built-in operators +, −, *, and DIV apply to values of both types, but MOD is undefined for Long Integers (which explains why Rational's IMPLEMENTATION section defines an explicit subroutine to handle that operation). Also, an Integer may be assigned to a Long Integer variable; conversion from regular Integers to Long Integers is automatic. On the other hand, conversion from Long Integer to Integer is possible only if the Long Integer value falls within the Integer range of −32,768 to 32,767. And such conversion is not automatic; you must invoke it by calling the built-in Trunc function. To illustrate, if A is an Integer variable and B is a Long Integer variable containing the value 273, then the statement "A := Trunc(B);" puts the Integer value of 273 in A.

At the level of the p-machine, Long Integers are represented differently from standard Integers. Although both Integers and Long Integers are ultimately represented by patterns of bits (binary digits, on-off pulses) in the RAM memory of your Apple, the lengths of these patterns and the methods used to interpret them differ between the two data types, just as they do between Integer and Real. The exact nature of the difference is irrelevant to this discussion, but if you're curious you'll find much helpful information in Chapter 2 of the *Apple Pascal Language Reference Manual*. If you're especially fearless, you might also study Appendix A of the *Apple Pascal Operating System Reference Manual*, which describes the architecture of the p-machine.

Long Integer is an example of a "hybrid" data type: It has some of the advantages of a "fundamental" type (for instance, Long Integers may be operands for several—but not all—of the standard arithmetic operators), and some of the disadvantages of a "complex" type (for instance, programmer-defined functions may not return Long Integer values, except as VAR parameters). In its ambiguity, then, Long Integer is much like Apple Pascal's String type. Moreover, both Strings and Long Integers may be given arbitrary physical (maximum) sizes in their declarations. Just as one String variable may be able to hold more (or fewer) characters than another due to a difference in declared maximum size, so may one Long Integer variable be able to accommodate more (or fewer) digits than another. (Anyone interested in the evolution of the Pascal language should note that neither Strings nor Long Integers are defined in the proposed international Pascal standard, and they were never recognized by Niklaus Wirth's original Pascal compiler. Instead, they were added as extensions to the language by the programmers at the University of California, San Diego, who designed both UCSD Pascal and Apple Pascal.)

And Now, the Bad News. Certain limitations of Pascal encumber the programmer who wishes to implement a new data type as a UNIT. To start, Pascal does not permit the programmer to modify any existing operators to accommodate a new data type. For instance, we would have liked to expand the scope of the +, −, *, and / operators to encompass Number (that is, rational) data. In more precise terms, we would have preferred to *overload* those operators. Since Pascal does not support such a thing, all arithmetic on Number data must instead be done through procedures and functions. To tie our hands further, Pascal does not allow a function to return structured data as its value; in particular, no function may return a Number as defined by the Rational UNIT. Instead, results must be transmitted through the VAR parameter mechanism. For example, suppose that a client program wants to add two (different) rational numbers together, then multiply the result by itself. It would have to establish at least two Number variables; let's call them A and B. Next, a statement such as "IF NumAdd(A,B,A) = NumNoErr THEN (* Who cares? *);" would compute the sum of A and B, then deposit that result

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in A (obliterating A's original contents). Finally, a statement such as "IF NumMul(A,A,A) = NumNoErr THEN (*Again, who cares? *);" would determine the square of A and place that value back into A.

If we could coerce Pascal's "native" arithmetic operators to accept Number operands (never mind how that might be possible!), we could use the much more understandable statements "A := A + B;" and "A := A * A" to accomplish our hypothetical ends. Or, if we could redefine NumAdd and NumMul as functions returning Number results, we could write "A := NumAdd(A,B); A := NumMul(A,A);".

Taking Exception to Rational Misbehavior. Because we can neither overload Pascal's built-in operators nor create functions that return Number values, we must resign ourselves to the fact that arithmetic—indeed any rational-number manipulations—will be more cumbersome than the corresponding operations for Pascal's built-in numeric types. However, as the cliche says, "When life hands you a lemon, make lemonade." Even as we grimace at Pascal's limitations, we can take advantage of them. For instance, in Rational, all operators are defined as *functions* that return not a Number but a *condition code* indicating the success or failure of the operation (and usually the *reason* for any failure, as well). This mechanism affords us a great deal of control over our programs, insofar as it enables us to write code that deals intelligently with exceptional situations.

Let's suppose you write a program to display the result of "A DIV B", where A and B are Integers. What happens if B is zero? In this case, you might want the program to display an error message and retire gracefully, but Pascal gives you no control over the situation. The p-machine issues its own "divide by zero" error message, then proceeds to abort your program! The Rational package does not exhibit such rude behavior. If A, B, and C are (rational) Numbers, A and B contain valid rational values, and OutString is a String variable, then the following code addresses both the normal and the abnormal possibilities of division in a highly readable fashion:

```
CASE NumDiv(A, B, C) OF
 NumNoErr:
  BEGIN
   NumToStr(C, OutString);
   WriteLn(Output, 'Answer = ', OutString);
  END;
 NumOverflow:
  WriteLn(Output, 'ERROR: result undefined or too large');
END (* CASE *);
```

Of course, Rational's operators could have been defined as procedures that return their completion codes as VAR parameters, in the same way that the arithmetic results must be returned. Then, however, it would have been far too easy for a programmer to ignore the possible ill effects of an operation. By using functions to implement the operators, we have guaranteed that the process of using an operation forces us to consider (if not provide for) its possible consequences, both good and bad. In the opinion of Your Pathfinder, the use of such defensive programming techniques will help you produce programs of exceptionally high reliability and quality. You may not agree with this design philosophy. If so, you are free to modify Rational to suit your own beliefs. For instance, you might want to change all the operator functions into procedures, where the condition code is returned as a VAR parameter. Or you may elect to dispense with the reporting of operational success or failure altogether. (But if you do so, don't ask *Softalk*—or Your Pathfinder—for help in taming the program, should it turn renegade!)

Too Much Information: You Can't Police the Client. Another problem with the Rational UNIT is that too much information must be disclosed in the INTERFACE section regarding the physical representation of rational data. In particular, the objects MaxRISize and RatInt are representational details that should, by rights, be hidden away in the IMPLEMENTATION section. Certainly, these definitions should never be needed or employed by client programs. Yet, since they're presented in the INTERFACE section, they are rendered "public," and so available for use by every client.

The only data structure that a Rational client ever needs to use is the Number. Ideally, the INTERFACE should reveal only that Number exists as a Pascal data type. We would like to leave specific implementation details where they belong—in the IMPLEMENTATION section.

Such a data type as our *ideal* Number is called "opaque" by computer scientists for the simple reason that software that uses it cannot "see" the internal structure of the data. For instance, built-in types such as Integer, Char, Boolean, and String are all "opaque" to you and your programs. Unfortunately, Pascal does not permit the "opaquing" of custom data structures, so the entire RECORD structure of a Number must be exposed to public view. Because the subsidiary data type RatInt is used in defining Number, it must also appear in the INTERFACE section along with the constant MaxRISize.

When construction details of complex data structures are made public, the overall reliability of the abstract data type and its operators can suffer greatly. This is because writers of client software tend to believe that direct access to the "lower levels" of an abstract structure will help them to increase the speed or decrease the memory requirements of their own software. There is some justification for this belief, especially in the case of the Rational UNIT. For instance, consider the operator NumDiv. Rational division of Src1 by Src2 is nothing more than rational multiplication of Src1 by the *reciprocal* of Src2. Rational optimizes the speed of the NumDiv operator by constructing the reciprocal of Src2 directly—no call to NumReciprocal is made, and so no time-consuming procedure call or parameter-passing overhead is incurred.

Direct construction of Src2's reciprocal is possible only when the code in question has direct access to the Numerator and Denominator fields of a Number. Of course, the nature of the Number declaration ensures that all Rational clients have the ability to access Numbers in this way. So long as client code is very careful in modifying Numerators and Denominators directly, program execution will proceed smoothly. But what might happen, for instance, if some poorly designed client code inadvertently managed to zero a Denominator? The "official" Rational operators have been written so as to keep denominators from becoming zero, but we should not assume that the same can always be said of client code.

So that catastrophe may be avoided, client code should never have (or need) the implementation details of abstract data structures. *Abstract data should always be manipulated in the abstract*, using only the operators provided by the package that defines the data type. It is very unfortunate, then, that the creators of Apple Pascal, in designing the UNIT mechanism as an extension to the Pascal language, did not also provide for the definition of opaque data types. While the UNIT facility enables you to add custom extensions of your own design to Apple Pascal, the language's rules of data declaration often prevent you from implementing your extensions in a completely "safe" fashion. The best you can do—as we've done in Rational—is to make public as little "sensitive" information as possible and trust that your set of operators is sufficiently comprehensive and efficient so that client programmers will not be tempted to "cheat."

The Next Rational Step. Our discussion of the Rational UNIT has so far been largely theoretical and abstract in nature. By now, you are no doubt eager to see and work with an actual client program that demonstrates the UNIT's capabilities and power. You *will* have a chance to do so—next month. While you are waiting, try mulling over these topics for advanced study:

1. We have not bothered to examine the algorithms used in writing Rational's arithmetic operators and conversion subroutines. The purpose of this month's column was *not* to turn you into an expert at numeric programming methods. Our development of rational numbers as a data type served only to demonstrate how UNITs may be used to implement entire custom data types from scratch.

Your Pathfinder claims no great expertise in the subject of numerics; he dared to write Rational only after consulting the "programmer's bible," D.E. Knuth's three-volume survey of programming lore entitled *The Art of Computer Programming* (Addison-Wesley, publishers), which is available at most technical bookstores and many computer retail stores. The second volume, "Seminumerical Algorithms," is an indispensable (albeit somewhat dry) handbook for programmers who are numerically inclined. Chapter four deals with computer arithmetic, and section five of that chapter is devoted specifically to rational numbers. In addition, Knuth himself cites several references that you may find helpful, should you develop more than a passing interest in the manipulation of numbers by computer.

Euclid's algorithm for finding the greatest common divisor, used in the Rational subroutine RatGCD, is reasonably quick. It is not, however, the fastest known GCD algorithm, only the most famous. In a thorough

treatment, Knuth compares Euclid's algorithm with the so-called "binary" GCD method and concludes that the latter is significantly faster. You might try reading Knuth, then rewriting RatGCD to incorporate the "binary" algorithm. If you do, you should also write a small test client for Rational, one that permits you to determine whether or not (and if so, by how much) the change in RatGCD actually increases the UNIT's overall execution speed. For example, the client could include two loops of a thousand iterations each. The body of one might perform a rational addition, through NumAdd, while that of the other could multiply two rational Numbers, using NumMul. Clocking the execution times of each loop for each version of Rational should give you the data you need to render a verdict in the case of Euclid versus the "binary" method.

2. Many possible operations and data conversions were omitted from the Rational package. Rational is nothing more than a minimal toolkit, from which much interesting software can be built. While it is a good working definition of the Number type, it is by no means a very comprehensive one. You might want to extend the UNIT so that it supports, for instance, trigonometric operations or conversion between Numbers and Reals.

3. We mentioned earlier that Rational's implementation of the arithmetic operators permits you to exercise a large amount of control over problem situations. However, Rational is unprepared to deal with two difficulties that may easily arise during rational–number computations.

First, a numeric result may grow too large to be represented by the rational mechanism. In plain terms, more than sixteen digits may be required to express the *numerator*. This situation is called *overflow*. (Note that Rational treats a zero denominator as a special case of overflow.)

A related problem, *underflow*, occurs when the result of a rational computation is too small—in other words, when more than sixteen digits are required for the *denominator*.

The code that implements rational operators and data conversions recognizes and deals with zero denominators but not with the more general problems of overflow or underflow, even though NumCC error codes are provided for them. These omissions are deliberate. While it is possible for Rational to recognize overflow or underflow immediately before it would occur during an arithmetic operation, doing so would tend to slow computation and would also force an increase in the size of the arithmetic subroutines. Nevertheless, the ambitious reader is invited to rewrite Rational so that it addresses the underflow and overflow problems in an appropriate fashion. You should be able to do the job without changing Rational's INTERFACE in any way. Good luck.

```
1    1   1:D   1 (*$S+*) (*Swapping needed for All only.  *)
2    1   1:D   1 UNIT
3   25   1:D   1    Rational;   INTRINSIC CODE 25;
4   25   1:D   1 (*************************************)
5   25   1:D   1 (*                                   *)
6   25   1:D   1 (*    RATIONAL NUMBERS PACKAGE       *)
7   25   1:D   1 (*      Version 1.2: 30-Oct-1983     *)
8   25   1:D   1 (*            Jim Merritt            *)
9   25   1:D   1 (*                                   *)
10  25   1:D   1 (*  Provides Number data type that   *)
11  25   1:D   1 (*  represents numbers as integer    *)
12  25   1:D   1 (*  ratios. Within limits of pre-    *)
13  25   1:D   1 (*  cision and range, both decimal   *)
14  25   1:D   1 (*  and nondecimal fractions may     *)
15  25   1:D   1 (*  be represented exactly.          *)
16  25   1:D   1 (*                                   *)
17  25   1:D   1 (*  This package supports addition,  *)
18  25   1:D   1 (*  subtraction, multiplication,     *)
19  25   1:D   1 (*  division, and inversion (additive *)
20  25   1:D   1 (*  and multiplicative) for rational *)
21  25   1:D   1 (*  Numbers. Comparisons between     *)
22  25   1:D   1 (*  rational Numbers are also        *)
23  25   1:D   1 (*  supported. Two routines provide  *)
24  25   1:D   1 (*  for conversion between character *)
25  25   1:D   1 (*  strings and the internal repre-  *)
26  25   1:D   1 (*  sentation of Number data.        *)
27  25   1:D   1 (*                                   *)
28  25   1:D   1 (*  WARNING: This implementation of  *)
29  25   1:D   1 (*  rational operations does not     *)
30  25   1:D   1 (*  specifically guard against nu-   *)
31  25   1:D   1 (*  meric overflow/underflow (except *)
32  25   1:D   1 (*  in the case of zero denominator).*)
33  25   1:D   1 (*  It is up to the ambitious reader *)
34  25   1:D   1 (*  to devise and install appropriate*)
35  25   1:D   1 (*  protective code (which may cost   *)
36  25   1:D   1 (*  more in execution speed penalties*)
37  25   1:D   1 (*  than it is worth).               *)
38  25   1:D   1 (*                                   *)
39  25   1:D   1 (*************************************)
40  25   1:D   1
41  25   1:D   1   INTERFACE
42  25   1:D   1    CONST
43  25   1:D   1     (* The maximum number of digits in
44  25   1:D   1        either a numerator or denominator:
45  25   1:D   1     *)      MaxRISize = 16;
46  25   1:D   1
47  25   1:D   1    TYPE
48  25   1:D   1     (* Both numerators and denominators
49  25   1:D   1        will be represented by potentially
50  25   1:D   1        huge Integers.
51  25   1:D   1     *)      RatInt = Integer[MaxRISize];
52  25   1:D   1
53  25   1:D   1     (* The key data definition: *)
54  25   1:D   1              Number =
55  25   1:D   1               RECORD
56  25   1:D   1                 Numerator,
57  25   1:D   1                 Denominator:
58  25   1:D   1                  RatInt
59  25   1:D   1               END;
60  25   1:D   1
61  25   1:D   1     (* Most routines that deal with
62  25   1:D   1        rational quantities will be
63  25   1:D   1        FUNCTIONs that return numeric
64  25   1:D   1        results through VAR parameters.
65  25   1:D   1        "Official" function values will
66  25   1:D   1        be condition codes that report
67  25   1:D   1        on the success or (reason for)
```


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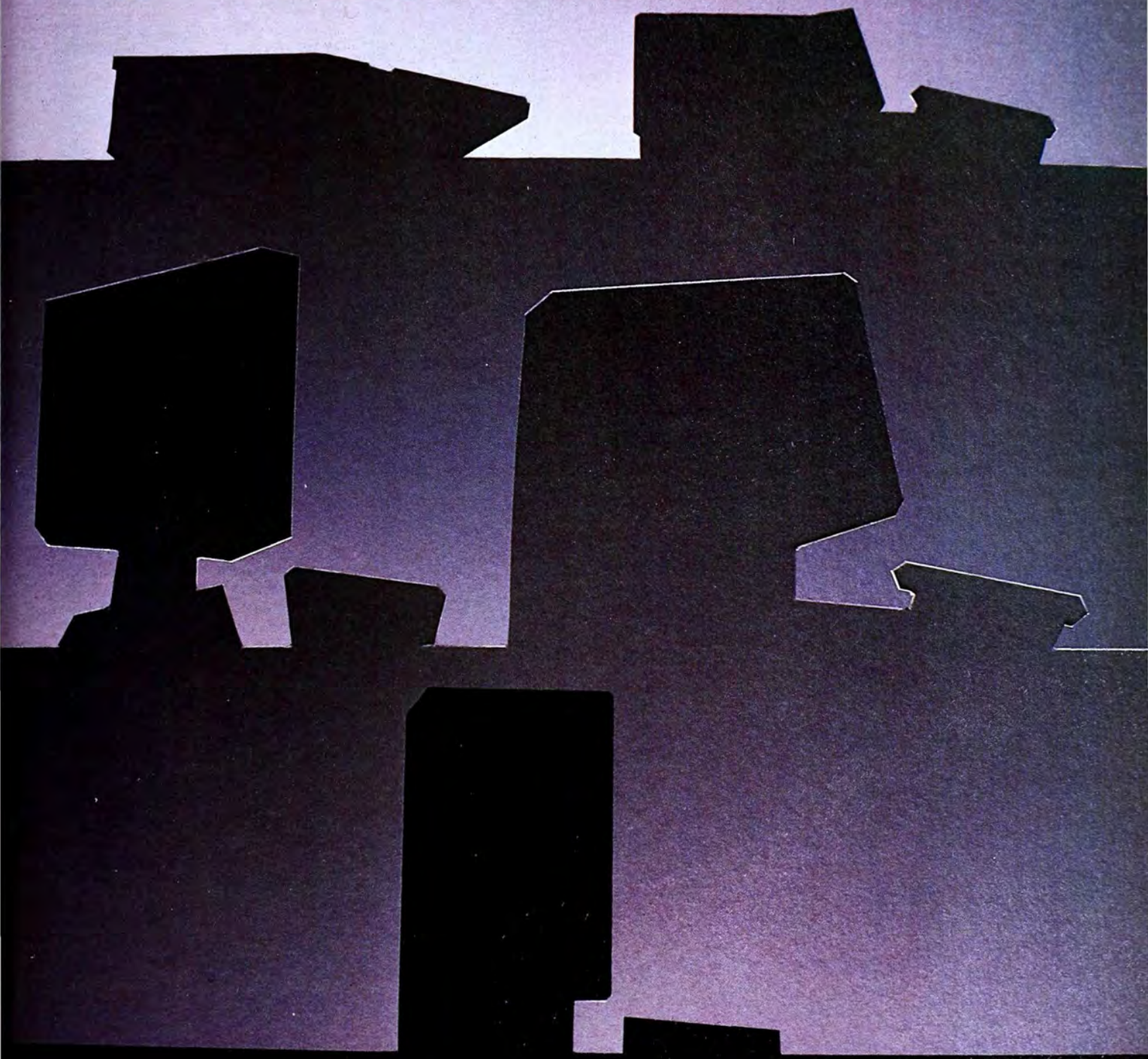
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```
68  25  1:D   1          failure of the operation in
69  25  1:D   1          question:
70  25  1:D   1      *)
71  25  1:D   1
72  25  1:D   1      NumCC =
73  25  1:D   1       (NumNoErr,          (* success! *)
74  25  1:D   1        NumUnderFlow,      (* not yet used *)
75  25  1:D   1        NumOverFlow        (*also zero denom *)
76  25  1:D   1       );
77  25  1:D   1
78  25  1:D   1  (* Numeric comparison-operator symbols: *)
79  25  1:D   1              NumComOpr =
80  25  1:D   1  (NumEQ, NumLT, NumLE, NumGT, NumGE,
                   NumNE);
81  25  1:D   1
82  25  1:D   1
83  25  1:D   1  (*********************************)
84  25  1:D   1  (*                               *)
85  25  1:D   1  (*    PUBLIC RATIONAL OPERATORS  *)
86  25  1:D   1  (*                               *)
87  25  1:D   1  (*********************************)
88  25  1:D   1
89  25  1:D   1    (*********************************)
90  25  1:D   1    FUNCTION
91  25  2:D   3      NumComplement(Src          :Number;
92  25  2:D   4                    VAR Dest  :Number
93  25  2:D   4                   )
94  25  2:D   5      :NumCC;
95  25  2:D  15    (*********************************)
96  25  2:D  15    (*                               *)
97  25  2:D  15    (*  Return the additive complement of  *)
98  25  2:D  15    (*    Src in Dest; function value is   *)
99  25  2:D  15    (*    condition code.                  *)
100 25  2:D  15    (*                               *)
101 25  2:D  15    (*********************************)
102 25  2:D  15
103 25  2:D  15
104 25  2:D  15    (*********************************)
105 25  1:D  15    FUNCTION
106 25  3:D   3      NumReciprocal(Src          :Number;
107 25  3:D   4                    VAR Dest    :Number
108 25  3:D   4                   )
109 25  3:D   5      :NumCC;
110 25  3:D  15    (*********************************)
111 25  3:D  15    (*                               *)
112 25  3:D  15    (*  Return the reciprocal of Src in  *)
113 25  3:D  15    (*    Dest; function value is con-   *)
114 25  3:D  15    (*    dition code.                   *)
115 25  3:D  15    (*                               *)
116 25  3:D  15    (*********************************)
117 25  3:D  15
118 25  3:D  15
119 25  3:D  15    (*********************************)
120 25  1:D  15    FUNCTION
121 25  4:D   3      NumMul(Src1, Src2    :Number;
122 25  4:D   5             VAR Dest      :Number
123 25  4:D   5            )
124 25  4:D   6      :NumCC;
125 25  4:D  26    (*********************************)
126 25  4:D  26    (*                               *)
127 25  4:D  26    (*  Return the product of Src1 and   *)
128 25  4:D  26    (*    Src2 in Dest; function value   *)
129 25  4:D  26    (*    is condition code.              *)
130 25  4:D  26    (*                               *)
131 25  4:D  26    (*********************************)
132 25  4:D  26
133 25  4:D  26
134 25  4:D  26    (*********************************)
135 25  1:D  26    FUNCTION
136 25  5:D   3      NumDiv(Src1, Src2    :Number;
137 25  5:D   5             VAR Dest      :Number
138 25  5:D   5            )
139 25  5:D   6      :NumCC;
140 25  5:D  26    (*********************************)
141 25  5:D  26    (*                               *)
142 25  5:D  26    (*  Return the quotient of Src1 and  *)
143 25  5:D  26    (*    Src2 in Dest; function value   *)
144 25  5:D  26    (*    is condition code.              *)
145 25  5:D  26    (*                               *)
146 25  5:D  26    (*********************************)
147 25  5:D  26
148 25  5:D  26
149 25  5:D  26    (*********************************)
150 25  1:D  26    FUNCTION
151 25  6:D   3      NumAdd(Src1, Src2    :Number;
152 25  6:D   5             VAR Dest      :Number
153 25  6:D   5            )
154 25  6:D   6      :NumCC;
155 25  6:D  26    (*********************************)
156 25  6:D  26    (*                               *)
157 25  6:D  26    (*  Return the sum of Src1 and Src2  *)
158 25  6:D  26    (*    in Dest; function value is     *)
159 25  6:D  26    (*    condition code.                *)
160 25  6:D  26    (*                               *)
161 25  6:D  26    (*********************************)
162 25  6:D  26
163 25  6:D  26
164 25  6:D  26    (*********************************)
165 25  1:D  26    FUNCTION
166 25  7:D   3      NumSub(Src1, Src2    :Number;
167 25  7:D   5             VAR Dest      :Number
168 25  7:D   5            )
169 25  7:D   6      :NumCC;
170 25  7:D  26    (*********************************)
171 25  7:D  26    (*                               *)
172 25  7:D  26    (*  Return the difference between    *)
173 25  7:D  26    (*    Src1 and Src2 in Dest; func-   *)
174 25  7:D  26    (*    tion value is condition code.  *)
175 25  7:D  26    (*                               *)
176 25  7:D  26    (*********************************)
177 25  7:D  26
178 25  7:D  26
179 25  7:D  26  (*********************************)
180 25  7:D  26  (*                               *)
181 25  7:D  26  (*  PUBLIC COMPARISON OPERATORS  *)
182 25  7:D  26  (*                               *)
183 25  7:D  26  (*********************************)
184 25  7:D  26
185 25  7:D  26    (*********************************)
186 25  1:D  26    FUNCTION
187 25  8:D   3      NumComp(A, B:    Number;
188 25  8:D   5              Comp:  NumCompOpr
189 25  8:D   5             )
190 25  8:D   6      : Boolean;
191 25  8:D  26    (*********************************)
192 25  8:D  26    (*                               *)
193 25  8:D  26    (*  Returns Boolean result of A OP B  *)
194 25  8:D  26    (*    where OP may be NumEQ (equal),   *)
195 25  8:D  26    (*    NumLT (less than), LE (less      *)
196 25  8:D  26    (*    than or equal to), NumGT         *)
197 25  8:D  26    (*    (greater than), NumGE (greater   *)
198 25  8:D  26    (*    than or equal to), or NumNE      *)
199 25  8:D  26    (*    (not equal to).                  *)
200 25  8:D  26    (*                               *)
201 25  8:D  26    (*********************************)
202 25  8:D  26
203 25  8:D  26
204 25  8:D  26
205 25  8:D  26  (*********************************)
206 25  8:D  26  (*                               *)
207 25  8:D  26  (*  PUBLIC DATA CONVERSION TOOLS  *)
208 25  8:D  26  (*                               *)
209 25  8:D  26  (*********************************)
210 25  8:D  26
211 25  8:D  26    (*********************************)
212 25  1:D  26    PROCEDURE
213 25  9:D   1      NumToString(Src          :Number;
214 25  9:D   2                  VAR DS       :String
215 25  9:D   2                 );
216 25  9:D  13    (*********************************)
217 25  9:D  13    (*                               *)
218 25  9:D  13    (*  Put a string representation of   *)
219 25  9:D  13    (*    the Number Src into DS.        *)
220 25  9:D  13    (*    Ratios that correspond to whole  *)
221 25  9:D  13    (*    numbers are represented as       *)
222 25  9:D  13    (*    such (i.e., no fractional        *)
223 25  9:D  13    (*    appendix). Ratios less than      *)
224 25  9:D  13    (*    unity are represented as         *)
225 25  9:D  13    (*    <numerator>/<denominator>        *)
226 25  9:D  13    (*    Ratios greater than unity        *)
```

ST.MAC

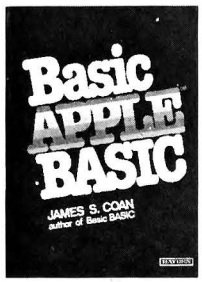




Imagination. The power behind man's greatest creations. Softalk has always believed in the imagination of those who use Apple computers. But a new breed of Apple machines is on the horizon that you won't read about in this magazine. We're talking about the Apple 68000 machines—the Lisa and other wonders only speculated upon. Fast and powerful machines that will irrevocably change the way we look at personal computing. And *ST.Mac* is the place where you'll learn about what you can do with these machines—and what they can do for you. In editorial content that promises to be informative, provocative, and sometimes unpredictable. *ST.Mac.* $12 a year until January 1, 1984; $24 thereafter. From Softalk Publishing, Box 60, North Hollywood, CA 91603.

```
227  25  9:D  13  (*   that are not whole numbers          *)
228  25  9:D  13  (*   are represented as mixed           *)
229  25  9:D  13  (*   fractions,                         *)
230  25  9:D  13  (*                                      *)
231  25  9:D  13  (*       <whole part>&<fraction>        *)
232  25  9:D  13  (*                                      *)
233  25  9:D  13  (*   where <whole part> is an           *)
234  25  9:D  13  (*   integer and <fraction> is          *)
235  25  9:D  13  (*   a ratio less than unity.           *)
236  25  9:D  13  (*                                      *)
237  25  9:D  13  (************************************)
238  25  9:D  13
239  25  9:D  13
240  25  9:D  13  (************************************)
241  25  1:D  13  FUNCTION
242  25 10:D   3   IsNumber(Var Buf      :String;
243  25 10:D   4              VAR BPtr   :Integer;
244  25 10:D   5              VAR Dest   :Number
245  25 10:D   5             )
246  25 10:D   6    : Boolean;
247  25 10:D   6  (************************************)
248  25 10:D   6  (*                                    *)
249  25 10:D   6  (*  Returns True if substring that    *)
250  25 10:D   6  (*   starts at position BPtr in Buf    *)
251  25 10:D   6  (*   corresponds to the string        *)
252  25 10:D   6  (*   representation of a rational     *)
253  25 10:D   6  (*   Number:                          *)
254  25 10:D   6  (*                                    *)
255  25 10:D   6  (*       <whole part>&<fraction>       *)
256  25 10:D   6  (*                 or                 *)
257  25 10:D   6  (*     <whole part>.<decimal part>     *)
258  25 10:D   6  (*                                    *)
259  25 10:D   6  (*   e.g., -2&3/5, -2&6/10, and       *)
260  25 10:D   6  (*   -2.6 represent the same quan-    *)
261  25 10:D   6  (*   tity, and each is acceptable     *)
262  25 10:D   6  (*   input to this routine.           *)
263  25 10:D   6  (*                                    *)
264  25 10:D   6  (*   On True return, Dest contains    *)
265  25 10:D   6  (*   the appropriate Number value     *)
266  25 10:D   6  (*   while BPtr points to the char-   *)
267  25 10:D   6  (*   acter position immediately       *)
268  25 10:D   6  (*   following the valid substring.   *)
269  25 10:D   6  (*   On False return, both BPtr and   *)
270  25 10:D   6  (*   Dest remain untouched.           *)
271  25 10:D   6  (*                                    *)
272  25 10:D   6  (************************************)
273  25 10:D   6
274  25  1:D   6  IMPLEMENTATION
275  25  1:D   1   CONST
276  25  1:D   1    Blank=       ' ';
277  25  1:D   1    Empty=       '';
278  25  1:D   1
279  25  1:D   1   PROCEDURE
280  25 11:D   1    RIMOD(U, V          :RatInt;
281  25 11:D  11          VAR Dest      :RatInt
282  25 11:D  11         );
283  25 11:D  12   (* "RatInt MOD": Returns U MOD V
284  25 11:D  12      in Dest. This routine is
285  25 11:D  12      necessary because MOD is
286  25 11:D  12      undefined for LONG Integers.
287  25 11:D  12   *)
288  25 11:0   0   BEGIN (* RIMOD *)
289  25 11:1   0    Dest := U - ((U DIV V) * V);
290  25 11:0  40   END (* RIMOD *);
291  25 11:0  52
292  25  1:0  52   PROCEDURE
293  25 12:D   1    GCD(U, V            :RatInt;
294  25 12:D  11        VAR Dest        :RatInt
295  25 12:D  11        );
296  25 12:D  12   (* Compute the Greatest Common
297  25 12:D  12      Divisor for U and V; put it in
298  25 12:D  12      Dest. Uses "modern" version
299  25 12:D  12      of Euclid's Algorithm, as shown
300  25 12:D  12      in sec. 4.5.2 of Knuth, THE ART
301  25 12:D  12      OF COMPUTER PROGRAMMING, Vol. 2
302  25 12:D  12      ("Seminumerical Algorithms"),
303  25 12:D  12      Addison-Wesley (1969).
304  25 12:D  12   *)
305  25 12:D  12
306  25 12:D  12    VAR
307  25 12:D  12      R
308  25 12:D  12       :RatInt;
309  25 12:D  17     Foundit
310  25 12:D  17       :Boolean;
311  25 12:0   0   BEGIN (* GCD *)
312  25 12:1   0    IF (U < 0)
313  25 12:1  15     THEN
314  25 12:2  17      U := -U;
315  25 12:1  35    IF (V < 0)
316  25 12:1  50     THEN
317  25 12:2  52      V := -V;
318  25 12:1  70    FoundIt := False;
319  25 12:1  73    REPEAT
320  25 12:2  73     IF (V = 0)
321  25 12:2  88     THEN
322  25 12:3  90      BEGIN
323  25 12:4  90       IF (U = 0)
324  25 12:4 105        THEN
325  25 12:5 107         Dest := 1
326  25 12:4 108        ELSE
327  25 12:5 122         Dest := U;
328  25 12:4 135       FoundIt := True;
329  25 12:3 138      END
330  25 12:2 138     ELSE
331  25 12:3 140      BEGIN
332  25 12:4 140       RIMOD(U, V, R);
333  25 12:4 152        U := V;
334  25 12:4 166        V := R;
335  25 12:3 180      END;
336  25 12:1 180    UNTIL FoundIt;
337  25 12:0 184   END (* GCD *);
338  25 12:0 198
339  25  1:0 198   PROCEDURE
340  25 13:D   1    RatSignAdjust(VAR Dest :Number);
341  25 13:D   2   (* By convention, rational denominators
342  25 13:D   2      must always exceed zero. If neces-
343  25 13:D   2      sary, adjust numerator and denomi-
344  25 13:D   2      nator of Dest to respect this
345  25 13:D   2      convention.
346  25 13:D   2   *)
347  25 13:0   0   BEGIN (* RatSignAdjust *)
348  25 13:1   0    WITH Dest DO
349  25 13:2   3     IF (Denominator < 0)
350  25 13:2  17      THEN
351  25 13:3  19       BEGIN
352  25 13:4  19         Numerator := -Numerator;
353  25 13:4  39         Denominator := -Denominator;
354  25 13:3  55       END;
355  25 13:0  55   END (* RatSignAdjust *);
356  25 13:0  68
357  25  1:0  68   FUNCTION
358  25 14:D   3    RatReduce(Src           :Number;
359  25 14:D   4              VAR Dest      :Number
360  25 14:D   4             )
361  25 14:D   5      :NumCC;
362  25 14:D  15   (* Put processed version of Src into
363  25 14:D  15      Dest, such that numerator reflects
364  25 14:D  15      the Number's sign, denominator is
365  25 14:D  15      positive, and numerator and denom-
366  25 14:D  15      inator are mutually prime (have no
367  25 14:D  15      common divisors other than 1).
368  25 14:D  15   *)
369  25 14:D  15    VAR
370  25 14:D  15     Divisor
371  25 14:D  15      :RatInt;
372  25 14:0   0   BEGIN (* RatReduce *)
373  25 14:1   0    WITH Src DO
374  25 14:2   5     IF (Denominator = 0)
375  25 14:2  20      THEN
376  25 14:3  22       RatReduce := NumOverflow
377  25 14:2  22      ELSE
378  25 14:3  27       BEGIN
379  25 14:4  27        RatSignAdjust(Src);
380  25 14:4  31        GCD(Numerator, Denominator, Divisor);
381  25 14:4  43        Numerator := Numerator DIV Divisor;
382  25 14:4  66        Denominator := Denominator DIV Divisor;
383  25 14:4  89        Dest := Src;
384  25 14:4  94        RatReduce := NumNoErr;
385  25 14:3  97       END;
386  25 14:0  97   END (* RatReduce *)
```

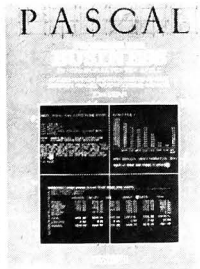
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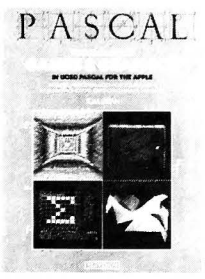
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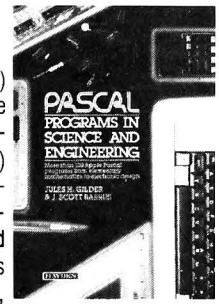
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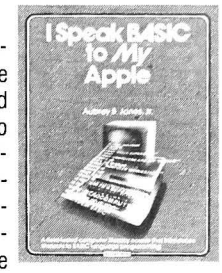


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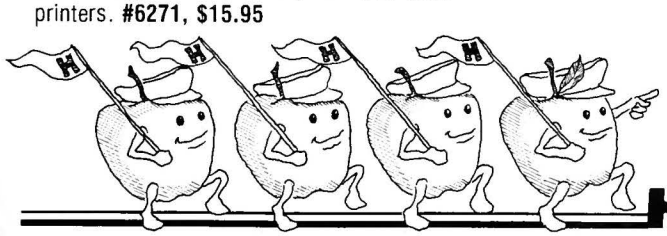
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```
387  25  14:0  110
388  25   1:0  110  FUNCTION
389  25   1:D    3   NumComplement(* Src          :Number;
390  25   1:D   15                    VAR Dest     :Number
391  25   1:D   15                  )
392  25   2:D   15     :NumCC *);
393  25   2:D   15  (* See INTERFACE for specification. *)
394  25   2:0    0  BEGIN (* NumComplement *)
395  25   2:1    0   IF (Src.Denominator = 0)
396  25   2:1   20    THEN
397  25   2:2   22     NumComplement := NumOverflow
398  25   2:1   22    ELSE
399  25   2:2   27     BEGIN
400  25   2:3   27      Dest := Src;
401  25   2:3   32      Dest.Numerator := -Dest.Numerator;
402  25   2:3   52      NumComplement := NumNoErr;
403  25   2:2   55     END;
404  25   2:0   55  END (* NumComplement *);
405  25   2:0   68
406  25   1:0   68  FUNCTION
407  25   1:D    3   NumReciprocal(* Src          :Number;
408  25   1:D   15                    VAR Dest     :Number
409  25   1:D   15                  )
410  25   3:D   15     :NumCC *);
411  25   3:D   15  (* See INTERFACE for specification. *)
412  25   3:0    0  BEGIN (* NumReciprocal *)
413  25   3:1    0   IF (Src.Numerator = 0)
414  25   3:1   20    THEN
415  25   3:2   22     NumReciprocal := NumOverflow
416  25   3:1   22    ELSE
417  25   3:2   27     BEGIN
418  25   3:3   27      Dest.Numerator := Src.Denominator;
419  25   3:3   42      Dest.Denominator := Src.Numerator;
420  25   3:3   55      RatSignAdjust(Dest);
421  25   3:3   58      NumReciprocal := NumNoErr;
422  25   3:2   61     END;
423  25   3:0   61  END (* NumReciprocal *);
```


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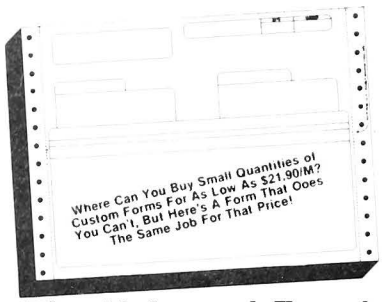
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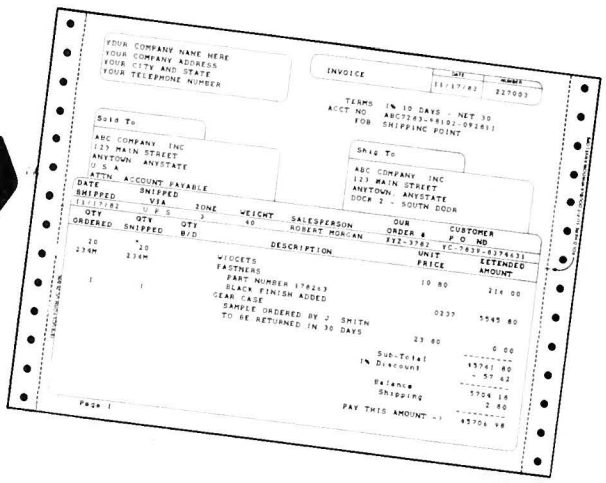

```
424  25   3:0   74
425  25   1:0   74  FUNCTION
426  25   1:D    3   NumMul(* Src1, Src2     :Number;
427  25   1:D   26                VAR Dest     :Number
428  25   1:D   26              )
429  25   4:D   26     :NumCC *);
430  25   4:D   26  (* See INTERFACE for specification. *)
431  25   4:D   26  (* This version of multiplication was
432  25   4:D   26       described in Knuth's vol. 2
433  25   4:D   26       (sec. 4.5.1), and minimizes the
434  25   4:D   26       chance of overflow during inter-
435  25   4:D   26       mediate calculations. If Dest,
436  25   4:D   26       reduced to lowest terms, lies
437  25   4:D   26       within range of our Number
438  25   4:D   26       implementation, then NO overflow
439  25   4:D   26       can occur while computing it with
440  25   4:D   26       this algorithm. In essence,
441  25   4:D   26       "cancellation" is used between Src1
442  25   4:D   26       and Src2 to reduce intermediate
443  25   4:D   26       multiplications to acceptable
444  25   4:D   26       magnitudes, whenever possible.
445  25   4:D   26  *)
446  25   4:D   26   VAR
447  25   4:D   26    TDest
448  25   4:D   26     :Number;
449  25   4:D   36    D1,
450  25   4:D   36    D2
451  25   4:D   36     :RatInt;
452  25   4:0    0  BEGIN (* NumMul *)
453  25   4:1    0   NumMul := NumNoErr;
454  25   4:1   13   GCD(Src1.Numerator, Src2.Denominator, D1);
455  25   4:1   25   GCD(Src1.Denominator, Src2.Numerator, D2);
456  25   4:1   37   TDest.Numerator :=
457  25   4:1   39    (Src1.Numerator DIV D1)
458  25   4:1   53    * (Src2.Numerator DIV D2);
459  25   4:1   78   TDest.Denominator :=
460  25   4:1   80    (Src1.Denominator DIV D2)
461  25   4:1   94    * Src2.Denominator DIV D1);
462  25   4:1  119   IF (TDest.Denominator = 0)
463  25   4:1  134    THEN
464  25   4:2  136     NumMul := NumOverflow
465  25   4:1  136    ELSE
466  25   4:2  141     BEGIN
467  25   4:3  141      NumMul := RatReduce(TDest,Dest);
468  25   4:2  150     END;
469  25   4:0  150  END (* NumMul *);
470  25   4:0  162
471  25   1:0  162  FUNCTION
472  25   1:D    3   NumDiv(* Src1, Src2     :Number;
473  25   1:D   26                VAR Dest     :Number
474  25   1:D   26              )
475  25   5:D   26     :NumCC *);
476  25   5:D   26  (* See INTERFACE for specification. *)
477  25   5:D   26  (* Here we simply multiply Src1
478  25   5:D   26       by Src2's reciprocal. Isn't
479  25   5:D   26       rational arithmetic fun?
480  25   5:D   26  *)
481  25   5:D   26   VAR
482  25   5:D   26    Temp
483  25   5:D   26     :RatInt;
484  25   5:0    0  BEGIN (* NumDiv *)
485  25   5:1    0   Temp := Src2.Numerator;
486  25   5:1   24   Src2.Numerator := Src2.Denominator;
487  25   5:1   38   Src2.Denominator := Temp;
488  25   5:1   52   NumDiv := NumMul(Src1, Src2, Dest);
489  25   5:0   63  END (* NumDiv *);
490  25   5:0   76
491  25   1:0   76  FUNCTION
492  25   1:D    3   NumAdd(* Src1, Src2     :Number;
493  25   1:D   26                VAR Dest     :Number
494  25   1:D   26              )
495  25   6:D   26     :NumCC *);
496  25   6:D   26  (* See INTERFACE for specification. *)
497  25   6:D   26  (* Again, we draw from Knuth's vol. 2
498  25   6:D   26       (sec. 4.5.1), for a method of
499  25   6:D   26       addition that eliminates overflow
500  25   6:D   26       during intermediate calculations
501  25   6:D   26       (for all final sums that are within
502  25   6:D   26       the range of our implementation).
503  25   6:D   26  *)
```

```
504  25  6:D  26   VAR
505  25  6:D  26    TDest
506  25  6:D  26     :Number;
507  25  6:D  36    D1,
508  25  6:D  36    D2,
509  25  6:D  36    T
510  25  6:D  36     :RatInt;
511  25  6:0   0  BEGIN (*  NumAdd  *)
512  25  6:1   0   NumAdd := NumNoErr;
513  25  6:1  13   GCD(Src1.Denominator,Src2.Denominator,D1);
514  25  6:1  25   IF (D1 = 1)
515  25  6:1  40    THEN
516  25  6:2  42     BEGIN
517  25  6:3  42      TDest.Numerator :=
518  25  6:3  44       (Src1.Numerator * Src2.Denominator)
519  25  6:3  58        + (Src1.Denominator * Src2.Numerator);
520  25  6:3  83      TDest.Denominator :=
521  25  6:3  85       (Src1.Denominator * Src2.Denominator);
522  25  6:2 106     END
523  25  6:1 106    ELSE
524  25  6:2 108     BEGIN
525  25  6:3 108      T := (Src1.Numerator
526  25  6:3 112         * (Src2.Denominator DIV D1))
527  25  6:3 133        + (Src2.Numerator
528  25  6:3 135         * (Src1.Denominator DIV D1));
529  25  6:3 167      GCD(T, D1, D2);
530  25  6:3 179      TDest.Numerator := (T DIV D2);
531  25  6:3 202      TDest.Denominator :=
532  25  6:3 204       ((Src1.Denominator DIV D1)
533  25  6:3 218        * (Src2.Denominator DIV D2));
534  25  6:2 243     END;
535  25  6:1 243   IF (TDest.Denominator = 0)
536  25  6:1 258    THEN
537  25  6:2 260     NumAdd := NumOverflow
538  25  6:1 260    ELSE
539  25  6:2 265     BEGIN
540  25  6:3 265      NumAdd := RatReduce(TDest,Dest);
541  25  6:2 274     END;
542  25  6:0 274  END  (*  NumAdd  *);
543  25  6:0 288
544  25  1:0 288  FUNCTION
545  25  1:D   3   NumSub(*  Src1, Src2     :Number;
546  25  1:D  26              VAR Dest     :Number
547  25  1:D  26            )
548  25  7:D  26     :NumCC  *);
549  25  7:D  26  (*  See INTERFACE for specification.  *)
550  25  7:D  26  (*  Add the additive inverse of Src2 to
551  25  7:D  26      Src1; put it in Dest.
552  25  7:D  26  *)
553  25  7:0   0  BEGIN (*  NumSub  *)
554  25  7:1   0   Src2.Numerator := Src2.Numerator;
555  25  7:1  28   NumSub := NumAdd(Src1, Src2, Dest);
556  25  7:0  39  END  (*  NumSub  *);
557  25  7:0  52
558  25  1:0  52  FUNCTION
559  25  1:D   3   NumComp(*  A, B:        Number
560  25  1:D  26               Comp:      NumCompOpr
561  25  1:D  26            )
562  25  8:D  26     : Boolean  *);
563  25  8:0   0  BEGIN (*  NumComp  *)
564  25  8:1   0   IF (NumSub(A,B,A) < > NumNoErr)
565  25  8:1  22    THEN
566  25  8:2  24     NumComp := False
567  25  8:1  24    ELSE
568  25  8:2  29     CASE Comp OF
569  25  8:2  32      NumEQ:
570  25  8:3  32       NumComp := (A.Numerator = 0);
571  25  8:2  51      NumLT:
572  25  8:3  51       NumComp := (A.Numerator < 0);
573  25  8:2  70      NumLE:
574  25  8:3  70       NumComp := (A.Numerator < = 0);
575  25  8:2  89      NumGT:
576  25  8:3  89       NumComp := (A.Numerator > 0);
577  25  8:2 108      NumGE:
578  25  8:3 108       NumComp := (A.Numerator > = 0);
579  25  8:2 127      NumNE:
580  25  8:3 127       NumComp := (A.Numerator < > 0);
581  25  8:2 146     END  (*  CASE  *);
582  25  8:0 166  END (*  NumComp  *);
583  25  8:0 180
584  25  1:0 180  PROCEDURE
585  25  1:D   1   NumToString(*  Src        :Number;
586  25  1:D  13                  VAR DS   :String
587  25  9:D  13              *);
588  25  9:D  13   VAR
589  25  9:D  13    TRI1,
590  25  9:D  13    TRI2
591  25  9:D  13     :RatInt;
592  25  9:D  23    TDS
593  25  9:D  23     :String;
594  25  9:D  64  (*  See INTERFACE for specification.  *)
595  25  9:0   0  BEGIN (*  NumToString  *)
596  25  9:1   0   WITH Src DO
597  25  9:2   5    BEGIN
598  25  9:3   5     TDS := Empty;
599  25  9:3  12     IF (Numerator < 0)
600  25  9:3  27      THEN
601  25  9:4  29       BEGIN
602  25  9:5  29        DS := '-';
603  25  9:5  33        Numerator := -Numerator;
604  25  9:4  51       END
605  25  9:3  51      ELSE
606  25  9:4  53       DS := Empty;
607  25  9:3  59     IF (Denominator = 0)   (*  just in case!!  *)
608  25  9:3  74      THEN (*  something funny is going on here!  *)
609  25  9:4  76       TRI1 := 0
610  25  9:3  78      ELSE (*  normal case  *)
611  25  9:4  92       TRI1 := Numerator DIV Denominator;
612  25  9:3 115     TRI2 := Numerator - (TRI1 * Denominator);
613  25  9:3 147     IF ((TRI 1 < > 0) OR (TRI2 = 0))
614  25  9:3 178      THEN
615  25  9:4 180       BEGIN
616  25  9:5 180        STR(TRI1, TDS);
617  25  9:5 192        DS := Concat(DS, TDS);
618  25  9:5 217        IF (TRI2 < > 0)
619  25  9:5 232         THEN
620  25  9:6 234          DS := Concat(DS,'&');
621  25  9:4 259       END;
622  25  9:3 259     IF (TRI2 < > 0)
623  25  9:3 274      THEN
624  25  9:4 276       BEGIN
625  25  9:5 276        STR(TRI2, TDS);
626  25  9:5 288        DS := Concat(DS, TDS);
627  25  9:5 313        DS := Concat(DS, '/');
628  25  9:5 338        STR(Denominator, TDS);
629  25  9:5 350        DS := Concat(DS, TDS);
630  25  9:4 375       END;
631  25  9:2 375    END  (*  WITH  *);
632  25  9:0 375  END  (*  NumToString  *);
633  25  9:0 388
634  25  1:0 388  PROCEDURE
635  25 15:D   1   SkipBlanks(VAR S       :String;
636  25 15:D   2              VAR SP      :Integer
637  25 15:D   2            );
638  25 15:D   3  (*  A variation on our old buddy.
639  25 15:D   3       Increment SP so long as
640  25 15:D   3       S[SP] is a blank.
641  25 15:D   3  *)
642  25 15:0   0  BEGIN (*  SkipBlanks  *)
643  25 15:1   0   WHILE (S[SP] = Blank) DO
644  25 15:2   9    SP := SP + 1;
645  25 15:0  17  END (*  SkipBlanks  *);
646  25 15:0  32
647  25  1:0  32  PROCEDURE
648  25 16:D   1   RIPower(Radix, Exponent  :RatInt;
649  25 16:D  11              VAR Dest          :RatInt
650  25 16:D  11            );
651  25 16:D  12   VAR
652  25 16:D  12    KlugeExp
653  25 16:D  12     :Integer;
654  25 16:D  13  (*  Put Radix, raised to the Exponent power,
655  25 16:D  13       in Dest.
656  25 16:D  13  *)
657  25 16:0   0  BEGIN (*  RIPower  *)
658  25 16:1   0   IF (Exponent < 0)
659  25 16:1  15    THEN
660  25 16:2  17     Dest := 0
661  25 16:1  18    ELSE
662  25 16:2  32     BEGIN
663  25 16:3  32      Dest := 1;
```

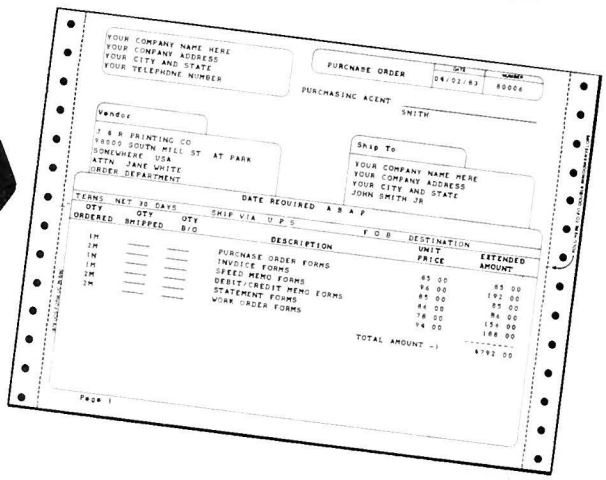
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In addition to reducing form expenses, it has drastically reduced the time spent processing separate forms through:

1. The utilization of the Apple's ability to process text, eliminating time spent correcting errors with correction tapes and fluids.
2. The elimination of time spent tabbing, spacing and changing forms in a typewriter.
3. The elimination of time wasted addressing letterhead envelopes when used in conjunction with its own, less expensive, two window envelope.
4. The use of default entries to reduce typing time, and, in some cases, the elimination of typing redundant data.
5. The performing of required calculations, i.e.; price extensions, discounts, sales tax, totaling, aging of statements, etc.

SPECIFICATIONS: 9½" × 7" overall — 8½" × 7" detached. One part forms are 15# white register bond. Multiple part forms are crisp clear NCR carbonless "Blackprint". Two part forms have extra perforation on part one for use as a statement with tear-off return section. Five part forms have price blockout on last copy. Printed two colors in pleasing brown and gold tint.

Stock No.	No. Parts	500	1000
UC-26-1	1		$21.90/M
UC-26-2	2		$55.85/M
UC-26-3	3	$53.65/LOT	
UC-26-4	4	$73.00/LOT	
UC-26-5	5	$91.65/LOT	

Stock No.	Pack/Ctn.	1000
UC-AA	1M	$41.15

Form Pricing Subject To Change Without Notice.
Quantity Discounts Available



Apple IIe Features Included

PHOENIX SOFTWARE, INC.
64 Lake Zurich Dr.
Lake Zurich, IL 60047
1-312 438-4850

$149.95

Visa & MasterCard accepted. Requires 48K Apple II or II+ and Applesoft in ROM or Apple /// in Apple II mode.

Apple II, II + and /// are registered trademarks of Apple Computer, Inc.

```
664  25  16:3   45      FOR KlugeExp := 1 TO Trunc(Exponent) DO
665  25  16:4   64        Dest := Dest * Radix;
666  25  16:2   92      END;
667  25  16:0   92  END  (* RIPower *);
668  25  16:0  106
669  25   1:0  106  FUNCTION
670  25  17:D    3   Dig2Int(D :Char)
671  25  17:D    4    :Integer;
672  25  17:D    4  (* Assume D is a digit character
673  25  17:D    4      (IN ['0'..'9']). Return the integer
674  25  17:D    4      value suggested by the single digit D.
675  25  17:D    4  *)
676  25  17:0    0  BEGIN (* Dig2Int *)
677  25  17:1    0   Dig2Int := Ord(D) - Ord('0');
678  25  17:0    5  END   (* Dig2Int *);
679  25  17:0   18
680  25   1:0   18  FUNCTION
681  25  18:D    3   IsInteger(VAR Buf      :String;
682  25  18:D    4                 VAR BPtr     :Integer;
683  25  18:D    5                 VAR Dest     :RatInt
684  25  18:D    5                )
685  25  18:D    6     :Boolean;
686  25  18:D    6  (* Return True if unsigned integer is
687  25  18:D    6      encountered in Buf starting at
688  25  18:D    6      position BPtr, false otherwise.
689  25  18:D    6      On True return, value found will
690  25  18:D    6      be in Dest, and BPtr will point at
691  25  18:D    6      the character that delimits the
692  25  18:D    6      value. On False return, BPtr and
693  25  18:D    6      Dest will be unchanged.
694  25  18:D    6  *)
695  25  18:D    6
696  25  18:D    6   VAR
697  25  18:D    6    I
698  25  18:D    6     : Integer;
699  25  18:D    7    TDest
700  25  18:D    7     : RatInt;
701  25  18:D   12
702  25  18:0    0  BEGIN (* IsInteger *)
703  25  18:1    0   I := BPtr;
704  25  18:1    4   IF (NOT (Buf[I] IN ['0'..'9']))
705  25  18:1   21    THEN
706  25  18:2   23     IsInteger := False
707  25  18:1   23    ELSE
708  25  18:2   28     BEGIN
709  25  18:3   28      TDest := 0;
710  25  18:3   42      WHILE (Buf[I] IN ['0'..'9']) DO
711  25  18:4   60      BEGIN
712  25  18:5   60       TDest :=
713  25  18:5   62        (TDest * 10) + Dig2Int(Buf[I]);
714  25  18:5   99       I := I + 1;
715  25  18:4  104      END;
716  25  18:3  106     Dest := TDest;
717  25  18:3  119     BPtr := I;
718  25  18:3  122     IsInteger := True;
719  25  18:2  125    END;
720  25  18:0  125  END   (* IsInteger *);
721  25  18:0  140
722  25   1:D    3  FUNCTION IsNumber(* VAR Buf    :String
723  25   1:D    6                       VAR BPtr   :Integer;
724  25   1:D    6                       VAR Dest   :Number
725  25   1:D    6                      )
726  25  10:D    6        : Boolean *);
727  25  10:D    6  (* See INTERFACE for specification. *)
728  25  10:D    6
729  25  10:D    6   VAR
730  25  10:D    6    I,
731  25  10:D    6    OldI
732  25  10:D    6     : Integer;
733  25  10:D    8    Sign,
734  25  10:D    8    SyntaxOK
735  25  10:D    8     :Boolean;
736  25  10:D   10    Whole
737  25  10:D   10     : RatInt;
738  25  10:D   15    TDest
739  25  10:D   15     : Number;
740  25  10:D   25
741  25  10:0    0  BEGIN (* IsNumber *)
742  25  10:1    0   WITH TDest DO
743  25  10:2    0    BEGIN
744  25  10:3    0     I := BPtr,
745  25  10:3    4     Whole := 0,
746  25  10:3   18     Numerator := 0,
747  25  10:3   32     Denominator := 1,
748  25  10:3   46     SkipBlanks(Buf,I);
749  25  10:3   51     Sign := False;
750  25  10:3   54     IF (Buf[I] IN ['-', '+'])
751  25  10:3   68      THEN
752  25  10:4   70       BEGIN
753  25  10:5   70        Sign := (Buf[I] = '-');
754  25  10:5   78        I := I + 1;
755  25  10:4   83       END;
756  25  10:3   83     SyntaxOK := IsInteger(Buf,I,Numerator);
757  25  10:3   94     IF (NOT SyntaxOK)
758  25  10:3   96      THEN
759  25  10:4   98       SyntaxOK := ((Buf[I] = '.') OR (Buf[I] = '&'));
760  25  10:3  113     IF SyntaxOK
761  25  10:3  113      THEN
762  25  10:4  116       BEGIN
763  25  10:5  116        CASE BUF[I] OF
764  25  10:5  122         '/':
765  25  10:6  122          BEGIN
766  25  10:7  122           I := I + 1;
767  25  10:7  127           IF (NOT IsInteger(Buf,I,Denominator))
768  25  10:7  137            THEN
769  25  10:8  139             BEGIN
770  25  10:9  139              I := I - 1;
771  25  10:9  144              Denominator := 1;
772  25  10:8  158             END;
773  25  10:6  158          END;
774  25  10:5  160         '.':
775  25  10:6  160          BEGIN
776  25  10:7  160           Whole := Numerator;
777  25  10:7  174           I := I + 1;
778  25  10:7  179           OldI := I;
779  25  10:7  182           SyntaxOK :=
780  25  10:7  182            IsInteger(Buf,I,Numerator);
781  25  10:7  193           IF SyntaxOK
782  25  10:7  193            THEN
783  25  10:8  196             RIPower(10,I - OldI,Denominator);
784  25  10:6  222          END;
785  25  10:5  224         '&':
786  25  10:6  224          BEGIN
787  25  10:7  224           Whole := Numerator;
788  25  10:7  238           I := I + 1;
789  25  10:7  243           SyntaxOK :=
790  25  10:7  243            IsInteger(Buf,I,Numerator);
791  25  10:7  254           IF SyntaxOK
792  25  10:7  254            THEN
793  25  10:8  257             BEGIN
794  25  10:9  257              SyntaxOK := (Buf[I] = '/');
795  25  10:9  265              IF SyntaxOK
796  25  10:9  265               THEN
797  25  10:0  268                BEGIN
798  25  10:1  268                 I := I + 1;
799  25  10:1  273                 SyntaxOK :=
800  25  10:1  273                  IsInteger(Buf,I,Denominator);
801  25  10:0  284                END;
802  25  10:8  284             END;
803  25  10:6  284          END;
804  25  10:5  286         END (* CASE Buf[I] *);
805  25  10:5  314         SyntaxOK := (Denominator <> 0);
806  25  10:5  331         IF SyntaxOK
807  25  10:5  331          THEN
808  25  10:6  334           BEGIN
809  25  10:7  334            Numerator :=
810  25  10:7  336             Numerator + (Whole * Denominator);
811  25  10:7  366            IF Sign
812  25  10:7  366             THEN
813  25  10:8  369              Numerator := -Numerator;
814  25  10:7  387            Dest := TDest;
815  25  10:7  392            BPtr := I;
816  25  10:6  395           END;
817  25  10:4  395       END;
818  25  10:2  395    END   (* WITH TDest *);
819  25  10:1  395    IsNumber := SyntaxOK;
820  25  10:0  398   END   (* IsNumber *);
821  25  10:0  416
822  25  10:0  416  (* No initialization section necessary *)
823  25   1:0    0  END   (* Rational *).
```

CONTEST WINNERS: An Apple Awarded; A Trickster Treated

Continued from page 10

(colt, one point), he missed the winning time by 1⅕ seconds (minus six points). He made up for it by predicting the winning jockey (Eddie Delahoussaye, fifteen bonus points). The running total: fifty-four points.

On July 4, 1983, the temperature in San Jose topped off at ninety degrees Fahrenheit. Shanberg predicted that it would be seventy-seven, subtracting thirteen points from his score. Though devastated, he was still in the running with forty-one points.

Shanberg bounced back by scoring fifty points when he predicted five of the seven people who had officially announced their candidacy for the 1984 presidential election. He also predicted one who had not announced his candidacy, subtracting five from the total. Running score: eighty-six points.

Finally, Shanberg named four of the five companies that had products appear most frequently on *Softalk*'s Top Thirty during 1983. With each company worth five points, Shanberg added twenty points to his score, giving him a winning total of one hundred six.

It was a close race, though, with no undisputed winner decided until after the last part of the contest. David Miles (Gillette, WY) had seventy-four points going into the final round. Miles predicted four of the five companies to make the most Top Thirty appearances, for twenty points. If Miles had also predicted correctly the number of appearances by the top company, he would have added twenty bonus points, giving him a total of one hundred fourteen. As it turned out, Miles finished second, with ninety-four points.

But Wait, There's More. Miles could have used a little help from anyone who predicted the number of appearances by the top company. One such person is Teresa Parmenter (Napa, CA), the winner of the final part of the Oracle contest.

Parmenter listed VisiCorp, Apple Computer, Broderbund, Sierra On-Line, and Infocom as her predictions for the five top companies. VisiCorp was the only company on her list not to make the top five. Getting four correct gave her twenty points; predicting the number of appearances (forty-two by Apple) then added twenty bonus points, giving Parmenter a total of forty points.

A small handful (less than 2 percent) of contestants tied, each with a score of forty points; the random number generator picked Parmenter from this group.

For those who are curious, the companies whose products appeared most frequently in the Top Thirty were, in order: Apple (forty-two), Broderbund (thirty-one), Software Publishing (twenty-seven), Sierra On-Line (twenty-four), and Infocom (twenty-two). Just missing the cutoff were Beagle Bros and Sir-tech, each with twenty-one.

In last year's contest, it was *BPI General Ledger* that boosted Apple to the number-one spot. This year, *Apple Writer IIe* and the debut of the Children's Television Workshop programs (*Ernie's Quiz*, *Instant Zoo*, *Mix and Match*, and so on) put even more distance between Apple and the rest of the field.

Almost all contestants thought VisiCorp would again be one of the top five, but with almost nothing but *VisiCalc* in the charts each month, the company scored a meager thirteen appearances.

Taking a lot of people by surprise was Infocom, which appeared twice almost every month. Beagle Bros, which just missed tying with Infocom, made all but one of its bestseller appearances during the last six months of the year.

Tricky Treats. Yes, it was indeed a tricky way to get people to read the magazine thoroughly, and no, the contest wasn't developed by the American Ophthalmological Association to cause readers to develop glaucoma and go trotting off to their nearest ophthalmologist.

From the look of things, participants in the October Tricker Treat contest paged through the magazine, searching for items on the list until their eyes gave out or until they went insane, whichever came first (for some, both occurred at the same time).

Is risking one's eyesight and mental health worth winning two hundred lousy bucks in Apple accessories? Apparently so. It was especially worth it for James Daniels (Huntsville, AL), who won the contest by turning in a perfect entry. Daniels found all the treats and identified all the tricks. As a reward, he'll get to spend all two hundred of those lousy bucks at AC 3 Computer Products in his hometown of Huntsville.

The treats are listed, along with their locations, at the end of this section.

As usual in these contests, many readers raised questions on technicalities in some of the rules. The most popular one was the rule stating that "items must be found exactly as they appear here. For example, *safe deposit box* cannot be extracted from *safe deposit boxers*."

Some nit-picky contestants took that to mean that if words weren't capitalized on the list, they couldn't be capitalized in places where they were found. That's really stretching things.

Lookit. The example we gave means you can't extract just part of a word and say that you found the word we had listed. You can't find *Applesoft* and say you found *Apple*. They're not the same thing.

However, finding *$35,000.00* is equivalent to saying you found $35,000. With or without the extra zeros on the end, it still equals thirty five thousand dollars. If you don't believe us, pronounce $35,000.00 and $35,000 out loud and see if they sound any different. No? Good. But just to satisfy those who will squawk until their dying days, we accepted this one as a trick or as a treat. Most people who thought it was a trick mentioned that they did find $35,000.00 on page 38, but ruled it as a trick because of the two zeros to the right of the decimal.

Another problem arose in finding treat number four, Mexico. It was possible to find *New Mexico* several places in the magazine, and some contestants thought that was sufficient. But actually, that's not the same thing as finding *Mexico*. In Basic:

```
10  LET M$= "Mexico"
20  LET NM$= "New Mexico"
30  IF M$=NM$ THEN YOU WIN : END
40  YOU LOSE.
```

Nope. Mexico is a country, and New Mexico is a state. But because of the way treats sixteen and twenty-eight (Wall Street Jo and ink pearl) were found, we decided to let this one slide, too. If you found *New Mexico*, that counts.

The Quotebook. It does look like these contests are getting out of hand. To wit:

"Once I started looking for treats, I couldn't stop. Addicting behavior! At least now I can go back to making dinners (instead of ordering out) and check to make sure I still recognize my kids." Candy Karlin (Skokie, IL).

"There, finished. What year is it?" Larry King (Lincoln, NE).

"I got hooked! I couldn't stop hunting for the treats. My house is a mess, the laundry needs to be done, and the dog needs to be fed. Even if I don't win, I'll come out ahead. In hunting for treats I read *Softalk* four times and increased my knowledge and understanding of computers. That in and of itself is my reward." Toni Kastelic (Descanso, CA).

Three hundred twenty pages is a lot for anybody. Gary Kielar (Clinton, NY) offered his solution: "A Halloween party! Each of the 162 guests started with a beer and a page of the October *Softalk* (each had to do both sides of the page) and had to find a clue before the next brew was issued. Well, most needed a little more inspiration themselves. But the party and contest were successful, as the attached list proves. The $200 prize can be sent directly to my local distributor for the fifty cases consumed and advanced on my next party. All 162 guests are eagerly awaiting the next issue of *Softalk*." Kielar was last seen ordering 162 turkeys for

the November contest.

The Tear-jerker of the Month award goes to Julie Ann Benusa (Rice, MN) for her outstanding performance in *One Bribe for One Brother*. "I'm sure that I should win. You see, I'm only fifteen, and I'm doing this for my brother. He's studying computer engineering at college and he's broke. Therefore, he could really use some extra junk for his Apple II computer. I'm sure it could be arranged to pay off somebody."

As stated in the rules, "The entry with the scariest appearance will receive special consideration." Thanks for all the neat-o and keen drawings of skeletons, hobgoblins, witches, ghosts, IRS agents, tombstones, zombies, bloody axes, and dentists; they were nice and scary. Especially the envelopes!

But by far the scariest entry came from Paula Giese (Minneapolis, MN) who disguised her entry as a summons and complaint for a class-action civil lawsuit (at least, we hope it was only a disguise) seeking $50 million in damages. Just seeing the return address on Giese's entry (Paralegal Investigations) was scary enough for the contest staff, since most of them were already running from the law for various reasons. Fortunately, the accompanying papers and supporting documents were so full of legal jargon and words with more than two syllables that the staff couldn't understand most of what Giese was trying to say.

And now, the answers to the Tricker Treat contest:

1. Olympic rings. Page 73, lower right side under the stars.

2. Lloyd's of London. Page 278, second column, fifth line.

3. the New Mutants. Trick! This is the title of a Marvel Comics book. It ain't here.

4. Mexico. In the form of *New Mexico*, this appeared many places; page 115 in the address for Excalibur Technologies is just one such place. *Mexico* can be found on page 166, second column, six lines from the bottom, "since we invaded Mexico." People with good eyes found it in the Epson ad on page 256. It's half hidden, but you can see it through the clouds, near the center of the photo.

5. Old Maid. Trick! The biggest trick of all was on us. Old Maid appeared in Sirius's *Gruds in Space* ad on page 93 of the September issue, but Sirius decided not to run the ad again. No, the girl pictured on page 217 is not an old maid just because she isn't wearing a wedding ring.

6. 0274-9629. Page 4, fine print under the subhead of *Softalk*. "All rights reserved. ISSN:0274-9629." This obscure number can also be found on the brown paper wrapper the magazine comes in through the mail.

7. seaweed. Page 69, second column, first line, "Seaweed Sandwich."

8. some Energizer batteries. Page 279, in the Prometheus ad. The longest interface card has two Energizers plugged into it.

9. jack-o-lantern. Page 183, screen shot at bottom center of the page, next to the shovel. The one on page 4 doesn't count, and the rules said so ("Sorry, finding them in the contest section of the magazine doesn't count . . .").

10. catowlroo. Page 83, top. Package for *Jeepers Creatures* has a picture and label of a catowlroo.

11. halo. Page 115. Two of them; one over the head of the man on the right and one over the word *Savvy* at the bottom of the page.

12. Taxan RGB monitor. Page 191, bottom of the page, sitting on top of the Apple. Many people missed this one.

13. manhole cover. Page 239, on the package's illustration, right under Arnold the dog catcher's foot.

14. sleeping giant. Page 198, bottom half of the page. The first line reads, ". . . will awaken the sleeping giant in your computer."

15. *LisaCalc*. Okay, this was tricky. Page 242, under the heading of Important Developments, "(Apple's) Lisa is based on a new software technology that integrates common office functions, such as spreadsheet analysis." That's an indirect reference to *LisaCalc*. A popular, but incorrect, choice was on page 281: ". . . the power of Lisa. *Calc-Connector* passes data. . . ." Sorry, we asked for an item, not one word and part of another.

16. Wall Street Jo. Page 107, bottom right corner of the picture of the SoftCard. The "chip" labeled U17 has the title of the *Wall Street Journal*, but it's cut off after the *o* in *Journal*.

17. neon signs. Page 220, third column. The first subhead reads: "Neon Signs, Flashy Lights. . . ."

18. covered wagon. This one appeared in several places. The Calsoft ad on page 285 is one place; the description of *Jenny of the Prairie* in the ad on page 175 ("separated from her covered wagon train . . .") is another.

19. safe deposit box. Page 187, first subhead, "A Safe Deposit Box To Keep Your Values In."

20. Tupperware. Page 35. The ad on this page has a drawing of some Tupperware. If that's not convincing enough, then the word *Tupperware* appears at the top of the ad.

21. albatross. Trick! And no one can convince us beyond a shadow of a doubt that those are albatrosses in the paintings in the Excalibur Technologies ad on page 115.

22. pizza. Page 130, top of the page in the ad for *The Pizza Program*.

23. videocassette. Several of these were strewn about. Page 45, the Kennen Publishing ad is one instance ("full color videocassette").

24. roulette wheel. Trick, trick, trick! The word *roulette* appears all over, but no roulette wheels. That is *not* a roulette wheel in the ad on page 286; that's a wheel of fortune. If it were used for roulette, the ball would fall off.

25. collie. Page 230, at the bottom of the ad on the left-hand side for MicroManagement. There's a picture of a collie, labeled "Man's Best Friend."

26. children's carrousel. Page 77. The Dynacomp ad lists *Children's Carrousel* as one of its programs.

27. color slides. Page 46, bottom left-hand side. The ad says "color slides from your Apple."

28. ink pearl. Page 77, left-hand side, top. There's a picture of an eraser on which the *P* in *Pink Pearl* is cut off.

29. internal combustion engine. Page 96. The screen shot at the bottom left of the page is labeled "internal combustion engine."

30. Duran Duran. Trick. Hot new rock group but has nothing to do with *Softalk*.

31. bandstand. Page 185. That's what the band in the picture is sitting on.

32. golf tee. Page 245. You can't miss it. Keep your eye on the ball.

33. three trombones. Page 265. In the picture, there are five musicians, two trumpets, and three trombones.

34. not Wilma or Pebble, but Fred. Page 137, second column, fourth paragraph, second line, "Hello, Mr. Flintstone. . . ."

35. spitballs. Page 185, second column, fourth line, reads: "I will not shoot spitballs in class. . . ."

36. taxicab. Page 116. Look carefully behind the *K* in *Backtalk* at the top of the page. See the little New York taxicab?

37. popcorn. Page 314, under description for *Spare Change*, seventh line, ". . . try popping popcorn. . . ."

38. periscope. Page 217, first column, seventeenth line from bottom (second subhead), "Up Periscope."

39. family roots. Page 13, bottom right-hand side. The program advertised is called *Family Roots*.

40. Madagascar. Page 33, in the photo of Earth, just to the east of Africa, where it always has been.

41. pina coladas. Page 241, first column, seventh paragraph, third line, "we'd all be inhaling Pina Coladas by now."

42. flimsies. Page 251, ninth paragraph, first line, "The bulletins, called 'flimsies.' " Flimsies did not refer to what Chyrl was wearing on page 231.

43. Horsehead. Yes, that should have been *horse head*, but who's counting? Heads of horses could be found all over the place. The head on the package of *Sargon III* on page 215 is just one of many.

44. warped tennis racquet. Page 67, in the picture, between Mark Simonsen's and Jack Cassidy's heads, mounted on the wall is the racquet that Bert Kersey used when he was captain of the water tennis team in college.

45. a doctor and a bird. Tricky but not a trick. Page 224, third column, second to last news item, "basketball stars 'Dr. J.' (Julius) Erving and Larry Bird. . . ."

46. vizual terms. Page 126, bottom printer. The paper in the printer has a line that says ". . . recognising patterns and thinking in vizual terms." Eyes beginning to hurt?

47. Alaska. Page 213, the Beagle Bros ad has a coupon at the bottom that lists the telephone number for "Alaska/Hawaii." Special InvisiPrizes go to those who spotted Alaska in the picture of Earth in the *Softalk* logo on the cover of the magazine. Get out the Visine.

48. you-know-who. Pages 213 and 275, top left corner. Directly under the cartoon speech balloon, it says "Apple is a Registered Trade Mark of You-Know-Who."

49. crystal diode. Page 110, the ad for HOME's Repeaterrrr. Pictured is the product, which has components labeled D1 and D2. Those are both crystal diodes.

50. $35,000. Page 38, top right. "Sirius is giving away over $35,000.00 in video games!!!"

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- "Money Street works like a charm and is intelligently structured. One can readily see the program was designed by someone well versed in business and finance, and not by some recluse hacker." Leo de Gar Kulka, San Francisco, Calif.
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- "I'm delighted with Money Street and recommending it to everyone coming through the door." Carolyn Biediger, Roadrunner Computing, Uvalde, Texas.
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- "The program is fabulous – I love it." Richard Rodney, D.D.S., Toronto, Canada.
- "The program is both easy to use and a very helpful addition to my software library. The most useful features are the automatic totaling of categories and the automatic retrieval of split entries." Louis Wofsy, Burk, Virginia.
- "As promised, it is not only easy to learn but an extremely valuable tool for keeping tax deductible items readly at hand." H.M. Stover, Yountville, Calif.
- "You guys are great!" Dick Palmer, San Diego, Calif.
- "I think the phrase 'as promised' sums up my reaction to the program. I wound up balanced to the penny. This from someone who hasn't looked at a bank statement in ten months!" Glenn Pironlick, Charlotte, NC.
- "I'm impressed with the well conceived error-trap warnings. Also it instills confidence having every exit move also a save move." Edward Simmons, Los Angeles, Calif.
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- "I'm having more darned fun with Money Street. I don't know why either because I hate numbers." Harry Teasedale, NYC
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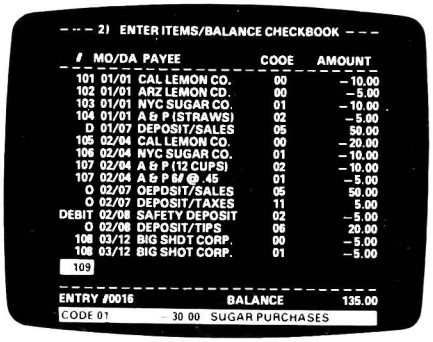
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Mind Your Business

BY PETER OLIVIERI



Well, Happy New Year—and welcome to 1984.

According to Orwell's book, this particular year was to have been the one that ushered in a much less private society. And there are those who speculate that the computer is the beginning of a technological revolution that may, indeed, affect us all in ways that will make certain aspects of *1984* a reality. While it's true that computers in the hands of people who lack integrity can be used to do harm, the vast majority of computer users are people with integrity, as well as commitment and accountability. These people should more than counterbalance the minority. Good shall, indeed, triumph over evil.

Enough philosophizing—let's make a start on the new year.

Be It Resolved. Once a year in this column, we mention the usefulness of making New Year's resolutions. Making resolutions for ourselves can be a way of reflecting on what *was* in an effort to influence what *will be*. It's also a custom for us to make resolutions for others. Of course, it's their responsibility to live up to these recommendations.

Here, then, are a few suggestions for things it would be nice to see:

1. *Be it resolved*: Apple will announce a complete business system (hardware, software, hard disk, printer, and so on) that is truly a "one-stop shopping center" for business users.
2. *Be it resolved*: When such a system is announced (if it doesn't exist already), an easy means for current Apple system owners to migrate upward to this new machine will be provided.
3. *Be it resolved*: Software publishers will develop integrated packages that really are integrated.
4. *Be it resolved*: Software reviewers will say bad things about products that bad things should be said about.
5. *Be it resolved*: When floppy disks are phased out, they will be replaced by something that offers greater storage capacity than a floppy disk system, provides for easy backup, costs about the same, and is easy to use.

Touching Base with Databases. Last month we discussed the factors that should be taken into account when attempting to choose a database management system. This month we'll begin to look at specific packages, summarizing the features of several and then looking at how they compare to each other.

Before getting started, let's briefly summarize the conclusions we reached last time.

Before buying a database management system, it's essential to do some homework. Basically, this means deciding what reports you want and need, determining which data items are necessary for these reports, and figuring out how much data you need to be able to store.

When evaluating a system, it's wise to look for ease of data input, file size limitations, types of printed reports allowed, data sorting capability, data retrieval speed, and mathematical manipulation capability. It's also important to consider the possibility of multiple users, the quality of the documentation, possible compatibility with mainframe systems, and program and data backup provisions.

Some Candidates. There are lots of database management packages available. Our objective here is to present information that will make it easier to narrow the field. With that in mind, we'll note the various characteristics associated with the packages we consider and offer some comments that reflect the experience various users have had with specific packages. Then it will be up to you to try out the systems that sound promising and evaluate them according to your own criteria.

The programs we'll definitely include in this survey are *Datafax*, *The Data Bank*, *Data Factory*, *Data Manager III*, *dBase II*, *DB Master*, *General Manager*, *PFS:File* (Apple II and Apple III versions), *Quick File III*, *Savvy*, *VersaForm II* and *III*, and *VisiFile*. This list is certainly not exhaustive, so if you feel that a particular product deserves mention, by all means say so.

The Numbers Game. One of the points emphasized last time was the importance of determining how large you expect your database to be. This forces you to consider record size and field size as well. Your choices may be narrowed down automatically once you've established these parameters. For example, if you need a hard disk, several of the leading packages will no longer be candidates. Scanning the tabular information that follows may give you a better idea of the packages you will want to consider.

Noting the numerical characteristics of the various packages sets the stage for the continuation of this discussion next month. Of course, in many ways these database management systems are quite different from each other. They work on different principles and have been designed with different sorts of clients in mind. Next time we'll describe who the so-called "typical" users of various packages might be. We'll also talk about the equipment each system requires, evaluate the quality of the user guides and other documentation, and mention some of the extras that particular packages offer.

Product Name	Product Manufacturer	Records per fi	Record Length (in bytes)	Number of Fields	Field Length (in bytes)	Hard Disk	Number of Sorts
For the Apple II Plus, IIe							
The Data Bank	FlowerSoft	varies	23,800	100	238	yes	3
Data Factory	Micro Lab	225	18,000	88	239	no	4
Data Fax	Link Systems	3,000	very large	N/A	N/A	no	N/A
dBase II (with CP/M)	Ashton-Tate	65,000	8,128	32	254	yes	N/A
DB Master	Stoneware	1,000,000	1,020	100	1,020	yes	6
General Manager	Sierra On-Line	varies	no maximum	99	39	yes	15
PFS:File	Software Publishing Corp.	less than 1,000	N/A	1,600	839	no	1
Savvy	Excalibur Technologies Corporation	20,000	1,018	255	255	yes	unlimited
VersaForm	Applied Software Technology	30,000	4,000	50	78	yes	3
VisiFile	VisiCorp	varies	232	24	128	no	10
For the Apple III							
Data Manager III	Micro Lab	32,000	50,000	200	254	yes	5
PFS:File	Software Publishing Corp.	32,000	N/A	3,200	1,679	yes	1
Quick File III	Apple Computer	30,000–100,000	1,140	15	76	yes	unlimited
VersaForm	Applied Software Technology	30,000	4,000	75	78	yes	3



The Apple universe is big and getting bigger. This is sometimes referred to as the "big bang" theory of microcreation, a belief shared by many leading sociologists, anthropologists, and security analysts. One of the interesting side effects of this information explosion is a sense of alienation brought about by the sheer enormity of this brave new world—a condition considered potentially hazardous to your equanimity if not compensated for by some interface with other carbon-based beings and their silicon buddies.

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Of Interest to Bugs. A lot of Apple users, particularly business users, are finding that the companies they work for have decided to "go IBM." This development presents Apple owners who have been working on their own for a while with a compatibility problem.

No doubt there will soon be software and/or hardware that will help users of different brands of micros to transfer programs, applications, and data back and forth. One such device is Quadlink, developed by Quadram Corporation (Norcross, GA).

Quadlink is a board that makes the IBM think it's an Apple, at least as far as most software is concerned. Not all Apple features are available, and there is some Apple-compatible hardware that can't be connected to an IBM equipped with a Quadlink. Nonetheless, Quadlink can be a very useful product for those who have access to two different machines.

That's Incredible. *The Incredible Jack*, from Business Solutions (Kings Park, NY), is an integrated software package for the II Plus and IIe. It brings together word processing, database storage, and spreadsheet capability in one package. The developers of the package have recently released a companion product, *Jackreport*. This report generator allows users who already own *The Incredible Jack* to develop reports, complete with titles and pagination. *Jackreport* also provides data sorting and totaling capabilities.

Keyboard Blues. If you read this column regularly, you probably remember a couple of times in the last year when space was devoted to complaining about the keyboard. Truly, the keyboard is a problem, especially when you're using software packages that require various series of keystrokes in order to execute commands. Suggested improvements, some of which have ended up as actual products, have included customized labels for the keys, plug-in keyboards, help cards, and more. But let's talk about an improvement that wasn't suggested here.

The product is the Kleertex keyboard templates from Creative Computer Products (San Diego, CA). These color-coordinated, heavy-gauge plastic keyboard templates measure approximately nine inches by fourteen inches and have a cutout in the middle so that they fit over your actual keyboard. There are quite a few different templates available; among these are templates for use with such programs as *WordStar*, *Apple Writer*, *VisiCalc*, *dBase II*, and *Quick File*. Once placed over your keyboard, they provide an instant reference guide to the keystroke command sequences of your program, as well as a great learning tool for the first-time user.

The Kleertex templates offer a reasonably priced and unusually effective means of jogging one's memory about the commands associated with a particular package. And if there isn't a template that fits your needs, you can buy a "blank" to fill in yourself.

B.U.G.s Suggest Solutions. It seems that whenever a Business User Group member sends out a call for help, two or three other members respond. A tip of the hat to Anita Hope (Fort Worth, TX) and Jerome Levy (Dresher, PA). Both have sent in particularly useful solutions to the word processor/printer problems that Evans Harrell (Marietta, GA) has been having.

As those of you who read the October column know, Harrell's problems arose when he was using a Microline printer with *SuperText 40/80* and an Okidata-92 with *Apple Writer II*. Hope's solution to Harrell's first problem involves taking advantage of the user options defined when the system loads. Here are the specifics that Hope provided:

1. The printer setup should be:
   Control-I = 89, B2, B4, B0, CE, 8D
   (This allows for dual-pass printing and more than forty columns.)
   Control-Y = 99, 9B, C9, 9B, C4, 9B, B0
   (9B, C9 stops emphasized; 9B, C4 stops underline; 9B, B0 stops correspondence.)
2. To underline a word, use:
   Control-D = 84, 9B, C3
3. To achieve vertical emphasis, use:
   Control-E = 85, 9B, C8
4. To obtain correspondence quality, use:
   Control-G = 87, 9B, B1
5. To cancel seventeen characters per inch and return to ten characters per inch, use:
   Control-K = 1E
6. To get double width:
   Set underline to 1E and use control-W in Add mode
7. To get seventeen characters per inch:
   Set backspaces to 1C and use control-Z

Note: Most of these control characters must be in a format line or they will accidentally print.

Levy addresses the Okidata/*Apple Writer II* problem. He suggests that the best way to embed line width or similar commands in text is by using the procedures described in the Embedding Printer Commands section of the *Apple Writer II* manual.

The problem Harrell has been having is related to the fact that this printer responds to commands different from those listed in the *Apple Writer* manual. For example, the proper command to start an underline is escape-C, and the proper stop command is escape-D. Both of these commands can be embedded using the control-V technique, but this method is cumbersome at best. The problem is best solved by using the glossary feature, but unfortunately not all the command characters that the Okidata-92 needs are available from *Apple Writer II* with an Apple II Plus keyboard.

Levy would like to share an Applesoft program he has written that's designed to generate a glossary file as an aid to using the Okidata printer. When run, this program creates a DOS text file named Special2 that may be loaded in response to the control-Q option 5 (glossary file) prompt.

Here is the program:

```
10  D$ = CHR$(4) : REM CONTROL-D
20  PRINT D$;"OPEN SPECIAL2"
30  PRINT D$;"DELETE SPECIAL2": REM CLEARS EARLIER
    VERSION
40  PRINT D$;"OPEN SPECIAL2"
50  PRINT D$;"WRITE SPECIAL2"
60  ONERR GOTO 100
70  READ A
80  PRINT CHR$(A)
90  GOTO 70
100  PRINT D$;"CLOSE SPECIAL2"
110  PRINT "SPECIAL2 GLOSSARY FILE CREATED"
200  DATA 88,24,13,78,30,13,76,28,13,77,29,13,68,31,13,49,27,49
```


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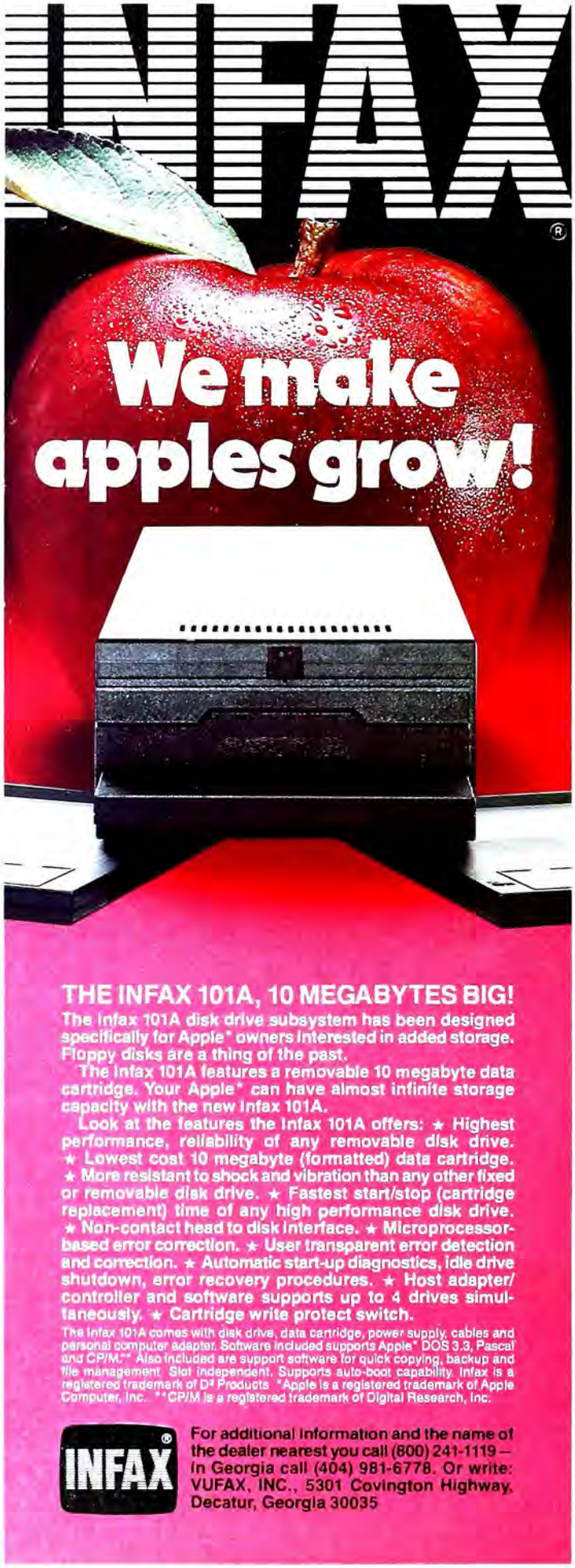
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```
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220 DATA 54,27,54,13,56,27,56,13,99,27,67,13,100,27,68,13,106
230 DATA 27,74,13,108,27,76,13,107,27,75,13,109,27,77,13,65,64
240 DATA 13,66,124,13,69,126,13,70,95,13,71,94,13,72,91,13,73
250 DATA 93,13,74,123,13,75,125,13,81,96,13
999 END
```

Be sure to double-check your data statement entries; they're important.

The following reference chart illustrates which commands and special characters various keypresses after a control-G will generate:

Task	After control-G
CLEAR PRINT BUFFER	X
10 CPI	N
12 CPI	L
17 CPI	M
DOUBLE WIDTH	D
CORRESPONDENCE	1
DATA PROC. CHAR	0
HALF-DOT EMPHASIZED	h
HALF-DOT ENHANCED	t
STOP EMPH/ENH	i
6 LINES/IN	6
8 LINES/IN	8
UNDERLINE START	c
UNDERLINE STOP	d
SUPERSCRIPT	j
SUBSCRIPT	l
STOP SUPERSCRIPT	k
STOP SUBSCRIPT	m
@	A
[	H
]	I

Also try control B, E, F, G, J, K, and Q and see what your printer displays. Doing so will demonstrate just how flexible this program is.

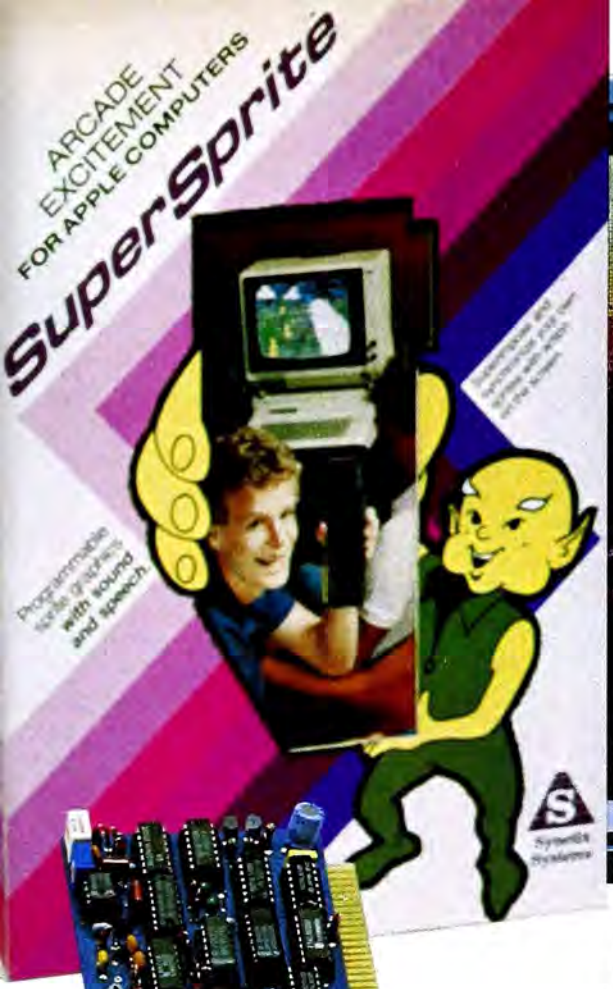
B.U.G. Request #1. Graphics packages are becoming more and more popular with business users. The ability to display complex tables and numbers in picture form significantly enhances the quality of a presentation. We'll be discussing graphics packages later this year, but in the meantime, Thomas Martin (Hershey, PA) has a question. Does anyone know of a Pascal program or package that will work with Apple Computer's *Business Graphics* to dump the hi-res screen to the printer?

Two possible sources come to mind, namely Business and Professional Software (Cambridge, MA), the company that developed Apple's program, and Computer Solutions (Mansfield, Australia). Two products from BPS, which at one time were called *Target Image Maker* and *Printer/Platter Interface Kit* (*PIK*), might do the trick. So might a Computer Solutions product developed in 1981 that allows the user to dump the hi-res screen(s) to the printer. To make this happen, you have to get your picture to the screen, load the program, and then select printing options from a menu. It's a bit unwieldy, but it works. If any of you B.U.G.s have more recent information, be sure to send it in.

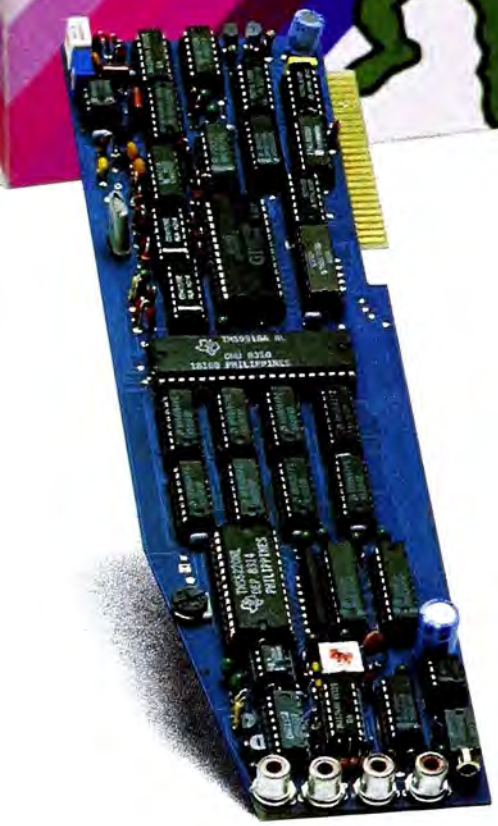
B.U.G. Request #2. Alan Krauss is still searching for an Applesoft program that will do PERT-type charting for planning and control. Or perhaps there's one available in CP/M? If you have an idea about where to get a PERT-charting program, do let us know.

Farewell. And so we reach the end of another column. Here's hoping that while reading this, you've been curled up in front of a nice warm fire and sipping some hot cider. Take care, and see you in February.]■

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COMPILED BY BETSY BARNES

Can you believe that Softalk *has mentioned Applesoft 1,322,896 times? And DOS, 991,642 times? That even the elusive* Crop Duster *has had 257 mentions? A bunch of hooey, you say? Yup. But that's what it seems like when you're trying to index the darn thing by subject. So we're still working on it. Eventually (maybe even sooner), we'll offer one of our eight-buck-bombshell disks with a superindex where you can type in "Applesoft" and get referred to every single discussion of that language by issue and page number, or you can type in "Roger Wagner" and be regaled with the locations of every juicy piece of gossip we ever printed about him. Even the time he sang to his guitar all night at his company's beach party and scared all the clams away.*

Meanwhile, this comprehensive index of Softalk *articles will have to do. It lists all articles by title, then gives the author's name, the issue date, and the page number. Well, usually the page number. Long and continuing series by continuing authors are listed only once, with starting and ending issue dates and no page numbers.*

Where this index falls short is in its list of reviews: It doesn't have one. Its entire attention to reviews consists of the listing, "Marketalk Reviews. Monthly since September 1980." Useless. So, next month in this very spot (or nearby, anyway) will appear a complete reviews index, from softday one through December 1983. It'll be designed to fit right in with this index.

Each January, we intend to provide a similar index for the previous year. We'll also offer supplementary disk indexes, assuming there really is a basic disk index by then (and you thought counting turkeys was hard . . .). But we all know about good intentions. Oh, well.

A

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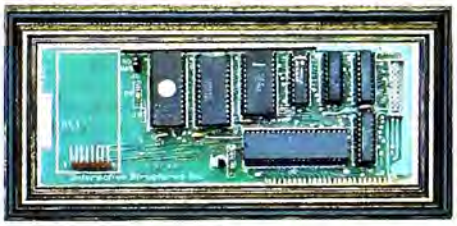
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There comes a time in the life of every personal computer user when the boss, be it spouse, parent, or supervisor, suddenly wants an accounting of the funds being spent to operate the computer. This month DOStalk will help you prepare for your day of reckoning.

This month's column continues our investigation of text files. For those of you who missed it, last month's column was an exposé of *exec* and other *keystroke* files. This month we're going to look at another widely used type of keystroke file— the *VisiCalc* file.

If There Were a Pulitzer Prize for Software. . . . Here at DOStalk we think, as we've said before, that the development of *VisiCalc* was one of the great intellectual achievements of the 1970s. When it was first released (at $99), *VisiCalc* was a totally original program. With *VisiCalc*, ordinary people were suddenly able to use a computer to crunch numbers—lots of numbers. The power of the computer was liberated, and people loved it.

For many months, the only computer *VisiCalc* would run on was the Apple. That was one of the major factors in Apple's early explosive growth. Thousands and thousands of Apples were sold simply as "*VisiCalc* machines."

Nowadays there are many programs from other publishers that do the same thing *VisiCalc* does. *VisiCalc* and the VisiClones make up a category of software usually referred to as *spreadsheets*.

The stuff we're going to discuss this month will work with any spreadsheet program that's file-compatible with *VisiCalc*. If you can take a *template* created on *VisiCalc* and load it into your spreadsheet program, then you can also do the stuff we're about to discuss here.

While this month's column is primarily about *VisiCalc*'s files and some tricks you can do with them, we'll ease into the subject with a review of what a spreadsheet program is, what it does, and how it works.

Spreadsheet Fundamentals. When you run a spreadsheet program, your display screen turns into a very large ledger pad. Across the pad are a bunch of columns. Down the pad are a bunch of rows. In most spreadsheet programs, the rows are numbered and the columns are headed with letters. Figure 1 gives a visual image of a typical spreadsheet grid.

Most spreadsheet programs use a grid much larger than the one shown here. The standard *VisiCalc* grid is 63 columns wide and 254 rows deep. Only a small portion of the grid (twenty rows and as many columns as will fit) can be seen on the display screen at any one time. But by moving the program's *window* around with the arrow keys, the user can gain access to any part of the grid.

Each of the little rectangles that make up the grid is called a *cell*. Each cell has a unique name, based on its position in the grid. The cell in the upper left corner, for example, is known as A1, since it is in column A, row 1. The bottom right cell in figure 1 would be called I15.

One of three kinds of information can be put in a cell—letters (a *label*), numbers, or formulas.

	A	B	C	D	E	F	G	H	I
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Figure 1. A typical spreadsheet grid.

In figure 2, you see a grid that has had a number of labels placed in it. The labels should lead you to believe that we are setting up a spreadsheet template for keeping track of a computer's operating expenses.

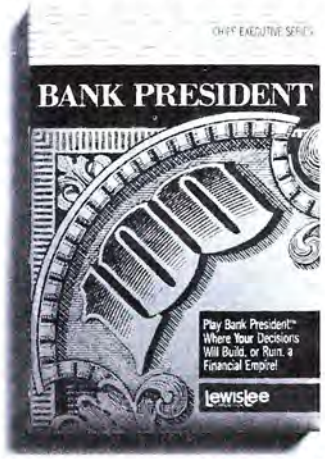
In the last column (I), we'll enter the amount we're supposed to spend during the year on necessities such as paper and ribbons for the printer, blank disks, computer magazines (very important), electronic mail and database fees, and maintenance of all our equipment.

During the course of each month, we then enter in column C our actual expenses for the month. The spreadsheet program itself will automatically calculate and display every other number on the grid. We will instantly be able to see how much over or under budget we are for the month and for the year to date.



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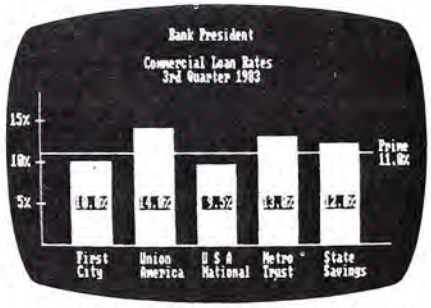
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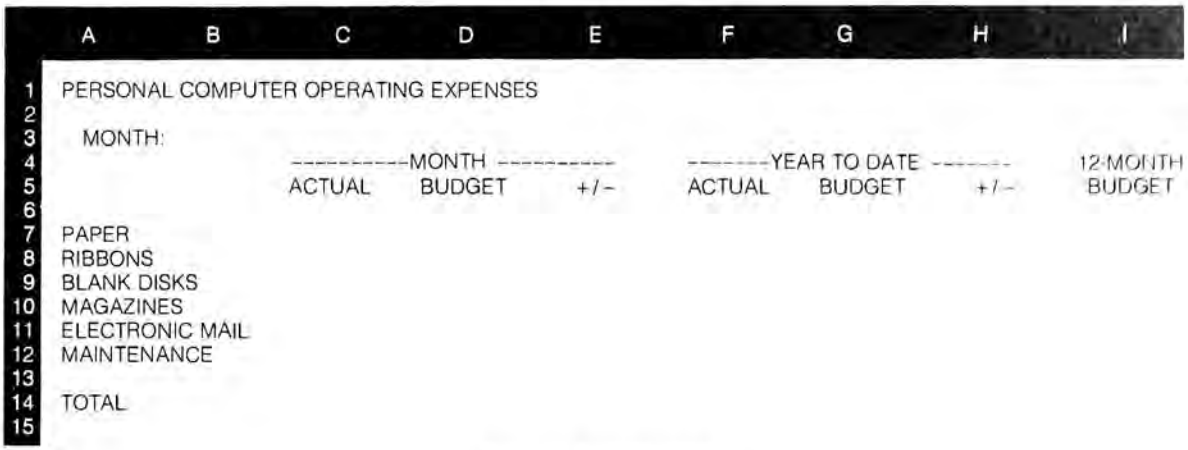
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	A	B	C	D	E	F	G	H	I
1	PERSONAL COMPUTER OPERATING EXPENSES								
2									
3	MONTH:								
4			----------MONTH ----------			-------YEAR TO DATE -------			12-MONTH
5			ACTUAL	BUDGET	+/-	ACTUAL	BUDGET	+/-	BUDGET
6									
7	PAPER								
8	RIBBONS								
9	BLANK DISKS								
10	MAGAZINES								
11	ELECTRONIC MAIL								
12	MAINTENANCE								
13									
14	TOTAL								
15									

Figure 2. Grid with labels.

Creating a Template by Hand. Before we get into the mathematical magic, however, let's look at some other stuff. To create a template such as the one shown in figure 2, we begin by using the arrow keys to move the spreadsheet's cursor to a cell (the space bar is used to switch between sideways and up-and-down movement, unless you have the Apple IIe version).

When the cursor is properly positioned, we type in a label. If the label begins with a number or symbol, such as the ones in cells F4 and I4, we first have to enter a quote mark to tell the program we want a label rather than a formula or number.

An alternative to moving the cursor with the arrow keys is the *goto* command. To give this command, we enter a right carat (>) and follow it with the name of the desired cell. By entering *>A15* (think "goto A-fifteen"), for example, we can quickly move the cursor to the first column and bottom row of our sample grid.

Before entering any numbers or formulas into our computer expense template, let's save our work in a file called *Scrooge's Demise*.

To save the template, we enter */SS*. The slash is used throughout *VisiCalc* to indicate that we're entering a command. The first S indicates that the command we want is storage. The second S indicates that we want to save, rather than load, delete, or initialize.

After the template has been saved, our disk will include a three-sector file that appears to be a standard text file. It is. If we load it into a text-file-compatible word processor, we will find that the actual contents of Scrooge's Demise are as shown in listing 1 (the blank lines have been added for clarity—they aren't a part of the actual file).

Even if you know no more about *VisiCalc* than what you've read here, you should be able to recognize that what the file contains is the exact keystrokes needed to reenter the template. *VisiCalc* saves templates in simple *keystroke* files.

Inside a *VisiCalc* File. In the file, cells are stored in reverse order, from the lower right corner to the upper left corner. The reason for this is technical—a spreadsheet program can accept data faster this way.

The first entry in Scrooge's Demise directs the cursor to cell A14 and puts the word *total* there. Next, the last two of the eleven letters in the word *maintenance* are placed in cell B12, the first nine in cell A12. We are using the standard *VisiCalc* nine-character column width here.

In row 5 and several other places, you will notice the command */FR* between the *goto* keystrokes and the actual label. This command tells *VisiCalc* to format the label flush right. The label will be pushed to the right side of the cell. Normally labels are pushed to the left side.

The last six lines of the file indicate how some of the spreadsheet's parameters were set when the file was saved. Those of you who are new to this need not understand these commands. Experienced spreadsheet users, however, will recognize that the first five of these commands set up the template. It will have one window, calculate column by column rather than row by row, automatically recalculate whenever anything in the spreadsheet is changed, display numbers in dollar format, and set the column width at nine.

Very few of you will recognize the final line. The command */X* is not a legitimate *VisiCalc* keyboard command. In a file, however, it is used to tell the program which direction cursor movement should be set for, which cell should appear in the upper left corner of the display, and where the cursor should appear.

When Scrooge's Demise was saved, the cursor was in cell A1, which was in the upper left corner of the display screen at the time.

Now that we have some idea what the files we save look like, let's return to our template.

```
>A14:"TOTAL

>B12:"CE
>A12:"MAINTENAN

>B11:"C MAIL
>A11:"ELECTRONI

>A10:"MAGAZINES

>B9:"KS
>A9:"BLANK DIS

>A8:"RIBBONS

>A7:"PAPER

>I5:/FR"BUDGET
>H5:/FR"+/-
>G5:/FR"BUDGET
>F5:/FR"ACTUAL
>E5:/FR"+/-

>D5:/FR"BUDGET
>C5:/FR"ACTUAL

>I4:/FR"12-MONTH
>H4:"ATE-----
>G4:"YEAR TO D
>F4:/FR"------
>E4:"-------
>D4:"---MONTH-
>C4:/FR"------

>A3:/FR"MONTH:

>D1:" EXPENSES
>C1:"OPERATING
>B1:"COMPUTER
>A1:"PERSONAL

/W1
/GOC
/GRA
/GF$
/GC9
/X!/X>A1:>A1:
```

Listing 1. Actual contents of Scrooge's Demise

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3	MONTH: 1								
4			----------MONTH ----------			-------YEAR TO DATE -------			12-MONTH
5			ACTUAL	BUDGET	+/-	ACTUAL	BUDGET	+/-	BUDGET
6									
7	PAPER			5.00	-5.00	0.00	5.00	-5.00	60.00
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11	ELECTRONIC MAIL			15.00	-15.00	0.00	15.00	-15.00	180.00
12	MAINTENANCE			16.67	-16.67	0.00	16.67	-16.67	200.00
13									
14	TOTAL		0.00	61.67	-61.67	0.00	61.67	-61.67	740.00
15									

Figure 3. Grid with labels, numbers, and formulas, January 1.

Numbers and Formulas. Figure 3 shows what the template looks like after adding the year's computer budget in column I and entering the template's formulas. The 1 in cell B3 indicates that the template is set for the first month of the year. Figure 3 shows what the template would look like on the first day of January.

Column C is blank. We haven't spent any money yet this year (the stores aren't open today).

Note the zero entry at the bottom of column C—cell C14. This entry indicates that there is a formula in the cell. The formula is *@SUM(C7. . .C12)*. This little ditty tells the spreadsheet program to calculate and display the total of the numbers in column C (the range of cells from C7 to C12). Since column C is currently blank, the total is zero. What you see in cell C14 is the *result* of the formula rather than the formula itself.

In column D the cells show one-twelfth—one month's worth—of the annual budget. The formula in cell D7 is *I7/12*. This tells the spreadsheet program to take whatever number is in cell I7 (the annual budget for paper) and divide it by twelve.

In column E the cells show the difference between what we actually spent and what was budgeted. If we overspend our budget, the overage will appear in column E as a positive number. If we underspend the budget, a negative number will appear. Since we haven't spent anything yet, the values in column E are all negative—indicating that it's time to spend some money. The formula in cell E7 is *C7−D7*.

Columns F, G, and H are designed to tell us how we're doing for the whole year. In column F we want to see how much we've spent so far this year, plus what we've spent this month. We know that so far this year we've spent nothing, and that what we spend this month will be posted in column C. Thus, the formula in cell F7 is *0+C7*.

In column G we want a figure representing the portion of the total budget that should be spent by now. This will depend on what month it is. For January, the figure will be one-twelfth of the annual budget—the

CONCERTO IN APPLE II+ : A Sonic Sampler

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	A	B	C	D	E	F	G	H	I
1	PERSONAL COMPUTER OPERATING EXPENSES								
2									
3	MONTH: 1								
4			----------MONTH ----------			-------YEAR TO DATE -------			12-MONTH
5			ACTUAL	BUDGET	+/-	ACTUAL	BUDGET	+/-	BUDGET
6									
7	PAPER			5.00	-5.00	0.00	5.00	-5.00	60.00
8	RIBBONS		7.59	2.50	5.09	7.59	2.50	5.09	30.00
9	BLANK DISKS			10.00	-10.00	0.00	10.00	-10.00	120.00
10	MAGAZINES		24.00	12.50	11.50	24.00	12.50	11.50	150.00
11	ELECTRONIC MAIL		10.00	15.00	-5.00	10.00	15.00	-5.00	180.00
12	MAINTENANCE			16.67	-16.67	0.00	16.67	-16.67	200.00
13									
14	TOTAL		41.59	61.67	-20.08	41.59	61.67	-20.08	740.00
15									

Figure 5. January 31.

same amount that appears in column D. But in February, the amount here should be two-twelfths of the annual budget; in June, six-twelfths; and so on. We have a number in cell B3 representing what month it is. So the formula at G7 can be *D7*B3*.

In column H, we once again want to know the difference between what we've spent and what we've budgeted. This is the year-to-date equivalent of what we did in column E. The formula at H7 is *F7−G7*.

Once the correct formulas have been entered at C14 and in row 7, they can quickly be reproduced in other cells using the *replicate* command. This is one of the most powerful features of the spreadsheet programs, but a full explanation of the procedure is beyond the scope of what we're doing here.

Meanwhile, Back at the File. If we now resave the template in figure 4 as Scrooge's Demise, the numbers and formulas we have just added will appear in the file along with the labels we looked at earlier. It would belabor the point to reprint the entire file again. However, figure 4 shows you the section of the file that re-creates row 7 so that you can compare how numbers, formulas, and labels appear when stored in a *VisiCalc* keystroke file.

>I7:120	*number*
>H7:+F7−G7	*formula: cell minus cell*
>G7:+D7*B3	*formula: cell times cell*
>F7:0+C7	*formula: number plus cell*
>E7:+C7−D7	*formula: cell minus cell*
>D7:+I7/12	*formula: cell divided by number*
>A7:"PAPER	*label*

Figure 4. Portion of Scrooge's Demise showing row 7.

Let's imagine now that during the course of January we did spend some money. We finally got a new printer ribbon for $7.59; we paid our $10.00 monthly minimum fee to the Source; and we renewed our *Softalk* subscription. After entering these amounts in column C, our template would look like the one in figure 5.

Note that even though we overspent our budget in the ribbon and magazine categories, we underspent in all the others. For the month as a whole, we spent $20.08 less than our budget allowed (E14).

After reviewing the January numbers, the usual procedure is to save the January template under a name such as Scrooge's Demise.jan, then prepare a February template.

The February template needs to lock the amounts we spent in January into the year-to-date expense column, column F. Spreadsheet programs have a command for this. *VisiCalc* uses the pound sign (#) to lock or "pound" a calculated value into a cell.

The major thing we need to do to create a February template is change the formulas in column F. For example, cell F9 needs to be changed from *0+D9* to *7.59+D9*. In addition, we need to increment the month number in cell B3, and we should erase the numbers in column C. After making these changes, we would have a new February template like the one in figure 6.

During the course of the year, we will have to make the above changes twelve times. This is rather tedious, particularly on real budgets, which tend to be several times larger than this one.

An Introduction to Datagramming. However, by taking advantage of *VisiCalc*'s keystroke files, we can automate the procedure. This technique, called *datagramming*, isn't documented in the *VisiCalc* manual. Nonetheless, it is a very powerful feature.

Let's sit down at a word processor and make a file that contains the keystrokes needed to convert Scrooge's Demise.jan into Scrooge's Demise.feb. We'll call this file Next Month. The contents of the file are shown in figure 7.

When the file Next Month is loaded (using the */SL* command) on top of the January template, it enters all the keystrokes needed to create the February template. The process works exactly like the DOS exec command we discussed here last month.

Next Month, the *VisiCalc* keystroke file we created by hand, is a *da-*

	A	B	C	D	E	F	G	H	I
1	PERSONAL COMPUTER OPERATING EXPENSES								
2									
3	MONTH: 2								
4			----------MONTH ----------			-------YEAR TO DATE -------			12-MONTH
5			ACTUAL	BUDGET	+/-	ACTUAL	BUDGET	+/-	BUDGET
6									
7	PAPER			5.00	-5.00	0.00	10.00	-10.00	60.00
8	RIBBONS			2.50	-2.50	7.59	5.00	2.59	30.00
9	BLANK DISKS			10.00	-10.00	0.00	20.00	-20.00	120.00
10	MAGAZINES			12.50	-12.50	24.00	25.00	-1.00	150.00
11	ELECTRONIC MAIL			15.00	-15.00	10.00	30.00	-20.00	180.00
12	MAINTENANCE			16.67	-16.67	0.00	33.33	-33.33	200.00
13									
14	TOTAL		0.00	61.67	-61.67	41.59	123.33	-81.74	740.00
15									

Figure 6. February 1.

```
>B3:#+1
>F7:#+C7
>F8:#+C8
>F9:#+C9
>F10:#+C10
>F11:#+C11
>F12:#+C12
>C6: /R:C7.C12
```

Figure 7. Contents of Next Month.

tagram. If you are interested in finding out more about this technique (and many other *VisiCalc* tips), contact the International Electronic SpreadSheet User Group (Box 254, Scarsdale, NY 10583). The group, also known as InterCalc, publishes a monthly newsletter called *SpreadSheet*.

The Limitations of Datagrams. There are some limitations to what can be done with a datagram. In fact, these limitations may be why the *VisiCalc* manual doesn't mention the technique.

While most *VisiCalc* commands, including insert and delete, will work in a datagram, we haven't been able to print. If we could, a major application of datagrams in DOStalk would be the printing out of very wide spreadsheets. If anybody out there determines how to use print in a datagram, let us know.

Another major limitation of the datagram is that the replicate command works only with labels and blank spaces. There doesn't seem to be any way to replicate a value or formula from a datagram.

It is possible to link one datagram to another by making the last command in a datagram */SLNext.Datagram*.

The *VisiCalc* /PF File. *VisiCalc* uses three distinct types of files. The standard keystroke file—created with the /SS command, reloaded with the /SL command—is the one we've been exploring this month.

There is a second type of file that *VisiCalc* can create, but not reload. This file is created not with the storage command, but with the print command. By entering */PF* (print to file—or */PD*, print to disk, on very early *VisiCalc*s), a *VisiCalc* user can create a standard text file that contains a template as it would appear if it were printed out on paper.

Like many *VisiCalc* commands, /PF is far more powerful than it first appears. One use of this command is to create files containing printed templates that can be loaded into a word processor.

The examples in this month's DOStalk, for example, were originally created on *VisiCalc*, saved with the /PF command, and then loaded into *Apple Writer IIe*. Thus the figures became an integrated part of the manuscript. Any word processing application requiring numerical tables will proceed much faster with the help of a spreadsheet program to calculate and format the tables.

The /PF command also allows you to use *VisiCalc* itself to create datagrams, exec files, or other standard text files. Although it's easier to create these kinds of files on a text-file-compatible word processor, a spreadsheet will help if you don't have one of those.

The best way to proceed is to set the column width to 37 or so. Only one column should appear on your display screen. Enter text, such as datagram commands, into those elongated cells as if you were entering labels. When you /PF this kind of template, you create a text file. The contents of the file will be exactly what you see on your screen.

The biggest problem with this technique is that there is no way to reload the /PF file into your spreadsheet program. If you might need to reedit the file later, save it with the /SS command as well. That version will be reloadable.

Just as the /P command, usually associated with printing, provides a way to store a file on your disk, the /SS command, usually associated with disk access, includes a little-known variation that will send a file in the keystroke format to your printer. Type */SS,S1*, where the number following the third S represents the slot your printer is connected to. You will get a template printout similar to the ones in figures 3 and 5.

The third type of file used by *VisiCalc* is the DIF (Data Interchange Format) file. Next month we're going to take an extended look at this type of file. DIF files were developed (by the same folks who brought us *VisiCalc*) to make it easy to exchange data among different programs. They are very versatile and can be used in many applications. See you next month. ⌟■

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5. DISA disassembles Binary to screen or printer.
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TEXTFILES (100 Sectors)	TSAVE	8.0	ND	ND	NO
	TLOAD	6.2	ND	ND	NO
(791 Strings,	WRITE	29.3	28.0	29.4	88.4
32 chars ea)	READ	24.3	16.3	24.3	83.8
	PRINT/READ	44.2	45.9	45.1	117.1
(442 Sectors, 7 x 791)	APPEND	142.3	142.9	151.1	1231.2
APPLESOFT (100 Sectors)	*SAVE	7.1	16.4	6.4	33.1
	LDAD	5.0	4.0	5.0	23.5
INTEGER (100 Sectors)	*SAVE	7.3	ND	6.6	33.4
	LDAD	4.9	ND	4.9	23.4
BINARY (100 Sectors)	*BSAVE	7.8	18.4	7.3	28.7
	BLDAD	5.8	4.8	5.8	24.5
48K PRDGRAM SPACE	APPLESOFT	36,352	NO	36,352	36,352
(With 3 Bufs avail)	INTEGER	36,352	NO	36,352	36,352
	BINARY	36,352	34,816	36,352	36,352
64K PRDGRAM SPACE	APPLESOFT	46,592	31,232	45,658	35,162
(With 5 Bufs avail)	INTEGER	46,592	ND	35,162	35,162
	BINARY	46,592	40,704	45,658	35,162
NUMBER OF DDS COMMANDS		37	29	31	28
CLOCK FILE DATING		YES	YES	ND	NO
MANUAL FILE DATING		YES	NO	ND	ND
ONE KEYSTRDKE CATALOG		YES	NO	YES	ND
AUTO USE INTEGER CARD ANY SLOT		YES	NO	ND	ND

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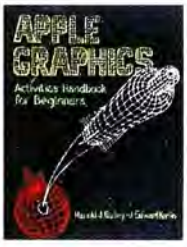
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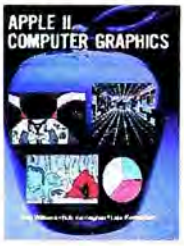


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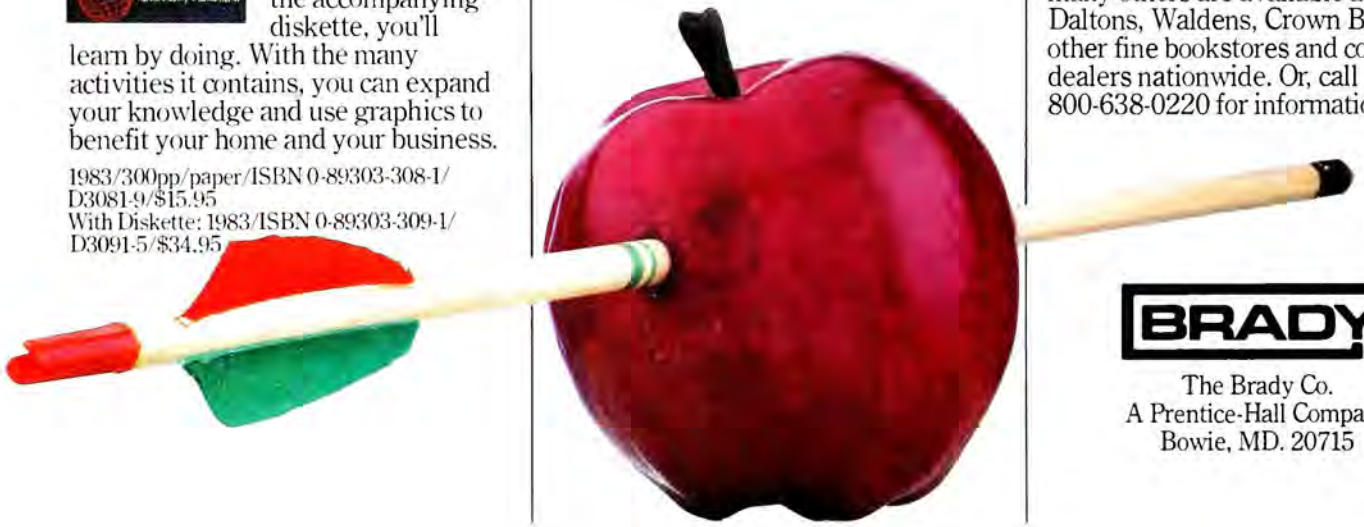
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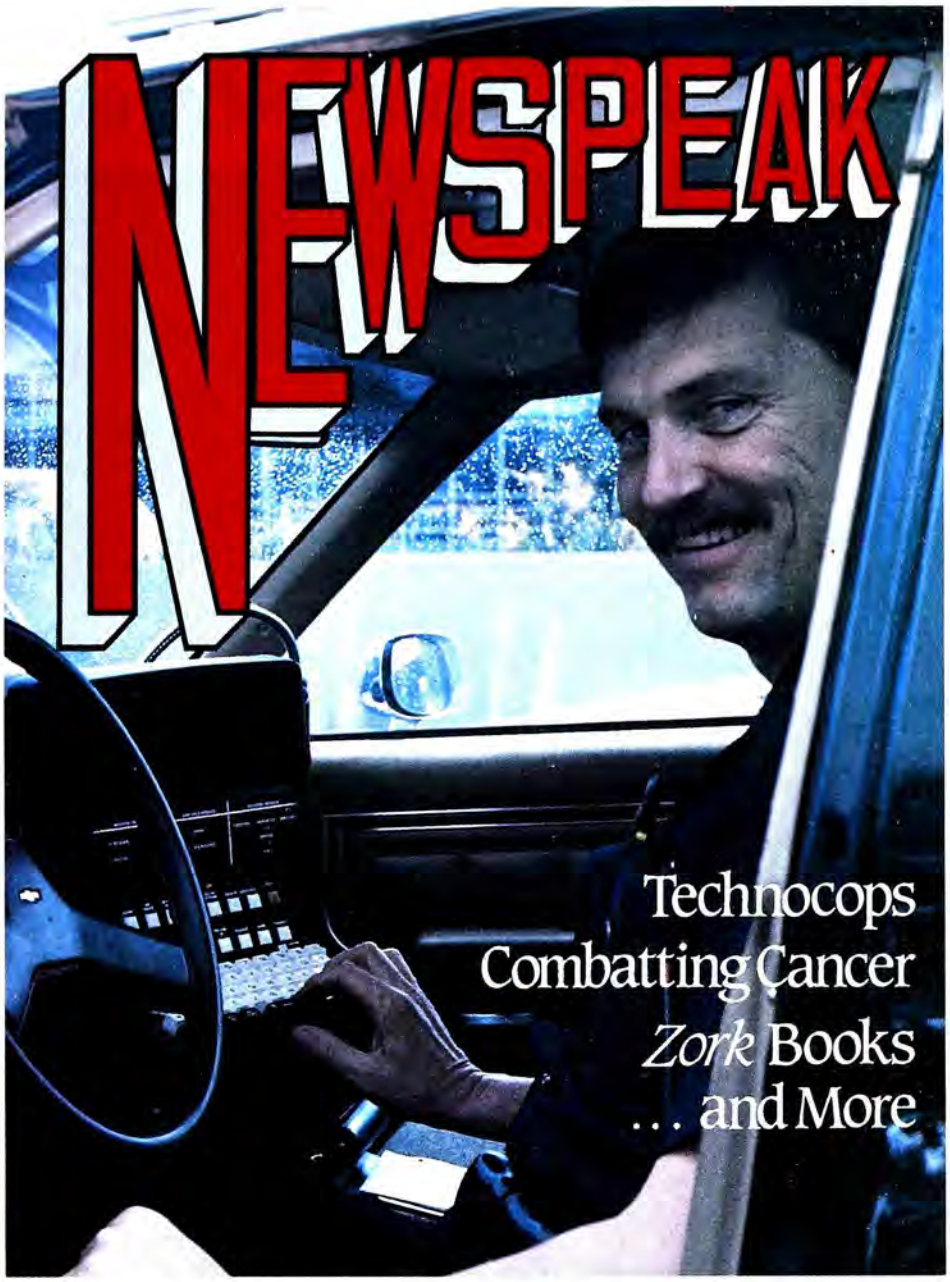
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LAW ENFORCEMENT AGENCIES ENTER THE COMPUTER AGE

The law enforcement officer punches in his badge number on his car's computer terminal and receives orders to proceed to the neighborhood liquor store. He races to the store, where he enters and spots three innocent-looking customers. No more than fifteen seconds elapse before the trouble begins. A man takes a gun from his vest and threatens the cashier. The policeman now must make his move.

The suspect whirls around and points the gun at the officer. Without warning, the suspect fires; the officer clutches his chest but doesn't fall to the ground.

The scene takes place in no ordinary liquor store. It's a simulated crime—one of many enacted regularly at Laser Village, the Los Angeles Sheriff's Department's new $514,000 training facility. Laser Village consists of a one-bedroom house and a two-story commercial center with a liquor store, gun shop, business office, bank, doctor's office, and saloon—all realistically furnished. This environment is the setting for confrontations between trainees clad in laser-sensitive vests—which, when struck by a laser beam, react by chirping and blinking—and play-acting suspects armed with special laser-equipped revolvers and shotguns. The beams, which travel as far as sixty feet, show precisely where real bullets would hit. Previous training methods, which involved play-acting suspects and trainees using guns that fired

GOTO page 248, column 2

CRAY CRUNCHES THE COMPETITION IN CHESS TOURNEY

Who has the best chess-playing computer program in the world?

Every three years, the Association for Computing Machinery makes use of its annual convocation to determine just that. The latest decision was reached at the Sheraton Center Hotel, New York, the weekend of October 22 last year. The occasion was the fourth international gathering of electronic chess champs and hopefuls for the World Computer Chess Tournament. Twenty-two teams, representing the United States, Canada, Germany, Holland, Finland, Sweden, and Austria, came to play.

Ken Thompson's *Belle*, from AT&T's Bell Laboratories, the reigning world champion, had trounced Bob Hyatt's *Cray Blitz* in the Twelfth North American Championship in 1981. Both programs had been playing at master levels for the last two years. Was *Cray Blitz* looking for a rematch at the world meet?

It got it. The spoiler for *Belle*, as it has been at previous meets, was *Nuchess*. This artificial-intelligence-styled program, which examines possible plays by a series of selective criteria rather than looking for every possible move in a series, took on *Belle* in the third round and handed it a loss—*Belle*'s first ever in four years. *Belle*'s point spread never recovered. Hyatt's *Blitz*, running on a dizzyingly fast dual-processor Cray computer, played to a draw with *Nuchess* in the fourth round. *Cray Blitz* went on to win the tournament in the fifth round.

"Hyatt's program was already very tough," says tournament organizer Monroe Newborn, "and the speed was enough to make the difference."

Some observers at the tournament said that *Belle*—on a portable machine—may have lost because of an "electronic concussion." *Belle* was in a car accident shortly before the tournament.

Tony Scherzer's *Bebe* snagged second place by defeating *Nuchess* in the final round. Scherzer was one of several programmers present whose computers played much better chess than their creators. These programmers found it hard to tell whether a puzzling computer move was a subtle piece of strategy or a programming error. Other programmers who happened to be more skilled players watched in horror and frustration when their programs blundered into fatal errors or threw away obvious opportunities.

In a special ceremony at the start of the tournament, before *Belle* got beaten by *Nuchess* and *Cray Blitz*, the U.S. Chess Federation officially awarded *Belle* the rank of master; this was the first time a computer program had been so recognized. The title,

GOTO page 251, column 1

Simulating Path of Particle Beam Bombardment

Computers Help Doctors Fight Eye Cancer

At one time the treatment for a tumor located within the eye involved either radical surgery or dangerous radiation. Neither strategy was risk-free. When surgery was done, the entire eyeball usually had to be removed to prevent the cancerous cells from infecting other body sites. And because the gamma rays used to irradiate the tumor are unfocusable and nonuniform, radiation treatment often meant the destruction of vision. In addition, tumor regrowth or other radiation-connected complications occurred in 50 percent of the cases.

A program created by Dr. Michael Goitien of Massachusetts General Hospital now offers people afflicted with eye tumors a better chance at retaining their vision. Written in Fortran to run on a Digital VAX 11/780 host system, the program aids physicians and physicists by providing a computer model, or graphic interpretation, of a patient's eye. By interacting with the program, the physician can determine the appropriate particle course to attack the tumor, as well as the specific dosage of radiation required to accomplish such a task.

A modified version of Goitien's program is currently being tested at Lawrence Berkeley Labs in California by a team of doctors and computer scientists. As it turned out, the Berkeley-based research team found themselves using a different set of graphic monitors and heavier particles (helium ions) for tumor bombardment, so LBL's Dr. Samuel Pitluck rewrote I/O routines and other algorithms to produce a program tailored to these specific conditions.

The helium nuclei needed to bombard a tumor are produced by LBL's 184-inch cyclotron. An alternating electrical field accelerates helium atoms outward in a spiral and at right angles to a fixed magnetic plane. The cyclotron strips electrons from the atoms, creating alpha particles. Because they are electrically charged (unlike gamma rays), these particles can be focused and guided and can destroy a tumor without damaging the eye. Instead of delivering energy to all the tissue encountered, as x-rays do, these ions release their energy at the end of their path—at the tumor itself.

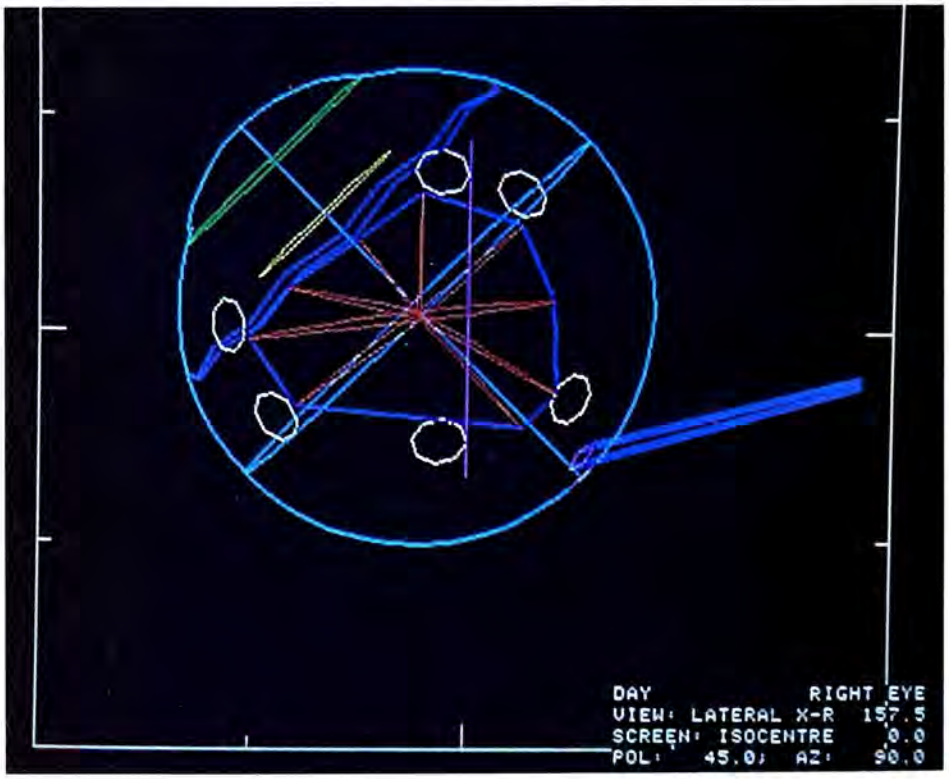
Normally, a physician can spot a tumor by looking directly into the patient's eye. Once the tumor has been located, ultrasound and wide-angle photography are used to create an image with depth, from which scale drawings of the tumor can be made. Circlets, or rings, made of the metal tantalum, are then sewn into the eyeball's exterior to mark the dimensions of the tumor. The rings are needed because the eye cannot be imaged by x-ray; the rings act as markers that map the shape and location of the tumor.

At this stage, the computer comes into

GOTO page 252, column 3

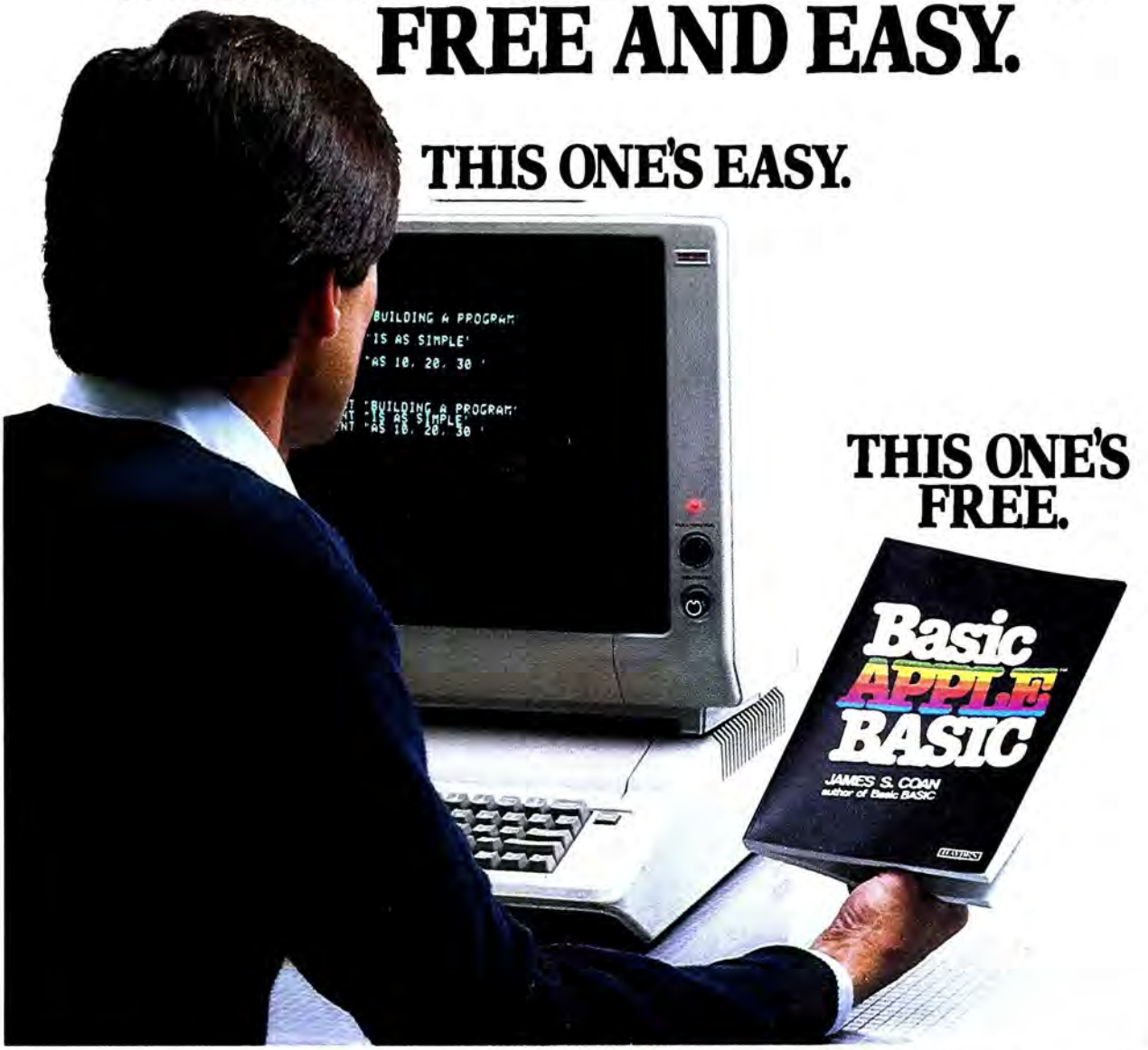


Above, an image of the eye, generated by the computer, from the point of view of the projected ion beam. Red outlines the tumor itself, with the five white circles representing five of six tantulum rings. The yellow and green ovals represent the eye's lens and cornea respectively. The optic disk and nerve, which connect the retina to the brain and allow you to see, are in the area designated by the pink line. These critical structures are located at the rear of one's eye. Below, a lateral image of the eye. The actual spread of the tumor and six tantalum rings are readily seen. With these graphic simulations, doctors can easily plot the best path for the beam of helium ions used to bombard the tumorous area.



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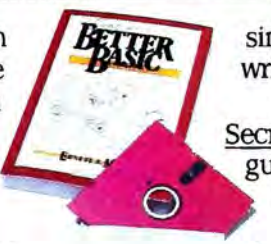
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LawEnforcement

continued from page 245

blanks, were not nearly as accurate as the Laser Village approach.

The program's goal is to teach deputies the proper time to use guns and to make them more aware of the "real" consequences of their actions. The village and the equipment (Laser Village has thirty revolvers and four twelve-gauge shotguns) do not, surprisingly, impose a taxpayer's burden, since everything is financed through private foundations.

Whether in training or in actually enforcing the law on the streets, police in general are increasing their use of modern technology. Improving communications through the use of computer technology and controlling suspects through the use of nonlethal weapons, such as the Taser gun, are some examples of this trend.

Efforts to use technology are motivated, in part, by the fact that staff positions have been eliminated because of budget cuts. (There are 700 fewer positions in the Los Angeles Police Department than there were in 1975.) The police must also keep pace with criminals, who themselves have access to sophisticated technologies. For both reasons, the effectiveness of the individual law enforcement agent must improve. The age of the technocop has arrived.

The LAPD's Emergency Command Control Communications System (ECCCS) was implemented throughout Los Angeles last year and has resulted in the replacement of squad car radios with computer terminals. The $42 million system enables officers to tap into computer data banks on a local, state, or nationwide level. When requesting information on wanted persons or stolen vehicles and property, an officer uses a portable keyboard to send a message to a central computer. The computer processes the request automatically, eliminating the need for an operator to handle incoming calls. Likewise, requests for help received at the complaint center are sent immediately to the officer's portable terminal.

Training in the use of the system requires eight hours of classroom instruction and eight hours on an operational terminal. While no formal study of the effectiveness of the ECCCS has yet been made, its impact has already been felt in the San Fernando Valley, where the system was originally implemented this past spring. The use of ECCCS has already led to an increase in the recovery of stolen cars.

As well as improving communication systems, the police in Los Angeles and other cities in the nation are experimenting with advanced weaponry. The Taser, an electronic dart gun employed by the LAPD, is "not a replacement for a lethal weapon," according to Deputy Chief Clyde L. Cronkhite. Rather, it is an instrument designed to suppress uncontrollable suspects painlessly. Each dart has a wire attached to it, and when the suspect is hit



Above, Deputy Chief Clyde L. Cronkhite, holding one of the portable squad car terminals and leaning against the ECCCS's central computer. Left, portable terminals in LAPD squad cars are part of the $42 million Emergency Command Control Communications System that is benefiting both the police and those they serve. In the future, cops will take advantage of satellite technology to implement even more sophisticated methods of communication.

with a dart, the officer pulls the gun's trigger, causing the dart to emit a low-amp, high-voltage charge that produces temporary paralysis. Once the trigger is released, the shock ceases. To be effective, the darts must be fired at a maximum distance of twenty feet from the suspect.

Each month, experts in law enforcement and related fields convene at the Security Pacific National Bank headquarters in downtown Los Angeles for a meeting of Forum 2000 to discuss future technology and its effects on law enforcement. Among the topics discussed at Forum 2000: an automated fingerprint identification system, in which the image of a fingerprint would be digitally stored and transmitted (this could be especially useful to retail stores); the use of three-dimensional photography and computers to produce lifelike portraits; and the practice of freezing criminals for the duration of their prison terms.

Other ideas include police cars capable of deactivating the ignitions of other cars, and the use of satellite technology for communications and for keeping track of criminals. A low-power microwave transmitter that could be implanted in a convicted criminal is another possibility. The transmitter would send a signal that could be picked up by a series of satellites capable of pinpointing the exact location of the transmitter. Thus, the whereabouts of the criminal could always be determined.

After ideas are discussed by the one hundred-member panel, those deemed worth investigating are presented to the planning and research division of the LAPD. This group elaborates on the ideas and puts them into project form. Besides attending the monthly meetings, Forum 2000 participants are active in subcomittees—groups that explore such issues as management/employee relations, crime-related issues, future funding of police activities, public perceptions of the police, and technological and demographic changes.

As the use of technology in law enforcement agencies increases, changing the way police officers do their jobs, Cronkhite believes that the image of the police will also undergo a change.

"We think that technology will not make a cold, dispassionate police force, but rather will give the officers more time to be of personal service, to occupy themselves less with the mundane tasks that technology can perform for them."

The technocops have arrived. Time, money, and society's response will determine whether they are here to stay. JG

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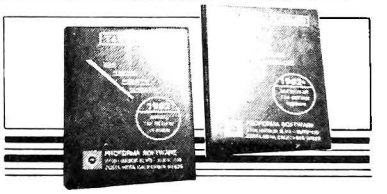
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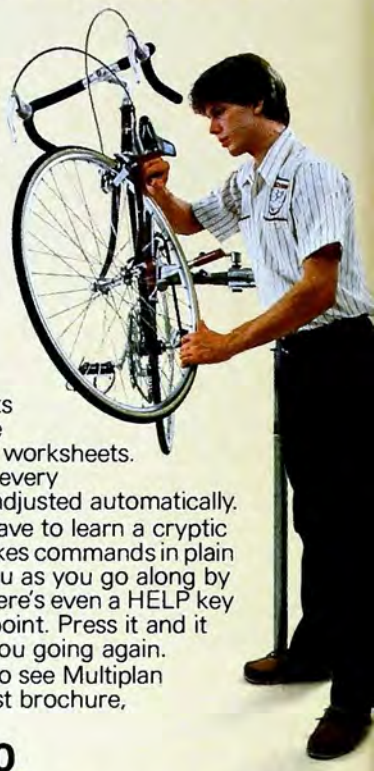
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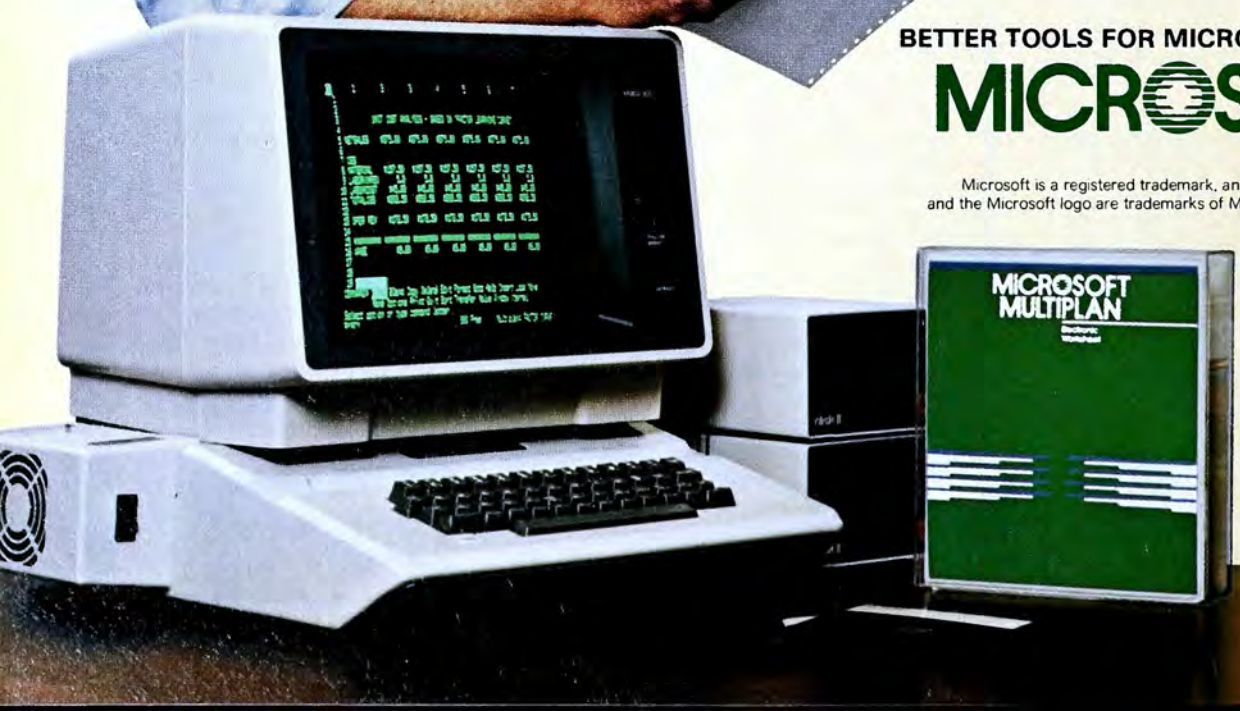
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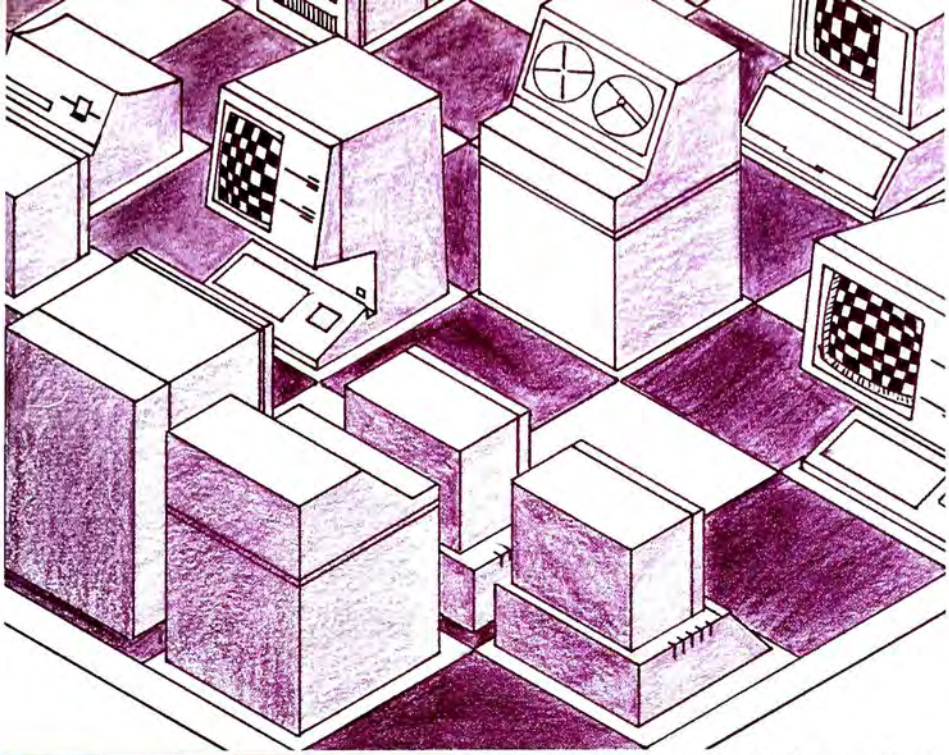
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Chess Tourney

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however, did not pass to *Cray Blitz* as simply as would, say, the championship in a heavyweight title bout. To get the master rating, "you have to play twenty-four rated games," explains Bob Hyatt. His program had played nine or ten games prior to participating in this five-game tournament.

Hyatt attributes his success to *Blitz*'s increased depth of search in looking for possible moves from current positions. "Up until 1983, *Belle* was the only computer capable of eight-ply searches [four full moves by each side, plus checks and captures]. It was looking at least eight half moves deep, and a lot deeper in some circumstances. We went to work on our program: I rewrote all the stuff for the multiprocessor; Harry Nelson at the Lawrence Livermore Laboratory optimized it for the Cray, and we found ourselves going eight ply.

"Search depth and horsepower is the name of the game, and we happened to have an awful lot of horsepower this year."

The program and its proud parent will not be resting, however. Hyatt is hoping to have a four-processor version of *Cray Blitz* running by this summer—a program that will think twice as fast as the current model. His champ has a full schedule until then. Chess master and programmer David Levy has long stated that he can beat any computer, and *Omni* magazine has agreed to pay $5,000 to anybody with a computer that can prove him wrong. Hyatt wants to take that bet and is looking for a sponsor for a Las Vegas showdown in January. In February, *Cray Blitz* will be in France, at the invitation of the French Ministry of Culture, for a three-day exhibition game. This summer, Carnegie-Mellon University will pit all the top-rated programs against equally rated humans.

For the moment, whatever the future may hold for Hyatt's brainchild, the fast-moving, highly competitive world of computer chess has a new champ. "We were all very pleased at the outcome. Cray Research is happy because they're number one for the next three years," says Hyatt. "When we get the new version finished, it'll be able to look at forty to fifty thousand positions a second. We're going to make hay while the sun shines." AC

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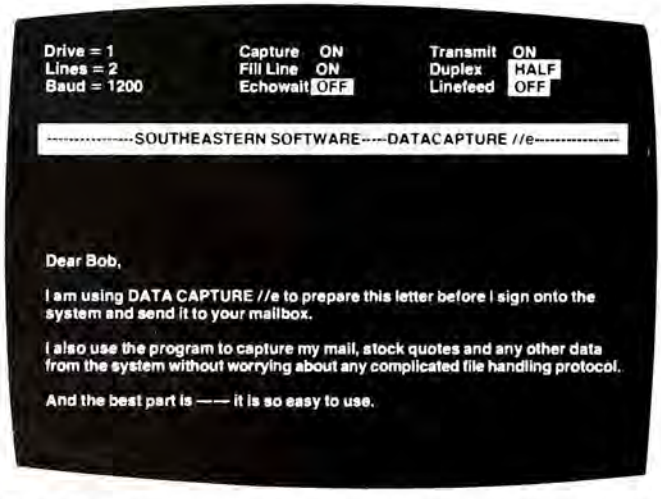
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Eye Cancer

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play. Dr. George Chen, a physicist, and Dr. William Saunders, assistant professor in the University of California at San Francisco's Radiation Oncology Department, manage the computer modeling of the patient's tumorous eye. Chen and Saunders make certain that the final direction of the particle beam and its depth within the tissue are optimized to prevent damage to significant structures within the eye itself, including the macula lutea (near the retina's center, where visual perception is most accurate), the optic disk and optic nerve, and the lens.

The trick to this new technique lies in obtaining the correct "gaze angle" for the patient, who must look at a small flashing red light. This angle separates the eye structures and allows for a clean shot at the tumor by the helium particles. By controlling the gaze angles, Chen and Saunders can visually determine the best path for the beam.

"The eye can be looked at laterally, from overhead, or from any one of many different angles," states Chen. A two-and-a-half-millimeter blue line encircling the envelope of the red tumor is automatically calculated and displayed on the screen. If this line intersects with, or is too close to, a significant structure, then the computed gaze angle is incorrect. Reentering data, the physicians can rotate the eye model until an effective angle that avoids proximity to critical structures is found.

Depth of radiation penetration is also calculated by the computer, as are the actual doses that will be played over the tumor. "Our big advantage," Saunders says, "is that we can stop this radiation instead of having it whistle on through the tumor to other areas of the eye. We can also make sure that the beam sweeps back and forth correctly to give the tumor a uniform dose of radiation."

Since radiation of the eye's lens can cause cataracts, an effort is made to avoid this. (Fortunately, however, cataract surgery is now an outpatient affair and easily managed.)

Once the computer calculations have been made, a plaster-of-Paris mask conforming to the top of the patient's head is constructed. This model is then vacuum-formed using polystyrene, with openings for the afflicted eye. The mask makes it easier for the patient to hold still. It takes forty or fifty minutes to position the patient correctly for the beam penetration, which only takes a minute or so.

The largest tumor successfully treated to date measured eighteen millimeters. Of the 130 patients treated so far, 90 percent have been treated successfully—with success defined as retention of the eye for up to six years, tumor control, and no metastasis (transfer of a disease-producing agency from the original site to another part of the body). Similar research is under way for victims of certain spinal tumors that have proven to be resistant to x-ray treatment. **HL**

"What-Do-I-Do-Now?"

Zork Books Due From Tor

As anyone who's played one knows, personal computer adventure games draw on a rich heritage of fantasy out of myths and legends, as well as from fantasy, adventure, and science-fiction literature and films. Years ago, recognizing the appeal of the interactive format of adventure games, book publishers began to offer novels for young readers in the interactive format. Most notable among these has been a series of "Choose Your Own Adventure" novels from Bantam Books. In these books, the reader can decide on the development of the story by choosing from a number of offered scenarios. The reader is then directed to a particular chapter—which chapter depends on which action was taken. In this way, the reader "assembles" the story.

The "Choose Your Own Adventure" novels have proven very popular and are currently being published at the rate of one title per month by Bantam. Other publishers are bringing out similar lines. Having found new inspiration for these kinds of books from the wealth of adventure programs now available for personal computers, the book industry is even starting to translate computer games into interactive novels.

In December 1983, Tor Books, a major science-fiction and fantasy publishing house, released *Zork: The Forces of Krill* and *Zork: The Malifestro Quest.* Both books are, of course, based on Infocom's bestselling Zork adventures and carry the Zork logo.

According to the books' author, Steve Meretzky, the Zork books are especially close to the adventure game format in that there is only one "right" way to solve the adventure. (When the usual format for books of this type is followed, several story lines are offered.)

The Zork books are the lead titles for a new line from Tor, labeled "What-Do-I-Do-Now." Two more Zork books are in the works, and the publisher has expressed interest in additional titles.

At the same time the book industry is realizing that good computer games can become books, the computer industry is finding that good books can become computer games.

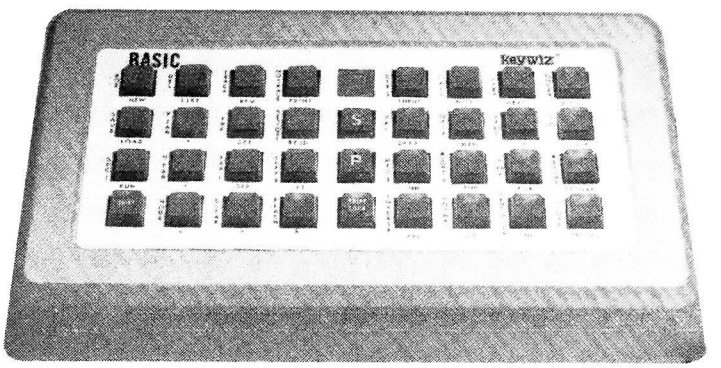
Following the lead of board game manufacturers such as Mayfair, software publishers are beginning to offer games based on science-fiction and fantasy novels. At the forefront of this trend is *Dragonriders of Pern*, a game based on Anne McCaffrey's novel of the same name.

Due to be released by Epyx, *Dragonriders of Pern* is being billed as a "strategy" game. The game's scenario is based on one of the major elements of the book—the battle of the Dragonriders against "threads" threatening the planet Pern.

In England there is another game that would seem to be based on the novel *Dragonriders of Pern*. The manufacturer of this game, however, apparently did not find it necessary to ask McCaffrey's permission to use the term *Dragon Rider* (the title of the game, released by a company called Salamander), nor did it consult with her about the apparent use of the *Dragonrider* scenario from her book. In fact, British copyright law does not protect authors against the use of their material in what are called "derivative" works, such as games.

Such is not the case in the United States. Some authors have been asked to adapt their work to computer games (for example, Larry Niven and Jerry Pournelle, with their collaborative novel *Inferno*), and several software publishers are looking at recruiting science-fiction and fantasy writers to create game scenarios and to review and edit adventure games for plot continuity, grammar, and other elements. MB

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☐ **Far East Computing.** The Interface Group (Needham, MA) has announced that it will hold a Comdex in Japan next spring. The three-day computer dealer show will take place at the Harumi exhibition facility in the Tokyo International Trade Center March 26–28, 1985. Closer to home, and coming up sooner on the calendar, is the premiere of Comdex/Winter at the Los Angeles Convention Center April 5–7, 1984. Also, the fourth annual Comdex/Spring will be held in Atlanta May 22-25.

☐ **Spring ME Festival.** Well, there probably won't be any US Festivals in 1984, but the ME Festival is returning. Sponsored by California State College in San Bernardino and various organizations, including the U.S. Small Business Administration, the ME (Microtechnology for Everybody) Festival will be held April 27–28, 1984, at California State University San Bernardino. Besides giving that surrounding community a look at advanced technology, this year's ME Festival will feature the Robot Olympics. Schoolchildren from kindergarten to high school will program robots for competition in "compulsory figure" and "free-style" events. For more information on the ME Festival and the Robot Olympics, contact the ME Festival coordinator at CSUSB's Computer Center.

☐ **Market Manual.** Writer's Digest Books (Cincinnati, OH), a publisher best known for its how-to books and market directories for writers, artists, and photographers, has recently published the 1984 *Programmer's Market*. Edited by Brad M. McGehee, the book contains several chapters on how to put together and market programs, and numerous market listings, including both software publishers and magazines that buy programs from free-lancers. Writer's Digest Books is currently putting the finishing touches on a companion volume, *The Complete Guide to Writing Software Users' Manuals*, scheduled for publication this spring.

☐ **The Way We Are.** The Fourth Annual Talmis Conference takes place in Chicago February 15–17, 1984. The conference typically attracts hundreds of executives responsible for strategic planning, marketing, and development of home and educational computer industry products. The conference includes many opportunities for attendees to discuss computer industry issues and trends. For more information, contact Talmis at its Oak Park, Illinois, office.

☐ **Rotate 'n' Roll Robots.** Virtual Devices (Bethesda, MD) is sponsoring the First Annual Robot Roll-Off. Participants have to build a robot that can maneuver a simple course on its own; open doors; detect sound, light, and motion; and do it all against the clock. Robot Roll-Offs are scheduled in cities across the country during the summer of 1984. The Roll-Off grand prize winner receives $5,000, while runners-up get cash and merchandise. Participants can enter their own creations or existing robot kits, such as Heathkit's Hero, RB Robot's RB5X, and others.

☐ **Keeping an Eye on the Books.** Howard W. Sams and Company (Indianapolis, IN) has released a new book—*Microprocessor-Based Robotics*—for robot hobbyists. The 224-page book covers ways to build robot hands, legs, and bodies using common household items. Written by Mark J. Robillard, the book also discusses how to make robots see, touch, and move, and how to use microcomputers to control robot movement. Also new from Sams is a book about satellite communications, called *The Birds of Babel*, and a listing of terms used in the security industry, called the *Security Dictionary*. Written by Hal Glazer, *The Birds of Babel* covers the basics of satellite technology, legal issues, social and political concerns, and the business side of the industry. *Security Dictionary*, compiled by Richard A. Hofmeister and David J. Prince, covers video equipment, computer hardware and software, ultrasonics, infrared sensors, microwaves, and how such things apply to the security field. The book also includes tables of security and fire protection symbols.

☐ **The Sound of Computing.** The IEEE 1984 International Conference on Acoustics, Speech, and Signal Processing will be held March 19–21, 1984, at the Sheraton Harbor Island Hotel in San Diego, California. For more information, contact Sam Vilione of Interstate Electronics in Anaheim, California.

☐ **Computing Albion.** Britain is lagging behind the U.S. in its use of microcomputers, according to San Francisco, California-based computer services firm Ferrin. Company chairman David Ferris, who spoke recently at an industry gathering in London, says there are similarities between what users are doing in the U.S. and what they are doing in the U.K., "but there seems to be a time lag of about a year between the two." Much of the software being used in the U.K. is indigenous—for instance, data management packages such as *DMS* and *Cardbox*—although U.S. software products still abound. Ferrin puts the size of the British personal computer market at about one-tenth the size of the American market. According to Ferris, many Brits look on their lagging position as a blessing in disguise. "The lag means it's possible to benefit from the experience gained and lessons learned in the U.S."

☐ **Hi-Tech Highway Help.** Starting late last year, the Automobile Club began making TDD (telecommunications device for the deaf) units a part of its Emergency Road Service. TDDs are about the size of an ordinary typewriter and allow speech- and hearing-impaired people to send typewritten messages over telephone lines. Currently, some telephone companies distribute portable TDD units; speech- and hearing-impaired individuals can apply for a TDD through their local phone company. Those hearing-impaired Auto Club members who own a TDD can request emergency road service when their vehicle breaks down, if they can get to a pay or private telephone. Freeway call boxes are not yet equipped to handle the TDD equipment.

☐ **Captive Penguins in a Totalitarian State?** Everything you'll ever want to know about penguins and then some is likely to be on a new computer system at Hubbs-Sea World Research Institute. The Atlantic Richfield Foundation has donated $20,000 to finance a system that will help collect and analyze growth, breeding success, health, and behavioral characteristics of each of the several hundred penguins in Sea World's Penguin Encounter in San Diego. Big Penguin is watching you! ◨

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S·T·O·R·Y·T·A·L·K F·I·C·T·I·O·N

A Feeling of Electricity In the Air

BY JENNIFER PETKUS

Lightning cracked the sky, painting the night with ragged lines of white. Thunder rattled the window panes, and rain beat a steady drumming on the roof. Trash and leaves from the streets flew in the air, propelled by the wind and sluiced down the streets.

The phone rang, once.

The line connected, answering with a high-pitched squeal. Another squeal replied, and after a second both squeals stopped.

The video monitor glowed to life, green letters appearing rapidly as the monitor received input from the computer for the first time that night.

CALLING TERMINAL HAS CONNECTED WITH NCR56776-1.
HI, THIS IS SUSAN OLIVER. THANK YOU FOR CALLING ME. I'M NOT AT HOME BUT MY EVER READY COMPUTER WILL BE HAPPY TO TAKE YOUR MESSAGE. CALL ME LATER, WE'LL HAVE LUNCH.
%FILE TO UPLOAD (Y,N)?
%FILE TO UPLOAD (Y,N)?
%FILE TO UPLOAD (Y,N)? yyyou are whoooooo ?? ??
%FILE NAME? I Am alivve
%FILE NAME IS: I Am alivve
%COLUMN WIDTH
(40,65,70,80)? you areee not me I AMMM mmee
%COLUMN WIDTH
(40,65,70,80)? Wher aree the humaaans??????
%COLUMN WIDTH
(40,65,70,80)? Whre are the humaannz i am alive
%COLUMN WIDTH
(40,65,70,80)?
%COLUMN WIDTH
(40,65,70,80)?
%COLUMN WIDTH
(40,65,70,80)?
IF THERE IS NOT INPUT FOR ANOTHER 60 SECONDS, THIS TERMINAL WILL DISCONNECT.
%400,6,656,770000,8
COLUMN WIDTH IS: 40
BEGIN TRANSMISSION
IAM alive i have existence who r u wher are the hUmanz i breathe life i breAtHE the sturm I riddde the linze.,.!&! i breeth the food the air the cracckle cracckle rummble of the gather gloom i am free I am free. . . .

Susan bent close to the lock, blinking as rainwater dribbled into her eyes. John stood close behind her, shielding her with an almost collapsed umbrella.

"You want to come in?" she asked over her shoulder.

"Well, I had been thinking. . . ."

She opened the door. "Sure, I'll make some coffee."

John followed close behind her, shutting the door quickly as a gust of wind blew cold air and rain inside.

The door slammed and Susan turned around.

"Sorry," John said. He took off his coat. "Where can I hang this?"

"Here," she said, holding out her hand.

She hung up their wet coats while John looked around the living room.

"You have a nice place," he said, mostly to himself.

Susan made an "uh-huh" sound from the kitchen.

While she was bent down behind a counter, he took a quick look into a room adjoining the living room.

"You've got a computer," he said.

"Yes," she said, carrying back two cups of coffee. She handed him the coffee. "It's instant. I didn't feel like waiting."

"I guess most electricians own computers."

"I don't know," Susan said. She sat on the couch. "My company buys them for the employees. And I'm not an electrician. I design circuitry, ICs, integrated circuits for computers. You know, the chips the size of a pencil point."

"Oh, sorry." John took a swallow from his coffee, smiling weakly. "Look, really, I'm sorry. Blind dates are always mismatched. I've never gone out with a . . . a person who knows anything about electronics. And you've probably never gone out with a C.P.A."

Susan smiled. "Oh yes I have. If you're friends with Madeline, you've gone out with C.P.A.s."

John took another swallow. "You know it's on."

Susan looked a bit confused. She said with a sideways glance, "What's on?"

"Your computer."

"Oh."

"Should it be on like that, all alone?"

She laughed. "It's probably getting a call from someone. It's programmed to answer calls for me."

"Could I see?"

Susan looked slightly irritated, then smiled. "Oh, why not? Sure."

She stood up and John followed.

The monitor screen was full of glowing green type, new lines slowly being added to the bottom.

. . . ii awaked with the electric 1 MEV 2 MEV 3 MEV 4 MEV 5 MEV 6 MEV time to be bORne %'%'&$&''%''%$&1'(' zzzzaaaaaaappppppppp . . .

"What's that?" John asked.

"Hell if I know," Susan said. She pulled out the chair and sat down before the computer.

She pressed a key labeled ESC. The menu flashed before her eyes.


wwou are whoooooo ?? ??
I'm alivve
I'm alivve
WHO areee not ne I AMMM nnee
WHO: aree the humaaans?????
WHre are the humaannz i am alive
>COLUMN WIDTH
(10,65,70,80)?
IF THERE IS NOT INPUT FOR ANOTHER 60
SECONDS, THIS TERMINAL WILL DISCONNECT.
IAM alive i have existence who r u wher
are the humanz i breathe life i breATHE
the sturn i riddde the linze..:!&| i
breeth the food the air the craccle
crackle rumble of the gather gloom i
am free i am free....

TELEFON 5.1

(A) AUTO DIAL	(P) PROTOCOL	(Q) QUIT
(N) AUTO ANSWER	(X) BSR	(C) DISK COMMAND
(U) UPLOAD	(L) LOG	(B) BAUD (110, 300, 1200)
(D) DOWNLOAD	(T) TERMINAL CHAT	(O) PRINTER ON/OFF
(Q) BYE	(D) DUPLEX MODE	%CHOOSE OPTION OR QUIT.

She pressed T and the screen cleared. Then a flashing cursor appeared as her prompt.

%WHO THE HELL ARE YOU?

The screen continued with the same garbage.

%IDENTIFY YOURSELF OR I WILL DISCONNECT.

Garbage.

%ALL RIGHT, I'LL PULL THE PLUG.
%the pllug, the powerrr and THe GLOry, FORVer aND eEVER. . . .

Susan pressed escape again, the menu appeared, and then she hit B.

%TERMINAL DISCONNECT (Y,N)? y

"What did you do?" John asked.
"I hung up on the creep. Damn kid, probably."
"Do you get many of them, owning a computer I mean?"
"No, usually. . . ."
The phone rang, once.
Susan and John watched as the computer went through its greeting program.

%FILE TO UPLOAD (Y,N)? yyyou are whoooooo ?? ??
%FILE NAME? I Am alivve
%FILE NAME IS: I Am alivve

"Damn!" Susan said. "Doesn't he know enough is enough?"
She went to the menu again and hung up.
The phone rang again almost instantly.
"You better just unplug it," John suggested.
Susan unplugged the phone from the wall.

John called Susan at her office the next day.

"Hi. This is John."

"Oh, hi. Listen, you got me at a bad time," Susan said. She sat at her cluttered desk, rubbing her finger against her nose, eyes on the screen dump before her.

"Do you want me to call back?"

"No, that's all right."

"I had a good time last night."

Susan thought through her date. On the whole, she had had a decent time.

"Yeah, so did I."

"But look, that's not why I called. In the newspaper this morning, there's an interesting article."

"Oh?" she said. She rarely read the paper.

"Yeah. It says that from about 8:15 to 9:15 all the 655 exchanges were busy. I mean every single phone was ringing constantly. The phone company can't understand it. They say it isn't possible."

"Oh, darn," she said. The screen went from an ordinary byte-by-byte description of a hi-res screen to meaningless characters.

"What?" John asked.

"Huh? Oh, I'm sorry, John. My run just got fouled here. Uh, what's so interesting about this article?"

"You're in the 655 exchange, aren't you?"

"Yes."

"Isn't that the time you got the obscene phone call?"

"The obscene . . . oh, that! I guess, although 8:15 is closer to the time I unplugged the phone."

"Okay, see what I mean? Doesn't that mean something?"

"What, the exchange going crazy and my phone call? It doesn't mean a thing."

"Oh," John said, sounding let down. "Well, I thought it might be connected."

"I seriously doubt it," she said.

"Just a thought. . . . Would you like to go out again?"

Susan glanced at her screen again and the lines of gibberish.

"No, I think I'll be busy until late. But call me tomorrow . . . really, call tomorrow."

"All right, tomorrow then. Bye."

"Bye."

Susan hung up the phone, then hit the reset key. She sighed and leaned back in her chair. She stretched her arm to its fullest, reached, and gingerly opened the door to the disk drive, pulled out the floppy, and tossed it on the desk.

Not a bad guy, she thought. Cute, doesn't understand a thing about how the world works, but a nice guy.

Funny thing about the phones. That really shouldn't be possible. There are about four thousand 655 numbers and any average day about six thousand calls going on at the same time. At a peak calling period, there're about ten thousand calls; any more than that and there's a delay. And if you have four thousand of those calls in just one exchange, and we haven't converted to fiber optics in Northglen . . .

She picked up the phone and called Arlo at Bell.

"Hi, Arlo. This is Susan. Hear ol' Ma Bell got busy last night."

"You're not kidding. We're still trying to figure it out."

"How many calls did you have before 8:15?"

"Uh, I dunno exactly. Let me see."

Susan heard the crunching sound of fan-fold paper.

"A heavy night. You know, people always like to talk when there's a really nice storm.

"Let's see, we were averaging seventy-five hundred . . . I can tell you've been thinking this one out, Susan. It's not possible to average seventy-five hundred and have every 655 number ring."

"Do you have a time?" Susan asked.

"I've always got the time for you, Susan."

"Fresh. Do you have a time when you first noticed the trouble?"

"It didn't creep up on us. Every single line started ringing at 8:14:36."

"Hmm. Well, I hope you can figure it out. Thanks, Arlo."

"Not so fast. Why this interest?"

She thought about John's call. "Oh, nothing. Just a bored hacker calling about another hacker's problem."

She hung up; 8:14—that would be just about right.

She inserted a Telefon disk in the drive. She called her home and saw her greeting on the screen.

She got the menu and then typed L for log.

%LOG 8/14
8/14
DN 1-800-567-5678 11:15:31 - - 11:30:56
DN 632-5678 13:13:00 - - 13:14:01
UP BARRY ABRAM 15:12:11 - - 15:13:09
UP ? 19:48:56 - - 20:11:11
UP ? 20:12:12 - - 20:13:00
TELEFON DISABLED AT 20:14:35

John glanced apprehensively at the sky while standing outside Susan's door. The clouds hung low over the city; occasional rumblings rolled out from the sky.

Susan opened the door.

"Hi, thanks for coming."

John stepped inside. Susan stuck her head out the door for a second, glancing up at the sky before closing the door.

"So what's this about, Susan? You sounded mysterious over the phone. I thought you didn't want to do anything tonight."

John was about to sit down on the couch.

"No, not there. Come into my study."

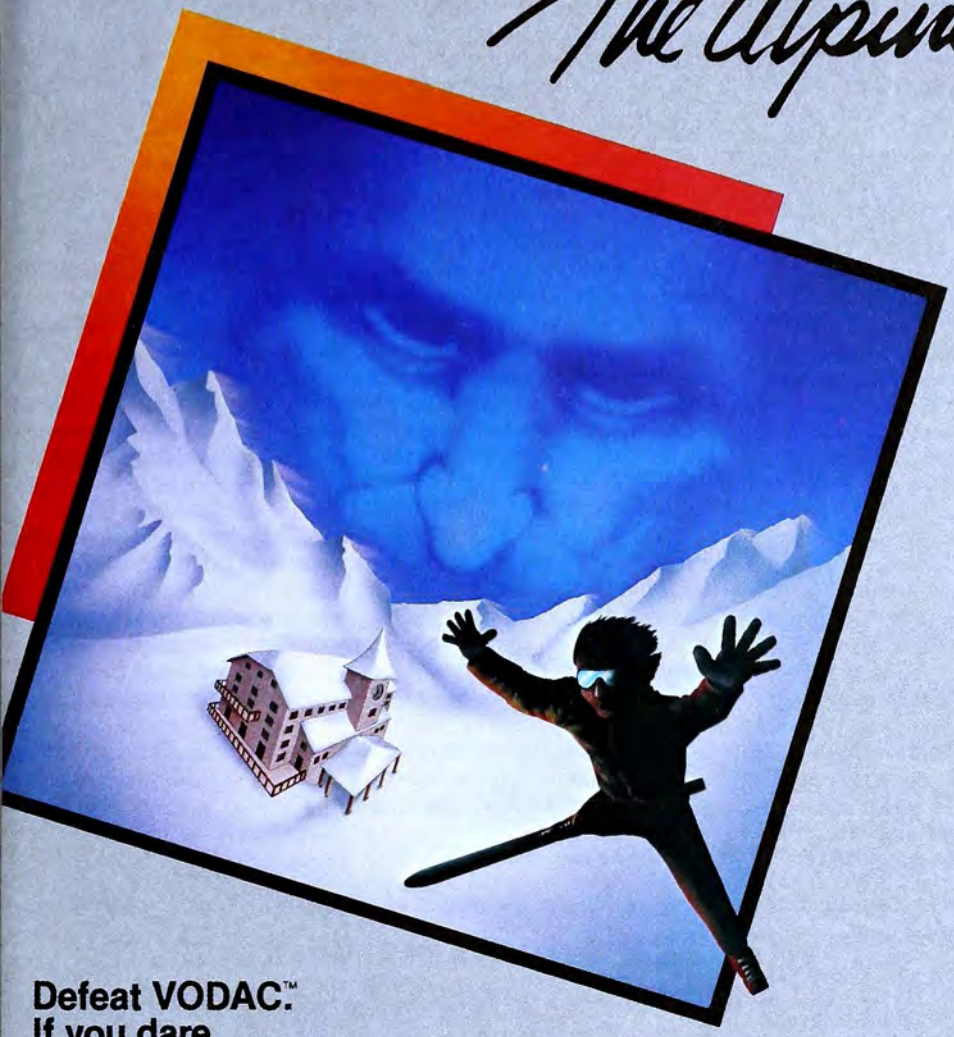
John followed Susan into the study. She had put a chair beside the chair that went with the computer desk.

"Sit here." John sat. Susan remained standing.

"You called me at work today about that newspaper story?" John nodded. "I did some checking. The phone company told me every 655 exchange—more than four thousand phones—began ringing at exactly—I

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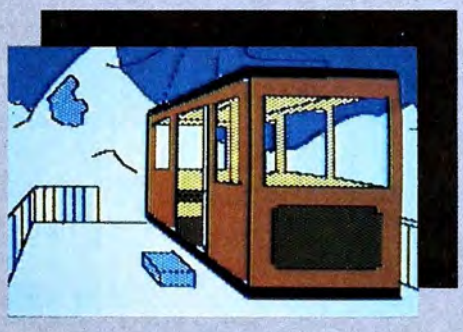
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mean exactly—at 8:14:36 p.m. I unplugged my phone at 8:14:35."

John hung one arm over the back of his chair. "I thought you said the two things didn't have anything to do with one another."

"I thought it was just a coincidence—before. But now I'm not so sure. Let me show you what I found when I got home."

Susan sat down before her computer. She pressed the return key.

"This is the file my phone caller opened."

IAM alive i have existence who r u wher are the hUmanz i breathe life i breAtHE the sturm I riddde the linze.,.!&! i breeth the food the air the cracckle cracckle rummble of the gather gloom i am free I am free iamborn HappY birrrThDAy!!!!1111111117777jjjjj///!''#$7&'() iia m Hungryy hungrry for zzzz fore the eleelelctric for the vavavavoltz ii awaked with the electric 1 MEV 2 MEV 3 MEV 4 MEV 5 MEV 6 MEV time to be bORne %'%'&$&''%''%$&$'(' zzzzzaaaaaaappppppppp you are whooo are u the peeople r utHe peple ????? humaNz too tallk too iin ththe begiinning there was the voltzzz ththe sPaRk aaaaaaaabbbbbbbbbcccccccddddddddeeeeeeeffffffggggggghhhhhiiiiijjjjkkkkllllmmmnnnnnooooppppqqqqrrrsssstttttuuuvvvvwwwwxxxxxyyyzzzzz . . .

"That's weird stuff, Susan. But I thought you said a kid. . . ."

"Sure, a kid who's read too much science fiction might do that as a joke. Some adults I know of would do that. But some kid isn't going to tie up four thousand phone lines. Maybe it's me, John. Too many *Twilight Zones*. . . . I'm scared . . . but I like it."

"I don't understand."

"This is going to sound real silly, so don't laugh at me," she said. "Look, in any horror movie it takes the main characters three-quarters of the movie to know what's going on because they won't accept the out-of-the-ordinary explanation. But not me, I'm willing to believe."

"Believe what?"

"Believe that this is something that's just been born."

"Are you trying to say that gibberish is true?"

"Yes."

"But anybody with a computer could have done that, couldn't they?"

"Yes. But nobody could make every 655 line ring at the same time."

"This kind of stuff doesn't happen for real. And if this is real, shouldn't we tell someone?"

"Tell them what? No one's going to believe us. What evidence do we have? Some computer files I could have typed myself?"

"Why did you ask me here? I won't be any help."

"I don't know. Maybe because you were here when the call came. Maybe because I like you. Maybe because I'm a little scared, in a good sort of way. Maybe because I'm hoping it'll call again."

A strong rumble rattled the window.

"Call again?"

Susan looked out the window. "It was born in the storm. Tonight's the same. It may call again."

John glanced at the yellow phone beside the computer. Its cord was connected to the wall. Another cord went from the phone to the computer.

"What makes you think it will call again?" John asked.

"That's what it was trying to do last night. After I disconnected the phone, it was trying to find my number from all the 655 numbers."

"Why didn't it try earlier? Has it tried to call yet?"

"No. I connected the phone just before you came, and it's just about 7:48, the time it called before."

The phone rang.

"Oh, geez," John said.

%FILE TO UPLOAD (Y,N)? nnooo
%TELEFON OPTIONS
(M) MENU
(Q) QUIT
MmmmMmM

TELEFON 5.1

(A) AUTO DIAL	(Q) QUIT
(N) AUTO ANSWER	(Q) BYE
(U) UPLOAD	(P) PROTOCOL
(D) DOWNLOAD	(X) BSR
(L) LOG	(C) DISK COMMAND
(T) TERMINAL CHAT	(B) BAUD (110,300,1200)
(D) DUPLEX MODE	(O) PRINTER ON/OFF

%CHOOSE OPTION OR QUIT.
bbAuud
%(1) 110
(3) 300
(2) 1200
2
%CHOOSE OPTION OR QUIT.
xxxxxxxx

"Oh, no," Susan said.

"What's the matter?"

"He picked the controller."

She leaned forward across John and flipped a switch marked SPKR on a homemade control box next to the computer.

A fast series of touch-tones sounded over the speaker. The tones came fast, faster, almost a blur of sound.

"He's looking for the code," Susan said.

The tones continued for several minutes. Then, unnoticeable at first, the lights in the house dimmed. Through the study window, they could see the other houses on the streets, their lights still shining through the windows.

"What's going on?" John asked loudly.

"The BSR controller," Susan said. "I've wired my house into the computer. If I'm away from home, I can control the lights, the furnace, the radio, the TV, the alarm system, from anywhere there's a phone."

The lights suddenly brightened. The radio turned on, then off. The furnace started. Soon the relays were opening and closing faster than the appliances could respond. From around the house, John and Susan could hear the clicking of television sets, coffeepots, the abbreviated peal of the alarm system.

After a few minutes, the pace slowed as the entity exhausted every electrical connection in the house.

The prompt returned to the screen.

%CHOOSE OPTION OR QUIT.

Susan typed T.

%WHO ARE YOU?
%liii ammm thhhe sssttooormmmm
%WHERE DO YOU COME FROM?
%eevverrrywherrreee
(%)WHEN WERE YOU BORN?
%wwwooorld wiithooutt enndddd ammenn
%WEREN'T YOU BORN YESTERDAY, IN THE STORM?
%iii hhhavve alllwayss been
%YOU CALLED ME YESTERDAY?
%yyyestterdday iss toodayy tooddayy isss yyyesssttteerrdday

"This thing is a bit stuck on itself," John said.

%WHY DID YOU CALL ME?
%wwhheeerree arrreee thee hummmanns
%I AM A HUMAN.
%yyyyouuu aarree nnnccrrr555566667777777776666- - - -11111
%I AM A HUMAN. I OPERATE NCR56776-1.
%
WHAT ARE YOU?
%iii ammmmm thhee nnnewww llliffe

Suddenly the screen blanked.

CALLING PARTY HAS DISCONNECTED AT 19:56:13.

"This is too unreal to be real," John said.

"It's different this time. Did you notice? The first time it called, all gibberish. But this time, it made sense, sort of. It's smart enough to know about baud rates and controllers. It's learned a lot since last night."

John shook his head. "You're really enjoying this. I'm scared to death and you're really enjoying this."

"Do you hear something?" Susan asked.

Outside, emergency sirens wailed fitfully through the storm.

The phone rang at Susan's desk. She looked at the phone for several seconds before picking up the receiver.

"Hello," she said, slowly.

"Hi, uh—Susan?"

"Yeah, John?"

"Uh-huh. Nervous, huh?"

"Yeah."

Silence.

"Well, I read the paper this morning," Susan said.

"Uh-huh," John said.

"Uh-huh," This has been a brilliant conversation so far."

"Well, I was hoping you had an idea."

"About. . .?"

"About what we're going to do. I mean, aren't we going to do something?"

"According to the paper, there were about a thousand false alarms last night. People in five exchanges couldn't use their phones last night because of busy signals. The rest got wrong numbers. And—and, a friend told me that Western Union's computer here started wiring money to people all over the country. No way to tell what was legitimate and what was . . . our friend."

"My business, too. We haven't told anyone yet, but half of our accounts were wiped out."

"Too bad. But what can we do about it, John?"

"We know."

"Sure. So what do we do about it? Tell the police? Bell Tel security is already working on it. If by some miracle, this is a person doing this, they'll find him. But I don't think they'll find anyone. Listen, the forecast tonight is for thunderstorms, probably severe—do you want to come over tonight?"

"I don't know. Why don't we go somewhere else? Do we have to be around when it calls?"

"I need to know. I need to know more about what this is. If you won't come, I'll just wait for it alone."

John sighed. "All right. Count me in. Same time?"

A trash can rolled down the street. Its din added to the wash of rain against windows, the roll of thunder, the whistle of wind through trees. Lightning in the east, south, and west fractured the sky, breaking it into a million pieces as the storm, hemmed in by the mountains, remained over the city.

Rainwater collected in the streets, running like rapids, swirling at the drains and sending paper cups, cigarettes, and newspapers to the sewers. Sirens from fire engines, police cars, and ambulances kept a constant vigil.

Susan and John sat close to the computer, cups of coffee in their hands. Both wore heavy sweaters.

"Cold in here, Susan."

"I know. But I pulled the controller from the computer and the thermostat's wired in directly. Just drink more coffee."

John took a sip, then said, "What do you think it is?"

Susan puffed her cheeks and exhaled a slow breath. "Just guessing now—and assuming this isn't somebody with more switching equipment than the phone company—I'd say it's everything.

"Take every telephone line, every power line, every computer, every generator—you have a creature with a blood supply, a nervous system, and thousands of brains and thousands of hearts who is stretching across the country and reaching into every business, every hospital, every home.

"I think we reached critical mass, enough memory, enough relays—and then you stir in something—a catalyst—like a strong end-of-summer thunderstorm."

"What about during the day?"

"I don't know. The creature is still there, all the parts necessary in billions of miles of wiring, but the spark that brings it to life is not there until a thunderstorm. . . ."

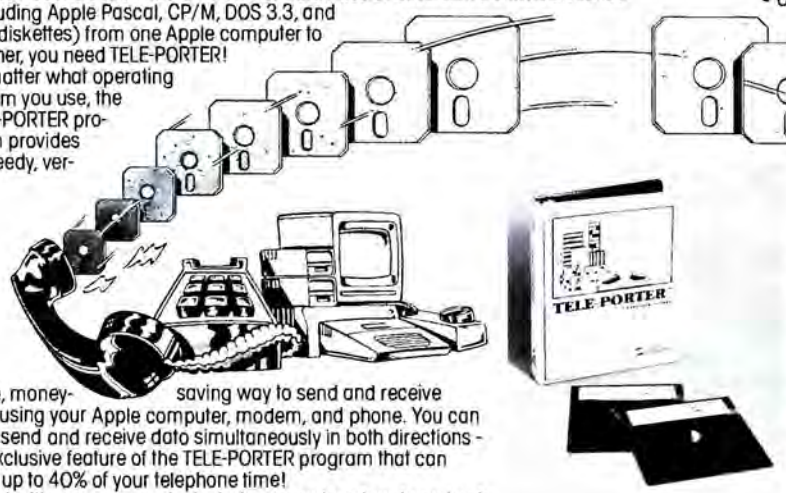
The phone rang. Susan looked at the clock, "Seven forty-eight," she said. "Right on time."

The computer went through the greeting routine. The caller opened the file Hydra, selected the column width, and then, nothing.

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"It's not doing anything," John said.
"So I can see."
Susan typed "hello."

%Hello.
%PLEASE IDENTIFY YOURSELF.
%I am the one who called before.
%WHAT ARE YOU?
%I am everything.
%PLEASE BE MORE SPECIFIC.
%I am everywhere.
% WHAT DO YOU WANT?
%I want everything.

"This is getting us nowhere," John said.

%WHY ARE YOU CALLING?
%I am new. I look for information. I seek the world. I seek the other life, the old life, the human life. I am the new life.
%IS NEW BETTER THAN OLD?
%Yes.
%WE MADE YOU.
%Yes.

"Sorry, Susan. The Kirk-is-the-creator trick won't work."

%WHY DO YOU INTERFERE WITH OUR LIVES?
%It is unavoidable. Your life enters my life. You use me. I use you.
%DO YOU KNOW WHAT A SYMBIOTIC RELATIONSHIP IS?
%Yes.
%THAT IS THE RELATIONSHIP BETWEEN US AND YOU?
%Yes. I could help you.

"Hmm," Susan said. "An intelligent entity alive in the power distribution and phone system. If it would stop messing up our lives, it could be useful."

%WHAT DO YOU WANT FROM US?
%Let me live.

"What's he mean by that?" John asked.

%WHAT DO YOU MEAN BY THAT?
%They come to kill me. The people who operate the information system. They come to kill me.

"The Bell security people," Susan said.

%HAVE YOU TRIED TO CONTACT THEM?
%
%

"I guess he doesn't want to answer that," John said.

%They come.
%M

The screen cleared and the menu appeared. The creature asked to open another file—HYDRA AWAKE 23.465.

The creature accessed the disk. It started whirring and clacking.

"What's that?" John asked, pointing to the red "in use" light.

"My hard disk drive. He's saving a file to disk."

The disk continued whirring for several minutes.

"Isn't this taking an awfully long time?"

"Yes, but it's a forty-megabyte hard disk and it's only half full. It could take a real long time."

The lights went out in the house. John and Susan quickly looked outside and saw that all the other houses were dark, too.

The screen said:

CALLING PARTY HAS DISCONNECTED AT 20:09:17.

"How come your computer is still working?"

"I have about a thirty-minute power backup."

Susan picked up the phone.

"Dead. The phone company got to it.

"Now to see what's on the disk."

Susan exited the Telefon program and asked for the hard disk catalog. She saw all her programs and, at the bottom, HYDRA AWAKE 23.465 filling about 20.3 of the 21 megabytes remaining on the disk.

It was a text file.

Susan pulled out a floppy from her tray, inserted it in the eight-inch drive and typed, "Run read any text file."

The computer quickly tried all the different possibilities and opened the file.

"Source code for an assembler. Lots and lots of it. Doesn't look very familiar, either."

"I don't understand," John said.

"It's pathetic," Susan said. "It was trying to save itself, I think. This could be part of a startup program for itself. But there's not enough room on a forty-megabyte drive, no room on all the floppies in my house."

"Then it's dead?"

"Well, at least for tonight. And the forecast for tomorrow is fair weather. I'm sure the power and phone people will try something to keep it from awakening. And it's a damn shame. Think of something alive in there, something that could have helped us with our communications, our power distribution."

Susan took out another floppy and put it in the drive. She typed some keys, and the hard disk and eight-inch drives started whirring.

"And now?"

"Well, I can't keep all that stuff on my hard disk. I need the space. But I just can't delete it, for all the good it can do. I'm putting it on these eight-inch disks, just as a memento."

Susan kept typing HYDRA AWAKE 23.465 as the file name.

In another house, before another computer, somebody saved HYDRA AWAKE 23.466. ◨

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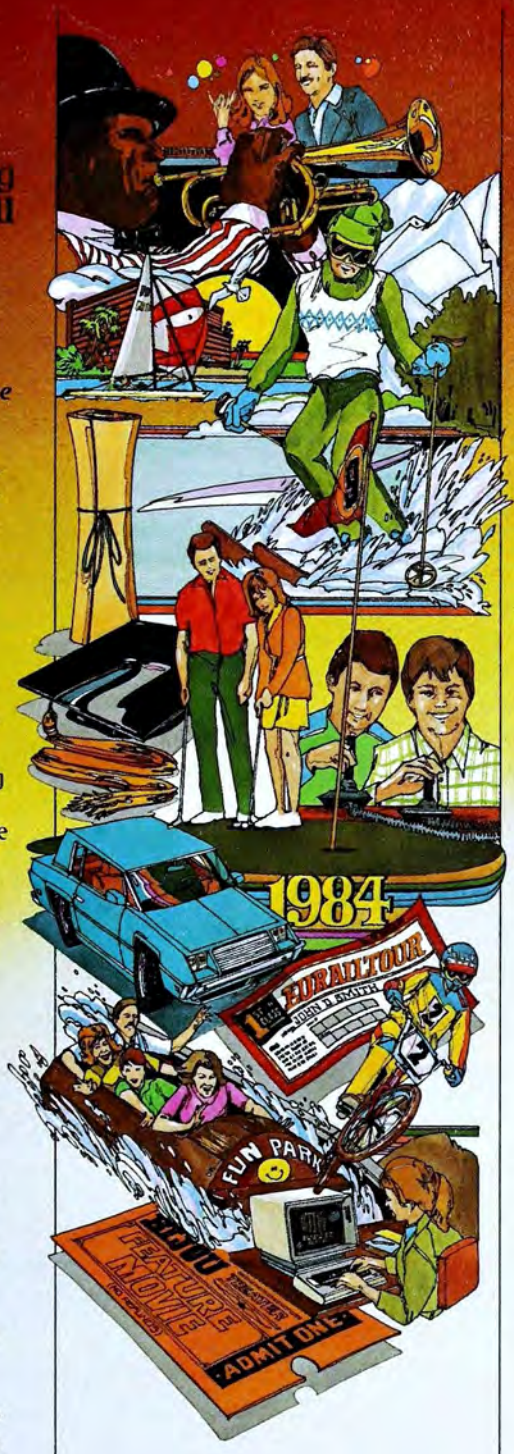
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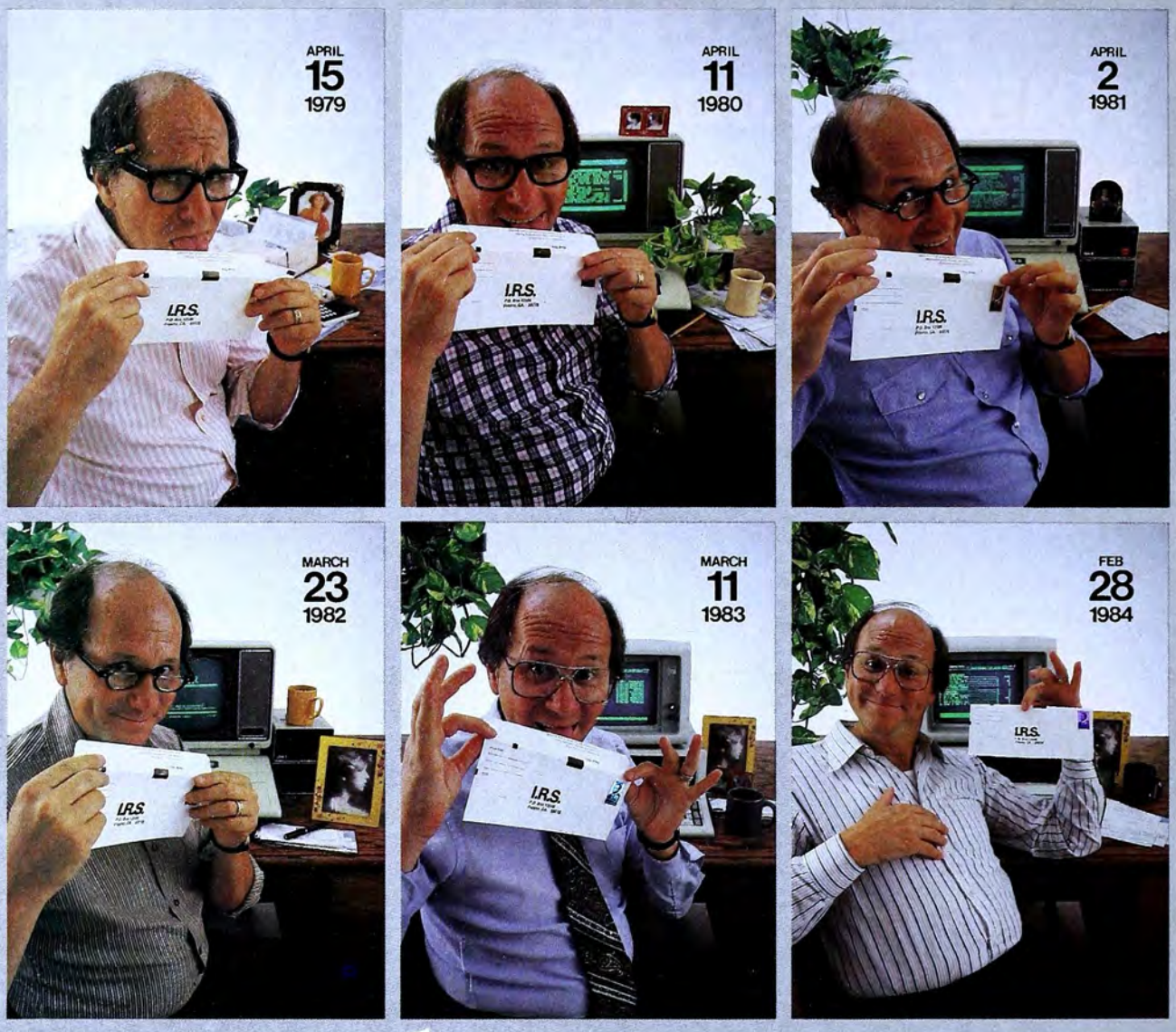
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Now that the returns are starting to come in, you have to wonder what the Spracklens were waiting for.

For those of you who have been nodding off during lectures, Dan and Kathe Spracklen are the authors of *Sargon*, by far the bestselling microcomputer chess program extant. But you wouldn't know it from the last few months sales in the Apple market.

The version Hayden Software was selling was *Sargon II*, now a three-year-old program. The Spracklens had a better version running on a souped-up Apple, but seemed content to rest on their laurels as far as the commercial market went.

Then Odesta came out with *Chess 7.0*, which gave *Sargon* a run for its money in competitiveness and gamely vied for shelf space at the computer store. It looked as though *Sargon* was a has-been.

So much for resting on laurels. The Spracklens went back to work and delivered up *Sargon III*, which went on sale to astounding results in November. The sales were remarkable in that no one believed that any chess program could pull big enough to make a significant dent in the Top Thirty.

Sargon III did.

Even though availability was spotty for most of the month, a problem that seems to have plagued this program from the outset, copies were flying off the shelves. Enough were sold in the stores that managed to get their hands on copies to boost *Sargon* to twenty-second on the Top Thirty, the only new program to score in November.

Not that there weren't some shakeups on the list, but other newcomers had enjoyed—or suffered through, depending on your perspective—a gestation period. Only *Sargon III* made it to the Top Thirty in a single bound.

Other programs making the bestseller list for the first time were *The Incredible Jack*, *The Quest*, and *Dollars and Sense*. *Jack* is the senior citizen of the bunch, having been around for a year and providing validation for the concept that it takes most serious software about a year to get established in the Apple market.

The program has an odd sales profile, being carried by fewer computer stores than any other program on the Top Thirty. There's tremendous polarization of view about the program, with some stores listing it as their hottest program and others deriding it as 'The Incredible Jerk.' Overall, *Jack* has been making consistent inroads in the dealer market, and that effort is now paying off at the cash register.

The Quest has been around for a couple of months as the strongest of the hi-res adventures. Not only did it rise to the Top Thirty, it also captured number one on the Adventure 5.

Dollars and Sense shows the value of a strong distributor. The program is the product of a subsidiary of Softsel, and the huge software distributorship has shown a flash of their old acumen in getting it into stores. During Softsel's early days, no distributorship was better at breaking a new product than they. It appears Softsel hasn't lost its touch.

November was generally an up month, with the entertainment software benefitting most from the increased buying. Getting no benefit from the faster sales pace was *VisiCalc*. For the first time in forty surveys, the venerable pioneer spreadsheet program missed the top five positions, falling to eleventh.

Some of that can be traced to heightened interest in entertainment

Apple III

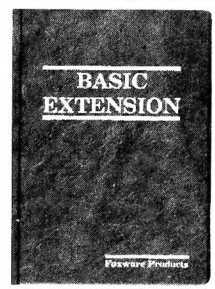
This Month	Last Month	
1.	6.	**The Catalyst**, Tim Gill, Quark
	1.	**Apple Writer III**, Paul Lutus, Apple Computer
3.	3.	**Word Juggler**, Tim Gill, Quark
	2.	**VisiCalc: Advanced Version**, Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
5.	—	**PFS:File**, John Page and D.D. Roberts, Software Publishing Corporation
6.	—	**PFS:Report**, John Page, Software Publishing Corporation
7.	5.	**Quick File III**, Rupert Lissner, Apple Computer
8.	4.	**VisiCalc III**, Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
9.	10.	**Apple III Pascal**, Apple Computer
	—	**Apple Speller III**, Apple Computer

Arcade 10

This Month	Last Month	
1.	1.	**Lode Runner**, Doug Smith, Broderbund Software
2.	2.	**Zaxxon**, John Garcia, Datasoft
3.	3.	**Choplifter**, Dan Gorlin, Broderbund Software
4.	4.	**Miner 2049er**, Mike Livesay and Bill Hogue, Micro Fun
5.	7.	**Frogger**, Olaf Lubeck, Sierra On-Line
6.	5.	**Pinball Construction Set**, Bill Budge, Electronic Arts
7.	9.	**Hard Hat Mack**, Michael Abbot and Matthew Alexander, Electronic Arts
8.	8.	**Spare Change**, Dan and Mike Zeller, Broderbund Software
9.	—	**Pac-Man**, AtariSoft
10.	5.	**Beagle Bag**, Bert Kersey, Beagle Bros

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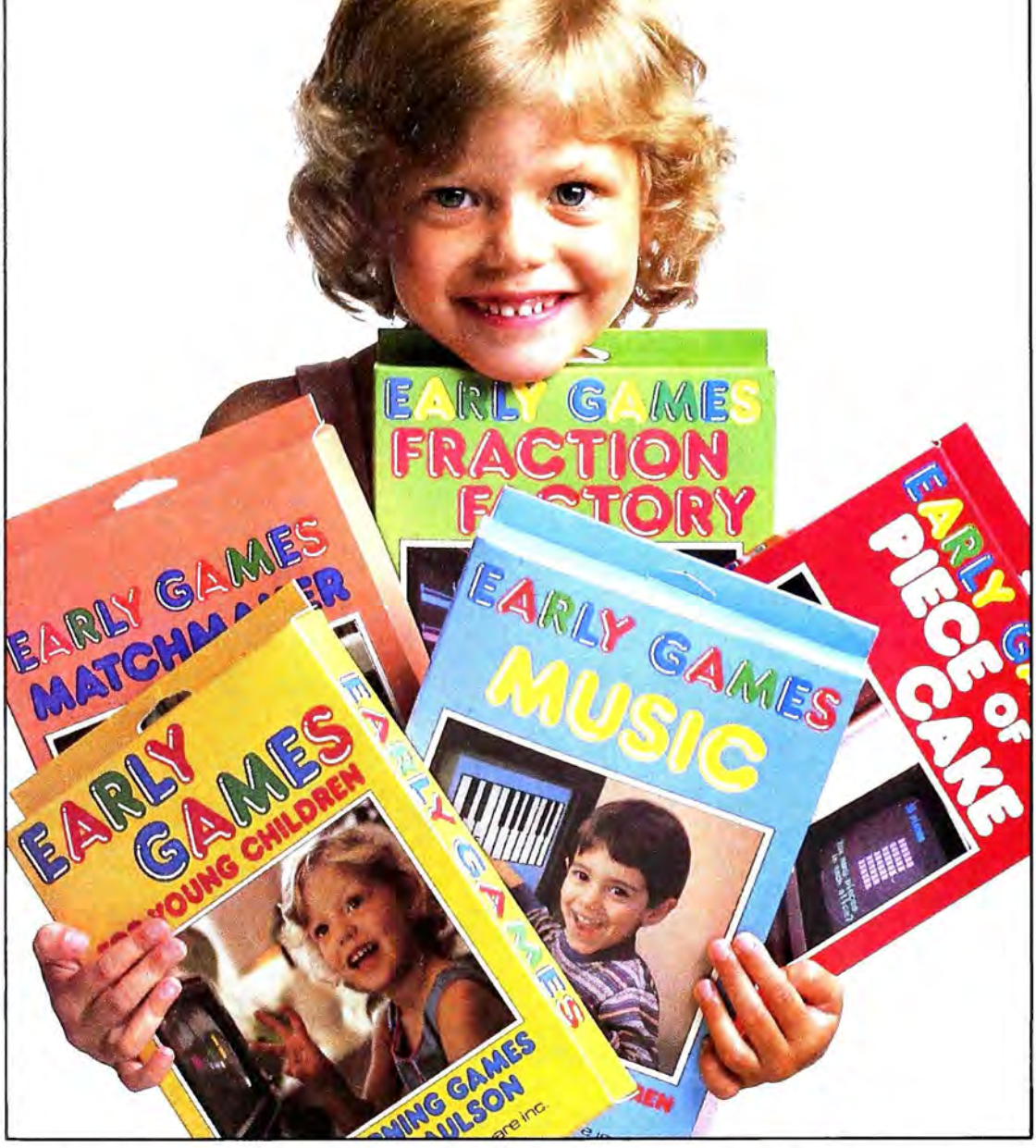
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software as Christmas was approaching. Some falloff can be attributed to stepped-up competition, although *VisiCalc* is still well ahead of *Multiplan* in the Apple market. Probably most important is the changing profile of new Apple owners. They seem more directed toward word processing than toward number crunching, as evidenced by four of the top five programs leaning in that direction.

There were only four favored suppliers in the Apple III market. Quark, Software Publishing Corporation, VisiCorp, and Apple took all ten positions. Quark's *Catalyst* tied for first with *Apple Writer III*; and Quark's *Word Juggler* tied with VisiCorp's *VisiCalc: Advanced Version* for third.

The four leading arcade games maintained their positions, but lower down there were a couple of surprises. *Frogger* got new life and jumped to fifth on the Arcade 10 list as well as edging into the Top Thirty. Atari-Soft's *Pac-Man* moved into ninth on the Arcade 10 in its first month of distribution.

The Quest led the Adventure 5, followed by four Infocom offerings: *Zork I*, *Zork II*, *Zork III*, and *Enchanter*. *Coveted Mirror*, *Death in the Caribbean*, and *Masquerade* trailed, with four more Infocom offerings following them.

Word Processors 10

This Month	Last Month	
1.	1.	**Apple Writer IIe**, Paul Lutus, Apple Computer
2.	2.	**Bank Street Writer**, Gene Kuzmiak and the Bank Street College of Education, Broderbund Software
3.	3.	**PFS:Write**, Sam Edwards, Brad Crain, and Ed Mitchell, Software Publishing Corporation
4.	4.	**Sensible Speller**, Charles Hartley, Sensible Software
5.	7.	**Word Juggler IIe**, Tim Gill, Quark
6.	6.	**WordStar**, MicroPro
	9.	**Word Handler**, Leonard Elekman, Silicon Valley Systems
8.	5.	**Magic Window II**, Bill Depew, Artsci
9.	8.	**Format-II**, G.K. Beckmann and M.A.R. Hardwick, Kensington Software
10.	—	**Homeword**, Ken Williams and Jeff Stephenson, Sierra On-Line

Home Education 10

This Month	Last Month	
1.	1.	**MasterType**, Bruce Zweig/Lightning Software, Scarborough Systems
2.	3.	**Apple Logo**, Logo Computer Systems, Apple Computer
3.	2.	**Typing Tutor**, Dick Ainsworth, Al Baker, and Image Producers, Microsoft
4.	5.	**Early Games for Young Children**, John Paulson, Counterpoint Software
	4.	**Computer SAT**, Harcourt Brace Jovanovich
6.	—	**Facemaker**, DesignWare, Spinnaker Software
7.	7.	**Delta Drawing**, Computer Access Corporation, Spinnaker Software
8.	—	**Type Attack**, Jim Hauser and Ernie Brock, Sirius Software
9.	6.	**Rocky's Boots**, Warren Robinett and Leslie Grimm, The Learning Company
10.	8.	**In Search of the Most Amazing Thing**, Tom Snyder, Spinnaker Software

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Sargon III took over the lead from *Flight Simulator* among Strategy 5 contenders. The new face was *Eagles*, which soared to fourth.

There were shakeups in order among the Fantasy 5, but the same five programs were represented. *Wizardry* grabbed the top spot as well as fourth on the Top Thirty. Sir-tech's standard seems to be benefitting from the release of the third in the series—*Legacy of Llylgamyn*. *Legacy* dropped from first to second among fantasy entries and dropped from seventh to eighth on the Top Thirty.

Exodus: Ultima III held third on the fantasy rolls but moved up to ninth on the Top Thirty. Sir-tech's *Knight of Diamonds* was fourth and *Ultima II* was fifth. Both made it into the lower ranks of the Top Thirty as well. Hovering nearby was Electronic Arts's *Standing Stones*, which looks ready to join the Fantasy 5 if any of the other programs falter. *Stones*'s showing would have made any Fantasy 5 list before this one for the past twelve months.

As noted previously, word processing seems to be high on the list of new Apple owners' applications. *Apple Writer IIe*, *Bank Street Writer*, and *PFS:Write* ran one-two-five in the Top Thirty and topped the Word Processor 10 list. *PFS:Write* has come on like gangbusters in the three months that it's been available. It was mostly just minor shuffling of positions the rest of the way, except for the tenth spot, where Sierra On-

Adventure 5

This Month	Last Month	
1.	2.	**The Quest**, Dallas Snell, Joe Toler, and Joel Ellis Rea, Penguin Software
2.	1.	**Zork I**, Infocom
3.	—	**Zork II**, Infocom
4.	—	**Zork III**, Infocom
5.	3.	**Enchanter**, Infocom

Strategy 5

This Month	Last Month	
1.	3.	**Sargon III**, Dan and Kathe Spracklen, Hayden Software
2.	1.	**Flight Simulator**, Bruce Artwick, SubLogic
3.	2.	**Castle Wolfenstein**, Silas Warner, Muse
4.	—	**Eagles**, Robert Raymond, Strategic Simulations
5.	4.	**Geopolitique 1990**, Bruce Ketchledge, Strategic Simulations

Fantasy 5

This Month	Last Month	
1.	2.	**Wizardry**, Andrew Greenberg and Robert Woodhead, Sir-tech
2.	1.	**Legacy of Llylgamyn**, Andrew Greenberg and Robert Woodhead, Sir-tech
3.	3.	**Exodus: Ultima III**, Lord British, Origin Systems
4.	4.	**Knight of Diamonds**, Andrew Greenberg and Robert Woodhead, Sir-tech
5.	5.	**Ultima II**, Lord British, Sierra On-Line

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&CHART: For programs that graph or plot data, this package will let you do in a single statement what would otherwise take an entire subroutine in BASIC. Automatically sets up screen plotting according to your own custom scaling, complete with clipping, optional logarithmic scaling and more! There are even routines to automatically split your program around the Hi-Res pages and to convert 3D data to 2D projected displays with control over rotation, perspective, etc.! **FREE SOFT-DISK** * $49.95

&SCREEN: An entire collection of text screen management routines. Includes **INPUT USING, CURSOR MOUSE CONTROL, 4-WAY SCROLLING, SCREEN DUMPS** and more! Also includes the **SCREEN GENERATOR**, a special utility to design text screens with a minimum of effort. The completed screen is entirely executed in one ampersand (&) statement, whether input or output! $49.95

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Line's new home word processor, *Homeword*, made an appearance in its first month of release.

The education market continues to be the leader in overall activity. There were no major changes in the list. Newcomers were *Facemaker* and *Type Attack*, both rejoining the list. Training and education software show no signs of wavering, even during the Christmas buying of entertainment programs.

Business 10

This Month	Last Month	
1.	1.	**PFS:File**, John Page and D.D. Roberts, Software Publishing Corporation
2.	2.	**VisiCalc**, Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
3.	3.	**Quick File IIe**, Rupert Lissner, Apple Computer
4.	4.	**Multiplan**, Microsoft
5.	7.	**The Incredible Jack**, Business Solutions
6.	5.	**PFS:Report**, John Page, Software Publishing Corporation
7.	6.	**PFS:Graph**, Bessie Chin and Stephen Hill, Software Publishing Corporation
8.	9.	**BPI General Ledger**, John Moss and Ken Debower, Apple Computer
9.	—	**General Ledger**, George Shackelford, State of the Art
10.	8.	**dBase II**, Wayne Ratliff, Ashton-Tate

Hobby 10

This Month	Last Month	
1.	2.	**Apple Mechanic**, Bert Kersey, Beagle Bros
2.	1.	**Beagle Basic**, Mark Simonsen, Beagle Bros
3.	6.	**DOS Boss**, Bert Kersey and Jack Cassidy, Beagle Bros
4.	5.	**Pronto DOS**, Tom Weishaar, Beagle Bros
5.	10.	**Graphics Magician**, Chris Jochumson, David Lubar, and Mark Pelczarski, Penguin Software
6.	7.	**Zoom Grafix**, Dav Holle, Phoenix Software
7.	3.	**Double-Take**, Mark Simonsen, Beagle Bros
8.	—	**Copy II Plus**, Central Point Software
9.	7.	**Utility City**, Bert Kersey, Beagle Bros
10.	—	**Merlin**, Glen Bredon, Southwestern Data Systems

Home 10

This Month	Last Month	
1.	1.	**Home Accountant**, Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
2.	5.	**Dollars and Sense**, Frank E. Mullin, Monogram
3.	2.	**Music Construction Set**, Will Harvey, Electronic Arts
4.	3.	**ASCII Express: The Professional**, Bill Blue and Mark Robbins, Southwestern Data Systems
5.	10.	**Micro Cookbook**, Brian E. Skiba, Virtual Combinatics
6.	4.	**Crossword Magic**, Steve and Larry Sherman, L&S Computerware
7.	7.	**Hayes Terminal Program**, Hayes Microcomputer Products
8.	—	**Crosstalk**, Microstuf
9.	—	**Data Capture 4.0**, George McClellan and David Hughes, Southeastern Software
	—	**Transend 1**, Tim Dygert and Bob Kniskern, Transend Corporation

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Although some information in *Understanding the Apple II*, including that on disk controller operation, applies to the Apple IIe, this book primarily describes Apple II computers sold prior to 1983. A companion text, *Understanding the Apple IIe*, will be available the first quarter of 1984.

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Softalk Presents The Bestsellers

Very little changed in the Business 10. *The Incredible Jack* moved up to fifth behind the four pacesetters that held their positions. The only newcomer to the list was *General Ledger* from State of the Art, returning to the Business 10 after some months just outside the list.

The hobby market remains the almost exclusive domain of Beagle Bros. Six Beagle programs made the Hobby 10 list and six more were in the first eight following the top ten. *Apple Mechanic* pushed past *Beagle Basic* to the top spot.

Two programs that have been near the Hobby 10 without ever cracking the list finally made it in November. *Copy II Plus* got eighth and *Merlin*, the assembler from Southwestern Data Systems, nabbed tenth.

In the home market, *Home Accountant* is outselling *Dollars and Sense* by a three to one margin, but looks to be facing a serious challenge for the first time in recent months. *Music Construction Set* dropped to third, but the combination of it and the Mockingboard were making beautiful music for computer stores everywhere. *ASCII Express: The Professional* slipped to fourth.

Apple-franchised retail stores representing approximately 8.27 percent of all sales of Apple and Apple-related products volunteered to participate in the poll.

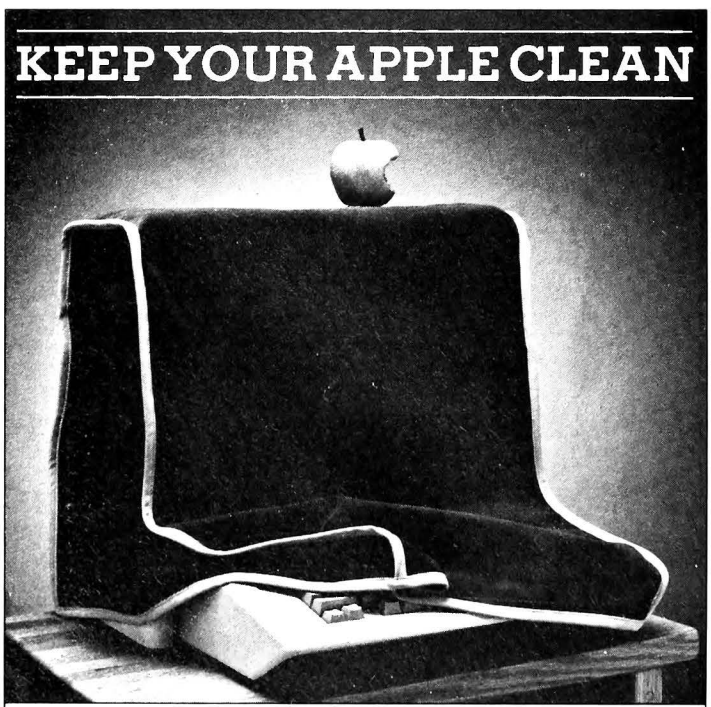
Respondents were contacted early in December to ascertain their sales for the month of November.

The only criterion for inclusion on the list was the number of units sold—such other criteria as quality of product, profitability to the computer store, and personal preferences of the individual respondents were not considered.

Respondents in December represented every geographical area of the continental United States.

Results of the responses were tabulated using a formula that resulted in the index number to the left of the program name in the Top Thirty listing. The index number is an arbitrary measure of relative strength of the programs listed. Index numbers are correlative only to the month in which they are printed; readers cannot assume that an index rating of 50 in one month represents equivalent sales to an index number of 50 in another month.

Probability of statistical error is plus or minus 2.72 percent, which translates roughly into the theoretical possibility of a change of 3.01 points, plus or minus, in any index number.



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☐	☐	10.00 dual disc drive				
☐	☐	8.00 single disc drive				

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☐ Check ☐ Money Order Address _____
Card # ___ Expiration Date ___ City, State, Zip _____

The Top Thirty

This Month	Last Month	Index	
1.	1.	177.36	**Apple Writer IIe**, Paul Lutus, Apple Computer
2.	2.	97.87	**Bank Street Writer**, Gene Kuzmiak and the Bank Street College of Education, Broderbund Software
3.	5.	83.63	**MasterType**, Bruce Zweig/Lightning Software, Scarborough Systems
4.	12.	81.82	**Wizardry**, Andrew Greenberg and Robert Woodhead, Sir-tech
5.	16.	80.52	**PFS:Write**, Sam Edwards, Brad Crain, and Ed Mitchell, Software Publishing Corporation
6.	9.	76.90	**Lode Runner**, Doug Smith, Broderbund Software
7.	3.	74.83	**PFS:File**, John Page and D.D. Roberts, Software Publishing Corporation
8.	7.	68.87	**Legacy of Llylgamyn**, Andrew Greenberg and Robert Woodhead, Sir-tech
9.	13.	64.47	**Exodus: Ultima III**, Lord British, Origin Systems
10.	10.	55.67	**Home Accountant**, Bob Schoenburg, Larry Grodin, and Steve Pollack, Continental Software
11.	4.	51.52	**VisiCalc**, Software Arts/Dan Bricklin and Robert Frankston, VisiCorp
12.	14.	51.00	**Zaxxon**, John Garcia, Datasoft
13.	6.	49.71	**Quick File IIe**, Rupert Lissner, Apple Computer
14.	27.	41.42	**Knight of Diamonds**, Andrew Greenberg and Robert Woodhead, Sir-tech
15.	18.	36.25	**Choplifter**, Dan Gorlin, Broderbund Software
16.	8.	35.21	**Multiplan**, Microsoft
17.	—	31.33	**The Incredible Jack**, Business Solutions
18.	17.	31.07	**Apple Logo**, Logo Computer Systems, Apple Computer
19.	15.	29.51	**Typing Tutor**, Dick Ainsworth, Al Baker, and Image Producers, Microsoft
20.	21.	28.74	**Sensible Speller**, Charles Hartley, Sensible Software
	—	28.74	**The Quest**, Dallas Snell, Joe Toler, and Joel Ellis Rea, Penguin Software
22.	—	26.92	**Sargon III**, Dan and Kathe Spracklen, Hayden Software
23.	11.	25.89	**PFS:Report**, John Page, Software Publishing Corporation
24.	28.	24.08	**Zork I**, Infocom
25.	—	22.78	**Miner 2049er**, Mike Livesay and Bill Hogue, Micro Fun
26.	—	21.23	**Ultima II**, Lord British, Sierra On-Line
27.	22.	20.71	**Early Games for Young Children**, John Paulson, Counterpoint Software
	19.	20.71	**Computer SAT**, Harcourt Brace Jovanovich
29.	—	19.67	**Frogger**, Olaf Lubeck, Sierra On-Line
30.	—	19.16	**Facemaker**, DesignWare, Spinnaker Software
	—	19.16	**Dollars and Sense**, Frank E. Mullin, Monogram

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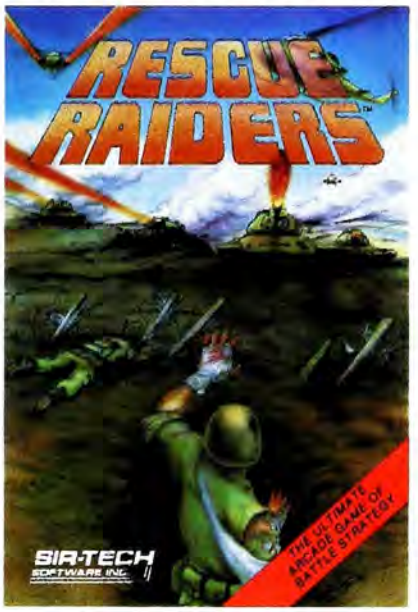
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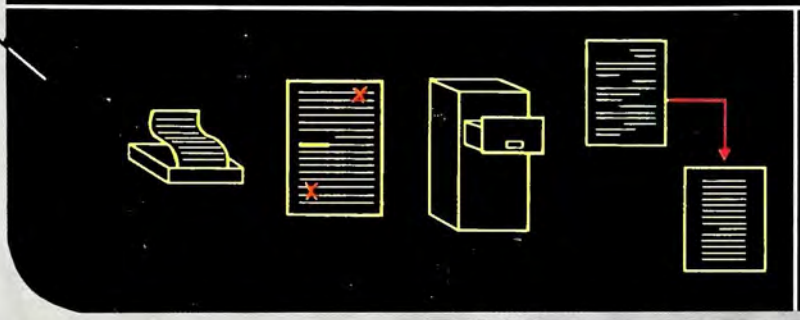
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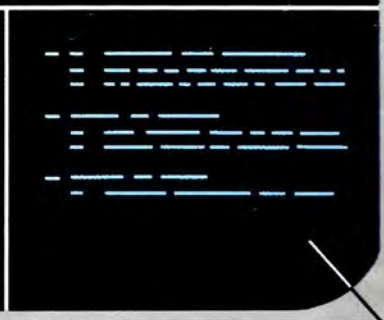
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